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ADHD-like behavior and entrepreneurial intentions

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Abstract Little is known about the relation between entrepreneurship and the extent of psychiatric symptoms. Validated psychiatric symptom scores are seldom used for non-clinical reasons. One prevalent symptom that deserves our interest is Attention Deficit and Hyperactivity Disorder (ADHD). ADHD is a developmental disorder characterized by inattentiveness and hyperactivity that has been linked to occupational choice and performance. Building on the person–environment fit literature, we hypothesize that individuals who exhibit behavior associated with ADHD are more likely to have entrepreneurial intentions. Using a sample of 10,104 students enrolled in higher education, we can confirm our prediction that students with a higher level of ADHD-like behavior are more likely to have entrepreneurial intentions. Additionally, we show that risk taking propensity is a mediator that partly explains this positive effect. Our study points to the importance of behavioral tendencies associated with developmental disorders, when making entrepreneurship decisions. Our study contributes to the literature on the determinants of entrepreneurship, which so far has largely neglected the effects of psychiatric symptoms on entrepreneurship.

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1 Introduction

Entrepreneurs are commonly characterized as individuals who have high energy levels (Kets de Vries 1985), who dare to pursue risky activities and who show resilience in times of adversity (Markman et al. 2005). At the same time, there is anecdotal evidence of successful entrepreneurs with ADHD (Attention Deficit and Hyperactivity Disorder) such as David Neeleman (founder of JetBlue Airlines) and Paul Orfalea (founder of Kinko's) (The Economist 2012). As a clinical condition, according to the American Psychiatric Association (2013), ADHD is a developmental disorder characterized by ample energy in the form of severe and persistent hyperactivity and distractibility that is essentially driven by behavioral "disinhibition" or a lack of restraint (Barkley 1997; Nigg 1999). Allegedly, there is similarity in the characteristics associated with entrepreneurship and those present in individuals with ADHD. However, there is only a small literature linking behaviors commonly associated with ADHD to well-known entrepreneurial characteristics such as risk taking (Mäntylä et al. 2012), creativity (White and Shah 2011), and action orientation (Barkley 1997), and thus far research has not systematically studied the link between behaviors associated with ADHD and a career in entrepreneurship (Mannuzza et al. 1993). In this study, we examine the relation between individual behaviors associated with ADHD and the intention to pursue an entrepreneurial career. Our paper links the literature on the consequences of ADHD to research about the determinants of entrepreneurship (Block et al. 2013; Verheul et al. 2012). So far, this literature has remained largely silent on the effects of psychiatric symptoms on entrepreneurship. Prior research has taken a psychological perspective and investigated the effects of different personality characteristics on entrepreneurship intentions (Lee et al. 2011; Nyock Ilouga et al. 2014) as well as the decision to become and stay self-employed (Beugelsdijk and Noorderhaven 2005; Caliendo et al. 2014), but has not taken an explicit psychiatric symptom perspective, which we do in our study.

Though the exact causes of clinical ADHD are not known, medical studies find consistent evidence that the disorder has a neurobiological origin (Mathis et al. 2014) and is genetically determined (Thapar et al. 1999; Mathis et al. 2014) with genetics contributing to about 60–75 % of cases (Cortese 2012; Faraone et al. 2005). Despite the fact that ADHD appears quite stable and the majority of adolescents continue to experience its symptoms in (young) adulthood (Biederman et al. 2007; Kan et al. 2013; Saviouk et al. 2011), most of what we know about its consequences for individual behavior is derived from research with children. Far less attention is paid to adult decision making and behavior (Young 2000). Nevertheless, it is recognized that high levels of attention deficit and hyperactivity have negative consequences within the work context. For example, adults who experience such behaviors tend to show substandard job performance (de Graaf et al. 2008; Halbesleben et al. 2013; Nadeau 2005) and have a higher chance of becoming unemployed (Barkley et al. 2006; Kessler et al. 2005). Even when equipped with higher levels of intelligence, few of them are found in higher-ranked occupational positions (de Graaf et al. 2008). At the same time, however, they may have specific talents. Recently, The Economist (2012) praised such "disorganization men" for their gift of breaking through business routines and inertia because of their ability to envision and create new realities. When they manage to develop "resilience" mechanisms to cope with their "weaknesses," individuals who exhibit behavior associated with ADHD may even outperform others in particular work environments, for example, in jobs that require fast decision making or creativity (Bozionelos and Bozionelos 2013).

Building on the person–environment (P–E) fit literature (Cable and Edwards 2004; Edwards et al. 2006; Kristof-Brown et al. 2005), we explore the person–entrepreneurship (career) fit of individuals who find themselves at the start of their careers and who report varying levels of *ADHD-like behavior* measured as the average symptom score on a validated ADHD screening scale. Whereas research has mainly taken a pathological perspective (i.e., studying the consequences of ADHD as a disorder that is typically diagnosed during childhood), we take a different

approach and examine ADHD as a behavioral tendency that varies across individuals. Hence, the aim of this study is *not* to diagnose individuals with ADHD and examine the career interests among those clinical cases. Instead, we hypothesize that individuals who exhibit higher levels of ADHD-like behavior—but who are not necessarily screened positive on ADHD in a clinical sense—have a relative good *fit* with entrepreneurship (compared to wage-employment), in turn boosting their entrepreneurial intentions. Drawing on evidence of behavioral disinhibition as the central "deficiency" of ADHD that triggers the experience of "under-arousal" and the need to seek incoming stimuli via engagement in excessive or extreme activities (Barkley 1997), we introduce risk taking propensity as a possible driver of the relationship between ADHD-like behavior and entrepreneurship.

Our study has several contributions. *First*, we test the relationship between behaviors associated with ADHD and entrepreneurial intentions in a large-scale quantitative study. So far, reliable evidence was lacking; the link between ADHD and entrepreneurship has been mainly described in the popular press (The Economist 2012; Hartmann 2002) based on anecdotal evidence from renowned entrepreneurs and small-scale studies such as that of Kirby and Honeywood (2007). By establishing that ADHD-like behavior predicts entrepreneurial intentions, we extend the literature on the determinants of entrepreneurial intentions, which so far has only taken a psychological (Douglas and Fitzsimmons 2013; Nyock Ilouga et al. 2014), but not a psychiatric symptom perspective.

Furthermore, we contribute to the emerging literature that takes a clinical perspective to explaining entrepreneurial intentions. By linking ("distal") psychiatric symptom scores via (more "proximal") psychological tendencies (such as risk taking propensity) to entrepreneurship, scholars may be able to create a better understanding of entrepreneurial intentions and the personality of future entrepreneurs (Epstein and O'Brian 1985; Mathieu and St-Jean 2013). Recent research provides evidence of relationships between entrepreneurship (measured as entrepreneurial intentions, activity or orientation) and continuous scores on other (initial) clinical constructs such as narcissism (Wales et al. 2013; Mathieu and St-Jean 2013), psychopathy (Akhtar et al. 2013), or the Dark Triad (narcissism, psychopathy, Machiavellianism) (Hmieleski and Lerner 2013). By examining the mediating role of risk taking propensity in the relation between ADHD-like behavior—that shows a highly genetic predisposition—and entrepreneurial intentions, our study also adds to the understanding of the genetic basis of entrepreneurship (van der Loos et al. 2013; Nicolaou et al. 2008; White et al. 2006).

Finally, research on the role of ADHD in the workplace generally focuses on the implications for working in large established, and often heavily regulated, organizations (Kessler et al. 2009). Following Markman and Baron (2003, p. 282) who argue that: "While much research … has focused on important components of fit with respect to existing, well-established organizations and routines, far less attention has been directed to person–organization fit in the context of new venture formation," we contribute by applying the person–environment fit literature to examine the fit with an entrepreneurial career of individuals who report varying levels of ADHD-like behavior. This is important given that individuals who exhibit higher levels of such behavior often have difficulties committing to a career decision (Painter et al. 2008) and exhibit below average performance in regular wage-employment (Nadeau 2005). Our findings can help create awareness of what inspires and motivates these individuals in a (future) profession and support them in deciding upon a career that is aligned with their wishes and abilities.

2 Theoretical background and hypotheses

2.1 Person–career fit

The person–environment (P–E) fit literature emphasizes the role of both individual and environmental (or organizational) factors in determining career decisions and outcomes (Kristof 1996; Kristof-Brown et al. 2005; Oh et al. 2013). The idea of P–E fit draws on principles of Interactional Psychology, asserting that neither personal nor environmental factors alone are able to explain individual behavior (Lewin 1951). The underlying premise is that of the compatibility between people and their environment—the latter of which can refer, for example, to an organization, job, or supervisor (Kristof-Brown et al. 2005). For example, *person–organization* fit may refer to the congruence of personal and organizational values, and *person–job fit* to that between the skills and/or

knowledge of an employee and what the job requires (Cable and DeRue 2002). P–E fit has been linked to several outcome variables, such as job satisfaction, organizational commitment, and citizenship behavior (Cable and Edwards 2004; Cable and DeRue 2002; Kristof-Brown et al. 2005), but also to job or career transitions. For example, Kristof-Brown et al. (2005) show that the perceived person–job fit leads to lower intentions to quit a job, and Carless (2005) finds evidence for a direct link between a perceived person–job fit and the intention to accept a job offer.

Within the context of entrepreneurship, Markman and Baron (2003, p. 286) argue that some people are "better suited to exploit commercial opportunities or create new companies than others". Despite contradictory findings, there is a large literature indicating that entrepreneurs differ from non-entrepreneurs on a range of characteristics including cognitive biases (Baron 1998; Busenitz and Barney 1997), intuition (Allinson et al. 2000), risk taking propensity (Stewart and Roth 2001) and taste for variety (Åstebro and Thompson 2011). In addition, the theoretical classics of Schumpeter (1934), Kirzner (1979) and Knight (1921) emphasize innovation, opportunity perception, and handling uncertainty, respectively, as defining characteristics of entrepreneurs. The higher individuals score on these distinctive characteristics, the better will be their P–E fit (Markman and Baron 2003). Building on the P–E fit literature, Lee et al. (2011) focus on innovation orientation as a distinctive individual characteristic and find that a misfit between an employee's innovation orientation and an organization's (lack of an) innovative climate leads to higher entrepreneurial intentions via lower satisfaction in the current job. Hence, if organizational conditions are not favorable, i.e., show a relatively poor fit with individuals' needs, skills, and characteristics, it is likely that they become dissatisfied and start exploring alternative career paths.

In the present study, we examine the perceived *relative* fit of individuals who exhibit different levels of ADHD-like behavior with entrepreneurial intentions versus intentions to work in a wage job. In considering fit, we examine it relative to the individual (i.e., whether entrepreneurial intentions are perceived to fit the individual's characteristics better than intentions to work in a wage job). Thus, we are not suggesting that an individual scoring higher on ADHD-like behavior would be necessarily good at entrepreneurship (relative to other individuals or relative to some particular standard), but simply that those individuals perceive an entrepreneurial career as a relatively good (i.e., better) fit compared with wage-employment. In sum, we suggest that the choice for an entrepreneurial career can be determined by a relative good fit between individuals' characteristics and the benefits and the requirements of entrepreneurship as compared to a relative poor fit with the work environment in wage-employment. No claim is being made that the fit with entrepreneurship is inherently "good"—but that for the particular individual the fit is better relative to wage-employment.

2.2 ADHD-like behavior and the work environment

Given that ADHD-like behavior is associated with "deficiencies" such as acting before thinking, a short attention span, and lack of persistence when facing routine tasks, (Barkley 1997), individuals who display such behavior may find it difficult to meet the requirements of a regular work environment (Barkley and Murphy 2010). They generally seek activities that do not require close supervision and that allow them to work independently (Mannuzza et al. 1993). Their impulsive nature makes them more prone to acting without thinking about the consequences, thereby risking offending their supervisors or other co-workers. Their distractibility, stemming from a lower inhibitory control, may prevent them from engaging successfully in activities that require sustained attention (Barkley 1997). Even when they are capable of working in a regular wage job, adults who exhibit ADHD-like behavior may prefer to work independently because of a desire for self-determination (Mannuzza et al. 1993). Their strong strive to maintain control to counteract an often chaotic lifestyle (Toner et al. 2006) contributes to their preference for a work environment that allows and promotes independent behavior. Thus, irrespective of whether adults with ADHD-like behavior are more independent out of necessity or because of a clear preference, they are more likely to be attracted to occupations in which they can work independently, in their own pace and without having to report to someone higher in hierarchy. At the same time, a high level of freedom and autonomy is generally seen as a universal reason for entrepreneurial intentions and new venture

creation (Shane et al. 1991) and among the most cited factors for preferring to found an own venture over working for a boss in wage-employment (Douglas and Shepherd 2002; Kolvereid 1996).

Entrepreneurship does not only fit well with the behavior associated with ADHD because of the absence of a rigid and formally structured work environment, it also requires characteristics and skills commonly attributed to individuals who exhibit ADHD-like behavior. For example, prior research shows evidence of a positive relation between ADHD and individual creativity (Abraham et al. 2006; Shaw and Brown 1991; White and Shah 2006). The lower inhibitory control associated with ADHD (Barkley 1997; Clark et al. 2007) has multiple behavioral consequences including a difficulty focusing attention on a given task, mind-wandering and a lower ability to distinguish irrelevant from relevant stimuli. Though this may hinder productivity in a formal work environment, in particular in terms of "in-role performance" (Halbesleben et al. 2013), an "uninhibited imagination" has been found conducive to creative thinking (Carson et al. 2003). In fact, adults who exhibit behaviors associated with ADHD perform better at tasks that require divergent thinking (White and Shah 2006), demonstrate higher originality in performing tasks, and have a higher preference for generating ideas compared with idea clarification or idea implementation (White and Shah 2011). The APA (2000, p. 86/7) notes that adults with ADHD are easily distracted when fulfilling "boring, repetitive" tasks and tend to perform better when working in novel settings or engaging in activities that they are passionate about. Because they seem to be more creative and prefer to engage in non-repetitive, idea-generating tasks, adults who exhibit ADHD-like behavior are more likely to pursue occupational activities that will enable them to exploit their creativity. At the same time, creating something new is a common motive for having entrepreneurial intentions and pursuing an entrepreneurial career (Carter et al. 2003; Cassar 2007), and it also distinguishes entrepreneurs from non-entrepreneurs (Carland et al. 1984).

Furthermore, adults who show ADHD-like behavior generally have to deal with a greater number of adverse events (e.g., poor performance in school, unemployment) originating from their lower inhibitory control. While adversity is often negatively related to well-being (Breslau et al. 1999; Turner and Lloyd 1995), recent evidence suggests that adversity may also foster resilience, i.e., individuals who experience moderate adversity may be better able to cope with stressful situations or failure and, therefore, report higher well-being (Seery et al. 2010; Seery, et al. 2013). By experiencing the negative consequences of ADHD from early childhood, those individuals may develop a higher resistance to failure as well as ways to cope with adversity and achieve success against significant odds (Wilmshurst et al. 2011). In particular, high-functioning adults who show ADHD-like behavior may exhibit greater resilience to disappointments. Resilience to disappointments and the ability to "bounce back" by continually (re)assessing and adapting to changing and stressful situations is not only common among individuals who exhibit ADHD (Young 2005), it is also a prerequisite for entrepreneurs who need to persevere in the face of high risk and resource constraints (Markman et al. 2005). Consequently, adults with ADHD-like behavior may perceive themselves as better equipped than their peers to work in environments that are stressful, uncertain and where setbacks are frequent. To summarize, a career in entrepreneurship appears to show a relative good fit with individuals who exhibit higher levels of ADHD-like behavior. We therefore assume that they are more likely to have entrepreneurial intentions. We derive the following hypothesis:

H1: ADHD-like behavior is positively related to entrepreneurial intentions.

2.3 The mediating role of risk taking propensity

ADHD is generally associated with a low activity level in the behavioral inhibition system (BIS) (Quay 1988, 1997), and according to Barkley (1997), poor response inhibition can be seen as the central deficiency in ADHD. It leads to an impairment of the executive functions including working memory, self-regulation of affect-motivation-arousal, internalization of speech, and reconstitution. The purpose of BIS is to withhold an initial response to an event, inhibit ongoing behavior and resist distraction by competing happenings (Barkley 1997). In addition, it motivates risk assessment behavior and behavioral caution (McNaughton and Gray 2000). Response inhibition essentially facilitates the self-regulation of arousal.

Individuals who experience ADHD-like behavior, such as restlessness and hyperactivity, tend to experience a chronic state of "under-arousal" (Shaw and Giambra 1993; White 1999). According to the optimal stimulation theory (Zentall and Zentall 1983), individuals who are exposed to ongoing low levels of incoming sensory stimulation have the habit to respond by showing "deviating" behavior aimed at increasing the level of sensory inputs. Loo et al. (2009) show that adults who exhibit ADHD are in need for continuously high levels of arousal ("cortical activation") to sustain their attention. They may therefore seek self-stimulation by way of engaging in excessive activity or, alternatively, in activities that induce higher arousal levels. And when they find themselves in a situation characterized by high levels of stimulation, the lower inhibitory control associated with ADHD-like behavior makes those individuals more likely to (re)act on the presented stimulus (White 1999). Applying Damasio's (1996) somatic marker hypothesis to individuals who exhibit ADHD, it is seen that they experience weaker physical signals to guide risky decisions (Bechara et al. 1997; Mäntylä et al. 2012; Toplak et al. 2005) which makes them relatively tolerant of risk. As a consequence, children and adolescents with ADHD may be more likely to engage in risky behavior than others. Shaw and Brown (1999) report that students who show higher levels of ADHD-like behavior indicate to have more interest in searching for stimulating and "risky" types of activities. Other studies provide evidence of a positive relationship between the occurrence of ADHD in childhood and the level of sensation seeking as a college student (Shaw and Giambra 1993) and the level of risk taking in adulthood (Olazagasti et al. 2013). This may lead (young) adults who exhibit ADHD-like behavior to be attracted to more risky jobs such as sales, stock brokerage and entrepreneurship (Weiss and Murray 2003). Therefore, we formulate the following hypothesis:

H2: ADHD-like behavior is positively related to risk taking propensity.

Traditionally, risk taking has been associated with entrepreneurship. Knight (1921) already pointed out that, unlike managers, entrepreneurs make business decisions in uncertain situations, thereby risking the loss of their investment. Yet, empirical research reveals conflicting findings, with some studies reporting a higher risk taking propensity of entrepreneurs as compared to the general population or managers (Stewart et al. 1998; Caliendo et al. 2009), while others report no significant differences (Brockhaus 1980). Recently, however, Niess and Biemann (2014) reported that high risk propensity predicts the self-employment decision. In addition, the meta-analysis by Zhao et al. (2010) provides further evidence that risk propensity is positively associated with entrepreneurial intentions. This leads us to hypothesize the following:

H3: Risk taking propensity is positively related to entrepreneurial intentions.

Given that ADHD is linked to an interest in risky professions and risk taking propensity has been associated with entrepreneurship, we expect risk taking propensity to mediate the relationship between ADHD-like behavior and entrepreneurial intentions. Selecting risk taking propensity as a mediating factor is also in line with other studies examining the effects of genetically determined attributes on entrepreneurship. For example, White et al. (2006) find that the (biological) effect of testosterone levels on new venture creation is partly mediated by risk taking propensity, while Nicolaou et al. (2008) find that sensation seeking (which involved taking risk) mediates the effect of genetics on the pursuit of an entrepreneurial career. We thus formulate the following mediation hypotheses:

H4: The relationship between ADHD-like behavior and entrepreneurial intentions is mediated by risk taking propensity.

3 Methods

3.1 Data collection

We test our hypotheses in a sample of students who did not yet embark on a career path. Specifically, we use the Global University Entrepreneurial Spirit Students' Survey (GUESSS) for 2011—a data set collected by an international research consortium aimed at examining career aspirations of students in higher education.

For the present study, we rely on data collected among 13,121 students at 14 universities and 24 universities of applied sciences in the Netherlands. Students received a link to the online survey via direct mailing, a newsletter, or the Intranet. A reminder was sent out after 1 month and two iPads 2.0 were raffled. The final response rate for universities that systematically collected data among their students amounts to 7.4 %.[1] To prevent self-selection of students who have entrepreneurial intentions, the survey was introduced as focusing on future career paths in general, without explicitly stating its focus on entrepreneurship.

Our final sample amounts to 10,104 students, which excludes students who do not yet know what they want to do after their studies ($N = 2{,}752$) and those who want to take over a (family) business ($N = 191$), the latter which cannot be considered intentional *founders*. Furthermore, 74 respondents are excluded because of missing values on one or more of the variables included in our analysis.

3.2 Measures[2]

3.2.1 Dependent variable

To measure our dependent variable *entrepreneurial intentions* students were asked to answer the following question: "Which career path do you intend to pursue right after completion of your studies?" We create a dichotomous variable where "1" represents entrepreneurial intentions as a prospective founder, and "0" denotes prospective employees.

3.2.2 Independent variable

To measure the level of ADHD-like behavior we use the six-item ADHD Self-Report Screener (ASRS-6) of the World Health Organization (WHO). The ASRS-6 is a short form of the 18-item patient-reported ASRS-v1.1 questionnaire, assessing the frequency of all 18 DSM-IV symptoms of ADHD. The ASRS-v1.1 scale has been proven effective in screening for adult ADHD (Kessler et al. 2005, 2007; Matza et al. 2011). The six-item screener shows a strong concordance with clinical diagnoses and outperforms a longer 18-item ADHD scale in terms of sensitivity, specificity and total classification accuracy (Kessler et al. 2005; Das et al. 2014). To capture the level of ADHD-like behavior, we calculate the average score of the ASRS-6 screener. The Cronbach's α for the ASRS-6 scale amounts to 0.58, which is relatively low but still close to the lower bound of reported alphas for the ASRS screener questions in Kessler et al. (2007).

3.2.3 Mediator

Risk taking propensity (i.e., the willingness to take risks) is measured with the single-item experimentally validated scale proposed by Dohmen et al. (2011): "How do you see yourself: Are you generally a person who is fully prepared to take risks or do you try to avoid taking risks?" with response categories "0" (risk averse) to "10" (fully prepared to take risk). This measure is highly correlated with economic measures on risk taking behavior with real money at stake (Dohmen et al. 2011).

3.2.4 Control variables

Prior research has shown that entrepreneurial intentions depend on age (Birley 2002; Matthews and Moser 1996), gender (Carter et al. 2003; Verheul et al. 2012), marital status (Amit et al. 1995), nationality (Bosma et al. 2008), the presence of self-employed parents (Laspita et al. 2012; Hoffmann et al. 2015), study level (Laspita et al. 2012), and study field (Zellweger et al. 2011). We therefore control for these factors. Moreover, we control for the particular university (20 dummies) and a self-reported grade [on a scale from 1 (bad) to 10 (excellent)] to consider that students who exhibit ADHD-like behavior may have unequal access to the job market, leading them toward founding their own venture. Furthermore, we include variables related to the Theory of Planned Behavior (Ajzen 1991): attitude toward entrepreneurship, social norms, compliance motivation and entrepreneurial self-efficacy (Linan and Chen 2009) as well as locus of control. Finally, we control for individuals' perceived risk of entrepreneurship by

[1] For the calculation of the response rate universities with no systematic data collection and/or those with less than twenty respondents were excluded. In the analysis these observations are combined in the category 'other' ($N = 247$).

[2] More details about our measures can be found in the electronic supplementary material.

including the score on the question: "How risky do you perceive starting your own company?" (0 = not risky … 10 = very risky) because the more risky an entrepreneurial career is perceived, the less likely individuals intend to found a venture (Simon et al. 2000).

3.3 Common method bias

Given that both our dependent and independent variables are measured in the same sample and at the same point in time, our results might be subject to common method bias (Podsakoff et al. 2003). To diagnose the extent of common method variance, we performed several tests. Our first test was Harman's one-factor test which is based on an exploratory factor analysis across all variables included in our regression analysis. The unrotated one-factor solution yields a factor with an eigenvalue of 2.52 accounting for 11.81 % of inter-item covariance. The extent of common method variance seems to be comparatively low. Next to the Harman's one-factor test, we performed partial correlation procedures (Podsakoff et al. 2003) to control for common method variance in our regression models. We used exploratory factor analysis to identify a latent common method factor and inserted the corresponding factor values into our regression models. The latent common method factor did not show a significant relation with the dependent variable; the relations between the independent variables were similar when compared to those in the main regression analyses. The (directly measured) latent method factor technique is another option to investigate the magnitude of possible common method variance (Podsakoff et al. 2012). We use AMOS and estimate a structural equation model (SEM) with the goal to find a common latent factor (common latent factor) that determines the common variance shared among all observed items in the model (Podsakoff et al. 2012). If this common variance is large, common method bias can occur. In our case, the results show a common variance of about 0.07 %. Thus, we observe a relatively low level of common method variance, which is unlikely to lead to a severe case of common method bias. The results for our main independent variables were also not strongly affected by the inclusion of the common latent factor. We conclude that common method bias seems not to be of major concern for our statistical analyses.

4 Results

4.1 Descriptives and correlation analysis

In our sample, 9,025 students (i.e., 89.3 %) intend to work in wage-employment and 1,079 students (10.7 %) aim to found a venture directly after their study. This percentage of intentional founders is comparable to the average level of start-up intentions in the Netherlands according to the Global Entrepreneurship Monitor (GEM), which is reported to be about 10 % (van der Zwan et al. 2012). Our sample contains 55 % female students and about 85 % have the Dutch nationality. Furthermore, 68 % of the students are undergraduates, 30 % are graduates, and 2 % are doctoral and MBA students. The majority of students are from Management (18 %), Medicine and Health Science (14 %), and Economics (10 %). Cultural Studies and Social Sciences together account for about 13 % of students, whereas the study fields Pedagogy, Engineering, and Law each account for about 5 % of the students.

Correlation analysis and the variance inflation factors (VIF) for our measures show that problems of multicollinearity are unlikely (see Table 1). The maximum VIF score is 2.08 for "Attitude," which is well below the recommended level of 10 (Neter et al. 1990).

4.2 Hypothesis testing

To test our first hypothesis, stating that the level of ADHD-like behavior is positively related to entrepreneurial intentions, we estimate stepwise binary logistic regressions (see Table 2). Control variables and mediator (risk propensity) are entered in Model 1 and ADHD-like behavior is entered in Model 2. We find that students who exhibit a higher level of ADHD-like behavior are significantly more likely to have entrepreneurial intentions ($B = 0.244$; $p < 0.001$). This provides support for hypothesis H1. The unstandardized coefficients explaining entrepreneurial intentions correspond with an odds ratio of 1.28. In total, 89.42 % of all observations were correctly classified in the model.

To test hypotheses H2, H3, and H4 we follow Hayes (2013) and report the results of the mediation analyses in Table 3. The Stata program *binary_mediation* is used to conduct the analyses since our

Table 1 Correlation table

		Mean	SD	VIF	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Entrepreneurial intentions	0.11	0.31	1.15																
2	ADHD-like behavior	2.57	0.60	1.17	0.06															
3	Risk taking propensity	5.88	2.07	1.25	0.16	0.01														
4	Risk perception	6.24	2.05	1.06	−0.11	0.05	−0.05													
5	Female	0.55	0.50	1.14	−0.08	−0.10	−0.08	0.06												
6	Age (years)	23.18	4.93	1.66	0.08	−0.02	0.05	−0.04	−0.08											
7	Single	0.93	0.26	1.51	−0.06	0.02	−0.005	0.05	0.01	−0.57										
8	Self-employed parents	0.28	0.45	1.04	0.05	0.004	0.10	−0.05	0.02	−0.07	0.06									
9	Nationality = Dutch	0.84	0.37	1.08	0.01	0.02	−0.07	−0.01	−0.02	−0.02	−0.02	−0.04								
10	Attitude	4.23	1.57	2.08	0.22	0.06	0.34	−0.12	−0.25	0.03	−0.01	0.14	−0.15							
11	Social norms	5.47	0.98	1.43	0.07	−0.03	0.20	−0.06	−0.06	−0.05	0.03	0.13	−0.08	0.47						
12	Compliance	5.18	1.08	1.11	−0.05	0.01	−0.03	−0.04	0.11	−0.10	0.08	0.04	−0.05	0.03	0.23					
13	Self-efficacy	4.48	0.87	2.03	0.19	−0.12	0.40	−0.13	−0.26	0.04	−0.02	0.13	−0.13	0.63	0.38	0.01				
14	Locus of control	3.08	0.72	1.18	0.01	0.30	−0.12	0.03	0.01	−0.07	0.02	−0.02	0.03	−0.02	−0.13	0.05	−0.18			
15	Study grade	7.29	0.70	1.10	−0.04	−0.18	−0.03	0.05	0.04	0.05	−0.03	0.003	−0.14	−0.04	−0.02	0.005	0.06	−0.15		
16	Study field = Management	0.19	0.39	1.10	0.02	−0.005	0.05	0.03	−0.12	−0.001	0.01	0.05	−0.17	0.22	0.13	0.03	0.23	−0.03	0.04	
17	Study level = Bachelor	0.68	0.47	1.15	0.06	0.05	0.05	−0.05	0.01	−0.28	0.08	0.03	0.07	0.04	0.05	−0.004	0.01	0.08	−0.17	−0.03

$N = 10{,}104$; all correlations ≥ 0.02 are significant at 5 % significance level

SD standard deviation, *VIF* variance inflation factor

Table 2 Binary logistic regression explaining entrepreneurial intentions

	Model 1 Coeff. (SE)	Model 2 Coeff. (SE)
ADHD-like behavior		0.244 (0.060)***
Risk taking propensity	0.139 (0.021)***	0.136 (0.021)***
Risk perception	−0.126 (0.017)***	−0.129 (0.017)***
Female	−0.202 (0.078)**	−0.171 (0.079)*
Age (years)	0.025 (0.008)**	0.026 (0.008)**
Single	−0.291 (0.146)*	−0.293 (0.146)*
Self-employed parents	0.197 (0.075)**	0.194 (0.075)**
Nationality (5 dummies)	Included	Included
Attitude	0.422 (0.036)***	0.406 (0.036)***
Social norms	−0.193 (0.044)***	−0.186 (0.044)***
Compliance	−0.096 (0.032)**	−0.098 (0.032)**
Self-efficacy	0.321 (0.059)***	0.356 (0.060)***
Locus of control	0.151 (0.050)**	0.101 (0.051)*
Study grade	−0.153 (0.052)**	−0.131 (0.052)*
Study field (14 dummies)	Included	Included
Study level (4 dummies)	Included	Included
University (20 dummies)	Included	Included
Constant	−2.884 (0.752)***	−3.663 (0.778)***
N (observations)	10,104	10,104
Log Pseudolikelihood	−2,865.27	−2,857.11
McFadden Pseudo R^2	0.1653	0.1677

SE robust standard errors
*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$ (two-sided tests)

Table 3 Mediation analyses

	Risk taking propensity	Entrepreneurial intentions	
	Model 1	Model 2	Model 3
ADHD-like behavior	0.185*** (0.033)	0.261*** (0.060)	0.246*** (0.060)
Risk taking propensity			0.136*** (0.021)
Controls	Included	Included	Included
Likelihood ratio test		$p < 0.001$	$p < 0.001$
F test	$p < 0.001$		
Log Pseudolikelihood		−2,879.98	−2,858.14
McFadden Pseudo R^2		0.1610	0.1674
Direct effect		0.0798 (0.0204)***	
Indirect effect		0.0083 (0.0021)***	
Total effect		0.0881 (0.0205)***	

$N = 10{,}104$. This table shows coefficients and standard errors in parentheses; the Stata program binary mediation was used
Standard errors and significance values for direct and indirect effects are calculated using bootstrapping (500 replications)
*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$ (two-sided tests)

dependent variable (entrepreneurial intentions) is a binary variable. Standard errors and significance levels for the direct and indirect effects are calculated using bootstrapping (500 replications).

First, we regressed the mediator (risk taking propensity) on the predictor (ADHD-like behavior) and the controls in Model 1, then the dependent variable entrepreneurial intentions on the predictor

and the controls in Model 2, and finally the dependent variable on the predictor and controls and the mediator in Model 3. First, we find that ADHD-like behavior is significantly related to risk taking propensity (Model 1: $B = 0.185$; $p < 0.001$), thereby supporting hypothesis H2. Second, ADHD-like behavior is significantly related to entrepreneurial intentions (Model 2: $B = 0.261$; $p < 0.001$). Finally, risk taking propensity is positively linked to entrepreneurial intentions after controlling for ADHD-like behavior (Model 3: $B = 0.136$; $p < 0.001$ and Model 5: $B = 0.114$; $p < 0.01$). Thus, hypothesis H3 is supported. Testing the indirect effect with bootstrapping confirms that risk taking propensity significantly mediates the relationship between ADHD-like behavior and entrepreneurial intentions (observed coefficient = 0.0083; bootstrap SE = 0.0021; 95 % CI from 0.0041 to 0.0124). This provides support for H4.

5 Discussion

The aim of this study is to examine the attraction of an entrepreneurial career among young adults who exhibit ADHD-like behavior. Adults who show this behavior tend to experience difficulties committing to a career choice, and when they finally commit to one, they often exhibit substandard performance and rarely attain higher-ranked occupational positions in salaried employment (de Graaf et al. 2008). Investigating the career intentions of over 10,000 university students, we find that ADHD-like behavior is positively related to entrepreneurial intentions. These findings convey two main messages. *First*, students with ADHD-like behavior seem to prefer an entrepreneurial career over one in wage-employment. *Second*, the preference for an entrepreneurial career of students who show ADHD-like behavior may be explained on the basis of the P–E fit theory. In other words, students base their career choices, at least to some extent, on their perceived fit with the work environment and the demands of entrepreneurship relative to wage-employment.

In our attempt to explain the relationship between ADHD-like behavior and entrepreneurship we also investigate whether risk taking propensity, a recurring theme in both entrepreneurship and ADHD research, mediates the relationship between ADHD-like behavior and entrepreneurial intentions. We find evidence to support our prediction. Thus, it seems that one underlying factor explaining the preference for entrepreneurship among students with ADHD-like behavior is the tendency to search for, and engage in, stimulating activities to compensate for their experienced under-arousal. Because of their willingness to take risks in general, they are also more likely to prefer an entrepreneurial career instead of one in wage-employment.

By establishing that ADHD-like behavior predicts entrepreneurial intentions, we extend the literature on the determinants of entrepreneurial intentions, which so far has only taken a psychological (Douglas and Fitzsimmons 2013; Nyock Ilouga et al. 2014) but not a psychiatric symptom perspective.

Our findings have implications for (entrepreneurship) educators as well as individuals with ADHD-like behavior who have to decide on a career. Considering the potential fit with an entrepreneurial career, it is important that individuals who show ADHD-like behavior carefully reflect on what motivates them in a (future) profession and create awareness that the identified preferred work characteristics may offer them guidance when deciding upon a career. Furthermore, educators should not only be aware of the challenges ADHD-like behavior poses, but also understand and facilitate its "blessings." Because an entrepreneurial career appears to fit with the risk taking propensity of young adults who demonstrate ADHD-like behavior, educators may want to help those "energetic" youngsters to develop skills and the persistence to found their own venture.

6 Limitations and future research

Our study has several limitations. *First*, we acknowledge that the effect size of our measure of ADHD-like behavior in explaining entrepreneurial intentions is relatively small. Calculating marginal effects for the model predicting entrepreneurial intentions, we find that a one unit change in the scale measuring ADHD-like behavior increases the likelihood of having entrepreneurial intentions by 3.85 %. To be able to compare the marginal effects of ADHD-like behavior with differently scaled independent variables (gender and self-employed parents are binary variables), we calculated full elasticities (instead of semi-elasticities). Here we find that a 1 % increase in ADHD-

like behavior leads to a 1.5 % increase in entrepreneurial intentions, which is comparable to the 1.1 % increase in entrepreneurial intentions when someone has a 1 % higher chance of having entrepreneurial parents or when the likelihood of being male increases by 1 %.

Second, we are aware of the relatively low reliability of our scale measuring the level of ADHD-like behavior measured by the Cronbach's α (0.58), which may be attributed to the fact that the scale captures two different types of behaviors; i.e., inattention and hyperactivity (Hesse 2011). Future research may yield interesting results when disentangling inattentive and hyperactive behaviors and examining their separate relations with entrepreneurship instead of using an average score capturing the full spectrum of ADHD-like behaviors.

There are several other avenues for researchers to pursue that advance our understanding of the relationship between ADHD-like behavior and entrepreneurship. *First*, more research is needed assessing this relationship in non-student samples, including employed and unemployed individuals. Although students are an appropriate population for studying (future) career decisions, we acknowledge that students who pursue a university education are a distinct group that may exhibit more efficient coping mechanisms and may therefore include more "success" cases and exclude more extreme cases. *Second*, future research is also warranted on how different levels of ADHD-like behavior impact an individual's capacity to advance in the entrepreneurial process. Assuming that a relative good person–career fit leads to more work satisfaction and better performance, the strengths of individuals who display ADHD-like behavior may lead them to outperform other entrepreneurs in certain domains, while their weaknesses may lead them to underperform elsewhere. The question arises whether adults who demonstrate ADHD-like behavior are also persistent, i.e., do they start their own venture and do they survive the ups and downs of the entrepreneurial journey in the long run? *Third*, further research should investigate how well-equipped individuals with ADHD-like behavior are to start, manage, and grow successful new ventures. We also expect that the relationships between ADHD-like behavior and actual founding behavior, and between ADHD-like behavior and firm performance are subject to contextual effects. Thus, the effect of ADHD-like behavior on founding behavior should be greater when accompanied by a higher level of human capital, or a supportive environment (e.g., availability of institutions that foster entrepreneurship, support from friends and family). *Fourth*, the effect of ADHD-like behavior on firm performance may vary depending on the industry where the firm operates, and the entrepreneurial team composition. Moreover, entrepreneurs with ADHD-like behavior may perform better, when integrated in entrepreneurial teams with a high complementarity in skills and functions. This is due to the fact that other team members may compensate for the behavioral "deficiencies" associated with ADHD, while at the same time benefiting from their unusual "blessings." *Finally*, another avenue for future research is the identification of other mediators in the relationship between ADHD-like behavior and entrepreneurial intentions. For example, *taste for variety* may drive individuals who exhibit ADHD-like behavior to pursue an entrepreneurial career because they often search for varied sensory input to satisfy their chronic underarousal, and taste for variety is also related to entrepreneurship (Åstebro and Thompson 2011). Another potential mediator is *adversity resilience* because individuals with ADHD-like behavior are likely to develop ways to cope with adversity and are therefore relatively resilient (Wilmshurst et al. 2011), while at the same time, adversity resilience has been related to entrepreneurship (Holland and Shepherd 2013; Markman and Baron 2003; Markman et al. 2005; Patel and Thatcher 2014; van Gelderen 2012).

The use of validated psychiatric symptom scores, originally developed to assess the extent of psychiatric symptoms, for non-clinical reasons is still in its infancy. Associating ADHD with occupational decisions such as the intention to become an entrepreneur appears successful. The rich world of these symptom scores (e.g., in the framework of Diagnostic and Statistical Manual of mental disorders; DSM-5) offers many opportunities for investigating the effect of addiction (such as reward-driven decision making), of hypomania (such as creativity), or of psychopathy (such as fearlessness) on entrepreneurship outcomes.

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