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## Article

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## Article

# Individual Traits Contributing to Entrepreneurial Entry: Character Strengths, Attention Deficit Hyperactivity Disorder (ADHD), and Highly Sensitive Person (HSP)

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## Abstract

Entrepreneurship is increasingly important for economic and societal innovation, yet the individual characteristics that encourage entrepreneurial entry remain insufficiently understood. This study examined whether character strengths, attention deficit hyperactivity disorder (ADHD), and highly sensitive person (HSP) traits influence entrepreneurial entry. Two independent web-based surveys were conducted, with ADHD assessed using a psychological scale in Study 1 and self-reported medical diagnosis in Study 2. The Character Strengths Test24 showed a revised factor structure, and an extracted factor (Drive) positively influenced entrepreneurial entry in both samples. ADHD (Hyperactivity/Impulsivity) consistently facilitated entrepreneurial entry, while HSP (Ease of Excitation) inhibited it. The robust positive contribution of ADHD traits across both symptomatic and clinically diagnosed individuals suggests that entrepreneurial potential is not limited by clinical labels and may also be found among individuals who are often marginalized, misunderstood, or discouraged in traditional career pathways. These findings highlight the importance of educational and support systems that not only develop character strengths linked to entrepreneurial drive but also recognize, accommodate, and strategically leverage diverse neuropsychological traits. Empowering individuals with varied cognitive profiles may expand pathways to innovation and contribute to a more inclusive entrepreneurial ecosystem.

**Keywords:** entrepreneurial behavior; character strength; attention deficit hyperactivity disorder (ADHD); highly sensitive person (HSP); entrepreneurship education



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## 1. Introduction

Entrepreneurship is an important concept that generates employment, economic and social development, innovation, and job satisfaction; thus, many researchers have focused on it (for review, [van Praag & Versloot, 2007](#)). Although its definition has not yet been established, it is broadly viewed as the totality of a person's qualities and activities that are used to make a profit, such as setting up a new business by undertaking risks and uncertainties ([Bruyat & Julien, 2001](#); [Gartner, 1990](#)). There is much room for improvement in entrepreneurship education research ([Ratten & Usmanij, 2021](#)); for example, there is a lack of knowledge on what tailored interventions are needed for individuals with certain characteristics. Individuals' psychological characteristics and behavioral traits are considered important key factors for entrepreneurship ([Frese & Gielnik, 2014](#)). Therefore, increasing our understanding of these would lead to more effective entrepreneurship education.

### 1.1. Integrating Stable and Malleable Psychological Traits

To situate this research in a clearer theoretical context, we adopt the view that entrepreneurial entry is shaped by both relatively stable neuropsychological traits and more malleable psychological resources. However, past empirical work has examined these trait domains in isolation—for example, focusing only on Big Five or other major personality traits, only on ADHD traits—without simultaneously testing how these factors may uniquely and jointly contribute to actual entrepreneurial entry. Moreover, most studies rely on entrepreneurial intention rather than real entry behaviors, leaving a gap in understanding the psychological factors that distinguish individuals who translate intention into action. In response, the present study aims to clarify the independent and potential interactive effects of character strengths, ADHD traits, and HSP traits on real entrepreneurial entry.

The Big Five personality traits and risk propensity have been reported to influence leadership and entrepreneurship within organizations (Chan et al., 2015). According to a systematic literature review, four of the Big Five factors (openness to experience, emotional stability, conscientiousness, and extraversion) and risk propensity (general tendency to take risks) are positively associated with entrepreneurial intention and/or entrepreneurial performance (Zhao et al., 2010). Conversely, another study reported that only conscientiousness directly affects entrepreneurial intention and that risk propensity is an intermediate factor that weakens the contribution of conscientiousness (Ahmed et al., 2022). The Big Five factors and risk propensity, either alone or in combination, are the most well-known individual factors that influence entrepreneurship.

To avoid conceptual ambiguity, the present study distinguishes among three types of individual differences. First, ADHD traits refer to continuous symptom expressions measured via Adult ADHD Self-Report Scale (ASRS), and “ADHD diagnosis” refers to a past medical diagnosis self-reported by participants. Second, HSP traits represent a sensory-processing sensitivity construct partly overlapping with Big Five neuroticism and openness, but theoretically distinct in its emphasis on depth of processing and responsiveness to environmental cues. Third, character strengths represent positive psychological capacities that are relatively stable yet developable through intervention, distinguishing them from fixed personality traits. These distinctions are theoretically important because they reflect different mechanisms through which individual characteristics may support or inhibit entrepreneurial action.

### 1.2. Stable Psychological Traits: ADHD and HSP

Interestingly, traits such as attention deficit hyperactivity disorder (ADHD) and highly sensitive person (HSP) are also considered positive in the context of entrepreneurship (Harms et al., 2019; Lerner et al., 2019; Verheul et al., 2015; Wiklund et al., 2017; Yu et al., 2021). Although individuals with ADHD are noted to have employment problems, such as being easily dismissed and quitting their jobs impulsively (Barkley & Murphy, 2010), they are more likely to actively engage in high-risk projects with uncertain outcomes and high benefits (Hatak et al., 2021; Wiklund et al., 2017) and have higher entrepreneurial intention (Lerner et al., 2019; Verheul et al., 2015). Empirically, people with ADHD are more likely to start a business, but this probability decreases with therapeutic interventions (Greidanus & Liao, 2021). It has also been found that among ADHD traits, Hyperactivity/Impulsivity contributes to entrepreneurship, whereas Inattention is negatively associated with entrepreneurship (Wiklund et al., 2017; Yu et al., 2021). Individuals with HSP traits, who have received considerable attention in recent years, exhibit high sensitivity and responsiveness to environmental stimuli (Aron & Aron, 1997). The term vantage sensitivity is used to describe ‘the notion that some individuals are more sensitive and positively responsive to the environmental advantages to which they are exposed’ (Pluess & Belsky, 2013, p. 903).

Vantage sensitivity can be thought to lead to some entrepreneurial opportunities. However, few studies have investigated the relationship between HSP and entrepreneurship (Harms et al., 2019). Based on the above, we conceptualize ADHD—particularly the Hyperactivity/Impulsivity factor—as contributing to greater action on perceived opportunities via elevated approach tendencies and impulsivity, while HSP traits may reflect higher sensitivity to risk and social signals, which can either facilitate or inhibit entrepreneurial action depending on the context.

### *1.3. Malleable/Trainable Traits: Character Strengths*

As discussed above, ADHD and HSP traits are considered individual factors that influence entrepreneurship. However, if entrepreneurship education aims to grow a target group, more flexible individual characteristics should also be examined. Therefore, in this study, we also focused on character strength, a concept that emerged within positive psychology. Here, “positive psychology” refers to the scientific study of strengths and positive traits (the academic branch originating with Seligman and Peterson) rather than implying a normative judgment of “goodness.” Character strengths are defined as “positive attributes that are stable, but not fixed and can be developed with conscious effort,” which tend to generate energy and drive performance (Miglianico et al., 2020, p. 744). Researchers have argued that these should be emphasized in educational settings (Biswas-Diener et al., 2011; Peterson & Seligman, 2004). Literature reviews on the relationship between character strengths and work have shown that character strengths are positively associated with job performance and that people who utilize and develop their character strengths perform better and are more proactive in the workplace (for review, Miglianico et al., 2020). A few studies examining the relationship between character strengths and entrepreneurship have found that at least five character strengths (honesty, leadership, fairness, gratitude, and zest) contribute to entrepreneurial behavior (Worrell, 2011; Zbierowski & Gojny-Zbierowska, 2022). In this study, character strengths were considered the main individual factor influencing entrepreneurship. For these reasons, we conceptualized character strengths as the energy and persistence that propel entry, and as malleable traits that may modulate the behavioral expression of more trait-like factors.

### *1.4. Research Gap and Study Necessity*

Despite these insights, no study to date has simultaneously examined character strengths together with ADHD and HSP traits in predicting entrepreneurial entry. This gap limits our ability to design targeted entrepreneurship education programs that consider both fixed and developable psychological factors. Addressing this gap is essential for creating more inclusive and individualized educational approaches.

To explain entrepreneurial behavior, a behavior that involves overcoming multiple difficulties, it is not sufficient to examine the simple effect of a single individual factor. Rather, it is necessary to consider multiple factors, including interactions between factors. For example, ADHD traits, when combined with a passion for founding and developing, increase entrepreneurial performance, such as sales, revenues, number of employees, product and service innovation, and customer satisfaction (Hatak et al., 2021). In addition, there are many people with ADHD whose Hyperactivity/Impulsivity does not lead to entrepreneurial behavior and who continue to have significant difficulties at work (Barkley & Murphy, 2010), which may also be explained by the interaction between ADHD and other traits. For an HSP person, it has been shown that HSP traits may enhance entrepreneurial intentions only when combined with an adept ability to recognize opportunity (Harms et al., 2019).

Based on the literature reviewed above, we propose a conceptual model in which (a) character strengths promote entrepreneurial entry by enhancing motivation, persistence, and opportunity engagement; (b) ADHD traits increase action orientation and risk tolerance, facilitating entry; (c) HSP traits may either inhibit or facilitate entrepreneurial entry—on one hand, by increasing sensitivity to negative evaluation and uncertainty, and on the other, by enhancing responsiveness to social needs and contextual cues; and (d) character strengths may theoretically buffer or amplify the behavioral expression of trait-like factors.

Accordingly, our research questions were:

(1) Which of these three domains—character strengths, ADHD traits/diagnosis, and HSP traits—predict entrepreneurial entry?

(2) Do character strengths interact with ADHD or HSP traits to influence entrepreneurial entry?

We tested these questions in two independent samples to assess robustness. Following the idea that entrepreneurship is not ideation and planning during which there is no new value creation (Bruyat & Julien, 2001), we only assessed actual entrepreneurial entry.

In this study, two types of research were conducted to establish indicators for assessing the strength of ADHD traits. Study 1 examined whether ADHD traits, viewed as a spectrum, contribute to entrepreneurship by utilizing scale scores. Study 2 investigated whether the findings of Study 1 could be applied to individuals with clinically significant ADHD traits by using the presence or absence of a medical diagnosis of ADHD as an independent variable.

## 2. Study 1

### 2.1. Sample

Participants were recruited through an online survey agency (Macromill) using convenience sampling. This approach allowed efficient access to working-age adults, including entrepreneurs and non-entrepreneurs, although it inherently limits representativeness and generalizability. The agency identified entrepreneurs aged 20–59 years who had “founded their own company (not inherited), had not gone bankrupt, and continued to operate the business,” and non-entrepreneurs who were “currently employed but had never started a business.”

Following recommendations for logistic regression that the smaller category of the dependent variable should exceed the number of predictors by at least a factor of ten (Peduzzi et al., 1996), we recruited 412 participants (206 entrepreneurs and 206 non-entrepreneurs). All psychological scales were administered in Japanese.

The number of consecutive responses was checked, and the participants who marked consecutive responses exceeding  $+2SD$  from the mean (e.g., eight times for HSP-J10 in Study 1) on any scale were excluded, resulting in the exclusion of 42 out of 412 participants. Finally, the analyses included 184 participants in the non-entrepreneur group (mean age: 43.60 [ $SD$ : 10.30]; 94 women) and 186 participants in the entrepreneur group (mean age: 46.08 [ $SD$ : 9.57]; 42 women). There were significant differences in age ( $p = 0.017$ ) and sex ratio ( $p < 0.001$ ) between groups.

### 2.2. Measures

- Character Strengths Test24 (CST24)

A 240-item measure of character strengths has been developed, consisting of 10 questions for each of the 24 different strengths (Peterson & Seligman, 2004), but the large number of items and copyright issues make it difficult to use in research and education. In this study, we used the CST24 (Shimai & Urata, 2023), a practical and simple abbreviated self-report character strengths scale consisting of 24 items. Each item was categorized

under a character strength, followed by text describing the item. The character strengths included items related to wisdom and knowledge, courage, humanity, justice, temperance, and transcendence. The higher the score, the higher a participant's perceived character strengths (each item in the English version is included in Table A1 in the Appendix A).

- Adult ADHD Self-Report Scale (ASRS)

We used the Adult ADHD Self-Report Scale (ASRS), an ADHD self-report scale developed by the World Health Organization (Kessler et al., 2005), to measure ADHD traits in Study 1. The scale consists of 18 questions measuring two factors (i.e., Inattention and Hyperactivity/Impulsivity) of ADHD symptoms. The higher the score, the more likely a person is to have ADHD traits.

- Japanese version of Highly Sensitive Person 10-Item Scale (HSP-J10)

Based on the original Highly Sensitive Person scale (Aron & Aron, 1997), various short versions have been created, translated, and used (e.g., Harms et al., 2019). We used the Japanese version of the highly sensitive person scale 10-item version (HSP-J10) (Iimura et al., 2023) to assess HSP traits. This scale comprises three factors: ease of excitation, low sensory threshold, and esthetic sensitivity. Higher scores indicate higher HSP traits.

### 2.3. Analysis

- Measurement evaluation

Before hypothesis testing, we conducted a confirmatory factor analysis (CFA) for each scale to establish its authenticity. The Kaiser-Meyer-Olkin test was used to determine whether each dataset was suitable for factor analysis. The criterion was set as measures of sampling adequacy  $> 0.80$  (Shrestha, 2021), and was met for all measures ( $> 0.84$ ). CFAs were performed using the diagonal weighted least squares method. The original models of each scale were the targets of CFA (e.g., two factors for ADHD). Goodness of fit was evaluated based on  $CFI \geq 0.95$ ,  $RMSEA \leq 0.08$ , and  $SRMR \leq 0.08$  (Hu & Bentler, 1999). If the original model did not fit well, a data-driven exploratory factor analysis (EFA) was conducted to derive meaningful factors. The number of factors to be extracted in the EFA was determined based on Kaiser's criterion (eigenvalues of the correlation matrix  $> 1$ ) and Horn's parallel analysis (20 iterations as default in the statistical analysis software used [JASP-Version 0.18.3]). For internal consistency, Cronbach's alpha and McDonald's  $\omega$  were calculated.

- Hierarchical Logistic Regression

Logistic regression analysis was performed, with the dependent variable coded '0' for non-entrepreneurs and '1' for the entrepreneur group. Every factor in the CST24, ASRS, and HSP-J10 was an independent variable. Age and sex were added to the model as covariates, and the variance inflation factor (VIF) was calculated and checked using a criterion of 5 or less (Akinwande et al., 2015); all variables met the criterion ( $VIF < 2.42$ ). The AIC and Tjur  $R^2$  (Tjur, 2009) were used as indices for model evaluation.

Only age and sex were included as covariates, given constraints of questionnaire length. We acknowledge that additional confounders—such as educational background, socioeconomic status, risk preference, and family entrepreneurial history—were not assessed, and this is addressed in the Limitations.

### 2.4. Result

- Measurement evaluation

As the original model of each scale fit satisfactorily, except for CST24 (Table 1), the factor scores in the original model were used as independent variables for the ASRS and

HSP-J10. For CST24, EFA identified three factors: Drive, Harmony, and Compassion (Table A1). As the model fit met the criteria (Table 1), these three factors' scores, rather than the six factors of the original model, were used as independent variables for the CST24. Descriptive statistics for each scale are presented in Table 2.

**Table 1.** Fit Indices for Each Model.

Study1/2	Measurement	FA	N of Factors	$\chi^2$	df	p	CFI	RMSEA	SRMR
Study 1	CST24	CFA	6	–	–	–	–	–	–
		EFA	3	326.65	207	<0.001	0.96	0.03	0.03
	ASRS	CFA	2	154.96	134	0.104	0.99	0.02	0.05
Study 2	HSP-J10	CFA	3	37.33	32	0.237	0.99	0.02	0.04
		CFA	6	–	–	–	–	–	–
	CST24	CFA	3	103.94	148	0.998	1.00	0.00	0.04
		CFA	3	27.12	32	0.712	1.000	0.00	0.04

Note. FA = factor analysis; df = degrees of freedom; CFI = comparative fit index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual; CST24 = Character Strengths Test24; ASRS = Adult ADHD Self-Report Scale; HSP-J10 = Japanese version of the Highly Sensitive Person Scale 10-Item Version; CFA = confirmatory factor analysis; EFA = exploratory factor analysis.

**Table 2.** Descriptive Statistics.

Study 1/2	Measurement	Factor	Mean	SD	$\alpha$	$\omega$
Study 1	CST24	Drive	32.20	8.56	0.88	0.79
		Harmony	38.85	8.60	0.87	0.78
		Compassion	12.19	3.17	0.71	0.72
	ASRS	Inattention	21.52	5.09	0.82	0.81
		Hyperactivity/Impulsivity	19.41	5.65	0.83	0.83
	HSP-J10	Ease of excitation	19.44	6.01	0.86	0.86
		Low sensory threshold	12.14	3.96	0.81	0.81
Study 2	CST24	Esthetic sensitivity	8.50	2.47	0.68	0.70
		Drive	32.56	7.82	0.86	0.78
		Harmony	39.87	8.12	0.85	0.77
		Compassion	12.46	3.05	0.64	0.65
		Ease of excitation	20.01	5.85	0.86	0.86
	HSP-J10	Low sensory threshold	12.36	3.99	0.83	0.84
		Esthetic sensitivity	8.47	2.60	0.77	0.77

Note. SD = standard deviation;  $\alpha$  = Cronbach's alpha;  $\omega$  = McDonald's omega; CST24 = Character Strengths Test24; ASRS = Adult ADHD Self-Report Scale; HSP-J10 = Japanese version of the Highly Sensitive Person Scale 10-Item Version.

- Hierarchical Logistic Regression

The results of the logistic regression analysis with the independent variables Drive, Harmony, and Compassion as factors of the CST24 showed that the facilitatory effect of entrepreneurial entry was significant only for the Drive factor (OR = 1.06, CI [1.03–1.09], Model 1, Table 3).

Logistic regression analysis with the independent variables Drive, as factor of the CST24, and the Inattention and Hyperactivity/Impulsivity factor of ASRS showed that Drive (OR = 1.06, CI [1.03–1.09]) and Hyperactivity/Impulsivity (OR = 1.05, CI [1.01–1.10]) as facilitatory effects of entrepreneurial entry were significant (Model 5, Table 3). The interaction between the Drive and Hyperactivity/Impulsivity did not significantly improve the model (Model 9, Table 3).

In addition to the Drive factor of the CST24 and the Hyperactivity/Impulsivity factor of the ASRS, three factors of the HSP-J10 (Ease of excitation, Low sensory threshold, and Esthetic sensitivity) were entered as independent variables in the logistic regression model. The results showed that Drive (OR = 1.05, CI [1.02–1.08]) and Hyperactivity/Impulsivity

(OR = 1.07, CI [1.02–1.11]) retained their significant facilitatory effects on entrepreneurial entry, and Ease of excitation had a significant inhibitory effect (OR = 0.95, CI [0.91–0.99]) (Model 6, Table 3). The interaction between Drive and Ease of excitation did not significantly improve the model (Model 10, Table 3).

**Table 3.** Logistic Regression Model Comparison in Study 1.

Model	Comparison Against	$\Delta\chi^2$	<i>p</i>	AIC	Tjur <i>R</i> <sup>2</sup>
Model 1: CST-D	Null	19.50	<0.001	468.19	0.13
Model 2: CST-D + CST-H	Model 1	2.34	0.126	467.85	0.13
Model 3: CST-D + CST-C	Model 1	2.22	0.136	467.97	0.13
Model 4: CST-D + ASRS-I	Model 1	1.65	0.198	468.53	0.13
Model 5: CST-D + ASRS-H/I	Model 1	6.92	0.009	463.27	0.15
Model 6: CST-D + ASRS-H/I + HSP-E	Model 5	5.05	0.025	460.21	0.16
Model 7: CST-D + ASRS-H/I + HSP-E + HSP-L	Model 6	0.02	0.883	462.19	0.16
Model 8: CST-D + ASRS-H/I + HSP-E + HSP-A	Model 6	1.67	0.196	460.54	0.16
Model 9: CST-D + ASRS-H/I + HSP-E + CST-D × ASRS-H/I	Model 6	1.02	0.311	461.19	0.16
Model 10: CST-D + ASRS-H/I + HSP-E + CST-D × HSP-E	Model 6	0.00	0.987	462.21	0.16

Note. All the models included age and sex as covariates. AIC = Akaike’s information criterion; CST-D = Drive of CST24; CST-H = Harmony of CST24; CST-C = Compassion of CST24; ASRS-I = Inattention of ASRS; ASRS-H/I = Hyperactivity/Impulsivity of ASRS; HSP-E = Ease of excitation of HSP-J10; HSP-L = Low sensory threshold of HSP-J10; HSP-A = Esthetic sensitivity of HSP-J10.

Model 6 explained entrepreneurial entry best of all models. Drive factor of the CST24 and the Hyperactivity/Impulsivity factor of the ASRS had significant facilitating effects, and Ease of excitation of HSP had a significant inhibiting effect on entrepreneurial entry (Table 4).

**Table 4.** Model 6 of Logistic Regression in Study 1.

Model	Independent Variable	$\beta$	SE	Wald	<i>p</i>	OR (95%CI)
Model 6: CST-D + ASRS-H/I + HSP-E	CST-D	0.48	0.01	13.90	<0.001	1.05 (1.02–1.08)
	ASRS-H/I	0.38	0.02	9.34	0.002	1.07 (1.02–1.11)
	HSP-E	−0.28	0.02	4.98	0.026	0.95 (0.91–0.99)

Note. All the models included age and sex as covariates. SE = standard error; OR = odds ratio; CI = confidence interval; CST-D = Drive of CST24; ASRS = Adult ADHD Self-Report Scale; ASRS-H/I = Hyperactivity/Impulsivity of ASRS; HSP-E = Ease of excitation of HSP-J10.

### 3. Study 2

#### 3.1. Sample

As in Study 1, data were collected from 412 participants (206 entrepreneurs and 206 non-entrepreneurs). Using the same criteria as in Study 1, 34 of the 412 participants were excluded, leaving 189 participants in the non-entrepreneur group (mean age: 44.22 [*SD*: 9.39]; 84 women) and 189 in the entrepreneur group (mean age: 45.77 [*SD*: 9.52]; 56 women). There were no age differences between the groups (*p* = 0.112), but significant differences in the sex ratio (*p* = 0.003). This sample did not overlap with that of Study 1.

#### 3.2. Measures

Study 2 used the same indicators as Study 1, except for ADHD, which in Study 2 was measured by whether a participant had ever received a medical diagnosis of ADHD. Objective documents, such as medical certificates, were not verified since the study was conducted via an online survey using the question “Have you ever been diagnosed with ADHD?”

### 3.3. Analysis

All indicators were analyzed in the same manner as in Study 1, except for ADHD.

### 3.4. Result

- Measurement evaluation

As in Study 1, the original model of each scale fit, except for CST24 (Table 1), for which the original factor scores were used as independent variables (Table 1). The factor scores in the original model were used as independent variables for the ASRS and HSP-J10. As the original model did not converge to a solution for the CST24, the three-factor structure obtained in Study 1 was used as it had satisfactory fit (Table 1). Descriptive statistics for each scale are presented in Table 2.

- Hierarchical Logistic Regression

Of the three factors of the CST24, only the Drive factor positively influenced entrepreneurial entry (OR = 1.04, CI [1.01–1.07], Model 1, Table 5).

**Table 5.** Logistic Regression Model Comparison in Study 2.

Model	Compare Against	$\Delta\chi^2$	<i>p</i>	AIC	Tjur <i>R</i> <sup>2</sup>
Model 1: CST-D	Null	11.69	<0.001	509.02	0.05
Model 2: CST-D + CST-H	Model 1	1.42	0.232	511.32	0.05
Model 3: CST-D + CST-C	Model 1	0.03	0.846	512.71	0.05
Model 4: CST-D + D of ADHD	Model 1	8.01	0.005	504.73	0.07
Model 5: CST-D + D of ADHD + HSP-E	Model 4	5.01	0.025	501.71	0.08
Model 6: CST-D + D of ADHD + HSP-E + HSP-L	Model 5	0.42	0.513	503.29	0.08
Model 7: CST-D + D of ADHD + HSP-E + HSP-A	Model 5	0.27	0.600	503.44	0.08
Model 8: CST-D + D of ADHD + HSP-E + CST-D × D of ADHD	Model 5	0.00	0.978	503.71	0.08
Model 9: CST-D + D of ADHD + HSP-E + CST-D × HSP-E	Model 5	0.00	0.992	503.71	0.08

Note. All the models included age and sex as covariates. AIC = Akaike’s information criterion; CST-D = Drive of CST24; CST-H = Harmony of CST24; CST-C = Compassion of CST24; D of ADHD = diagnosis of ADHD; HSP-E = Ease of excitation of HSP-J10; HSP-L = Low sensory threshold of HSP-J10; HSP-A = Esthetic sensitivity of HSP-J10.

The Drive factor of CST24 (OR = 1.05, CI [1.021–1.08]) and a medical diagnosis of ADHD (OR = 6.79, CI [1.43–32.17]) positively influenced entrepreneurial entry (Model 4, Table 5), but the interaction between the two did not significantly improve the model (Model 8, Table 5).

Drive (OR = 1.04, CI [1.01–1.07]) and a medical diagnosis of ADHD (OR = 7.25, CI [1.54–34.081]) positively influenced entrepreneurial entry, and the Ease of excitation factor of the HSP-J10 (OR = 0.95, CI [0.92–0.99]) negatively influenced entrepreneurial entry (Model 5, Table 5). The interaction between Drive and Ease of excitation did not significantly improve the model (Model 9, Table 5).

Model 5 explained entrepreneurial entry best of all models. Drive factor of the CST24 and ADHD diagnosis had significant facilitating effects, and Ease of excitation of HSP had a significant inhibiting effect on entrepreneurial entry (Table 6).

**Table 6.** Model 5 of Logistic Regression in Study 2.

Model	Independent Variable	$\beta$	SE	Wald	<i>p</i>	OR (95%CI)
Model 5: CST-D + D of ADHD + HSP-E	CST-D	0.33	0.01	8.32	0.004	1.04 (1.01–1.07)
	D of ADHD	0.36	0.78	6.31	0.012	7.25 (1.54–34.08)
	HSP-E	−0.25	0.02	4.91	0.027	0.95 (0.92–0.99)

Note. All the models included age and sex as covariates. SE = standard error; OR = odds ratio; CI, confidence interval; CST-D = Drive of CST24; D of ADHD = diagnosis of ADHD; HSP-E = Ease of excitation of HSP-J10.

## 4. Discussion

The purpose of this study was to clarify how developable psychological characteristics (character strengths) and relatively fixed trait-like factors (ADHD and HSP) independently or interactively predict entrepreneurial entry. Across two independent samples, the findings consistently demonstrated direct effects but no interaction effects among these domains.

This study focused on character strengths, ADHD, and HSP traits, which have been suggested in previous research as influencing entrepreneurial behavior, and examined whether they interactively influence entrepreneurial entry. The results of two independent surveys showed that the CST24 had a different factor structure than previously assumed, and one of its factors (i.e., Drive) influenced entrepreneurial entry, whereas ADHD and HSP significantly facilitated and inhibited entrepreneurial entry, respectively. No expected interaction effects were observed, and only direct effects were found.

In this study, character strengths were divided into three factors: Drive, Harmony, and Compassion (Table A1). The six-factor model with a theoretical factor structure (Peterson & Seligman, 2004) was a poor fit in previous studies ( $CFI \geq 0.869$ ,  $RMSEA \leq 0.084$ ,  $SRMR \leq 0.0524$ ; Shimai & Urata, 2023). In the present study, the original model did not converge to a solution for the CST24, and the three-factor structure with data-driven factors explored through EFA indicates the goodness of fit of the model (Study 1, 2;  $CFI \geq 0.96$ ,  $RMSEA \leq 0.08$ ,  $SRMR \leq 0.05$ ). Further, internal consistency was stable (Study 1, 2;  $\alpha > 0.64$ ;  $\omega > 0.65$ ) across the two independent samples. Furthermore, we limited our sample in the non-entrepreneur group to eliminate the specificity of having equal proportions of entrepreneurs and non-entrepreneurs for CFA for CST24 and performed CFA on the three-factor CST24 model obtained in Study 1. It also had good fit and internal consistency (Appendix A). This can be considered a stable factor structure for CST24 in Japanese participants.

The extracted factor (Drive) positively influenced entrepreneurial entry in both samples. Character strengths are pliable (Biswas-Diener et al., 2011; Proyer et al., 2013), and identifying and developing them can improve subjective judgments regarding outcomes such as life happiness and satisfaction (Dubreuil et al., 2016; Peterson & Seligman, 2004). Character strengths have also been shown to increase work performance (for review, Miglianico et al., 2020). For example, Peláez et al. (2020) showed that specific interventions based on character strengths improved work engagement and performance, as rated by supervisors. Based on the results of this study, it is expected that interventions aimed at improving character strengths will also positively influence entrepreneurial entry. In this context, the eight character strengths of the Drive factor identified in this study (creativity/originality, curiosity, bravery, leadership, zest/vitality, love of learning, persistence/perseverance, and perspective) could be important individual elements that should be nurtured in entrepreneurship education with the expectation of transformation toward entrepreneurial entry.

Regarding ADHD, only the Hyperactivity/Impulsivity factor significantly facilitated entrepreneurial entry were significant, and the results were consistent with those of previous studies showing the contribution of ADHD traits to entrepreneurship that have been noted so far (Wiklund et al., 2017; Yu et al., 2021). By presenting results using different approaches to measure ADHD, such as questionnaire scale scores and the presence or absence of an ADHD diagnosis, the robustness of the contribution of ADHD characteristics as a spectrum rather than as a binary choice of being diagnosed or not diagnosed with ADHD, and the extent to which it includes people with clinical-level ADHD was clarified. In entrepreneurship education, it makes sense to focus more on those who have been diagnosed with, or are prone to, ADHD. Assisting individuals with anxiety and stress coping strategies to protect and nurture flexible thinking and a risk-taking mentality may

not only reduce symptoms but also help find potential entrepreneurs. Nevertheless, this result may be a double-edged sword: people with severe ADHD traits may easily take entrepreneurial action when they are unable to gather detailed information or sufficient funds, or even in areas where they do not possess the necessary strengths. Entrepreneurship education may also need to consider the worrying aspects of severe ADHD traits. Because both studies relied on cross-sectional designs, the present results should not be interpreted as causal. Rather, they indicate that individuals with stronger Hyperactivity/Impulsivity characteristics—and those who have received an ADHD diagnosis—may be more likely to have undertaken entrepreneurial entry, consistent with past correlational work.

Ease of excitation, a factor of the HSP-J10, suppressed entrepreneurial entry, as HSPs are more sensitive to negative stimuli and risks and are more likely to experience negative emotions (Lionetti et al., 2019; Yano et al., 2021). This can be understood as a tendency to avoid the risk of engaging entrepreneurial entry. Furthermore, the fact that the sample was Japanese may have exacerbated the negative influence of HSP on entrepreneurial entry. The items included in the Ease of excitation factor that suppressed entrepreneurial entry in the present study were: “Do other people’s moods affect you” “When you must compete or be observed while performing a task, do you become so nervous or shaky that you do much worse than you would otherwise?” which measured the tendency to be easily influenced by others and mentally agitated. Compared to other developed countries, entrepreneurial entry is low in Japan (Hill et al., 2024), but it is believed that the traditional collectivistic nature of the Japanese people is not in line with the essentially individualistic nature of entrepreneurial behavior (Okamuro et al., 2017). In the Japanese population, where there is an underlying belief that standing up may be opposed by others, entrepreneurial entry may be perceived as a greater barrier for HSP with a higher Ease of excitation than those in other countries. These characteristics may have reduced the strength of HSP regarding noticing social signals and signs and taking entrepreneurial action through vantage sensitivity (Pluess & Belsky, 2013). These findings suggest that vantage sensitivity may not translate into entrepreneurial action unless accompanied by additional enabling conditions such as opportunity recognition or supportive environments, consistent with Harms et al. (2019). This nuance highlights that HSP traits may be context-dependent contributors rather than universally positive or negative predictors.

On the other hand, there was no interaction between character strengths and ADHD or HSP traits, and each trait affected entrepreneurial entry separately. The interaction term showed no effect, with no consistency in the sign of the coefficient. We expected that the impulsivity of ADHD would push people to overcome risks that could not be overcome through character strengths alone but that character strengths would contribute to entrepreneurial entry regardless of ADHD. For example, even in cautious individuals with little or no ADHD impulsivity, the development of character strengths can facilitate entrepreneurial entry. In addition, character strengths did not interact with HSP. The results suggest that character strengths may be an independent axis in entrepreneurship education, without considering other individual characteristics.

## 5. Limitations and Future Prospects

Although this study proposes individual characteristics to focus on entrepreneurship education for which no methodology has yet been established, it has several limitations. First, all data were self-reported and may include response bias, including inaccurate recall of ADHD diagnosis. Second, the use of convenience sampling through an online panel limits the representativeness of both samples. Third, the cross-sectional design precludes any causal inference regarding the relationships among traits and entrepreneurial entry. Furthermore, the statistical models only controlled for age and sex, potentially leading

to omitted variable bias. Several potentially important confounding variables—such as risk preferences, educational attainment, family entrepreneurial background, and income level—were not assessed. Future studies must explicitly include these factors and adopt longitudinal or experimental designs to more robustly clarify causal mechanisms.

In addition to these methodological limitations, the study has several conceptual constraints. First, it was limited to entrepreneurial entry and did not examine its relationship with entrepreneurial performance. In actual entrepreneurship, entrepreneurial performance, such as sales growth, number of employees, quality, and variety of products, is important. Second, the contribution of character strengths and ADHD in the present study may not be limited to entrepreneurial entry. Positive associations with activism in confronting environmental and human rights issues, as well as other occupations with a low probability of success and high uncertainty (e.g., even athletes and artists), may be latent but were not examined in the present study. Third, to generalize the results of this study, it is necessary to verify whether data such as those obtained here are applicable to other cultural spheres and regions.

## 6. Conclusions

While the results were consistent across two independent samples, they should be interpreted with caution given the limitations noted above. The present findings nonetheless contribute to clarifying how multiple individual characteristics relate to entrepreneurial action. We conclude that the eight character strengths in the Drive factor identified in this study could be important individual elements to be nurtured in entrepreneurship education and that ADHD and HSP significantly facilitated and inhibited entrepreneurial entry, respectively. It should be noted that this study achieved self-replication by using two independent samples. The contribution of ADHD (Hyperactivity/Impulsivity) to entrepreneurial entry was similar across both questionnaire and diagnosis, demonstrating its robustness, as shown in previous studies. An inhibitory effect of HSP (Ease of excitation) on entrepreneurial entry is a novel finding, as it is inconsistent with previous studies showing that HSP has a positive influence on entrepreneurship only through interactions with other factors. We propose that entrepreneurship education should focus on nurturing character strengths and understanding the role of trait-like factors, such as ADHD and HSP.

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## Appendix A

In this study, character strengths were divided into three factors: Drive, Harmony, and Compassion (Table A1). The three-factor structure with data-driven factors by EFA met the goodness of fit of the model (Study 1, 2;  $CFI \geq 0.96$ ,  $RMSEA \leq 0.08$ ,  $SRMR \leq 0.05$ ), as the internal consistency was stable (Study 1, 2;  $\alpha > 0.64$ ;  $\omega > 0.65$ ) in two independent samples. Furthermore, we limited our sample to the non-entrepreneur group (Study 1, 184; Study 2, 189, a total of 373) to eliminate the specificity of having equal proportions of entrepreneurs and non-entrepreneurs for CFA in CST24 and performed CFA on the three-factor CST24 model obtained in Study 1. It had a good fit ( $CFI = 1.00$ ,  $RMSEA = 0.00$ ,  $SRMR = 0.04$ ) and internal consistency ( $\alpha > 0.68$ ;  $\omega > 0.69$ ). This can be considered a stable factor structure for CST24 in Japanese.

The Drive factor includes, for example, Creativity: I come up with new ways of seeing and thinking, and use them to solve problems in unique ways, Curiosity: I like new things, meeting new people, and having new experiences, and Bravery: I meet challenges head on and do not shy away from them. This factor was named Drive, because the items indicate the driving force that motivates us to move forward in new and difficult situations.

The Harmony factor includes, for example, Social intelligence: I am aware of the flow of the situation and the feelings of others, and I pay careful attention to them, Fairness: I believe in equal opportunity and treat everyone the same, Teamwork: I will work with my group members, work for the team, and actively fulfill my responsibilities. This factor was named Harmony because many items valued cooperation and contributed to the maintenance of harmony.

Compassion factor such as love and be loved: I am warm and approachable and well-liked by others; Forgiveness: I am able to tolerate unreasonable treatment and forgive others for their mistakes; Kindness: I am full of desire to take care of others and do something for them, was named Compassion because it showed compassion and sympathy for trying to relieve the suffering of others.

**Table A1.** Items of the Three Factors of the Character Strengths Test 24 (CST24) English version.

Virtues	Strengths	Items
Drive	Creativity/Originality	Creativity: I come up with new ways of seeing and thinking, and use them to solve problems in unique ways.
	Curiosity	Curiosity: I like new things, meeting new people and having new experiences.
	Bravery	Bravery: I meet challenges head on and don't shy away from them.
	Leadership	Leadership: I am better at working for everyone is a leader than following someone else.
	Zest/Vitality	Zest: I am enthusiastic about life and daily living and always give it my all, energetically.
	Love of learning	Love of learning: I am eager to learn new things in order to deepen my knowledge and experience.
	* Persistence/Perseverance	Persistence: I am able to continue to do what I start until I finish it, despite obstacles.
Harmony	Perspective	Perspective: I have a good grasp of the flow of things and the big picture, and I am often consulted by others.
	* Persistence/Perseverance	Persistence: I am able to continue to do what I start until I finish it, despite obstacles.
	Prudence	Prudence: I plan carefully and prepare carefully enough to avoid regrets later.
	Gratitude	Gratitude: I do not take the good things in my life for granted, but I am grateful for them and express my gratitude.
	Social intelligence	Social intelligence: I am aware of the flow of the situation and the feelings of others, and I pay careful attention to them.
	Fairness	Fairness: I believe in equal opportunity and treat everyone the same.
	Judgment Open-mindedness	Judgment: I consider various aspects of a matter and come to a conclusion based on a well-reviewed rationale.
	Appreciation of beauty and excellence	Appreciation of beauty: I often find something beautiful or wonderful, and am struck and inspired by it.
	Teamwork	Teamwork: I will work with my group members, work for the team, and actively fulfill my responsibilities.
	Modesty/Humility	Modesty: I am more willing to admit my shortcomings and to celebrate the successes of others rather than my own.

Table A1. Cont.

Virtues	Strengths	Items
Compassion	Forgiveness/Mercy Love Kindness	Forgiveness: I am able to tolerate unreasonable treatment and forgive others for their mistakes. Love and be loved: I am warm and approachable and well-liked by others. Kindness: I am full of desire to take care of others and do something for them.

Note. This is a 19-item questionnaire consisting of three factors extracted from the CST24 (Shimai & Urata, 2023).  
\* Persistence/Perseverance was associated with both Drive and Harmony factors in the exploratory factor analysis.

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