



Attention-Deficit Hyperactivity Disorder Symptoms and Entrepreneurial Behavior: A Mediation Analysis

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Abstract

Background: Attention-deficit hyperactivity disorder (ADHD) and entrepreneurship are two concepts that have recently received attention from researchers.

Objectives: This study aimed to find the relationship between ADHD symptoms and entrepreneurial behavior with the mediating role of entrepreneurial self-efficacy and attitude, as well as to assess the relationship between entrepreneurial self-efficacy and entrepreneurial behavior with the mediating role of entrepreneurial attitude.

Methods: This study was conducted on 388 Iranian entrepreneurs in 2021. The Entrepreneurial Behavior Scale, the Entrepreneurial Attitude Questionnaire, the Entrepreneurial Self-efficacy Scale, and the Adult ADHD Self-report Scale were used to collect the data. Data were analyzed using Mplus software (version 8).

Results: The results revealed that hyperactivity/impulsivity symptoms were positively and significantly related to entrepreneurial behavior ($P < 0.001$), and attention-deficit symptoms were negatively and significantly related to entrepreneurial behavior and entrepreneurial attitude, mediated through entrepreneurial self-efficacy ($P < 0.01$).

Conclusions: Our findings suggest that the entrepreneurial behaviors and entrepreneurial attitudes of individuals with attention-deficit symptoms depend on their entrepreneurial self-efficacy. Our findings hold important implications for empowering individuals with ADHD symptoms in the entrepreneurial path.

Keywords: Attention Deficit Hyperactivity Disorder, Attitude, Behavior, Entrepreneurship, Self-efficacy

1. Background

There is an increasing interest in participation in entrepreneurial activities, and research is expanding in this field. Mental health is one of the variables that researchers believe is associated with entrepreneurship (1). Studies have revealed a positive relationship between mental health status, especially in individuals with attention-deficit hyperactivity disorder (ADHD), and seizing opportunities (2). The symptoms of ADHD, which often compromise well-being during adulthood, can empower individuals to be involved in starting their own businesses (3). Adult entrepreneurs with ADHD have reported that this disorder has contributed to their efforts (4).

Attention-deficit hyperactivity disorder is a persistent pattern of attention deficit (distraction, lack of perseverance, difficulty concentrating, and disorder) or hyperactivity/impulsivity (constant fidgeting, hitting, acting with-

out thinking, and excessive talking) (5). Numerous studies have reported occupational problems in adults with ADHD (6); however, recent research suggests that ADHD symptoms help these adults proceed in a transforming and uncertain entrepreneurial environment (7) and perform better in tasks that require creativity and divergent thinking (8). Therefore, entrepreneurship, which includes high-risk, complex, and innovative activities, can be a suitable job for such individuals (2).

The individuals' quality of life and socioeconomic status depend on having a satisfactory occupational condition because they spend many hours in the work environment. Therefore, it is important to understand the link between ADHD and occupational achievements (4). In addition to its dark side, ADHD also has a bright side that makes such individuals successful entrepreneurs (9). The bright side of ADHD in an entrepreneurial work environment includes creativity, risk-taking, proactivity, and au-

tonomy (10, 11).

The person-environment fit theory in an entrepreneurial environment expresses that individuals with ADHD are more likely to prefer an entrepreneurial career because of their desire to seek and engage in adventurous activities (12). Research revealed a significant relationship between ADHD symptoms and various entrepreneurial variables, including entrepreneurial intentions (13), entrepreneurial actions (2), and entrepreneurial orientation (7). However, a negative relationship has been reported between ADHD symptoms and entrepreneurial self-efficacy (14, 15).

The present study conceptualizes entrepreneurial behavior as discovering and exploiting opportunities by creating and developing new high-risk businesses (16, 17). Some researchers attribute entrepreneurial behaviors to individuals' beliefs in their abilities to start a high-risk business (i.e., entrepreneurial self-efficacy) (18, 19). However, others believe that entrepreneurial behaviors are affected by how people interpret them as desirable or undesirable (i.e., entrepreneurial attitude) (20, 21). On the other hand, individuals' beliefs make them adopt a certain attitude and incline toward a specific behavior (22). For example, Arshad et al. reported that entrepreneurial self-efficacy influenced attitudes toward entrepreneurship (23).

Although much effort has been made to explore the relationship between ADHD and entrepreneurship, gaps remain regarding how ADHD symptoms, entrepreneurial self-efficacy, as well as entrepreneurial attitudes and behaviors, are related to each other. In order to fill this gap, we here provided a conceptual model for relationships between these variables. Our findings would have implications as they could reveal ADHD, which is a disorder that poses challenges in all aspects of work, as a strength in entrepreneurship activities.

2. Objectives

This study aimed to determine the relationship between ADHD symptoms and entrepreneurial behavior and assess the mediating role of entrepreneurial self-efficacy and entrepreneurial attitudes. Furthermore, the relationship between entrepreneurial self-efficacy and entrepreneurial behaviors mediated through entrepreneurial attitudes was investigated.

3. Methods

3.1. Participants and Procedures

Iranians who were acknowledged as entrepreneurs on the following Instagram pages: @meidountv,

@omidiye.tv, and @zananekarafariniran were selected using the convenience sampling method from July 2021 to September 2021. Initially, 650 entrepreneurs were contacted, 555 of whom received the questionnaire's link after giving consent to participate in this research. The response rate was around 70% (i.e., 388 valid and completely filled-out questionnaires were received).

Inclusion criteria were Iranian nationality, being an entrepreneur, and having the intention to run a business. It is believed that entrepreneurial intentions predict entrepreneurial behaviors (24), so entrepreneurs running a business participated in this study, and the following question was asked regarding their intention, "did you intend to start your own business and be an entrepreneur?". Participants who responded "yes" to this question were included in the study. The exclusion criterion was the unwillingness to participate in the study.

The sample size was calculated based on the

$$n = \left(\frac{4(z1 + z2)^2}{\left(Ln \frac{1+r}{1-r} \right)^2} \right) + 3 \quad (1)$$

formula, considering a 95% confidence interval ($z1$) of 1.96, 95% the study power ($z2$) of 1.64, and the minimum correlation (r) of 0.2 between the components of the structural equation model.

Considering the relationship between culture and entrepreneurship (25), we examined the face and content validity of data collection tools in a qualitative manner according to Iranian culture. For this purpose, seven experts in the field were requested to comment on questions and phrases, and the revisions required were made. Content validity was quantitatively assessed using the content validity ratio (CVR) and the content validity index (CVI) based on the judgment of 10 experts.

The

$$CVR = \frac{n_E - \frac{N}{2}}{\frac{N}{2}} \quad (2)$$

formula was used, in which "N" is the total number of experts, and n_E is the number of experts who announce an item as essential. The CVR value was higher than 0.62 for all items, indicating their suitability based on the Lawshe table (26).

According to Waltz and Bausell (27), the CVI was calculated by dividing the number of experts giving a rating of 3 or 4 regarding clarity, simplicity, and relevance by the total number of experts. The CVI values obtained were higher than 0.79 for all items. It is worth mentioning that Geisinger's (28) method was used to translate questionnaires.

3.2. Measures

Entrepreneurial Behavior ($\alpha = 0.61$). Entrepreneurial behavior was assessed by nine items developed by Farmer et al. (29). For each item, the participants were asked to mention whether or not they performed these behaviors. The responses were rated on a two-point scale of 0 (did not perform it) and 1 (did it). Saif (30) approved the validity and reliability of four of these items with Cronbach's alpha coefficients of 0.94.

Adult ADHD ($\alpha = 0.83$). The Adult ADHD Self-report Scale (ASRS-V1.1) was designed in collaboration with the World Health Organization (WHO) (31). The scale includes 18 items and measures two subscales, attention deficit (nine items) and hyperactivity/impulsivity (nine items). Responses are provided on a five-point Likert scale from zero (never) to four (always). Somma et al. (32) approved the validity and reliability of the scale. In Iran, Mokhtari et al. (33) reported a Cronbach's alpha coefficient of 0.87 for this scale.

Entrepreneurial self-efficacy ($\alpha = 0.74$). The Entrepreneurial Self-efficacy Scale was used to measure entrepreneurial self-efficacy (34). This scale has four items, and the participants are asked to show their confidence in being prepared to carry out successful activities using a five-point Likert scale from one (strongly disagree) to five (strongly agree). Li et al. (19) confirmed the validity of the scale and reported Cronbach's alpha coefficient of 0.91 for this scale.

Entrepreneurial attitude ($\alpha = 0.72$). The entrepreneurial attitude was measured by five items developed by Liñán & Chen (35), scored on a five-point Likert scale from one (strongly disagree) to seven (strongly agree). Arshad et al. (23) and Liñán & Chen (35) approved the scale's reliability and validity with Cronbach's alpha coefficients of 0.87 and 0.90.

3.3. Control Variables

Previous studies have noted that age, gender, familial business background, prior experience, and social perceptions are related to entrepreneurial behaviors; therefore, we designated them as confounding/demographic variables in the present study. "Does any of your family members listed below own a business? (A) parents (father, mother, or both), (B) another close family member (family business background), "have you started or run a business before starting your current business?" (Past experiences), or "in Iran, many individuals regard beginning a new business as a good choice. What do you think?" (Social perceptions). It is noteworthy that similar questions were used in the studies conducted by Neneh (24) and Stappers & Andries (13).

3.4. Statistical Analysis

Structural equation modeling (SEM) was run to test the study's hypotheses (relationships between the main variables while controlling for the effects of demographic/confounding variables) using Mplus version 8.

4. Results

The mean age of 388 entrepreneurs included in this study was 37.02 years ($SD = 7.98$), ranging between 21 and 61 years; 51% ($n = 198$) of the participants were female, and 39.9% ($n = 155$) of them had bachelor's degrees. Cronbach's alphas, means, standard deviations, and correlations among the variables are shown in Table 1.

The chi-square per degrees of freedom (χ^2/df), the Tucker-Lewis index (TLI), the comparative fit index (CFI), the root means square error of approximation (RMSEA), and the standardized root mean square residual (SRMR) were used to test the fit of the hypothesized path model (see Figure 1). If χ^2/df is less than 2; the TLI and CFI values are close to 1, and the RMSEA and SRMR values are less than 0.05 (36), the model has a good fit. The hypothesized path model well fitted into the data: $\chi^2/df = 1.09$, $P\text{-value} = 0.37$, $TLI = 0.99$, $CFI = 0.99$, $SRMR = 0.04$, $RMSEA = 0.01$, and 90% confidence interval ($CI \leq 0.001 - 0.058$).

Direct and indirect relationships in the hypothesized path model were examined. By controlling confounding/demographic variables, as presented in Table 2, the direct links of hyperactivity/impulsivity symptoms and entrepreneurial self-efficacy with entrepreneurial behaviors were found to be positive and significant ($P < 0.001$). Also, the direct link of attention-deficit symptoms with entrepreneurial self-efficacy was negative and significant ($P < 0.001$). In addition, attention-deficit symptoms and entrepreneurial self-efficacy were negatively and positively related to entrepreneurial attitude, respectively ($P < 0.05$).

The assessment of indirect relations showed that attention-deficit symptoms were negatively and significantly related to entrepreneurial attitudes and entrepreneurial behaviors through the mediating role of entrepreneurial self-efficacy ($P < 0.01$).

The coefficient of determination (R^2) showed that ADHD symptoms contributed uniquely to the variance of predicted entrepreneurial behaviors through entrepreneurial self-efficacy and attitudes after controlling for confounding/demographic variables ($R^2 = 0.188$, $P < 0.001$). The R^2 value also revealed that ADHD symptoms explained 5.7% of the total variance of entrepreneurial self-efficacy ($R^2 = 0.057$, $P = 0.013$) and 22% of the total variance

Table 1. The Means, Standard Deviations, Cronbach's Alphas, and Correlations Among the Study's Variables

Variables	Mean ± SD	α	1	2	3	4	5
1. ADHD	28.32 ± 9.52	0.83	1				
2. Attention-deficit	13.86 ± 5.36	0.77	0.87 ^a	1			
3. Hyperactivity/impulsivity	14.46 ± 5.51	0.72	0.88 ^a	0.53 ^a	1		
4. ESE	17.41 ± 2.97	0.74	-0.23 ^a	-0.23 ^a	-0.17 ^a	1	
5. EA	31.90 ± 4.07	0.72	-0.15 ^a	-0.18 ^a	-0.08	0.46 ^a	1
6. EB	6.42 ± 1.90	0.61	0.05	-0.04	0.13 ^b	0.35 ^a	0.23 ^a

Abbreviations: ESE, entrepreneurial self-efficacy; EA, entrepreneurial attitude; EB, entrepreneurial behavior.

^a P < 0.01.

^b P < 0.05.

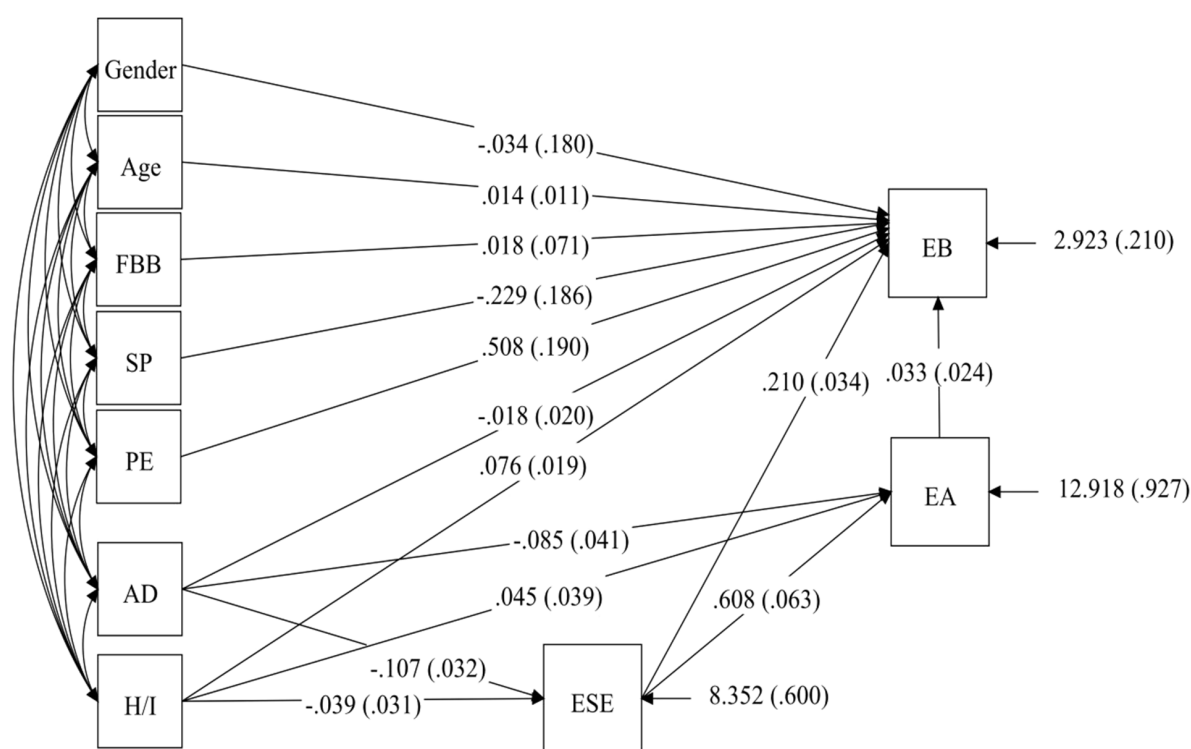


Figure 1. The hypothesized path model. ESE, entrepreneurial self-efficacy; EA, entrepreneurial attitude; EB, entrepreneurial behavior; FBB, family business background; SP, social perceptions; PE, prior experience; AD, attention-deficit; H/I, hyperactivity/impulsivity.

of entrepreneurial attitudes through entrepreneurial self-efficacy after controlling for confounding/demographic variables ($R^2 = 0.220, P < 0.001$).

5. Discussion

Our study provided a conceptual model for predicting the link of ADHD symptoms with self-efficacy, entrepreneurial attitudes, and entrepreneurial behaviors. Our results revealed that attention-deficit symptoms were

negatively and significantly related to entrepreneurial attitudes and behaviors through entrepreneurial self-efficacy. This finding was consistent with previous reports (14, 15). Tucker et al. (15) concluded that individuals with attention-deficit symptoms failed to show self-efficacy in the entrepreneurial context, especially in identifying opportunities.

Individuals with ADHD have lower self-esteem and self-efficacy (37) due to their numerous negative ADHD-related experiences (38). Individuals with attention-deficit symp-

Table 2. Direct and Indirect Relationships in the Hypothesized Path Model

Direct Relationship Paths	Standardized Coefficient β	SE	P-Values
Attention-deficit → EA	-0.085	0.041	0.037
Hyperactivity/impulsivity → EA	0.045	0.039	0.255
Attention-deficit → EB	-0.018	0.020	0.348
Hyperactivity/impulsivity → EB	0.076	0.019	0.000
Attention-deficit → ESE	-0.107	0.032	0.001
Hyperactivity/impulsivity → ESE	-0.039	0.031	0.217
EA → EB	0.033	0.024	0.174
ESE → EA	0.608	0.063	0.000
ESE → EB	0.210	0.034	0.000
Indirect Relationship Paths			
Attention-deficit → ESE → EA	-0.065	0.021	0.002
Hyperactivity/impulsivity → ESE → EA	-0.024	0.019	0.221
Attention-deficit → EA → EB	-0.003	0.002	0.255
Hyperactivity/impulsivity → EA → EB	0.001	0.002	0.383
ESE → EA → EB	0.020	0.015	0.178
Attention-deficit → ESE → EA → EB	-0.002	0.002	0.212
Hyperactivity/impulsivity → ESE → EA → EB	-0.001	0.001	0.363
Attention-deficit → ESE → EB	-0.022	0.008	0.003
Hyperactivity/impulsivity → ESE → EB	-0.008	0.007	0.226

Abbreviations: SE, standard errors; ESE, entrepreneurial self-efficacy; EA, entrepreneurial attitude; EB, entrepreneurial behavior.

toms struggle to achieve concentration and attention; therefore, they might not have the ability and skills to identify opportunities (15). Furthermore, entrepreneurial self-efficacy is a personal competency and an essential factor that motivates entrepreneurial behaviors (19), affecting attitudes toward entrepreneurship (39). In general, due to the problems they experience and little access to self-efficacy resources, individuals with attention-deficit symptoms gain less self-efficacy when promoting experiences and consequently show less favorable attitudes towards entrepreneurship and entrepreneurial behaviors.

Our findings also demonstrated that hyperactivity/impulsivity was positively and significantly related to entrepreneurial behaviors. This finding was consistent with the report of Stappers and Andries (13), who showed that hyperactivity/impulsivity symptoms played a significant role in turning pre-entry goals into entrepreneurial behaviors.

We expected entrepreneurial self-efficacy to be positively related to entrepreneurial behaviors through the mediating role of entrepreneurial attitudes, but we could not confirm this idea. According to Mayer & Sutton (40), attitude is determined by believing in oneself whether it

is positively or negatively evaluated. The present study's participants might not strongly believe in their potential capabilities to gain a positive attitude and translate them to the form of entrepreneurial behaviors. Social support is another factor influencing attitude, as proposed by Ajzen (20). Consistent with the effects of these two factors, a positive relationship was found among entrepreneurial attitude, perceived behavioral control, perceived support, social learning, and mental norms (41). It can be stated that the society in which this study was conducted may not appropriately support entrepreneurship activities. As a result, the participants did not view entrepreneurship as a positive idea.

There was no significant relationship between ADHD symptoms and entrepreneurial behaviors through entrepreneurial attitudes. Calza et al. (25) showed that cultural values affected the growth of entrepreneurial behaviors in society and the fact that each culture has certain values and norms for creating new high-risk businesses. Accordingly, it seems that the culture of Iranian society and its values also influence the attitudes of individuals with ADHD towards entrepreneurship.

5.1. Limitations

The present study has some limitations. First, this study relied on self-report measures, so we cannot rule out the possibility of common method bias. Second, about 30% of the questionnaires did not return, so there is a possibility of selection bias as well. Therefore, future researchers are recommended to use other data collection instruments or multi-source data and conduct longitudinal or experimental studies. Third, our study was conducted on the Iranian entrepreneurial community; therefore, more research is needed to examine the applicability of the model presented here in other countries and cultures.

5.2. Conclusions

Our research supported the idea that entrepreneurship was dependent on the culture of societies. Our results showed that ADHD symptoms were related to entrepreneurial self-efficacy, entrepreneurial attitudes, and entrepreneurial behaviors. Therefore, besides entrepreneurial intentions, orientations, and actions, ADHD individuals' belief in their abilities to run a high-risk business and their attitudes toward entrepreneurship influence their progress in this path. The findings demonstrated that attention-deficit symptoms significantly contributed to entrepreneurial attitudes and behaviors through entrepreneurial self-efficacy. In general, it is essential to empower individuals with ADHD symptoms in the entrepreneurial path (a path of autonomy and uncertainty) so that they can turn their weaknesses into strengths.

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Footnotes

Authors' Contribution: F. F. I. and E. S. contributed to the study concept, collecting the data, and writing the manuscript. M. R. M. and F. F. I. contributed to statistical analyses and interpretation of data. F. S. edited the manuscript. All authors read and approved the final manuscript.

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