

ADHD SYMPTOMS, ENTREPRENEURIAL ORIENTATION (EO) and FIRM PERFORMANCE

WEI YU

Whitman School of Management
Syracuse University
Syracuse NY 13210

JOHAN WIKLUND
Syracuse University

ANA PEREZ-LUÑO
Universidad Pablo de Olavide

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) of small businesses. 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 et al., 2009), entrepreneurial orientation (e.g., Lumpkin & Dess, 1996) and clinical psychology (e.g., Barkley, 1997) literatures, to develop and test a conceptual model of how entrepreneurs' ADHD symptoms influence firm performance. Specifically, our model suggests that the entrepreneur's individual characteristics (ADHD symptoms) influence entrepreneurial orientation (EO), which then translates into firm performance.

THEORETICAL DEVELOPMENT

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 reflects problems of sustained attention and distraction (Barkley, 1997). 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). Further, ADHD symptoms have been found to lead to many difficulties in private and work life (Barkley & Murphy 2010; Barkley et al., 2006).

In order to understand the organizational implications of stable individual characteristics, a process view that connects individuals to organizational outcome is required. 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. Specifically, the CEO characteristics would first influence the scan, selection and interpretation of information at hand, which then lead to the types of strategies chosen by the firm and the subsequent performance (Finkelstein et al., 2009). 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 a firm's innovation strategy and strategic flexibility and also influences performance (see Finkelstein et al., 2009 for an overview).

In an entrepreneurial organization, the entrepreneur is the most important individual, having a disproportional influence on firm strategy and outcomes. We argue that ADHD symptoms of the entrepreneur could first influence the adoption of EO. 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 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.

ADHD symptoms fit closely with the three dimensions of EO. Firstly, the weak executive functioning and the resultant inattention symptoms can lead to greater creativity and innovation. Early research by Eysenk (1993, 1995), Kris (1952) and Martindale (1999) found that creative people often exhibit over-inclusive thinking, defocused attention and associative thinking. They speculated that these characteristics are reflections of cognitive disinhibition. Cognitively disinhibition people are less likely to push aside irrelevant information from information processing, thus increasing the spread of action among neural networks and being able to combine unrelated mental elements (Martindale & Dailey, 1996; Vartanian, 2002). Empirical research found that the inhibition deficits of ADHD individuals increase divergent thinking abilities that are closely related to innovation and creativity (White & Shah, 2006). Thus, we expect entrepreneurs high on ADHD symptoms are more likely to identify and discover innovative opportunities, conducting innovation strategy for their ventures.

Second, ADHD symptoms could also be related to proactiveness. ADHD individuals are found to have a higher tendency to seek novelty and avoid routine due to their sensation seeking nature (Issa, 2015). More so, their hyperactivity increases the energy levels, potentially promoting them to actively seek new opportunities and activities, instead of passively waiting for change (Oreg, 2003). Research also shows that the cognitive disinhibition of ADHD individuals may be associated with vivid imagination and insights for future (Davtian et al., 2012), which could increase the proactive strategic making of the firm when combined with hyperactivity.

Finally, ADHD symptoms are found to be associated with risk taking in a large amount of studies. Research shows that the impulsivity associated with ADHD often leads to risk taking in various areas both financially and physically (Matthies et al., 2012). This is often due to the lack of consideration or premeditation for future consequences and a greater utility put on immediate rewards and intuition (Bruce et al., 2009). Moreover, impulsivity has been found to be related to a lower appraisal for threats and risks (Franken, 1992), which also leads to greater propensities to take risks. Taken together, we hypothesize the following:

Hypothesis 1: Entrepreneur's ADHD symptoms are positively related to EO.

The relationship between EO and entrepreneurial 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). Further, 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

Hypothesis 2: EO is positively related to firm performance.

Hypothesis 3: EO mediates the relationship between entrepreneur's ADHD symptoms and firm performance.

STUDY 1: YOUNG PRESIDENTS' ORGANIZATION

Sample

Two surveys with different collection methods were conducted in order to test our hypotheses. This helps establish the robustness and generalizability of our results. It also reduces common method variance, and establishes reliability and validity of our measures.

The first study collects online survey data from Young Presidents' Organization (YPO). Members 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. We distributed the survey through the confidential discussion board of the Innovation and Entrepreneurship Network. 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 internal missing values, we had a sample of 242 individuals with complete responses. Median sales are \$20M and the median employee number is 100.

Measures

As suggested by Wiklund & Shepherd (2003), firm performance is the dependent variable which is multidimensional and comparisons to competitors could reveal important information. 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).

We used the ASRS (ADHD Self-Report Scale) developed by World Health Organization (Kessler et al., 2005) to measure *ADHD symptoms*. This scale has been demonstrated good predictive validity, test-retest reliability and internal consistency in many countries (e.g., Kessler et al., 2006), and has been used by previous ADHD and entrepreneurship literature (e.g., Wiklund et al., 2017). It contains 18 questions measuring a person's inattention (9 items), hyperactive (6 items) and impulsive symptoms (3 items) typical of ADHD individuals. Assessing the degree of ADHD symptoms is better than ADHD diagnosis due to the difficulty associated with ADHD diagnosis (Wasserstein, 2005), the remission of symptoms for many who receive a diagnosis at childhood (Biederman et al., 2000), and the measurement error associated with the yes/no diagnosis (MacCallum et al., 2002).

We used the well-established scale developed by Covin & Slevin (1989) to measure the *Entrepreneurial Orientation* of a firm. The scales measures three inter-related aspects of EO: innovativeness (3 items), productiveness (3 items) and risk-taking (3 items).

We control for several variables based on previous literature (Wiklund & Shepherd, 2003; Wales et al., 2013), including the entrepreneur's *age*, *gender*, *education level*, *industry experience*, *startup experience*, *firm status* (1, "the entrepreneur started the focal firm", 0 "the entrepreneur bought or inherited the focal firm"), *firm size* (the number of employees), *firm age*, and *industries*. We log transformed firm age and size to account for outlier influence.

Analytical Method

Before testing the hypotheses, the dimensionality, the reliability and the validity of each of our construct were examined using exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). We found that the 18 ADHD items can be extracted to 3 factors, namely inattention, hyperactivity and impulsivity. In terms of EO and subjective performance, both of them revealed one-factor structure. This is consistent with previous tests of the factor structure of EO (e.g., Stam & Elfring, 2008). The initial model shows poor model fit, leading us to drop several cross-loading and/or low loading items. Construct reliability and validity are then checked after having the acceptable model. All constructs show satisfactory construct reliability (Lance et al., 2006), convergent validity (Fornell & Larcker, 1981) and discriminant validity (Fornell & Larcker, 1981).

Because of the limited sample size compared to degrees of freedom, and the non-multivariate normality of our data, 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's (2008) suggestion using bootstrapping, which is a non-parametric method superior to the traditional Baron and Kenny (1986) approach (see Hayes, 2013 for a detailed explanation).

Results

Hypothesis 1 states that ADHD symptoms are positively related to EO. When we regress the mediator EO on control variables and three independent variables of interests, 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. Hypothesis 2 states that EO increases firm performance. When we regress firm performance on EO and control variables, we find that EO is positively related to performance (0.28 ; $p < 0.001$). Thus, H2 is supported. Finally, 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 to 0.11) and impulsivity (indirect effect: 0.07 ; 95% confidence interval: 0.02 to 0.13) are positive and significant. Thus, our H3 is supported for hyperactivity and impulsivity, but not for inattention.

Extensive robustness checks are conducted, including checking for common method bias using common factor approach (Podsakoff et al., 2003), using objective firm sales and employment growth rate as measures of performance, checking for sample selection bias, and using post-stratification weight to account for the oversampling of individuals with ADHD potential. Results remain robust.

STUDY 2: SPANISH SMALL WINERIES

Sample

Next, we test our hypotheses using a sample of entrepreneurs in the Spanish wine industry, which is extensive by international standards (ICEX, 2014). The industry has more than 4,500 wineries and is dominated by small and medium-sized local firms (Ruiz and Riaño, 2011). To obtain the data we used the following process. First, we used the SABI/AMADEUS database to identify all Spanish wineries with annual sales above 100,000 Euros. Second, these firms were contacted by telephone to ensure they belonged to the sample frame. This resulted in 520 responses. Out of these, 145 wineries agreed to take part in our study. After deleting observations with missing values, we had 105 useable responses for a response rate of 28%. The questionnaire was directed to the winery's entrepreneur. Objective information about performance was obtained from SABI/AMADEUS database, reducing the risk of common method bias. Firms within our sample have median sales of 995,000 Euros and employee number of 9.

Measures, Analytical Approach and Results

Similar to Study 1, in terms of dependent variable we used subjective performance measures as our main analysis and objective performance measures as a robustness check. Following Zahra (1996), we measure *subjective firm performance* by asking subjective ratings of the *satisfaction* with economic profitability, financial profitability, sales growth and net margin. We measure *objective firm performance* by measuring the sales growth rate from 2014 to 2015. In terms of independent variables, we used the short screening scale ASRS-6 to measure *ADHD symptoms* in order to limit survey length. It contains 6 questions measuring a person's inattention and hyperactivity symptoms. In terms of *Entrepreneurial Orientation*, we used the same scale as in Study 1 (Covin & Slevin, 1989). The control variables we used in the second study were

similar to Study 1. We control for the entrepreneur's *age, gender, education level, industry experience, firm size* (measured by the number of employees) and *firm age*.

We used the same analytical procedures as Study 1. Consistent with prior studies of ASRS-6 (e.g., Wiklund et al., 2017), factor analyses indicate that the 6 ADHD items can be extracted to 2 factors corresponding to inattention and hyperactivity. In terms of EO and subjective performance, our factor analyses revealed that each was uni-dimensional, consistent with Study 1. Similarly, we OLS regression models to test the hypotheses and Hayes (2013)'s bootstrapping method for mediation tests.

Results for study 2 are similar to study 1. In terms of subjective performance, our H1 is supported for hyperactivity, but not for inattention. H2 is supported. Our H3 is supported for hyperactivity, but not for inattention. When we use objective performance of sales growth, results are same.

DISCUSSION AND IMPLICATIONS

In this paper, we build and test a theoretical model of the ADHD and performance relationship. We draw on two samples of entrepreneurs, 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 through EO. Inattention symptoms are related to neither EO nor firm performance. Our results are robust to a wide variety of changing conditions, including types of firms, survey language and distribution method, construct measurement, and model specification.

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., Baron et al., 2016) 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), or entry into self-employment (Verheul et al., 2016; Wiklund et al., 2017) but has not addresses whether these symptoms are functional 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. 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). Our results suggest that entrepreneurship is a unique context in need of its own unique theories, because relationships established elsewhere do not hold up in this context.

Finally, 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). 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.

REFERENCES AVAILABLE FROM THE AUTHORS