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Counterfactual Thinking and Entrepreneurial Self-Efficacy: The Moderating Role of Self-Esteem and Dispositional Affect

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Scholars have suggested that counterfactual thinking may play an important role in entrepreneurship; however, empirical research positioned to inform the nature of this relationship has been equivocal. In this study, we draw on the tenets of social cognition theory as a basis to investigate the relationship between counterfactual thinking and the dispositional attributes of the entrepreneur, hypothesizing concomitant influences upon the entrepreneur's self-efficacy. Based on a survey of 138 entrepreneurs, our findings suggest that the implications of counterfactual thinking for entrepreneurial self-efficacy are moderated by individual differences based in the dispositional attributes of the entrepreneur.

Introduction

“When one door closes, another opens; but we often look so long and so regretfully upon the closed door that we do not see the one which has opened for us.”

—Alexander Graham Bell

Entrepreneurship has been conceptualized as a process of envisioning the future (Haynie, Shepherd, & McMullen, 2009). Scholars have suggested that these conceptualizations of future events, outcomes, and consequences are often based in counterfactual thoughts; that is, reflections upon “what might have been” if the individual had acted differently, or if the circumstances surrounding an event or action had been different (Baron, 2000; Gilovich & Medvec, 1994; Kahneman & Lovallo, 1994; Miller & McFarland, 1986). Roese (1997) highlights that “thoughts of what might have been, may suggest paths to *what may yet be* (p. 133, emphasis added). Specifically, counterfactual thinking involves comparing actual

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events to “alternatives that are constructed ad hoc rather than retrieved from past experience” (Kahneman & Miller, 1986, p. 136). In the context of entrepreneurship—where a future-focused orientation is pervasive and opportunity discovery the goal—the role that counterfactual thinking may play in defining “what may yet be” could prove important. However, support for this proposition remains ambiguous in the context of the extant entrepreneurship research.

Implicit in some conceptualizations of the entrepreneurial process is an acknowledgment of the role that individual difference attributes may play with regard to impacting entrepreneurship-related outcomes (McMullen & Shepherd, 2006; Shane & Venkataraman, 2000; Venkataraman, 1997). Recently, Baron (2008) and others have adopted a social cognition lens to suggest that attributes of personality exert “strong effects on cognition—the processes through which information is entered into memory, processed, and retrieved for later use” (p. 328; see also Forgas, 1995; Isen, 2002). Further, cognitive psychologists adopting a social cognition lens suggest that individual differences based on such things as beliefs, attitudes, and also attributes of personality serve to bias both cognitive processing, and subsequent behavioral outcomes (Fiske & Taylor, 1991). These propositions generally suggest that entrepreneurship research should be situated in the human experience, so as to effectively consider how and why both intra- and inter-individual differences influence entrepreneurial outcomes and behaviors.

In this study, our aim is to adopt an individual-differences lens as an empirical step toward clarifying the role that counterfactual thinking may play in entrepreneurship, specifically with regard to *entrepreneurial self-efficacy*. Self-efficacy refers to the belief in one’s capabilities to organize and execute the actions required to manage prospective situations (Bandura, 1978), and has been demonstrated to be an important antecedent to entrepreneurial action (Bandura; Zhao, Seibert, & Hills, 2005). We investigate the relationship between counterfactual thinking and entrepreneurial self-efficacy across a sample of 138 entrepreneurs. We ground our theorizing and subsequent empirical tests in social cognition theory and scholarship from entrepreneurship relating counterfactual thoughts to entrepreneurial action. We build from the extant findings that frequent, intense, and unpleasant counterfactual thoughts will have a negative impact on the individual’s perceptions of entrepreneurial self-efficacy (Baron, 1997). However, we then take a step beyond extant research to explore contingency situations where the dispositional psychology of the individual may moderate the extent to which regretful thinking has a negative influence on levels of entrepreneurial self-efficacy. We suggest that this study makes three primary contributions.

First, this research represents a meaningful step toward clarifying the role of counterfactual thinking in the entrepreneurial process. Our results highlight conditions under which counterfactual thinking might benefit the entrepreneur (and by extension the venture), and also conditions under which counterfactual thinking may significantly impede action by reducing entrepreneurial self-efficacy. We suggest that both of these conditions represent contingencies driven by the dispositional psychology of the entrepreneur; that is, our findings highlight how and under what conditions counterfactual thinking might be beneficial to some and limiting to others in an entrepreneurial context. Second, this study is positioned as an empirical bridge between counterfactual thinking and dispositional affect, two constructs proposed as important to entrepreneurship (Baron, 2000, 2008). Baron (2008) suggests that the “interface between affect and cognition is both continuous and pervasive” (p. 328). In a way complementary to this suggestion, we explore how the dispositional affect of the entrepreneur might inform the relationship between counterfactual thinking and entrepreneurial self-efficacy. Our findings suggest that the more positive the affect, the more engaging in counterfactual thinking serves to

increase entrepreneurial self-efficacy. However, we also hypothesize that exactly the opposite is true for those entrepreneurs assuming a negative affect. Finally, we aim to highlight practical implications related to the development of prescriptive strategies for entrepreneurs in terms of learning from past experiences and moving forward in the face of both terminal (i.e., bankruptcy) and intermediate (i.e., not getting a loan, etc.) failures. We argue that some individuals are better suited to apply past experiences through counterfactual thoughts as a means toward developing strategies appropriate for future “entrepreneurship”—and based on our findings, we suggest prescriptions for both the pedagogy and practice of entrepreneurship.

Theoretical Development

Social Cognition

The social cognition theory (SCT) represents an approach to the study of human cognition and information processing that assumes the motivations, emotions, and other attributes of the individual impact cognition and subsequently how the individual interprets the social world (Fiske & Taylor, 1991; Showers & Cantor, 1985; Tetlock, 1990). Operario and Fiske note that contemporary research within cognitive social psychology has “abandoned a unidimensional view of social thinkers, now treating them as complicated entities who bring their own values, experiences, knowledge structures, and personal motivations to social perception and interaction” (Operario & Fiske, 1999, p. 67). Fundamental to understanding cognitive processing and outcomes, proponents of social cognition assert, is to understand the goals, emotions, and motivations of the individual actor within the context of the situation. Although we might envision abstract cognitive processes such as reasoning and the development of counterfactual thoughts as devoid of context, research has found that different forms of reasoning vary in their domain specificity (Markman & Gentner, 2001). Further, psychological research demonstrates that individual motivations influence the development and selection of cognitive strategies (Earley, Connolly, & Lee, 1989; Kahneman, 1973; Staw & Boettger, 1990), such that certain motivational states activate specific cognitive interpretations (e.g., opportunities for creating new business ventures) based on characteristics of the context (Schacter, 1996).

Specifically, a social cognition lens assumes that the attributes representative of a given situation, reflection, or social situation become more or less salient as a function of how those attributes relate to the emotions and motivations of the individual. Consider this process as akin to taking a mental snapshot, and then assigning meaning to what you see in the picture. Not all elements representative of the situation or reflection are considered equally. In effect, the SCT suggests that some individuals may be more “sensitized” than others to certain elements or characteristics of this mental picture as a function of their own emotions, motivations, and other idiosyncratic attributes. As such, *how* an individual makes sense of a given situation is, to a large extent, a function of the emotions and motivations of the perceiver. Thus, the SCT is positioned to inform our understanding of how individual differences may impact how individuals interpret, and subsequently respond to, counterfactual thoughts—specifically as a function of the dispositional attributes of the individual “thinker.”

Counterfactual Thinking

Counterfactual thinking involves comparing actual events to “alternatives that are constructed ad hoc rather than retrieved from past experience” (Kahneman & Miller,

1986, p. 136). Counterfactual thoughts represent “alternative versions of the past” where the individual compares their current circumstance to some envisioned worse (downward counterfactual), or better (upward counterfactual) outcome (Roese, 1997, pp. 133–134). The basis of the difference between upward and downward counterfactuals relates to the person’s interpretation of the situation. Individuals may use counterfactuals to learn from the past (preparative function), and also to comfort themselves and others (affective function; Johnson & Sherman, 1990; Roese, 1994). In an affective role, for example, Roese (1994) suggests that, “people can strategically use downward counterfactuals to make themselves feel better” (p. 816). Sanna, Meier, and Turley-Ames (1998, p. 267) substantiated this notion by finding evidence for counterfactual thinking as a “mood-repair strategy.” Similarly, Taylor, Wood, and Lichtman (1983) illustrate how cancer patients sometimes find solace by arguing that their illness “could have been even worse.”

In a preparative role, counterfactual thinking is central to experiential learning. Research suggests counterfactual thinking to be a logical requirement in seeking explanations of causation, posing alternatives, and estimating the value of our explanations under other conditions (Ferguson, 1997). The process of counterfactual thinking necessarily involves deconstruction of a past incident into smaller components, which serves to facilitate future-orientated sensemaking. This process effectively redefines the outcomes associated with either the antecedents or the consequences (or both) of established facts (Hoch, 1985), and as a result allows the individual to conceptualize what went wrong, what needs to be changed, or how future events can be better controlled. In addition, research suggests that some individual levels of preparedness for the future may be served by counterfactuals that help identify the schemas for future action and propel the formulation of plans necessary for success (e.g., Johnson & Sherman, 1990; Markman, Gavaniski, Sherman, & McMullen, 1993; Roese, 1994).

Theories of social comparison, which Roese (1994) suggests are the theoretical origin of the counterfactual thought, provide support for the preparative role of counterfactual thinking (Collins, 1996; Wood, 1999). Similarly, Taylor and Lobel (1989) demonstrate that people coping with negative life events find the most pertinent preparative information from comparisons with better-off people. According to Markman et al. (1993), the motivations underlying the social comparisons and counterfactual thoughts may mirror each other. Put differently, “thoughts of what might have been yield useful prescriptions for future behavior, heightening success-facilitating intentions and corresponding behaviors” (Roese, p. 815).

Counterfactual Thinking in Entrepreneurship

Given that one of the defining attributes of entrepreneurship is the notion of decision making in the face of uncertainty, scholars have suggested that counterfactual thinking may help further the entrepreneurial process because inherent in counterfactual thoughts are mechanisms through which the individual deconstructs the past to make sense of the present—in preparation for future actions and events. Thus, such cognitions are necessary antecedents to entrepreneurial action in the face of an unknowable future (Baron, 2000; Gilovich & Medvec, 1994; Kahneman & Lovallo, 1994).

However to date, research focused at the interface of counterfactual thinking and entrepreneurship has been equivocal. Some researchers suggest that entrepreneurs can remain positive about the future because they tend to focus only on current events and ignore past outcomes (Baron, 2000; Kahneman & Lovallo, 1994). Similarly, Gartner, Bird, and Starr (1992) posit that entrepreneurs maintain a certainty bias, a propensity to believe that equivocal events are certain to occur. These scholars support Baron’s (1997,

p. 82) contention that “entrepreneurs engage in counterfactual thinking about past events less frequently than others.” Other scholars, however, suggest that counterfactual thinking may have an important impact on entrepreneurial self-efficacy, actions, and outcomes (Hmieleski & Corbett, 2008; Markman, Baron, & Balkin, 2005; Zhao et al., 2005). For example, Markman, Balkin, and Baron (2002) demonstrate that inventors who start a new business tend to have higher self-efficacy related to the task, but also more intense counterfactual thoughts. In a separate study, the same authors report that entrepreneurs experience a greater number and more intense regrets, concurrently with higher levels of perseverance and self-efficacy (Markman et al.). Similarly, Gaglio (2004) relates counterfactuals to opportunity recognition, and suggests that since counterfactual thinking involves deconstructing and reconstructing scenarios, such thought processes may result in the identification of otherwise unforeseen opportunities. A study by Gaglio and Katz (2001, p. 99) substantiates this contention, suggesting that, “counterfactual thinking and mental simulations facilitate the reassessment process and may (but do not always) indicate that it is necessary to radically alter the contents or the relational dynamics of schema and the existing means-ends framework.” This process of alteration and reconstruction may suggest insights into future market opportunities.

In the end, the equivocal nature of the findings with regard to counterfactual thinking in entrepreneurship mirrors findings in other decision contexts, like parenting, education, and career choice (Roese, 1997; Roese & Olson, 1995a, 1995b; Roese & Summerville, 2005). We suggest that one source of the ambiguity with regard to the role of counterfactual thinking in the entrepreneurship literature may be the implicit assumption that all individuals “use” counterfactual thoughts in the same way; when in fact, given the prescriptions of the SCT, it is likely that the affective and emotional consequences of counterfactual comparison may be shaped by individual differences represented by dispositional attributes of the entrepreneur (Buunk, Collins, Taylor, VanYperen, & Dakof, 1990). Thus, we suggest that the ambiguity represented in the literature may hint at a more complex relationship than suggested by previous research.

Efficacy and Entrepreneurship

In this study, we represent entrepreneurial self-efficacy as an important antecedent to entrepreneurial action (Bandura, 1978; Zhao et al., 2005). Self-efficacy refers to the belief in one’s capabilities to organize and execute actions required to manage prospective situations (Bandura). Self-efficacy has been applied in contexts as diverse as education, learning, health, business, and entrepreneurship to measure not just the belief, but also the actual likelihood of taking action. Schunk and Zimmerman (1997), for example, show that when compared with students who doubt their learning capacities, those with a higher self-efficacy for particular tasks participate more readily, work harder, persist longer when they encounter difficulties, and achieve at a higher level. Such studies support Bandura’s contention that what people believe influences their motivations and actions, whether or not the belief is objectively true. Further, he argues that behavior can be predicted by self-efficacy, as it determines what people will do with their knowledge and skills. For example, Krueger and Dickson (1994) suggest that where determining behavior is concerned, an individual’s perceptions of their own skill can be more important than the objective skills themselves. Thus, the prospective entrepreneur who believes he or she can start a new business is likely to pursue this course of action whether he or she possesses the set of skills necessary to do so or not.

Along these lines, previous research in entrepreneurship has indicated that self-efficacy represents a proxy for other more “objective” measures of entrepreneurial

performance (cf. Baron, 1999, 2008; Chen, Greene, & Crick, 1998) and has indicated that it is connected to opportunity recognition (Krueger & Brazeal, 1994), career intention, and the decision to pursue an entrepreneurial career (Kickul, Gundry, Barbosa, & Whitkanack, 2009). For example, entrepreneurial self-efficacy is seen as one of the determinants of the set of potential options an individual has for action (Kickul et al.), in a way consistent with Markman et al.'s (2002) finding that inventors who possessed higher levels of self-efficacy chose to start their own ventures while those with lower levels of self-efficacy chose to work in established firms. Chen et al. provide further evidence that higher levels of entrepreneurial self-efficacy are tied to intentions to start a new venture (i.e., pursue an entrepreneurial career), strengthening the argument that scholars have made that entrepreneurial self-efficacy is an important antecedent to entrepreneurial action (Boyd & Vozikis, 1994). Further research has indicated that education and related experiences can influence individuals' levels of entrepreneurial self-efficacy and that these changes may impact entrepreneurial outcomes. For example, Segal, Borgia, and Schoenfeld (2002) found that certain educational initiatives were successful in boosting students' entrepreneurial self-efficacy by enhancing their expectations of the potential for, and possibility of, positive outcomes from entrepreneurial action.

Thus, given the equivocal nature of prior research focused on the relationship between counterfactual thoughts and entrepreneurial outcomes, as a "jumping-off" point toward teasing apart the interplay between the psychology of the individual and the impacts of counterfactual thinking, we suggest that: (1) because negative events tend to trigger more counterfactuals than positive ones (Roese & Hur, 1997), and (2) because intermediate and terminal failure characterize the entrepreneurial experience, it is likely that increases in the frequency, intensity, and unpleasantness of the counterfactual will have a negative impact on the entrepreneur's subsequent efficacy toward entrepreneurship:

Hypothesis 1: All else being equal, as the intensity, frequency, and unpleasantness of counterfactual thinking increases, entrepreneurial self-efficacy decreases.

Counterfactual Thinking and Individual Differences

Empirical evidence from entrepreneurship, considered in concert with studies from other decision contexts, suggests that counterfactual thinking can be beneficial, but may also result in inaction and paralyzing regret. As highlighted above, while prior research has focused on the implications of counterfactuals for entrepreneurship, less studied are the relationships between counterfactual thinking and individual personality attributes. Do different dispositional "types" of people use counterfactuals differently? More specifically, might the attributes of the individual differently influence the hypothesized relationship (hypothesis 1) between counterfactual thinking and entrepreneurial self-efficacy? There is implicit and explicit evidence from other disciplines to suggest that this may be the case.

For example, in an experimental study designed to investigate differences in the desirability of sticking with one's first answer on an exam, or changing the answer upon reflection, Kruger, Wirtz, and Miller (2005) show that sticking with the first answer—rather than switching—generates stronger, more salient counterfactual thoughts than does the act of changing from a wrong to a correct answer. Importantly, individuals with higher levels of self-esteem believe more strongly in the decision to change answers (or, by extension, to follow a given entrepreneurial opportunity), and will thus be less likely to be impacted by counterfactual reflections. Like self-esteem, dispositional affect is also likely to impact the content of the counterfactual generated, which Walsh and Byrne (2004) have

shown can have an important influence on the mutability of the facts under consideration. For example, an individual who chooses to leave a stable, lucrative, full-time job to pursue a given business opportunity, only to see his or her venture fail, can approach the situation by mutating the events as they occurred, or by considering the past and ascribing fault for the failure (Mandel & Lehman, 1996). Thus, while Roesse (1997) posits that counterfactual thinking is *activated* by negative affect, we suggest dispositional levels of self-esteem and affect may also impact the relationship between counterfactual thinking and subsequent outcomes. We explore both affect and self-esteem, in turn, as attributes of the entrepreneur that may serve to moderate the general hypothesis that as the intensity, frequency, and unpleasantness of counterfactual thinking increases, entrepreneurial self-efficacy decreases.

Dispositional Affect. Affect is central to the process of an individual's interaction with stimuli, and refers to the experience of feeling or emotion. It indicates an instinctual reaction to stimulation occurring before the typical cognitive processes considered necessary for the formation of a more complex emotion. Zajonc (1980) asserts that this reaction to stimuli is a primary determinant of behavior for human beings; individuals' reactions to the clues from their environment are likely to be shaped by their affective state. Individuals in positive affect are likely to receive and interpret bad news in a positive light, while those in negative affect are likely to give an unfavorable spin even to good news. Thus, affect is expected to play a critical role in the relationship between counterfactual thinking and entrepreneurial self-efficacy. As Baron (2000, p. 80) indicates, "a large body of literature suggests that . . . negative affect can, in turn, strongly color perceptions, leading individuals to view situations or events less favorably—for instance, as riskier or potentially more costly." Such findings are also consistent with a social cognition lens. Fundamental to understanding cognition, proponents of social cognition assert, is to understand the goals, emotions, and motivations of the individual actor within the context of the situation. It is impossible to separate the actor from the context, in that the actor constructs mental maps to facilitate reasoning based on inputs from the environment. Affective dispositions will influence how context is perceived and interpreted (Griffin & Ross, 1991; Schacter, 1996). At the same time, context may impact an individual's affect (Wyer & Srull, 1989). Further, high activation emotions—ones that elicit strong arousal (e.g., passion, excitement, etc.)¹—are likely to be more salient to the individual, and thus be strongly encoded into memory. Entrepreneurial regrets, given the strong psychological linkage between the entrepreneur and the venture (Haynie et al., 2009), are likely to represent high activation emotions. Ultimately, how such emotions are encoded serves as the basis for the development and employment of cognitive strategies positioned to process and make sense of a social situation or outcome, and subsequently impact behavior, judgment, and choice. As such, drawing from both extant scholarship on counterfactual thinking and also the prescriptions of social cognition theory, we expect that the frequency, intensity, and unpleasantness of counterfactual thinking will impact entrepreneurial self-efficacy such that:

Hypothesis 2: The negative relationship between counterfactual thoughts (intensity, frequency, and [un]pleasantness) and entrepreneurial self-efficacy becomes less negative as dispositional affect becomes more positive.

1. Higher and lower levels of activation, along with higher and lower levels of pleasantness, represent axes upon which a circumplex model of emotion can be constructed (cf. Feldman Barnett & Russell, 1998; Russell, 1980; Russell & Feldman Barnett, 1999).

Self-esteem. Self-esteem refers to a person's evaluation of self, and research generally suggests evidence to support the notion of chronic—or dispositional—levels of self-esteem across individuals. Becker (1971, p. 79) suggested that self-esteem refers to the feeling that “one is an object of primary value in a world of meaningful action,” implying that self-esteem is a culturally defined and perpetuated phenomenon (see also, Pyszczynski, Greenberg, Solomon, Arndt, & Schimel, 2004).

Extant research suggests a positive relationship between counterfactual thinking and self-esteem. For example, in a study focused on regret related to past inaction, Feeney and coauthors found that regret was confined to those with a high level of self-esteem (Feeney, Gardiner, Johnston, Jones, & McEvoy, 2005); that is, those with high self-esteem regretted inaction as they would have missed opportunities. Sociometer theory has suggested that self-esteem acts as a sort of gauge that indicates for us the relative quality of our interpersonal relationships (Leary, 1999; Leary & Downs, 1995). The prehistoric, prelinguistic need for humans to exist in groups led to the development of self-esteem as a tool for internalizing others' reactions to our actions, allowing for adjustment of individuals' behavior. In other words, esteem provides ongoing feedback regarding an individual's relational value (as compared to others), suggesting self-esteem as a gauge of the degree to which an individual is socially accepted or rejected (Leary). Pyszczynski and coauthors (2004) focus on self-esteem as a “shielding” mechanism through the lens of terror management theory, demonstrating that self-esteem functions to mitigate fears of one's mortality; higher self-esteem serves to reduce fear and anxiety related to death.

The research cited here—while grounded in disparate domains and theoretical frameworks—illustrates how self-esteem impacts the manner in which the individual interprets and subsequently behaves in the context of a social environment. By definition, counterfactual thinking is the process of decomposing and reconstructing past events; as such, counterfactual reflections represent opportunities to expose the individual to mental “replays” of significant past events. The subsequent impact of these reflections on future attitudes, beliefs, and behaviors is likely to be defined—in part—by the self-esteem of the individual. For example, just as high self-esteem may lessen the impacts of fear related to death (Pyszczynski et al., 2004), in the same way levels of self-esteem are likely to moderate effects of fear of failure (mortality) of the entrepreneurial venture or a missed opportunity—common regrets of entrepreneurs. Thus, we propose that self-esteem will moderate the relationship between regret and entrepreneurial self-efficacy such that:

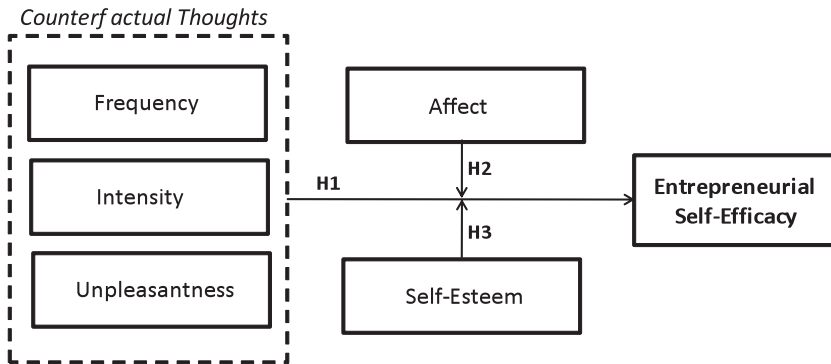
Hypothesis 3: The negative relationship between counterfactual thoughts (intensity, frequency, and [un]pleasantness) and entrepreneurial self-efficacy becomes less negative as levels of dispositional self-esteem increase.

The relationships proposed above are conceptually summarized in Figure 1.

Ultimately, we believe that incorporating attributes of the individual (in our case dispositional levels of self-esteem and affect) into our analysis opens the door to more precisely addressing important questions that have remained unanswered in the context of counterfactual thinking and entrepreneurship. The conceptual model represented here, consistent with our theoretical development, represents the influences of affect and self-esteem as moderating the relationship between counterfactual thoughts and entrepreneurial self-efficacy; that is, assuming that the entrepreneur engages in counterfactual thinking, we investigate how dispositional affect and self-esteem might influence what we propose to be an otherwise negative relationship between counterfactuals and entrepreneurial self-efficacy. We acknowledge that attributes of personality—such as affect and

Figure 1

Conceptual Model



self-esteem—might also influence the likelihood that an individual may engage in counterfactual thinking; however, this question is beyond the scope of our theorizing and empirical design. Put simply, our purpose is to test, given the nature of counterfactual thoughts in terms of frequency, intensity, and unpleasantness, (1) what are the influences on entrepreneurial self-efficacy, and (2) how are those influences impacted by personality attributes of the individual doing the “thinking.” To this end, in what follows we present our sample, research design, methods, and detail our findings.

Method

Research Design and Sample

Participants in the study include entrepreneurs identified through their association with a sample of business incubators from across the United States. We employed a two-stage random sampling technique. In the first stage, 20 incubators were randomly selected from a directory of business incubators. In the second stage, 240 entrepreneurs were randomly selected from mailing lists provided by the incubators, and asked to complete our survey instrument online. These mailing lists included past clients of the incubators (entrepreneurs whose ventures “graduated” from the incubator), as well as current clients of the incubator. Of those surveyed, 138 entrepreneurs completed the instrument (57.5% response rate). Both the sample size and the response rate are comparable to—or exceed—previous studies focused on the interface of counterfactual thinking and entrepreneurship. We attribute our high response rate to our adherence to the suggestions of Dillman (2000), which are purported to encourage high levels of participation in research programs; these suggestions include personalized correspondence and multiple follow-up contacts.

Of the entrepreneurs represented in our sample, 94 were male and 44 female, with an average age of 40.96 years. On average, the entrepreneurs surveyed had founded 2.36 ventures (standard deviation [SD] = 1.39). Forty-six of the entrepreneurs had graduated from business schools (33.3%), and another 41 (29.7%) with university-level degrees in science and engineering. Importantly, the entrepreneurs represented in our sample were engaged in the day-to-day operations of their ventures, and reported spending an average

of 51.17 hours (SD = 10.82) per week actively managing their ventures. All respondents represented ventures that were, at the time of their participation in this study, producing and selling some product or service.

Variables and Measures

Entrepreneurial Self-Efficacy. The dependent variable in this study is entrepreneurial self-efficacy. To capture entrepreneurial self-efficacy, we administered a measure developed by Zhao et al. (2005). This scale is grounded in past research on self-efficacy in entrepreneurship (e.g., Chen et al., 1998; Markman et al., 2002, 2005), and consists of items that direct entrepreneurs to rate their confidence in “successfully identifying new business opportunities, creating new products, thinking creatively, and commercializing an idea or new development” (Zhao et al., p. 1268). The instrument is scored on a 1 (no confidence) to 5 (complete confidence)-point Likert scale, and makes a holistic assessment of entrepreneurial self-efficacy (Zhao et al.). The Cronbach’s alpha for the entrepreneurial self-efficacy scale in this research was 0.83.

Counterfactual Thinking. Counterfactual thinking, our independent variable of primary interest, was captured following a design adapted from Baron (1999) and Markman et al. (2002, 2005). As in these prior studies, each respondent was asked to list three regrets that were specifically related to their role as an entrepreneur. Then, the entrepreneur was asked to indicate the frequency, intensity, and unpleasantness of each of those reflections on a 7-point Likert scale. Frequency refers to how often the entrepreneur reflects on his/her regrets, and constructs counterfactual scenarios (from never, to all the time). Intensity refers to the depth of feeling with which they reflect on these scenarios. Unpleasantness captures how agreeable (or not) the entrepreneur finds reflecting on these scenarios. This data was captured for each of the three regrets reported by the entrepreneurs. We include examples of the regrets cited by our sample in Appendix 1.

While prior research on counterfactual thinking has demonstrated that the frequency of regret, intensity, and unpleasantness of the counterfactual thought impacts entrepreneurial self-efficacy (Baron, 1999; Markman & Miller, 2006; Markman et al., 2002, 2005), this literature does not necessarily suggest a clear and consistent path forward for scholars with regard to the role that these dimensions *together* play in informing the construct of counterfactual thinking; that is, prior studies do not make a clear theoretical case for the appropriateness of whether to use these three subdimensions together as a composite scale, to use them individually as separate scales, or to combine some dimensions and not others. For example, Markman et al. (2002) asked only that entrepreneurs indicate how many regrets they had, and how they experienced those regrets. Baron, on the other hand, asked the entrepreneurs to rate three regrets on all of the three subdimensions (as we did here), but in turn tested frequency of regret as an independent construct, while choosing to combine intensity and unpleasantness. Baron implies that the robustness of the counterfactual thought is improved when the entrepreneur is directed to consider each of the three dimensions, but says little by way of theoretical or empirical reasoning to explain why frequency of regret was represented independently in the model, while intensity and unpleasantness were combined as a single construct.

Like Baron (1999), we believe that it is important to make the entrepreneurs specifically think through all three subdimensions to get a robust measure of the true nature of counterfactual thinking. However, unlike Baron, we decided to construct a composite counterfactual thinking measure by computing the average score for each dimension of

the three counterfactual reflections (frequency, intensity, and unpleasantness), and then collapsing the three responses (three regrets) per entrepreneur into a single score.² We chose this path for both theoretical and empirical reasons. Theoretically, prior research (e.g., Baron) suggests that whether entrepreneurs think often and not so intensely about only a few unpleasant regrets, or less often but more intensely about many regrets, the consequences of such regretful thinking on outcomes and behaviors are similar. As such, there does not appear to be a theoretical reason to consider each dimension separately given our research motivation and hypotheses. Empirically, factor analysis (detailed in our results) revealed that the three dimensions that describe the regretful thoughts loaded together on a single factor and worked in the same direction to inform the impact of the regretful thought. We also conducted an analysis of reliability on the combined scale, and the Cronbach's alpha for the counterfactual thought scale was 0.87.³

Affect. Recent research indicates that positive and negative affect are distinct concepts that are negatively related, with very low to negligible correlation between the two (Crawford & Henry, 2004; Watson, Clark, & Tellegen, 1988). This stream of research advocates using separate scales to capture positive and negative affect. Further, research also indicates that affective scales when used with "short-term instructions (e.g., right now or today) are sensitive to fluctuations in mood," but exhibit trait-like stability when used with longer term instructions (Watson et al., p. 1069). We adopted both of these recommendations into the design of this study. In our study, we use the methodology suggested by Watson et al., and employed two separate scales each with 10 items (the Positive Affect Negative Affect Schedule, or PANAS) to measure positive and negative affect, respectively. Further, we directed respondents to adopt a "long-term" orientation when completing the inventory in an effort to capture affect as trait-stable, consistent with the recommendations of Watson et al. Scale items designed to capture positive affect included questions focused on whether or not the respondent felt particularly excited or interested in something, proud of their accomplishments, "on top of the world," etc. Similarly, negative affect was measured by items that addressed feelings of boredom and loneliness, feeling "disconnected" from other people, feeling depressed or unhappy, being upset at criticism, etc. The Cronbach's alphas indicating the reliability of the positive and negative affect scales were 0.84 and 0.74, respectively.

Self-Esteem. Self-esteem refers to a person's overall appraisal of his or her own worth. Self-esteem is generally regarded as an enduring personality characteristic, shaped by our experiences over a lifetime. Rosenberg (1965) and social learning theorists have shown that given its stable nature, it is measurable by self-report questionnaires. Given its long history of reliability and validation, we use Rosenberg's scale to measure self-esteem. The questions on this scale ask respondents to rate their level of agreement (on a 7-point Likert scale) to questions such as "I feel that I am a person of worth," "I feel that I have a number

2. Each member of the author team independently coded each counterfactual reported by the respondents, based on a hypothetical "exemplar" of both an upward and downward counterfactual statement. As to be expected based on prior research, the overwhelming majority (98%) of the counterfactuals reported by our sample were categorized as upward counterfactuals, and thus, only these upward counterfactual thoughts were included in our analysis.

3. For added rigor, we conducted a sensitivity analysis to determine whether creating a composite counterfactual thinking index (as opposed to including each variable separately in our model) would meaningfully impact our results. The results of this analysis demonstrated that the results were substantively the same using either approach.

of good qualities,” and “I am able to do things as well as most other people.” Unlike self-efficacy, which relates to a person’s belief in his ability to do a particular task (e.g., write, take an exam, ride a bicycle, etc.), self-esteem measures a person’s global belief in him/herself (Bandura, 1989, 1997; Rosenberg; Schworer, May, Hollensbe, & Mencl, 2005; Wilson, Kickul, & Marlino, 2007).⁴ The Cronbach’s alpha for the self-esteem scale in this research was 0.87.

Control Variables. Consistent with previous research in entrepreneurship (Chen et al., 1998; Forbes, 2005; Markman et al., 2002, 2005; Wilson et al., 2007), we control for both the gender and age of the entrepreneur because previous research has highlighted perceptible differences in the levels of self-efficacy among these categories of entrepreneurs. Additionally, we also control for *both* the number of ventures that the entrepreneur has founded (either as sole founder or as a team) and his status as sole founder or team member in their venture. We suggest this control is important in the context of this study, because we posit that working in a team may create a support structure that blunts the impact of counterfactual thinking. We control for the number of hours devoted to the business to control for levels of entrepreneurial involvement in and commitment to their venture.⁵

Instrumental Variables. The psychometric nature of both our independent and dependent variables suggests the possibility of conjoint influences, and as such, we follow the recommendations of Hausman (2001) and employ instrumental variables regression (IVR) in our final model to test the robustness of our findings. We use Neugarten, Havighurst, and Tobin’s (1961) Life Satisfaction Index (LSI) scale and Zung’s (1972) depression scale as instruments in the IVR analysis. These scales form part and parcel of Ryff’s (1989) psychological well-being scale, which again has been shown to be valid and reliable in past research (e.g., Seifert, 2005). Thus, their use together as instrumental variables is a matter of common practice. The Cronbach’s alphas were 0.70 and 0.67 for the life satisfaction and depression scales, respectively.

Results

We employed hierarchical regression and ordinary least squares regression to test our hypotheses. As detailed above, while we captured three measures related to each counterfactual scenario, analysis of the data employing the principal component factoring method suggested a single, underlying dimension for each counterfactual scenario; specifically, our analysis (at the level of the individual regret) clearly demonstrated that frequency, intensity, and unpleasantness together loaded on a single factor, explaining 92% of the variance in the model. An examination of the resulting Scree plot confirmed this finding. The “goodness-of-fit” of a factor model is assessed by comparing the observed covariance with the covariance predicted by the model, and large discrepancies between the observed and predicted covariance may indicate poor model fit. The algorithm used to estimate the parameters in the model minimizes a chi-square statistic that compares the observed and predicted covariance. For our results, we found the goodness-of-fit test to be significant ($p < 0.001$), and therefore, we have no basis to reject

4. We used alpha and confirmatory factor analyses to confirm that self-esteem and self-efficacy are in fact distinct constructs.

5. In our sensitivity analysis, we also run our model without any of these control variables, and our results essentially remain the same.

the null hypotheses that the discrepancy between the observed and predicted covariance is equal to zero. Means and correlations are reported in Table 1. Shapiro–Wilk analysis of the responses for each scale suggests a normal distribution.

Tests of our hypothesized relationships are reported as a series of three regression models, presented in Table 2. Model 1 presents the regression of counterfactual thinking and our control variables on entrepreneurial self-efficacy, and provides support for hypothesis 1. This finding is consistent with prior research; however, it is important to highlight that this finding is noteworthy in the face of novel controls employed in this study—controls that have been suggested (but not employed) by past studies (e.g., Baron, 1999; Markman et al., 2002, 2005).⁶ Our findings indicate that as counterfactual thinking increases (becomes more frequent, intense, and/or unpleasant), entrepreneurial self-efficacy decreases ($B = -0.13$; $p < 0.05$). It is also noteworthy that experience in founding ventures is significant in this model, and this represents a potentially interesting area for future research.

Model 2 represents the complete main-effects model, and includes self-esteem and both positive and negative affect as explanatory variables. While not hypothesized, all three variables are statistically significant predictors of entrepreneurial self-efficacy, such that moving from low to high positive affect ($B = 0.18$; $p < 0.01$) is positively related to changes in entrepreneurial self-efficacy, and moving from low to high negative affect ($B = -0.21$; $p < 0.05$) is negatively related to changes in entrepreneurial self-efficacy. Similarly, moving from low to high self-esteem ($B = 0.31$, $p < 0.01$) is positively related to changes in entrepreneurial self-efficacy.

Model 3—the full model—represents the hypothesized contingent relationships (hypothesis 2 and 3) between counterfactual thinking and levels of self-esteem and affect. All three interactions (CFT and positive affect [$B = 0.39$; $p < .01$]; CFT and negative affect [$B = -0.34$, $p < 0.05$]; CFT and self-esteem [$B = 0.32$, $p < 0.01$]) were significant. To aid in the interpretation, these interactions are plotted in Figures 2 (positive affect), 3 (negative affect), and 4 (self-esteem). High and low levels of affect and self-esteem are plotted in relation to a y -axis of self-efficacy (the dependent variable), and an x -axis representing counterfactual thinking. Following the recommendations of Cohen and Cohen (1983) and Aiken and West (1991), high and low levels of the independent and moderator variables are defined as one SD above and below the mean. Furthermore, Aiken and West recommend the use of unstandardized, but centered, variables. They suggest that the uncentered solutions are prone to severe multicollinearity that may result in “dramatically different results” in regressions examining interactions. In contrast, use of centered solutions, which involve additive transformation of variables by subtracting the mean from the observed values, addresses the problem of multicollinearity while returning identical slopes, standard errors, and t -test results. Thus, this approach has both methodological rigor and ease of interpretability, and therefore we follow these guidelines in our interaction plots. Further, we conducted *post hoc* t -test analysis to test whether the slopes of the lines indicated in the interaction plots were different from zero. Here, t is equal to the simple slope divided by its standard error, with $(n - k - 1)$ degrees of freedom, where n is the sample size, and k is the number of predictors including the interaction term.

Specifically, Figure 2 plots the significant interaction between counterfactual thinking and positive affect, Figure 3 plots the interaction between counterfactual thinking and negative affect, and Figure 4 plots the interaction between counterfactual thinking and

6. We include at least three additional controls that have not been considered in previous research: number of ventures founded, sole or team founder, and number of hours per week devoted to entrepreneurial venture.

Table 1
Descriptive Statistics and Correlations

Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10	11
1. Entrepreneurial self-efficacy	4.62	0.75											
2. Gender	0.68	0.47	0.02										
3. Age	41.04	11.34	0.06	0.07									
4. Hours at work	48.72	20.56	0.14	0.17*	0.12								
5. Individual/team	0.64	0.48	0.07	0.16*	0.02	0.18**							
6. Ventures founded	2.5	1.78	0.27***	0.14*	0.29***	0.07	0.13						
7. Counterfactual thoughts	3.46	0.66	-0.15**	0.08	-0.04	0.12	-0.05	-0.04					
8. Positive affect	4.71	0.96	0.44***	-0.11	0.02	0.07	0.10	0.15*	-0.09				
9. Negative affect	3.51	0.96	-0.24***	-0.03	-0.14	-0.04	-0.17	-0.08	0.22**	-0.11			
10. Self-esteem	4.3	0.91	0.56***	-0.06	0.01*	0.15*	0.09	0.18*	-0.03	0.49***	-0.21**		
11. Life satisfaction	4.22	0.59	0.19**	0.06	-0.09	-0.12	-0.02	0.06	0.09	0.36**	0.15*	0.12	
12. Depression	3.61	0.83	-0.05	-0.09	-0.04	-0.03	-0.16	-0.05	0.11	-0.06	0.52***	-0.02	0.14

* $p < .10$, ** $p < .05$, *** $p < .01$; $n = 136$.
SD, standard deviation.

Table 2

Regression Results

	Model 1		Model 2		Model 3	
Variables	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>
Intercept	4.2	0.27***	4.41	0.19***	4.44	0.18***
Gender	-0.06	0.14	0.08	0.11	0.08	0.11
Age	0.00	0.01	0.00	0.00	0.00	0.00
Hours at work	0.00	0.00	0.00	0.00	0.00	0.00
Individual or part of team	0.02	0.13	-0.08	0.1	-0.12	0.1
Number of ventures founded	0.11	0.04***	0.06	0.02***	0.07	0.02***
Upward counterfactual thoughts (CFT)	-0.13	0.06**	-0.07	0.06	-0.05	0.08
Positive affect (PA)			0.18	0.08**	0.26	0.06***
Negative affect (NA)			-0.21	0.1**	-0.29	0.05***
Self-esteem (EST)			0.31	0.08***	0.33	0.1***
Interactions						
PA × CFT					0.39	1.06***
NA × CFT					-0.34	0.17**
EXT × CFT					0.32	0.10***
R ²		0.1***		0.42***		0.48***
ΔR ²				0.32***		0.06***
<i>F</i>		3.04		9.37		9.5

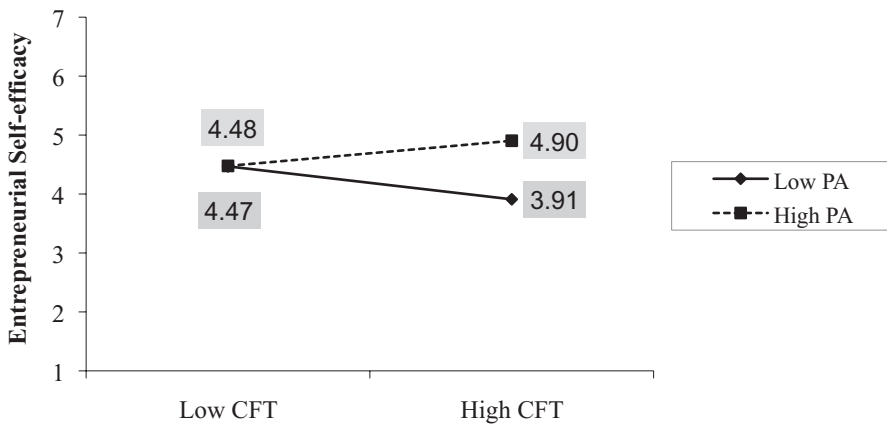
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$; $n = 136$.

Note: Unstandardized coefficients reported.

SE, standard error.

Figure 2

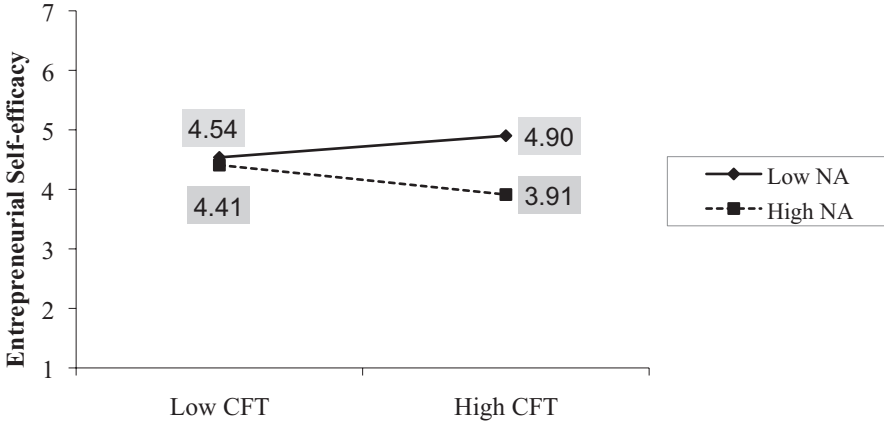
Interaction of Positive Affect and CFT on Entrepreneurial Self-Efficacy



CFT, Counterfactual thoughts; PA, Positive Affect

Figure 3

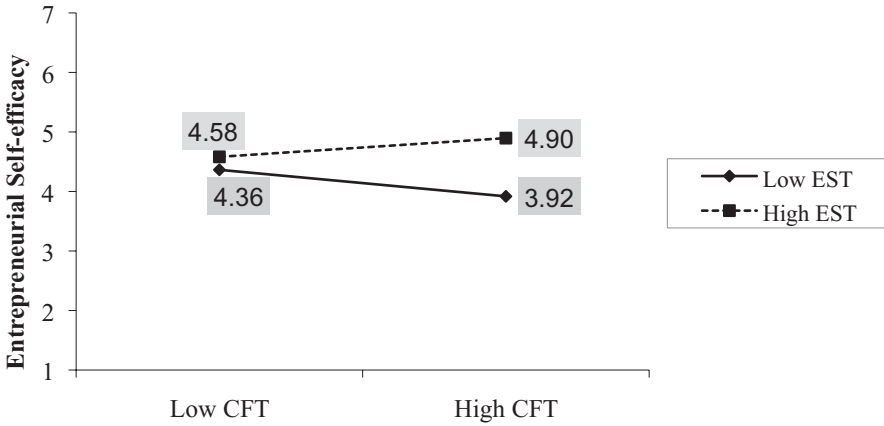
Interaction of Negative Affect and CFT on Entrepreneurial Self-Efficacy



CFT, Counterfactual thoughts; NA, Negative Affect

Figure 4

Interaction of Self-Esteem and CFT on Entrepreneurial Self-Efficacy



CFT, Counterfactual thoughts; EST, Self-Esteem

self-esteem. Figure 2 indicates that moving from low to high counterfactual thinking (left to right on the *x*-axis), the negative relationship between upward counterfactual thinking and entrepreneurial self-efficacy becomes more negative for those with low positive affect, and more positive for those with high positive affect. The *post hoc t*-test analysis of the simple slopes confirmed that both the upper and lower lines in the plot have slopes that are significantly different from zero ($p < 0.05$) and from each other ($p < 0.01$).

Figure 3 plots the significant interaction between counterfactual thinking and negative affect. As with positive affect, moving from low to high counterfactual thinking (left to right on the x -axis), the negative relationship between counterfactual thinking and entrepreneurial self-efficacy becomes more negative for those with high negative affect, and less negative for those with low negative affect. As with positive affect, *post hoc* analysis of the simple slopes confirms that both the upper and lower lines in the plot have slopes that are significantly different from zero ($p < 0.05$) and from each other ($p < 0.05$).

Finally, Figure 4 plots the significant interaction between counterfactual thinking and self-esteem. As with positive and negative affect, the plot highlights that moving from low to high counterfactual thinking (left to right on the x -axis), the positive relationship between counterfactual thinking and entrepreneurial self-efficacy becomes more positive for those with high self-esteem and less positive for those with low self-esteem. As with positive and negative affect, the *post hoc* analysis of the simple slopes confirms that both the upper and lower lines in the plot have slopes that are significantly different from zero ($p < 0.10$ for the upper line and $p < 0.05$ for the lower line) and from each other ($p < 0.05$). In fact, all three plots suggest that moving from low to high levels of counterfactual thinking actually confers benefits to those with high self-esteem, high positive affect, and low negative affect, *increasing entrepreneurial self-efficacy*.

Finally, IVR is employed in our final models to test the robustness of our findings given that the psychometric nature of both our independent and dependent variables suggests the possibility of endogeneity (Hausman, 2001). We use Neugarten and colleagues' (1961) LSI scale as an instrument for self-esteem and Zung's (1972) depression scale as an instrument for positive and negative affect (PANAS scale). An instrumental variable should be significantly related to the variable assumed to be endogenous, but not significantly related to the dependent variable. As noted above, these scales form part and parcel of Ryff's (1989) psychological well-being scale, which again has been shown to be valid and reliable in past research (e.g., Seifert, 2005), and their use together as instruments is a matter of common practice. Results in models 4 and 5 of Table 3 confirm that even after using instruments, the regression results detailed above remain significant.

Discussion and Conclusion

As detailed throughout this paper, previous research on counterfactual thinking in entrepreneurship has produced ambiguous and equivocal results. The findings represented by this study suggest a path forward for future research positioned to link "what might have been" with "what yet may be."

To begin, this research is the first to consider empirically the proposition that attributes of the person doing the "thinking" may influence differently the outcomes associated with counterfactual thoughts. Our findings suggest that the dispositional attributes of the individual may have important implications for the relationship between counterfactual thinking and behaviors and outcomes. This research opens the door for entrepreneurship scholars to further tease apart the complex relationship between behavior, action, and outcomes given past events and experiences. Consider that the importance of experience and prior knowledge as an antecedent to future entrepreneurship is a theme represented throughout the literature (Shane, 2000). To that end, our research suggests a danger in broad generalizations in terms of how past events are reflected in entrepreneurial outcomes, and the lens adopted in this study focuses future research toward a careful consideration of the attributes of the individual as a conduit through which those past experiences are interpreted and acted upon. While we

Table 3

IVR Regression Results

	Model 4		Model 5	
DV: Entrepreneurial self-efficacy	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>
Intercept	-1.26	1.2	-0.09	1.14
Gender	0.09	0.11	0.08	0.11
Age	0	0.01	-0.01	0.01
Hours at work	0	0	0	0
Individual or part of team	-0.18	0.15	-0.22	0.23
Number of ventures founded	0.05	0.04	0.07	0.06
Counterfactual thoughts (CFT)	-0.1	0.07	0.05	0.09
Affect (PANAS Scale)1	0.91	0.45**	0.63	0.36*
Self-esteem (EST)	1.14	0.37***	0.98	0.43**
Affect × CFT			0.23	0.06***
EST × CFT			0.12	0.05**
Adj. R ²	0.37***		0.56***	
ΔR ²			0.19***	
Wald c2			28.59	

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$; $n = 136$.

Note: Unstandardized coefficients reported.

DV, dependent variable; *SE*, standard error; PANAS, Positive Affect Negative Affect Schedule.

hypothesized a significant moderation of the negative relationship between counterfactual thinking and entrepreneurial self-efficacy as a function of levels of affect and self-esteem, our results painted a picture beyond our original theorizing; that is, it appears from our findings that in the face of high levels of affect and self-esteem, the hypothesized negative relationship between counterfactual thinking and entrepreneurial self-efficacy actually turns positive. These findings highlight some counterintuitive insights worthy of additional consideration.

Consider that Baron's recent work seems to use affect and mood state interchangeably in his discussion of mood congruence and mood-dependent memory (Baron, 2008). The foundation of Baron's logic is that "current moods strongly determine which information in a given situation is noticed and entered into memory" and that "affect also influences what specific information is retrieved from memory" (Baron, p. 330). The implication is that when experiencing an impactful event or outcome, whether the individual assumes a positive or negative affect state will influence how that event is stored in memory, or indeed whether it is stored at all. It seems as though over time, the individual's interpretation of the memory will then change depending on contemporary states of affect and on subsequent memories. Subsequent experiences will change the way in which we interpret that initial experience. It is likely that this tendency is related to the degree to which dispositional attributes such as affect and esteem endure over time. To this end, it is also important to acknowledge in future tests of the relationship between dispositional attributes and counterfactual thinking that retrospective bias plays a central role in counterfactual thinking—as by definition, all counterfactual thoughts are retrospective. This fact has implications for study design, methodology, and also for theory.

Throughout the entrepreneurship literature, there has been substantial concern about the problem of retrospection (Gartner, 1989; Shaver & Scott, 1991). Probably the most relevant of these concerns to the study of counterfactual thinking is that retrospective

accounts (which describe counterfactual thoughts) have been shown to be influenced by a self-justification bias (Carter, Gartner, Shaver, & Gatewood, 2003). Such a bias could impact the “true nature” of the regret; for example, research has demonstrated that, over time, individuals “justify” the choices they made in the past, and thus, the influence of those choices on future actions and behaviors is lessened (Golden, 1992; Huber & Power, 1985). This aspect of retrospection highlights several implications for the study of counterfactual thinking. First, future research might ask entrepreneurs to detail regrets within a very proximal time period, as opposed to opening the door to more distal regrets. Second, this discussion highlights the opportunity to add a dimension to the counterfactual construct. In addition to frequency, intensity, and unpleasantness, future researchers might include a measure to capture the degree to which some cited regret may either influence or subsequently inform the actions, attitudes, or choices made by the entrepreneur when performing entrepreneurial tasks. Such a dimension could add to the robustness of the counterfactual thinking measure and serve as a control for the self-justification bias that is characteristic of retrospection. Additionally, affect is represented in the literature as somewhat more enduring than mood state (which tends to be described as situational), and self-esteem is represented as a more enduring disposition than affect. Given our findings, the extent to which counterfactual thinking can (or does) influence the degree to which these constructs persist over time represents another area for future research to consider.

For example, our finding that when individuals with high esteem engage in counterfactual thinking entrepreneurial self-efficacy increases, suggests that counterfactual thoughts are insufficient to undermine a strong sense of self-esteem that has developed over a lifetime. Conversely, it is still unknown whether counterfactual thoughts would be able to positively influence self-esteem in any long-term sense. Our findings raise similar questions with regard to the relationship between affect and counterfactual thinking, and highlight opportunities for both entrepreneurship and psychology scholars. It is quite possible that additional attributes of the individual (beyond affect and self-esteem) may also moderate the relationship between counterfactual thinking and entrepreneurial self-efficacy.

For example, work in entrepreneurship on how an individual’s locus of control may influence entrepreneurial outcomes and actions has demonstrated that locus of control impacts individuals’ perceptions about future actions (Lumpkin & Dess, 1986; Poon, Ainuddin, & Junit, 2006); thus, it is likely that an individual’s orientation with regard to locus of control may also moderate the relationship between counterfactual thinking and entrepreneurial self-efficacy. In the context of our findings, this suggests an important avenue for future research focused on the relationship among locus of control, counterfactual thinking, and entrepreneurial self-efficacy. Similar to the influences of affect and self-esteem, might an individual’s locus of control differently moderate how individuals interpret counterfactual thoughts in a way that impacts entrepreneurial self-efficacy? Further, how might locus of control possibly interact with dispositional attributes of personality to influence entrepreneurial self-efficacy in response to frequent, intense, and/or unpleasant counterfactual thoughts? These are all important questions that are beyond the scope of our data to address, although they represent interesting opportunities for scholars.

In addition, future research may consider the possibility of a mediating role of self-esteem and affect, with regard to the relationship between counterfactual thinking and entrepreneurial self-efficacy. While beyond the scope of our theorizing, *post hoc* analysis (Sobel test, Aroian test, Goodman test) were used to consider whether self-esteem, and positive affect and negative affect together, might mediate the relationship between counterfactual thoughts and entrepreneurial self-efficacy. These tests were equivocal;

however, future research based on more complex research designs—possibly a laboratory experiment—may further tease apart these complex relationships. Importantly, we acknowledge that failure represented by a counterfactual thought can be informative (Minniti & Bygrave, 2001) and, in some cases, can have positive impacts on individuals' learning, on the development of new attitudes towards risk, and other outcomes that may positively impact self-efficacy (cf. Newton, Khanna, & Thompson, 2008). This fact also represents a nuance related to ongoing efforts to tease apart the relationship between counterfactual thinking and self-efficacy, which should serve to motivate future research.

With regard to the teaching and practice of entrepreneurship, our findings suggest that it may be important, for example, to provide training to aspiring entrepreneurs in terms of understanding *themselves* in the context of how such an understanding may influence their interpretations of past entrepreneurial events. Further, our findings would seem to indicate that a critical mechanism of such an understanding may involve processes related to self-reflection and self-regulation on past entrepreneurial experiences, events, and endeavors. This implication from our findings motivated us to explore mechanisms positioned to promote such self-reflection and self-regulation as avenues for future research. Drawing from the extant entrepreneurship literature, we focused on the connection between our findings, metacognition, and the research on how entrepreneurs experience failure.

Entrepreneurship scholars have begun to consider the ways in which the experience of failure can be harnessed, for example, in teaching entrepreneurship students how to manage emotional reactions to failure (Shepherd, 2004). Considering the effectiveness of such techniques as error management training (Keith & Frese, 2005), we see the potential in placing entrepreneurship students in experiential learning situations in which they are set up to make mistakes and fail, and in which they learn ways of recognizing and harnessing the counterfactual thoughts that are expected to result from these situations. Practice and experience with errors and failure should cause learners to stop to consider the causes of and their reactions to these errors, including the counterfactual thoughts (Keith & Frese). In this way, the “real time” recognition of counterfactual thoughts and taking a conscious decision to follow up on them as a strategy for pursuing an opportunity can be seen as a metacognitive process.

Previous research has indicated that metacognition can be taught (Haynie & Shepherd, 2009), and that the self-awareness associated with improved metacognition can help reduce dependence on habitual, patterned behavior and biases in decision making (Sadler-Smith & Shefy, 2007). If prospective entrepreneurs can be taught to recognize counterfactual thoughts and their individual, habitual reactions to them, those with higher positive affect and higher self-esteem—who our results show should benefit from these thoughts—may be able to more effectively harness the benefit of looking back. Similarly, for those lower in positive affect or self-esteem, an improved ability to recognize both counterfactuals and habitual reactions to them, may allow them to choose a response strategy based on some other decision process (Haynie & Shepherd). This may minimize the negative effect that the counterfactual thought has: benefitting the entrepreneurial process.

Limitations

This research shares limitations with prior work focused on deconstructing the psychological and cognitive processes associated with entrepreneurial behaviors and outcomes. First, a limitation of this research is the use of primarily self-report measures. Future research might combine self-reports with additional measures of entrepreneurial self-efficacy based on, for example, “other-reports” (from peers, colleagues, etc.). Further, like Zhao et al. (2005), we acknowledge that the use of a behavioral intention measure as

a proxy for subsequent action represents a limitation of this study. Finally, by its very nature, the study of counterfactual thinking opens the door to issues related to retrospective bias. This bias may be particularly evident given that our sample represents active entrepreneurs, and prior research suggests that retrospective reconstructions of past events “are particularly likely to be biased when intervening events have modified the meaning of the initial event” (Donovan & Marlatt, 2005). This said, we suggest that such limitations are part and parcel of the challenge of investigating constructs that reside at the interface of cognition and personality. In addition, it is highly likely that additional attributes of the individual (beyond affect, self-esteem, and the control variables incorporated in our analysis) may also moderate the relationship between counterfactual thinking and entrepreneurial self-efficacy. For example, and as noted above, there has been a significant amount of work in entrepreneurship focused on how an individual’s locus of control may influence how an entrepreneur interprets entrepreneurial outcomes and actions (Begley & Boyd, 1987; Lumpkin & Dess, 1986; Poon et al., 2006; Sebora, Lee, & Sukasame, 2009). We highlight our inability to control for such possibilities as a limitation of this research.

Finally, our sample also had in common an association with business incubators, and we cite this self-selection bias as a possible limitation of this research. Arguably, this association may suggest that entrepreneurs associated with incubators might differ from the general population of entrepreneurs. For example, some of these differences might include access to the incubators’ resources (both physical space and mentorship services), support structures, and clear entrepreneurial intention. Some of these factors may influence the nature and frequency of regrets differently, as compared to entrepreneurs who did not have an association with an incubator. Future research might explore how the nature and frequency of counterfactuals for entrepreneurs associated with incubators might differ in comparison to those entrepreneurs who did not have an association with an incubator.

Conclusion

In the end, we believe that this research represents an important and meaningful step toward clarifying the role that counterfactual thinking plays in the entrepreneurial process. We empirically validate Baron’s (2008) contention that the interface between cognitions and personal attributes such as affect is ongoing and “pervasive.” Our findings highlight that some individuals are better suited to apply past experiences through counterfactual thoughts toward developing strategies for future for “entrepreneurship” in a way that illustrates prescriptions for advancing both the pedagogy and practice of entrepreneurship.

Appendix 1

Examples of Counterfactuals Reported by Study Respondents*

1. Invention—I should have considered the licensing path instead of the “do it all, earn it all” approach.
2. I sincerely thought I, (repeat “I”) could achieve everything all by myself.
3. I regret not taking up offer of friend who wants to invest in the business.
4. I regret not getting investors involved.

5. I regret relying too much on a single opportunity.
6. I should have handled potential stakeholders better.
7. I regret biting off more than I could chew, just because I wanted to be my own boss.
8. I regret exploring too many opportunities at the same time.
9. I failed to launch the idea due to a personal setback. Now I get a bit emotional when I see so many players in my space.
10. I regret that I missed a big business opportunity because of a small error by the employee.
11. I regret I didn't go for mentorship initially, because I would be further along today.
12. I dragged a larger team down in a competitive proposal, because of my lack of experience.
13. I should have done better to identify the correct partners/coworkers.
14. The execution strategy should had been more strong for the Portal Idea.

*This list is not all inclusive, but represents a sample of the regrets cited by study participants.

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