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Dropout Intention among University Students with ADHD Symptoms: Exploring a Path Model for the Role of Self-Efficacy, Resilience, and Depression

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Abstract: Major conceptual models of ADHD and learning disabilities underscore the adverse effects they have on academic performance and dropout from university. Therefore, identifying psychological risks and protective factors can aid in managing academic challenges and decreasing dropout rates. In this cross-sectional study, a sample of 395 Hungarian college students (66.6% female, mean age 23.72 years [SD = 3.87]) responded to an online survey including the Adult ADHD Self-Report Scale, Beck Depression Inventory, General Self-Efficacy Questionnaire, Academic Resilience Scale, and the Higher Education Retention Questionnaire. Path analysis indicated that depression and academic resilience mediate the relationship between ADHD symptoms and dropout intention, while self-efficacy moderates this association. The findings highlight the critical role of psychological factors in shaping academic dropout for college students with ADHD symptoms. Enhancing academic resilience and self-efficacy may help mitigate the negative impact of ADHD symptoms on college retention.

Keywords: ADHD symptoms; higher education; risk and protective factors; dropout intention

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1. Introduction

The conceptualization of attention-deficit hyperactivity disorder (ADHD) has undergone a paradigm shift in recent years. Previously considered to be limited to childhood, research and clinical attention have now begun to focus on the adult population [1], with findings indicating symptom continuity in 40–80% of childhood cases into adolescence [2] and approximately 50% into adulthood [3]. Despite a tendency for cases to be hidden in higher education settings [4], Mak and colleagues [5] reported that 15.9% of university students across nine countries screened positive for ADHD, while Shaw and Selman [6] found that 8.4% of individuals currently applying for entry into universities reported having ADHD. These statistics are particularly relevant for Hungary, where significant demand for diagnosis far exceeds the capacity of available resources, resulting in a substantial lack of knowledge regarding the prevalence of ADHD among college students, its relationship with mental health status, and potential interventions for the affected population [7].

Once in college or university, students with ADHD generally complete fewer years of education than their peers [8,9] and are more likely to drop out than students without ADHD [8,10]. Henning and colleagues [11] emphasized impaired attention as a major factor contributing to withdrawal from postsecondary education. While the mechanism underlying the relationship between these two variables remains unclear, students with ADHD often face difficulties with executive functions, manifesting as challenges in focusing on tasks, following directions, comprehending and retaining information, transitioning between activities, problem solving, and organizing their work. Consequently,

they may struggle to complete assignments, perform well on tests, and meet academic demands [12]. Furthermore, students with ADHD frequently encounter challenges related to self-regulation, including difficulties with classroom behavior, motivation, perseverance during demanding tasks, and time management. These struggles can also impact peer relationships and interactions with professors, and indirectly influence academic attrition [13].

Previous research examined academic success by analyzing "real dropout" cases and measuring academic persistence based on the duration of students' enrollment in the university [8], including their decision to discontinue studies [14]. However, Respondek and colleagues [15] identified a limitation in these studies, all of which were conducted after the students had already dropped out leading to limited samples. To address this shortcoming, it is recommended that students' intention to drop out of university be assessed as it has been found to have a strong association with and predict the actual dropout. The intention to drop out is typically assessed by considering two aspects: (a) the contemplation of leaving university and (b) discussing this matter with parents, friends, or others. By detecting signs that identify potential dropouts early, universities may be able to implement intervention programs to prevent them from following through with their intentions [14]. It is important to acknowledge that while DuPaul and colleagues [8] studied the academic persistence and enrollment status of students with ADHD, their research did not include dropout intentions. Furthermore, the referenced studies [14,15] primarily focused on typical university students and did not address ADHD symptoms or include clinical samples with ADHD.

In addition to the above-mentioned perspectives, a growing number of studies have emphasized the need to consider psychological elements in the dropout intention process (e.g., [8,16–18]). For instance, Martínez-Líbano and Yeomans-Cabrera [19] drew attention to depressive symptoms, Bittmann [20] demonstrated that resilient individuals have more positive academic trajectories and lower dropout intentions, and Buizza [21] articulated the role of self-efficacy in this context. However, there is a dearth of studies focusing on unique psychological variables and the way they may influence outcomes in students who are academically at risk owing to impairments related to ADHD. This research gap needs to be addressed, especially given the higher rates of college failure experienced by these students. Therefore, in addition to considering depression as a potential risk factor for dropout intention, we also included two potential protective factors in our study, namely, academic resilience and self-efficacy.

1.1. The Mediating Role of Depression and Academic Resilience

An expanding body of research has underscored the link between internalizing symptoms and compromised college attrition, particularly in the academic realm. All depressive disorders share common features, including feelings of sadness, emptiness, and irritability, along with somatic and cognitive changes that significantly affect an individual's ability to function [22]. Symptoms of depression can reduce interest in daily activities, leading to students losing enthusiasm for learning. This can result in their disengagement from classes and sub-par achievement on exams and assignments [1]. Numerous studies have highlighted the significant negative impact of depression on students' academic persistence. For example, in an extensive, 2-year longitudinal study, Eisenberg and colleagues [23] established that while depression correlates with lower grade point average (GPA) scores, it directly predicts an increased likelihood of dropping out of university. Furthermore, a study by Arbona and colleagues [24] not only confirmed a direct relationship between depression symptoms and college persistence but also highlighted the mediating role of depression in this context. In critically assessing these findings, it should be noted that these studies did not screen for ADHD symptoms in their sample. This aspect is fundamental, as college students with ADHD symptoms are not only at an increased risk of college dropout [8], but also prone to higher levels of depression due to their symptoms [25,26]. In their research among university students, Sahmurova and colleagues [26] found that

ADHD symptoms directly predict higher depressive symptoms. This can be attributed to stressful environmental situations that ADHD can provoke, such as strained relationships [27], victimization by peers [28], and academic underachievement [1]. Depressive symptoms, often resulting from ADHD, significantly contribute to the intention of college students to drop out. This pattern suggests that ADHD symptoms might lead to dropout intentions through the influence of depression, indicating its potential role as a mediator to explain how and why ADHD symptoms and dropout intentions are connected. This assumption remains untested to date.

However, some factors can reduce these risks and promote academic success. For instance, resilience can be defined as maintaining psychological well-being despite adversity [29], and academic resilience reflects an increased likelihood of educational success despite adversity [30]. A growing consensus in the literature considers resilience to be a domain-specific construct [31]. Allan and colleagues [32] and Colp [33] suggest that in the context of university, academic resilience provides a more insightful construct for study than a broader, general resilience. It encompasses a range of factors, such as planning, control, commitment, and low levels of anxiety, and predicts effective school participation and learning enjoyment [34]. Academic resilience may enhance students' mental health and thus improve their learning outcomes, especially those at risk of learning difficulties and school failure [35]. This is particularly relevant for students with ADHD symptoms, as they have lower levels of resilience and a higher chance of dropping out of university [36]. Martin and Burns [37] reported that ADHD symptoms directly challenge a student's ability to adapt, leading to an increasing disengagement from academic activities and the learning environment. Known as the maladaptive Adaptability–Buoyancy–Resilience cycle, this sequential relationship—in which ADHD impacts resilience, which then affects dropout intentions—fits the theoretical understanding of mediation whereby one variable affects another through an intermediate variable.

Although numerous studies [38–40] have documented the role of resilience as a protective factor against mental health problems in the typical university student population, the specific advantages of academic resilience remain less explored. To our knowledge, no previous research has investigated academic resilience in association with ADHD symptoms, depression, and dropout intentions in a university population. These largely unexplored associations indicate the need for further investigation. Therefore, we suggest that resilience (particularly academic resilience) can directly contribute to (lower) intention to drop out and mediate the link between ADHD and dropout intentions.

1.2. The Role of Self-Efficacy between ADHD Symptoms and Dropout Intention

Self-efficacy plays an essential role in enhancing academic achievement and persistence [41]. Under the lens of Bandura's Social Cognitive Theory [42], self-efficacy, or an individual's confidence in their ability to accomplish tasks and achieve objectives, is a significant determinant of human behavior and motivation. When individuals harbor a strong belief in their capabilities, they are more inclined to actively engage in, exert effort toward, and demonstrate persistence in those activities. According to this theory, there are four primary sources of self-efficacy: mastery experience (previous success), observational experience (vicarious learning), social persuasion (encouragement from others), and physical/affective states (emotional and physical reactions during tasks) [42]. A common thread among these sources is that they are based on subjective experiences, indicating that self-efficacy can be enhanced.

Previous research exploring the link between dropout intentions and self-efficacy (both academic and general) presents inconsistent findings. Nemtcan and colleagues [43] identified academic self-efficacy (measured by the Motivated Strategies for Learning Questionnaire) as a direct predictor of dropout intentions. Likewise, Buizza and colleagues [21] reported a significant link between academic self-efficacy (measured by Perceived School Self-Efficacy) and dropout intention. Conversely, Fior [44] found that academic self-efficacy (measured by the Higher Education Self-Efficacy Scale) directly influenced semester grades

rather than dropout intention. Furthermore, Bulut and Bulbul [45] explored academic self-efficacy (measured by the Academic Self-efficacy Scale) and dropout intention: their findings revealed no significant results using correlation and simple regression analyses. These results align with the findings of Robbins and colleagues [46], which suggest that academic self-efficacy is primarily associated with academic performance rather than retention.

While Bandura [47] acknowledges that strong self-efficacy in one area can sometimes influence a person's confidence in related situations, Mascia and colleagues [48] found no direct effect of general self-efficacy on dropout intentions, noting the study's limitations, including the lack of control for learning disabilities. Rußmann and colleagues [49] studied students with disabilities (physical, learning, psychic, and other impairments), finding that general self-efficacy is a direct predictor and a mediator of dropout intentions, and while they did not specify the exact diagnoses, the study referenced an item battery that captured different kinds of impairments. Samuel and Burger [50] in a 4-year longitudinal study found a negative connection between general self-efficacy and dropout intentions, yet they argued the mediating nature of the construct. The study identified self-efficacy as a moderator variable in this relationship: high levels of general self-efficacy reduced the influence of adverse life events on dropout intention.

It is important to note that these studies did not explore ADHD symptoms. This is an important gap, given that individuals with ADHD often grapple with a diminished sense of personal agency and experience feelings of demoralization, anxiety, and uncertainty regarding their future trajectory. The literature suggests that these individuals are more susceptible to failure and underachievement, contributing to a decline in self-efficacy [18]. Low self-efficacy is not considered a direct consequence or outcome of ADHD symptoms. Instead, it emerges from high stress levels, limited resources, and interaction with one's environment [51]. ADHD symptoms predict fewer positive and more negative memories, which in turn predict lower self-efficacy through reduced social support [50]. This diminished self-efficacy can undermine the capacity for successful adaptation to college and adult life and compromise persistence in higher education [52]. Self-efficacy may also be essential for individuals with ADHD who seek treatment or mental health support. When people with ADHD have confidence in their abilities, they are more likely to feel equipped to manage the everyday difficulties that often accompany ADHD [51]. This self-belief can be a cornerstone in making positive changes in their lives, such as adopting healthier habits, maintaining motivation, and recovering from setbacks [53]. Newark and colleagues [51] identified self-efficacy as a therapy-relevant factor that reduces the impact of ADHD symptoms. In support of these results, Sagar [54] reported that self-efficacy might buffer the adverse outcomes stemming from ADHD symptoms. General self-efficacy emerges as a relevant variable for assessing dropout intentions in contexts involving ADHD traits, since students with these symptoms face challenges that extend beyond the academic domain (e.g., increased difficulties in adjusting to everyday life and adult responsibilities).

In light of the above we suggest that (1) general self-efficacy may have an influence on dropout intention; (2) rather than including low self-efficacy as a risk factor for students with learning or attention difficulties, exploring the protective potential of self-efficacy could be a valuable area of research; (3) findings on general self-efficacy show mixed results: it has been identified as not being a direct predictor, acting as a mediator, or serving as a moderator; (4) using a widely recognized and validated scale of general self-efficacy could enhance the comparability and generalizability of findings across studies; (5) the specific relationship between general self-efficacy and dropout intentions concerning ADHD symptoms remains unexplored. Therefore, this study aims to bridge the gap linking ADHD symptoms and dropout intention, while clarifying the function of self-efficacy within this dynamic. Through exploratory analysis, we intend to determine whether self-efficacy may act as a mediating or moderating factor in this relationship.

1.3. Objectives of the Study

Based on the literature reviewed [8,11,55], we aimed to extend prior research by gaining more detailed insight into the interaction among ADHD symptoms, dropout intention, and other factors including self-efficacy, academic resilience (as protective factors), and depression (as a risk factor). The primary objective of this study was to examine a path model through which ADHD symptoms may be related to dropout intention (as an outcome variable) by assessing the potential mediating effects of academic resilience and depression. To gain a better understanding of the connection between the measured variables, we built on Devi and colleagues' [38] work to investigate whether academic resilience mediates the relationship between ADHD symptoms and depression. Given that general self-efficacy can mitigate the negative consequences of ADHD [51], we explored whether self-efficacy could reduce the impact of ADHD symptoms on dropout intention. We conducted an exploratory analysis of its role, adhering to the mediation criteria by Baron and Kenny [56], following the mediator approach of Rußmann and colleagues [49], and examining its potential as a moderator, in line with Samuel and Burger [50]. In light of these considerations, we hypothesize a mediation model with a moderator in which ADHD symptoms negatively and directly predict dropout intentions through the mediating role of academic resilience and depression. We also expect that academic resilience may predict depression. Additionally, we propose that self-efficacy moderates the ADHD–dropout relationship, such that the direct effect of ADHD on dropout intention is weaker when self-efficacy is high.

2. Materials and Methods

2.1. Participants

A total of 395 students, 263 (66.6%) female and 132 (33.4%) male, enrolled in a higher education institution in Hungary participated in the study; their ages ranged from 18 to 35 years, with a mean of 23.72 years (SD = 3.90). Hungary's higher education institutions adhere to a well-defined three-tier degree system aligned with the European Qualifications Framework (EQF). Bachelor's programs (EQF Level 6) typically encompass 6–8 semesters (3–4 years) of study. Subsequently, students can pursue master's programs (EQF Level 7), necessitating additional 2–4 semesters (1–2 years) of coursework. A characteristic of the Hungarian system is the undivided one-tier master's program. This unique route integrates bachelor's and master's level curricula into a single, comprehensive 5-to-6-year program, leading directly to a master's degree. This integrated model is prevalent in specialized fields such as medicine and teacher training. The highest level of academic qualification, the doctoral degree (EQF Level 8), can be attained in 4-year postgraduate programs. In addition to these traditional pathways, Hungary also offers vocational higher education programs, providing practical, skills-based training that leads to professional qualifications. Of the participants, 312 (79%) were full-time students and 83 (21%) were part-time students. Twenty-two students (5.6%) were enrolled in a vocational higher education program, 244 (61.8%) in a bachelor's degree program, 80 (20.3%) in a master's degree program, 31 (7.8%) in an undivided one-tier master's degree program, and 18 (4.6%) in a doctoral program. All participants were engaged in their studies within the normative duration. In our study, 12 participants (2.90%) reported a prior ADHD diagnosis, and all participants indicated no other learning disabilities, intellectual impairments, psychiatric conditions, neurological disorders, or difficulties. All participants identified Hungarian as their primary language.

2.2. Procedure

In this cross-sectional study, empirical data were collected between May and September 2022, through a self-administered digital questionnaire using the Typeform platform. The target population for this study included all university students in Hungary. The questionnaire was disseminated through Neptun, a widely adopted unified study platform used by all Hungarian universities. Thus, the questionnaire was shared within Facebook groups that had significant followings among Hungarian students and revolved around

topics related to research, psychology, and ADHD. The participants were not provided with any form of compensation for their involvement or completion of the survey. This study relied on the voluntary participation of individuals. The inclusion criteria for participating in this study were as follows: (a) being over 18 years of age, (b) being enrolled as an active student at a Hungarian university, and (c) provision of written informed consent. To ensure quality control and data collection accuracy, participants had to confirm that they (1) did not have any difficulties in understanding the questions and (2) responded carefully and truthfully. Application of these criteria did not lead to exclusions. The ethnic composition of Hungary, predominantly consisting of ethnic Hungarians, renders ethnicity a less pertinent factor in characterizing our sample. Additionally, while socioeconomic status (SES) holds significance in numerous domains, it was not a central element of our study, leading us to exclude these variables. During data collection and analysis, we strictly adhered to the principles outlined in the Declaration of Helsinki and followed all relevant ethical guidelines about the involvement of human subjects. The Institutional Review Board approved the study procedures (7/2021). After providing informed consent, the participants answered questions regarding their basic demographic information before responding to the measures described below. There were no missing data. The study materials were administered in Hungarian.

2.3. Measures

2.3.1. ADHD

In this study, ADHD symptoms were evaluated using the World Health Organization's Adult ADHD Self-Report Scale (ASRS-v.1.1), a self-report measure consisting of 18 items [57]. Participants were asked to rate the frequency of their experiences with the statements on a five-point scale, with 0 indicating "never" and 4 indicating "very often". The scale includes nine items that focus on hyperactive/impulsive symptoms (e.g., "How often do you fidget or squirm with your hands or feet when you have to sit down for a long time?") and nine items that examine attention-deficit symptoms (e.g., "When you have a task that requires a lot of thought, how often do you avoid or delay getting started?"). The first six items of the ASRS can be used as a screening tool, due to their validated and highly predictive accuracy (94.3%) for identifying individuals at risk for ADHD. This makes these items an effective tool for preliminary assessment [58]. The goal of the ASRS v1.1 is to reliably identify adults who may warrant further assessment for ADHD. Importantly, the scale is not diagnostic but serves as an initial screening tool. While the original dichotomous scoring method (assigning 1 point for exceeding the threshold) has been replaced with a more nuanced 0–24 scale, research indicates this revised system is more robust for studying ADHD symptoms and related factors than the 0–6 system [59]. The 0–24 scale categorizes scores into four distinct risk levels: 0–9 (low-negative), 10–13 (high-negative), 14–17 (low-positive), and 18–24 (high-positive). Higher ASRS scores indicate an increased likelihood of clinically significant levels of self-reported ADHD symptoms [60]. The six-question World Health Organization Adult ADHD Self-Report Scale (ASRS) Screener was validated in a sample of subscribers to a large health plan in the US. Its internal consistency (reliability) ranged from 0.63 to 0.72, and its test–retest reliability (Pearson correlations) ranged from 0.58 to 0.77. The ASRS Screener proved strong concordance with clinical diagnoses, with an area under the receiver operating characteristic curve (AUC) of 0.90. The brevity and ability to discriminate at-risk cases from non-cases make this screener attractive for research and clinical outreach [59]. The ASRS Screener demonstrates strong reliability and validity, as well as partial invariance across 42 countries and various languages, cultures, and genders [61]. In their study focusing on college students, Fuller-Killgore and colleagues [62] found an internal consistency of 0.66 for the six-item ASRS screening tool. Cronbach's α was 0.63 in the current study, aligning with these established metrics.

2.3.2. Depression

The Hungarian-adapted and validated version of the Beck Depression Inventory Short Form (BDI-H) was used as a screening tool to measure depressive symptoms [63,64]. The BDI-H consists of nine items asking respondents to evaluate their experiences (e.g., "I am too tired to do anything") on a four-point scale, with 1 representing "not typical at all" and 4 representing "entirely typical". A total score was obtained by summing the responses to each item, with a score of 20 or higher indicating a risk of depression. The Beck Depression Inventory is a widely used and well-respected tool for assessing depression. Its reliability and validity have been firmly proven through numerous studies worldwide, making it a valuable resource in both research and clinical practice. In the initial study conducted by Rózsa and colleagues [64], the internal reliability of the scale was α =.83. In line with this, Storch and colleagues [65] found high internal consistency and positive correlations with other self-report measures of depression and anxiety, securing the validity and reliability of the BDI as a measurement tool for depression in college students. The scale yielded a reliability coefficient of 0.83 in the current study.

2.3.3. Self-Efficacy

The General Self-Efficacy Questionnaire (GSE) was used to measure the participants' perceptions of their ability to cope effectively with stressful situations [66]. This questionnaire consists of 10 items (e.g., "I am confident that I could deal efficiently with unexpected events"). Participants were asked to rate the extent to which each statement described them using a four-point Likert scale, with 1 indicating "not at all true" and 4 indicating "exactly true". The total GSE score was obtained by adding the responses to all items. The scores range from 10 to 40, with a higher score indicating a higher level of self-efficacy. The General Self-Efficacy (GSE) questionnaire, originally a 20-item self-assessment scale developed by Jerusalem and Schwarzer (1979), was later refined into the widely used 10-item version (GSE-10). The GSE-10 has demonstrated good psychometric properties and has been translated into numerous languages, facilitating its use in diverse populations, including adults with ADHD [53]. The scale's internal reliability, ranging from 0.76 to 0.90, was reported by the scale authors across samples from 23 different nations. The internal consistency (Cronbach's α) was 0.89 in this study.

2.3.4. Academic Resilience

The Academic Resilience Scale-30 (ARS-30) was used to measure a context-specific construct of academic resilience [30], using student responses to academic adversity as the basis. The scale was translated and back-translated by bilingual translators.

Participants responded to the 30 items using a five-point Likert scale, where 1 represents "likely" and 5 represents "unlikely," after being exposed to a short vignette. The vignette's purpose was to portray a realistic scenario of academic adversity, highlighting notable academic challenges and the associated difficulties and struggles. The ARS-30 questionnaire comprises three factors: perseverance (e.g., "I would keep trying"), reflective and adaptive help-seeking (e.g., "I would seek help from tutors"), and negative affectivity and emotional response (e.g., "I would begin to think my chances of success at university were poor"). The global score for the ARS-30 was determined by adding the responses to all 30 individual items, each receiving equal weight. Total scores ranged between 30 and 150, with a higher score indicating a higher level of academic resilience. The validation study involved a sample of undergraduate students and had an internal consistency: α = 0.90 [27]. Furthermore, the ARS-30 has been validated in multiple languages, further establishing its effectiveness. These findings suggest that the ARS-30 is a reliable and valid instrument for assessing academic resilience in college students, providing a valuable resource for educational and psychological evaluations [67]. In the current study, Cronbach's α was 0.87.

2.3.5. Dropout Intention

The intention to drop out of university was assessed using a Higher Education Retention Questionnaire [68]. The Hungarian questionnaire consists of 17 items and six subscales: support from teachers (e.g., "I felt supported by my teachers"), expectations of own performance (e.g., "I strived to go to my exams as prepared as possible"), transparency of expectations (e.g., "It was clear to me what I had to do to complete my coursework"), social involvement (e.g., "I felt I didn't belong to any social group at university"), intention to drop out (e.g., "I was thinking about suspending my studies"), and academic/study involvement (e.g., "I liked my studies"). Participants were asked to rate their agreement with each statement on a six-point Likert scale, where 1 indicates "almost never" and 6 indicates "almost always". In the present study, only the "intention to drop out" subscale of the Higher Education Retention Questionnaire was applied. In the study conducted to validate the scale among Hungarian higher education students, the internal consistency of the scale was found to be $\alpha = 0.94$ [68]. In the current study, Cronbach's alpha was 0.95 for this subscale.

2.4. Data Analysis Plan

To test our proposed model, we conducted multiple mediator and moderator analyses using Preacher and Hayes' [69] PROCESS macro v3.3 for IBM SPSS. We followed the recommendations of Hayes [70] and selected bias-corrected 95% confidence intervals (CIs). In this case, the indirect effect is significant if the CI does not include 0. All variables were z-standardized before the path analyses. The conditional indirect effects were evaluated at three levels: one standard deviation above the sample mean, one below the sample mean, and the sample mean itself. We employed the open-source statistical software program JASP 0.17.3 [71] to secure comprehensive fit indices. The Tucker–Lewis index (TLI), comparative fit index (CFI), and root mean square error of approximation (RMSEA) were reported as model fit indices. A satisfactory fit is indicated by TLI and CFI values of 0.90 or above, while values exceeding 0.95 denote an excellent fit, as per Hu and Bentler [72] and McDonald and Marsh [73]. For RMSEA, values less than 0.05 suggest a good fit, values ranging between 0.05 and less than 0.08 denote an adequate fit, and those between 0.08 and 0.10 indicate a mediocre fit. RMSEA values greater than 0.10 are unacceptable [74]. To determine the minimum required sample size for this study, we employed G*Power 3.1.9.7 [75] and specified the following parameters: (a) significance level (α, probability of Type I error) at $p < 0.05$; (b) statistical power ($1 - \beta$, probability of avoiding a Type II error) at 0.95; and (c) an effect size of 0.15 (medium). The resulting minimum sample size was calculated to be 119 for the mediation and moderation analyses. The actual sample size used in the study exceeded these minimum requirements.

3. Results

3.1. Correlation Matrix

Prior to the mediation and moderation analyses, we examined the intercorrelations between all the measured variables (see Table 1). The results show that the intention to drop out was positively correlated with ADHD symptoms and depression, and negatively correlated with academic resilience and self-efficacy. In contrast, ADHD scores were negatively correlated with academic resilience and self-efficacy and positively correlated with depression. Academic resilience was positively correlated with self-efficacy and negatively correlated with depression. Self-efficacy was also negatively correlated with depression.

Based on the ASRS screening tool, 32.2% ($n = 127$) of participants scored in the low-negative, 39.2% ($n = 155$) in the high-negative, 19.5% ($n = 77$) in the low-positive, and 9.1% ($n = 36$) in the high-positive categories for ADHD risk. The skewness and kurtosis values of the measured variables were within the range of ± 1.0, indicating that the distribution did not deviate significantly from normality [76]. Furthermore, variance inflation factors (VIFs) ranging from 1.07 to 1.54 and tolerance values between 0.64 and 0.93 indicated

no substantial multicollinearity among the independent variables. The data also met the assumption of independent errors (Durbin–Watson = 1.86). Based on these results, all correlated variables were included in further analyses.

Table 1. Descriptive statistics and Spearman's correlations for study variables for the full sample.

Variable	M	SD	Skewness	Kurtosis	Min.	Max.	1	2	3	4
1. Dropout intention	7.10	4.58	0.98	−0.24	3	18	–			
2. ADHD symptoms	11.58	4.15	0.44	0.17	2	24	0.31 ***	–		
3. Academic resilience	98.51	10.92	−0.14	−0.11	67	126	−0.40 ***	−0.33 ***	–	
4. Self-efficacy	30.41	5.55	−0.35	0.16	12	40	−0.20 ***	−0.23 ***	0.50 ***	–
5. Depression	16.24	5.44	0.63	−0.06	9	33	0.39 ***	0.40 ***	−0.51 ***	−0.44 ***

Note. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

3.2. Mediation and Moderation Analyses

The tested model assessed the indirect effect of ADHD symptom scores on university dropout rates, considering the mediating roles of academic resilience and depression. Furthermore, the model explored the direct effect of ADHD symptoms on dropout intention and whether it was mediated or moderated by self-efficacy.

As shown in Figure 1, the analyses indicated a significant negative relationship between ADHD symptoms and academic resilience, as indicated by a beta coefficient of −0.34 ($p < 0.001$). Furthermore, a positive association was observed between ADHD symptoms and depression, with a beta coefficient of 0.27 ($p < 0.001$). These findings suggest that an increase in ADHD symptoms corresponds to a decline in academic resilience and an increase in depression.

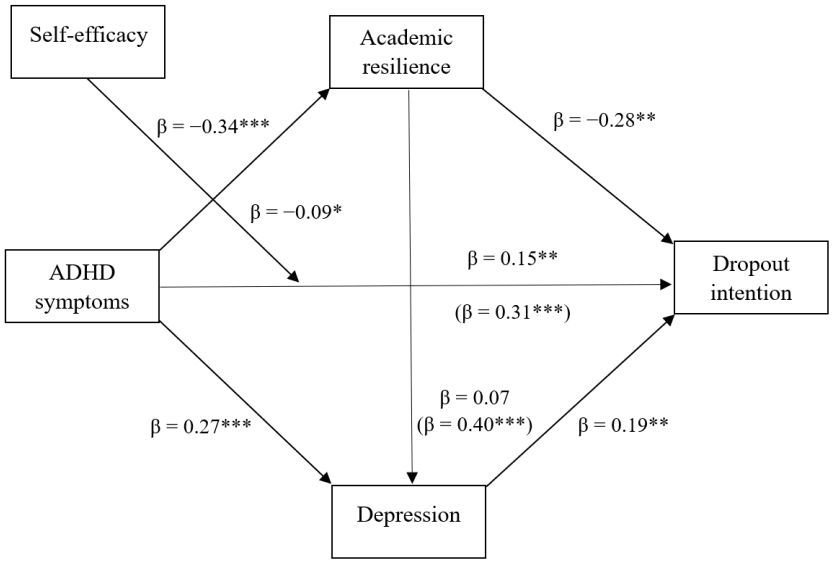

Figure 1. Mediation model with dropout intention as the outcome variable. ADHD symptoms as a predictor, and academic resilience and depression as mediators, with the moderation of self-efficacy. Additional analysis with depression as the outcome variable, ADHD symptoms as the predictor, and academic resilience as the mediator. Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

When considering dropout intention as the outcome variable, there was a negative association between academic resilience and dropout intention (β = −0.28, $p < 0.001$). Conversely, depression (β = 0.19, $p < 0.001$) and ADHD symptoms (β = 0.31, $p < 0.001$) were positively associated with dropout intention. This suggests that enhancements in academic resilience are linked to increased persistence, whereas the presence of depression and ADHD symptoms heightens dropout intention.

The direct relationship between academic resilience and depression appeared positive, as evidenced by the beta coefficient of 0.40 ($p < 0.001$). However, when we factored in the interaction between academic resilience and ADHD symptoms, with depression as the dependent variable, the effect did not reach statistical significance ($\beta = 0.07$, $p = 0.062$).

Interestingly, self-efficacy did not appear to directly impact the relationship between ADHD symptoms and dropout intention, as indicated by the non-significant coefficient of 0.04 ($p = 0.516$; 95% CI = −0.071; 0.142). Therefore, it failed to meet the criteria of a mediator set forth by Baron and Kenny [56]. However, it played a pivotal role as a moderator between ADHD symptoms and dropout intention, with a significant interaction effect of −0.09 ($p < 0.05$). These findings indicate that the effect of ADHD symptoms on dropout intention depends on self-efficacy. At the low (−1 SD) and mean levels of self-efficacy, the conditional effects of ADHD symptoms on dropout intention were significant, with coefficients of 0.23 (95% CI = 0.105; 0.360) and 0.14 (95% CI = 0.051; 0.240), respectively (both $p < 0.001$). Based on 5000 bootstrap samples, the 95% bias-corrected CI consistently excluded zero; however, this effect diminished (95% CI = −0.064; 0.182) and became non-significant at high levels (+1 SD) (coefficient = 0.06, $p = 0.335$). The data underscored that the impact of ADHD symptoms on dropout intention was more potent at lower mean levels of self-efficacy. After controlling for the measured variables, ADHD symptoms continued to demonstrate a significant effect of 0.15 ($p < 0.001$) on dropout intention. The final model showed an adequate fit (CFI = 0.98, TLI = 0.95, RMSEA = 0.06). The model explained 23% of the variance in the intention to drop out (R2 = 0.23, F = 23.81, $p < 0.001$). As presented in Table 2, the total and indirect paths were significant (except for self-efficacy as a mediator), as the 95% bias-corrected CIs did not include zero in each case.

Table 2. Point estimates and 95% CIs for the indirect effect of ADHD symptoms on dropout intention through depression and academic resilience.

Mediator	Point Estimate	SE	Lower BC 95% CI	Upper BC 95% CI
Total indirect effects	0.174	0.033	0.113	0.242
Depression	0.079	0.027	0.028	0.134
Academic resilience	0.095	0.023	0.053	0.143
Self-efficacy	0.092	0.013	−0.035	0.020

Note: BC = bias corrected; CI = confidence intervals; 5000 bootstrap samples.

4. Discussion

This study aimed to test a path model designed to explain the relationship between ADHD symptoms and dropout intention, with a focus on evaluating the potential mediating effects of academic resilience and depression as well as the mediating or moderating effect of self-efficacy. The results indicate that depression and academic resilience mediate the link between ADHD symptoms and dropout intention, whereas self-efficacy moderates this association. The following sections discuss the main findings and their implications for future research.

4.1. Mediation and Moderation Findings between ADHD Symptoms and Dropout Intention

Academic resilience and depression partially mediated the relationship between ADHD symptoms and dropout intentions, whereas self-efficacy moderated this link. These results suggest that psychological and mental health factors may play a role in the relationship between ADHD symptoms and dropout intention, beyond the commonly studied executive functioning deficits (e.g., skills related to organization, assignment tracking, and completion). In a previous study, depressive symptomatology was found to be a negative predictor of persistence intention and was associated with an increased likelihood of dropping out of college [24]. Given that students with ADHD are particularly affected [26], it is plausible that depressive symptoms may partially explain the relationship between ADHD symptoms and dropout intention.

The results of the current study, along with the theoretical considerations, suggest that academic resilience may function as a mediator between ADHD symptoms and the intention to drop out. Martin and Burns [37] proposed the maladaptive Adaptability–Buoyancy–Resilience theoretical cycle to explain how academic resilience may play a role in educational setbacks in the lives of students with ADHD. Students with ADHD often experience difficulties in regulating their behavior, thoughts, and emotions, which can impede their ability to keep up with or adapt to the unpredictable and varied demands of a typical academic day. The inability to adapt to changing and unpredictable school-day events can result in low-level academic risks, such as difficulties in meeting deadlines, strained relationships with professors, and early indications of poor academic performance. These struggles reflect poor academic buoyancy, or the ability to recover and bounce back from academic setbacks and challenges. Persistent difficulties managing low-level academic risks may result in chronic non-completion of work, maladaptive relationships with teachers, and sustained underachievement. As academic underachievement persists, students with ADHD may become increasingly disconnected from academic processes and important behavioral, cognitive, and emotional regulation skills. A lower regulatory capacity can further diminish students' ability to adapt to the unpredictable nature of a typical day at university, which can perpetuate a cycle of maladaptive adaptability, buoyancy, and resilience [37]. Although previous research suggested that resilience could act as a protective factor against depression [38], it did not control for ADHD symptoms. However, our study did not find any significant relationship. Despite the lack of significant mediating effects, the findings provide valuable insight into how academic resilience and ADHD symptoms may independently influence depression. These results suggest that both academic resilience and ADHD symptoms are important factors for understanding depression among college students. Strengthening academic resilience could potentially contribute to a lower risk of depression, regardless of the presence of ADHD symptoms, highlighting the importance of promoting resilience in this population. However, addressing ADHD symptoms may also be critical in reducing the risk of depression, even for students with higher levels of academic resilience.

Self-efficacy moderated the link between ADHD symptoms and dropout intention. The absence of a significant direct effect implies that self-efficacy alone does not reliably predict a student's intention to drop out. This finding is consistent with the conclusions of Mascia and colleagues [48] and supports the moderating function of self-efficacy proposed by Samuel and Burger [50]. The significant interaction between ADHD symptoms and self-efficacy suggests that the relationship between ADHD symptoms and dropout intention depends on self-efficacy. Higher self-efficacy levels tended to weaken the association between ADHD symptoms and dropout intentions, while low self-efficacy levels strengthened this relationship. In other words, when individuals with ADHD have higher confidence in their ability to overcome challenges and succeed, the likelihood of dropout intention is reduced. In contrast, when self-efficacy is low, the link between ADHD symptoms and dropout intention becomes more pronounced. The results build on those of Newark and colleagues [51]. Oliveira and colleagues [17] suggested that ADHD symptoms can lead to poor college adjustment, which, in turn, may result in lower self-efficacy. While they specifically focused on work self-efficacy, the results suggest that this effect also extends to general self-efficacy. Our findings align with this perspective, as self-efficacy serves as a moderator rather than a mediator in the relationship between ADHD symptoms and dropout intention. A possible explanation for how students with ADHD symptoms develop reduced confidence in their academic and career decision-making ability, leading to dropout intention, could be this potential mechanism.

It appears that dropout intention stems from the complex interaction of multiple factors, rather than a straightforward linear relationship. Gaining a comprehensive understanding of the connections between these variables is essential for developing effective interventions for students with ADHD, both before and during college [17,77].

4.2. Strengths and Limitations

This study has several strengths, including its investigation of the role of multiple factors (ADHD symptoms, mental health problems, and psychological resources) in university dropout intention. It is unique in focusing on protective factors for university dropout in addition to risk factors. Furthermore, our investigation of these associations in Hungary is novel. However, the study has some limitations. First, although the recruitment materials did not explicitly mention the study's purpose, we took steps to distribute the questionnaire to groups commonly accessed by students with an interest in ADHD and psychology. Despite this, the approach poses a limitation as it may have resulted in a relatively higher proportion of students with high levels of ADHD symptoms in our sample. This can also be explained by the 2–3-year-long waiting lists for ADHD screening in Hungarian hospitals, resulting in a higher prevalence of undiagnosed students [7]. It is important to acknowledge the lack of data on participants' academic majors, current semesters, and the proportion of female participants in our study. The latter could be attributed to the tendency of female individuals to be more likely to participate in surveys than male individuals [78].

Second, the data were based on self-reports, and although the ADHD scale we used was validated for screening purposes [59,79], it cannot replace clinical diagnoses. The ASRS only aims to identify individuals who may exhibit ADHD symptomatology and, therefore, require a full diagnostic workup. The scale, however, should not be misconstrued as a diagnostic instrument; its primary purpose is to prepare further clinical inquiry. The same issue is relevant for the assessment of depression. Moreover, despite its use in college settings, the ASRS was not specifically developed for this population [4]. The reliability of the ADHD symptom measure was low, which should be considered when interpreting our results. However, we concur that the issue extends beyond the psychometric properties of the instrument. Our results and the research landscape [80] underscore the need for further refinement in ADHD assessment, particularly within college populations. Hartung and colleagues [81] observed that a lower symptom threshold of 4, rather than the DSM-5's 5, proved more effective in predicting impairment in college students. Similarly, Matte and colleagues [82] suggested distinct symptom thresholds for inattention and hyperactivity–impulsivity in adults. Flory and colleagues [83] provided evidence that a unidimensional model of ADHD might be most suitable for college students, challenging the separation of symptom clusters. However, some authors have suggested entirely new ADHD symptoms for adults (e.g., changing plans at the last minute, procrastination, low follow-through on commitments, emotional dysregulation, and fluctuating quality of work) [80]. Collectively, these findings imply that current diagnostic criteria may not be optimally calibrated for adult and college student populations, warranting further exploration of alternative symptom thresholds and models to refine screening accuracy and ensure appropriate interventions.

A further important limitation of our study is that we did not assess medication usage for depression in our sample. However, in our study, 28.6% of the sample met the criteria for ADHD risk (low- and high-positive), aligning with Farcas and colleagues [79] who found a similar result in Hungary using the 6-item ASRS-v1.1 screening test. Their study reported an unweighted prevalence of ADHD symptoms of 37.3%, corresponding to individuals classified as having a high likelihood of ADHD based on the screening. Likewise, in our sample, 31.13% were at risk of depression based on the BDI scale, in line with previous Hungary-wide research [84], which identified approximately 40% of students with an elevated risk of depression. Given the retrospective nature of the data, self-reported symptom intensity may be subject to recall bias, potentially leading to either an underestimation or overestimation of the actually lived experiences. To establish the replicability of these findings, further studies integrating behavioral measures are necessary.

Despite the theoretical framework not directly pointing toward it, examining the role of academic self-efficacy could be valuable in the context of students with ADHD symptoms and dropout intention. We chose not to pursue this direction due to the theoretical

underpinnings, concerns about the replicability of results, and the lack of a validated academic self-efficacy questionnaire in Hungarian.

Our study contributes to the understanding of the correlates associated with ADHD symptoms without pathologizing them, which is particularly relevant given their prevalence among university students. The self-report tools used in our study are widely known and frequently used in research. This makes it easy to access and replicate the study using different samples in different countries. Future research should consider adopting longitudinal designs to explore the role of self-efficacy as a moderator in greater depth and to uncover potential protective factors for students with ADHD symptoms. Assessing these factors before students enter tertiary education, throughout their academic journey, and as they transition into adulthood and the workforce would be particularly valuable. Additionally, it would be intriguing to examine whether this moderating mechanism influences other dropout-related behaviors, such as disengagement from academic support services, patterns of class attendance and participation, struggles with procrastination and time management, difficulties in social integration, persistence in challenging courses, and engagement in extracurricular activities. Finally, owing to the limited sample size, the results cannot be generalized to other populations.

5. Conclusions and Implications

This study contributes to the expanding body of research on how ADHD symptoms are related to dropout intention through psychological mediators and moderators. Our findings highlight the unique contributions of academic resilience and general self-efficacy in reducing the risk of college dropout among students with ADHD symptoms, shedding new light on these important protective factors. Our results have significant implications for the treatment of adult ADHD symptoms, indicating that therapy and intervention programs should incorporate resource-oriented modules to enhance a multifaceted strength-based approach toward this population.

Bartimote-Aufflick and colleagues [85] suggested that certain teaching strategies can enhance students' self-efficacy. Effective strategies include providing opportunities for peer collaboration, addressing misconceptions, using multimedia in the learning process, offering additional resources for challenging concepts, and encouraging students to share their personal experiences. Furthermore, Van Dinther and colleagues [86] highlighted that interventions based on the Social Cognitive Theory are more effective in emphasizing mastery experiences. Practical experiences such as engaging in tasks that apply knowledge and skills to challenging situations are considered to facilitate mastery. Additionally, combining goal setting with self-reflection (i.e., self-regulation components) may influence students' perceptions of progress, leading to a sense of mastery experience [40]. These approaches are particularly important for students with ADHD. Educators and practitioners play a central role in empowering students by cultivating a stronger sense of self-efficacy. Based on the findings of Schmidt-Barad and colleagues [87], the role of teachers and their interactions with students with ADHD can significantly influence their self-efficacy. Positive and negative memories of teachers can profoundly affect students' beliefs about their ability to succeed academically. Moreover, social support, including support provided by teachers and peers, plays a vital role in students' self-efficacy and overall academic experience.

Our results are consistent with those of a previous study [24], which suggested that depression is a significant risk factor for college dropout among students with ADHD symptoms. This emphasizes the importance of addressing depression in this population in order to promote academic resilience and success. The results of this study are highly promising and define the potential effectiveness of psychosocial interventions, such as cognitive-behavioral therapy (CBT) programs [88] and the ACESS program [89]. These interventions aim to enhance adaptive thinking skills through cognitive therapy strategies, targeting the co-occurring depression and anxiety commonly observed in this group [90]. The program addresses them concurrently in an integrated manner, centered on a common

theme, such as academic functioning [91]. Global adoption of the ACESS program and coaching interventions could lead to substantial advantages, particularly in countries such as Hungary, where no such programs are currently available for college students with ADHD symptoms.

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