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ADHD SYMPTOMS, IMPULSIVITY AND ENTREPRENEURIAL ACTION THREE ESSAYS

Wei Yu
Syracuse University

ABSTRACT

Anecdotal evidence of successful entrepreneurs with ADHD, along with books on the strengths of ADHD individuals, has drawn people's attention towards the potential benefits of this mental disorder. Instead of viewing those individuals as inattentive, impulsive and hyperactive, the very characteristics may become assets in certain environments where creativity, quick action and experimentation are needed. Entrepreneurship represents such an environment that has been long recognized by scholars and practitioners alike. First, entrepreneurship is an uncertain journey full of obstacles, which requires potential entrepreneurs to overcome the fear and worry and resolve the uncertainty through entrepreneurial actions. Second, compared with existing organizations, entrepreneurship provides more autonomy and flexibility of job design, which may attract certain individuals who find fitting with traditional settings difficult. Third, entrepreneurship is a creative destruction process where being creative and innovative are crucial.

Recognizing the unique characteristics of the entrepreneurial environment and the potential fit with ADHD, in this dissertation I draw on Person-Environment Fit and Strategic Leadership Theory to examine why, how, and when ADHD could be related to entrepreneurship. Specifically, I focus on the ADHD symptoms (i.e., inattention, impulsivity and hyperactivity symptoms) instead of the ADHD diagnosis due to the fact that ADHD has been found to be a continuous attribute among the population. Three essays are included in this dissertation. The first essay (chapter 2) is a conceptual piece that looks at impulsivity traits in particular. Impulsivity is a key characteristic of individuals high on ADHD symptoms and by its definition very related to action under uncertainty. The paper outlines a conceptual framework and develops detailed propositions for the multifaceted influence of impulsivity on entrepreneurial action. It moves beyond entrepreneurship as a deliberate cognitive process to sufficiently account for how uncertainty influences action. The second essay (chapter 3) is an empirical one that

develop and test a model which suggests that ADHD symptoms influences entrepreneurial preference and business startup through the multifaceted trait of impulsivity. The third essay (chapter 4) directly examines the functionality of ADHD symptoms in terms of firm performance.

The three essays show the nuanced relationship between ADHD symptoms, impulsivity traits and entrepreneurship. Results suggest that ADHD symptoms are indeed related to entrepreneurship because of the potential fit of ADHD characteristics with the environmental features of entrepreneurship (*whether* question). Further, the distal psychiatric symptoms of ADHD can lead to higher entrepreneurial intention and action through the multifaceted impulsivity traits and to better firm performance through the entrepreneurially oriented strategy (*how* question). Finally, the functionality of ADHD symptoms may depend on the particular symptoms being examined, the particular traits being manifested by ADHD and the type of venture being pursued (*when* question). Generally speaking, I find that the sensation seeking tendencies of individuals high on ADHD may be most beneficial for entrepreneurship and that impulsivity and hyperactivity symptoms of ADHD are more functional than inattention symptoms. By showing that ADHD symptoms, which are commonly viewed as negative, could be assets in entrepreneurship, this dissertation indicates the uniqueness of entrepreneurship as a research field and the practical need for entrepreneurial career training programs for ADHD individuals.

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THREE ESSAYS

By

Wei Yu

B.A. University of Nottingham Ningbo China, 2011

M.S. Syracuse University, 2013

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DEDICATION

To My Mom Yifang He

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After five years of intensive training and preparing, I'm finally here at this stage writing the acknowledgements for my dissertation thesis. Looking back, I feel like these five years could be the most important period of my life, because I have not only learned a new way to look at this world through research, but also gained more understanding of who I am and who I want to be.

I would first like to thank my advisor and chairman of my committee, Dr. Johan Wiklund, for this work would not have been possible without his extensive encouragement and support. I have known Dr. Wikund for almost 7 years since I was a master's student here in Syracuse University. He was the one who first guided me on providing constructive feedbacks to students, on critically reviewing literatures, on understanding what scholarship means, and of course on how to write paper that can lead to publications. I'm so indebted to Dr. Wiklund for all the achievements I have, and I will never forget his words "You can do this" when I have difficulties and doubts about myself in this long and lonely journey. Thank you for never giving up on me.

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be curious of this world and ask abstract questions without her generous financial support. I'd like to thank my mother for all the sacrifice she made for the family.

Finally, I'd like to end with what James March (2011: 206) wrote in his "A Scholar's Quest": "But in order to sustain the temple of education, we probably need to rescue it from those deans, donors, faculty, and students who respond to incentives and calculate consequences, and restore it to those who respond to senses of themselves and their callings, who support and pursue knowledge and learning because they represent a proper life, who read books not because they are relevant to their jobs but because they are not, who do research not in order to secure their reputations or improve the world but in order to honor scholarship, and who are committed to sustaining an institution of learning as an object of beauty and an affirmation of humanity."

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CHAPTER ONE: DISSERTATION OVERVIEW

1 Background

Entrepreneurship research has long recognized the uniqueness of entrepreneurial environment compared to existing organizations. For example, entrepreneurship entails uncertainty, which is reflected in the impossibility of potential entrepreneurs to gauge and predict the outcomes of entrepreneurial action (Knight, 1921). Second, the entrepreneur's ability to creatively identify opportunities and introduce innovative product/service is crucial for entrepreneurial action and success (Schumpeter, 1934). Further, compared to working for an existing organization, being one's own boss provides more opportunities for flexible job design to fit an individual's personal needs and strengths (Haynie & Shepherd, 2011).

Due to the unique attributes of entrepreneurship, previous research has extensively examined the difference between entrepreneurs and non-entrepreneurs (e.g., managers), and found relevant entrepreneur traits such as need for achievement, self-efficacy and proactivity (Rauch & Frese, 2007). A closer examination of these literatures reveals a predominantly "positive" view of entrepreneurship. In other words, traits and characteristics found to be positive in other areas of life are also found to be positive in entrepreneurship. While it is certainly worthwhile to examine those "positive" traits, anecdotal evidence (see Archer, 2014) and emerging studies (e.g., Wiklund et al., 2016; Verheul et al., 2016) of entrepreneurs with mental disorders such as ADHD prompt us to pay greater attention to counterintuitive relationships. Is this possible that the unique entrepreneurial context calls for unique traits such as ADHD that is normally viewed as "negative" but could be assets in entrepreneurship? Being able to answer this question holds great implications not only for theory but also for practice.

Specifically, in this dissertation I focus on examining the relationship between ADHD symptoms and entrepreneurship. ADHD is short for Attentive Deficit Hyperactive Disorder. It is a neurodevelopmental disorder with behavioral symptoms of inattention, hyperactivity and impulsivity. ADHD is traditionally viewed as a diagnostic dichotomy, but a categorical view of ADHD suffers from some shortcomings such as the diagnostic difficulty for adults (Wasserstein, 2005), the remission of symptoms with age and medicine (Halmoy et al., 2009), and the evidence of the continuous nature of ADHD (Levy et al., 1997). Thus, it appears that examining ADHD as a continuous variable at the symptom level is more appropriate. Generally, ADHD has been associated with various negative outcomes in many walks of life, such as crime, drug use, academic and job underperformance, and unemployment (Anthsel, 2017; Weiss & Hechtman, 1993). However, there are anecdotal evidence of successful entrepreneurs being diagnosed with ADHD and contributing their success to ADHD. For example, David Neeleman, the founder of JetBlue Airways, argues that "My ADD brain naturally searches for better ways of doing things. With the disorganization, procrastination, inability to focus, and all the other bad things that come with ADD, there also come creativity and the ability to take risks" (The Economist, 2012). Further, research has found that ADHD symptoms and the associated impulsive behavior may have benefits in certain situations. For example, White and Shah (2006) argue that ADHD is related to a divergent thinking style which could stimulate creativity. Dickman (1990) found that impulsivity or a lack of consideration of consequences could be beneficial in a highly paced and uncertain environment. The characteristics exhibited by individuals high on ADHD and/or impulsivity thus seem to fit well with the task characteristics of entrepreneurship where quick action, experimentation and creativity are needed (Eisenhardt, 1989; Wiklund & Shepherd, 2011).

However, a blanket statement about the functionality or non-functionality of ADHD in entrepreneurship may be overly simplistic. This is because ADHD has been found to involve different clusters of symptoms including inattention and hyperactivity/impulsivity. Further, it is likely that ADHD has different implications for different stages and types of entrepreneurship, considering the complexity of entrepreneurial phenomenon. It is also more likely that individuals high on ADHD symptoms need social and network support to better capitalize on their strengths. Thus, it would appear more appropriate to investigate the following research questions: why, how and when could ADHD symptoms be related to entrepreneurship? This dissertation sets out the first step towards answering these questions.

2 Overview of Three Essays

When thinking about starting new ventures, uncertainty is one of the often mentioned attribute. Indeed, the foundational work of Knight (1921) establishes entrepreneur as someone who bears uncertainty no one else dares. However, previous work on entrepreneurial decision making pays much more attention on the deliberate cognitive process without paying sufficient attention to how uncertainty influences intention and action. For example, to act and progress under uncertainty where information is rarely available and collectible, individuals may need to look at and learn from uncertain situations differently; experimentation may be more functional than optimization (Wiklund et al., 2009); emotions may have a stronger influence on action than analysis (Baron, 2008). Highlighting uncertainty as the cornerstone of entrepreneurship, in the first paper "Impulsivity and Entrepreneurial Action" we[1] conceptually examine how impulsivity traits can be related to different stages of entrepreneurship. Impulsive behaviors are one of the key ADHD symptoms, and by the very definition, they are also closely related to action under

[1] To facilitate future publication, the three dissertation papers were developed with the help of several co-authors. Thus, hereafter, "we" is used to describe the arguments related to the three specific papers.

uncertainty (Leland, Arce, Feinstein & Paulus, 2000). Impulsivity traits are four independent dimensions of traits that can lead to impulsive behaviors. They are sensation seeking, lack of premeditation, lack of perseverance and urgency. We show conceptually that impulsivity traits are linked to different views on uncertain outcomes, different manifestations of emotions for acting under uncertainty, and different learning styles in the process of resolving uncertainty. In particular, the first paper highlights the important role of affect/emotion for individuals high on impulsivity, which is in accordance with previous literature suggesting the emotional over-reactivity and lack of deliberation of those individuals. We suggest that in highly uncertain environment such as entrepreneurship, such emotional reactivity, especially positive emotional reactivity, could be an important facilitator for action and progress. Further, the first paper suggests that sensation seeking and lack of premeditation may attract individuals to have entrepreneurial intention, to act on and persevere with their intention, but may be detrimental for effective learning from feedbacks. On the contrary, individuals high on urgency may be unwilling to start their ventures due to anxiety and worry but may learn more effectively from environmental cues.

Inspired by the first paper, the second paper "ADHD, Impulsivity and Entrepreneurship" focuses directly on examining empirically the ADHD symptoms and entrepreneurial intention/action relationship. Specifically, we use Person-Environment Fit theory and argue that ADHD symptoms could be related to entrepreneurial intention and action due to the fit between inattention and hyperactive/impulsive symptoms with the uncertain, flexible and novel entrepreneurial environment. Further, we build and test a theoretical model arguing that the influence of ADHD symptoms on entrepreneurship is mediated by the more proximal personality traits of impulsivity, thus providing a more nuanced understanding of how ADHD could be

related to entrepreneurship. We uses survey data from a sample of MBA alumni and find that ADHD symptoms can insert both positive and negative influence on entrepreneurial preference and business startup (or action), with its sensation-seeking characteristic being positive, while its urgency characteristic being negative. Our results also suggest that inattention symptoms are mostly negative for entrepreneurship but hyperactive symptoms are positive, and that hyperactive symptoms may be more beneficial for highly uncertain ventures.

The third paper moves a step further, examining empirically how ADHD symptoms could be related to firm performance beyond intention and action. Based on the survey data of entrepreneurs of the Young President Organization (YPO), we made no assumption on the direct relationship between ADHD and performance but hypothesize and find that ADHD symptoms can positively influence firm performance through Entrepreneurial Orientation (EO). Again, we find that this positive influence is mainly due to the hyperactive and impulsive symptoms, not inattention symptoms.

Overall, the three dissertation papers shed important light on why, how and when ADHD symptoms could be related to entrepreneurship. Summarizing results from the three papers, we can argue that ADHD symptoms are related to or even functional in entrepreneurship because (1) these individuals may find the uncertain and flexible environment of entrepreneurship to be attractive and fit with their personal needs; and (2) the creativity and impulsivity exhibited by those individuals could be assets in entrepreneurship because discovering opportunities and action under uncertainty are essential for entrepreneurship. With regard to how could ADHD symptoms be related to entrepreneurship, we argue and find that (1) distal ADHD symptoms could be related to entrepreneurial intention and action through more proximal personality traits of impulsivity; and (2) ADHD symptoms of entrepreneurs are related to firm performance

through the innovative, risky and proactive strategies adopted by those individuals. Finally, individuals high on ADHD may be more functional in entrepreneurship when (1) they exhibit more hyperactive/impulsive symptoms than inattention symptoms; and (2) they are in a highly uncertain new venture.

3 Intended Contributions and Future Research

By examining an unconventional personal characteristic- ADHD- and linking it to different stages of entrepreneurship, this dissertation talks to a number of streams of emergent literature in entrepreneurship. For example, research in impulsivity and ADHD is closely linked to research on emotion/affect under uncertainty (see Baron, 2008 for a review) as those individuals high on ADHD/impulsivity lack "brakes" to control their emotional reactions. Nevertheless, entrepreneurs high on ADHD/impulsivity may harness their emotional strengths. This research also complement recent interests in alternative ways of decision making in entrepreneurship (for example see Lerner, Hunt & Dimov, 2018). In addition, individuals high on ADHD/impulsivity usually suffer from anxiety, addiction and unemployment problems. To the extent entrepreneurship is a fit career for them, engaging in entrepreneurship may help alleviate their problems and increase their well-being. In other words, studying ADHD and entrepreneurship may also provide unique insights into the relationship between wellbeing and entrepreneurship (Uy, Foo & Song, 2013). Next, I'm going to articulate some of the most important contributions of this dissertation and suggest for future research.

First, I find counterintuitive relationships showing that *certain* ADHD symptoms and impulsivity traits, which have wide ranging negative implications for individuals and society, could have positive implications on entrepreneurial preference, business startup and performance. This reinforces what foundational and recent works (e.g., Schumpeter, 1934; Knight, 1921;

Kirzner, 1971; Wiklund et al., 2011) suggested, that is, the entrepreneurial environment-including the decision to become entrepreneurs and the discovery and exploitation opportunity-is distinctively different from other types of work and occupational environment, as relationships hold in other areas do not hold in entrepreneurship. Thus, the implications are that on one hand, entrepreneurship needs its own unique theory that incorporates those fundamentally distinct attributes and that one the other hand, entrepreneurship provides a context to expand the boundaries of established theories.

Second, I provide a counterweight to existing work that typically focuses on the reflective system emphasizing the evaluation and planning aspects of entrepreneurship (cf. Krueger et al., 2000). I develop a conceptual model and show empirically that the hot impulsive system has an important role to play in this context. My finding that impulsivity can explain why people have entrepreneurial preference and why people successfully start businesses informs research on entrepreneurial decision making. Departing from the idea that venture creation is mainly based on rationality and extensive planning, recent studies have increasingly emphasized the role of biases, heuristics, and affect in making entrepreneurial decisions (for a recent review see Shepherd et al., 2015). These studies often explain entrepreneurs' biases, heuristics, and affect based on experience (Parker, 2006) or contextual factors (Forbes, 2005), but less often based on personality traits (for exceptions see, e.g., Baron, 2008). My theorizing suggests that impulsivity as a stable personality trait characterized by a tendency to act rapidly without consideration of negative consequences (Moeller et al., 2001) can lead to fast entrepreneurial decisions. This is in line with the wider trend in psychology of examining the influence of how stable psychological characteristics operate in concert with environmental influences to explain behavior and outcomes.

Third, I contribute to the entrepreneurship personality literature by providing a counterweight to existing work that typically focuses on the "positive" traits of entrepreneurs. Recent work (e.g., Judge et al., 2009) has called for a contextual view of personality traits, arguing that "positive" traits may be detrimental while "negative" traits may be beneficial for certain contexts. I heed that call, arguing that ADHD symptoms could be functional in entrepreneurship, but that relationship also depends on the specific symptoms being examined, the stage of entrepreneurial action and the type of venture. This dissertation provides a foundation for other researchers to expand the scope of their investigations from studying how generally positive characteristics of individuals influence entrepreneurship to paying greater attention to counterintuitive relationships, thus expanding the boundary of entrepreneur personality theory.

Finally, my research has profound real-world implications. Many people struggle with ADHD and impulsivity, as indicated by the rapid rise of psychiatric diagnoses such as ADHD. Instead of seeing individuals with mental disorders as fundamentally wrong, the development of society and science has called for a strength-based view of disorders. What needed then is research that could help show the path for those individuals to use their strengths to thrive. This dissertation shows a path, suggesting that entrepreneurship may provide a suitable career choice for these individuals with higher ADHD symptoms. More importantly, my research also suggests that ADHD symptoms and impulsivity traits are not overall good or bad but depend on the mechanisms involved and the stages of entrepreneurship. The differential influence of different ADHD symptoms and dimensions of impulsivity highlights the possibility of designing effective intervention strategies to make best use of the advantages and bypass the disadvantages associated with ADHD and impulsivity in the entrepreneurial context.

My dissertation on ADHD symptoms, impulsivity and entrepreneurship opens doors for future work on this line of research. It is important to note that ADHD is an "outlier" trait and entrepreneurship is also an "outlier" context. Thus, studying ADHD in the entrepreneurial context provides ample opportunities for expanding boundaries of existing theories. For example, further work could incorporate sociology, economic and anthropology perspectives to look into how individual ADHD symptoms interact with the social environment, the economic system and the cultures in shaping entrepreneurial activities and outcomes. Taking a team perspective and studying how ADHD entrepreneurs work with team members can also bring unique insights about personality and emotional conflicts for new venture team literature. Finally, utilizing the wellbeing lens to examine entrepreneurs' ADHD symptoms and self-care behaviors is also of great value, because ADHD is particularly related to negative psychological problems such as anxiety and addiction.

CHAPTER TWO: IMPULSIVITY AND ENTREPRENEURIAL ACTION[2]

ABSTRACT

Impulsive individuals are attracted to uncertain contexts, such as entrepreneurship, and are more likely to act despite this uncertainty. Thus, impulsivity may represent an asset in entrepreneurship. This paper outlines a conceptual framework and develops detailed propositions for the multifaceted influence of impulsivity on entrepreneurial action. It moves beyond entrepreneurship as a deliberate cognitive process to sufficiently account for how uncertainty influences action. In so doing, this paper constitutes a counterweight to the extensive examinations of positive personal attributes in entrepreneurship research. It also suggests a context in which a common trait with strong negative connotations may be advantageous.

Keywords:

Impulsivity; entrepreneurship; uncertainty

[2] This paper has been developed with input from Dr. Johan Wiklund and Dr. Holger Patzelt.

1 Introduction

"*It was as if Jobs' brain circuits were missing a device that would modulate the extreme spikes of impulsive opinions that would pop into his mind. . . . Most people have a regulator between their mind and mouth that modulates their brutish sentiments and spikiest impulses. Not Jobs*."
(from Walter Isaacson's biography of Steve Jobs, 2011)
"*I make up my mind about a business proposal within 30 seconds and whether it excites me*"
(from Richard Branson's autobiography, 1998)

Action under uncertainty is a fundamental premise of entrepreneurship (Knight, 1921; McMullen & Shepherd, 2006; Shane & Venkataraman, 2000). Entrepreneurs need to make decisions regarding uncertain entrepreneurial opportunities, to quickly engage in action before windows of opportunities close, and to learn from feedback as uncertainty unfolds. In this paper, we propose that impulsivity is an important explanation for why some entrepreneurs but not others take the leap of faith to engage in entrepreneurial action. Specifically, in this paper we address the following research question: How does impulsivity relate to entrepreneurial action? We develop a framework to suggest that the cluster of traits labeled "impulsivity" relates to entrepreneurial action in complex ways depending on the dimensionality of impulsivity and the entrepreneurship phase to which it is applied.

As the opening quotations indicate, successful entrepreneurs and managers can be impulsive individuals. The rich literature on impulsivity proposes that across a wide variety of contexts, impulsive individuals are drawn to, act on, and thrive on uncertainty (e.g., Eysenck & Zuckerman, 1978; Leland, Arce, Feistein &Paulus, 2006). However, the relevance of impulsivity

to the entrepreneurial context remains to be explored. Such an investigation can substantially advance management research as contemporary business environments are highly dynamic and uncertain (McGrath, 1999). In addition, prior studies have emphasized that understanding managerial decisions in these contexts requires explanations that go beyond "rational" and analytical perspectives but include, for example, "gut feel" (Sadler-Smith & Shefy, 2004; Huang & Pearce, 2015), intuition (Burke & Miller, 1999; Miller & Ireland, 2005), and affect (Delgado-García & De La Fuente-Sabaté, 2010), all concepts closely related to impulsivity (Deutch & Strack, 2008). Thus, impulsivity as a trait-like individual-level characteristic might well explain differences in decision making and behavior across managers under uncertainty.

Specifically, we define impulsivity as "a predisposition toward rapid, unplanned reactions to internal or external stimuli without regard to the negative consequences of these reactions" (Moeller, Barratt, Dougherty, Schmitz, & Swann, 2001, p. 1784). Following Whiteside & Lynam (2001), we view impulsivity as a broad construct with four distinct personality traits leading to impulsive actions. These four dimensions are sensation seeking, lack of premeditation, lack of perseverance, and urgency. We develop a framework proposing how these personality traits might function independently at different phases of the entrepreneurial process. Merging insights from the literatures on entrepreneurial action and impulsivity, we develop specific propositions suggesting that the influence of impulsivity varies depending on the impulsivity dimension and the phase of action, thus taking context into consideration, which is important in entrepreneurship and management research (e.g., see Welter, 2011 cf. also Johns 2006).

In so doing, we make the following contributions to the literature. First, there is a success bias in entrepreneurship research (McGrath, 1999), often expressed as a lack of research on failed entrepreneurial attempts, which are an unescapable part of uncertain endeavors (e.g.,

Davidsson & Honig, 2003; Shepherd, 2003). However, there is also a success bias in terms of the personal attributes examined in previous research, leading Miller (2015:1) to state that "the negative aspects of the entrepreneurial personality have been largely ignored." A recent summary of meta-analytical findings concerning entrepreneurship and psychology identified that positive psychological attributes, such as self-efficacy, achievement motivation, stress tolerance, and human capital had been thoroughly examined and that they were typically associated with positive entrepreneurial outcomes (Frese & Gielnik, 2014). By focusing on impulsivity, we provide a counterweight to this dominating positive narrative, contributing to an increasing stream of literature examining the dark sides of entrepreneurs' personality traits (e.g., Klotz & Newbaum, 2016). The negative implications of impulsivity across different spheres of human activity, including work life, are well documented (e.g., Kreek, Nielsen, Butelman & LaForge, 2005; Moeller et al., 2001). However, very little attention has been devoted to potentially positive implications of impulsivity (see Dickman, [1990; 2000] for an exception). We posit that entrepreneurship represents a context where some aspects of impulsivity can represent an asset.

Second, our conceptual framework takes into account potential boundary conditions of extant theories and findings in the entrepreneurship literature. In this regard, our research is consistent with calls to establish the uniqueness of entrepreneurship as a research domain (e.g., Wiklund, Davidsson, Audretsch & Karlsson, 2011). Specifically, by considering the different phases of entrepreneurial action, we highlight the contingent effects of impulsivity traits on entrepreneurship and thus provide a more nuanced understanding of the relationship between impulsivity and entrepreneurship.

Finally, it seems that high levels of impulsivity, even at the pathological level, are becoming increasingly common. For example, formal diagnoses of attention-deficit/hyperactivity

disorder (ADHD) are rapidly increasing, at present affecting 11% of the population aged four to 17, and people maintain these traits into adulthood (Kessler et al., 2006). Several other psychiatric diagnoses associated with impulsivity are also increasing (e.g., borderline personality disorder, conduct disorder, impulse control disorder). Thus, impulsivity influences the lives of millions of people, and entrepreneurship may be a suitable career choice for some of these individuals. Exploring the (potentially positive) linkages between impulsivity and entrepreneurship can therefore have substantial real-life consequences.

2 Uncertainty, Entrepreneurship, and Impulsivity

Entrepreneurship involves the creation of novelty (Gartner, 1985; Schumpeter, 1934). Because the outcomes of novelty-creating entrepreneurial endeavors are unknown and unknowable at the time of action, uncertainty is inherent to the entrepreneurial process. Further, judgment must be exercised to make a decision about whether to act on an opportunity and what courses of action to choose in situations characterized by uncertainty. There are no established activity sequences that guarantee success.

Research has associated impulsivity with behavioral differences related to uncertainty. In uncertain situations, most individuals react with a sense of doubt and anxiety (Tellegen, 1985), which leads to continued evaluation of alternatives as well as procrastination (McMullen &Shepherd, 2006). Impulsive people, however, tend to charge ahead in such situations (Leland, Arce, Feinstein & Paulus, 2006), unable to delay gratification (Mischel & Metzner, 1962; Mischel, 1961).

Research on impulsivity has a long and extensive history, attracting interest in nearly all areas of psychology. Consequently, impulsivity has been conceptualized in many different ways. Most definitions focus on impulsiveness manifested in behavior characterized by one or several

of the following aspects: the inability to wait, insensitivity to consequences, a tendency to act without forethought, an inability to inhibit inappropriate behaviors, or deficient tolerance of delayed gratification (Mobini et al., 2007).

A range of definitions and conceptualizations of impulsivity have been offered, but there is now general agreement that impulsivity represents a multifaceted super-construct (Evenden, 1999; Whiteside & Lynam, 2001) consisting of a number of independent dimensions that often but not necessarily co-vary. Regardless of the definition used, the negative connotations associated with impulsivity are strong (e.g., Ainslie, 1975). Thousands of empirical studies have been carried out to confirm substantial negative behavioral consequences of impulsivity for individuals and society. For example, there are studies suggesting that impulsivity has a negative influence on academic performance that is stronger in magnitude than the positive effect of intelligence (Colom et al., 2007; Duckworth & Seligman, 2005). However, among all the negative findings regarding impulsivity, there are also studies proposing that impulsivity might be positive for creativity (Alter, 2001; Furst, Ghisletta & Lubart, 2014; Dellas & Gaier, 1970), which could have positive implications for entrepreneurship. A meta-analysis of the relationship between a large number of personality traits and creativity (Feist, 1998, p. 290) concluded that "In general, creative people are more . . . impulsive. Out of these, the largest effect sizes were on . . . impulsivity." In particular, it seems that impulsive individuals are skilled at generating ideas—that is, producing and synthesizing the ideas (Furst, Ghisletta & Lubart, 2014).

2.1. The Dimensionality of Impulsivity

Substantial effort has been expended on isolating the dimensions of impulsivity, labeling them appropriately, and determining their relationship to personality traits and other types of impulsivity assessments. In particular, the Eysenck Personality Questionnaire (EPQ or PEN)

(Eysenck, H.J., 1987; Eysenck, H.J. & Eysenck, M.W., 1985; Eysenck, H.J. & Eysenck, S.B.G., 1968, 1975; Eysenck, S.B.G. & Eysenck, H.J., 1977, 1978; Eysenck, S. B. G., Easting & Pearson, 1984; Eysenck, S.B.G., Easting, Pearson & Allsopp, 1985); the Barratt Impulsiveness Scale (BIS-11) (Patton et al., 1995); Zuckerman's Sensation Seeking Scale (SSS) (see Zuckerman, Kolin, Price & Zoob, 1964), and the Zuckerman-Kuhlman Personality Questionnaire (ZKPQ) (Zuckerman, 2002) have been extensively examined, validated, and modified over a period of more than 50 years. To some extent, the development of these scales and the underlying theorizing are reflective of a more general progression of research into personality.

Using the Five Factor Model of personality ("Big Five," FFM) as their point of departure, Whiteside and Lynam (2001) mapped 17 different conceptualizations of impulsivity onto the personality dimensions in FFM, including the latest versions of the conceptualizations and scales mentioned above. Through this extensive exercise, they arrived at four facets of impulsivity that are "not considered variations of impulsivity, but rather discrete psychological processes that lead to impulsive-like behaviors" (Whiteside and Lynam, 2001, p. 685). Thus, the four dimensions represent distinct personality traits that do not necessarily co-vary within an individual. A recent extensive review and meta-analysis firmly rejected the notion of impulsivity as a unitary construct and supported Whiteside and Lynam's arguments on conceptual as well as empirical grounds (Sharma, Markon & Clark, 2014). As such, it appears that the use of the term "impulsivity" gives an inappropriate illusion of a single, unidimensional construct.

The four impulsivity dimensions include sensation seeking, lack of premeditation, lack of perseverance, and urgency. Sensation seeking consists of two sub-dimensions: the tendency to enjoy and pursue activities that are exciting and openness to trying new experiences that may be dangerous. Individuals who score high on this dimension enjoy engaging in novel, dangerous,

and risky activities. Lack of premeditation refers to a difficulty with deliberate thinking and considering the consequences of an act before engaging in that act. Those who score high on this dimension act at the spur of the moment without regard to consequences. Lack of perseverance refers to the inability to remain focused on boring or difficult tasks. High scorers find it difficult to work under conditions that require resistance to distracting stimuli, and they tend to give up easily. Finally, urgency refers to the tendency to strongly experience negative emotions, such as anxiety, worry, sadness, fear, vulnerability, or anger, and to act on these emotions. Thus, urgency is linked to emotionality, particularly negative affectivity.[3] The four dimensions should be viewed as continuous variables ranging from low to high values. At very high levels, these dimensions of impulsivity become pathological and constitute aspects of mental disorders. For example, borderline personality disorder is associated with high urgency. In our research, we are primarily concerned with non-pathological levels of impulsivity. To better illustrate the four dimensions of impulsivity, Table 1 summarizes the various characteristics examined by previous literature and their relationships to these dimensions.

Insert Table II- 1 About Here

Out of the four dimensions, prior entrepreneurship research has primarily examined aspects of the sensation-seeking dimension under rubrics like risk-taking propensity or tolerance of uncertainty (e.g., Forlani & Mullins, 2000; Brockhaus, 1980; Teoh & Foo, 1997). Generally, these traits are seen as positive characteristics in the entrepreneurship context. The other

[3] Following Baron (2008), we refer to affect as a general label for the moods, feelings, and emotions individuals experience.

dimensions of Whiteside and Lynam's (2001) conceptualization have received little or no direct attention in the entrepreneurship literature.

3 A Framework Linking the Dimensions of Impulsivity to Entrepreneurial Action

Entrepreneurial action can productively be conceptualized as a number of activities rather than as a single act (Shepherd, 2015). The entrepreneurial process unfolds over time and consists of a host of activities, which are sometimes conducted over extensive periods of time (e.g., Reynolds & Miller, 1992). It is likely that different dimensions of impulsivity play important roles during different phases of the entrepreneurial action process. Therefore, we develop propositions at the level of the different dimensions of impulsivity rather than viewing impulsivity at the level of the super-construct and outline how they influence different phases of the entrepreneurial action process. We rely on Shane and Venkataraman's (2000) popular conceptualization of entrepreneurship as consisting of the discovery, evaluation, and exploitation of opportunities to identify the different phases of the action process. For each of these phases, we identify aspects that are particularly likely to be affected by impulsivity. During opportunity discovery, we argue that the emotions evoked by an opportunity will be of particular salience. During opportunity evaluation, impulsivity will influence the desirability of pursuing an opportunity as well as the relative weight the individual places on desirability versus feasibility. Finally, we argue that impulsivity has considerable impact on the exploitation phase, influencing the probability that an individual will initiate action, persist with the opportunity, and possibly learn from the process. Table 2 outlines how the four dimensions of impulsivity relate to each of these aspects of the three phases of entrepreneurial action. In what follows, we develop a number of propositions in relation to this framework.

Insert Table II- 2 About Here

3.1 Phase 1. Opportunity Discovery

When a person determines whether a situation represents an opportunity, there is no way of knowing if it constitutes a "real" objective opportunity or if the person is capable of bringing the opportunity into fruition—that is, entrepreneurial opportunities are predicated on uncertainty (e.g., Davidsson, 2015). How individuals react to uncertain situations (e.g., when recognizing a new opportunity) is influenced by affective experiences, which often arise from impulsive rather than reflective processes (Evans, 2007). Indeed, research has suggested that the high levels of risk and uncertainty associated with entrepreneurship make it a highly emotional journey (Baron, 2008; Cardon, Foo, Shepherd & Wiklund, 2012; Foo, 2011). For example, negative affective experiences, such as worry, fear, or anxiety, triggered by the immediacy of uncertainty or the contemplation of future uncertain outcomes can cause procrastination and deter the initiation of action, and hesitancy, doubt, and procrastination are common implications of entrepreneurial uncertainty (McMullen & Shepherd, 2006). In contrast, positive affective experiences, such as excitement and happiness, can facilitate the initiation of entrepreneurial action despite the uncertainty individuals face (Baron, 2008).

Affect can influence action independently of cognition (Zajonc, 1984) and often results in more rapid judgment and action (LeDoux, 2003). In particular, when there is little room for analysis—for example, when there is little reliable information on which to base decisions—affect tends to play a more prominent role in individuals' assessments (Finucane, Alhakami, Slovic & Johanson, 2000). For instance, positive affect can serve as a heuristic cue that helps entrepreneurs form decision-making strategies and adapt to dynamic changes in their

environment (Baron, 2008). In general, uncertainty is likely to invoke negative affect, such as anxiety and fear (Loewenstein et al., 2001; Mitchell & Shepherd, 2010; van Gelderen et al., 2015), rather than positive affect. For example, van Gelderen et al. (2015) hypothesized and found support for the notion that the uncertainty of entrepreneurial action evokes affective experiences of action aversion, action fear, and action doubt.

Lack of perseverance might influence the negative affect entrepreneurs experience from opportunity recognition. Lack of perseverance reflects the inability to persevere when tasks become difficult (Whiteside & Lynam, 2001) and/or the inability to inhibit irrelevant thoughts (Bechara & Van der Linden, 2005). As a result, the difficulty of assessing an uncertain situation that might represent an entrepreneurial opportunity and the complexity of information involved in this assessment are likely to make people who lack perseverance anxious that they will be unable to successfully complete the assessment task and come to the right conclusion.

Similarly, urgency as an impulsivity dimension likely influences the level of negative affect individuals experience during opportunity recognition. Specifically, anxiety is a strong inhibitor of behavior under uncertainty (Paulus, 2007). People with high anxiety are more likely to perceive uncertain situations as threatening, which makes them sensitive to the negative cues of the situation (Paulus, 2007) and leads them to avoid these situations altogether or refrain from taking action. In contrast, experiments show that people less prone to anxiety choose riskier actions under identical scenarios (Bechara, Damasio, Damasio & Anderson, 1994). Further, Mitchell and Shepherd (2010) found that entrepreneurs low in fear of failure assess entrepreneurial opportunities more favorably even when their potential value is relatively low. Given that people who are high in urgency are generally more sensitive to the negative cues of an uncertain situation (Paulus, 2007), they are likely to experience stronger negative affect in

terms of fear and anxiety when recognizing uncertain opportunities than those with lower urgency levels. Empirically, studies have shown that lack of perseverance and urgency are related to high levels of anxiety (e.g., Zermatten & Van der Linden, 2008). Therefore, we propose the following:

> ***Proposition 1****: During opportunity discovery, the higher an entrepreneur's (a) lack of perseverance, and (b) urgency, the stronger the negative affect (fear, anxiety) he or she will experience.*

However, not all individuals experience negative affect and anxiety in the face of opportunity-related uncertainty (Mitchell & Shepherd, 2010). Specifically, individuals who are sensation seekers tend to find the pursuit of activities in uncertain contexts exciting (Eysenck & Zuckerman., 1978) because they weigh the potential rewards inherent in a high level of uncertainty higher than the potential losses (Gray, 1970). Based on the excitement they experience when assessing uncertain situations and the high hope for potential rewards, sensation seekers are ready to "take physical, social, legal, and financial risks for the sake of such experiences" (Zuckerman, 1994: 27) even though the activities under consideration may be dangerous. That is, when recognizing an uncertain opportunity, entrepreneurs who are high in sensation seeking are likely to emphasize the upsides and ignore the risks associated with the opportunity and, as a consequence, experience hope and excitement over potential positive outcomes rather than fear or anxiety over potential losses.

Finally, entrepreneurs' lack of premeditation might trigger experiences of positive affect during opportunity recognition. Individuals lacking premeditation tend to act before considering potential negative consequences. For example, these individuals will experience little fear and anxiety when assessing an uncertain opportunity because they tend to ignore its potential

downsides (Whiteside & Lyman, 2001). Consistent with Loewenstein et al.'s (2001) conclusion that "populations who do not feel or fear the future in the same way that others do make decisions that display a profound disregard for future consequences," research has found that entrepreneurs low in fear of failure put less emphasis on the number of available opportunities from which they can choose (Mitchell & Shepherd, 2010). That is, entrepreneurs lacking premeditation are more likely to experience overly high levels of hope when they recognize an opportunity because they are likely to ignore information indicating a high probability of failure. These arguments lead us to our next proposition:

> ***Proposition 2****: During opportunity discovery, the higher an entrepreneur's (a) sensation seeking and (b) lack of premeditation, the stronger the positive affect (excitement, hope) they experience.*

3.2 Phase 2: Opportunity Evaluation

Although initial opportunity discovery is often shaped by an individual's previous experiences and knowledge (Shane, 2000), the final decision of whether action should be taken is determined by a more detailed evaluation of the perceived desirability and feasibility of exploitation (McMullen & Shepherd, 2006; Schlaegel & Koenig, 2014; Shane & Venkataraman, 2000). Perceived desirability denotes the extent to which an individual finds the prospect of pursuing a recognized opportunity attractive or not. It is typically conceived of in terms of the potential amount of financial and other value exploitation can generate. If this value exceeds the money, time, and effort the entrepreneur needs to invest, exploiting the opportunity is considered to be desirable (Mitchell & Shepherd, 2010; Shane & Venkataraman, 2000).

Given that judgments of recognized opportunities are carried out under uncertainty, desirability assessments are influenced by prospective entrepreneurs' willingness to bear

uncertainty (McMullen & Shepherd, 2006), which can exert a pull force on impulsive individuals (Leland et al., 2006) toward exploitation. Specifically, sensation seekers find uncertainty rewarding in and of itself and are more prone to act under uncertainty than others. At the neurological level, uncertainty triggers a greater striatal activation response, which provides greater salience to the experience, enhances dopamine release, and makes the experience more rewarding (Leland et al., 2006). Entrepreneurs high in sensation seeking thus find it more desirable to bear the uncertainty associated with opportunity exploitation than those who are low in sensation seeking.

In addition, people who lack premeditation and tend to ignore the potential negative consequences of opportunity exploitation (DeYoung, 2010), such as potential financial failure or the social stigma of failure, are more likely to perceive exploiting a recognized opportunity as desirable than those who consider the potential downsides of failure more seriously. Indeed, previous entrepreneurship studies have highlighted that some entrepreneurs are more likely than non-entrepreneurs to be over-optimistic (Lowe & Ziedonis, 2006) and show a bias toward seeing potential upsides while disregarding potential downsides (Kahneman, 2011). Entrepreneurs who lack premeditation are similar to over-optimists in the sense that they are less able to fathom downsides, making them succumb to the immediate temptation of exploiting an opportunity.

Also, those who lack perseverance might view entrepreneurship particularly positive. Entrepreneurs have the leeway to autonomously choose and design their own work tasks in ways that are not possible in most other jobs (Miner et al., 1989). Such autonomy and flexibility are likely to seem attractive to people who lack of perseverance and find it difficult to persevere with tasks they do not find enjoyable (Mannuzza, Klein, Bessler, Malloy & LaPadula, 1993). Entrepreneurs are also typically "Jacks (or Jills) of all trades" rather than specialists, conducting

a wide variety of tasks rather than specializing on a limited set of tasks (Lazaer, 2004). Such variation in work tasks is also likely to be desirable to someone who lacks perseverance because it allows them to switch from one task to the next before getting bored. Entrepreneurs who employ others may also be able to delegate work tasks that they find less enjoyable (Lazaer, 2004). As a result, people who lack perseverance may find exploiting an opportunity desirable because an entrepreneurial career accommodates—at least partially—their problems associated with remaining focused on and persisting with tasks they do not like or find difficult to accomplish.

Finally, urgency is likely related to perceptions of desirability related to entrepreneurial action. Urgency is associated with high emotionality, in particular negative affectivity (Bresin et al., 2013). As noted, evaluating the desirability of pursuing an opportunity involves estimating the potential rewards that can be reaped relative to the potential downsides of exploitation. Thus, it is a forward-looking process, which gives rise to anticipated emotions (Loewenstein et al., 2001), which influences decision making (Bagozzi et al., 2003). Those who are high in urgency typically experience these emotions more strongly than others, thus placing greater emphasis on anticipated emotions in their decision making. Further, because of their sensitivity to negative cues, these individuals are likely to experience strong fear of failure and little hope of success, weighing the potential downsides heavier than the potential upsides. Empirical studies have suggested that high urgency is highly correlated with low distress tolerance and little faith in one's own ability to tolerate negative emotions (Kaiser et al., 2012). March and Shapira (1987) noted that expectations of anxiety and fear are important factors affecting managers' willingness to take risks. Thus, people high in urgency are likely to pay greater attention to their anticipated

emotions, and these emotions will mainly be negative, reducing the desirability of entrepreneurial action. Taken together, our arguments lead to the following proposition:

> ***Proposition 3****: During opportunity evaluation, the higher an entrepreneur's (a) sensation seeking, (b) lack of premeditation, and (c) lack of perseverance and the lower an entrepreneur's (d) urgency, the higher the perceived desirability of exploiting a recognized opportunity.*

The perceived feasibility of engaging in entrepreneurial action reflects the extent to which an individual is convinced that he or she can successfully carry out the activities required for successful opportunity exploitation. Thus, perceived feasibility relates to an individual's perception that he or she possesses adequate knowledge and skills (Krueger, 1993a, b), which is often conceptualized in terms of entrepreneurial self-efficacy (e.g., Fitzsimmons & Douglas, 2011). Acquiring relevant new knowledge about the opportunity and about one's own abilities can increase the perceived feasibility of opportunity exploitation (McMullen & Shepherd, 2006). However, extensive information gathering and analysis are also likely to lead to insights about previously unforeseen obstacles and the need to change plans and forecasts. Thus, knowledge acquisition is likely to reduce uncertainty regarding the feasibility of engaging in exploitation, but could influence perceived feasibility of exploitation both positively and negatively.

In terms of self-efficacy, which is important in determining if a person believes opportunity exploitation to be feasible, there is no systematic relationships with impulsivity regarding engagement is risky activities, such as opportunity exploitation (Slanger & Rudestam, 1997; Llewellyn & Sanchez, 2008). Therefore, we do not expect impulsivity to directly influence the perceived feasibility of exploiting a given opportunity. Instead, we expect that impulsivity is associated with the relative weight one places on feasibility and desirability. Impulsive

individuals are more likely to follow their desires, paying less attention to whether actions are feasible or not (Hofmann et al., 2009). For example, impulsive individuals are more likely to eat another cookie even though they are as aware as others of the possible negative consequences of the behavior (Nederkoorn, Braet, van Eijs, Tanghe & Jansen, 2006).

It is impulsive individuals' lack of premeditation that makes them more likely to engage in behavior without carefully considering the consequences, including limited evaluation of their ability to successfully carry out the behavior. Impulsive people who do not premeditate are likely to put less effort into gathering and analyzing information about a recognized opportunity before forming the intention to exploit it. That is, the rashness associated with lack of premeditation influences the extent to which perceived feasibility is taken into account in entrepreneurs' assessments of opportunity exploitation. Those who do not premeditate their decisions are likely to emphasize perceived feasibility less while weighing perceived desirability more, and they are more likely to exploit a desirable opportunity regardless of whether it is feasible or not. This leads to the following proposition:

> ***Proposition 4:*** *During opportunity evaluation, the higher an entrepreneur's lack of premeditation, the greater the weight he or she will place on desirability relative to feasibility in forming the intention to exploit a recognized opportunity.*

3.3 Phase 3. Opportunity Exploitation

3.3.1 Probability of Initiating Action

We refer to opportunity exploitation as the process of engaging in concrete actions (e.g., developing products, assembling resources, talking to potential customers, registering the new business) to bring a new business into existence. The first decision to be made is whether to engage in action at all. It is common to assume that prospective entrepreneurs automatically

convert their intentions to start a business into actual action (e.g., Bird, 1988; Krueger et al., 2000). However, that is not necessarily the case. For example, van Gelderen et al. (2015) found that of those having an intention to start a business within 12 months, the vast majority (69%) actually took no action at all during the subsequent 12 months. One important reason for abstaining from action is the immediacy of the action, which often triggers affective responses. These responses are *immediate* emotions triggered by the situation at hand and are experienced at that time. They are "immediate visceral reactions (e.g., fear, anxiety, dread) to risks and uncertainties" Loewenstein et al., 2001; 267-268) as opposed to the *anticipated* emotions associated with initial assessments of an opportunity's desirability and feasibility, which relate to emotions one expects to experience in the future (Loewenstein, 2000; Loewenstein et al., 2001). When the time of action approaches, the uncertainty concerning whether, when, and how to act becomes salient (van Gelderen et al., 2015).

Negative affective reactions, such as fear, worry, aversion, anxiety, doubt, and hesitancy, are common emotional responses to uncertainty in general (Loewenstein et al., 2001) and entrepreneurial uncertainty specifically and often contribute to procrastination while inhibiting entrepreneurial action (McMullen & Shepherd, 2006). In contrast, positive affect, such as excitement, passion, and happiness, can facilitate the initiation of action despite uncertainty (Baron, 2008). This resonates with people high in sensation seeking, who are less likely to experience fear and anxiety and are more likely to experience excitement as they are engaging in uncertain, risky activities. In fact, sensation seeking is often defined and measured in terms of the probability and frequency of engaging in such action (e.g., Whiteside & Lynam, 2001). The same is true for those who do not premeditate. They are prone to act and generally do not consider potential issues, thus being less sensitive to the immediacy of risk and uncertainty. The

opposite applies to those high in urgency. They strongly experience anxiety and fear, which triggers avoidance responses and a higher likelihood of "chickening out" of risky, uncertain activities (Loewenstein, 2000). No relationship is expected between lack of perseverance and the probability of initiating entrepreneurial action. The above discussion leads to the following proposition:

> ***Proposition 5****: During opportunity exploitation, (a) sensation seeking and (b) lack of premeditation increase the probability of initiating action, whereas (c) urgency decrease the probability of initiating action.*

3.3.2 Persistence

Recent studies of entrepreneurial processes following nascent entrepreneurs from their first action toward starting a business and onward have found that it typically takes years from the first initiation of organizing activities aimed at starting a new venture until the venture is up and running. For example, although time spans vary greatly, one study found that on average, nascent entrepreneurs spend around three years on these organizing activities (Reynolds & Miller, 1992). However, many nascent entrepreneurs abandon their efforts even before they have reached the state of an operational business. For instance, Delmar and Shane (2003) found that close to 40% of all startup attempts were abandoned before the firm was ever up and running. In this context, we refer to opportunity persistence as the completion of the organizing activities necessary to bring a new venture into operation.

Part of the reason why it takes such a long time to create a new venture and why many people decide to abort the process is that due to the uncertainty surrounding new venture creation, there are no established templates prescribing the crucial activities that must be completed, nor is there any established activity sequence that guarantees success. For example,

there is limited support for the idea that business planning pays off at all in the new venture context (Brinckmann, Grichnik & Kapsa, 2010). Moreover, many entrepreneurial activities are likely to lead to disappointing outcomes. For example, van Gelderen (2012) suggested that many activities are more difficult, expensive, and time consuming than entrepreneurs anticipate and that market reception is often far from being as positive as expected. Thus, in the new venture context, opportunity persistence in the face of setbacks and surprises is important for the entrepreneur to achieve eventual positive outcomes (Holland & Shepherd, 2013).

Consistent with the notion of sensation seeking, attention to positive as opposed to negative information as well as optimistic outcome attributions are argued to be positively associated with persistence (van Gelderen, 2012). A number of studies have found that individuals with higher levels of sensation seeking are very attentive to potential rewarding outcomes while simultaneously being less sensitive to punishment cues (e.g., Horvath & Zuckerman., 1993). As a result, individuals high in sensation seeking are less likely to feel distressed by stressful events (Smith, Ptacek, & Smoll, 1992). Indeed, Zuckerman and Kuhlman (2000: 1001) concluded that "The approach gradient is higher and the avoidance gradient is lower in high sensation seekers than in low sensation seekers over the range of novel risk-taking activities." In the context of opportunity persistence, entrepreneurs high in sensation seeking are therefore more likely to complete activities related to establishing a new venture even if they face obstacles.

Additionally, this lack of consideration for negative information and a tendency for persistent action may also apply for those who do not premeditate. When pursing potentially rewarding opportunities, those who lack premeditation become very focused on the tasks at hand and insensitive to any negative feedback information, forging ahead in the direction chosen

(Patterson & Newman, 1993; Zermatten et al., 2005) and conducting activities at a rapid pace (Smillie & Jackson, 2006). Entrepreneurs lacking premeditation are thus likely to persist with opportunities when facing activities that seem challenging and yield negative feedback, such as during unsuccessful negotiations with investors or after negative customer feedback on a product.

In contrast to traits that benefit persistence, lack of perseverance might be a serious threat to entrepreneurs' opportunity persistence. People who score high on lack of perseverance tend to be easily distracted from boring tasks. They have a tendency to interrupt or delay such tasks because they are drawn to activities that they consider to be more fun. It seems that their lack of perseverance is a result of their disinhibition to ward off temptations from alternative activities rather than an inability to sort out and conduct the tasks themselves (DeWitte & Schouwenburg, 2002). In other words, people who lack perseverance have the capacity to organize and carry out needed activities but lack the mental focus to remain concentrated on such tasks unless they enjoy them. For example, a study on the impact of impulsivity on students' studying behavior found that lack of perseverance—but none of the other impulsivity dimensions—was associated with procrastination (DeWitte & Schouwenburg, 2002). While engaging in entrepreneurial activities is volitional and many of the tasks and roles associated with opportunity persistence can be stimulating and evoke positive affect (Cardon et al., 2009), given the range of essential tasks required, it is likely that entrepreneurs lacking perseverance will find some of these tasks to be tedious and boring, making it hard for them to persist with the opportunity overall.

Finally, urgency might negatively influence opportunity persistence. Entrepreneurs high in urgency are likely to attend to negative feedback associated with the challenges and setbacks of establishing their venture rather than the positive information related to success (Cyders &

Smith, 2008). They experience impulses and impulse-induced affect more strongly than those low in urgency (Billieux, Gay, Rochat & van der Linden, 2010) and tend to act impulsively based on their affective experiences either to soothe negative affect or to maintain and enhance positive affect. Their strong and salient affect reduces the cognitive resources they have available for affective control and rational decision making (Billieux et al., 2010). To persist with an opportunity, however, entrepreneurs must be able withstand challenges, negative news, and temptations and stay focused on the goal of conducting the activities needed to start their business. As such, those high on urgency are less likely to be able to stay focused on the task of establishing a successful business. These arguments lead to the following propositions:

> ***Proposition 6****: During opportunity exploitation, the higher an entrepreneur's (a) sensation seeking and (b) lack of premeditation and the lower an entrepreneur's (c) lack of perseverance and (b) urgency, the higher his or her persistence in completing entrepreneurial activities.*

Because of the uncertain nature of entrepreneurship, starting a business is often largely a trial-and-error process, requiring frequent and sometimes radical changes to initial plans. Entrepreneurs face challenges and unexpected difficulties they need to respond to (Holland & Shepherd, 2013), and they need to develop contingencies based on feedback from earlier actions (Sarasvathy, 2001). Such environmental demands put heavy emphasis on entrepreneurs' learning ability—namely, the ability to learn from feedback during the entrepreneurial process and, as a result of such learning, change courses of action if necessary (Haynie et al., 2012). Being able to correctly register, interpret, and analyze feedback information is essential in figuring out the causal relationship between prior actions so as to develop appropriate alternative courses of

action moving forward. However, it appears that entrepreneurs differ in their learning abilities based on their impulsivity.

First, people high in sensation seeking usually fail to pause and reflect but have a general bias for action. Research has found that sensation seekers appraise risky activities as less risky than others (Horvath & Zuckerman, 1993) and generally view more their environment as less threatening (Franken et al., 1992). Relatedly, recent research has suggested that high sensation seeking is related to lower arousal from negative outcomes (Cservenka et al., 2013) and a lower ability to learn from negative outcomes (Tournier et al., 2013; Cox et al., 2015). As a result, these individuals generally fail to reflect on their past activities and the outcomes of those activities, which makes them less likely to learn from their experiences (Patterson & Newman, 1993). Also, when sensation seekers pursue opportunities, they tend to become very focused on their focal tasks while ignoring negative feedback information (Patterson & Newman, 1993) that might inform learning. Thus, while their bias for attending to positive rather than negative feedback facilitates persistence, entrepreneurs high in sensation seeking are likely to face difficulties in appropriately interpreting environmental cues and potential negative feedback, thus diminishing learning.

Second, the same arguments apply for entrepreneurs who do not premeditate. By definition, such individuals do not pause and reflect but have a bias for acting. Lack of premeditation relates to reduced sensitivity to negative information and an inability to correctly interpret negative feedback information (e.g., Franken et al., 2008; Carlson et al., 2013), leading to the tendency to forge ahead in a set course of actions without response flexibility (Franken et al., 2008) and, thus, learning.

Similarly, people who lack perseverance are less likely to actually absorb information from challenges and negative feedback when pursuing entrepreneurial opportunities. Because of their inability to remain focused in situations they find boring or difficult, those who lack perseverance are likely to shy away from negative information. These entrepreneurs are thus less likely to learn from feedback on the opportunity pursued.

Unlike the other three dimensions, it appears that urgency might have the opposite effect and actually facilitates entrepreneurs' learning. People high in urgency are very attuned to their environments and experience environmental cues very strongly. For example, neuroticism—a trait closely related to urgency—is associated with attentional bias to negative cues, and those high in neuroticism are thus more likely to maintain negative information in memory (Derryberry & Reed, 1994). As such, neurotic individuals more quickly correct inaccurate behavior because of their sensitivity to negative feedback (Byrom & Murphy, 2013). By extension, we expect that people high in urgency are likely to learn quickly and react to that feedback by adapting their behaviors, products, and activities. For example, entrepreneurs high in urgency might quickly and strongly realize when competitors enter the market with a similar product, or they might be highly attentive to potentially negative feedback from customers. Taken together, the above discussion leads to the following proposition:

> ***Proposition 7****: During opportunity exploitation, the lower an entrepreneur's (a) sensation seeking, (b) lack of premeditation, and (c) lack of perseverance and the higher an entrepreneur's (d) urgency, the higher his or her learning from feedback.*

3.4 Impulsivity and Performance

We have not linked our framework to performance outcomes from entrepreneurial endeavors largely because the implications of the four impulsivity dimensions vary across the

different phases of the entrepreneurial process. As such, the relationships between impulsivity and outcomes seem to be complex, and it appears difficult to infer general implications from the impulsivity dimensions for final performance. However, we can develop some performance implications across entrepreneurial opportunities with different levels of uncertainty—that is, opportunities that vary in the degree to which they are innovative or imitative.

As we observed earlier, the amount of uncertainty entrepreneurs experience varies across different entrepreneurial pursuits, with innovative opportunities being more uncertain than imitative opportunities. Differences in uncertainty originate, in part, from the amount of information available regarding a particular business opportunity (Navis & Ozbek, 2016). The higher the innovativeness (i.e., novelty), the less information is available and, thus, the higher the uncertainty. In contrast, imitative opportunities (those trying to copy an existing business model) are typically associated with lower uncertainty. For example, opening a local corner store may entail less uncertainty than developing a new medical device because it is possible to collect information on the behavior and performance of existing corner stores but not information on innovative (non-existing) medical devices. For the most part, the impact of greater innovativeness (and thus greater uncertainty) will amplify the relationships that we outlined in our propositions. Specifically, those who are more attracted to high levels of uncertainty, who pay less attention to potential negative outcomes, and who experience more positive emotions under uncertainty are particularly likely to enjoy pursuing innovative opportunities over imitative opportunities. These are characteristics that resonate particularly well with people who score high on sensation seeking and lack of premeditation. The opposite applies for people high in urgency; they are likely to shy away from innovative opportunities. To the extent that they are at

all attracted to entrepreneurial opportunities, they will favor imitative over innovative opportunities.

Not only would people high in sensation seeking and those who lack premeditation be attracted to innovative opportunities, they would also likely be quite successful at pursuing them. Under conditions of high uncertainty, the relationships between actions and outcomes become blurry and difficult to understand. Under these conditions, sensation seekers and those who don't premeditate are likely to thrive. First, under such conditions, the potential to learn from feedback will be limited for everyone, such that sensation seeking and lack of premeditation seem to be less of a liability. In contrast, under these circumstances, acting without much forethought and conducting multiple activities simultaneously (rather than trying to figure out a priori which activities will lead to success) can be beneficial. Indeed, Dickman's (1990) research, replicated by Smillie and Jackson (2006) and Heyes et al. (2012), suggested that the approaches typical of people high in sensation seeking and lack of premeditation signified by forging ahead can be effective under conditions of high uncertainty.

Finally, in highly uncertain environments, actively experimenting with alternative courses of action is more important than in environments characterized by less uncertainty (McGrath, 1999), where the fine-tuning of already established courses of actions is more common (Navis & Ozbek, 2016). Because sensation seekers are not satisfied with the status quos and are constantly looking for new and exciting experiences (Zuckerman, 1994), they are more likely to be acclimated to highly uncertain environments requiring frequent changes in direction. Thus, it seems that sensation seeking and lack of premeditation are traits that are relatively better suited for innovative opportunities with high uncertainty rather than imitative opportunities with low uncertainty.

4 Discussion

Our focus on impulsivity as a trait typically associated with negative consequences for the individual provides a counterweight to existing research emphasizing the role of "positive" personal attributes in explaining entrepreneurial action (cf. Miller, 2015; Frese & Gielnik, 2014). Given the increasing prevalence of high levels of psychological disorder–related impulsivity in society (e.g., ADHD) (Kessler et al., 2006), such a perspective seems highly appropriate. Indeed, along with negative effects, our theorizing suggests several favorable aspects of some impulsivity dimensions for entrepreneurial action, including a higher tendency to experience stronger positive and weaker negative emotions when recognizing uncertain opportunities, a potentially positive effect on opportunity exploitation, and a potentially positive effect on persistence with completing entrepreneurial activities. Since those with impulsivity-related disorders often have trouble finding salaried work, it appears that entrepreneurship can be an alternative suitable career choice for these individuals.

Our theoretical developments also propose that any blanket statements related to impulsivity's positive or negative influences on entrepreneurial action seem overly simplistic. While our theorizing emphasizes the overall role of impulsivity in explaining entrepreneurial action, it is important to note that our framework offers a more nuanced view distinguishing different impulsivity dimensions and provides insights into the interactive effects among these dimensions. Indeed, theoretical arguments led us to propose that some dimensions are more important for some phases of the entrepreneurial action process but less so for others. This finding is important because although the dimensions tend to positively correlate to some degree, there is also variance to the extent they manifest across individuals (Whiteside & Lynam, 2001). Some individuals can have high levels of sensation seeking and lack of premeditation but at the

same time have relatively low levels of urgency or lack of perseverance. As a result, these types of individuals are not only more likely to form favorable opportunity perceptions but are also more likely to exploit and persist with opportunities. Our theorizing thus heeds the call for researchers to explore the interaction effects of different personality traits (Klotz & Neubaum. 2016) and provides insights into how these dimensions of impulsivity can interact at different phases of the entrepreneurial process. Further, our theorizing extends previous studies speculating about the potential role of impulsivity-related concepts in the entrepreneurial process at a more general level (e.g., see Baron & Henry [2010] regarding the role of self-control).

Intention-based models have emphasized how the propensity to act influences entrepreneurial intentions and actions (Krueger, 1993a). Conceptualized within the framework of impulsivity, characteristics highlighted in various streams of the entrepreneurship literature, such as risk-taking propensity, willingness to bear uncertainty, and propensity to act, all reflect aspects of impulsivity related to sensation seeking, reward reactivity, and lack of premeditation. Our framework proposes that impulsivity—specifically its dimensions of sensation seeking, lack of premeditation, and lack of perseverance—impacts individuals' perceptions of the desirability of opportunity exploitation and the way desirability is emphasized over feasibility in the formation of entrepreneurial intentions. In contrast to existing work, which has typically concentrated on the reflective system emphasizing the rational and planning aspects of forming entrepreneurial intentions (cf. Krueger et al., 2000; Schlaegel & Koenig, 2014), our framework explains potential influences of the hot, impulsive system.

Further, while theoretical models have proposed and empirical research has shown that desirability and feasibility perceptions are important antecedents of forming entrepreneurial intentions, only few studies have explored their mutual relationship. Drawing on regulatory focus

theory, Fitzsimmons and Douglas (2011) found a negative interaction effect of desirability and feasibility perceptions in explaining entrepreneurial intentions. Similarly, findings of a recent meta-analytic review suggested that feasibility perceptions can trigger desirability perceptions and that contextual moderators explain how strongly these perceptions impact intentions (Schlaegel & Koenig, 2014). Further, Tumasjan et al. (2013) reported that desirability is emphasized more than feasibility when there is larger temporal distance between evaluation and exploitation potentially because when action time is further away, individuals do not need to consider the "reality issues" of the distant future as much. Our theorizing extends these studies by suggesting that premeditation as an impulsivity dimension explains the relationship between desirability and feasibility and why they vary across individuals. Individuals lacking premeditation seem to disregard reality (e.g., the potential obstacles and negative consequences of entrepreneurial action), thus constantly weighing desirability more than feasibility.

Our finding that impulsivity can explain opportunity exploitation informs research on entrepreneurial decision making. Departing from the idea that venture creation is mainly based on rationality and extensive planning, recent studies have increasingly emphasized the role of biases, heuristics, and affect in entrepreneurial decision making (Baron, 1998; for a recent review, see Shepherd et al., 2015). These studies have often explained entrepreneurs' biases, heuristics, and affect based on experience (Parker, 2006) or contextual factors (Busenitz & Barney, 1997; Forbes, 2005) but less often based on personality traits (for exceptions, see, e.g., Baron, 2008; Baron et al., 2012, Foo, Uy & Baron, 2009). Our theorizing suggests that impulsivity as a personality trait characterized by the tendency to act rapidly without consideration of negative consequences (Moeller et al., 2001) can lead to fast decisions to exploit recognized opportunities.

Our framework also proposes that impulsivity can increase individuals' persistence with entrepreneurial activities in the face of setbacks and obstacles. This finding complements the literature on entrepreneurial persistence and escalation of commitment (DeTienne et al., 2008; Holland & Shepherd, 2013; Patzelt & Shepherd, 2008; McMullen & Kier, 2016). Specifically, this literature has highlighted that entrepreneurial persistence can be attributed to entrepreneurs' low performance thresholds (Gimeno, Cooper & Woo, 1997; DeTienne & Cardon, 2012) and the interplay between entrepreneurs' considerations of environmental, personal, and organizational aspects (DeTienne et al., 2008; Holland & Shepherd, 2013). Limited attention, however, has been devoted to examine the role of personal characteristics in entrepreneurs' commitment escalation (as an exception, McMullen & Kier [2016] highlighted how different regulatory foci impact escalation). Our study suggests that sensation seeking and lack of premeditation may be related to attentional bias toward positive outcomes and a disregard for negative cues, potentially contributing to escalation of commitment to entrepreneurial action.

Finally, we highlight implications of different uncertainty levels across different types of entrepreneurial opportunities and the ways they interact with entrepreneurs' personality. Previous studies have argued that context influences the manifestation and outcomes of personalities in entrepreneurship (e.g., Klotz & Neubaum, 2016). Specifically, whether certain personalities are functional or dysfunctional depends on their level of fit with the demands of the entrepreneurial environment (Kristof-Brown et al., 2005). We argue that more innovative opportunities represent higher levels of uncertainty than imitative opportunities, thus amplifying the positive and negative effects of impulsivity dimensions on opportunity recognition, opportunity exploitation, and opportunity persistence. Our theorizing is in line with other personality-focused entrepreneurship research emphasizing the different influences of

personalities on different types of opportunities (e.g., Navis & Ozbek, 2016; Hmieleski et al., 2015).

4.1 A Research Agenda

Based on the implications that our framework offers for various strands of the entrepreneurship literature, a number of future research opportunities emerge that can further advance our understanding of entrepreneurial phenomena. We offer a selection of such opportunities below.

4.1.1 Opportunities for Testing our Conceptual Framework

An obvious extension of our work is empirically testing the theoretical framework we offer. Urgency, (lack of) premeditation, (lack of) perseverance, and sensation seeking can be measured using the well-established and extensively validated scale by Whiteside & Lynam (2001). Further, there are scale-based measures to determine individuals' desirability and feasibility perceptions related to entrepreneurial action (see Schlaegel & Koenig, 2014) as well as well-established scales for measuring positive and negative affect, such as the Positive and Negative Affect Scale (PANAS, Watson, Clark & Tellegen, 1988), which has been applied to the entrepreneurial context before (e.g., Foo et al., 2009; Baron & Tang, 2011). Finally, scholars have developed experimental approaches to explore entrepreneurs' decisions to exploit opportunities (Choi & Shepherd, 2004; Haynie, Shepherd & Patzelt, 2012) and to persist with entrepreneurial action (Holland & Shepherd, 2013). We hope that future research uses these (and/or other) empirical approaches to verify the impulsivity framework of entrepreneurial action offered here.

4.1.2 Opportunities for Cross-Disciplinary Work

Studying impulsivity as a personality trait that is closely related to psychological and social functioning might particularly profit from cross-disciplinary research (e.g., see Ireland & Webb, 2007; Short et al., 2010). First, a sociology perspective might be useful to understand the relationship between individual impulsivity and entrepreneurs' social environment. For example, impulsive individuals often tend to use inappropriate words and behaviors in social situations (Evenden, 1999), which might influence how they build and access (certain types of) social networks and their positions within these networks—a topic often studied by sociologists. For example, recent research in entrepreneurship has indicated that behavioral disinhibition has a negative effect on obtaining resources from potential resource providers (Lerner, 2016).

Second, an economic perspective can reveal insights into the relationship between impulsivity and economic growth, which is particularly relevant due to the substantial and rapidly growing number of individuals suffering from impulsivity-related disorders (Kessler et al., 2006). For example, because impulsive individuals are often unable to focus and collaborate well with coworkers, there might be effects on unemployment and subsequent economic growth. Third, from an anthropology perspective, it would be interesting to examine the influence of different national cultures on the manifestations of impulsivity. For example, more intolerant cultures may push impulsive individuals into informal sectors. Fourth, a human resource management perspective might inform studies trying to understand how impulsive entrepreneurs can manage employees and collaborate with other members of the entrepreneurial team effectively.

Fifth, based on first attempts to link entrepreneurship and operations research (Shepherd and Patzelt, 2017), from an operations perspective, perhaps entrepreneurs' impulsivity impacts their interactions with and reliance on suppliers, which can influence ventures' operational and

supply chain processes. Sixth, a finance perspective can help explain how impulsive entrepreneurs and executives manage their money and cash flow. For example, are they more likely to make frequent and high-risky investments due to sensation seeking and lack of premeditation? Seventh, scholars might take a marketing perspective to study how entrepreneurs' impulsivity influences a venture's market orientation (Kohli & Jarkowski, 1990) or situation analysis (e.g., SWOT, Valentin, 2001). Finally, the literature on family businesses tries to understand differences between family and non-family managers. Perhaps the impact of impulsivity is different for family and non-family managers given that in family firms, family members' personal and psychological well-being are often more pronounced than financial goals (Gomez-Mejia et al., 2007). Overall, while we have not provided an exhaustive list of potential research opportunities, we wish to encourage future research to adopt a cross-disciplinary approach to develop a deeper understanding of impulsivity in entrepreneurship.

4.1.3 Opportunities for Examining Contextual Influences

While our framework provides insights into some of the contextualized effects of impulsivity dimensions on sub-processes of entrepreneurial action, future research can investigate other contextual influences that are important for entrepreneurial action. At the individual level, for example, gender may play a role, with impulsive men perhaps being more likely to act on entrepreneurial intentions than impulsive women. Women tend to have lower levels of self-efficacy than men (Wilson, Kickul &Marlino, 2007), and entrepreneurship is often considered a less suitable career for women than for men (BarNir et al., 2011), which might limit the impact of impulsivity on entrepreneurial decisions. Further, family support (both emotionally and financially) also plays an important role in individual functioning, thus influencing whether impulsive individuals can bypass some of the obstacles to persistence with entrepreneurial

activities. Individuals also differ in their knowledge and experiences, which influences how they identify (Shane, 2000) and decide to exploit (Choi & Shepherd, 2004) entrepreneurial opportunities.

For instance, impulsive decision making might limit the extent to which an individual can capitalize on his or her knowledge and experiences because it often prevents thorough assessments of the opportunity under consideration based on the individual's knowledge. Perhaps the type of opportunity pursued differs between more and less impulsive individuals—whereas less impulsive individuals might pursue opportunities more related to their knowledge and experience, those with high impulsivity might recognize and decide to exploit seemingly unrelated opportunities more often. Similarly, the entrepreneur's team context may provide an important contextual factor (see Klotz, Hmieleski, Bradley & Busenitz, 2014) limiting or fostering the extent to which his or her impulsive decisions are implemented. Finally, research on contextual contingencies at the temporal level can possibly examine how the evolution of new ventures and changes in societies over time (e.g., technological and social trends) impact the relationship between impulsivity and entrepreneurial action. For example, impulsive decision making may lead to more problems as new ventures grow due to emerging hierarchical structures requiring higher levels of planning and coordination.

Larger, more general environmental influences may also be explored. For example, a positive change in societal attitudes toward people with impulsive characteristics and disorders (e.g., ADHD) may reduce the career obstacles encountered by these people over time. Moreover, at the environmental level, future research could explore variance in the impact of impulsivity on entrepreneurship across cultures with different values and across industries with different characteristics. Perhaps cultures that value diversity (versus collective cultures) may be more

conducive to the manifestation of impulsivity, and perhaps new industries (versus mature industries) that are more uncertain may attract and reward entrepreneurs with more impulsive characteristics. In terms of methodological aspects, cross-level research capturing many of the aforementioned levels and longitudinal research exploring dynamic aspects of changing impulsivity levels and contextual influences could greatly enhance our understanding of the role of impulsivity in entrepreneurial action. Besides using survey-based designs and secondary data, future research could also draw on opportunity-recognition exercises (e.g., Gregoire, Barr & Shepherd, 2010) or experimental decision-making approaches (Haynie et al., 2012) to enhance our understanding of impulsive entrepreneurs.

4.1.4 Opportunities for Examining Entrepreneurial Failure

An important stream of recent research has explored the motivational and learning consequences of entrepreneurial failures (Shepherd, 2003; Shepherd, Patzelt, & Wolfe, 2011). These studies have shown that failure is linked to negative emotional experiences that interfere with entrepreneurs' motivation to start again and learn from the failure experience. However, they have also shown that there is considerable variance between individuals' coping with entrepreneurial failure. Perhaps impulsivity plays some role in explaining this variance. For example, reinforcement sensitivity theory suggests that impulsive individuals are mainly driven by the behavioral activation system (BAS) while the behavioral inhibition system (BIS) is less engaged. Given that the BIS is required for allocating attention to environmental stimuli and for cautiously responding to environmental events, perhaps those who are more impulsive learn less from their failure experiences. On the other hand, however, they might be able to more quickly regain their motivation to start anew because a less active BIS generally diminishes negative emotions like fear, anxiety, and frustration, which often prevent failed entrepreneurs from re-

entering entrepreneurship. It appears that future research can make important contributions by integrating the concept of impulsivity and its individual dimensions into models of entrepreneurial failure.

4.1.5 Opportunities for Examining Relationships with Self-Control and Self-Regulation

Our study also relates to theories related to self-control and self-regulation. We highlight how sensation seeking, lack of premeditation, and urgency can lead to different attentional and motivational tendencies toward positive outcomes versus negative outcomes of entrepreneurial action (phases). These findings can be related to regulatory focus theory (Higgins, 1998), which proposes that people can have a promotion focus or a prevention focus. Promotion focus is characterized by seeking "gains" and attentional focus on information relevant to success, whereas prevention focus is characterized by avoiding "mistakes" and attentional focus on information relevant to failure (Higgns & Tykocinski, 1992; McMullen & Kier, 2016). Thus, it seems that sensation seeking is related to higher promotion focus and lower prevention focus, lack of premeditation is related to lower prevention focus, and urgency is related to higher prevention focus. Lack of premeditation, due to its action orientation and lack of consideration of alternative means and consequences, also resembles the notion of "locomotion" proposed by Kruglanski et al. (2000).

Furthermore, lack of perseverance could be associated with research on grit, which entails sustained attention and efforts towards the goal (e.g., Duckworth, Peterson, Matthews & Kelly, 2007). Thus, future research clarifying the impact of these specific impulsivity dimensions on entrepreneurial action might find theories related to self-control and self-regulation a valuable point for departure.

4.1.6 Opportunities for Examining Mental Disorders and Entrepreneurship

Finally, given that the numbers of psychiatric diagnoses associated with impulsivity are rising rapidly (e.g., ADHD, borderline personality disorder, conduct disorder, impulse control disorder) and that individuals with these diagnoses often face problems pursuing regular employment, there seems to be a societal need to understand whether and how entrepreneurship is a potential alternative career option for these individuals. While our theoretical arguments suggest that impulsivity stimulates entrepreneurial action, an important extension of this framework might explore how entrepreneurship (compared to salaried employment) enhances or diminishes the potential negative effects of impulsivity on individuals' financial and emotional well-being.

For example, perhaps entrepreneurs' freedom to organize their work environment provides the flexibility needed to account for impulsive decisions. Indeed, recent research has indicated that an entrepreneurial career helps individuals deal with the psychological challenges associated with trauma from combat (Haynie & Shepherd, 2011), imprisonment (Patzelt, Williams and Shepherd, 2014), and ADHD (Wiklund, Patzelt & Dimov, 2016). On the other hand, however, with less structure in the work environment, external "controls" limiting the implementation of impulsive and premature decisions might be lacking and enhance the likelihood of mistakes and thus entrepreneurial failures. Exploring these and other potential effects of impulsivity and entrepreneurial careers on personal outcomes might benefit both entrepreneurship research and the well-being of those with psychiatric diagnoses.

4.2 Practical Implications

Our research speaks to the importance of having entrepreneurial career counseling available for those individuals dealing with impulsivity, notifying them of the possibility of thriving within the entrepreneurial context. In particular, the differential influence of impulsivity

dimensions on entrepreneurship highlights the possibility of designing effective intervention strategies to make best use of the advantages and bypass the disadvantages of impulsivity for these people's professional and entrepreneurial careers. For example, it seems that sensation seeking has mostly positive effects on the entrepreneurial action process, whereas urgency has mostly negative effects. Thus, for individuals with both characteristics, teaching them emotion-regulation techniques may be helpful to capitalize on sensation seeking–related advantages while minimizing urgency-related challenges.

5 Conclusions

Impulsivity is a trait that seems to be more prevalent among entrepreneurs than other people. We develop a framework exploring how different impulsivity dimensions impact different phases of the entrepreneurial process. Our theorizing suggests that impulsivity dimensions influence the recognition and exploitation of as well as persistence with entrepreneurial opportunities in complex ways such that there is not a uniformly positive or negative impact of the impulsivity super-construct on entrepreneurial action. Based on the novel implications of our framework for theorizing on entrepreneurial traits, decision making, and opportunities, we offer a research agenda that hopefully inspires future work on this important topic—work that has the potential to enhance not only our view of entrepreneurship but also the life of millions who suffer from impulsivity-related diagnoses.

Table II-1. Dimensions of Impulsivity and Their Association with Related Concepts

Dimensions of Impulsivity	Related Personality Traits Examined in Previous Literature	Biological characteristics	Risk (Uncertainty) Perception and Appraisal*	Emotional Expressions	Example Behavioral Expressions
Sensation Seeking	Arousal or stimulation seeking (Zuckerman, 1994), risk taking (Zuckerman, 1994), openness to experience (Aluja et al., 2003), low agreeableness (Zuckerman, 1994), high extraversion (Aluja et al., 2003), high psychoticism (Glicksohn & Abulafia, 1998), disinhibition (Zuckerman, 1994), boredom susceptibility (Zuckerman, 1994)	Lower cortisol release to stressors (Netter et al., 1996); increased activity in the dopaminergic system (Norbury & Husain, 2015); higher levels of testosterone, estrogen, and androgen (Daitzman & Zuckerman, 1980; Daitzman et al., 1978)	Typically appraise risky activities as less risky than others (Horvath & Zuckerman, 1993), view the environment as less threatening (Franken et al., 1992)	Less fear, anxiety, and stress to stressors (Roberti, 2004)	Alcohol use, substance use, risky sexual activities, gambling (see Roberti, 2004 for a review), choosing stimulating careers and jobs (Kish & Donnenwerth, 1969), mastery goal orientation (O'Connor & Jackson, 2008)
Lack of Premeditation	Low conscientiousness (Whitside & Lynam, 2001), low impulse control (McCabe et al., 2015), risk taking (Rogers et al., 2013)	Deficits in executive functioning, such as deficits in anterior ventromedial prefrontal cortex (Zermatten et al., 2005) and in the orbitofrontal cortex (Franken et al., 2008), indicating impaired somatic markers for emotional-based decision making	Lower level of perceived risk (Zimmermann, 2010), higher level of tolerance for uncertainty (Pawluk & Koerner, 2013)	Less general anxiety and worry (Pawluk & Koerner, 2013)	Substance use (Miller et al., 2003), risky sexual activities (Miller et al., 2003), rapid anticipatory responses for risky and time-sensitive rewards (Heyes et al., 2012)

Lack of Perseverance	Low conscientiousness (Whitside & Lynam, 2001), procrastination (Dewitte & Schouwenburg, 2002)	Deficits in executive functioning, such as difficulties in resisting thought unrelated to the task at hand (Gay et al., 2008)	Lack of perseverance is generally not found to be significantly related to risk perception or appraisal or risky behaviors (see Romer et al., 2016)	More worries about time pressure and unattained outcomes (Gay et al., 2011), general anxiety, and depression (Billieux et al., 2008)	Inattention (Miller et al., 2003), greater occurrence of irrelevant thoughts (Bechara & Van der Linden, 2005)
Urgency	High neuroticism, low conscientiousness, low agreeableness (Settles et al., 2012), risk taking (Cyders et al., 2015), poor distress tolerance (Weitzman et al., 2011), intolerance for uncertainty (Pawluk & Koerner, 2016)	Deficits in executive functioning, such as deficits in propotent response inhibition (Bechara & Van der Linden, 2005); low 5HT serotonin receptor and high DA (dopamine) levels in the amygdala-OFC pathway (Cyders & Smith, 2008)	Intolerance for uncertainty (Pawluk & Koerner, 2016)	More general anxiety and worry (Pawluk & Koerner, 2013)	Substance use (Adams et al., 2012), binge eating (Fischer et al., 2003), gambling (Cyders & Smith, 2008)

***** = Economists separate risk from uncertainty, with risk entailing computable probabilities while uncertainty does not. Psychologists do not typically make this distinction, and their use of the term risk is closer to economists' use of the term uncertainty.

Table II- 2. Dimensions of Impulsivity and Phases of the Entrepreneurial Action Process

Entrepreneurial Action Phase	*Opportunity Discovery*	*Opportunity Evaluation*		*Opportunity Exploitation*		
Aspect Considered	*Emotions Evoked by Opportunity*	*Perceived Desirability of Acting on Opportunity*	*Weight of Desirability Relative to Feasibility*	*Probability of Initiating Action*	*Persistence*	*Learning*
Sensation Seeking	Mainly positive (P2a)	Positive (P3a)	No influence	Positive (P5a)	Positive (P6a)	Negative (P7a)
Lack of Premeditation	Mainly positive (P2b)	Positive (P3b)	Positive (P4)	Positive (P5b)	Positive (P6b)	Negative (P7b)
Lack of Perseverance	Mainly negative (P1a)	Positive (P3c)	No influence	No influence	Negative (P6c)	Negative (P7c)
Urgency	Mainly negative (P1b)	Negative (P3d)	No influence	Negative (P5c)	Negative (P6d)	Positive (P7d)

CHAPTER THREE: ADHD, IMPULSIVITY AND ENTREPRENEURSHIP[4]

ABSTRACT

Recently, entrepreneurship scholars have started to show interest in how "negative" traits associated with mental disorders such as ADHD may have positive implications in entrepreneurship. While this research has the potential of producing important and counter-intuitive results, it is still in its infancy and the causal mechanisms that drive those individuals to be attracted to entrepreneurship have received limited attention. Consequently, we draw on the person-environment fit literature and propose that individuals are attracted to, and engage in, entrepreneurship because the task environment of entrepreneurship which favors speed of action is aligned with the traits of those individuals. We develop and test a model which suggests that ADHD influences entrepreneurship through the multifaceted trait of impulsivity. We find that Inattention is negatively but hyperactivity positively associated with entrepreneurship. We also find that sensation seeking and lack of premeditation generally positively influences entrepreneurship, whereas urgency has the opposite influence. Taken together, this suggests complex, multifaceted implications of ADHD and impulsivity in entrepreneurship. Theoretical implications of these findings are discussed.

[4] This paper has been developed with input from Dr. Johan Wiklund, Dr. Reg Tucker and Dr. Louis Marino.

1 Introduction

Mental disorders are, by definition, dysfunctional. Otherwise they wouldn't be classified as disorders which are assessed and treated by medical doctors. At the same time, most traits are not universally positive or negative and what is functional or dysfunctional depends on context (Judge et al., 2009). In his famous novel "The Country of the Blind" H.G. Wells (1904) tells the story of the seeing man who accidently enters a secluded valley where everybody is blind. As a seeing man, he initially believes he will be able to rule the blind, but soon realizes that the valley has been adapted to those who are blind and that he is actually at a disadvantage. Using logic similar to Wells's, people have started exploring whether certain mental disorders are potentially less dysfunctional or could even be advantageous in various walks of life, including entrepreneurship. It may be that the very traits that make it difficult to fit into most regular vocations could provide a good fit with the high uncertainty environment and lack of established routines associated with entrepreneurship. In particular, there is reason to believe that entrepreneurship exerts a pull on people who exhibit symptoms consistent with the neurodevelopmental disorder Attention Deficit and Hyperactivity Disorder (ADHD) (e.g., Archer, 2015; Verheul et al., 2015; 2016; Wiklund, Patzelt & Dimov, 2016).

Invoking person-environment (P-E) fit theory, we develop a model to propose that ADHD symptoms manifest in trait impulsivity and that the dimensions of impulsivity influence entrepreneurial preferences and behavior. We believe that this research makes several important contributions. First, the premise that the specific demands placed on entrepreneurship may make it particularly suitable for people with certain personal qualities has been researched extensively. For over 50 years, scholars have associated entrepreneurship with positive traits such as need for achievement, need for independence, internal locus of control, and self-efficacy, suggesting that

these traits enhance people's willingness to assume risk and uncertainty, and to persevere despite the many challenges entrepreneurs face (see Miller, 2015, 2016 for recent reviews of this literature). More recently, scholars have started discussing the destructive implications of entrepreneurs' negative traits including traits such as narcissism, psychopathy, deviance, and ruthlessness (e.g., Klotz & Neubaum, 2016). What is lacking, however, is theorizing and empirical evidence pointing to entrepreneurship as a distinctive arena that may be fitting for people who display characteristics that otherwise have negative implications. Our conceptual model and empirical findings support such a notion and provide support for the contention that entrepreneurship is a distinctive context which is in need of unique theoretical arguments that take into account the potential boundary conditions that entrepreneurship presents for extant theories and findings. For example, there is extensive evidence of the negative implications of ADHD symptoms and impulsivity across contexts and situations (e.g., Barkley, 1997). Our findings concerning fit with entrepreneurship suggest boundaries to existing theories, and should stimulate new theoretical developments. As such, this research is consistent with the notion of entrepreneurship as a unique domain and a field of research (e.g., Wiklund, Davidsson, Audretsch & Karlsson, 2011). Specifically, our results suggest a 'logic of action' characterized by speed rather than accuracy (cf. the Carnegie School [e.g., Cyert & March, 1963] for logics of consequences vs. appropriateness), which may be useful in the entrepreneurial context. Further, although stable individual differences such as personality traits have received substantial attention in entrepreneurship research, and the traits that we examine have been shown to have far-reaching implications in other walks of life, there has been virtually no overlap in these areas of research. Hopefully, our research can provide a foundation for other researchers to expand their research scope to pay greater attention to how ADHD symptoms, impulsivity and traits and

characteristics that are otherwise viewed negatively may have positive implications in the entrepreneurship context.

Second, we develop and test a fine-grained conceptual model linking ADHD symptoms to entrepreneurship. In so doing, we integrate the literatures on ADHD, impulsivity, and entrepreneurship to develop detailed, novel hypotheses in a model proposing how ADHD symptoms influence entrepreneurship and how this relationship is mediated by trait impulsivity. This model provides a more nuanced understanding of how distal psychiatric symptoms associated with ADHD may influence entrepreneurship via more proximal psychological processes. Recently, scholars have started to examine associations between entrepreneurship and mental disorders, finding support for such a notion (e.g., Dimic & Orlov, 2014; Freeman et al., 2015; Logan, 2009; Verheul et al., 2015; Thurik et al., 2016; Wiklund et al., 2016). However, the theorizing about why this is the case is still in its infancy and empirical evidence is lacking. For example, it is unclear if these people are pulled into entrepreneurship because it is an attractive occupation, or pushed out of the regular labor market into self-employment. In this paper, we apply person-environment fit theory (Holland, 1997) to examine entrepreneurial preferences and behavior among individuals that likely have viable career options. Specifically, we examine MBA alumni from an AACSB accredited US business school consistently ranking among the top 50 public business schools in the USA whose graduates had an overall average starting base salary of $68,000 in 2015. We propose and find support for the notion that entrepreneurship is particularly attractive and suitable for people high on impulsivity in terms of sensation seeking and lack of premeditation because they find uncertainty attractive and can master it. We also shed light on the specific ADHD symptoms (attention deficit and inattention) that are more or less beneficial, or detrimental, in the entrepreneurship context. Our results indicate

positive *and* negative influences of ADHD symptoms, suggesting that the relationship between ADHD symptoms and entrepreneurship is more complex than assumed (e.g., Verheul et al., 2015; 2016; Thurik et al., 2016; Wiklund et al., 2016).

Finally, we contribute to the person-environment fit literature. To some extent, employees can craft their own jobs (Wrzesniewski & Dutton, 2001), to achieve better fit between their abilities and the demands of the work tasks (Lu et al., 2014). Few, if any, have greater possibility than entrepreneurs to craft their jobs to fit their own idiosyncratic needs and abilities (Baron, 2010; Miner, 1994). However, entrepreneurs, and their level of autonomy to design their own work tasks, have received virtually no attention in the P-E fit literature (Baron, 2010). Very few studies have examined the relationship between work and ADHD, and in particular not the aspect of fitting jobs for people with ADHD (Lasky et al., 2016). We examine how people's extent of ADHD symptoms influence P-E fit in entrepreneurship. It is likely that those that exhibit particularly extensive ADHD symptoms – sufficient for a formal ADHD diagnosis – could especially benefit from the autonomy of entrepreneurship in terms of job crafting, because they have special needs that may be difficult to accommodate in regular work places (Wiklund et al., 2016). In addition, the study of non-typical individuals (those with ADHD symptoms) and non-typical jobs (entrepreneurship) can lead to valuable new insights and test the boundary conditions of P-E fit theories.

This paper proceeds as follows: first, we present our theoretical framework and develop hypotheses of the relationships among ADHD, impulsivity and entrepreneurship. Then we introduce our data collection and sample. After that comes our analyses and results. Finally, we conclude the paper with a discussion of the theoretical and practice implications of our study.

2 Theoretical Framework

2.1 ADHD, Personality Traits and Entrepreneurship: A P-E Fit Perspective

The person-environment (P-E) fit literature examines the antecedents and outcomes of compatibility between a person and his or her work environment (Kristof, 1996; Kristof-Brown et al., 2005). According to the theory, people are attracted to work environments that present work cultures, values, requirements, and demands that match their own personalities, needs and skills. The work environment can be analyzed on different levels of specificity including the vocation, the job, the organization, or the work group (Kristof-Brown et al., 2005). The vocation or occupation represents the broadest category of the work environment because different jobs or organizations can be housed within a specific vocational category (Kristof, 1996). For example, a cook could work for several different restaurants and perform different jobs at any given restaurant.

Personality traits influence personal interests, competencies and values. Consequently, people are attracted to vocations whose perceived characteristics and requirements are congruent with their personalities (Holland, 1997). For example, the "investigative types" will perceive themselves as curious and will enjoy performing scientific and mathematical activities. Therefore, they will be likely to choose vocations that reward curiosity and provide opportunities for solving challenging problems such as scientists and statisticians (Holland, 1997). Similarly, Dawis and Lofquist (1984) posit that individuals are attracted to vocations that provide a correspondence between personality traits (including abilities, needs and values) and workplace requirements. Congruence between the individual's personality traits and workplace requirements results in higher personal satisfaction and longevity in the vocation (Dawis & Lofquist, 1984). To a large extent, the P-E literature has studied how people adapt to predefined jobs, but more recent literature acknowledges that employees have the possibility, to some extent,

to craft their own jobs (Wrzesniewski & Dutton, 2001) and that this can lead to better fit between their abilities and the demands of the work tasks (Lu et al., 2014).

Empirical research has demonstrated relationships between personality traits on the one hand and vocational preferences and choice, job satisfaction, performance, and turnover on the other (e.g., Edwards, Cable, Williamson & Shipp, 2006). People leave work environments for which they lack interest and seek out work environments for which they possess interest and the required abilities (Holland & Nichols, 1964). For example, college students are attracted to those volunteer organizations that correspond to their personality types (Sergent & Sedlacek, 1990; see also Tokar, Fischer, & Subich, 1998 for a review). In terms of work-related outcomes, studies have found that P-E fit influences job satisfaction (Judge, 1994), organizational commitment (Hoffman & Woehr, 2006), and job turnover (Donohue, 2006).

A recent review and meta-analysis notes that there is a whole host of different conceptualizations, measures, and analytical approaches in the P-E fit literature (Krystof-Brown et al., 2005). What is clear from their review, however, is that P-E fit has been conceptualized and examined in terms of attitudes, behavior, and outcomes. That is, for example, apparent in Schneider's (1987) famous attraction, selection, attrition (ASA) model. In this paper, we focus primarily on the two first aspects, i.e., attitudes and behavior rather than outcomes (although we conduct some post hoc analyses of outcomes). In other words, we are interested in how personality traits influence the preference for entrepreneurship as a vocation as well as the likelihood of engaging in the actual startup of a business.

P-E fit is particularly interesting in the entrepreneurship context because entrepreneurs have the leeway of autonomously choosing and designing their own work tasks and performance benchmarks: "Control over the person's behavior derives neither from superiors, nor professional

norms, nor peer group members" (Miner et al., 1989: 554). In this, entrepreneurship provides flexibility for individuals to design their jobs and tasks in ways that suit their personal needs and preferences (Lu et al., 2014). This may be particularly beneficial for non-typical individuals, such as those with extensive ADHD symptoms. P-E fit has received some attention in prior entrepreneurship research, focusing on attitudes as well as behavior. For example, Markman and Baron (2003) proposed that entrepreneurship is characterized by liabilities of newness and smallness and a need for innovation. They suggested that self-efficacy, the ability to recognize opportunities, personal perseverance, human and social capital and superior social skills would be particularly important individual characteristics to provide a high level of fit with the entrepreneurship vocation (Markman & Baron, 2003). Lee, Wong, Foo and Leung (2011) proposed that innovation-oriented individuals would become dissatisfied in work environments that did not promote innovation. That would increase their entrepreneurial intentions and entice them to engage in entrepreneurship. Gupta, Turban, Wasti and Sikdar (2009) focused on gender differences in entrepreneurial intentions, arguing that entrepreneurial intentions are influenced by the perceived fit between gender and the stereotypes associated with entrepreneurship. Because entrepreneurship is usually perceived to be more consistent with the male gender role stereotype, women are less likely to form entrepreneurial intentions than men (Gupta et al., 2009). Instead of examining intentions to enter entrepreneurship, Brigham, De Castro and Shepherd (2007) examined intentions to exit entrepreneurship among existing entrepreneurs, suggesting that the fit or misfit between owner-manger's preferred decision-making style and the level of formal structure influenced entrepreneurs' exit intentions.

In sum, our review of the literature suggests that a P-E perspective can be helpful in teasing out how ADHD symptoms can be related entrepreneurial preferences as well as

engagement in actual entrepreneurial action.

2.2 ADHD and Impulsivity

When assessing the P-E fit of individuals with ADHD symptoms and entrepreneurship, it is important to clearly define characteristics associated with ADHD as well as the job requirements of entrepreneurship viewed as an occupation. We start by discussing ADHD. According to the latest version of the Diagnostic and Statistical Manual (DSM 5 [APA, 2013]) which is used for diagnosing mental disorders, ADHD is a neurodevelopmental disorder characterized by inattentiveness and/or hyperactivity/impulsivity. It entails behavioral, cognitive, and affective difficulties that emerge in childhood and persist chronically (APA, 2013). The diagnostic criteria are specific and include the pervasive display of behaviors such as making careless mistakes, failure to pay close attention to detail, difficulty organizing tasks and activities, excessive talking, or losing things necessary for tasks and activities in ways which interfere with functioning or development (APA, 2013). ADHD can be severely impairing and has been linked to several negative outcomes in life such as poor academic performance, imprisonment, unemployment, substance abuse and so on (Knecht et al., 2015). The symptoms of ADHD can make it difficult to fit in a typical work environment (Barkley & Murphy 2010). Over half of adults with ADHD have been fired (Murphy & Barkley, 1996) and supervisors rate performance of workers with ADHD lower than those without the condition (Barkley et al., 2006; Weiss & Hechtman, 1993).

ADHD is a categorical yes/no diagnosis, with around 5% prevalence world-wide (Polanczyk, De Lima, Horta, Biederman, & Rohde, 2007). It has higher prevalence in the U.S., with currently 11% of all youths diagnosed with ADHD, and numbers are increasing around the globe (Visser et al., 2014). Although the ADHD diagnosis is a categorical yes/no, it is based on

an underlying continuous disposition (Nigg et al., 2002).

There are two primary theoretical models of ADHD: the response inhibition model (Barkley, 1997) and the dual-pathway model (Sonuga-Barke, 2002). Although different, they converge on the idea that ADHD has a biological origin. This idea receives support from recent studies showing that ADHD symptoms are hereditary (Nikolas & Burt, 2010; Gillis et al., 1992) and that people with ADHD have brains that are structurally different from typical individuals in important ways (Valera, Faraone, Murray, & Seidman, 2007; Konrad & Eickhoff, 2010). However, whereas the underlying ADHD disposition is a continuous construct with broad implications based on structural brain differences (Nigg et al., 2002), narrowly defined, specific symptoms are used for the clinical diagnosis. Therefore, directly relating clinical ADHD symptoms to complex behavior such as entrepreneurship may be challenging. It is difficult to see how e.g., making careless mistakes, or the failure to pay close attention to detail should translate directly into preferences for or engagement in entrepreneurship. Moreover, the clinical diagnosis is aimed at identifying the extreme cases associated with impairment, rather than reflecting the full variance of the ADHD disposition in the population. Finally, as with other mental disorders, the clinical diagnostic criteria are descriptive rather than causal (Nigg, 2000).

We link ADHD symptoms to entrepreneurship by way of *trait impulsivity*. Because ADHD symptoms are chronic (APA, 2013), variables representing stable individual differences are appropriate. Personality traits are stable, represent "the fundamental building blocks of individual differences" (Nigg et al., 2002: 452) and have been subjected to extensive theorizing. ADHD is complex with several associated personality traits (Martel et al., 2010). For the purposes of assessing how ADHD symptoms relate to entrepreneurship within a P-E framework and linking it to entrepreneurship, we believe it fruitful to examine how ADHD symptoms

manifest in trait impulsivity. Considering all aspects of personality, ADHD symptoms seems particularly positively and strongly related to trait impulsivity (Black et al., 2013; Nigg et al., 2002; Pironti et al., 2016; Roberts et al., 2014) because ADHD has its roots it disinhibition (Barkley, 1997; Nigg, 2000). Moreover, impulsive individuals may be particularly attracted to and suitable for entrepreneurship because they likely thrive on uncertainty and prefer action over analysis (Verheul et al., 2015).

Trait impulsivity represents a multi-faceted super-construct with four underlying dimensions (Whiteside & Lynam, 2001). This notion of impulsivity was supported both conceptually and empirically by a recent review and meta-analysis (Sharma, Markon & Clark, 2014). Using the Five-Factor Model (FFM [e.g., Gurven, von Rueden, Massenkoff, Kaplan & Lero Vie, 2013]) as the starting point, Whiteside and Lynam (2001) connected seventeen different conceptualizations of impulsivity to the dimensions of personality in FFM, arriving at four facets of the impulsivity construct that capture these previous conceptualizations, namely: lack of premeditation, urgency, lack of perseverance, and sensation seeking. These dimensions have been validated in later research (e.g., Cyders, Smith, Spillane, Fischer, Annus, & Peterson, 2007).

(1) Sensation seeking has two aspects: a tendency to enjoy and seek exciting activities, and a receptiveness to new experiences that may be risky and dangerous; (2) *(lack of) premeditation* is defined as a lack of deliberation and planning of the consequences before engaging in an act; (3) *(lack of) perseverance* describes the inability to concentrate on boring or difficult tasks, reflecting the difficulty in resisting distracting stimuli; and (4) *urgency* is the tendency to experience strong impulses, thus engaging in impulsive behaviors under the influences of affect, in order to reduce emotions despite potentially harmful long-term

consequences.

Consistent with previous studies using P-E fit theory in entrepreneurship (e.g., Brigham et al., 2007; Markman & Baron, 2003), we view the entrepreneurial vocation as the start-up of an independent business (see also Miner, [1994] for a similar view of entrepreneurship as a vocation consisting of a set of specific tasks). As noted above, the P-E literature discusses P-E fit in terms of attitudes, behavior, and outcomes. Attitudes relate to the perceptions of an individual that a particular vocation would be attractive and fitting for him or her. Consistent with a burgeoning body of entrepreneurship literature (e.g., Scherer, Adams, Carley & Wiebe, 1989; Scherer, Brodzinski, & Wiebe, 1991), we focus on attitudes in terms of *Entrepreneurial Preference,* i.e., the extent to which an individual believes that entrepreneurship would be a suitable vocation for him or her. In term of entrepreneurial behavior, we focus on whether or not an individual has engaged in *Business Startup.* Again, this is consistent with conceptualizations in an extensive body of entrepreneurship literature (e.g., McMullen & Shepherd, 2006: Krueger et al., 2000). On the basis of this, the conceptual models that we test are shown in Figure 1.

It could be noted that the ADHD diagnosis uses hyperactivity/impulsivity among its diagnostic criteria. However, the diagnosis does not differentiate hyperactivity from impulsivity, and scales commonly used to measure ADHD symptoms (e.g., ASRS-6 [Kessler et al., 2005] that we use) focus on the hyperactivity rather than the impulsivity aspect. Moreover, the diagnostic criteria do not reflect modern views of impulsivity as a multi-dimensional construct consisting of several independent dimensions (Sharma et al., 2014; Whiteside & Lynam, 2001). Further, this model is consistent with other models finding that the four dimensions of impulsivity serve as mediators between ADHD symptoms and behavior (Roberts et al., 2014). In terms of causal order between ADHD symptoms and impulsivity, our model is consistent with

ADHD having a direct biological basis, as manifested in structural brain differences, as well as empirical studies finding that ADHD symptoms lead to impulsivity traits rather than the other way around (Pironti et al., 2016: 283): "*Our results suggest that high impulsivity traits … are part of the clinical phenotype of adults with ADHD, rather than personality traits harbouring an increased risk for the disorder."* Next we develop hypotheses for the relationships of the model.

Insert Figure III- 1 about here

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3 Hypotheses

3.1 ADHD Symptoms, Sensation Seeking and Entrepreneurship

Under normal circumstances, people with ADHD symptoms often experience under-arousal (Barkley, 1997; White, 1999). They require higher levels of arousal from external activities to release neurotransmitters, such as dopamine, that could provide the desired physical and psychological excitement (Linnet, Rojskjaer, Nygaard, & Maher, 2006; Nicolaou, Shane, Cherkas, & Spector., 2008). Therefore, they seek external stimulation to increase activity and sensory experiences by engaging in novel and risky activities and become sensation seekers (White, 1999). Thus, ADHD symptoms are likely to be positively linked to the sensation seeking dimension of impulsivity. Empirically, there is support for this notion. Sensation seeking is positively correlated with hyperactivity symptoms among college students (Roberts et al., 2014) and adults diagnosed with ADHD show higher sensation seeking than controls (Garland, 1999; He et al., 2015) just like those diagnosed with ADHD during childhood show higher levels of sensation seeking than controls later in life (Anckarsater et al., 2006). This suggests that *ADHD symptoms will positively influence sensation seeking.*

In terms of sensation seeking and entrepreneurship, because entrepreneurship entails the creation of new means-ends frameworks (Schumpeter, 1934), there will be limited similarity to previous businesses, which leads to uncertainty (Knight, 1921). Decisions have to be made when there are no historical trends, no compatible industry peers, and little market information (Miller & Friesen 1984). These conditions can lead to a high level of uncertainty which will impact the perceived desirability of entrepreneurship for a prospective entrepreneur when coupled with the entrepreneur's subjective assessment of this uncertainty (Ajzen, 1991, 2011), and their inclination to tolerate the uncertainty (McMullen & Shepherd, 2006; Zhao et al., 2010).

There is research to suggest that uncertainty itself exerts a pull on people high on sensation seeking (Leland, Arce, Feinstein, & Paulus, 2006). Sensation seekers may be more disposed to act under conditions of uncertainty than bothers because the find operating under uncertainty intrinsically satisfying (Rosenbloom, 2003; Zuckerman, 1994). People high on sensation seeking may therefore find it more desirable to bear the uncertainty associated with entrepreneurial action and will have stronger entrepreneurial preferences than those low on sensation seeking.

People who are high on sensation seeking may also approach new situations more positively (Nicolaou et al., 2008). Specifically, research found that sensation seekers have an inherent desire and curiosity to explore and learn about the environment, especially when the environment contains novel stimulus (e.g. Ball & Zuckerman, 1990; Jackson, 2011; Pickering, 2004). Their curiosity about the environment could enhance their mastery goal motivation, i.e., the motivation to acquire new skills and master the surroundings (O'Connor & Jackson, 2008). The entrepreneurship context represents a highly exploratory and flexible environment that would be appealing to sensation seekers. Sensation seekers may thus be less discouraged by

setbacks that could be encountered in the entrepreneurship context and instead view them as valuable learning opportunities for mastering new skills and situations. Such attitudes can be important for forging ahead and acting on their entrepreneurial preferences. As a result, sensation seekers are also more likely to act entrepreneurially and to engage in entrepreneurial behavior. The anticipated positive relationship between ADHD symptoms and sensation seeking and the positive influences of sensation seeking on entrepreneurial preferences and entrepreneurial behavior are consistent with the paths in Figure 1 and lead to the following hypotheses:

Hypothesis 1. *(a) ADHD symptoms positively influence sensation seeking. Sensation seeking positively influences (b) entrepreneurial preference and (c) business startup.*

Hypothesis 2. *Sensation seeking mediates the relationship between ADHD symptoms and (a) entrepreneurial preference and (b) business startup*

3.2 ADHD Symptoms, Lack of Premeditation and Entrepreneurship

As part of their inhibition deficits, people with ADHD exhibit underdeveloped working memory capacity (Barkley, 1997; see also Martinussen, Hayden, Hogg-Johnson, & Tannock, [2005] for meta-analytical evidence]). Working memory is used for holding and processing old and new information. Thus, it plays an important role in recalling information (hindsight) and in developing plans for the future (forethought). As a result, people with ADHD symptoms are less proficient in the anticipation and planning of future events and are more influenced by what goes on around them at any given time and are more influenced by the immediate, rather than long-term, consequences of their actions (Barkley, 1997). As such, ADHD symptoms are positively linked to lack of premeditation.

In terms of the link between premeditation and entrepreneurship, individuals high on lack of premeditation are less likely to feel fear and worry when facing an uncertain opportunity

because they tend to overlook the negative consequences (Whiteside & Lyman, 2001). People who don't premeditate are more likely to be attracted to entrepreneurship and have stronger entrepreneurial preferences because they likely ignore negative information suggesting that the risk of failure is high. They are also more likely to forge ahead and act on their preferences because they don't consider all the consequences of their actions. Consistent with this notion, entrepreneurs tend to be more over-optimistic than non-entrepreneurs (Lowe & Ziedonis, 2006) and to focus on upside potential rather than downside risk (Kahneman, 2011). The anticipated positive relationship between ADHD symptoms and lack of premeditation and the positive influences of lack of premeditation on entrepreneurial preferences and entrepreneurial behavior are consistent with the paths in Figure 1 and lead to the following hypotheses:

Hypothesis 3. *(a) ADHD symptoms positively influence lack of premeditation. Lack of premeditation positively influences (b) entrepreneurial preference and (c) business startup.*

Hypothesis 4. *Lack of premeditation mediates the relationship between ADHD symptoms and (a) entrepreneurial preference and (b) business startup*

3.3 ADHD Symptoms, Lack of Perseverance and Entrepreneurship

Deficits in working memory, such as those associated with ADHD symptoms, are likely associated with impaired ability to stay focused on the task at hand and to control outside disturbances (Barkley, 1997). This is consistent with the inattention aspect of the ADHD diagnosis. Such lack of perseverance has been found in empirical studies of people with ADHD (Marx, Domes, Havenstein, Berger, Schulze, & Herpertz, 2011; Pelletier, Hodgetts, Lafleur, Vincent, &Tremblay, 2013). Thus, we expect that *ADHD symptoms will be positively associated with lack of perseverance* (Miller, Flory, Lynam, & Leukefeld, 2003).

Regarding lack of perseverance and entrepreneurship, those who score high on this variable tend to have difficulty persevering when tasks become difficult (Whiteside & Lynam, 2001) and/or to have difficulties disregarding irrelevant information and inhibiting irrelevant thoughts (Bechara & Van der Linden, 2005). Because of their inability to sustain attention, they often find it difficult to fit in existing organizations where rules, sustained attention and cooperation are important (Barkley & Murphy, 2010). As a result, people who lack perseverance may prefer an environment where they can work independently and have extensive autonomy (Mannuzza, Klein, Bessler, Malloy, & LaPadula, 1993), such as entrepreneurship. In addition, entrepreneurs tend to be jacks-of-all-trades rather than experts in any specific area (Lazear, 2004). This is attractive to those who lack perseverance because they have challenges with repetitive tasks preferring non-repetitive and novel tasks (Whiteside & Lynam, 2001). Because of the varieties of entrepreneurial activities that can be tried and performed with limited need for mastery (Lazear, 2004), individuals who lack perseverance will find entrepreneurship attractive, leading to high entrepreneurial preferences.

Although being attracted to entrepreneurship, people high on lack of perseverance are less likely to engage in entrepreneurial behavior. Assessing whether a situation represents a true entrepreneurial opportunity requires the processing of extensive amounts of uncertain and complex information (McMullen & Shepherd, 2006). Those high on lack of perseverance have problems remaining focused and discriminating relevant from irrelevant information (Bechara & Van der Linden, 2005). People who lack perseverance will doubt that they can correctly assess the situation and draw the correct conclusion, which leads to anxiety (Zermatten & Van der Linden, 2008) and subsequent inaction because under uncertainty, anxiety inhibits action (Paulus, 2007). Moreover, actually starting a business typically takes a long time, on average

around 3 years (Reynolds & Miller, 1992) and close to half of all startup attempts are abandoned before the business is up and running (Delmar & Shane, 2003) because many activities are more expensive, difficulty, and time-consuming than anticipated (van Gelderen, 2012). Therefore, even if those who lack perseverance initiate actions towards starting a business, they would be likely to abandon the attempts before the business is up and running. Taken together, this leads to the following hypotheses:

Hypothesis 5. *(a) ADHD symptoms positively influence lack of perseverance. Lack of perseverance (b) positively influences entrepreneurial preference and (c) negatively influences business startup.*

Hypothesis 6. *Lack of perseverance mediates the relationship between ADHD symptoms and (a) entrepreneurial preference and (b) business startup*

3.4 ADHD Symptoms, Urgency and Entrepreneurship

ADHD is associated with poor emotional regulation due to impaired executive functioning (Barkley, 1997). Thus, people with ADHD often exhibit emotional lability or emotional ‘‘hyper-responsiveness’’ (Barkley, 1997), and these symptoms have been consistently considered as significant features of the disorder (Skirrow, McLoughlin, Kuntsi & Asherson, 2009). Not surprisingly, urgency and neuroticism, which indicate heighted emotional responsiveness and instability, have been positively related to ADHD symptoms (Miller et al., 2003; Nigg et al., 2002; White, 1999). This suggests that *ADHD symptoms are positively linked to urgency*.

People higher on urgency are more sensitive to negative cues and are more likely to identify uncertain conditions as threatening (Paulus, 2007). They experience negative emotions more frequently and more strongly than others (Billieux, Gay, Rochat, & Van der Linden, 2010).

Because entrepreneurship is uncertain, it likely induces anxiety among those high on urgency, who will find entrepreneurship less attractive. Further, urgency is related to emotional instability (Settles et al., 2012). Emotionally unstable persons are vulnerable to psychological stress and are sensitive to negative feedback tending to become discouraged by small failures under difficult situations (Zhao et al., 2010). The anticipation or experience of negative emotions may inhibit people from engaging in behavior (Loewenstein, Weber, Hsee, & Welch, 2001). Further, high urgency is also likely to impede entrepreneurial actions because entrepreneurs often have to find the wherewithal to stay focused on conducting the activities necessary to launch their businesses and to encourage themselves in the face of challenges and negative feedback (Zhao et al., 2010). However, those with high urgency are likely to be sensitive to negative feedback. These arguments lead to the following hypotheses:

Hypothesis 7. *(a) ADHD symptoms positively influence urgency. Urgency negatively influences (a) entrepreneurial preference and (c) business startup.*

Hypothesis 8. *Urgency mediates the relationship between ADHD symptoms and (a) entrepreneurial preference and (b) business startup*

4 Method

4.1 Research Design and Sample

To test our hypotheses, we collected survey data from MBA alumni who had graduated from an AACSB accredited US business school which is consistently ranked among the top 50 public business schools in the USA. The overall average starting base salary for MBA graduates from that school was $68,000. Of those graduating between 2004 and 2016, 77% had no prior work experience when admitted. Of those with work experience the average amount was 3.23 years with a range of 1-12 years. For those with no work experience, the average starting base

salary was $66,000, with a range of $31,000-$200,000. For those with work experience, the average starting salary was $72,111 with a range of $27,000-$150,000. This sample has some notable advantages. Entrepreneurship is a minority phenomenon (Davidsson, 2004) and it is important to find a sample with a reasonably high entrepreneurial preferences and incidents of business startups, which is more likely among MBA alumni (Crant, 1996). An MBA degree is among the most attractive in the labor market, making it less likely that people in our sample would be pushed into entrepreneurship because of limited other employment options. This is a particularly important consideration when examining ADHD symptoms and impulsivity as both are associated with problems in the labor market (Faraone & Biederman, 2005).

Data were collected in 4 rounds, six months apart. In Round 1 of data collection we sent emails with a link to a survey to 4,574 MBA alumni, with two follow-up reminders sent one week apart. The survey was open for one month from the initial date. After removing 6 cases with severe internal missing values (25% or over), a total of 559 individuals completed the survey for a 12% response rate. We noted that 56 respondents had skipped individual scale items, in particular for the long (45 items) impulsivity scale. To make maximum use of the data we imputed

missing values if a maximum of 2 item values were missing for a scale.[5] This produced and effective samples size of 545 respondents of which , 67% (364) are male, with an average age of 41 years (S.D.=12.81), average work experience of 18 years (S.D.=13.32), and 186 (34%) have started a business and 90% (490) of which are Caucasian.

[5] For example, if item 2 of a scale with a total of 8 items was missing we regressed item 2 on remaining items. Regression-based imputation allows us to utilize information from items that supposedly have a close relationship with missing items. This method has been found to be effective for self-reports scales, especially when the number of missing values are relatively small (around 10%) (Shrive et al., 2006).

In round 1 we collected all data needed to test our conceptual model (i.e., all hypotheses). However, in order to avoid relying solely on cross-sectional data, and to allow for alternative model specifications, robustness tests, and complementary analyses, we collected three additional rounds of data, at about 6 month intervals, using the same procedure. The target for these survey rounds were the 559 respondents from Round 1. Response rates were 333 (60%), 290 (52%), and 257 (46%) respectively. [6]

4.2 Dependent Variables

Entrepreneurial preference (Round 1). We employed the 4-item measure developed by Zhao, Seibert and Hills (2005) to capture entrepreneurial preference. This measure has been used and validated in previous studies (e.g., Gupta, Turban & Bhawe, 2008). Most often, the variable is labelled intention. However, we believe that it better reflects preferences as it contains no reference to how hard people are willing to work, which is part of the definition of behavioral intention (cf. Ajzen 1991). We asked respondents how interested they were in engaging in four prototypical entrepreneurial activities (starting a business, acquiring a small business, starting and building a high-growth business, and acquiring and building a company into a high-growth business) within the next 5 to 10 years. A 5-point Likert scale was used, ranging from 1 (very little) to 5 (a great deal). Initial analysis revealed that four items had high internal consistency with a Cronbach's Alpha score of 0.94. Exploratory factor analysis confirmed that the four items loaded on one factor. Thus, the four items were averaged to form an overall composite measure.

At Round 2, 3 and 4, we used an alternative scale to tap entrepreneurial intentions (Linan, 2009), which allows us to estimate convergent validity. Correcting the scales for measurement error as recommended in the literature (Brown, Davidsson & Wiklund, 2001; Schmitt, 1996), the correlation of the underlying constructs were 0.80, 0.64, and 0.64 for Rounds 2-4. This suggests

[6] All questions included in the different survey rounds are included in Appendix 6.

acceptable convergent validity (Robinson et al., 1991). Given that the scales were developed somewhat based on different constructs (see Linan & Chen, 2009), we would not expect higher correlations.

Business startup (Rounds 1, 2 and 4). Because business startup is a rare phenomenon affecting only a small share of the population in any given moment, we measured business startup cumulatively by asking *during Rounds 1,2, and 4* "Have you ever started a business". Out of the 545 respondents in Round 1, 162 responded yes (coded 1), and 383 responded no (coded 0). Out of those responding no in Round 1, 19 then responded yes in Round 2, and another 5 who responded no in Rounds 1 and 2 responded yes in Round 4. Thus, 162 had started a business before our study, and another 24 started a business during the two years of the study for a total of 186 (34%) who had started a business and 359 (66%) who had never started a business.

The repeated measure of this variable allowed us cross-validate responses across rounds. Business startup is irreversible. Thus, anybody who answered yes to this question should not respond no during a later survey round. However, we found that of the 162 who responded yes in Round 1, 12 responded no in Round 2, and another 12 in Round 4. We also found one case who responded yes in Round 1, did not answer the question in Round 2, and responded no in Round 4. We dealt with these cases based on their responses in Round 4. If they responded to this question in Round 4, we equated their responses to what they responded in Round 4. If they did not respond to this question in Round 4, we deleted their observations. In the end, 5 observations were deleted leaving us with 540 cases for analyses when business startup is the dependent variable. Out of these, 164 (30%) cases started a business while 376 (70%) cases didn't.

Because ADHD symptoms and impulsivity are stable individual characteristics that don't change over time, the risk for reverse causality and retrospective bias should be minimal.

Contemporaneous Business startup (Round 2). In order to minimize the risk of reverse causality we also included a contemporaneous measure of business startup, using it as an alternative dependent variable to validate the robustness of our results. These data were collected during Round 2. We asked respondents: "Are you currently, alone or with others, trying to start a business." This question is used in GEM and PSED to tap if people are engaged in business startup activity. Respondents that indicated "yes" were coded 1 and respondents who answered "no" were coded 0. Of the 545 respondents from Round 1, 327 provided responses to this question. 282 (86%) answered no while 45 people (14%) answered yes.

Entrepreneurial Performance (Round 4). In the fourth wave, we asked respondents who had started a business about their performance, thus exploring whether factors that influence entrepreneurial preferences and behavior also influence performance. We used the scale of Wiklund & Shepherd (2013). including subjective ratings of profits, sales development, cash flow and market value compared to main competitors on a 5-point scale. Of the 164 individuals who had started a business, 71 responded to these questions (Cronbach's Alpha = 0.95). EFA confirmed that the four items loaded on one factor.

Failure (Round 4). As an alternative performance measure, we also asked these respondents about possible failure, leading to 71 responses (out of 164). We asked them if they still operated their business and if not, for what reason (retirement, took an outside job, the business failed and other). Those who failed were coded "1" and the others "0". Nine (13%) had started a business that failed and 62 (87%) had not.

4.3 Independent Variables

ADHD symptoms (Round 1, 3 and 4). Following previous research (e.g., Nigg et al., 2002; Verheul et al., 2015; Thurik et al., 2016) we focus on the underlying ADHD disposition

(ADHD symptoms) rather than the ADHD diagnosis using the the adult ADHD self-report scale (ASRS-6). This is a screening scale for use in the general population and has been validated in various settings (Kessler et al., 2005) composed of six questions measured on 5-point scales (1=never; 5=very often). Four questions concern inattentive symptoms and two hyperactive symptoms[7]. Initial analysis showed the Cronbach's Alpha for the ASRS-6 scale was 0.61, which is lower than Kessler et al. (2007). confirmatory factor analysis (CFA) suggested the scale be split into one inattention and one hyperactivity dimension. The Cronbach's Alpha was 0.68 for both scales.[8]

The ASRS-6 scale has high concordance with actual clinical diagnoses (Kessler et al. 2005, 2007) and outperforms the longer 18-item ASRS-v1.1 in terms of the proportion of actual ADHD individuals who are correctly identified, the proportion of non-ADHD individuals incorrectly identified and total classification accuracy (Kessler et al. 2005; Das, Cherbuin, Anstey, Abhayaratna, & Easteal, 2014). Based on the criteria developed by Kessler et al. (2007) and widely adopted in practice[9], 78 cases (14%) out of 545 respondents may be diagnosed with ADHD.

The same measure for ADHD was used again in Rounds 3 and 4 to assess the test-retest reliability of the scale. In Round 3, 118 individuals completed the scale (Chronbach's Alpha = 0.74). The mean score was not significantly different from Round 1 and the test–retest coefficient of reliability was 0.74. In Round 4, 254 individuals completed the scale (Chronbach's

[7] A new ASRS scale adapted to the most recent DSM-5 is currently under development (see Ustun et al., 2017). We relied on the established scale based on DSM-4.

[8] Given that the items are part of a short screener of a heterogeneous latent construct, reliance on non-overlapping items is appropriate. Therefore, low alpha values are appropriate. High alpha values would suggest the screener could be further thinned. Standardized coefficient alpha would be a more accurate estimate for two-item scale (Eisinga, Grotenhuis & Pelzer, 2013). The standardized coefficient alpha for hyperactivity scale is 0.69.

[9] If an adult answers "Sometimes", "Often" or "Very Often" to the three inattentive symptom questions, they are coded 1 for each question. If they answer "Often" or "Very Often" to the last inattention symptom and the two hyperactive symptom questions, they are coded 1 for each question. If these scores add up to 4 or more, there is a high probability that the person would be diagnosed with ADHD.

Alpha = 0.61). The mean score was not significantly different from the Round 1 and the test-retest coefficient of reliability was 0.70. According to conventions, this corresponds to good test-retest reliability (Robinson et al., 1991). These authors suggest that the test-retest reliability coefficient should be higher than 0.5 for time intervals of more than 1 year.

Impulsivity (Round 1). Impulsivity was assessed using the 45-item UPPS Impulsive Behavior Scale (Whiteside & Lynam, 2001) which has been validated in numerous studies. The four subscales contain 10 to 12 items each with high levels of internal consistency: sensation-seeking= 0.89; lack of premeditation=0.86; lack of perseverance= 0.82; urgency = 0.90. EFA showed that all items loaded on their corresponding factors with limited cross loadings.

4.4 Control Variables

General self-efficacy (Round 1). We controlled for general self-efficacy using a scale developed by Chen, Gully and Eden (2001), focusing on the belief in one's general capabilities in performing activities and overcoming challenges under different kinds of situations (Chen et al., 2001; Eden & Aviram, 1993). This measure was an eight-item, five -point scale (1 = strongly disagree; 5 = strongly agree). EFA confirmed that the eight items loaded on one factor (Cronbach's Alpha = 0.89. The eight items were averaged to form an overall measure.

Gender (Round 1). Across countries, men are twice as likely as women to become entrepreneurs (Acs, Arenius, Hay, & Minniti, 2005). Thus, we controlled for gender with females coded "0" and males coded "1".

Age (Round 1). Previous studies suggest that age influences the propensity to start a business (e.g., Brockhaus, 1982). Thus we controlled for the respondents' age.

Race (Round 1). Race influences the propensity of engaging in entrepreneurship (e.g., Koellinger & Minniti, 2006). Building on the PSED II we included choices for 6

races/ethnicities. More than 90% of respondents were white, so we dichotomized this variable into whites and non-whites.

Work experience (Round 1). The unique knowledge obtained through work is important for venture creation (e.g., Shane, 2000). Thus, we controlled for the respondent's years of work experience.

5 Analyses and Results

Following recommendations (e.g., Keith, 2014), we validated our scales using CFA first entering all items for multi-item constructs (i.e., entrepreneurial preference, ADHD symptoms, general self-efficacy and the four dimensions of impulsivity) into one analysis, allowing covariance among constructs. This showed an unsatisfactory model fit[10]: We then we deleted items loadinf below 0.6 on their respective constructs (Anderson & Gerbing, 1988; Awang, 2014). Nineteen items from the impulsivity scale were deleted, leaving 6 items for lack of premeditation, 8 items for urgency, 8 items for sensation-seeking and 4 items for lack of perseverance.[11] The CFA also suggested that inattention and hyperactivity should be split into two separate constructs and that one of the items of inattention should be dropped. Some prior studies have found that inattention and hyperactivity constitute two different constructs (e.g., Hesse, 2013) and may arise from different mental processes that need not be correlated (Carlson & Mann, 2002). With these modifications, we reran the CFA, this time resulting is satisfactory fit[12].

We checked composite reliability (CR) and discriminant validity of the key constructs for the re-specified model. CR for each dimension of impulsivity was well above the recommended

[10] The Comparative Fit Index (CFI) was 0.832, the Tucker Lewis Index (TLI) was 0.823, the Incremental Fit Index (IFI) was 0.833, and the Root Mean Square Error of Approximation (RMSEA) was 0.055.
[11] The original items and the trimmed items are shown in Appendix 6.
[12] (CFI = 0.907, TLI = 0.900, IFI = 0.908 and RMSEA = 0.055)

level for scale development (Lance et al., 2006). Sensation-seeking had a CR score of 0.90; Lack of premeditation 0.83; Lack of perseverance 0.83; and Urgency 0.90. Inattentive symptoms and hyperactive symptoms had lower CR, but were very close to 0.7 (0.70 and 0.69 respectively).[13] In terms of discriminant validity, for each construct, the square root of the average variance should be higher than its bivariate correlation with any other construct (Fornell & Larcker, 1981). The bivariate correlation for any two constructs ranged from 0.000 to 0.622, and the square root of average variance explained for each construct ranged from 0.661 to 0.888 providing evidence of discriminant validity. Table 1 shows the composite reliability and discriminant validity index.

Table 2 provides descriptive statistics for key constructs and correlations, using the trimmed impulsivity scales. The inter-correlations among the four dimensions of impulsivity (i.e., sensation seeking, lack of premeditation, lack of perseverance, and urgency) are relatively low, confirming Whiteside and Lynam (2001)'s claim that these dimensions are distinct and independent facets of impulsivity.

We used Ordinary Least Square (OLS) regression to test the hypotheses related to entrepreneurial preferences (validated by SEM, see below). To test hypotheses related to business startup, which is a binary 0/1 variable, we used logistic regression. To eliminate possible effects of multicollinearity among the impulsivity dimensions, the variables were orthogonalized using the modified Gram-Schmidt procedure (Colub & Van Loan, 1996). Robust standard errors were used. We computed the variance inflation factor (VIF) scores which ranged from 1.02 to 9.39, below the threshold value of 10 (Neter, Kutner, Nachtsheim, & Wasserman, 1996).

[13] Lance et al. (2006) reinforced that Nunnally's (1978) critical value for scale reliability should be exceeding 0.8 for most basic research.

To test mediation, we use the PROCESS approach (Preacher and Hayes, 2008) that allows for simultaneous examination of multiple mediators in a single model. As recommended, we used 1000 rounds of bootstrapping. This approach is superior to Baron and Kenny's (1986) (see Chapter 6 of Hayes [2013]) for details. In particular, Hayes statistically significant direct effects are not needed to establish mediation. For example, an independent variable may exert both positive and negative indirect effects cancelling out each other., leading to a non-significant direct effect. Since we hypothesize that ADHD symptoms have both positive and negative indirect effects, this approach to mediation tests is more appropriate.

We do not use SEM for our main testing of hypotheses for four reasons. First, SEM relies on maximum likelihood estimation which requires multivariate normality (Jackson, 2003), something which was not satisfied by our data (Doornik-Hansen [2008] normality test: $\chi 2=768.11$, $p<0.05$). Second, the recommended minimum sample size in SEM is 10 to 20 times the number of parameters estimated (e.g., Jackson, 2003). Our model contains 119 parameters, and our sample size is 545, making this ratio around 5. Third, Preacher and Hayes (2008)'s approach and the related PROCESS macro has been previously validated and adopted (e.g., Bradley et al., 2011; Jones et al., 2014; Bonte et al., 2015) and has the benefit of ease of interpretation. Finally, SEM may not be ideal for binary dependent variables (Finney & DiStefano, 2006), which we have in one of our models.

The results of the hypothesis tests are presented in Tables 3 and 4. We first test the influence of ADHD symptoms on the four facets of impulsivity, corresponding to Hypotheses 1a, 2a, 3a, and 4a, controlling for self-efficacy, gender, age, race, and work experience. Results are shown in Table 3, Models 1, 2, 3, and 4. Among the control variables, we note that self-efficacy positively influences sensation seeking, and negatively influences lack of perseverance

and urgency. Gender (being male) positively influences sensation seeking and negatively influences lack of premeditation and urgency, which is consistent with studies of gender differences in impulsivity (Whiteside & Lynam, 2009; Cross, Copping & Campbell, 2011). We also note a negative influence of age and a positive influence of work experience on sensation seeking. Interestingly, the influences of inattentive and hyperactive symptoms are different across the models. Inattentive symptoms are positively related to lack of perseverance (B: 0.64; $p<0.000$) and urgency (B: 0.23; $p<0.01$). In contrast, hyperactive symptoms are positively related to sensation seeking (B: 0.25; $p<0.000$), lack of premeditation (B: 0.15; $p<0.01$) and urgency (B: 0.17; $p<0.000$). These findings are consistent with our hypotheses.

Models 7 and 10, respectively, test the hypotheses concerning the relationship between the four dimensions of impulsivity on the one hand and entrepreneurial preference and business startup on the other, including control variables (Models 5 and 8) and also controlling for the effect of ADHD inattentive and hyperactive symptoms (Model 6 and 9). Self-efficacy and gender (male) positively influence entrepreneurial preferences, while age has a negative influence in Model 5. Gender (male) and work experience positively influence business startup in Model 8, which is consistent with prior research. No direct influence is noted from the ADHD symptoms in Model 6 or Model 9, which provides preliminary evidence for our mediation hypotheses. In terms of the hypotheses, we find that sensation seeking positively influences entrepreneurial preference (B: 0.33; $p<0.000$) and business startup (log OR: 0.38; $p<0.01$). Lack of premeditation increases entrepreneurial preference (B: 0.10; $p<0.05$) but has no influence on actual startup (log OR: 0.17; $p>0.10$). Lack of perseverance has no influence on entrepreneurial preference (B: -0.069; $p>0.05$) or business startup (log OR: 0.09; $p>0.05$). Finally, urgency is

negatively related to entrepreneurial preference (B:-0.12; $p<0.05$) but has no influence on business startup (log OR: -0.10; $p>0.05$).

The results of the mediation tests are shown in Table 4. Inattentive symptoms reduce entrepreneurial preferences through urgency (indirect effect: -0.03; $p<0.05$). In contrast, hyperactive symptoms increase entrepreneurial preference through sensation seeking (indirect effect: 0.08; $p<0.05$) and lack of premeditation (indirect effect: 0.02; $p<0.05$), but reduce it through urgency (indirect effect: -0.02; $p<0.05$). On balance, the positive influences of hyperactivity are larger than the negative. Moreover, hyperactive symptoms increase business startup through sensation seeking (indirect effect: 0.09; $p<0.05$). Inattentive symptoms have no indirect effect on business startup. Thus, overall, it seems that the effects of inattentive and hyperactive symptoms are radically different with the former decreasing the preference for entrepreneurship, while the latter increases preference as well as actual startup, a theme we return to in the discussion section. We summarize the results of our hypotheses tests in Table 5.

Insert Tables III- 1 to III- 5 about here

5.1 Robustness Tests

We tested the robustness of our results by first conducting SEM analyses for the entrepreneurial preference dependent variable. We bootstrapped 1000 times and used bias-corrected percentile method because of non-normality of our data (Nevitt & Hancock, 2001; Stine, 1989). These results are qualitatively identical to our main analyses, confirming the robustness of our main analyses. All hypotheses supported in the main analyses were confirmed with SEM. We also tested our conceptual model piecewise, adding one mediating variable at a

time in separate models, conducting eight separate analyses rather than the two combined analyses. These eight analyses generated identical results for our hypothesis tests, suggesting that our findings are robust.

Further, our measurement of impulsivity was based on the original 45-item scale developed by Whiteside and Lynam (2001) trimmed to 26 items. As a robustness test, we reran the analyses only including the 16 items of the short UPPS scale (Cyders et al., 2014). The dimensions of impulsivity showed satisfactory reliability and discriminant validity. The measurement model also showed satisfactory model fit (CFI = 0.908, TLI = 0.891, IFI = 0.908 and RMSEA =0.061). When using this short version, the OLS regression results and the SEM results are identical to results using the UPPS trimmed scale in terms of hypotheses supported. Thus, our results are robust to different measurements of impulsivity[14].

Impulsivity and ADHD symptoms are associated with lack of planning and organization. Therefore, those scoring higher on these concepts may be less likely to fill out the survey, potentially leading to non-response bias. To test this, we conducted a one-way ANOVA comparing key characteristics of early and late respondents, assuming that the late responses are more similar to non-responses (Kanuk & Berenson, 1975). We found no significant differences between early and late responses in terms of any independent variables.

Finally, we used the common method factor to test for common method bias of our cross-sectional data (Richardson et al., 2009; Podsakoff et al., 2003). Specifically, we added a common method factor into the CFA allowing all items for ADHD, impulsivity, and entrepreneurial

[14] We also conducted three additional robustness checks by: 1. . Rerunning our analyses using complete responses (i.e., listwise deletion) instead of imputed missing values, 2. Including a contemporaneous measure of business startup, collected during Round 2, and 3. We checked if our results would remain robust when using original scores of impulsivity dimensions rather than the orthogonalized impulsivity prescribed by Bradley et al. (2011),. Our results were robust in each of these tests.

preference to load onto their respective factors as well as a common method factor. We then compared these results with our research model. Model fit did not change substantially ($\Delta\chi^2$ (Δd.f.)= 42.92(35), p>0.05; ΔCFI=0.003; ΔTLI=0.002; ΔRMSEA=0.002), indicating that common method bias should not be a major concern. Moreover, the nature of our variables (stable individual characteristics and actual behavior) should help safeguard against common method bias.

Overall, the extensive robustness tests that we have conducted make us confident that our results are robust and valid.

5.2 Post-Hoc Analyses

Our data allowed us to explore issues that are potentially interesting but that lie outside of our hypotheses. There is research to suggest gender differences concerning the main variables of interest (ADHD symptoms, impulsivity, entrepreneurial preference and business startup). In order to allow for a more fine-grained assessment than using a gender control variable, we split our sample by gender. There were 364 men and 181 women in our sample. The results of this analysis are presented in Appendices 2 (Males) and 3 (Females). For men, hypothesis support was identical to the full sample. For women, our results were generally weaker than for the overall sample. In part, this could be explained by the smaller sample size of women than men, which requires a larger effect size for statistical significance. However, not only were fewer effects statistically significant, the effect sizes were generally weaker and the model fit was not as good. Specifically, the following hypotheses 3a, 3b, 4a, 7a, 7b, 8a that were supported by the full sample, did NOT receive support for the women only subsample. Taken together, these results suggest that our conceptual model and hypotheses are better aligned with the behavior of men than women. This should not be completely surprising as prior research has devoted more

attention to male subjects when it comes to ADHD as well as to entrepreneurial and labor market behavior, and we build upon this prior research.

In the developing our hypotheses, we suggest that people high on sensation seeking and lack of premeditation would be attracted to uncertainty whereas those high on urgency would shy away from high uncertainty. We tested this suggestion by using the nature of the business as a proxy for uncertainty. Our Entrepreneurial Preference measure, consisting of 4 items, asks how interested the respondents are in "acquiring a small business" and in "starting and building a high-growth business" within the next 5-10 years. We suggest that preferences for "starting and building a high-growth business" would indicate greater attraction for high uncertainty, whereas preference for "acquiring a small business" would indicate an attraction to less uncertainty. We conducted separate regression analyses for each of these dependent variables. Our results, shown in Appendix 4, largely confirm our suspicions. Sensation seeking (0.38*** vs. 0.30***) and lack of premeditation (0.12* vs. 0.045) have a stronger positive relationship with the intention to start a high growth business compared to acquiring a small business while urgency (-0.14* vs. -0.10) shows the opposite relationship. These results suggest that the effects of ADHD symptoms and impulsivity on entrepreneurship may be most pronounced under highly uncertain environments.

Finally, we examined the impact of ADHD symptoms on performance, which is a third consideration in the P-E fit literature. We collected additional data during Round 4 asking those who had started a business about their *Entrepreneurial Performance* and *Failure*. Of those who had started a business, 71 provided complete responses. OLS and logistic regression analyses show that inattention reduces entrepreneurial firm performance through urgency (indirect effect: -0.21, $p < 0.05$). No other statistically significant results are noted. To some extent, this could be

because of the relatively small sample size which reduced the statistical power, in particular in the multivariate setting. Therefore, we conducted simple bivariate correlations among ADHD symptoms, impulsivity, performance and survival to further explore potential performance implications (see Appendix 5 for the correlation matrix). Given the investigative nature of this post hoc analysis and our small sample size we focus here on the general nature of the relationships rather than being overly concerned with the statistical significance of the findings with the realization that these findings should be interpreted with these limitations in mind. Focusing on the directions and magnitudes of the relationships, we can observe that sensation seeking is positively correlated with both performance and survival, whereas urgency is negatively related to both performance and survival. Lack of premeditation is positively related to survival but negatively related to performance. These coarse-grained results suggest that the sensation seeking positively influenced entrepreneurial preference and startup was also positively associated with performance, while urgency negatively influenced both entrepreneurial preference and survival and performance. We also find that both inattention (-0.08; -0.21) and hyperactivity (-0.24; -0.16) are negatively correlated with survival and with performance. The result for inattention reinforces the negative relationships we found concerning preferences, mediated via urgency, whereas the result for hyperactivity is different from what we found for entrepreneurial preferences and startup.

6 Discussion

6.1 ADHD and Entrepreneurship

Inspired by anecdotal evidence and recent research findings we set out to examine how ADHD symptoms may be adaptive in the entrepreneurship context. We found that inattention was negatively associated with entrepreneurship. This is somewhat surprising. Some suggest that

the inattentive component of ADHD symptoms relates to a particular cognitive style, rather than being a deficit (e.g., Grossman, Hoffman & Berger, 2015). These symptoms would be associated with reduced ability to deal with repeated stimuli (due to boredom and zoning out) but better ability to detect and attend to stimuli in a dynamic, fast changing environment, which could potentially be associated with better ability to discover unexpected entrepreneurial opportunities. However, our results only indicate negative implications of inattention. Importantly, our model provides insights into the underlying reasons for the negative influence. It seems that inattention is associated with urgency, which in turn reduces entrepreneurial preferences. People high on urgency are prone to experience anxiety (Whiteside & Lynam, 2001). Because entrepreneurship is associated with uncertainty and uncertainty typically invokes anxiety (Loewenstein et al., 2001), which is a strong inhibitor of action (Paulus, 2007). It is also important to note that three of the four items measuring inattention of the ASRS-6 explicitly include the words "trouble", "problems" and "difficulty", whereas none of the hyperactivity items include such negatively loaded words. Thus, it seems that the ASRS-6 captures the pathological aspects of inattention more than pathological aspects of hyperactivity[15]. Moreover, there seems that the inattention items of ASRS-6 actually tap into lack of perseverance more than inattention. For example, the first item of the scale reads "How often do you have trouble wrapping up the final details of a project, once the challenging parts have been done?" This overlap can potentially explain the overwhelming influence of inattention in the regression with lack of perseverance as the dependent variable.

Hyperactivity, on the other hand, seems to be an ADHD symptom that is positive in the entrepreneurship context and its positive associations with sensation seeking is particularly important. This is consistent with research suggesting that ADHD symptoms are associated with

[15] We thank one of the anonymous reviewers for making this insightful observation.

greater risk taking in decision making (Mäntylä et al., 2012) and that risk taking propensity is linked to entrepreneurship (Zhao et al., 2010). That risk taking mediates the relationship between ADHD symptoms and entrepreneurial preferences was also noted by Verheul et al. (2016). Our research findings support this causal pathway and we note that it is hyperactivity rather than inattention that is associated with sensation seeking and entrepreneurship.

Hyperactivity is also positively associated with entrepreneurial preferences via lack of premeditation and negatively associated with entrepreneurial preferences via urgency. This mixed influence is interesting and helps explain why there is no direct association between ADHD symptoms and entrepreneurial preferences. As noted earlier, prior research on ADHD and entrepreneurship has mainly focused on empirics, paying less attention to the theoretical mechanisms that bring about the phenomenon. Had we not considered how ADHD symptoms are manifested (i.e., in higher trait impulsivity) we would have erroneously concluded that ADHD symptoms would be unrelated to entrepreneurial intentions and business startup. This is an important contribution to the literature on ADHD and entrepreneurship.

6.2 Impulsivity and Entrepreneurship

Our theoretical model and findings also allow us to comment on the relationships between the four dimensions of impulsivity and entrepreneurship. A first observation is that the correlations among the dimensions are generally small to moderate, with the highest being 0.33 (between lack of perseverance and urgency). Thus, our multidimensional approach is supported.

We hypothesized and found that sensation seeking and lack of premeditation had a positive influence on entrepreneurial preferences, whereas urgency negatively influenced entrepreneurial preferences. No effect was found for lack of perseverance. Sensation seeking and lack of premeditation make people more attracted to uncertainty and less concerned about

potentially negative aspects of entrepreneurship, which makes entrepreneurship attractive (i.e., strong entrepreneurial preferences). However, people high on urgency are more emotionally vulnerable and unstable and as the uncertainty of entrepreneurship may lead to anxiety, this detracts from their entrepreneurial preferences.

While each individual effect is interesting, perhaps the most exciting aspect of these findings is the fact that two aspects of impulsivity exert a positive influence on entrepreneurial preference whereas urgency exerts a negative influence. This is particularly interesting given that the dimensions of impulsivity are largely independent of each other. Depending on which impulsivity traits are more pronounced, highly impulsive people will be more, or less, attracted to entrepreneurship. Our findings also provide a counterweight to the extensive work on entrepreneurial preferences and intentions which has focused on how rational thinking and planning influence entrepreneurial intentions, building on theories such as theory of planned behavior (cf. Krueger et al., 2000; Schlaegel & Koenig, 2014). Our research shows that there is more to the story. Even in our sample of MBA alumni, who have extensive training in rational thinking, impulsivity plays an important role in shaping entrepreneurial preferences (note our entrepreneurial preferences scale has been labeled entrepreneurial intentions in prior studies).

In terms of behavior, we hypothesized and found a positive influence of sensation seeking on business startup. These findings are consistent with studies that find a positive influence of risk taking propensity on entrepreneurship (Frese & Geliniek, 2014; Nieß & Biemann, 2014). We found no influence on startup of the other impulsivity dimensions. This lack of results should not be a total surprise as it is considerably harder to predict entrepreneurial action than preferences or intentions since entrepreneurial intentions often do not convert into behavior (see van Gelderen et al., 2015). In addition, people who do not premeditate or persist

may be prone to engage in startup attempts but easily give up when facing obstacles (Fayolle & Gailly, 2015; Patel & Thatcher, 2014).

Further, the differential relationship we find between dimensions of impulsivity and entrepreneurial preference/business startup speaks to the distinction between functional and dysfunctional impulsivity as highlighted by Dickman (1990) and Smillie and Jackson (2006). Functional impulsivity denotes the rapid tendency to grasp opportunities when such behavior is optimal. It has been found to be closely related to venturesomeness, enthusiasm, optimism and reward reactivity (Dickman, 1990; Smillie & Jackson, 2006). In contrast, dysfunctional impulsivity reflects the lack of forethought when such behavior causes difficulty. It has been found to be more closely related to lack of order, psychoticism and neuroticism (Dickman, 1990; Smillie & Jackson, 2006). The combination of sensation seeking and lack of premeditation beneficial for entrepreneurship may reflect functional impulsivity, whereas urgency, detrimental to entrepreneurship and closely associated with neuroticism, may reflect dysfunctional impulsivity.

Finally, our post hoc analyses provide some preliminary insight into outcomes in terms of entrepreneurial performance – an additional aspect of P-E fit. Our findings suggest that only sensation seeking is positively associated with both entrepreneurial performance and survival, while inattention, hyperactivity, lack of perseverance and urgency are negatively related to both performance and survival. Interestingly, lack of premeditation is negatively associated with performance, but positively associated with survival for entrepreneurs who have started firms suggesting that entrepreneurs' ability to act on their "gut feel" may be beneficial in adapting evolving environmental conditions. While the results of our post hoc analysis regarding the impact of ADHD dimensions on performance and survival point to a complex relationship that

merits further investigation, caution should be used in interpreting these findings as they are not supported by robust statistical findings.

It is worthy to note that our analysis provided strong support for the importance of sensation seeking by providing indication of a positive relationship between sensation seeking and all three aspects of P-E fit (i.e., attitude, behavior and outcome). This corresponds to previous literature (e.g., Nicolaou et al., 2008) that shows the importance of this personality factor in the entrepreneurial entrance decision. It seems that their appetite for uncertainty and their motivation for mastering the new environment enable them to select and act on entrepreneurship.

6.3 Implications for Entrepreneurship and P-E Fit Theory

ADHD symptoms and impulsivity traits are individual characteristics that can have negative implications in the labor markets, as evidenced by multiple studies (e.g., Fletcher, 2014). In this paper, we hypothesize and find some support for the notion that having more ADHD symptoms and scoring higher on impulsivity can be positively associated with entrepreneurship. This seems at odds not only with the mainstream research on ADHD and impulsivity but also with theorizing in entrepreneurship (cf. Miller, 2015, 2016). For example, a recent extensive meta analytical review of the entrepreneurship psychology literature (Frese & Gielnik, 2014) demonstrated that traits that are beneficial in other walks of life are also beneficial in the entrepreneurship context. However we argue that there may also be positive implications of seemingly negative traits.

We believe that our results and their implications can be fruitfully understood in relation to logics of action. In traditional corporate managerial roles impulsivity traits may be considered impediments to the application of systematic decision making tools used in this setting. However,

new ventures often face resource constraints not encountered by larger firms, and are unlikely to have access to the established routines, extensive analytical tools and elaborate hedging strategies used by their larger counterparts to identify opportunities and/or to reduce uncertainty (Lumpkin, McKelvie, Gras, & Nason, 2010). These smaller firms must, instead, rely on the decisions making heuristics, or the "gut feeling" of the firm's leadership. In larger firms these heuristics may not be sufficient to justify action, but in smaller firms which are more likely to have to act on incomplete information they may provide sufficient justification. In this instance the impulsivity of the leaders may be beneficial as it can allow the firm to act in the absence of complete information and can thereby facilitate decision-making and promote beneficial strategic action in these smaller entrepreneurial firms. Thus, the appropriate logic of action in an entrepreneurial context may differ significantly from the optimal process in larger corporations.

The psychology literature differentiates between rational and impulsive behavior. Rational behavior is defined as appropriate consideration of the consequences of behavior (Vigil-Colet & Codorniu-Raga, 2004; Strack & Deutsch, 2004) thus resonating with the logic of consequences on the Carnegie School. It is associated with reasoning, intentionality and reasoned action. Impulsive behavior is defined as the opposite – action without forethought, and insensitivity to the consequences of action (Reynolds, Ortengren, Richards, de Wit, 2006; Vigil-Colet & Codorniu-Raga, 2004).

Similarly, the Carnegie School has identified two logics of action (e.g., Cyert & March, 1963; March & Simon, 1958; March & Olsen, 2006; Simon, 1955). The logic of consequences is analysis based. A decision maker evaluates the future consequences of different courses of action and chooses the alternative believed to be associated with the most favorable outcomes. This is the logic implicitly or explicitly associated with most models of entrepreneurial action, for

example the widespread discovery, evaluation, and exploitation model (Shane & Venkataraman, 2000) or models discussing feasibility and desirability analysis (cf. McMullen & Shepherd, 2006).

The logic of consequences is contrasted with the logic of appropriateness. This logic emphasizes habitual rather than deliberate action. It is based on rules, which can be related to anything from routines, experience, knowledge, conventions, norms, or laws (Schulz, 2014). Although we often consider this logic to be associated with repetitive, routine actions, this does not have to be the case (March & Olsen, 2006).

In their in-depth study of entrepreneurs with ADHD diagnoses, Wiklund et al. (2016) proposed that they harness their impulsivity by acting according to an alternative logic without specifying the details of this logic. Based on our findings, we propose that ADHD symptoms and impulsivity lead people to prefer action speed over action accuracy and that this may be functional in entrepreneurship. New ventures have few established routines (Stinchcombe, 1965), and operate outside established norms (Aldrich & Fiol, 1994). Because of uncertainty and complexity, there is little meaningful information on which to base decisions and entrepreneurs may rely on biases and heuristics in their decision making (Busenitz & Barney, 1997). Therefore, there is little room for action based on organizational routines and habits; and the careful consideration of different courses of action and their consequences have limited value. There is research to suggest that while impulsivity impairs deliberation because it hampers the consideration of alternatives, it also facilitates action effort (Carver, 2005) as well as action speed (Dickman, 1990). For example, the on-the-spot decision to launch a new business in a new industry with hardly any money [e.g.,, Sam Shuen who launched U-haul and had its first trailer for rent within two weeks of not being able to rent his own one-way trailer] may be interpreted as

the application of decision heuristics based on prior experience, fueled by tendencies towards sensation seeking and lack of premeditation. In short – we believe that the idea of logics of action can be fruitfully used to understand how ADHD symptoms and impulsivity traits manifest in the entrepreneurship context. In particular, understanding the pros and cons of action speed vs. action accuracy seems valuable.

This study also contributes to the P-E fit literature. To some extent, employees can craft their own jobs (Wrzesniewski & Dutton, 2001), to achieve better fit between their abilities and the demands of the work tasks (Lu et al., 2014). Few, if any, have greater possibility than entrepreneurs to craft their jobs to fit their own idiosyncratic needs and abilities (Baron, 2010; Miner, 1994). However, entrepreneurs, and their level of autonomy to design their own work tasks, have received virtually no attention in the P-E fit literature (Baron, 2010). Moreover, this literature has generally examined the attitudes, behavior, and performance of typical workers, rather than workers with special characteristics or needs, such as those with ADHD. Similarly, the ADHD literature has paid little attention to work issues for those with ADHD, and even less specifically related to fitting work conditions (Lasky et al., 2016) What little exists largely deals with workplace accommodations (Nadeau, 1997), not considering that people with ADHD can be empowered to craft their own jobs to fit their special needs.

A recent exception from the above examined what jobs people with an ADHD diagnoses were engaged in and considered fitting (Lasky et al., 2016). Note that these findings concern those with an actual diagnosis, which would correspond to those scoring very high on the ASRS-6 scale. The study reached several interesting findings that inform our study. They found that work environments that are stimulating, challenging, busy, fast paced, intrinsically motivating, full of novelty and requiring multitasking may be particularly well suited for those with ADHD.

To a large extent, these are characteristics that we associate with entrepreneurship. Similarly, specifically examining entrepreneurs with an ADHD diagnosis, Wiklund et al. (2016) found that the subjects believed entrepreneurship was very fitting for them because it allowed them to focus on the work tasks they enjoy the most, to switch tasks when getting bored, and to engage in novel activities. At the same time, they had problems dealing with the complexity that resulted from the constant search for novelty, which led to anxiety. The financial side of running a business was also associated with anxiety and problems (Lasky et al., 2016; Wiklund et al, 2016). Thus, it seems that many aspects of entrepreneurship could be fitting for those with ADHD, but that the autonomy to design own work tasks can also lead to decisions that are detrimental and may enhance ADHD symptoms. In sum, the study of non-typical individuals (those with ADHD symptoms) and non-typical jobs (entrepreneurship) can lead to valuable new insights, but it can also test the boundary conditions of P-E fit theories. For example, job crafting is typically associated with positive outcomes (e.g., Lu et al, 2016), but it is possible that at very high levels of autonomy in job crafting (entrepreneurship), and for vulnerable individuals (those with ADHD), job crafting can potentially lead to negative outcomes (cf. Baron, 2010; Wiklund et al., 2016).

6.4 Implications for Practice

Our research also speaks to the importance of considering the importance of harnessing "negative" traits in organizations. Specifically, the differential influence of dimensions of ADHD symptoms and impulsivity on entrepreneurship highlights the possibility of designing effective intervention strategies to make best use of advantages and bypass disadvantages. For example, it would seem beneficial to provide a highly flexible and novel environment for individuals with

ADHD symptoms while at the same time offering emotional counselling and support to relieve their negative emotions such as anxiety and stress.

6.5 Limitations and Future Research

This study was designed to link ADHD symptoms to entrepreneurial preferences and behavior. A natural extension would be to focus instead of outcomes in terms of entrepreneurial performance. We were able to conduct some rudimentary analyses, but much more can be done. For example, our survey instruments for ADHD symptoms and impulsivity could be used to survey practicing entrepreneurs to assess several aspects of the performance of their businesses.

There were several limitations of our research that also provide opportunities for the future. First, our measure of actual P-E fit, i.e., business startup is overly course-grained. Ideally, we would have access to information as to whether people had engaged in any entrepreneurial action, as well as fine-grained assessment of the outcomes of these behaviors. We suspect that ADHD and impulsivity have a positive influence on engaging in entrepreneurial action, but not on success. Studying this empirically would constitute an important contribution. Second, our scale measuring ADHD symptoms exhibited low reliability, which possibly weakened our results. However, these values are not very different from results obtained by other studies using the same measurement scale. For example, the attention dimension has been found to have CR scores of 0.58 (Verheul et al., 2016) and 0.76 (Thurik et al., 2016) while the hyperactivity dimension had scores of 0.50 (Verheul et al., 2016) and 0.70 (Thurik et al., 2016). Specifically, the low values are, in part, a consequence of the relatively few items used to measure the constructs. Other scales exist, specifically an 18-item version of the same scale, which may be more appropriate. Further, we included the ASRS-6 measure again in Rounds 3 and 4, which allowed us to estimate test-retest reliability. The test-retest reliability was good. This suggests

that the measurement scale is valid. Finally, our sample of the MBA alumni is likely skewed away from those with severe ADHD symptoms because they are less likely to complete university degrees. Thus, caution is needed in generalizing our results to the general population.

Given that new ventures are rarely the result of only one individual, future research might examine how individuals with ADHD-like symptoms gather resources and organize teams when starting new ventures. We speculate that new venture founders who exhibit ADHD-like symptoms will move quickly to gather resources (e.g., financial, human), but may have trouble maintaining these relationships. Consequently, this will have a negative effect on venture performance. Relatedly, new venture founders often require financial capital beyond their own means. One avenue for future research worthy of inquiry is how individuals with ADHD-like symptoms or impulsivity, are perceived by venture capitalists (cf. Lerner, 2016). For example, Peter Thiel, a venture capitalist and first investor in Facebook, believes Asperger's syndrome, or some symptoms associated with it, to be an advantage in venture creation.

Figure III-1. Conceptual Model

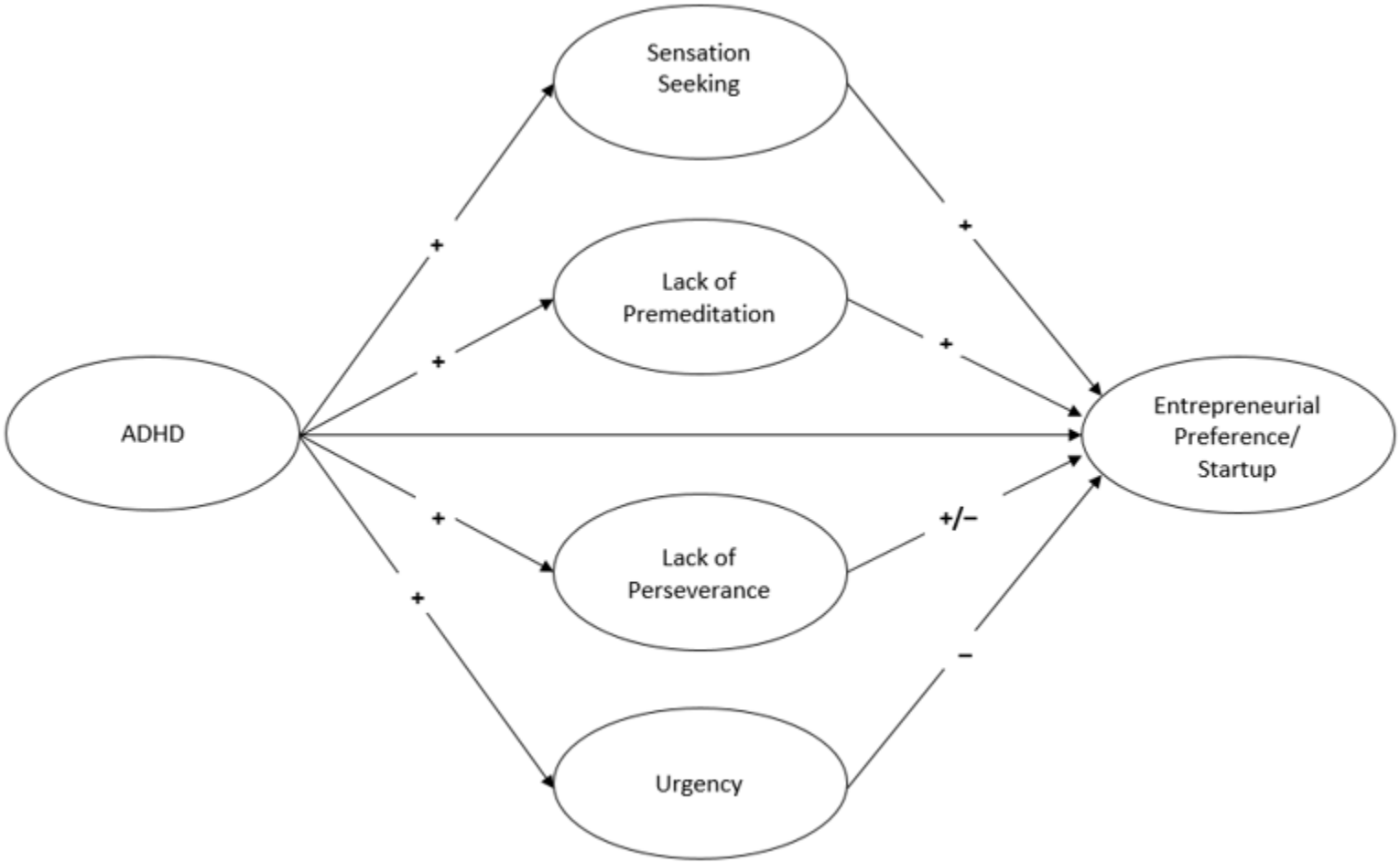

Table III- 1. The CR, Cronbach's Alpha and Discriminant Validity Index

	CR	Cronbach's alpha	Entrepreneurial preference	Inattentive symptoms	Hyperactive symptoms	Sensation Seeking	Lack of premeditation	Lack of perseverance	Urgency
Entrepreneurial preference	0.937	0.938	**0.888**						
Inattentive symptoms	0.699	0.686	0.000	**0.661**					
Hyperactive symptoms	0.686	0.682	0.185	0.173	**0.723**				
Sensation seeking	0.896	0.888	0.407	-0.079	0.385	**0.722**			
Lack of premeditation	0.829	0.826	0.091	0.165	0.208	0.250	**0.670**		
Lack of perseverance	0.827	0.823	-0.091	0.622	-0.032	-0.069	0.278	**0.741**	
Urgency	0.895	0.893	-0.137	0.409	0.211	-0.017	0.207	0.354	**0.719**

Note:
CR: composite reliability
The diagonal values (in bold) is the square root of AVE. The discriminant validity for all constructs is established when a diagonal value is higher than the values in other rows and columns.
CR and Cronbach's alpha values for these constructs are based on trimmed impulsivity and trimmed ADHD scales. Cronbach's alpha values reported in the Variable Section are based on original items.

Table III-2. Mean, Standard Deviation and Correlations

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12
1.Entrepreneurial preference	2.62	1.27	1											
2.Business startup	0.34	0.47	0.229***	1										
3.Inattentive symptoms	2.41	0.61	-0.0155	0.0471	1									
4.Hyperactive symptoms	2.89	0.96	0.132**	-0.0579	0.106*	1								
5.Sensation seeking	2.62	0.64	0.375***	0.138**	-0.0810	0.293***	1							
6.Lack of premeditation	1.89	0.43	0.0907*	0.0741	0.102*	0.178***	0.236***	1						
7.Lack of perseverance	1.68	0.45	-0.0808	0.0420	0.473***	-0.0109	-0.0775	0.213***	1					
8.Urgency	1.96	0.52	-0.131**	-0.0741	0.336***	0.165***	-0.0298	0.164***	0.329***	1				
9.General self-efficacy	4.30	0.48	0.156***	0.0632	-0.286***	0.0578	0.261***	-0.0969*	-0.428***	-0.296***	1			
10.Gender	0.67	0.47	0.267***	0.212***	0.0394	0.0271	0.218***	-0.118**	0.00619	-0.125**	0.0855*	1		
11.Age	40.64	12.81	-0.259***	0.273***	-0.0251	-0.255***	-0.179***	-0.00411	0.0988*	-0.0432	-0.00989	0.221***	1	
12.Race	0.90	0.30	-0.0513	0.00921	0.0132	0.0546	0.0538	0.0433	-0.0607	-0.00206	0.0745	0.0510	0.0498	1
13.Working experience	17.67	13.32	-0.225***	0.304***	-0.0424	-0.237***	-0.137**	0.00990	0.0713	-0.0774	0.0186	0.214***	0.958***	0.0775

Note:
Results are based on trimmed impulsivity and trimmed ADHD scale.
* p<.05; ** p < .01; *** p <.001.

Table III- 3. Regression Results for ADHD Symptoms, Impulsivity, Entrepreneurial Preferences, and Startup

DV	Sensation Seeking	Lack of Premeditation	Lack of Perseverance	Urgency	Entrepreneurial Preference			Business Startup		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
	B	B	B	B	B	B	B	Log-Odds	Log-Odds	Log-Odds
Intercept	-1.47**	0.29	0.88	-0.54	2.73***	2.57***	3.02***	-2.33*	-2.71*	-2.30
	(0.52)	(0.53)	(0.71)	(0.60)	(0.54)	(0.61)	(0.59)	(1.15)	(1.34)	(1.39)
Control Variables										
General self-efficacy	0.35***	-0.15	-0.63***	-0.23*	0.33**	0.32**	0.15	0.21	0.28	0.20
	(0.08)	(0.09)	(0.12)	(0.09)	(0.10)	(0.10)	(0.10)	(0.20)	(0.20)	(0.24)
Gender	0.50***	-0.44***	-0.012	-0.24**	0.89***	0.88***	0.74***	0.94***	0.95***	0.83**
	(0.09)	(0.09)	(0.08)	(0.09)	(0.10)	(0.10)	(0.11)	(0.24)	(0.25)	(0.26)
Age	-0.035**	-0.0016	0.014	0.024	-0.06***	-0.05***	-0.039**	-0.029	-0.032	-0.019
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.03)	(0.03)	(0.03)
Race	0.037	0.15	-0.16	0.097	-0.28	-0.29	-0.32*	-0.075	-0.074	-0.079
	(0.14)	(0.14)	(0.11)	(0.17)	(0.16)	(0.16)	(0.15)	(0.08)	(0.08)	(0.08)
Work experience	0.022*	0.0095	-0.0052	-0.025	0.02	0.02	0.012	0.073**	0.075**	0.066*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.03)
ADHD Symptoms										
Inattention	-0.044	-0.014	0.64***	0.23**		-0.001	0.086		0.17	0.16
	(0.07)	(0.07)	(0.08)	(0.09)		(0.08)	(0.09)		(0.18)	(0.20)
Hyperactivity	0.25***	0.15**	-0.0085	0.17***		0.05	-0.027		-0.083	-0.19
	(0.04)	(0.05)	(0.04)	(0.05)		(0.06)	(0.06)		(0.11)	(0.12)
Impulsivity										
Sensation seeking							0.33***			0.38***
							(0.06)			(0.11)
Lack of premeditation							0.10*			0.17
							(0.05)			(0.11)
Lack of perseverance							-0.069			0.088
							(0.06)			(0.13)
Urgency							-0.12*			-0.100
							(0.05)			(0.11)
Model										
N	545	545	545	545	545	545	545	540	540	540
F-value	20.96***	5.75***	32.42***	7.65***	33.44***	23.90***	21.60***			
Adjusted R2	0.19	0.05	0.32	0.09	0.20	0.19	0.26			
Log likelihood								-296.47	-295.80	-287.57
Wald chi2								58.28	58.01***	70.82***
McFadden Pseudo R^2								0.11	0.11	0.13

Note: Results are based on trimmed impulsivity scale, trimmed ADHD scale and orthognized impulsivity dimensions.

* p<.05; ** p < .01; *** p <.001.

Table III-4. Mediation Test: ADHD symptoms, Impulsivity, Entrepreneurial Preferences, and Startup

DV	**Entrepreneurial Preference**		**Business Startup**	
Indirect Effects		**95% Confidence Interval**		**95% Confidence Interval**
Inattention→Sensation Seeking→Entrepreneurial Preference/Startup	-0.01	[-0.06, 0.03]	-0.02	[-0.08, 0.03]
Inattention→ Lack of premeditation →Entrepreneurial Preference/Startup	-0.001	[-0.03, 0.01]	-0.002	[-0.04, 0.03]
Inattention→Lack of perseverance →Entrepreneurial Preference/Startup	-0.04	[-0.13, 0.02]	0.06	[-0.13, 0.23]
Inattention→Urgency →Entrepreneurial Preference/Startup	-0.03*	[-0.08, -0.005]	-0.02	[-0.11, 0.03]
Hyperactivity→Sensation Seeking→Entrepreneurial Preference/Startup	0.08*	[0.05, 0.13]	0.09*	[0.04, 0.18]
Hyperactivity → Lack of premeditation →Entrepreneurial Preference/Startup	0.02*	[0.001, 0.04]	0.03	[-0.004, 0.08]
Hyperactivity →Lack of perseverance →Entrepreneurial Preference/Startup	0.0006	[-0.004, 0.01]	-0.0003	[-0.02, 0.02]
Hyperactivity →Urgency →Entrepreneurial Preference/Startup	-0.02*	[-0.05, -0.003]	-0.02	[-0.07, 0.02]

Note: Results are based on trimmed impulsivity scale, trimmed ADHD scale and orthognized impulsivity dimensions.
* $p<0.05$.

Table III- 5. Summary of Hypotheses Tests

Hypothesis	**Results**
Hypothesis 1. *(a) ADHD symptoms positively influence sensation seeking. Sensation seeking positively influences (b) entrepreneurial preference and (c) business startup.*	1a supported for hyperactivity but not inattention. 1b supported 1c supported
Hypothesis 2. *Sensation seeking mediates the relationship between ADHD symptoms and (a) entrepreneurial preference and (b) business startup*	2a supported for hyperactivity but not inattention 2b supported for hyperactivity but not inattention
Hypothesis 3. *(a) ADHD symptoms positively influence lack of premeditation Lack of premeditation positively influences (b) entrepreneurial preference and (c) business startup.*	3a supported for hyperactivity but not inattention. 3b supported 3c not supported
Hypothesis 4. *Lack of premeditation mediates the relationship between ADHD symptoms and (a) entrepreneurial preference and (b) business startup*	4a supported for hyperactivity but not inattention 4b not supported
Hypothesis 5. *(a) ADHD symptoms positively influence lack of perseverance. Lack of perseverance (b) positively influences entrepreneurial preference and (c) negatively influences business startup.*	5a supported for inattention but not hyperactivity 5b not supported 5c not supported
Hypothesis 6. *Lack of perseverance mediates the relationship between ADHD symptoms and (a) entrepreneurial preference and (b) business startup*	6a not supported 6b not supported
Hypothesis 7. *(a) ADHD symptoms positively influence urgency. Urgency negatively influences (a) entrepreneurial preference and (c) business startup.*	7a supported 7b supported 7c not supported
Hypothesis 8. *Urgency mediates the relationship between ADHD symptoms and (a) entrepreneurial preference and (b) business startup*	8a supported 8b not supported

CHAPTER FOUR: ADHD SYMPTOMS, ENTREPRENEURIAL ORIENTATION (EO) AND FIRM PERFORMANCE[16]

ABSTRACT

Inspired by anecdotal evidence of successful entrepreneurs with attention deficit hyperactive disorder (ADHD), scholars have started to investigate the relationship between ADHD and entrepreneurship. However, there is limited understanding of whether or not ADHD symptoms of entrepreneurs are functional in terms of firm performance. Drawing on a sample of 242 entrepreneurs we found that impulsive and hyperactive symptoms of ADHD are conducive to firm performance while inattention symptoms are not. Further, the positive relationship between ADHD symptoms and firm performance is fully mediated by Entrepreneurial Orientation (EO). We discuss the implications of our findings for entrepreneurship literature.

[16] This paper has been developed with input from Dr. Johan Wiklund

1 Introduction

There is increasing interest in the relationship between attention deficit hyperactive disorder (ADHD) symptoms and entrepreneurship. Initial research suggests that entrepreneurship is attractive to people with ADHD symptoms resulting in higher entrepreneurial intention and action (Verheul et al., 2015, 2016; Wiklund et al., 2017), and that ADHD symptoms are related to higher Entrepreneurial Orientation (EO) among small business owners. These results suggest that entrepreneurship may provide an environment where individuals with ADHD could extract positive utility through the novelty and autonomy provided by this occupation. It is unclear, however, whether these symptoms can contribute to firm-level performance once individuals with ADHD symptoms become entrepreneurs, and if so, how. Answering this question bears important theoretical and practical implications, as it indicates whether ADHD, a trait with strong negative implications across many walks of life, can actually be functional in the entrepreneurship context.

In this paper, we integrate insights from the strategic leadership (e.g., Finkelstein & Hambrick, 1996; Finkelstein et al., 2009), entrepreneurial orientation (e.g., Lumpkin & Dess, 1996) and clinical psychology (e.g., Barkley, 1997; Resnick, 2005) literatures, to develop a conceptual model of how entrepreneurs' ADHD symptoms influence firm performance. Specifically, our model suggests that the entrepreneur's individual characteristics (ADHD symptoms) influence strategic orientation (EO), which then translates into firm performance (see e.g., Finkelstein & Hambrick, 1996; Hambrick & Manson, 1984). We propose that ADHD symptoms (particularly high activation level, sensation seeking and impulsivity) are positively aligned with the three dimensions of EO (innovativeness, proactiveness and risk taking), as Thurik et al. (2016) found.

This paper stands to make several contributions. First, a growing number of studies have started to examine mental disorders in entrepreneurship in general (e.g., Stephan & Roesler, 2010; Baron et al., 2016; Stephan, 2017) and ADHD symptoms specifically (e.g., ., Thurik et al., 2015, 2016; Verheul et al., 2016 ; Wiklund et al., 2016, 2017). However, to date, this research has focused on preferences (Thurik et al., 2015; Wiklund et al., 2017), attitudes (Lerner, 2016), or entry into self-employment (Verheul et al., 2016; Wiklund et al., 2017) but has not addresses whether these symptoms are functional or dysfunctional in entrepreneurship. Examining the performance implications of ADHD symptoms is important to move this research forward, and also has direct practical implications in terms of recommendations to those with ADHD symptoms and their loved ones, and society more broadly. Does entrepreneurship appear to be a wise career choice for somebody exhibiting extensive ADHD symptoms? If the answer is yes, entrepreneurship could be a way for those individuals to effectively use their talents, thus contributing to value creation in society and to personal well-being (Lasky et al., 2016). Second, our research stands to advance entrepreneurship theory. To date, psychological studies in entrepreneurship have mainly examined and found that psychological variables that have positive (negative) implications in other walks of life, are also positive (negative) in entrepreneurship (for a review, see e.g., Frese & Gielnik, 2014). To the extent that we find that ADHD symptoms have positive performance implications in entrepreneurship, it suggests that entrepreneurship is a unique context in need of its own unique theories, because relationships established elsewhere do not hold up in this context.

Third, we also contribute to the EO literature. We find that the entrepreneur's hyperactive and impulsive symptoms are positively related to EO. Both hyperactivity and impulsivity are action-related concepts. Taken together, our results suggest that an action-oriented logic of the

individual that focuses on experimentation and action speed may be an important precursor to EO, contributing to the literature on the determinants of EO (Wiklund et al., 2009). While anxiety and procrastination can be a normal reaction under uncertainty (McMullen & Shepherd, 2006), individuals who favor decision speed over accuracy may skip deliberation and quickly engage in proactive and risk-taking actions to grasp opportunities, which in turn lead to better performance in an uncertain environment.

Fourth, our study also contributes to strategic leadership theory (Finkelstein & Hambrick, 1996). Previous strategic leadership literature has mostly focused on the personality traits of CEOs of large firms. Generally, positive traits such as conscientiousness and locus of control are found to have positive implications while negative traits such as narcissism have no or negative effects (e.g., Chatterjee & Hambrick, 2007; Haynes et al., 2015). We focus on entrepreneurial firms and show that ADHD symptoms, a negative personal attribute in almost all areas of life, could contribute to better entrepreneurial firm performance. Thus, we highlight the distinctiveness of entrepreneurial firms as a form of firm for expanding strategic leadership research. Further, we heed the call for researchers to examine different firm contexts in the strategic leadership framework (Hambrick, 2007).

2 Theoretical Background and Development

2.1 Attention Deficit Hyperactive Disorder (ADHD) and Entrepreneurship

ADHD is short for Attention Deficit Hyperactivity Disorder and consists of three clusters of symptoms that do not necessarily covary: inattention, hyperactivity and impulsivity (APA. 2013). Inattention mostly reflects the cognitive aspect of ADHD, reflecting problems of sustained attention and distraction (Barkley, 1997). It reflects intolerance for boredom and a need for continuous stimulation (Malkovsky et al., 2012). Hyperactivity symptoms related to

excessive energy levels easily getting emotionally excited, and having problems sitting still (APA, 2013). Impulsivity reflects behavioral disinhibition and action without thinking about consequences (Winstanley et al., 2006). ADHD symptoms are found to be stable and persistent across time, reflecting deep-seated differences across individuals (Larsson et al., 2004).

The symptoms of ADHD can make it difficult to meet the requirements of a typical work environment (Barkley & Murphy 2010). Over half of adults with ADHD have been fired (Murphy & Barkley, 1996) and supervisors rate performance of workers with ADHD lower than those without the condition (Barkley et al., 2006; Weiss & Hechtman, 1993). Workers with ADHD also absent more from work (Secnick et al., 2005) and earn much less (Fletcher, 2013). Adults with ADHD report that work is the mostly affected domain in terms of impairments (Safren et al., 2010). The unemployment of adults with ADHD leads to an annual cost of $3.7 billion in the U.S. (Birnbaum et al., 2006). In short, ADHD symptoms have many negative implications in work life.

In order to understand the organizational implications of stable individual characteristics, a contextualized view is required (Judge et al., 2009) which focuses on how well these characteristics fit with the person's work environment (Kristof, 1996; Kristof-Brown et al., 2005). Entrepreneurship represents a unique environment characterized by high uncertainty and autonomy, which could attract individuals who favor uncertainty (Nicolaou et al., 2008) and prefer a flexible work environment (Wiklund et al., 2016). Individuals high on ADHD symptoms often display such preferences, and previous research find positive relationship between ADHD symptoms and entrepreneurial intentions (Verheul et al., 2015; Wiklund et al., 2017) and entry (Verheul et al., 2016). However, others find different effects of hyperactivity and inattention,

proposing that they be studies separately (Verheul, et al., 2016; Thurik et al., 2016; Wiklund et al., 2017).

2.2 Strategic Leadership Theory on Entrepreneur's Characteristics

Strategic Leadership Theory (Finkelstein et al., 2009) evolves from the Upper Echelon Perspective (Hambrick and Mason, 1984) suggesting that an organization is a reflection of its top executives (e.g., CEO) and highlight the importance of executives' idiosyncratic experience, values and personalities for the strategy and performance of the organization. However, unlike the Upper Echelon Perspective that mostly focus on the demographic variables Strategic Leadership Theory emphasizes psychological attributes and focuses on the individuals who have overall responsibilities for the firm because their psychological characteristics are most likely to directly influence strategic choices at the firm level (Finkelstein et al., 2009). For example, prior studies have found that CEO's "Big Five" personality dimensions, locus of control and positive self-regard (e.g., narcissism, hubris, overconfidence) influence a number of organizational aspects, such as top management team dynamics, a firm's innovation strategy and strategic flexibility (see Finkelstein et al., 2009 for an overview) and also influences performance (Weiner & Mahoney, 1981).

In an entrepreneurial organization, the entrepreneur is the most important individual, having a disproportional influence on firm strategy and outcomes. The entrepreneur's psychological attributes will first influence the strategic choices made, which will in turn influence firm performance (Hambrick & Mason, 1984; Hambrick, 2007; Wales et al., 2013). Specifically, an entrepreneur's psychological characteristics could influence the strategic choice through the three-stage filtering process of information: the field of vision, selective perception and interpretation (Hambrick & Mason, 1984). *Field of vision* represents the directions and

sources where the entrepreneur looks for information. For example, research on CEOs found that a CEO with an internal locus of control search information from a wider net of sources and also search more extensively (Finkelstein and Hambrick, 1996). Dollinger (1984) found that among entrepreneurs, those who had the ability to attend to a wide range of stimuli participated in more boundary spanning activities. *Selective perception* means that an entrepreneur could only "selectively perceive only a portion of the stimuli within his or her field of vision." (Finkelstein et al., 2009: 47). For example. Nadkarni & Herrmann (2010) argued that conscientious CEOs selectively ignore those unique and new strategies due to their needs for legalism and control, and agreeable CEOs would probably filter out those voices calling for change due to their needs for affiliation and harmony. Finally, *interpretation* means that different entrepreneurs attach different meanings to stimuli. For example, Malmendier and Tate (2005) found that overconfident CEOs had an overestimate of their ability (or an underestimate of risk), thus using more money in investment projects than releasing money as dividends. Milliken (1990) found that the same trend-the shrinking of the 18-20 old population in the U.S. - appeared differently to different executives, with some viewing it as threat and some showing no concern.

The above shows detailed processes of *how* different psychological attributes of entrepreneurs could lead to the implementation of strategies of different nature and type. In previous entrepreneurship literature, research has found the importance of the entrepreneur's personality or other psychological attributes for firm strategy and performance. For example, Baum et al. (2001) found that the entrepreneur's tenacity, proactivity and passion for work are related to a focused and differentiation strategy. Meta-analysis by Zhao et al. (2010) and Rauch and Frese (2007) also show the relevance of entrepreneur personalities, such as conscientiousness, need for achievement and self-efficacy, for firm performance.

2.3 ADHD and EO

Since an entrepreneur's psychological characteristics could influence the scan, selection and interpretation of information at hand, they directly influence the kind and the nature of strategies chosen by the firm (Finkelstein et al., 2009). Entrepreneurial Orientation (EO) is a firm-level strategy, reflecting "a firm's *strategic orientation*, capturing specific entrepreneurial aspects of decision-making styles, methods, and practices" (Wiklund & Shepherd, 2003). Miller (1983: p.771) summarized EO as the characteristic of an entrepreneurial firm that "engages in product-market innovation, undertakes somewhat risky ventures, and is first to come up with 'proactive' innovations, beating competitors to the punch." As such, EO is an umbrella term that represents the entrepreneurial nature of a firm's strategic choices. There are three interrelated dimensions of EO: innovativeness, proactiveness, and risk taking (see Rauch, Wiklund & Lumpkin 2009 for a review). Innovativeness reflects the tendency of the firm to focus on supporting new ideas and experimenting with new products/services. Proactiveness refers to the firm's forward-looking posture that tries to act on future demands and establishes first-mover advantage. Risk taking reflects the firm's willingness to commit large amounts of resources to uncertain territories with the potential of large loss and failure. Previous research has suggested that CEOs' locus of control (Miller, 1983), core self-evaluation (Simsek et al., 2010) and narcissism (Wales et al., 2013) have significant linkages with the adoption of EO practices. . Importantly, influence of the entrepreneur on his/her firm's EO could be more substantial than that of the CEO of large corporation because of the smallness of entrepreneurial firms enabling a centralized power and more managerial discretion (Miller, 1983; Hambrick, 2007). It has been long recognized the importance of entrepreneurs' characteristics for EO, as Miller (1983: 773) suggested, "in small centralized firms, entrepreneurship (EO) is predominantly influenced by the

leader: his personality, his power, and his information. He is in a position sufficiently powerful to override structural and environmental obstacles to entrepreneurship (EO)."

We argue that ADHD symptoms of the entrepreneur could directly influence the adoption of EO. ADHD has been found to be related to quick action without much deliberation (Barkley, 1997), higher tolerance for risks (Verheul et al., 2015), creativity (Coetzer & Trimble, 2009) and proactiveness in a flexible and exploratory environment (Archer, 2015). Conceptually, these characteristics resonate closely with the three dimensions of EO. Empirically, ADHD symptoms have also been found to lead to higher EO (Thurik et al., 2016). Building on the three-stage filtering process of strategic leadership theory, we outline how ADHD symptoms are likely to influence the field of vision, selective perception and/or interpretation of information, which then predispose entrepreneurs to adopt innovative, proactive and risk-taking strategies.

Firstly, individuals high on ADHD symptoms get bored easily and need new sensations and stimulations (Barkley, 1997). This can be reflected in their lack of perseverance in boring tasks once the challenging part is done. Thus, it is likely that that entrepreneurs with ADHD symptoms would have a field of vision that targets new, innovative and non-routine information. Further, individuals high on ADHD symptoms are cognitively disinhibited, being easily disrupted by new information and being unable to push aside irrelevant information (Barkely, 1997). This implies that entrepreneurs with higher ADHD symptoms are less likely to perceive stimuli selectively and are more open to different types of information at hand. Previous research shows that a cognitive disinhibition and the resultant openness to information increase the spread of actions among neural networks and enables individuals to combine unrelated mental elements, which further promotes creativity and innovation (Eysenk, 1993, 1995; Kris, 1952; Martindale, 1999). Indeed, it was found that the inhibition deficits of ADHD individuals

increase divergent thinking abilities that are closely related to creativity (White & Shah, 2006). Thus, we expect entrepreneurs high on ADHD symptoms are more likely to discover innovative opportunities due to their wide range of attention. Further, we also expect ADHD symptoms to lead to a more positive interpretation of the adoption of innovation strategy. Sensation seeking is an important aspect of ADHD (Wiklund et al., 2017), and previous research found that the sensation seeking is related to openness to new experiences and readiness to change (Aluja et al., 2003). In short, because of the broad field of vision, the wide perception of information and the favorable interpretation of innovation, ADHD symptoms of the entrepreneur are likely to increase the adoption of innovation strategy.

Second, research shows that the ADHD individuals may be associated with vivid imagination and insights for future (White & Shah, 2006; Davtian et al., 2012). This indicates that ADHD symptoms may be related to a field of vision that is future oriented, which an important part of Proactiveness (Rauch et al., 2009). Further, individuals high on ADHD symptoms are impulsive, being unable to wait patiently for action (APA, 1993). Their hyperactivity also increases the energy levels of ADHD individuals, prompting them initiate changes actively (Oreg, 2003). Adler and Shaw (2011: 98) further argued that ADHD symptoms in adult often manifested as "a feeling of ambition and a desire to accomplish." These characteristics of individuals high on ADHD indicate that they are attentionally attuned to those action opportunities for pioneering and at the same time cannot wait to act on those opportunities, which resonates with EO's proactivity aspect, that is "one that… first to come up with 'proactive' innovations, beating competitors to the punch" (Miller, 1983).

Finally, ADHD symptoms could be related to a different interpretation of risk-related information. Generally, individuals with ADHD show a stronger sensitivity to potential rewards

and less regard for potential losses in risky decision-making. A recent research by Shoham et al. (2016) found that ADHD in adults is not related to risk perception, but with exaggerated view of potential benefits in risky situations. Similarly, Matthies et al. (2012) found and argued that adults with ADHD have similar intellectual capacity as healthy controls, but are more attracted by rewards and are willing to bear potential losses for the sake of pleasure. Bruce et al. (2009) found that children with ADHD engage in cognitive processes of thinking about risk, just in a different way. Children with ADHD overestimates their abilities, have higher anticipation of positive outcomes and less anticipation of negative outcomes (Bruce et al., 2009). Specifically, the impulsivity dimension of ADHD often leads to risk taking in various areas both financially and physically (Barkley, 1997). This is often due to the impulsive individual's lack of consideration or premeditation for future consequences and a greater utility put on immediate rewards (Wiklund et al., 2016). Impulsivity has also been found to be related to a lower appraisal for threats and risks (Franken et al., 1992). Taken together, we expect entrepreneurs with higher ADHD symptoms to interpret a risky situation as less threatening and as a result adopt more risky strategies.

Taken together, we hypothesize the following:

H1: Entrepreneur's ADHD symptoms are positively related to EO.

2.4 EO and Entrepreneurial Firm Performance

The relationship between EO and firm performance has been extensively examined. A recent meta- analysis finds that EO has positive implications for firm performance (Rauch et al., 2009). This stems from the fact that shortening product and business model life cycles make relying on existing routines and strategies less profitable, while being innovative, proactive and

risk-taking could help establish first-mover advantages and generate above-average returns (Wiklund & Shepherd, 2003).

H2: EO is positively related to firm performance.

We previously proposed that ADHD symptoms are positively related to EO, and that EO is positively related to firm performance. Since executives' characteristics are not likely to influence performance directly but indirectly through strategic choices of firms (Hiller & Hambrick, 2005), we suggest that ADHD symptoms of entrepreneurs would first influence EO, which then transmit into firm performance. Thus, we hypothesize that

H3: EO mediates the relationship between entrepreneur's ADHD symptoms and firm performance.

3 Method

3.1 Data Collection and Sample

To test our hypotheses, we targeted those entrepreneurs who operated a venture with non-marginal influence. In other words, we intended to step away from those mon-and-pop stores, which often sell imitative products/service, having limited intention to growth and thus may not be true representations of entrepreneurship (Das & Teng, 1997). Therefore, we collected online survey data from Young Presidents' Organization (YPO). To become a member of YPO, individuals need to be under the age of 45 at the time of application, and hold top positions (e.g., the president or chairman and chief executive officer) of a qualifying corporation with at least 50 regular employees and/or sales more than $13M. Because we are interested in entrepreneurs, we specifically targeted YPO's entrepreneurship chapter, which has over 2,000 members. Members within that chapter are supposed to be individuals who have founded, inherited or bought a firm

and are in the top position of the firm being responsible for the strategies and performance of the business.

We distribute the survey through the confidential discussion board of the Innovation and Entrepreneurship Network. We posted a thread explaining the survey and providing the link to the survey. The survey was open for 3 months from Mar 2016 to May 2016. During the period, three reminders were sent on the Network discussion board to promote the survey.

We received a total of 327 responses. After deleting observations with missing values, we had a sample of 242 individuals. Within these 242 individuals, 92% are men and 64% are from the U.S. The average age of respondents is 47.6 years. The average years of work experience are 24.7 years. The median sales of respondents' firms are $20M and the median employee numbers are 100. 84% of our respondents (i.e., 204 respondents) had less than 500 employees, which indicates that most firms in our sample are small businesses according to the criteria developed by SBA. In other words, entrepreneurs in our sample would have a much larger influences on their businesses compared to CEOs from large corporations, in which the big size usually restrict managerial discretion (Finkelstein et al., 2009). This makes our sample an ideal context for applying strategic leadership theory.

3.2 Measures

Dependent Variable: As suggested by Wiklund & Shepherd (2003), firm performance is multidimensional and comparisons to competitors could reveal important information. Specifically, comparisons to competitors would show whether the firm is just following market trends or the firm is deviating from norms reflecting *competitive* advantage of the firm. Thus, we measure *firm performance* by subjective ratings of profits, sales development, cash flow and market value compared to main competitors, on a scale from 1 to 5. This performance measure

has been widely used and tested by previous literature (e.g., Lumpkin & Dess, 2001; Wiklund & Shepherd, 2003; Wiklund, 1999). Further, subjective ratings of performance have been found to be useful for firms that are privately held with little incentive to disclose objective data (Eddleston et al., 2008; Keh et al., 2007).

Independent variables: We used the ASRS (ADHD Self-Report Scale) developed by World Health Organization (Kessler et al., 2005) to measure *ADHD symptoms*. This scale contains 18 questions measuring a person's inattention, hyperactive and impulsive symptoms typical of ADHD individuals..

Following previous research (e.g., Verheul et al., 2015; Wiklund et al., 2017) we assess the degree of ADHD symptoms that individuals currently display An alternative could have been to assess whether or not people have an ADHD diagnosis. We believe our approach is superior for a number of reasons. First, several people who would qualify for an ADHD diagnosis never receive one, particularly in countries outside of the USA (Wasserstein, 2005). Second, many who receive a diagnosis at childhood could be in remission as adults. In fact, until recently, it was a common belief that ADHD symptoms disappeared as people matured (Biederman et al., 2000). Third, people who have an ADHD diagnosis may medicate, which would alleviate many of the ADHD symptoms (Halmoy et al., 2009). Fourth the diagnosis is a binary yes/no variable although the underlying symptoms leading to the diagnosis represent a continuous variable (Levy et al., 1997). A focus on the diagnosis therefore introduces much measurement error (MacCallum et al., 2002). Finally, the ASRS-18 scale has been demonstrated good predictive validity, test-retest reliability and internal consistency in many countries (e.g., Adler et al., 2006; Kim, lee & Joung, 2013; Morin et al., 2013; Kessler et al., 2006), and has been used by previous ADHD and entrepreneurship literature (e.g., Wiklund et al., 2017).

Specifically, the ASRS-18 scale contains 9 questions that measure inattentive symptoms (e.g., How often do you have difficulty keeping your attention when you are doing boring or repetitive work?); 6 questions that measure hyperactive symptoms (e.g., How often do you feel overly active and compelled to do things, like you were driven by a motor?); and 3 questions that measure impulsive symptoms (e.g., How often do you have difficulty waiting for your turn in situations when turn talking is required?).

We used the well-established scale developed by Covin & Slevin (1989) to measure the *Entrepreneurial Orientation* of a firm. This scale has been demonstrated to be a reliable measure for firm-level entrepreneurship (Wiklund, 1998) and has been used extensively by previous study (e.g., Wiklund & Shepherd, 2003; Green et al., 2007). The scales measures three inter-related aspects of EO: innovativeness (3 items), productiveness (3 items) and risk-taking (3 items).

Control variables: We control for several variables based on previous literature (Wiklund & Shepherd, 2003; Wales et al., 2013). At the individual level, we control for the entrepreneur's *age, gender, education level* (1, "education equal to or more than Master degree", and 0, "education less than Master degree"), *industry experience, startup experience and firm status* (1, "the entrepreneur started the focal firm", 0 "the entrepreneur bought or inherited the focal firm"). At the firm level, we control for *firm size* as measured by the number of employees, and *firm age*. At the industry level, we control for the different *industries* to take account of the different level of competitiveness and environmental dynamism in different industries. We log transformed firm age and size to account for outlier influence.

4 Analytical Method

Before analysis, the dimensionality, the reliability and the validity of each of our construct were examined using exploratory factor analysis (EFA) and confirmatory factor analysis (CFA).

4.1 Dimensionality of Constructs

With regard to the ASRS, factor analyses indicate that the 18 ADHD items can be extracted to 3 factors with eigenvalues more than 1. The three factors are inattention, hyperactivity and impulsivity respectively with most items load onto their corresponding theoretical factors.. To firmly establish the factor structure of the 18 ADHD items, we thus conduct CFA comparing models with 1 ADHD super factor, 2 interrelated inattention and hyperactivity/impulsivity factors, and 3 interrelated inattention, hyperactivity and impulsivity factors. CFA results indicate that the three-factor model perform better than the other two alternatives (2 factor model to 3 factor model: Δchi2 (2) =56.77; p=0.000; 1 factor model to 3 factor model: Δchi2 (3) =82.61; p=0.000). Thus, in this paper we treat inattention, hyperactivity and impulsivity as three separate but interrelated dimensions.

In terms of EO, our factor analysis revealed that all items load onto one factor (i.e., only one factor with Eigenvalue greater than 1). This is consistent with previous literature about the factor structure of EO (e.g., Stam & Elfring, 2008). The four performance measures also load onto one same factor based on the EFA.

4.2 Reliability and Validity of Constructs

Construct reliability and validity are tested using the full CFA model including all the constructs and their corresponding indicators (e.g., inattention, hyperactivity, impulsivity, EO and performance). The initial model shows poor model fit (CMIN/DF: 2.42; CFI: 0.83; TLI: 0.81 RMSEA: 0.08; AGFI: 0.74). To improve model fit, we dropped several cross-loading and/or low

loading items (loading less than 0.4) from ASRS scale and also freed two error covariances between 4 indicators of EO (e2 ←→ e3 and e8 ←→ e9). We thus dropped 4 items from ADHD inattention dimension and 2 items from ADHD hyperactivity dimension. [17]After the modification, model fit improved greatly, showing acceptable fit (CMIN/DF: 1.99; CFI: 0.91; TLI: 0.90; RMSEA: 0.06).

Construct reliability and validity are then checked after having the acceptable model. All constructs show satisfactory construct reliability by having composite reliability score more than the 0.7 benchmark (Lance et al., 2006). Also, the average variance extracted (AVE) from each construct exceed 0.5, indicating that all constructs explains at least 50% of the variance in corresponding indicators. Thus, all constructs show convergent validity (Fornell & Larcker, 1981). Finally, all constructs show good discriminant validity by having the square root of AVE greater than the inter-construct correlations (Fornell & Larcker, 1981). Table 1 shows the reliability and validity of constructs used in this study.

Insert Table IV-1 here

4.3 Analytical Approach

Because of the small sample size and the non-multivariate normality of our data (chi2(20) =2272.25, p=0.,000), using SEM may not be an optimal choice (Jackson, 2003). Thus, we used OLS regression models to test the hypotheses. In terms of testing the indirect effect between ADHD, EO and performance, we followed Preacher and Hayes (2008)'s suggestion of using

[17] [17] Inattention: drop ADHD item 7, 8, 9, 11; Hyperactivity: drop ADHD item 14, 15.

bootstrapping method, which is a non-parametric method being superior than the traditional Baron and Kenny (1986) (see Hayes, 2013 for a detailed explanation). [18]

ADHD inattentive, hyperactive and impulsive scores are measured by taking the average of the corresponding items (i.e., those remaining items after dropping low loading and/or cross loading items). EO and subjective performance was also measured by taking the average of corresponding items.

5 Results

Table 2 shows the descriptive statistics of variables. It shows that on average, entrepreneurs in our sample have started 3.7 ventures. Further statistics show that the median number of venture started by respondents is 2. 50% of them have earned a Master's degree or higher. 58% of entrepreneurs in our sample started the firm while the remaining bought or inherited the firm.

Table 3 shows the regression results. For each model, VIF values for each variable do not exceed the threshold value of 10, suggesting limited concern for multicollearity (Neter, Kutner, Nachtsheim, & Wasserman, 1996). In Model 2, we regress the mediator EO on control variables and three independent variables of interests- inattention, hyperactivity and impulsivity. Results show that inattention has no influence on EO (-0.003; $p>0.05$) while both hyperactivity (0.23; $p<0.01$) and impulsivity (0.25; $p<0.01$) are positively related to EO. Thus, our H1 is supported for hyperactivity and impulsivity, but not for inattention.

In Model 3, we regress performance on control variables, ADHD symptoms and the mediator EO. Results show that EO is significantly related to performance (0.28; $p<0.001$). Thus, our H2 is supported.

[18] We also used the widely incremental approach of Baron and Kenny (1986) as a robustness check, which showed the same results as what we got from the bootstrapping method.

In Table 4, the indirect effect of ADHD symptoms on firm performance through EO is assessed using 1000 bootstrap samples for bias corrected bootstrap confidence intervals. Results show that the indirect effect of inattention is not significant (95% confidence intervals includes zero), while the indirect effects of hyperactivity (indirect effect: 0.06; 95% confidence interval: 0.03 – 0.11) and impulsivity (indirect effect: 0.07; 95% confidence interval: 0.02- 0. l3) are positive and significant. Thus, our H3 is supported for hyperactivity and impulsivity, but not for inattention. Further, Table 4 also shows that hyperactivity and impulsivity have no direct relationship with firm performance, suggesting that the influences of hyperactivity and impulsivity on performance are fully mediated by EO.

Insert Table IV-2, 3, 4 here

5.1 Robustness Check and Post-Hoc Analyses

Considering the cross-sectional and self-report nature of our data, we took several procedures to check common method bias. Following Podsakoff et al. (2003), we added a common method factor into the measurement model of SEM. SEM results show that model fit does not change significantly after adding the common method factor ($\Delta chi2(25)=30.68$; $p=0.20$, indicating that common method bias may not be a major concern. Further, objective measures of performance are less prone to common method bias. Thus, we asked respondents to report current sales and employment, as well as the corresponding figures three years ago. On the basis of this, we computed growth rates for both sales and employment. Results are qualitatively similar to our main results when we use objective measures of firm sale and employee growth (see Table 5 and 6).

ADHD symptoms are related to lack of perseverance and boredom susceptibility (Wiklund et al., 2017). Thus, it is likely that entrepreneurs who have higher ADHD symptoms abandon the survey in the process or do not finish the survey. This could potentially cause selection bias, or performance is observed only when "other variables take on particular values" (Wooldrige, 2010: 777). We thus check whether respondents who do not finish the survey have significantly different ADHD symptoms compared to respondents who complete the survey. We found no statistically significance difference in total ADHD symptoms (t=-0.75, p=0.45), inattentive symptoms (t=-0.68, p=0.50), hyperactive symptoms (t=0.23, p=0.82) or impulsive symptoms (t=-0.30, p=0.76) based on the t-test. Since the significant relationship between *x* and the likelihood of selection is required to establish the selection bias (Certo et al., 2015), we argue that there is limited selection bias in our study.

ASRS is a screening instrument to screen for potential ADHD diagnosis. Based on the criteria developed by Kessler et al. (2006), 55% of our respondents within the sample may have ADHD or they need to talk to the doctor further. According to Faraone and Biederman (2005), about 16.4% of the adult population may have ADHD based on the screening criteria (similar to what we used in our survey- the ASRS screening instrument). Thus, it seems that we oversampled individuals with ADHD symptoms, which help us get more reliable estimates but may indicate a sampling problem. To correct for this sampling bias, we employ post-stratification weights in regressions based on Faraone and Biederman (2005)'s study of the prevalence of ADHD in the adult population. In other words, we give more weights to individuals with less ADHD symptoms, and more weights to those with more ADHD symptoms. Our results are robust to the use of weights, as can be seen in Table 7.

In our sample. 58% of entrepreneurs started the firm while the remaining bought or inherited the firm. According to previous research, entrepreneurs who started the business would have higher level of growth ambition compared to entrepreneurs who bought or inherited the business (Mochrie et al., 2006). Further, inheriting a firm from the family means that the entrepreneur would be influenced by family embeddedness, potentially reducing his or her discretion (Sharma & Manikutty, 2005; Mitchell et al., 2009). Thus, we expect the entrepreneur to have a stronger influence on firm strategy and performance when the firm is started or founded by him/her. We split the sample and run the regression. When the sample only includes entrepreneurs who started their businesses, results are the same as the main analyses, showing that hyperactivity and impulsivity contribute to EO, which then fully mediate the relationship between hyperactivity/impulsivity and performance. When the sample only include entrepreneurs who bought or inherited their businesses, results show that only impulsivity contributes to EO and the indirect relationship between impulsivity and performance through EO is not significant. Despite the reduced statistical power after splitting the sample, these results (shown in Table 8 and 9) show that the effects of ADHD symptoms on entrepreneurship may be most pronounced when the entrepreneur started his or her own firm. It further suggests that managerial discretion is an important aspect in the executive- strategy/performance relationship (Finkelstein et al., 2009).

About 16% (i.e., 38 firms) of the firms managed by entrepreneurs in our study have more than 500 employees. These firms are not necessarily small businesses based on the SBA criteria, thus may exhibiting more inertial forces limiting entrepreneurs' managerial discretion (Finkelstein et al., 2009). After dropping those firms from analyses, results remain the same to the main analyses.

Previous results show that ADHD individuals are more prone to mental health problems such as anxiety and depression. We asked questions about their subjective ratings of anxiety, depression and addiction problems in our survey. Simple t-tests comparing entrepreneurs with potential ADHD diagnoses and individuals who do not show that individuals with potential ADHD diagnoses have more anxiety ($t=-4.26$, $n=245$, $p<0.001$), depression ($t=-3.36$, $n=241$, $p<0.001$) and addiction problems ($t=-3.87$, $n=238$, $p<0.001$).

Insert Table IV- 5, 6, 7here

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6 Discussion and Implications

6.1 ADHD and Entrepreneurship

There is emerging interest in entrepreneurship concerning how ADHD symptoms manifest in the uncertain and autonomous environment of new ventures, and if these symptoms are functional or dysfunctional (e.g., Antshel, 2017; Wiklund et al., 2016, 2017). Individuals high on ADHD may be attracted to entrepreneurship because the fit with entrepreneurship may be greater than that provided by traditional employment (e.g., Barkley et al., 2006). To date, this research has found that ADHD symptoms influence entrepreneurial intentions, entry into entrepreneurship, and EO (Thurik et al., 2016) . However, it has stopped short of theorizing or examining potential performance implications of ADHD symptoms.

In this paper, we build and test a theoretical model of the ADHD and performance relationship. We hypothesized that ADHD symptoms would indirectly influence firm performance through the firm-level strategy orientation- EO. We draw on a sample of established entrepreneurs from YPO, finding that ADHD symptoms are better treated as three

distinct but interrelated dimensions of inattention, hyperactivity and impulsivity. Further, we find that hyperactivity and impulsivity symptoms enhance firm performance mediated by EO. Inattention symptoms are related to neither EO nor firm performance. Cumulative evidence (i.e., this study, Wiklund et al., 2017 and Verheul et al., 2016) indicates the need to differentiate inattention symptoms with hyperactivity and impulsivity symptoms in studies of ADHD and entrepreneurship

This lack of relation between inattention and EO (and firm performance) seems to run counter to our arguments that cognitive disinhibition could be related to higher levels of creativity thus innovation. Wiklund et al. (2016) also argues that inattention may be associated with the discovery of unexpected entrepreneurial opportunities. However, our finding is consistent with previous findings that inattention seems to reduce entrepreneurial intentions and action (Wiklund et al., 2017; Verheul et al., 2016). This is likely because inattentive individuals experience anxiety and worry under uncertainty (Gomez & Corr, 2010).

Our findings of the positive effects of entrepreneurs' hyperactivity and impulsivity symptoms on EO and performance suggest that these two types of symptoms of ADHD could be functional in the entrepreneurial context. This adds weight to research that shows positive relationships between hyperactivity and entrepreneurial intention and entry (Wiklund et al., 2017; Verheul et al., 2016). Importantly, hyperactivity and impulsivity are related to the motivational tendency for novelty and sensation seeking (Roberts et al., 2014) and the behavioral tendency of swift action without much forethought (Dickman, 1990). These characteristics seem to help the entrepreneur to successfully navigate the uncertain and changing environment of entrepreneurship. Sensation seeking could be related to not only higher action orientation under uncertainty (Grinblatt & Keloharju, 2009) but also an appetite for learning and mastery of skills

in exploratory environment (Jackson, 2005). This suggests that the sensation seeking of the entrepreneur may have an important functional role for firm performance. Moreover, both hyperactivity and impulsivity symptoms are action-oriented attributes, with hyperactivity leading to excessive activities (e.g., constant moving, "on the go') and impulsivity leading to disinhibited activities. By extension, this suggests that an action logic of the entrepreneur that focuses on experimentation and action speed could be a crucial determinant of firm-level EO and entrepreneurial firm performance. The importance of action speed for firm performance has long been recognized in previous literature (Eisenhardt, 1989; Baum & Wally, 2003). Entrepreneurial firms have less resources and routines to rely on. At the same time, they are facing uncertainties and obstacles about their products/service. As a result, entrepreneurs' preferences for experimentation and action speed may be facilitators for the firm to quickly establish an acceptable product/service and accumulate resources needed for firm growth (Baum, 2003). In short, our results imply that entrepreneurs' logic of action that focuses on experimentation and action speed may be beneficial for entrepreneurial firms.

Theoretically, the systematic examination of the ADHD and firm performance relationship is vital for entrepreneur personality research and entrepreneurship theory, as it indicates whether ADHD, a negative personal attribute in almost all areas of life, can be functional in entrepreneurship. The positive relationship implies that entrepreneurship represents a unique environment with distinctive work requirements. Previous entrepreneur personality research has mostly focused on those positive traits- traits such as internal locus of control and need for achievement that are also perceived positive in other areas of life. Examining the benefits of those positive traits in entrepreneurship provides limited insights as to the distinctness of entrepreneurship as a field. By showing that generally negative traits such as hyperactivity and

impulsivity can be functional for entrepreneurship, we take a step towards establishing unique theory on how stable individual difference matter in entrepreneurship (e.g., Wiklund, Davidsson, Audretsch & Karlsson, 2011).

6.2 Implications for EO Literature

Hyperactivity and impulsivity reflect action-oriented logic of the entrepreneur. Thus, an action logic of the CEO or the entrepreneur that focuses on experimentation and action speed could be a crucial determinant of EO. A person who focuses on action speed with little premeditation is more likely to grasp first-mover opportunities quickly although such opportunities may seem rather risky. A further implication of this is that future research could potentially examine other action-related constructs in relation to EO, such as Locomotion (Kruglanski et al., 2000) and Promotion Focus (Higgins, 1997). Our research also complements the findings regarding narcissism and EO (Wales et al., 2013).

Moreover, our paper goes back to the roots of EO by examining how the individual characteristics of the leaders influence the EO of small firms. In the foundational EO paper, Miller (1983) argued that leaders in small entrepreneurial firms have a profound influence on the adoption of EO at the firm level. This has received scant attention in later research, where EO has mainly been used as an explanation of variance in performance (see e.g., Rauch et al., 2009).

6.3 Implications for Strategic Leadership Theory

We contribute to strategic leadership theory in several ways. First, strategic leadership theory argues that the CEO's personal attributes would influence firm performance through the strategies made by the CEO. This indicates that the influence of the CEO's personal attributes should be fully mediated by the strategies. We find that hyperactivity and impulsivity's influence on firm performance are fully mediated by the adoption of EO strategy. Thus, our findings

corroborate the validity of strategic leadership theory, and at the same time show that there is a high correspondence between ADHD symptoms of entrepreneurs and firm-level EO.

Further, as in entrepreneur personality research, strategic leadership research has mostly focused on the positive outcomes of positive traits of CEOs in large firms (see Judge et al., 2002 for a review). Recently, increasing interests have been devoted to "dark" traits such as narcissism and psychopath. However, CEO's dark traits have generally found to have no or negative effects on overall firm performance (e.g., Chatterjee & Hambrick, 2007; Haynes et al., 2015). Instead of focusing on large firms, we apply the strategic leadership theory to entrepreneurial firms, in which there is more uncertainty, flexibility, autonomy and centrality of power (Miller, 1983). In such kind of environment, CEO's ADHD, a problematic attribute in many areas of life, could be beneficial. Thus, we heed the call for researchers to examine different firm contexts that may shape the CEO - Firm relation in the strategic leadership framework (Hambrick, 2007). First, entrepreneurial firms provide an ideal environment for examining the influence of CEO due to more managerial discretion owned by the entrepreneur (Miller, 1983; Hambrick, 2007). Our post-hoc analysis shows that the ADHD symptoms of entrepreneurs who start their own businesses have stronger effects on EO and firm performance than those of entrepreneurs who inherited or bought the business. These results imply the importance of managerial discretion for observing the CEO- strategy (and performance) relationship, as suggested by Hambrick (2007). Second, studying entrepreneurial firms and realizing their unique job demands and requirements can expand the boundary of strategic leadership theory. Unlike previous leadership research that shows positive (negative) effects of positive (negative) CEO traits in relatively large firms, our results suggest that certain negative psychological attributes, such as ADHD, may render itself beneficial in the entrepreneurial context.

6.4 Practical Implications

Practically, our results suggest that effective career intervention programs can be developed to help harvest the positive side of ADHD, providing those individuals with information and support related to entrepreneurship. This also applies to existing organizations, in which managers could think about providing a more accommodating and flexible work environment for individuals with ADHD.

6.5 Limitation and Future Research

Our study has some limitations that also provide opportunities for future research. First, it is important to note that the results are based on established entrepreneurs. Thus, our results may not apply to all entrepreneurs or to all individuals with ADHD symptoms. Future study could do a comparison study, collecting a sample of more representative entrepreneurs and/or a sample of entrepreneurs at different stages. Examining the performance implications of ADHD symptoms at different stages of entrepreneurship would reveal important theoretical and empirical implications regarding the ADHD and entrepreneurship fit thesis.

Second, our results are based on cross-sectional data, leading to potential endogeneity problems. It is possible that being in an entrepreneurial environment could also lead to higher ADHD symptoms. Although we do not expect severe endogeneity problems due to the hereditary and stable nature of ADHD symptoms (Larsson et al., 2004), future study could utilize a longitudinal dataset to fully explore the causal relationship.

Table IV- 1. Construct Reliability and Validity

	CR	AVE	MSV	EO	Inattention	Impulsivity	Hyperactivity	Performance
EO	0.906	0.517	0.243	**0.719**				
Inattention	0.837	0.508	0.187	0.160	**0.713**			
Impulsivity	0.785	0.550	0.301	0.321	0.360	**0.741**		
Hyperactivity	0.811	0.521	0.301	0.326	0.433	0.549	**0.722**	
Performance	0.836	0.562	0.243	0.493	0.116	0.337	0.342	**0.750**

Table IV-2. Descriptive Statistics and Correlations

	Mean	SD	Performance	Age	Gender	Education	Industry experience	Startup experience	Firm size	Firm age	Business status	Inattention	Hyperactivity	Impulsivity
Performance	3.61	0.82	1											
age	47.63	7.52	-0.0827	1										
gender	0.92	0.27	-0.0122	0.0654	1									
education	0.50	0.50	0.0251	-0.0136	-0.0178	1								
industry experience	16.61	10.55	0.0323	0.455***	0.0724	-0.102	1							
startup experience	3.71	5.61	0.0553	0.147*	0.0698	-0.0957	0.122	1						
firm size	4.65	1.80	0.272***	-0.0687	0.206**	0.0302	0.167**	-0.0044	1					
firm age	2.92	0.97	-0.0252	0.184**	0.155*	- 0.00896	0.269***	-0.0994	0.498***	1				
Business status	0.58	0.49	0.127*	-0.0118	-0.0601	-0.0824	-0.0861	0.282***	-0.317***	-0.606***	1			
Inattention	2.06	0.77	0.104	-0.138*	-0.116	-0.0803	-0.125	0.196**	-0.0274	-0.0844	0.0835	1		
Hyperactivity	2.32	0.86	0.284***	-0.143*	0.0337	-0.0889	-0.0631	0.117	0.0661	-0.0509	0.145*	0.360***	1	
Impulsivity	2.20	0.86	0.273***	-0.0296	-0.0110	-0.0972	-0.0480	0.0842	0.0463	0.0245	0.0754	0.298***	0.432***	1
EO	4.94	1.07	0.429***	-0.0136	-0.0342	- 0.00868	-0.0718	0.171**	-0.0360	-0.292***	0.289***	0.158*	0.299***	0.277***

Table IV- 3. OLS Regression Results

	Model 1	Model 2	Model 3
	DV: performance	DV: EO	DV: performance
Industry effects	Included	Included	Included
Age	-0.01	0.01	-0.01
	(0.01)	(0.01)	(0.01)
Gender	-0.21	-0.05	-0.19
	(0.18)	(0.21)	(0.15)
Education	0.03	0.07	0.06
	(0.10)	(0.13)	(0.09)
Industry experience	0.00	-0.00	0.01
	(0.01)	(0.01)	(0.01)
Startup experience	0.00	0.01	-0.01
	(0.01)	(0.02)	(0.01)
Firm size	0.18***	0.07	0.15***
	(0.03)	(0.04)	(0.03)
Firm age	-0.07	-0.32**	-0.01
	(0.08)	(0.10)	(0.08)
Business status	0.27*	0.14	0.16
	(0.14)	(0.17)	(0.12)
Inattention		-0.00	-0.00
		(0.09)	(0.07)
Hyperactivity		0.23***	0.09
		(0.07)	(0.06)
Impulsivity		0.25**	0.11
		(0.08)	(0.06)
EO			0.28***
			(0.04)
Constant	3.10***	3.98***	1.33*
	(0.53)	(0.64)	(0.56)
N	242	242	242
R2	0.16	0.25	0.33
Adjusted R2	0.10	0.19	0.27
F	3.22***	5.78***	7.81***
VIFs	1.05-3.42	1.07-3.50	1.07-3.50

Robust standard errors in parentheses

* p<0.05, ** p<0.01, *** p<0.001

Table IV- 4. Indirect Effect of ADHD Symptoms on Firm Performance (Subjective)

Indirect Effect of ADHD Symptoms on Firm Performance				
	Effect	**SE**	**LLCI**	**ULCI**
Inattention	0.00	0.02	-0.05	0.04
Hyperactivity	0.06	0.02	0.03	0.11
Impulsivity	0.07	0.03	0.02	0.13

Direct Effect of ADHD Symptoms on Firm Performance				
	Effect	**SE**	**LLCI**	**ULCI**
Inattention	0.00	0.07	-0.15	0.14
Hyperactivity	0.09	0.06	-0.03	0.22
Impulsivity	0.11	0.06	-0.02	0.23

1000 bootstrap samples for bias corrected bootstrap confidence intervals

Table IV- 5. OLS Regression Results for Objective Performance

	Model 1	Model 2	Model 3
	DV: performance	DV: EO	DV: performance
Industry effects	Included	Included	Included
Age	-0.03	0.01	-0.02
	(0.04)	(0.01)	(0.04)
Gender	1.20	-0.05	1.43
	(1.00)	(0.21)	(0.88)
Education	0.14	0.07	0.38
	(0.46)	(0.13)	(0.45)
Industry experience	-0.01	-0.00	0.00
	(0.02)	(0.01)	(0.02)
Startup experience	-0.04	0.01	-0.06*
	(0.02)	(0.02)	(0.02)
Firm size	0.07	0.07	-0.00
	(0.14)	(0.04)	(0.14)
Firm age	-1.89***	-0.32**	-1.93***
	(0.51)	(0.10)	(0.50)
Business status	0.01	0.14	-0.38
	(0.62)	(0.17)	(0.60)
Inattention		-0.00	0.17
		(0.09)	(0.26)
Hyperactivity		0.23***	0.44
		(0.07)	(0.25)
Impulsivity		0.25**	0.51
		(0.08)	(0.27)
EO			0.39*
			(0.19)
Constant	7.19**	3.98***	3.09
	(2.64)	(0.64)	(2.47)
N	211	242	211
Adjusted R2	0.17	0.19	0.22
F	3.23***	5.78***	3.32***

Robust standard errors in parentheses

* p<0.05, ** p<0.01, *** p<0.001

Table IV-6. Indirect Effect of ADHD Symptoms on Firm Performance (Objective)

Indirect Effect of ADHD Symptoms on Firm Performance				
	Effect	**SE**	**LLCI**	**ULCI**
Inattention	-0.01	0.05	-0.14	0.05
Hyperactivity	0.08	0.05	0.001	0.22
Impulsivity	0.09	0.06	0.003	0.25

Direct Effect of ADHD Symptoms on Firm Performance				
	Effect	**SE**	**LLCI**	**ULCI**
Inattention	0.17	0.34	-0.50	0.84
Hyperactivity	0.44	0.30	-0.16	1.03
Impulsivity	0.51	0.29	-0.07	1.08

1000 bootstrap samples for bias corrected bootstrap confidence intervals.

Table IV- 7. OLS Regression Results After Adding Post-Stratification Weights

	Model 1	Model 2	Model 3	Model 4
	DV: performance	DV: EO	DV: performance	DV: performance
Industry effects	Included	Included	Included	Included
Age	-0.00073	0.0077	-0.0071	-0.0049
	(0.02)	(0.02)	(0.01)	(0.02)
Gender	-0.38	0.26	-0.47	-0.39
	(0.36)	(0.42)	(0.23)	(0.30)
Education	-0.037	0.49*	-0.043	0.094
	(0.19)	(0.24)	(0.18)	(0.16)
Industry experience	0.0060	0.0042	0.0098	0.011
	(0.01)	(0.01)	(0.01)	(0.01)
Startup experience	-0.039	0.078	-0.039	-0.017
	(0.04)	(0.06)	(0.05)	(0.04)
Firm size	0.17***	-0.026	0.15***	0.14**
	(0.05)	(0.07)	(0.04)	(0.05)
Firm age	-0.081	-0.38*	0.017	-0.089
	(0.11)	(0.16)	(0.11)	(0.11)
Inattention		0.071	0.089	0.11
		(0.14)	(0.11)	(0.12)
Hyperactivity		0.20	-0.0022	0.055
		(0.14)	(0.10)	(0.10)
Impulsivity		0.28*	0.15	0.23*
		(0.13)	(0.10)	(0.11)
EO			0.28***	
			(0.08)	
Constant	3.06**	3.88***	1.37	2.46**
	(0.91)	(0.91)	(0.93)	(0.92)
N	101	101	101	101
Adjusted R2	0.05	0.14	0.22	0.12
F	2.34**	3.21***	4.31***	2.71**

Robust standard errors in parentheses

* p<0.05, ** p<0.01, *** p<0.001

Table IV- 8. OLS Regression Results for Entrepreneurs Who Started the firm

	Model 1	Model 2	Model 3
	DV: performance	DV: EO	DV: performance
Industry effects	Included	Included	Included
Age	-0.012	0.015	-0.0060
	(0.01)	(0.01)	(0.01)
Gender	-0.10	-0.17	-0.072
	(0.21)	(0.25)	(0.19)
Education	0.074	-0.082	0.14
	(0.14)	(0.17)	(0.13)
Industry experience	0.0011	-0.0033	-0.00038
	(0.01)	(0.01)	(0.01)
Startup experience	0.0022	0.0051	-0.0048
	(0.01)	(0.02)	(0.01)
Firm size	0.18***	0.093	0.15***
	(0.05)	(0.06)	(0.04)
Firm age	-0.098	-0.27	-0.039
	(0.13)	(0.16)	(0.12)
Inattention		-0.035	-0.086
		(0.12)	(0.09)
Hyperactivity		0.30***	0.16
		(0.08)	(0.09)
Impulsivity		0.24*	0.087
		(0.11)	(0.08)
EO			0.28***
			(0.05)
Constant	3.69***	4.05***	1.54*
	(0.61)	(0.89)	(0.70)
N	141	141	141
Adjusted R2	0.06	0.08	0.25
F	1.78***	2.86***	4.54***

Indirect Effect of ADHD Symptoms on Firm Performance				
	Effect	**SE**	**LLCI**	**ULCI**
Inattention	-0.01	0.03	-0.08	0.05
Hyperactivity	0.09	0.03	0.03	0.15
Impulsivity	0.07	0.04	0.004	0.16

Table IV-9. OLS Regression Results for Entrepreneurs Who Bought or Inherited the Firm

	Model 1	Model 2	Model 3
	DV: performance	DV: EO	DV: performance
Industry effects	Included	Included	Included
Age	-0.00073	0.0077	-0.0071
	(0.02)	(0.02)	(0.01)
Gender	-0.38	0.26	-0.47
	(0.36)	(0.42)	(0.23)
Education	-0.037	0.49*	-0.043
	(0.19)	(0.24)	(0.18)
Industry experience	0.0060	0.0042	0.0098
	(0.01)	(0.01)	(0.01)
Startup experience	-0.039	0.078	-0.039
	(0.04)	(0.06)	(0.05)
Firm size	0.17***	-0.026	0.15***
	(0.05)	(0.07)	(0.04)
Firm age	-0.081	-0.38*	0.017
	(0.11)	(0.16)	(0.11)
Inattention		0.071	0.089
		(0.14)	(0.11)
Hyperactivity		0.20	-0.0022
		(0.14)	(0.10)
Impulsivity		0.28*	0.15
		(0.13)	(0.10)
EO			0.28***
			(0.08)
Constant	3.06**	3.88***	1.37
	(0.91)	(0.91)	(0.93)
N	101	101	101
Adjusted R2	0.05	0.14	0.22
F	2.34**	3.21***	4.31***

Indirect Effect of ADHD Symptoms on Firm Performance				
	Effect	**SE**	**LLCI**	**ULCI**
Inattention	0.02	0.04	-0.06	0.14
Hyperactivity	0.06	0.05	-0.02	0.19
Impulsivity	0.08	0.05	-0.0003	0.20

APPENDICES

Appendix III- 1. OLS Regression Results without Imputation

DV	Sensation Seeking	Lack of Premeditation	Lack of Perseverance	Urgency	Entrepreneurial Preference			Business Startup		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
	B	B	B	B	B	B	B	Log-Odds	Log-Odds	Log-Odds
Intercept	-1.93**	0.04	1.43	-0.18	2.29**	2.23*	2.77***	-2.37	-3.45*	-2.81
	(0.63)	(0.65)	(0.79)	(0.67)	(0.78)	(0.86)	(0.75)	(1.39)	(1.65)	(1.64)
Control Variables										
General self-efficacy	0.41***	-0.21*	-0.56***	-0.41***	0.29*	0.28*	0.13	0.20	0.29	0.10
	(0.09)	(0.10)	(0.14)	(0.12)	(0.11)	(0.12)	(0.12)	(0.24)	(0.25)	(0.29)
Gender	0.61***	-0.31**	0.25**	-0.27**	0.82***	0.81***	0.63***	0.75**	0.73**	0.54*
	(0.09)	(0.09)	(0.09)	(0.09)	(0.11)	(0.11)	(0.13)	(0.25)	(0.26)	(0.27)
Age	-0.02	0.004	-0.007	0.03*	-0.03	-0.03	-0.02	-0.02	-0.02	-0.01
	(0.02)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.02)
Race	0.06	0.14	-0.22	-0.003	-0.25	-0.26	-0.30	-0.32	-0.34	-0.37
	(0.16)	(0.15)	(0.13)	(0.19)	(0.18)	(0.18)	(0.17)	(0.35)	(0.34)	(0.35)
Work experience	0.004	0.002	0.01	-0.02*	0.003	0.003	-0.003	0.06*	0.06*	0.06*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.02)
ADHD Symptoms										
Inattention	-0.11	0.06	0.54***	0.44***		-0.02	0.07		0.25	0.36
	(0.08)	(0.08)	(0.09)	(0.09)		(0.10)	(0.11)		(0.20)	(0.22)
Hyperactivity	0.23***	0.21***	-0.06	0.14**		0.04	-0.04		0.02	-0.07
	(0.05)	(0.06)	(0.04)	(0.05)		(0.06)	(0.06)		(0.12)	(0.13)
Impulsivity										
Sensation seeking							0.31***			0.35**
							(0.06)			(0.12)
Lack of premeditation							0.17**			0.19
							(0.06)			(0.12)
Lack of perseverance							0.01			0.02
							(0.06)			(0.13)
Urgency							-0.17**			-0.19
							(0.06)			(0.13)
Model										
N	489	489	489	489	489	489	489	489	489	489
F-value	21.74***	5.15***	20.85***	15.71***	19.18***	13.89***	15.62***			
Adjusted R2	0.22	0.06	0.22	0.18	0.15	0.15	0.22			
Log likelihood								-266.91	-266.05	-259.36
Wald chi2								43.30***	42.87***	54.53***
McFadden Pseudo R^2								0.08	0.09	0.11

DV	Entrepreneurial Preference		Business Startup	
Indirect Effects		**95% CI**		**95% CI**
Inattention→Sensation Seeking→Entrepreneurial Preference/Startup	-0.03	[-0.09, 0.008]	-0.04	[-0.12, 0.01]
Inattention→ Lack of premeditation →Entrepreneurial Preference/Startup	0.01	[-0.01, 0.05]	0.01	[-0.01, 0.09]
Inattention→Lack of perseverance →Entrepreneurial Preference/Startup	0.008	[-0.05, 0.07]	0.01	[-0.13, 0.15]
Inattention→Urgency →Entrepreneurial Preference/Startup	-0.08*	[-0.16, -0.02]	-0.08	[-0.23, 0.03]
Hyperactivity→Sensation Seeking→Entrepreneurial Preference/Startup	0.07*	[0.04, 0.11]	0.08*	[0.02, 0.16]

Hyperactivity → Lack of premeditation →Entrepreneurial Preference/Startup	0.04*	[0.01, 0.08]	0.04	[-0.01, 0.11]
Hyperactivity →Lack of perseverance →Entrepreneurial Preference/Startup	-0.0009	[-0.01, 0.006]	-0.001	[-0.03, 0.02]
Hyperactivity →Urgency →Entrepreneurial Preference/Startup	-0.02*	[-0.06, -0.006]	-0.03	[-0.08, 0.007]

Note: Results are based on trimmed impulsivity scale, trimmed ADHD scale and orthognized impulsivity dimensions.
* p<.05; ** p < .01; *** p <.001.

Appendix III- 2. Regression Results for Males

DV	Sensation Seeking	Lack of Premeditation	Lack of Perseverance	Urgency	Entrepreneurial Preference			Business Startup		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
	B	B	B	B	B	B	B	Log-Odds	Log-Odds	Log-Odds
Intercept	-1.40*	-0.22	0.61	-1.01	3.80***	3.64***	4.07***	-1.11	-1.87	-1.52
	(0.57)	(0.63)	(0.81)	(0.72)	(0.64)	(0.73)	(0.69)	(1.27)	(1.50)	(1.54)
Control Variables										
General self-efficacy	0.43***	-0.20	-0.57***	-0.25*	0.38**	0.39**	0.20	0.19	0.30	0.21
	(0.09)	(0.10)	(0.14)	(0.11)	(0.11)	(0.12)	(0.12)	(0.22)	(0.23)	(0.27)
Age	-0.032**	0.0018	0.013	0.031	-0.07***	-0.07***	-0.051***	-0.039	-0.044	-0.033
	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.03)	(0.03)	(0.03)
Race	0.10	0.11	-0.31*	0.18	-0.44*	-0.44*	-0.49*	-0.056	-0.054	-0.057
	(0.19)	(0.17)	(0.14)	(0.24)	(0.22)	(0.22)	(0.21)	(0.10)	(0.10)	(0.10)
Work experience	0.021	0.0079	-0.0053	-0.031*	0.03*	0.03*	0.020	0.083**	0.087**	0.077**
	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.03)	(0.03)	(0.03)
ADHD Symptoms										
Inattention	-0.056	-0.039	0.71***	0.24*		0.04	0.13		0.32	0.34
	(0.08)	(0.09)	(0.09)	(0.11)		(0.10)	(0.11)		(0.21)	(0.24)
Hyperactivity	0.23***	0.24***	-0.0096	0.19**		0.01	-0.088		-0.13	-0.25
	(0.06)	(0.07)	(0.05)	(0.06)		(0.07)	(0.08)		(0.13)	(0.14)
Impulsivity										
Sensation seeking							0.36***			0.34*
							(0.07)			(0.14)
Lack of premeditation							0.15*			0.21
							(0.06)			(0.13)
Lack of perseverance							-0.053			0.088
							(0.07)			(0.15)
Urgency							-0.13*			-0.15
							(0.06)			(0.12)
Model										
N	364	364	364	364	364	364	364	359	359	359
F-value	14.95***	3.38**	29.80***	5.36***	29.13***	19.24***	17.68***			
Adjusted R2	0.17	0.05	0.34	0.08	0.17	0.17	0.25			
Log likelihood								-220.29	-218.61	-212.11
Wald chi2								28.69***	29.87***	41.91***
McFadden Pseudo R^2								0.07	0.08	0.11

Mediation Test	Entrepreneurial Preference		Business startup	
Indirect Effects		95% CI		95% CI
Inattention→Sensation Seeking→Entrepreneurial Preference/Startup	-0.02	[-0.08, 0.04]	-0.02	[-0.10, 0.03]
Inattention→ Lack of premeditation →Entrepreneurial Preference/Startup	-0.006	[-0.05, 0.02]	-0.008	[-0.08, 0.03]
Inattention→Lack of perseverance →Entrepreneurial Preference/Startup	-0.04	[-0.13, 0.06]	0.06	[-0.16, 0.30]
Inattention→Urgency →Entrepreneurial Preference/Startup	-0.03*	[-0.09, -0.002]	-0.04	[-0.15, 0.01]
Hyperactivity→Sensation Seeking→Entrepreneurial Preference/Startup	0.08*	[0.04, 0.14]	0.08*	[0.01, 0.17]
Hyperactivity → Lack of premeditation →Entrepreneurial Preference/Startup	0.04*	[0.008, 0.08]	0.05	[-0.01, 0.14]
Hyperactivity →Lack of perseverance →Entrepreneurial Preference/Startup	0.0005	[-0.005, 0.01]	-0.0001	[-0.03, 0.02]
Hyperactivity →Urgency →Entrepreneurial Preference/Startup	-0.02*	[-0.07, -0.004]	-0.03	[-0.10, 0.01]

Appendix III- 3. Regression Results for Females

DV	Sensation Seeking	Lack of Premeditation	Lack of Perseverance	Urgency	Entrepreneurial Preference			Business Startup [a]		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
	B	B	B	B	B	B	B	Log-Odds	Log-Odds	Log-Odds
Intercept	-0.013	0.16	1.84	0.21	1.97	1.98	2.23	-4.61	-3.13	-3.59
	(1.18)	(1.12)	(1.28)	(1.20)	(1.08)	(1.26)	(1.25)	(2.98)	(3.60)	(3.78)
Control Variables										
General self-efficacy	0.12	-0.011	-0.83***	-0.18	0.21	0.15	-0.0027	0.41	0.21	0.28
	(0.18)	(0.16)	(0.22)	(0.17)	(0.19)	(0.20)	(0.21)	(0.46)	(0.51)	(0.62)
Age	-0.051*	-0.0062	0.0096	-0.0055	-0.01	-0.01	0.0015	0.040	0.040	0.065
	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.07)	(0.07)	(0.07)
Race	-0.083	0.17	0.072	-0.032	-0.06	-0.05	-0.020	-0.12	-0.12	-0.12
	(0.21)	(0.22)	(0.18)	(0.23)	(0.21)	(0.21)	(0.21)	(0.14)	(0.15)	(0.15)
Work experience	0.033	0.0094	0.0026	-0.0019	-0.01	-0.01	-0.018	0.0062	0.0081	-0.0075
	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.07)	(0.07)	(0.06)
ADHD Symptoms										
Inattention	-0.050	0.064	0.50***	0.23		-0.10	-0.0091		-0.37	-0.42
	(0.13)	(0.13)	(0.11)	(0.14)		(0.14)	(0.16)		(0.40)	(0.41)
Hyperactivity	0.28***	-0.018	0.013	0.15		0.15	0.084		0.067	-0.082
	(0.07)	(0.09)	(0.06)	(0.08)		(0.09)	(0.08)		(0.29)	(0.29)
Impulsivity										
Sensation seeking							0.26**			0.52*
							(0.09)			(0.22)
Lack of premeditation							-0.0086			0.16
							(0.09)			(0.26)
Lack of perseverance							-0.13			0.11
							(0.11)			(0.29)
Urgency							-0.062			0.092
							(0.10)			(0.27)
Model										
N	181	181	181	181	181	181	181	181	181	181
F-value	5.99	0.24	9.58***	2.87*	4.12**	2.80*	2.49**			
Adjusted R2	0.11	0.03	0.29	0.05	0.04	0.05	0.08			
Log likelihood								-75.50	-75.04	-72.37
Wald chi2								10.33*	12.39	19.16*
McFadden Pseudo R^2								0.05	0.06	0.09

Mediation Test	Entrepreneurial Preference		Business Startup	
Indirect Effects		95% CI		95% CI
Inattention→Sensation Seeking→Entrepreneurial Preference/Startup	-0.01	[-0.09, 0.06]	-0.03	[-0.21, 0.12]
Inattention→ Lack of premeditation →Entrepreneurial Preference/Startup	-0.001	[-0.03, 0.02]	0.01	[-0.06, 0.18]
Inattention→Lack of perseverance →Entrepreneurial Preference/Startup	-0.06	[-0.22, 0.04]	0.05	[-0.28, 0.48]
Inattention→Urgency →Entrepreneurial Preference/Startup	-0.01	[-0.11, 0.02]	0.02	[-0.12, 0.25]
Hyperactivity→Sensation Seeking→Entrepreneurial Preference/Startup	0.07*	[0.02, 0.15]	0.14*	[0.02, 0.34]
Hyperactivity → Lack of premeditation →Entrepreneurial	0.00	[-0.02, 0.02]	-0.003	[-0.11, 0.04]

Preference/Startup				
Hyperactivity →Lack of perseverance →Entrepreneurial Preference/Startup	-0.002	[-0.03, 0.02]	0.001	[-0.03, 0.07]
Hyperactivity →Urgency →Entrepreneurial Preference/Startup	-0.009	[-0.06, 0.01]	0.01	[-0.06, 0.20]

Note: trimmed impulsivity scale, trimmed ADHD scale and orthognized impulsivity dimensions
* p<.05; ** p < .01; *** p <.001.

Appendix III- 4. Regression Results for Different Preference Items

DV	Sensation Seeking	Lack of Premeditation	Lack of Perseverance	Urgency	Entrepreneurial Preference- Small Business			Entrepreneurial Preference- High Growth Business		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
	B	B	B	B	B	B	B	B	B	B
Intercept	-1.47**	0.29	0.88	-0.54	2.08***	2.02**	2.44***	3.01***	2.86***	3.41***
	(0.52)	(0.53)	(0.71)	(0.60)	(0.58)	(0.67)	(0.66)	(0.60)	(0.70)	(0.66)
Control Variables										
General self-efficacy	0.35***	-0.15	-0.63***	-0.23*	0.32**	0.31**	0.15	0.32**	0.32**	0.100
	(0.08)	(0.09)	(0.12)	(0.09)	(0.10)	(0.10)	(0.11)	(0.10)	(0.11)	(0.11)
Gender	0.50***	-0.44***	-0.012	-0.24**	0.77***	0.76***	0.61***	1.04***	1.03***	0.86***
	(0.09)	(0.09)	(0.08)	(0.09)	(0.11)	(0.11)	(0.12)	(0.12)	(0.12)	(0.13)
Age	-0.035**	-0.0016	0.014	0.024	-0.04**	-0.04**	-0.025	-0.06***	-0.06***	-0.043**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Race	0.037	0.15	-0.16	0.097	-0.20	-0.20	-0.22	-0.37*	-0.37*	-0.41*
	(0.14)	(0.14)	(0.11)	(0.17)	(0.18)	(0.18)	(0.17)	(0.18)	(0.18)	(0.17)
Work experience	0.022*	0.0095	-0.0052	-0.025	0.01	0.01	0.0038	0.03	0.03	0.012
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
ADHD Symptoms										
Inattention	-0.044	-0.014	0.64***	0.23**		-0.03	0.045		-0.01	0.11
	(0.07)	(0.07)	(0.08)	(0.09)		(0.09)	(0.10)		(0.10)	(0.10)
Hyperactivity	0.25***	0.15**	-0.0085	0.17***		0.05	-0.011		0.06	-0.035
	(0.04)	(0.05)	(0.04)	(0.05)		(0.06)	(0.06)		(0.06)	(0.06)
Impulsivity										
Sensation seeking							0.30***			0.38***
							(0.06)			(0.06)
Lack of premeditation							0.046			0.12*
							(0.06)			(0.06)
Lack of perseverance							-0.059			-0.11
							(0.06)			(0.07)
Urgency							-0.098			-0.14*
							(0.06)			(0.06)
Model										
N	545	545	545	545	545	545	545	545	545	545
F-value	20.96***	5.75***	32.42***	7.65***	18.35***	13.22***	11.99***	38.04***	27.29***	24.94***
Adjusted R2	0.19	0.05	0.32	0.09	0.12	0.12	0.16	0.20	0.20	0.26

Mediation Test	Small Business Preference		High Growth Preference	
Indirect Effects		95% CI		95% CI
Inattention→Sensation Seeking→Entrepreneurial Preference	-0.01	[-0.06, 0.03]	-0.02	[-0.07, 0.04]
Inattention→ Lack of premeditation → Entrepreneurial Preference	-0.0006	[-0.02, 0.006]	-0.002	[-0.03, 0.02]
Inattention→Lack of perseverance → Entrepreneurial Preference	-0.04	[-0.13, 0.04]	-0.07	[-0.17, 0.04]
Inattention→Urgency → Entrepreneurial Preference	-0.02	[-0.07, 0.0006]	-0.03*	[-0.08, -0.006]
Hyperactivity→Sensation Seeking→ Entrepreneurial Preference	0.07*	[0.04, 0.12]	0.09*	[0.06, 0.15]
Hyperactivity → Lack of premeditation → Entrepreneurial Preference	0.007	[-0.008, 0.03]	0.02*	[0.003, 0.05]
Hyperactivity →Lack of perseverance → Entrepreneurial Preference	0.0005	[-0.004, 0.01]	0.001	[-0.006, 0.01]

Hyperactivity →Urgency → Entrepreneurial Preference	-0.02	[-0.05, 0.002]	-0.02*	[-0.06, -0.006]

Note: trimmed impulsivity scale, trimmed ADHD scale and orthognized impulsivity dimensions.
* p<.05; ** p < .01; *** p <.001.

Appendix III- 5. Correlations for ADHD, Impulsivity, Business Performance and Survival

	Survival	Performance	Inattention	Hyperactivity	Sensation Seeking	Lack of Premeditation	Lack of Perseverance	Urgency
Survival	1							
performance	0.402***	1						
Inattention	-0.0758	-0.211	1					
Hyperactivity	-0.236*	-0.155	0.203	1				
Sensation Seeking	0.0499	0.099	-0.124	0.237*	1			
Lack of Premeditation	0.0382	-0.153	0.0542	0.323**	0.341**	1		
Lack of Perseverance	-0.0210	-0.0967	0.423***	0.130	0.122	0.352**	1	
Urgency	-0.157	-0.374**	0.581***	0.240*	0.00627	0.200	0.370**	1

Note: Results are based on the trimmed impulsivity scale, trimmed ADHD scale.

Appendix III- 6. Variables in Data Collection

Wave 1 Variables
Time:
First Email – September 1, 2015
Second Email – September 10, 2015
Third Email – September 16, 2015

[1] General Self-Efficacy
Chen, G., Gully, S.M., & Eden, D. (2001). Validation of a new general self-efficacy scale. *Organizational Research Methods, 4*(1), 62-83.

Likert Scale 1 to 5. 1 = "Strongly Disagree"; 5 = "Strongly Agree"

Please respond to the following statements indicating the extent to which you agree or disagree.
GSE1 – I will be able to achieve most of the goals that I have set for myself.
GSE2 – When facing difficult tasks, I am certain that I will accomplish them.
GSE3 – In general, I think that I can obtain outcomes that are important to me.
GSE4 – I believe I can succeed at most any endeavor to which I set my mind.
GSE5 – I will be able to successfully overcome many challenges.
GSE6 – I am confident that I can perform effectively on many different tasks.
GSE7 – Compared to other people, I can do most tasks very well.
GSE8 – Even when things are tough, I can perform quite well.

[2] Attention Deficit Hyper-Disorder (*Underlined items are the ones used for regression analyses; un-underlined items are deleted because of their low loading*)
Kessler et al. (2005). The World Health Organization (WHO) adult ADHD self-report scale (ASRS): A short screening scale for use in the general population. *Psychological Medicine, 35*(2), 245-256.

Likert Scale 1 to 5. 1 = "Never"; 5 = "Very Often"

Please read the following statement and then answer the following questions.
Considering the past 6 months –.
ADHD1 – How often do you have trouble wrapping up the fine details of a project, once the challenging parts have been done?
ADHD2 – How often do you have difficulty getting things in order when you have to do a task that requires organization?
ADHD3 – When you have a task that requires a lot of thought, how often do you avoid or delay getting started?
ADHD4 – How often do you have problems remembering appointments or obligations?
ADHD5 – How often do you fidget or squirm with your hands or your feet when you have to sit down for a long time?

ADHD6 – How often do you feel overly active and compelled to do things, like you were driven by a motor?

[3] Impulsivity (*Underlined items are the ones used for regression analyses; un-underlined items are deleted because of their low loading*)

Whiteside, S.P., & Lynam, D.R. (2001). The five factor model and impulsivity: Using a structural model of personality to understand impulsivity. *Personality and Individual Differences, 30*(4), 669-689.

Please respond to the following statements indicating the extent which you agree or disagree.
Premeditation=
IMP1 – I have a reserved and cautious attitude toward life.
IMP2 – My thinking is usually careful and purposeful.
IMP3 – I am not one of those people who blurt out things without thinking.
IMP4 – I like to stop and think things over before I do them.
IMP5 – I don't like to start a project until I know exactly how to proceed.
IMP6 – I tend to value and follow a rational, "sensible" approach to things.
IMP7 – I usually make up my mind through careful reasoning.
IMP8 – I am a cautious person.
IMP9 – Before I get into a new situation I like to find out what to expect from it.
IMP10 – I usually think carefully before doing anything.
IMP11 – Before making up my mind, I consider all the advantages and disadvantages.

Urgency=
IMP12 – I have trouble controlling my impulses.
IMP13 – I have trouble resisting my cravings (for food, cigarettes, etc.).
IMP14 – I often get involved in things I later wish I could get out of.
IMP15 – When I feel bad, I will often do things I later regret in order to make myself feel better now.
IMP16 – Sometimes when I feel bad, I can't seem to stop what I am doing even though it is making me feel worse.
IMP17 – When I am upset I often act without thinking.
IMP18 – When I feel rejected, I will often say things that I later regret.
IMP19 – It is hard for me to resist acting on my feelings.
IMP20 – I often make matters worse because I act without thinking when I am upset.
IMP21 – In the heat of an argument, I will often say things that I later regret.
IMP22 – I am always able to keep my feelings under control. (R)
IMP23 – Sometimes I do things on impulse that I later regret.

Sensation Seeking=
IMP24 – I generally seek new and exciting experiences and sensations.
IMP25 – I'll try anything once.
IMP26 – I like sports and games in which you have to choose your next move very quickly.
IMP27 – I would enjoy water skiing.
IMP28 – I quite enjoy taking risks.

IMP29 – I would enjoy parachute jumping.
IMP30 – I welcome new and exciting experiences and sensations, even if they are a little frightening and unconventional.
IMP31 – I would like to learn to fly an airplane.
IMP32 – I sometimes like doing things that are a bit frightening.
IMP33 – I would enjoy the sensation of skiing very fast down a high mountain slope.
IMP34 – I would like to go scuba diving.
IMP35 – I would enjoy fast driving.

Perserverance=
IMP36 – I generally like to see things through to the end.
IMP37 – I tend to give up easily. (R)
IMP38 – Unfinished tasks really bother me.
IMP39 – Once I get going on something I hate to stop.
IMP40 – I concentrate easily.
IMP41 – I finish what I start.
IMP42 – I'm pretty good about pacing myself so as to get things done on time.
IMP43 – I am a productive person who always gets the job done.
IMP44 – Once I start a project, I almost always finish it.
IMP45 – There are so many little jobs that need to be done that I sometimes just ignore them all. (R)

[4] Entrepreneurial Intentions
Zhao, H., Seibert, S.E., & Hills, G.E. (2005). The mediating role of self-efficacy in the development of entrepreneurial intentions. *Journal of Applied Psychology, 90*(6), 1265-1272.

Likert Scale 1to 5. 1 = "Very Little"; 5 = "Great Deal"

Thinking of yourself, how interested are you, in the next 5-10 years, in:
EI1 – Starting a business?
EI2 – Acquiring a small business?
EI3 – Starting and building a high-growth business?
EI4 – Acquiring and building a company into a high-growth business?

[5] Have you ever started a business?
[no]
[yes]

[6] Gender
[Female]
[Male]

[7] Race
[Asian or Asian-American]
[Black or African-American]
[Hispanic/ Non-White]

[White or Caucasian]
[Native American]
[Pacific Islander]

[8] Age ___

[9] Work Experience (years) ___

Wave 2 Variables

Time:
First Email – March 31, 2016
Second Email – April 13, 2016
Third Email – April 19, 2016

[1] Entrepreneurial Intentions
Liñán, F., & Chen, Y. W. (2009). Development and Cross-Cultural application of a specific instrument to measure entrepreneurial intentions. Entrepreneurship theory and practice, 33(3), 593-617.

Likert Scale from 1to 7. 1 = "Total disagreement"; 7 = "Total agreement"

Thinking of yourself, how interested are you, in the next 5-10 years, in:
EI1 – I'm ready to do anything to be an entrepreneur.
EI2 – My professional goal is to become an entrepreneur.
EI3 – I will make every effort to start and run my own firm.
EI4 – I am determined to create a firm in the future.
EI5 – I have very seriously thought of starting a firm.
EI6 – I have the firm intention to start a firm some day.

[2] Are you currently, alone or with others, trying to start a business?
[no]
[yes]

[3] Have you ever started a business?
[no]
[yes]

Wave 3 Variables

Time:
First Email – September 6, 2016
Second Email – September 14, 2016
Third Email – September 21, 2016

[1] Attention Deficit Hyper-Disorder
Kessler et al. (2005). The World Health Organization (WHO) adult ADHD self-report scale (ASRS): A short screening scale for use in the general population. *Psychological Medicine, 35*(2), 245-256.

Likert Scale 1 to 5. 1 = "Never"; 5 = "Very Often"

Please read the following statement and then answer the following questions.
Considering the past 6 months –.
ADHD1 – How often do you have trouble wrapping up the fine details of a project, once the challenging parts have been done?
ADHD2 – How often do you have difficulty getting things in order when you have to do a task that requires organization?
ADHD3 – When you have a task that requires a lot of thought, how often do you avoid or delay getting started?
ADHD4 – How often do you have problems remembering appointments or obligations?
ADHD5 – How often do you fidget or squirm with your hands or your feet when you have to sit down for a long time?
ADHD6 – How often do you feel overly active and compelled to do things, like you were driven by a motor?

[2] Entrepreneurial Intentions
Liñán, F., & Chen, Y. W. (2009). Development and Cross-Cultural application of a specific instrument to measure entrepreneurial intentions. Entrepreneurship theory and practice, 33(3), 593-617.

Likert Scale from 1to 7. 1 = "Total disagreement"; 7 = "Total agreement"

Thinking of yourself, how interested are you, in the next 5-10 years, in:
EI1 – I'm ready to do anything to be an entrepreneur.
EI2 – My professional goal is to become an entrepreneur.
EI3 – I will make every effort to start and run my own firm.
EI4 – I am determined to create a firm in the future.
EI5 – I have very seriously thought of starting a firm.
EI6 – I have the firm intention to start a firm some day.

Wave 4 Variables

Time:
First Email – February 15, 2017
Second Email – February 21, 2017
Third Email – March 1, 2017

[1] Have you ever started a business?
[no]
[yes]

[2] Are you still operating this business (refer to your latest business if you have started more than one)?

[3] Please rate your performance over the PAST 3 YEARS relative to your main competitors (refer to your latest business if you have started more than one).

1 = Much smaller; 2 = Somewhat smaller; 3 = Equal; 4 = Somewhat larger; 5 = Much larger

1) Profits
2) Sales Development
3) Cash flow (liquidity)
4) Market value

[4] Using the choices below, please select the reason you are no longer operating your business?

1) Retirement
2) Took an outside job
3) The business failed
4) Other

[5] Attention Deficit Hyper-Disorder

Kessler et al. (2005). The World Health Organization (WHO) adult ADHD self-report scale (ASRS): A short screening scale for use in the general population. *Psychological Medicine*, *35*(2), 245-256.

Likert Scale 1 to 5. 1 = "Never"; 5 = "Very Often"

Please read the following statement and then answer the following questions.
Considering the past 6 months –.
ADHD1 – How often do you have trouble wrapping up the fine details of a project, once the challenging parts have been done?
ADHD2 – How often do you have difficulty getting things in order when you have to do a task that requires organization?
ADHD3 – When you have a task that requires a lot of thought, how often do you avoid or delay getting started?
ADHD4 – How often do you have problems remembering appointments or obligations?
ADHD5 – How often do you fidget or squirm with your hands or your feet when you have to sit down for a long time?
ADHD6 – How often do you feel overly active and compelled to do things, like you were driven by a motor?

[6] Entrepreneurial Intentions

Liñán, F., & Chen, Y. W. (2009). Development and Cross-Cultural application of a specific instrument to measure entrepreneurial intentions. Entrepreneurship theory and practice, 33(3), 593-617.

Likert Scale from 1to 7. 1 = “Total disagreement”; 7 = “Total agreement”

Thinking of yourself, how interested are you, in the next 5-10 years, in:

EI1 – I’m ready to do anything to be an entrepreneur.
EI2 – My professional goal is to become an entrepreneur.
EI3 – I will make every effort to start and run my own firm.
EI4 – I am determined to create a firm in the future.
EI5 – I have very seriously thought of starting a firm.
EI6 – I have the firm intention to start a firm someday.

Appendix IV- 1. Variables Measured

DV: Firm Subjective Performance
Please rate your performance over the PAST 3 YEARS relative to the your main competitors.

	Much smaller	Somewhat Smaller	Equal	Somewhat Larger	Much Larger
Profits	1	2	3	4	5
Sales development	1	2	3	4	5
Cash flow (liquidity)	1	2	3	4	5
Market value	1	2	3	4	5

IV: ADHD ASRS Scale
Kessler et al. (2005). The World Health Organization (WHO) adult ADHD self-report scale (ASRS): A short screening scale for use in the general population. *Psychological Medicine, 35*(2), 245-256.
Likert Scale –
1 = "Never"
2 = "Rarely"
3 = "Sometimes"
4 = "Often"
5 = "Very Often"

Inattention:
ADHD1-How often do you have trouble wrapping up the final details of a project, once the challenging parts have been done?
ADHD2-How often do you have difficulty getting things in order when you have to do a task that requires organization?
ADHD3-How often do you have problems remembering appointments or obligations?
ADHD4-When you have a task that requires a lot of thought, how often do you avoid or delay getting started?
ADHD7-How often do you make careless mistakes when you have to work on a boring or difficult project?
ADHD8-How often do you have difficulty keeping your attention when you are doing or repetitive work?
ADHD9-How often do you have difficulty concentrating on what people say to you, even when they are speaking to you directly?
ADHD10-How often do you misplace or have difficulty finding things at home or at work?
ADHD11-How often are you distracted by activity or noise around you?

Hyperactivity:
ADHD5-How often do you fidget or squirm with your hands or feet when you have to sit down for a long time?

ADHD6-How often do you feel overly active and compelled to do things, like you were driven by a motor?
ADHD12-How often do you leave your seat in meetings or other situations in which you are expected to remain seated?
ADHD13-How often do you feel restless or fidgety?
ADHD14-How often do you have difficulty unwinding and relaxing when you have time to yourself?
ADHD15-How often do you find yourself talking too much when you are in social situations?

Impulsivity:
ADHD16-When you're in a conversation, how often do you find yourself finishing the sentences of the people you are talking to, before they can finish them themselves?
ADHD17-How often do you have difficulty waiting for your turn in situations when turn talking is required?
ADHD18-How often do you interrupt others when they are busy?

IV: Entrepreneurial Orientation
Covin, J. G., & Slevin, D. P. (1989). Strategic management of small firms in hostile and benign environments. *Strategic management journal*, *10*(1), 75-87.

In general, the top managers of my firm favor . . .		
A strong emphasis on the marketing of tried and true products or services	1 to 7	A strong emphasis on R&D, technological leadership, and innovations
How many new lines of products or services has your firm marketed in the past 5 years?		
No new lines of products or services	1 to 7	Very many new lines of products or services
Changes in product or service lines have been mostly of a minor nature	1 to 7	Changes in product or service lines have usually been quite dramatic
In dealing with its competitors, my firm . . .		
Typically responds to actions which competitors initiate	1 to 7	Typically initiates actions which competitors then respond to
Is very seldom the first business to introduce new products/services, administrative techniques, operating technologies, etc.	1 to 7	Is very often the first business to introduce new products/services, administrative techniques, operating technologies, etc.
Typically seeks to avoid competitive clashes, preferring a 'live-and-let-live' posture	1 to 7	Typically adopts a very competitive, 'undo-the-competitors' posture
In general, the top managers of my firm have . . .		
A strong proclivity for low-risk projects (with normal and certain rates of return)	1 to 7	A strong proclivity for high-risk projects (with chances of very high returns)
In general, the top managers of my firm believe that . . .		
Owing to the nature of the environment, it is best to explore it gradually via timid, incremental behavior	1 to 7	Owing to the nature of the environment, bold, wide-ranging acts are necessary to achieve the firm's objectives
When confronted with decision-making situations involving uncertainty, my firm. . .		
Typically adopts a cautious, 'wait-and-see' posture in order to minimize the probability of making costly decisions	1 to 7	Typically adopts a bold, aggressive posture in order to maximize the probability of exploiting potential opportunities

CV (Control Variable):

1. *Entrepreneur age:*

   Please indicate in which year you were born _____.

2. *Entrepreneur gender:*

   What is your gender?
   (1) Male
   (0) Female

3. *Entrepreneur education(code 0 for less than Master degree, code 1 for equal to or more than Master degree):*

   What is the highest level of education you have completed?
   (1) 12th grade or less

(2) Graduated high school or equivalent
(3) Some college, no degree
(4) Associate degree
(5) Bachelor's degree
(6) Master degree
(7) Doctorate degree

4. *Entrepreneur industry experience:*

   How many years of work experience have you had in the industry where this business competes? _____.

5. *Entrepreneur startup experience:*

   How many businesses have you started? _____.

6. *Firm size:*

   Approximately how many people work for this business now? _____.

7. *Firm age:*
   Do you know in which year the business was founded? _____.

8. *Business status (code 0 if inherited or bought the business, code 1 for starting the business):*

   Have you started, inherited or bought the business?
   (1) Inherited
   (2) Bought
   (3) Started

9. *Industry:*

   Which of the following best describes this business?
   (1) Retail store
   (2) Manufacturing
   (3) Service
   (4)Agriculture
   (5) Mining
   (6) Wholesale distribution
   (7) Transportation, Utilities & Communications
   (8) Finance, Insurance and Real estate
   (9) Construction
   (10)Something else

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Chapter 3

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VITA

January 3, 1989……Born, Ningbo China

July, 2011……Bachelor of Arts, International Business with Spanish
University of Nottingham Ningbo China
Ningbo, China

2011- 2013……..Master of Science in Finance
Syracuse University, NY USA

2013- 2018……..……Doctor of Philosophy, Entrepreneurship
Syracuse University, NY USA