

ADHD Symptoms and Entrepreneurial Orientation of Small Firm Owners

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This study investigates the link between attention deficit hyperactivity disorder (ADHD) symptoms and entrepreneurial orientation (EO). EO is known to be a crucial factor for small firm survival and growth, conceptualised as a business characteristic but influenced by the personality of the small business owner and measured at her individual level. There is ample anecdotal evidence claiming that ADHD symptoms have helped entrepreneurs in their careers. Using a data set of French small firm owners, we are the first to go beyond the anecdotal level in linking ADHD symptoms and EO. Our study contributes to our understanding of entrepreneurship, particularly the determinants of EO, and to “destigmatising” ADHD, which is considered solely a clinical disorder that should be treated.

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INTRODUCTION

There is much anecdotal evidence about a relationship between attention deficit hyperactivity disorder (ADHD) symptoms and entrepreneurship. The popular press, such as *The New York Times* and *USA Today*, has highlighted many examples of renowned entrepreneurs who claim to have benefited from their diagnosed or presumed ADHD while successfully creating and developing their companies (see, for instance, Turner, 2003). Prominent examples include David Neeleman (JetBlue airlines) and Paul Orfalea (Kinko's, now FedEx Office). There is also circumstantial evidence: ADHD symptoms have been related to entrepreneurial characteristics, including opportunity recognition and innovative achievement (White & Shah, 2011), risk taking (Mäntylä, Still, Gullberg, & Del Missier, 2012), action orientation (Flach, 1997), and entrepreneurial intentions (Verheul, Block, Burmeister-Lamp, Thurik, Tiemeier, & Turturea, 2015). However, we have not found any systematic large sample evidence on the direct link between ADHD symptoms and entrepreneurship.

In the present study, entrepreneurship is measured using the entrepreneurial orientation (EO) concept. EO refers to the strategy-making policies and practices that firms apply when identifying opportunities and launching new ventures (Miller, 2011). It is a business characteristic that is strongly influenced by the personality of the entrepreneur and that, in the small business context, can be measured at the individual level (Wales, Patel, & Lumpkin, 2013). It is, perhaps, the most important concept in the world of entrepreneurship research because it is consistently shown to be a crucial factor for small firm survival and growth (Wiklund, Patzelt, & Shepherd, 2009).

The present study builds on the perspective that ADHD symptoms can be viewed as personal traits with both “bright” (i.e. desirable) and “dark” (i.e. undesirable) sides with countervailing effects on entrepreneurial effectiveness (Judge, Piccolo, & Kosalka, 2009). Bright traits may favor entrepreneurial effectiveness in general but also involve paradoxical utility (e.g. non-impulsive entrepreneurs may fail to take control of ambiguous situations due to their reluctance to take risks). Stated differently, dark traits may compromise entrepreneurial effectiveness in general but also enhance productivity and success in specific situations (e.g. impulsive entrepreneurs may take control of ambiguous situations due to their willingness to take risks) (Judge et al., 2009).

In the present study, we examine a sample of 306 French small firm owners and test the link between their ADHD symptoms (measured by a validated scale based on the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (DSM)) and their EO (a self-reported measure of innovativeness, risk taking, and proactiveness). Moreover, we test whether this link remains intact when we add controls that might function as alternative explanations such as creativity, health and human capital of the owner, and firm size, which are documented to be associated with EO.

Our study contributes in several ways. First, by demonstrating beyond the anecdotal level that ADHD symptoms are associated with EO in a small firm context, we extend the rich literature on EO in a new direction, linking it to validated psychological symptoms (Wales et al., 2013). Second, this association suggests that, at least under the appropriate circumstances, ADHD symptoms that are often regarded as “problematic” for adults’ well-being may contribute to higher levels of entrepreneurial performance and, hence, to firm survival and firm growth. Third, this association may help people with ADHD symptoms—who often experience problems in regular wage jobs or in finding fitting employment—to consider starting their own business and to exploit their entrepreneurial talent. In this sense, our study may help stimulate entrepreneurship in an entirely new way by lowering a possible self-inflicted barrier. Overall, our study may also contribute to “destigmatising” ADHD, which is considered solely a clinical disorder that should be treated.

The remainder of our study is structured as follows. In the next section, we discuss EO, ADHD symptoms, and their relationship. In the data and method section, we present our data collection, measurement issues, and control variables. Subsequently, we present the empirical results. In the discussion section, we highlight theoretical and practical implications, and we devote close attention to future research.

THEORY AND HYPOTHESIS

Entrepreneurial Orientation (EO)

EO is a business characteristic that describes a firm’s ability to compete, adapt, and perform effectively in competitive environments (Wales, Monsen, & McKelvie, 2011). It refers to “the entrepreneurial strategy-making processes that key decision makers use to enact their firm’s organizational purpose, sustain its vision, and create competitive advantage(s)” (Rauch, Wiklund, Lumpkin, & Frese, 2009, p. 763). EO is determined by “the extent to which the top managers are inclined to take business-related risks (the risk-taking dimension), to favor change and innovation in order to obtain a competitive advantage for their firm (the innovation dimension), and to compete aggressively with other firms (the proactiveness dimension)” (Covin & Slevin, 1988, p. 218). From the perspective of the upper echelons theory (Hambrick & Mason, 1984), EO in small firms is strongly influenced by the personality of the owner-manager and can, therefore, be measured at the individual level (Wales et al., 2013; Khedhaouria, Gurău, & Torrès, 2015). In the present study, the risk-taking, innovativeness, and proactiveness dimensions are based on self-report measures completed by the firm owners.

Attention Deficit Hyperactivity Disorder (ADHD)

ADHD is a common childhood disorder that is characterised by inattentiveness, impulsivity, and hyperactivity (Doshi, Hodgkins, Kahle, Sikirica, Cangelosi, Setyawan, Erder, & Neumann, 2012). These symptoms begin at an early age, are displayed across environments, and continue throughout life (Pelham, Foster, & Robb, 2007). ADHD is associated with deficiencies that may hamper an individual's activities, including acting before thinking, a short attention span, difficulty organising work, a lack of persistence when facing routine tasks, a lack of memory, and problems with decision making (Brown, 2005). These deficiencies arise from a poor-performing behavioral inhibition system in the brain, which is considered the central deficiency in individuals with ADHD (Barkley, 1997).

ADHD symptoms among adults are specifically related to inattentiveness symptoms, whereas hyperactive-impulsive symptoms tend to decline with age (Davidson, 2008). The persistence of these symptoms often translates into workplace-related problems such as a greater number of job terminations, disciplinary actions, job changes, absenteeism, lower income, poorer performance, work-related accidents and injuries, lower likelihood of full-time employment, poorer self-evaluations of functioning in teams, and a greater reliance on teammates without an associated acceptance of that reliance (Coetzer & Trimble, 2009).

Furthermore, adults with ADHD are less likely to be professionals and more likely to be unemployed or to occupy lower-level positions in organisations (Kessler, Adler, Gruber, Sarawate, Spencer, & Van Brunt, 2007). Their under-representation in higher-level positions may be explained by the primary deficits related to ADHD symptoms pertaining to specific activities such as organising, prioritising and commencing tasks, focusing, regulating alertness, sustaining effort and processing speed, managing frustration and modulating emotions, utilising working memory, and monitoring and self-regulating behavior (Nadeau, 1997). According to the American Psychiatric Association (2000, p. 86), "symptoms typically worsen in situations that require sustained attention or mental effort or that lack intrinsic appeal or novelty". As the great majority of adults with ADHD symptoms are undiagnosed, their integration into an incongruous organisational environment characterised by high levels of formal structures, control, and routine tasks can worsen behavioral problems and lead to underperformance in the workplace (Biederman, Mick, Fried, Aleardi, Potter, & Herzig, 2005). In addition, adults with ADHD symptoms often experience difficulties beyond those related to the workplace, for example, difficulties in formal education (Murphy & Barkley, 1996). Due to their underachievement, adults with ADHD symptoms often struggle with psychological difficulties and have strong feelings of incompetence, insecurity,

and ineffectiveness, and many of them live with a chronic sense of frustration (Murphy & Barkley, 1996).

The Relationship between ADHD and EO

Although they are unable to focus on or persist in repetitive or uninteresting tasks, adults with ADHD symptoms have the ability to sustain rare levels of intensity and focus on activities and projects that capture their interest and can be infectiously enthusiastic and passionate about those interests (White, 1999). As a result, they are capable of outstanding performance in certain areas (Biederman et al., 2005). Not surprisingly, the ADHD syndrome is often interpreted as “showing what they can do if they really want to” or “if they put their mind to it” (Mate, 2000, p. 14–15).

The bright side of ADHD often surfaces in a flexible work environment where adults are able to determine their own tasks and work at their own pace (Biederman et al., 2005; Goldstein, 2005). In such a work environment, ADHD symptoms can be associated with high levels of risk taking, innovativeness, a high tolerance for uncertainty and proactiveness (Coetzer & Trimble, 2009; Corman & Hallowell, 2006; White & Shah, 2006).

That is why an entrepreneurial work environment in which innovativeness, risk taking, and proactive traits may thrive (Macko & Tyszka, 2009) may be suitable for people with ADHD symptoms. In such a context, entrepreneurs are often motivated to do what they like, discover unexplored terrains, and dare to pursue risky activities and venture into the unknown (McMullen & Shepherd, 2006).

When we view ADHD symptoms through the entrepreneurial lens, inattentiveness becomes a desire to imagine and discover unexplored terrains, hyperactivity becomes an aptitude for multitasking and innovation, and impulsivity becomes a trigger of risk taking (Verheul et al., 2015). Following a close consideration of the qualities that make successful entrepreneurs, the symptoms of ADHD can be identified as distinct advantages: inattentiveness may lower the barrier for individuals to discover and develop new activities (White & Shah, 2011). Inattentiveness reflects proactiveness because it leads people to initiate change rather than reacting to events (Mäntylä et al., 2012). Hyperactivity or restlessness is another symptom that lends itself to an entrepreneurial career (Verheul et al., 2015), as it leads people to engage in introducing several innovative activities or products simultaneously (Corman & Hallowell, 2006). Finally, impulsivity is another symptom that increases risk taking and the propensity for action under uncertainty (Brown, 2005). While generally associated with executive impairment (Barkley, 1997), impulsivity has been found to be associated with innovative achievement (White & Shah, 2011). A key feature of this symptom is that it does not focus on what will happen; rather, it is driven

by an individual's sense of what should be done (White & Shah, 2011). Impulsive people act and do not think or wait (Brown, 2005).

In short, adults with ADHD symptoms may become professionally successful (Corman & Hallowell, 2006). However, the use of psychiatric symptoms to identify associations with entrepreneurship remains in its infancy. Validated DSM (*Diagnostic and Statistical Manual of Mental Disorders* published by the American Psychiatric Association, 2000) measures are obvious candidates for a first exploratory approach. In the present paper, we will not treat ADHD as a clinical disorder; rather, we will employ a validated measure of ADHD to assess the links between (experiencing) ADHD symptoms and EO. Thus, we hypothesise the following:

The extent to which small business owners experience ADHD symptoms is positively associated with their level of EO.

DATA AND METHOD

Data Collection

Primary data were collected by a research team of the French Amarok observatory (www.observatoire-amarok.net) between March 2011 and December 2012. Founded in January 2010, Amarok aims to study French small firm owners' beliefs, attitudes, and behaviors concerning their physical and mental health. During its development, Amarok partnered with the French mutual insurance company "Malakoff Mederic" and with the young leaders' network "Centre des Jeunes Dirigeants", which represents 3,500 business owners from many economic sectors.

An email invitation was sent to the 3,500 business owners, 334 of whom agreed to participate in a survey to be administered in March 2011. Twenty-eight participants abandoned the survey for various reasons (e.g. business exit, time constraints), resulting in a sample of 306 participants. Amarok's telephone operators then interviewed the participants using a structured questionnaire that lasted approximately 20 minutes.

Participating firms have, on average, approximately 37 employees, with a standard deviation (*SD*) of approximately 98 employees. Thus, in terms of firm size, the sample is consistent with the European definition of a small firm (fewer than 250 employees). The average age of the participants is approximately 44 years, with an *SD* of approximately 8 years, and 83 per cent are male. A total of 199 firm owners have more than 5 years of education, with an *SD* of less than half a year, while 124 have more than 10 years' experience, with an *SD* of more than 7 years.

Sample representativeness is assessed by comparing the distributions of age, gender, and education level in the current sample to those in the population of French small businesses obtained from the National Institute of Statistics and Economics (INSEE, 2012). The results show that our sample is similar to the profile of owners of French small businesses with respect to age, gender, and education level (Khedhaouria et al., 2015).

Variables and Measures

Entrepreneurial Orientation. In our research, EO is assumed to be a formative construct because its dimensions vary independently and represent a unique aspect of the construct (George, 2011). Accordingly, changes in the dimensions cause changes in the EO construct. EO was measured using the widely adopted scale developed by Covin and Slevin (1988) which includes three sub-dimensions related to innovativeness, risk taking, and proactiveness. Each sub-dimension was measured using three items (Wales et al., 2013). The respondents were asked to indicate the extent to which each item characterises their entrepreneurial style, using a 7-point Likert-type scale. Acknowledging the EO dimensionality debate (Covin & Wales, 2012), we factor-analyzed the items and found that they loaded onto their corresponding constructs with values above 0.60 and eigenvalues exceeding 1, which is sufficient according to Hair, Black, Babin, and Anderson (2010). Dillon-Goldstein's rho (ρ) and Cronbach's alpha (α) values are in excess of 0.7 for each sub-dimension, indicating a good level of reliability. The measurement of the sub-dimensions is discussed below.

The innovation sub-dimension was measured using three questions ($\rho = 0.858$; $\alpha = 0.753$): (1) I introduced and favored many product or service innovations in my company; (2) I marketed many new lines of products or services in my company; (3) I made minor changes in product or service lines offered by my company (reverse scored).

The risk-taking sub-dimension was measured using three questions ($\rho = 0.794$; $\alpha = 0.710$): (4) I tend to strongly favor high-risk projects (with chances of very high returns); (5) Owing to the nature of the environment, I favor bold and wide-ranging acts to achieve the company's objectives; (6) I typically adopt a bold and aggressive posture in order to maximise the probability of exploiting potential opportunities.

The proactiveness sub-dimension was measured using three questions ($\rho = 0.832$; $\alpha = 0.726$): (7) I am very seldom the first business to introduce new products/services, management techniques, or operating technologies in my company (reverse scored); (8) I typically respond to actions that competitors initiate rather than preceding them (reverse scored); (9) I have a tendency to follow competitors to adapt to the market rather than anticipating it (reverse scored).

ADHD Symptoms. ADHD symptoms were measured as a formative construct using the World Health Organization's ADHD Self-Reported Scale (ASRS-6), which includes two sub-dimensions: attention deficit and hyperactivity disorder (Davidson, 2008). The ASRS-6 measure comprises six of the original 18 DSM-IV "Criterion A" symptoms of ADHD and has proven effective in screening for ADHD (Kessler et al., 2007). The aim of the present study was not to clinically screen individuals for ADHD but, rather, to examine the link between the frequency with which ADHD symptoms are experienced and EO in a "non-diagnosed" sample. Each sub-dimension was measured by asking respondents to check the response that best describes how they felt and conducted themselves over the past six months, measured on a 5-point Likert scale ranging from 1 = "Never" to 5 = "Very often".

The attention deficit sub-dimension was measured using four questions ($\rho = 0.820$; $\alpha = 0.768$): (1) How often do you have trouble wrapping up the final details of a project, once the challenging parts have been done? (2) How often do you have difficulty getting things in order when you have to do a task that requires organisation? (3) How often do you have problems remembering appointments or obligations? and (4) When you have a task that requires a lot of thought, how often do you avoid or delay getting started?

The hyperactivity disorder sub-dimension was measured using two questions ($\rho = 0.765$; $\alpha = 0.709$): (5) How often do you fidget or squirm (move) with your hands or feet when you have to sit down for a long time? and (6) How often do you feel overly active and compelled to do things like you were driven by a motor?

Control Variables. Creativity has been explicitly related to the dimensions of EO (Khedhaouria et al., 2015), including innovation (Baron & Tang, 2011), risk taking (Macko & Tyszka, 2009), and proactiveness (Shane & Nicolaou, 2014). Creativity was measured as a reflective construct using four items ($\rho = 0.891$; $\alpha = 0.838$) often reported in psychology and management research (Tierney, Farmer, & Graen, 1999): (1) I have confidence in my ability to solve problems creatively; (2) I feel that I am good at generating novel ideas; (3) I have a tendency to try out new approaches or methods in my work; (4) I feel that I am a good role model for creativity. Respondents provided their answers on a 7-point Likert scale ranging from 1 = "strongly disagree" to 7 = "strongly agree".

We also controlled for health because it has been found to be associated with entrepreneurship (Dijkhuizen, Gorgievski, Van Veldhoven, & Schalk, 2014; Rietveld, van Kippersluis, & Thurik, 2015). Health was measured as a reflective construct of self-rated health using an asymmetric 5-point Likert scale that is commonly used in medical research (Eriksson, Undén, & Eloffson, 2001). For both the physical and mental health categories, a single item was used (Bjorner, Kristensen, Orth-Gomér, Tibblin, Sullivan, & Westerholm, 1996): (1)

During recent months, would you say your physical health was . . .? (2) During recent months, would you say your mental health was . . .?

Because previous studies suggest that smaller firms may face more challenges compared to their larger counterparts with respect to exploiting opportunities and access to human capital (Rauch et al., 2009), we controlled for firm size, measuring it in a dichotomous fashion (≤ 10 and > 10 employees).

Finally, in line with the general trend in entrepreneurship research to label entrepreneurs according to some demographic or other characteristic (e.g. young and old people, high and low levels of education and experience), which is often essential to understanding entrepreneurial behavior (Grilo & Thurik, 2008), we examined the effects of the entrepreneur's age (≤ 45 and > 45 years), level of education (< 5 and ≥ 5 years of study), and experience (≤ 10 and > 10 years). Dichotomous variables were obtained by splitting the scale at the sample median, which facilitates comparisons between groups with high and low measurement values (MacCallum, Zhang, Preacher, & Rucker, 2002). The variables of age, education, and experience were combined into a construct labeled human capital (Wiklund et al., 2009).

Data Transformation and Analysis

For all variables, the level of missing data is less than 10 per cent, which is acceptable (Hair et al., 2010). The Little's MCAR test was performed, allowing the expectation maximisation method to be used to replace missing data.

The data were analyzed using partial least squares (PLS) path modeling following the general procedures suggested by Chin (1998). PLS is appropriate for our study because it can address both reflective and formative constructs even with single-item constructs (Ringle, Sarstedt, & Straub, 2012).

RESULTS

Testing the Measurement Model

We first assessed the convergent validity, discriminant validity, and reliability of the measurement scales for the first-order factors. The results show adequate convergent validity, as all retained items load onto their corresponding constructs with a value above 0.6 except two items related to the attention deficit sub-dimension. Dropping these two items would ensure convergent validity (Chin, 1998) because attention deficit is a reflective sub-dimension, but the results after dropping these items are similar to the results with all six items retained. Table 1 shows good evidence of discriminant validity (the square roots of the average variance extracted, or AVE, on the diagonal are greater than the corresponding off-diagonal inter-construct correlations) and composite reliability

TABLE 1
Discriminant Validity

	Composite reliability (ρ)	Correlation of constructs								
		Attention deficit	Hyperactivity disorder	Creativity	Innovation	Risk-taking	Proactiveness	Health	Firm size	Human capital
Attention deficit	0.820	0.834								
Hyperactivity disorder	0.765	0.191	0.787							
Creativity	0.891	-0.113	-0.081	0.819						
Innovation	0.858	0.036	0.013	0.249	0.820					
Risk-taking	0.794	0.008	0.144	0.234	0.449	0.751				
Proactiveness	0.832	-0.113	-0.034	0.216	0.325	0.350	0.790			
Health	0.859	-0.113	-0.092	0.169	0.137	0.124	0.160	0.868		
Firm size	1.000	-0.043	0.007	0.033	0.049	0.017	0.093	-0.028	n/a	
Human capital	1.000	-0.152	-0.173	0.057	0.021	0.047	-0.002	0.058	0.050	n/a

Diagonal elements are the square root of the average of variance explained (AVE).

(measured scales range from 0.765 to 0.891, exceeding the recommended threshold of 0.70) (Chin, 1998). Finally, we controlled for common method bias using the unmeasured common latent method factor (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). The results show no common method bias and provide support for the validity of our measures.

Testing the Structural Model

Following the results of the first-order factor analysis, we used PLS to obtain the second-order factor indicators. The resulting latent variable scores were then used as formative measures of the aggregate EO and ADHD constructs (Diamantopoulos, Riefler, & Roth, 2008).

An important concern associated with formative constructs is the level of multicollinearity across their sub-dimensions (Diamantopoulos et al., 2008). We tested the formative constructs for multicollinearity by calculating the variance inflation factor (VIF) values. All values are well below the threshold of 3.30, indicating no serious multicollinearity issues (Diamantopoulos et al., 2008).

Another concern associated with a formative construct is the weight significance of sub-dimensions. Removing formative sub-dimensions that are not significant should be theoretically justified rather than merely based on empirical results (Diamantopoulos et al., 2008). Because the proactiveness subdimension is part of the EO construct and has a significant bivariate correlation ($r = 0.542, p < .05$), we retained it despite its nonsignificant weight (Diamantopoulos et al. 2008). Rerunning the model with the nonsignificant proactiveness sub-dimension removed yielded similar results as the model that included all sub-dimensions.

Table 2 shows the results for the relationship between ADHD and EO ($\beta = 0.177, p < .01$ and $R^2 = 3.1\%$). There is, indeed, a significant link between ADHD and EO.

To test the model's robustness (Hair et al., 2010), first, we added the following controls: creativity, health, firm size, and human capital (consisting of age, years of education, and experience). Creativity and health have the expected positive association with EO, whereas size and human capital do not have an association. The link between ADHD and EO remains positive and significant ($\beta = 0.111, p < .05$ and $R^2 = 12.1\%$) despite the "competition" from these relevant controls. Second, we use firm size, age, education, and experience as dichotomous moderators. The results indicate that the link between ADHD and EO remains stable and is not affected by controls and moderators: it is consistently positive and significant in four out of eight cases. The multi-group *t*-test shows no difference between any of the sub-groups.

TABLE 2
The Link between ADHD and EO: Controls and Moderators

<i>Standardized values (β)</i>	<i>Relationship between ADHD and EO</i>	<i>Relationships between controls and EO</i>	<i>Explained variance (R_{EO}^2 %)</i>
ADHD and EO alone ($n = 306$)	0.177**		3.1
With controls ($n = 306$)	0.111*		12.1
Creativity		0.288***	
Health		0.139*	
Firm size		0.052	
Human capital		0.031	
With controls and moderators			
Firm size ≤ 10 ($n = 154$)	0.173*		17
Creativity		0.385***	
Health		0.045	
Firm size > 10 ($n = 152$)	0.083		11.2
Creativity		0.197*	
Health		0.245**	
Multi-group t -test ($D = 0.090$)			
Age ≤ 45 ($n = 189$)	0.135*		12.5
Creativity		0.251***	
Health		0.216**	
Age > 45 ($n = 117$)	0.129		13
Creativity		0.351***	
Health		- 0.016	
Multi-group t -test ($D = 0.006$)			
Years of education < 5 ($n = 107$)	0.088		18.4
Creativity		0.383***	
Health		0.100	
Years of education ≥ 5 ($n = 199$)	0.135*		9.1
Creativity		0.254***	
Health		0.139*	
Multi-group t -test ($D = 0.047$)			
Years of experience ≤ 10 ($n = 182$)	0.158*		8.6
Creativity		0.229**	
Health		0.105	
Years of experience > 10 ($n = 124$)	0.085		18.4
Creativity		0.374***	
Health		0.171*	
Multi-group t -test ($D = 0.073$)			

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

DISCUSSION

Starting from the assumption that entrepreneurial orientation can be measured at the level of the individual small business owner (Khedhaouria et al., 2015), and building on the perspective that ADHD symptoms can be viewed as

personal traits with both bright and dark sides (Judge et al., 2009), the present study examines whether small firms led by entrepreneurs who experience ADHD symptoms exhibit higher levels of entrepreneurial orientation. Using data on 306 French small firm owners and a partial least squares (PLS) approach, we show that there is such a link. We are the first to go beyond the anecdotal level and find evidence of a link between ADHD symptoms and entrepreneurial orientation, which is known to be a crucial antecedent of entrepreneurial success in terms of small firm survival and growth (Wiklund et al., 2009). Our study contributes to our understanding of the determinants of entrepreneurial orientation and to “destigmatising” ADHD, which is considered a clinical disorder that should be treated.

Theoretical Implications

Our study makes at least two important contributions. First, our main contribution is the positive association between ADHD and entrepreneurial orientation. This finding can be compared to that of Wales et al. (2013), who find that CEO narcissism, a classically detrimental trait, can be linked to entrepreneurial orientation. Our finding suggests that ADHD symptoms in the workplace are not inherently negative. Of course, high levels of specific cognitive behavioral traits such as ADHD may impair an individual’s ability to lead a sound professional and personal life. This is highlighted by the clinical perspective, leading to a negative connotation and an emphasis on the treatment of such traits. We avoid the clinical interpretation and show that ADHD symptoms may lead to positive outcomes in a small firm context. Our finding contributes to an emerging literature that employs biomarkers and psychosocial markers to explain entrepreneurial choice or intensity (van der Loos et al., 2013). We are not aware of any similar studies on entrepreneurial orientation.

Second, our study adds to the rich literature on the determinants of entrepreneurial orientation. By examining the association between ADHD and entrepreneurial orientation, we address Wales et al.’s (2013) call to progress beyond simple discussions of entrepreneurial traits and focus on the implications of those traits for company outcomes. Our study is unique in that it employs a well-defined and validated cognitive behavioral trait in a model to “explain” levels of entrepreneurial orientation while taking into account many controls that might function as alternative explanations.

Practical Implications

Our findings have implications for individuals who experience symptoms of ADHD and have entrepreneurial aspirations. First, educators may consider enhancing the positive attributes exhibited by individuals with ADHD symptoms that coincide with innovativeness, risk-taking behavior, and proactiveness, which can contribute to the successful pursuit of their entrepreneurial

ambition (Verheul et al., 2015). Thus, educators should create an appropriate environment in which individuals with ADHD symptoms are able to exploit their particular gifts (Biederman et al., 2005) and create awareness of how the nature of human neurocognitive diversity may encourage entrepreneurship behaviors (Nadeau, 2005).

Second, in the workplace environment, management should not only be aware of the challenges these symptoms pose but also understand their advantages. The positive attributes associated with ADHD could provide an incentive for workplace change, and measures to reduce discrimination against individuals with ADHD symptoms are likely to allow their strengths to be more fully developed and utilised, which will benefit the organisation (Nadeau, 2005). Just as cognitive diversity was perhaps selectively advantageous to early human groups, tapping into such diversity in the workplace is likely to improve organisational performance (Nadeau, 1997). Individuals exhibiting what some researchers describe as a brain disorder may also possess a creative genius and a wealth of thoughts that may prove invaluable to organisations (Kelly & Ramundo, 2006). The alternative view, i.e. that the negative characterisation of ADHD is merely a contextual perspective of otherwise positive attributes, implies a failure in schools, workplaces, and other social settings to adequately accommodate and embrace the positive attributes of individuals with ADHD symptoms. This view raises the question of how individuals with these attributes can be accommodated. Recognising the need to create workplace practices and organisational cultures that embrace diversity is a practical endeavor to accommodate individuals from a wider range of backgrounds, which may ultimately lead to increased organisational performance (Thomas, 1990). ADHD coaching is another promising intervention approach that can improve the workplace performance of entrepreneurs with ADHD symptoms (Goldstein, 2005). Similar to the psychological treatments, there are many other supplementary treatments for ADHD that, although showing potential, still require rigorous study in adult ADHD populations, including neurofeedback, working memory training, and mindfulness meditation (Zylowska et al., 2008).

Limitations and Future Research

The present study has a number of limitations that need to be addressed in future research.

First, the explained variance of entrepreneurial orientation (R_{EO}^2) using ADHD is relatively low. Many antecedents of entrepreneurial orientation are not included in the present study. The fact that creativity and health consistently contributed to the explanation of entrepreneurial orientation opens interesting avenues for further model building. For instance, creativity is a

documented determinant of entrepreneurial orientation (Khedhaouria et al., 2015), and it is also reported to be associated with ADHD (Cramond, 1994). It would be worthwhile to examine the link between ADHD and entrepreneurial orientation as mediated by creativity.

Other individual factors such as self-efficacy (Khedhaouria et al., 2015), internal locus of control (Cromie, 2000), and achievement motive (Ahmed, 1985) have shown links with entrepreneurial orientation. Furthermore, the work of Baron points to affect (e.g. feelings and emotions) and divergent thinking (Ames & Runco, 2005) as candidates for inclusion in a model explaining the entrepreneurial process (Baron, 2008).

Second, although our measurement strategy is unlikely to suffer from common method bias, more research is warranted (Podsakoff et al., 2003). In particular, our data collection is based on self-reported measures. Self-reported measures based on perceptions may lead to biases, especially when data are collected at the same point in time. These biases may be limited in our case because neither ADHD symptoms nor entrepreneurial orientation are likely to change drastically during one's adult life. Nevertheless, future research should collate different measures spread over time or use separate primary and secondary observations.

Third, although we argued that an entrepreneurship or small firm context is often perceived as an appropriate work environment for ADHD adults' effectiveness and success (Verheul et al., 2015), we could not define and clarify such an environment in terms of autonomy or work satisfaction using our data set. This limitation should certainly be overcome in future research that examines the entrepreneurial orientation achievements of people with ADHD symptoms in different workplace environments (Nadeau, 2005). In such research, the perspective that ADHD symptoms are viewed as personal traits with both "bright" (i.e. desirable) and "dark" (i.e. undesirable) sides could be thoroughly investigated (Judge et al., 2009).

Fourth, it is worthwhile studying entrepreneurial choice using a sample of entrepreneurs and a control group, as we address only the entrepreneurial orientation of individuals who are already entrepreneurs in the present study. Similarly, it would be valuable to study the link between ADHD symptoms and entrepreneurial success.

Finally, while the literature indicates that there is a greater prevalence of ADHD among males than among females (Nussbaum, 2012), the low number of females in our study (52 observations) did not allow us to use gender as a moderator. This limitation should be overcome in future research.

CONCLUSION

Our findings reveal a novel and intriguing pattern that shows that ADHD symptoms of firm owners may contribute to small firm survival and firm

growth through the association with the entrepreneurial orientation of their owners. This pattern merits replication to better understand the behavioral manifestations of ADHD and entrepreneurial orientation. When employed in an appropriate environment, individuals with ADHD symptoms may be regarded as assets rather than as possibly problematic cases. We should recognise their strengths rather than remediate what are often simply regarded as their weaknesses. Thus, we may wish to re-evaluate the labels that society assigns to individuals with ADHD symptoms and, instead, search for these individuals' strengths.

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