

## **AD/HD SYMPTOMS AND ENTREPRENEURIAL INTENTIONS**

**Ingrid Verheul<sup>1</sup>, Joern Block<sup>2</sup>, Katrin Burmeister-Lamp<sup>1</sup>,  
Roy Thurik<sup>3</sup>, Henning Tiemeier<sup>4</sup> & Roxana Turturea<sup>1</sup>**

1. Department of Strategic Management & Entrepreneurship, Rotterdam School of Management, Erasmus University, P.O. Box 1738, 3000 DR Rotterdam, the Netherlands, iverheul@rsm.nl; kburmeister@rsm.nl; rturturea@rsm.nl.
2. Department of Technology and Innovation Management, TUM Business School, Technical University Munich, Germany, block@wi.tum.de.
3. Department of Applied Economics, Erasmus School of Economics, Erasmus University Rotterdam, P.O. Box 1738, 3000 DR Rotterdam, the Netherlands, thurik@ese.eur.nl.
4. Department of Epidemiology, Erasmus Medical Center, Rotterdam, the Netherlands, h.tiemeier@erasmusmc.nl.

## INTRODUCTION

Despite the high social and economic costs of AD/HD (de Graaf et al., 2008; Birnbaum et al., 2005; Matza et al., 2005), there is still limited research into its consequences for occupational choice and performance. Yet, AD/HD symptoms have been related to a dysfunctional career choice process and anxiety when committing to a career decision (Painter et al., 2008). ‘On the job’, people who display symptoms of AD/HD, often experience difficulties of conforming and fitting in with co-workers. They frequently report problems with verbal impulsiveness as they tend to blurt out their thoughts or opinions without first carefully considering the consequences (Hartmann, 2002, p. 29). While they sometimes function well in high school and university, adults with AD/HD symptoms experience more workplace difficulties, require more time off work, and show substandard performance (Nadeau, 2005; de Graaf et al., 2008). Even when equipped with higher levels of intelligence, few of them are found in higher-ranked occupational positions (De Graaf et al., 2008). Not only are symptoms of AD/HD more prevalent in lower-level occupations, they are also more widespread among unemployed than employed individuals (Kessler et al., 2005).

At the same time, there is considerable attention, in particular in the popular press, for the ‘virtues’ of AD/HD. Here it is asserted that people who report symptoms of AD/HD function well, or even above average, in different areas (e.g., work, private life, school) due to the development of mechanisms to cope with their weaknesses and/or the ability to exploit their strengths (Hartmann, 2002). These individuals exhibit several ‘resilience factors’ such as goal orientation, persistence in achieving their goals, and the aim to keep control over their lives. They typically choose a career in which the work environment and job requirements are aligned with their symptoms (Gerber, 2001). Empirical evidence shows that many entrepreneurs, including successful role models, such as Donald Trump and Oprah Winfrey, display AD/HD symptoms. Indeed, many of these symptoms show resemblance to entrepreneurial characteristics, including the need for independence, creativity, risk taking, strong intrinsic motivation and action orientation (Kirby and Honeywood, 2007; Hartmann, 2002). AD/HD indicators have also been connected with entrepreneurial outcomes. Manuzza et al. (1993) reports that adult men with AD/HD symptoms are up to four times more likely to run their own business than those without such symptoms. Assuming that they are better ‘leaders’ than ‘followers’, higher educated young adults with AD/HD may be better off in self-employment than in wage-employment (Toner et al., 2006).

Combined with the increasing importance of entrepreneurship and innovation for maintaining the economic welfare of modern societies, the proposed link between AD/HD and entrepreneurship intentions suggests that, at least under the right circumstances, symptoms of AD/HD can be seen as a blessing rather than as a curse. Moreover, given that current research has emphasized general occupational outcomes and has not systematically examined entrepreneurial careers of adults with AD/HD symptoms, it is worthwhile to investigate the extent to which young adults who display such symptoms have entrepreneurial intentions, and how their intention can be turned into (successful) entrepreneurial action. In this study we examine the entrepreneurial intentions of students in higher education. Not only are these students an under-researched group in the

AD/HD literature (Gropner and Tannock, 2009, p.575), they also resemble entrepreneurs in terms of their relative underperformance within formal education. There are abundant examples of college drop-outs who successfully started an entrepreneurial career. Therefore, and in line with Kirby and Honeywood (2007, p.81), we assume that students with symptoms of AD/HD are “a potential source of entrepreneurial talent”.

The aim of the present study is to empirically assess the relationship between AD/HD symptoms and entrepreneurial intentions in a large sample of students in higher education. More specifically, we examine the underlying motives for students’ future career choice that might drive this relationship. To our knowledge this study presents the first attempt to systematically and empirically investigate the ‘black box’ linking a neurobehavioral developmental disorder, AD/HD – classified by the APA (2000)<sup>1</sup> – to entrepreneurship.

The remainder of this study is structured as follows. In the next section we will discuss the relationship between AD/HD symptoms, entrepreneurial intentions, and the role of career motives in the decision to become entrepreneur. In the method section, we present our sample and variables. Subsequently, we elaborate on the results and conclude.

## **THEORY AND HYPOTHESES**

### **AD/HD Symptoms and Entrepreneurial Intentions**

Most of what is known about the consequences of AD/HD symptoms is derived from research with children (Young, 2000). Yet, the symptoms are reported to persist into adulthood in 30 to 70 percent of cases (Mannuzza et al., 1998). Research shows that adults with AD/HD symptoms have difficulty adjusting to, and meeting with, the requirements of a regular work environment (Barkley and Murphy, 2010). A wide spectrum of related symptoms has been reported that could hamper the functioning in a regular wage job, including acting before thinking, short attention span, lack of persistence when facing routine tasks, lack of memory, and limited decision-making capacity. These ‘deficiencies’ stem from inhibitions in the executive functions: working memory, self-regulation of affect-motivation-arousal, internalization of speech, and reconstitution (Barkley, 1997).

The persistence of such ‘deficiencies’, even among adults who are diagnosed and receive treatment, often translates into lower socioeconomic conditions (Weiss and Murray, 2003). Adults with AD/HD symptoms are found less often among professionals (e.g., doctors, lawyers, educators) and more often among the unemployed (Kessler et al., 2005), or in lower-ranked occupational positions (de Graaf et al., 2008; Mannuzza et al., 1997; Wyld, 1997). Their underrepresentation in more promising and higher-ranked positions may be related to the increased intensity and complexity of responsibilities at higher organizational levels, where the symptoms of AD/HD become more challenging (Nadeau, 2005). Yet, these lower-level positions tend to be characterized by tasks that are repetitive or that lack stimulation. And this is precisely

---

<sup>1</sup> In the DSM IV, Diagnostic and Statistical Manual of Mental Disorders

the type of work that individuals with AD/HD symptoms are reluctant to fulfill. According to the APA (2000, p.86): “*symptoms typically worsen in situations that require sustained attention or mental effort or that lack intrinsic appeal or novelty*”. Ironically, many adults who display symptoms of AD/HD find themselves in ‘less suitable’ highly structured work environments. Even though they would benefit from close supervision<sup>2</sup>, at the same time this can easily lead to conflicts with their direct supervisors. The poor fit with their work environment may also explain the relatively high incidence of sick leaves, reported underperformance, multiple job changes, and the higher preference for part-time work among adults with AD/HD (Wyld, 1997).

The hyperactive symptoms of AD/HD fit relatively well with working in a highly dynamic and challenging environment. In such settings individuals with AD/HD are even found to perform better than others (Wyld, 1997). The inattentiveness symptoms of AD/HD, reflected in forgetfulness about appointments, procrastination and distractibility, would call for a flexible environment (Carroll and Ponterotto, 1998), where adults who display such symptoms can work at their own pace. Because entrepreneurship is often perceived as challenging, dynamic, lacking routines and allowing for flexible working hours, starting up and running a company may provide a fruitful occupational opportunity for (young) adults with AD/HD. This may be particularly true for students in higher education who tend to value their independence and qualify for higher positions in business.

Entrepreneurship does not only seem to ‘fit’ people with AD/HD symptoms because of a preferred and suitable work environment, but an entrepreneurial career also requires specific skills and characteristics, such as creativity, risk tolerance, action orientation, resilience and adaptability, which are often present in adults with AD/HD. For example, several studies show that individuals with symptoms of AD/HD exhibit relatively high levels of creativity (Kirby and Honeywood, 2007; White and Shah, 2011), an indispensable ingredient for opportunity *recognition* and/or opportunity *creation* via innovation (Amabile et al., 1996; Ardichvili et al., 2003; Ward, 2004). Furthermore, it is suggested that adults with AD/HD symptoms display a greater ability to ‘bounce back’ by continually assessing, reassessing and adapting to changing or stressful situations, which is typical for entrepreneurship (Young, 2005). AD/HD symptoms have also been linked with risk perception, decision-making under uncertain conditions and risk taking behavior (Toplak et al., 2005; Bechara et al., 1997; Mäntylä et al., 2012).

Since entrepreneurship appears to offer adults with AD/HD symptoms a working environment that is compatible with their symptoms and where they can exploit their strengths, we expect that they perceive entrepreneurship as their preferred (*desirable*) occupational choice. In addition, because the specific skills that adults with AD/HD symptoms possess (e.g., creativity, adaptability, risk tolerance) closely resemble entrepreneurial traits, they will perceive the pursuit of an entrepreneurial career as more *feasible* compared to other career choices. Perceived desirability and feasibility are the main drivers of entrepreneurial intentions (Ajzen, 1991;

---

<sup>2</sup> According to the APA (2000, p. 86/7): “*Signs of the disorder may be minimal or absent when the person is receiving frequent rewards for appropriate behavior, is under close supervision, is in a novel setting, is engaged in especially interesting activities, or is in a one-to-one situation*”.

Krueger et al., 2000; Shapero and Sokol, 1982). Based on the aforementioned, we hypothesize the following:

*H1: Students with AD/HD symptoms are more likely to have entrepreneurial intentions than students without such symptoms.*

## **AD/HD Symptoms, Career Motives, and Entrepreneurial Intentions**

Understanding the formation of entrepreneurial intentions is essential in creating more insight into actual entrepreneurial behavior (Krueger et al., 2000). Previous studies indicate that individual attitudes towards entrepreneurship<sup>3</sup> are important for understanding the choice for an entrepreneurial career (Krueger and Carsrud, 1993; Krueger, 1993; Robinson et al., 1991; Kolvereid and Isaken, 2006). Shane et al. (2003, p. 258) also propose that human motivation is an essential ingredient of the entrepreneurial process. Douglas and Shepherd (1999) argue that the entrepreneurial career decision is based on a maximization of the anticipated utility derived from entrepreneurship versus that of other career options. They model the entrepreneurship decision as depending on the sum of five main sources of utility including income, work effort, risk, independence and other working conditions<sup>4</sup>. In a similar vein, Carter et al. (2003) propose six categories of career reasons of nascent entrepreneurs; innovation, independence, control and flexibility, status, recognition, following a role model, financial success, and self-realization<sup>5</sup>.

In the present study, we examine to what extent and how (under)graduate students who report symptoms of AD/HD differ from the average student population in terms of their preferred work attributes and how this influences their entrepreneurial intentions. More specifically, we test whether two salient motives for an entrepreneurial career – independence and innovation<sup>6</sup> – mediate the relationship between AD/HD and entrepreneurial intentions.

### ***Independence motive***

Adults with AD/HD symptoms have problems adjusting and meeting the requirements of a regular work environment because they experience difficulties dealing with repetitive or boring tasks and with authority (Barkley and Murphy, 2010). Although they would benefit from close supervision, many of them appear to run into relationship problems with their direct supervisors, in particular when they are required to work on non-challenging and repetitive tasks for longer periods of time (Mannuzza et al., 1993). Due to their impulsive nature, they sometimes just blur out their thoughts before carefully thinking through the consequences, thereby offending their

---

<sup>3</sup> This is based on Ajzen's (1991) Theory of Planned Behavior. Shapero and Sokol (1982) refer to 'desirability'.

<sup>4</sup> Douglas and Shepherd (2002) find empirical evidence that individuals take into account risk, independence and income when weighing alternative career options.

<sup>5</sup> The factors making up these six career reasons accounted for about seventy per cent of the variance (Carter et al., 2003). However, when comparing nascent entrepreneurs and non-entrepreneurs, Carter et al. (2003) only find significant differences regarding roles and recognition, scored lower by entrepreneurs.

<sup>6</sup> When investigating the career choice intentions of students with a family business background, Zellweger et al. (2011) also takes into account these two motives.

supervisors. As a result, it can be expected that adults with symptoms of AD/HD prefer to work in an environment where they have a lot of freedom and in which they do not frequently have to report to someone higher in the hierarchy.

At the same time, this desire for freedom has been reported as a universal reason for new venture creation, i.e., one that is stable across countries and gender (Shane et al., 1991). Kolvereid (1996) shows that independence is the most cited pull factor for preferring entrepreneurship over wage employment. According to Hartmann (2002), the strong sense of individualism, high creativity, and the ability to be a self-starter are recurring themes in the lives of AD/HD adults, and this makes them more likely to start their own companies than their non-AD/HD peers.

Taking into account that adults with AD/HD symptoms perform best when they work independently in their own pace and that independence is one of the main motives for pursuing an entrepreneurial career, we formulate the following set of hypotheses:

- H2: The independence motive mediates the relationship between AD/HD symptoms and entrepreneurial intentions of students.*
- H2a: Students with AD/HD symptoms value independence as a career motive higher than students without such symptoms.*
- H2b: High valuation of independence as a career motive is positively related to entrepreneurial intentions.*

### ***Innovation motive***

Adults with symptoms of AD/HD are easily distracted when fulfilling “boring, repetitive” tasks and tend to perform better when they work in novel settings or engage in activities that particularly interest them (APA, 2000, p.86/7). They look for challenging projects and dynamic environments that can keep them motivated, which means that they are often involved in new and innovative activities. White and Shah (2011) find that adults with AD/HD symptoms have a higher preference for idea generation and a lower preference for problem clarification and idea development. This drive for innovation is fuelled by a high level of creativity. Kirby and Honeywood (2007, p.86) demonstrate that students with AD/HD symptoms are more likely to have a preference for right-brain learning (instead of left-brain learning), which is at the heart of creative processes. Other studies, such as Weiss (1997) also show evidence of the exceptional creativity and unconstrained thinking ability of people who display symptoms of AD/HD.

Since Schumpeter’s *Theory of Economic Development*, first published in 1911, innovation has been central to entrepreneurship. Schumpeter (1911, 1939) characterized the entrepreneur as someone who is ‘mentally free’, who enjoys to create and change, and is not afraid to show deviant behavior when pursuing something new. Carland et al. (1984) proposed innovation, and the preference for creating activity, as the critical factor distinguishing between entrepreneurs and

non-entrepreneurs (i.e., managers and small business owners). Generally, innovation is reported as a common motive for pursuing an entrepreneurial career (Carter et al. 2003; Cassar, 2007; )<sup>7</sup>.

Taking into account that adults with symptoms of AD/HD are motivated to work on challenging innovative projects and that innovation is central to our understanding of entrepreneurship, we propose the following hypothesis:

*H3: The innovation motive mediates the relationship between AD/HD symptoms and entrepreneurial intentions of students.*

*H3a: Students with AD/HD symptoms value innovation as a career motive higher than students without such symptoms.*

*H3b: High valuation of innovation as a career motive is positively related to entrepreneurial intentions.*

## **METHODOLOGY**

### **Data Collection**

To test our hypotheses we use a data set originating from the Global University Entrepreneurial Spirit Student's Survey (GUESSS) conducted in 2011. This international research consortium examines the career aspirations and entrepreneurial intentions of students in higher education. The GUESSS consortium was founded by the Swiss Research Institute of Small Business and Entrepreneurship at the University of St. Gallen (KMU-HSG) in 2003 as the International Survey on Collegiate Entrepreneurship (ISCE) and was renamed GUESSS in 2008.

For the purposes of this study we rely on data collected among students in higher education of different study fields and at different levels (e.g., undergraduate, graduate) in the Netherlands.<sup>8</sup> An online (identification-based) questionnaire was distributed by institutional representatives at 14 Universities and 27 Schools of Applied Science between March and June 2011, reaching more than 300,000 students. One month after the initial mailing the educational institutions were requested to send out a reminder to their students. To motivate students to participate in the online survey two I-pads 2.0 were allotted among the participants who completed the survey.

The final response rate for the Netherlands amounts to approximately 7.4 percent<sup>9</sup>, which is a bit higher than the GUESSS country average (Sieger et al., 2011). This is an acceptable response rate given that only one reminder was sent out and that several institutes decided not to send a direct mail to the students, but instead distributed the link to the online questionnaire in a newsletter or

---

<sup>7</sup> Considering the widely acknowledged role of innovation in venture performance (Heunks, 1998), innovation seems to be an antecedent for both starting and running a successful venture.

<sup>8</sup> For a detailed description of the GUESSS project visit [www.guesssurvey.org](http://www.guesssurvey.org).

<sup>9</sup> For the calculation of this response rate educational institutions with no systematic data collection and/or those reporting less than twenty respondents have been excluded. Note that in the analysis these observations are combined, together with the exchange students, in a separate dummy: 'other educational institutions' (N=247).

via the Intranet. This drastically reduced response rates for these institutions<sup>10</sup>. Table A1 in the Appendix presents the participating educational institutes in the Dutch GUESSS survey. For our analysis we only included individuals who responded to all items that were relevant for our study. Our final sample consists of 12,863 respondents.

## Measurements

To measure entrepreneurial intentions students were asked the following question: “*Which career path do you intend to pursue right after completion of your studies?*” Respondents could choose only one option of the following answer categories: (1) as an employee; (2) as a founder; (3) as a successor; (4) other<sup>11</sup>. A dummy variable is created where prospective founders and successors were coded ‘1’ (i.e., entrepreneurial intentions), and prospective wage employees and the ones without a clear profession in mind were labeled ‘0’ (i.e., no entrepreneurial intentions). In accordance with Zellweger et al. (2011) we note that because our data set consists of students who have not yet started their professional career, we can take a prospective view rather than a retrospective one, the latter which frequently suffers from survivor bias.

To measure AD/HD symptoms we make use of the World Health Organization (WHO) AD/HD self-report scale (ASRS-6). This screener is based on a selection of 6 out of the 18 DSM-IV criterion A symptoms of AD/HD (Kessler et al., 2005).

Students were asked to: “Check the response that best describes how you have felt and conducted yourself over the past 6 months”. There were five response categories: 1=never; 2=rarely; 3=sometimes; 4=often; 5=very often. Responses were required for the following 6 statements:

- 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 organization?
- 3) How often do you have problems remembering appointments or obligations?
- 4) When you have a task that requires a lot of thought, how often do you avoid or delay getting started?
- 5) How often do you fidget or squirm with your hands or feet when you have to sit down for a long time?
- 6) How often do you feel overly active and compelled to do things, like you were driven by a motor?

According to Kessler et al. (2005) this AD/HD screener outperforms the (unweighted) 18-question ASRS in sensitivity, specificity, and total classification accuracy. Furthermore, Kessler et al. (2007, p.52) argue that: “The brevity and ability to discriminate DSM-IV cases from non-

---

<sup>10</sup> Four institutes posted the questionnaire on the Intranet, leading to response rates of less than one percent. One institution decided to put the link to the questionnaire in a newsletter that was sent to the students, which led to a reasonable response rate of about four percent.

<sup>11</sup> No professional career in mind (e.g., travelling, family).

cases make the six-question ASRS attractive for use both in community epidemiological survey and in clinical outreach and case-finding initiatives”. Matza et al. (2011) also reports a good test-retest reliability of the ASRS.

According to Hesse (2012) the ASRS-6 measures the two latent factors: attention deficit and hyperactivity, suggesting that the measure is clearly two-dimensional and a distinction can be made between two types of AD/HD.

The career motives have been measured by asking respondents the following question: “*How important are the following motives for your future work and career path?*” on a seven-point Likert scale ranging from 1 (very unimportant) to 7 (very important).

The variable ‘Independence motive’ is calculated as the average score on the following career motives: ‘Get a greater flexibility for my personal life’ and ‘be my own boss’ (Cronbach alpha is 0.52). The variable ‘Innovation motive’ is calculated as the average score on the motives: ‘Be innovative, at the forefront of technology’ and ‘Develop an idea for a product’ (Cronach alpha is 0.76).

## RESULTS

Table 1 shows means, stand deviations and correlations for our measure.

-----INSERT TABLE 1 ABOUT HERE -----

To test our first hypothesis H1, which says that students with AD/HD symptoms have higher entrepreneurial intentions than students without such symptoms, we used hierarchical multiple regressions. Control variables such as career motives, socio-demographics, antecedents of planned behavior and study related factors were entered at Step 1 (Model M1 in Table 2) and our measure of AD/HD symptoms was entered at Step 2 (Model M2 in Table 2) of the regression equation. As shown in Model M2 in Table 2, we found that AD/HD symptoms are positively associated with entrepreneurial intentions, supporting our first hypothesis H1 ( $\beta = 0.15; p < 0.01$ ). In other words, students who report AD/HD symptoms have significantly higher intentions to start their own business than their peers without these symptoms.

-----INSERT TABLE 2 ABOUT HERE -----

To test H2 (a and b) and H3 (a and b), we followed Kenny, Kashy, and Bolger (1998) as well as Baron and Kenny (1986) who suggest four steps to test for mediation. Given that our mediators (independence motive and innovation motive) are correlated, we test their mediating effects separately. The results of the mediation analysis are reported in Table 3.

The first condition for mediation was satisfied because the independent variable (AD/HD symptoms) is significantly related to the dependent variable entrepreneurial intentions (Model M1 in Table 3:  $\beta = 0.175; p < 0.01$ ). The second condition for mediation requires that the independent variable (AD/HD symptoms) is significantly related to the mediator (independence motive and innovation motive). As shown in Models M2 and M3 of Table 3, this condition is met

both for independence motive (H2a;  $\beta = 0.077; p < 0.01$ ) and innovation motive (H3a;  $\beta = 0.128; p < 0.01$ ). Hence, we accept H2a and H2b.

With respect to the third condition, both independence motive (H2b) and innovation motive (H3b) are positively related to entrepreneurial intentions after controlling for AD/HD symptoms (Model M4 in Table 3:  $\beta = 0.251; p < 0.01$  and M5 in Table 3:  $\beta = 0.052; p < 0.01$ ). Hence, our findings confirm H2b and H3b. However, since AD/HD symptoms are still significantly related to entrepreneurial intentions (Model M4 in Table 3:  $\beta = 0.156; p < 0.01$  and Model M5 in Table 3:  $\beta = 0.170; p < 0.01$ ) the fourth condition for complete mediation is not met. Instead, we find that both independence and innovation motive partially mediate the relationship between AD/HD and entrepreneurial intentions. In other words, both independence motive and innovation motive partially explain the positive relationship between AD/HD symptoms and students' entrepreneurial intentions.

-----INSERT TABLE 3 ABOUT HERE -----

## **DISCUSSION AND CONCLUSION**

The aim of this paper was to investigate the career intentions and motives of students with AD/HD related symptoms. Specifically, we compared students with AD/HD related symptoms with students without such symptoms based on their entrepreneurial intentions. Furthermore we tested whether the independence and innovation as career motives mediate the relationship between AD/HD symptoms and entrepreneurial intentions. This study makes several contributions.

First, our study contributes to the occupational choice literature by exploring the career motives of a distinct group of individuals, students with AD/HD related symptoms. We showed that students with AD/HD symptoms value independence and innovation as career motives higher than students without such symptoms. This is particularly important considering that adults with AD/HD often have difficulties committing to a career decision (Painter et al., 2008), and exhibit a substandard performance when they finally do (Nadeau, 2005). Our findings imply that adults with AD/HD should analyze what motivates them in their (future) profession and that these motives may offer guidance when making an occupational choice.

Moreover, our paper adds to the literature on entrepreneurial intentions by showing how symptoms associated with AD/HD relate to entrepreneurial intentions. We found that AD/HD symptoms have a positive effect on entrepreneurial intentions, even after controlling for potential mediators. This finding is perhaps surprising considering that adults with AD/HD are often found in lower ranked occupational positions where the complexity of responsibility is low (de Graaf et al., 2008; Manuzza et al., 1997; Wyld, 1997) and that they typically benefit from close supervision (APA, 2000, p.87/7). However, the fact that an entrepreneurial career does not

involve any of the above, suggests that the increased responsibility and lack of supervision are not barriers for adults with AD/HD symptoms when pursuing an entrepreneurial career. This is in line with the AD/HD literature that implies that adults with AD/HD develop coping mechanisms to overcome their weaknesses and exploit their strengths (Gerber, 2001).

Our findings also confirm that adults with AD/HD are better ‘leaders’ than ‘followers’ (Toner et al., 2006) because they value careers with a high degree of independence implying informal supervision or no supervision at all. Similarly, adults with AD/HD symptoms aim for work on challenging novel projects that enable them to innovate. The search for an innovative activity is in line with previous findings that adults with AD/HD symptoms appreciate routine work and highly structured work environments less than their peer without AD/HD symptoms (Wyld, 1997).

Finally we showed that independence and innovation motives partially mediate the relationship between AD/HD symptoms and entrepreneurial intentions, but without cancelling the direct effect. These findings further emphasize the similarity between adults with AD/HD and adults with entrepreneurial intentions with respect to their career motives.

## **Implications**

Our findings have implications for entrepreneurship educators and adults with AD/HD symptoms and entrepreneurial intentions. First, entrepreneurship educators should be aware of the blessings of AD/HD symptoms with young adults. Specifically, educators should stimulate young adults with AD/HD symptoms to think about an entrepreneurial career instead of one in a corporate context. As adults with AD/HD symptoms experience difficulties adjusting and meeting the requirements of a regular work environment, but seem to have entrepreneurial intentions, an entrepreneurial career may prove a fruitful occupational choice for them. In case of an existing interest in starting an own business, educators should stimulate people with AD/HD to form an entrepreneurial team, where their positive attributes (creativity, energy, determination) can contribute to the success of the team, while their negative attributes (poor organization, inattention, lower social skills) can be compensated by others (Kirby and Honeywood, 2007, p.88). The fact that adults with AD/HD typically have problems with authority and the formality of a regular work environment (Barkley and Murphy, 2010) does not necessarily mean they would not benefit from more structure or organization.

Second, for adults with AD/HD symptoms and entrepreneurial intentions our findings imply that they are not an exception in the population of people who want to start their own business. In contrast, individuals with AD/HD symptoms want to start relatively more often their business than individuals without these symptoms. This result may stimulate the creation of a network of people with AD/HD interested in entrepreneurship to facilitate exchange among like-minded individuals that face similar challenges.

## **Limitations and future research**

Considering the high socio-economic costs of AD/HD but also the increased importance of entrepreneurship and innovation for modern society, the link between AD/HD symptoms and a potential entrepreneurial career poses important directions for further research.

First, more research is needed to assess the influence of AD/HD symptoms on entrepreneurial intentions, including non-student samples such as employed and unemployed people. A potential direction for research would also be to look at the entrepreneurial intentions of adults with AD/HD symptoms from a broader perspective, encompassing the formations of the intentions by accounting also for the perceived desirability and feasibility of an entrepreneurial career. Second, we analyze entrepreneurial intentions but do not investigate whether young adults with AD/HD symptoms actually start their own business more often than others. Hence, investigating actual start up behavior of adults with AD//HD symptoms would complement our study and allow for policy implications. Third, it would be interesting to investigate how entrepreneurs with AD/HD symptoms perform as compared to entrepreneurs without these symptoms. Besides higher entrepreneurial intentions, do adults with AD/HD also have the endurance to follow the ups and downs of the entrepreneurial journey in the long term? Finally, our study is based on self-reported survey data and may suffer from a common method bias. Using a longer version of the AD/DH screener questions would allow analyzing the influence of the separate components of AD/HD - attention deficit, hyperactivity and impulsivity – on entrepreneurial intentions.

## REFERENCES

- Ajzen, I. (1991) The theory of planned behavior, *Organizational Behavior and Human Decision Processes*, 50 (2), 179-211.
- Amabile, T.M., Conti, R., Coon, H., Lazenby, J. and M. Herron (1996) Assessing the Work Environment for Creativity, *Academy of Management Journal* 39, 1154-84.
- American Psychiatric Association (2000) *Diagnostic and Statistical Manual of Mental Disorders: DSM-IV-TR*, 4<sup>th</sup> Edition, Text Revision, American Psychiatric Press: Washington D.C.
- Ardichvili, A., Cardozo, R. and S. Ray (2003) A theory of entrepreneurial opportunity identification and development, *Journal of Business Venturing* 18, 105-123.
- Barkley, R.A. (1997) Behavioral Inhibition, Sustained Attention, and Executive Functions" Constructing a Unifying Theory of AD/HD. *Psychological Bulletin*, 121(1):65-94
- Barkley, R. and K. Murphy (2010) Impairment in occupational functioning and adult AD/HD: The predictive utility of executive function (EF) ratings versus EF tests, *Archives of Clinical Neuropsychology* 25, 157-173.
- Baron, R.M., Kenny, D.A. (1986) The moderator mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations, *Journal of Personality and Social Psychology* 51(6), 421-444.
- Bechara, A., Damasio, H., Tranel, D. and A.R. Damasio (1997) Deciding advantageously before knowing the advantageous strategy, *Science* 272, 1293-1295.
- Birnbaum H., Kessler R., Lowe, S., Secnik, K., Greenberg P., Leong S., and Swensen, A. (2005) Costs of attention deficit-hyperactivity disorder (AD/HD) in the US: excess costs of persons with AD/HD and their family members in 2000, *Current Medical Research and Opinion*, 21, 195–206.
- Carland, J.W., Hoy, F., Boulton, W.R. and Carland, J.C. (1984) Differentiating entrepreneurs from small business owners: A conceptualization, *Academy of Management Review* 9 (2), 354-359.
- Carroll, C. and Ponterotto, J. (1998) Employment counseling for adults with Attention-Deficit / Hyperactivity Disorder: Issues without answers, *Journal of Employment Counseling* 35, 79-95.
- Carter, N.M., Gartner, W.B., Shaver, K.G. and E.J. Gatewood (2003) The career reasons of nascent entrepreneurs, *Journal of Business Venturing* 18, 13-39.
- Cassar, G. (2007) Money, money, money? A longitudinal investigation of entrepreneur career reasons, growth preferences and achieved growth, *Entrepreneurship & Regional Development* 19(1), 89-107.
- Douglas, E.J. and D.A. Shepherd (1999) Entrepreneurship as a utility maximizing response, *Journal of Business Venturing* 15, 231-251.
- Douglas, E.J. and D.A. Shepherd (2002) Self-employment as a career choice: Attitudes, entrepreneurial intentions, and utility maximization, *Entrepreneurship Theory and Practice*, Spring 2002, 81-90.
- Gerber, P. (2001) Employment of adults with learning disabilities and AD/HD: Reasons for success and implications for resilience, *The AD/HD Report*, 9(4) 1-5.
- Graaf, R. de, Kessler, R.C., Fayyad, J., ten Have, M., Alonso, J., Angermeyer, M., Borges, G., Demyttenaere, K., Gasquet, I., de Girolamo, G., Haro, J.M., Jin, R., Karam, E.G., Ormel,

- J., Posada-Villa, J. (2008) The prevalence and effects of adult attention-deficit/hyperactivity disorder (AD/HD) on the performance of workers: results from the WHO World Mental Health Survey Initiative. *Journal of Occupational and Environmental Medicine*, 65:835-842
- Gropper, R.J. and R. Tannock (2009) A pilot study of working memory and academic achievement in college students with AD/HD, *Journal of Attention Disorders* 12(6), 574-581.
- Hartmann, T. (2002) *AD/HD Secrets of Success, Coaching Yourself to Fulfillment in the Business World*, New York: Select Books.
- Hesse, M. (2012) The ASRS-6 has two latent factors: Attention deficit and hyperactivity, *Journal of Attention Disorders*, forthcoming.
- Kenny, D.A., Kashy, D.A., Bolger, N. (1998) Data analysis in social psychology. In *The Handbook of Social Psychology* (4<sup>th</sup> edn), Gilbert, D.T., Fiske, S.T., Lindzey, G. (eds.), Oxford University Press: New York.
- Kessler, R.C., Adler, L.A., Gruber, M.J., Sarawate, C.A., Spencer, T. and D.L. van Brunt (2007) Validity of the World Health Organization Adult AD/HD Self-Report Scale (ASRS) in a representative sample of health plan members, *International Journal of Methods in Psychiatric Research* 16(2), 52-65.
- Kessler, R.C., Adler, L., Ames, M., Demler, O., Faraone, S., Hiripi, E.,m Howes, M.J., Jin, R., Secnik, K., Spencer, T., Ustun, T.B. and E.E. Walters (2005), The World Health Organization adult AD/HD self-report scale (ASRS): A short screening scale for use in the general population, *Psychological Medicine* 35, 245-256.
- Kirby, D.A. and D. Honeywood (2007) Graduate entrepreneurship, AD/HD and the creation of young entrepreneurs: Is there a need to rethink? *International Journal of Entrepreneurship Education* 5, 79-92.
- Kolvereid, L. (1996) Organizational employment versus selfemployment: Reasons for career choice intentions, *Entrepreneurship Theory and Practice* 20(3), 23–31.
- Kolvereid, L. and E. Isaksen (2006) New business start-up and subsequent entry into self-employment, *Journal of Business Venturing* 21, 866-885.
- Krueger, N. (1993) Impact of prior entrepreneurial exposure on perceptions of new venture feasibility and desirability, *Entrepreneurship Theory and Practice* 18 (1), 5-21.
- Krueger, N. and A. Carsrud (1993) Entrepreneurial intentions: Applying the theory of planned behavior, *Entrepreneurship and Regional Development* 5, 315-330.
- Krueger, N., Reilly, M. and Carsrud, A. (2000) Competing models of entrepreneurial intentions, *Journal of Business Venturing* 15(5-6), 411-432.
- Mannuzza, S., Klein, R.G., Bessler, A., Malloy, P., LaPadula, M. (1993) Adult outcome of hyperactive boys: Education achievement, occupational rank, and psychiatric status, *Archives of General Psychiatry* 49: 565-576.
- Mannuzza, S., Klein, R. G., Bessler, A., Malloy, P. and M. la Padula, M. (1998). Adult psychiatric status of hyperactive boys grown up, *American Journal of Psychiatry*, 155, 493-498.
- Mäntylä, T., Still, J., Gullberg, S. and F. del Missier (2012), Decision making in adults with AD/HD, *Journal of Attention Disorders* 16(2), 164-173.

- Matza, L., Paramore, C. and Prasad, M. (2005) A review of the economic burden of AD/HD, *Cost Effectiveness and Resource Allocation*, 3(5), 1-9.
- Matza, L.S., Brunt, D.L. van, Cates, C. and L.T. Murray (2011) Test-retest reliability of two patient-report measures for use in adults with AD/HD, *Journal of Attention Disorders* 15(7), 557-563.
- Nadeau, K.G. (2005). Career Choices and Workplace Challenges for Individuals with AD/HD. *Journal of Clinical Psychology: In Session*, 61: 549–563.
- Painter, C., Prevatt, F. and Welles, T. (2008) Career beliefs and job satisfaction in adults with symptoms of attention-deficit/hyperactivity disorder, *Journal of Employment Counseling* 45, 178-188.
- Robinson, P.B., Stimpson, D.V., Huefner, J.C. and H.K. Hunt (1991) An attitude approach to the prediction of entrepreneurship, *Entrepreneurship Theory and Practice*, summer, 13-31.
- Schumpeter, J. (1934) *The Theory of Economic Development*, Harvard University Press, Cambridge Mass. (First edition 1911).
- Schumpeter, J. (1939) *Business Cycles*, McGraw-Hill: New York/London.
- Shane, S., Kolvereid, L., and P. Westhead (1991) An exploratory examination of the reasons leading to new firm formation across country and gender, *Journal of Business Venturing* 6, 431-446.
- Shane, S., Locke, E.A. and C.J. Collins (2003) Entrepreneurial motivation, *Human Resource Management Review* 13, 257-279.
- Shapero, A. and L. Sokol (1982) Social dimensions of entrepreneurship, in Kent, C.A., Sexton, D.L. and K.H. Vesper (eds.), *Encyclopedia of Entrepreneurship*, Englewood Cliffs: Prentice Hall, 72-87.
- Sieger, P., Fueglistaller, U. & Zellweger, T. (2011). *Entrepreneurial Intentions and Activities of Students across the World, International Report of the GUESSS Project 2011*. St.Gallen: Swiss Research Institute of Small Business and Entrepreneurship at the University of St.Gallen (KMU-HSG).
- Toner, M., O'Donoghue, T., Houghton, S. (2006). Living in Chaos and Striving for Control: How adults with Attention Deficit Hyperactivity Disorder deal with their disorder. *International Journal of Disability, Development and Education* 53(2):247-261
- Toplak, M.E., Jain, U. and R. Tannock (2005) Executive and motivational processes in adolescents with Attention-Deficit-Hyperactivity-Disorder (AD/HD), *Behavioral and Brain Functions* 1(8), 1-12.
- Ward, T.B. (2004) Cognition, creativity, and entrepreneurship, *Journal of Business Venturing* 19, 173-188.
- Weiss, L. (1997) *ADD and Creativity*, Dallas: Taylor Publishing Company.
- Weiss, M. and C. Murray (2003) Assessment and management of attention-deficit hyperactivity disorder in adults, *CMAJ* 168, 715-722.
- White, H.A. and P. Shah (2011) Creative style and achievement in adults with attention-deficit/hyperactivity disorder, *Personality and Individual Differences* 50, 673-677.

- Wyld, D.C. (1997) Attention Deficit / Hyperactivity Disorder in adults: Will this be the greatest challenge for employment discrimination law? *Employee Responsibilities and Rights Journal* 10 (2), 103-125.
- Young, S. (2000) AD/HD children grown up: An empirical review, *Counseling Psychology Quarterly* 13(2), 190-200.
- Young, S. (2005) Coping strategies used by adults with AD/HD, *Personality and Individual Differences* 38, 809-816.

**Table 1: Means, standard deviations and correlations**

See below

**Table 2: Effect of AD/HD symptoms on entrepreneurial intentions<sup>†</sup>**

INDEPENDENT VARIABLES	MODEL M0	MODEL M1
	COEFF. (SE)	COEFF. (SE)
AD/HD	.	0.15** (0.06)
<b>CAREER MOTIVES</b>		
Independence motive	0.25** (0.04)	0.25** (0.04)
Innovation motive	0.05 (0.03)	0.05 (0.03)
Self-realization motive	-0.13** (0.05)	-0.13** (0.05)
Financial success motive	-0.17** (0.04)	-0.16** (0.04)
Role model motive	0.10** (0.03)	0.10** (0.03)
Recognition motive	-0.13** (0.03)	-0.13** (0.03)
<b>SOCIO-DEMOGRAPHICS</b>		
Female	-0.22** (0.07)	-0.20** (0.07)
Student age (in years)	0.02** (0.01)	0.02** (0.01)
Single	-0.33* (0.14)	-0.34* (0.14)
Self-employed parents	0.30** (0.07)	0.30** (0.07)
Nationality (5 dummies)	p=0.340	p=0.367
<b>ANTECEDENTS OF PLANNED BEHAVIOR</b>		
Attitude towards entrepreneurship	0.34** (0.04)	0.33** (0.04)
Social norms	-0.018** (0.004)	-0.018** (0.004)
Entrepreneurial self-efficacy (domain-specific)	0.47** (0.06)	0.49** (0.06)
Locus of control	0.10* (0.05)	0.07 (0.05)
<b>STUDY-RELATED</b>		
Study grade	-0.11* (0.05)	-0.10* (0.05)
Study field (14 dummies)	p<0.001	p<0.001
Study level (4 dummies)	p=0.483	p=0.481
Educational institution (21 dummies)	p<0.001	p<0.001
Constant	-5.06** (0.58)	-5.55** (0.61)
N observations	12,863	12,863
Log pseudolikelihood value	-3464.56	-3460.73
Pseudo-R <sup>2</sup>	0.153	0.154

<sup>†</sup>Notes: SE = robust standard errors; \*\* p<0.01, \* p<0.05; dependent variables: entrepreneurial intentions (dummy variable); regression model: logistic regression

**Table 3: Mediation analysis<sup>†</sup>**

<b>INDEPENDENT VARIABLES</b>	<b>MODEL M1</b>	<b>MODEL M2</b>	<b>MODEL M3</b>	<b>MODEL M4</b>	<b>MODEL M5</b>
	Entrepreneurial intentions	Independence Motive	Innovation motive	Entrepreneurial intentions	Entrepreneurial intentions
	<b>COEFF. (SE)</b>	<b>COEFF. (SE)</b>	<b>COEFF. (SE)</b>	<b>COEFF. (SE)</b>	<b>COEFF. (SE)</b>
AD/HD	0.175** (0.055)	0.077** (0.015)	0.128** (0.020)	0.156** (0.055)	0.170** (0.055)
<b>MEDIATING VARIABLES</b>					
Independence motive				0.251* (0.035)	
Innovation motive					0.052* (0.026)
<b>CONTROLS</b>	Included, p<0.001	Included, p<0.001	Included, p<0.001	Included, p<0.001	Included, p<0.001
N observations	12,863	12,863	12,863	12,863	12,863
Likelihood-ratio test	p<0.001			p<0.001	p<0.001
F test		p<0.001	p<0.001		
Log pseudolikelihood value	-3,488.49			-3,462.25	-3,486.40
Pseudo-R <sup>2</sup>	0.148			0.154	0.148

<sup>†</sup>Notes: SE=robust standard errors; \*\* p<0.01, \* p<0.05; regression model: logistic regression

**Table 1: Means, standard deviations and correlations**

		Mean	S.d.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	VIF
1	Entrepreneurship intentions	0.10																				
2	AD/HD	2.59	0.61	0.04																		
3	Independence motive	4.74	1.26	0.18	0.05																	
4	Innovation motive	3.94	1.60	0.13	0.07	0.35																
5	Self-realization motive	5.90	0.80	0.04	-0.08	0.29	0.19															
6	Financial motive	4.33	1.07	0.04	0.01	0.38	0.27	0.14														
7	Role model motive	2.57	1.40	0.09	0.09	0.23	0.31	0.04	0.40													
8	Recognition motive	5.34	1.13	0.01	-0.01	0.35	0.29	0.34	0.45	0.19												
9	Female	0.57		-0.08	-0.09	-0.10	0.26	0.08	0.08	0.07	0.02											
10	Student age	22.95	4.83	0.08	0.03	0.06	0.01	0.02	0.08	0.08	0.05	0.09										
11	Single	0.93		-0.06	0.03	0.03	0.02	0.01	0.02	0.03	0.02	0.01	0.56									
12	Self-employed parents	0.29		0.07	0.01	0.12	0.07	0.06	0.05	0.12	0.04	0.01	-0.07	0.06								
13	Dutch nationality	0.85		-0.01	0.01	0.19	0.12	0.08	0.16	0.11	0.06	0.01	0.03	0.02	0.05							
14	Attitude towards entrepreneurship	4.17	1.55	0.22	0.06	0.55	0.42	0.23	0.32	0.21	0.23	0.24	0.04	-0.01	0.14	0.14						
15	Social norms	28.50	8.64	0.02	0.02	0.22	0.14	0.23	0.21	0.13	0.23	0.03	0.08	0.07	0.10	0.08	0.30					
16	Entrepreneurial self-efficacy	4.43	0.87	0.19	0.12	0.44	0.47	0.30	0.32	0.23	0.28	0.25	0.05	0.03	0.12	0.12	0.63	0.25				
17	Locus of control	3.11	0.72	0.01	0.31	0.02	0.05	0.23	0.13	0.24	0.02	0.02	0.07	0.02	0.01	0.01	0.01	0.04	0.17			
18	Study grade	7.26	0.70	-0.03	-0.19	0.02	0.03	0.10	0.07	0.04	0.05	0.03	0.05	0.04	0.00	0.13	0.03	0.01	0.06	0.15		
19	Study field: Management	0.18		0.03	0.00	0.15	0.11	0.06	0.16	0.10	0.13	0.13	0.00	0.00	0.05	0.16	0.22	0.10	0.23	0.02	0.04	
20	Study level: Bachelor	0.70		0.04	0.07	0.03	0.00	0.02	0.09	0.07	0.01	0.02	0.28	0.08	0.03	0.07	0.03	0.02	0.00	0.08	0.17	0.04