

The Effects of Adolescent Depression and ADHD on Educational Attainment in Adulthood

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Abstract

Mental disorders, notably early-onset depression and ADHD are of increasing concern for U.S. adolescents. Past research provides inconclusive findings on the effects of adolescent depression and ADHD on educational attainment, and the mechanisms for such effects are unclear. In this paper, I estimate the causal effects of adolescent depression and ADHD on adulthood educational attainment using data from the National Longitudinal Study of Adolescent to Adult Health. To tackle unobservable confounders, measurement errors, and reverse causality, I use polygenetic scores (PGSs), friend suicide attempts, and the interview period as instruments for depression and ADHD. I find that a one standard deviation increase in adolescent ADHD score reduces years of education by **1.5-1.6**, the predicted probability of attaining some post-secondary education by **15.2-16.5 percentage points**, and the predicted probability of achieving a bachelor's degree by **26.5-26.6 percentage points**. Early-onset depression **does not** have significant effects on educational attainment. I further uncover that the adverse effects of ADHD on education arise through mechanisms of **impaired cognitive and non-cognitive skills** using intermediate in-school performance and educational outcomes. Potential interventions to mitigate the negative effects of ADHD could be **school-based interventions** and **parent management training**.

Motivation

- In recent years, the rising incidence of early-onset mental disorders like depression and ADHD has sounded the alarm for the mental health of young people and drawn economists' attention to the topic of mental health disorders.
- The period of adolescence is pivotal to educational development, where individuals begin to take ownership of responsibility for their coursework and long-term goals.
- Adolescent mental disorders not only jeopardize immediate school performance but also undermine long-term educational attainment and human capital accumulation.
- Research questions: How do adolescent depression and ADHD affect educational attainment in adulthood and what are the underlying mechanisms?

Data

Source: Wave I, III, IV, and V of the restricted version of the National Longitudinal Study of Adolescent to Adult Health (Add Health)

Sample: Limit the sample to those without missing values in educational attainment, depression score, and ADHD score, and exert mean imputation for missing values of control variables ($N=13,509$)

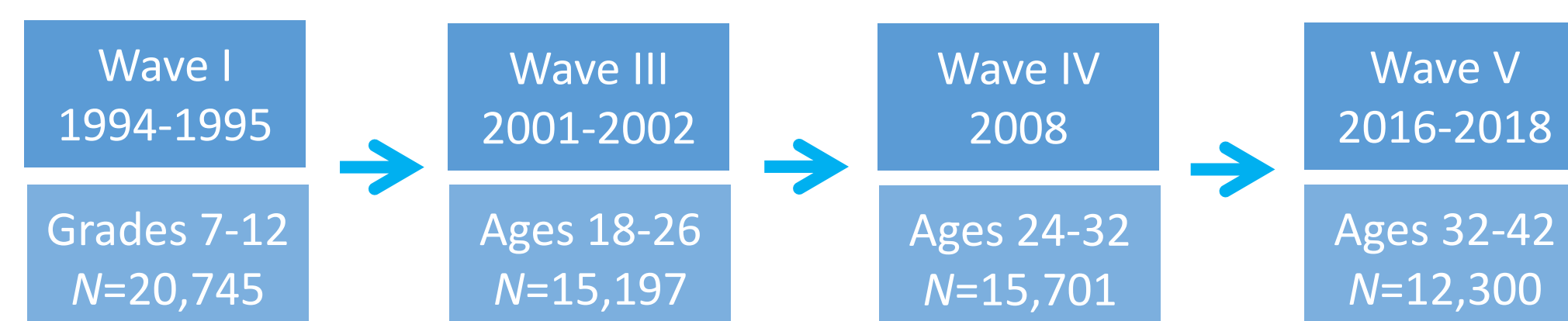
Educational Attainment: Continuous years of schooling and binary indicators of some post-secondary education and receiving a bachelor's degree converted from the highest degree achieved in Wave IV and V

Intermediate Learning Outcomes: Continuous average GPA and times of non-excused absences and binary indicators of grade repetition, receiving out-of-school suspensions, having trouble getting along with teachers, and having trouble getting along with other students measured in Wave I

Mental Illnesses: Depressive symptom scores at Wave I during grades 7-12 and retrospective ADHD scores of symptoms at ages 5-12 collected at Wave III (both standardized continuous scales and binary versions showing moderate to severe depression symptoms and marginally symptomatic ADHD symptoms)

Control Variables: Age at which educational attainment is measured, gender, race/ethnicity, educational levels of parents, socioeconomic status, family structure, the proportion of female students in the same grade, and the proportion of ethnic minority students in the same grade.

Instrumental Variables (IVs): First set: depression polygenetic score (PGS), ADHD PGS, and friend suicide attempts; second set: depression PGS, ADHD PGS, and interview period



Empirical Model

Effects of early-onset mental illnesses on later educational attainment:

$$E_{i,t} = \beta_0 + \beta_M M_{i,t-n} + \beta_I I_{i,t-n} + \beta_F F_{i,t-n} + \beta_P P_{i,t-n} + \mu_{S(i)} + \epsilon_{i,t}$$

First-stage regression of the IV model:

$$M_{i,t-n} = \alpha_0 + \alpha_Z Z_{i,t-n} + \alpha_I I_{i,t-n} + \alpha_F F_{i,t-n} + \alpha_P P_{i,t-n} + \theta_{S(i)} + \epsilon_{i,t-n}$$

- $E_{i,t}$: educational attainment of individual i at time t
- $M_{i,t-n}$: mental disorder symptoms of adolescent depression and ADHD of individual i at time $t-n$
- $I_{i,t-n}$: demographic information such as gender, school grade, and race/ethnicity
- $F_{i,t-n}$: family characteristics such as education levels of the father and mother, family structure, and family socioeconomic status
- $P_{i,t-n}$: peer factors such as proportions of female students and ethnic minority students in the same grade
- $Z_{i,t-n}$: sets of instruments
- $\mu_{S(i)}, \theta_{S(i)}$: school-fixed effects

Results

Baseline Results

ADHD has a significant **negative effect** on educational attainment and depression **does not**:

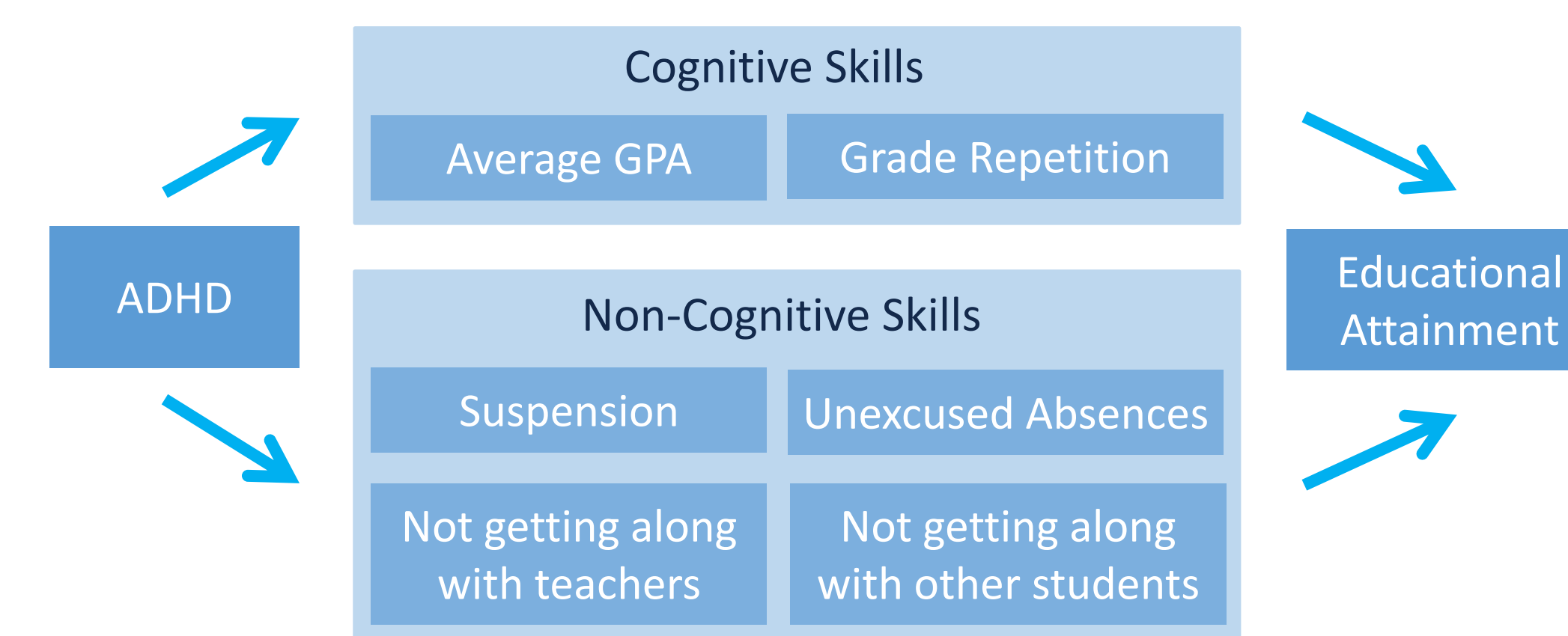
- A one standard deviation increase in ADHD score decreases years of schooling by **1.5** or **1.6**, the predicted probability of attaining some post-secondary education by **15.2** or **16.5 percentage points**, and the predicted probability of receiving a bachelor's degree by **26.6** or **26.5 percentage points**, for two sets of IVs respectively.
- Having marginally symptomatic ADHD (above the 76th percentile threshold) reduces years of education by **2.9** or **2.7**, the predicted probability of attaining some post-secondary education by **32.7** or **34.4 percentage points**, and the predicted probability of achieving a bachelor's degree by **49.8** or **49.6 percentage points**, for two sets of IVs respectively.
- The results are **robust** across models using mean imputation for missing PGS values, adding school-fixed effects and longitudinal weights; the sensitivity analysis confirms the robustness of the findings to a **reasonable violation of the exclusion restriction assumption**.

Heterogeneity

- The same amount of increase in depression score has a more profound adverse effect on education for **females** than for males, controlling for ADHD scores.
- Receiving **psychological counseling** significantly mitigates the negative scholastic effect of depression, but not of ADHD.
- Having a **diagnosis of ADHD** significantly decreases the adverse effect of a one standard deviation increase in ADHD score on years of education by 1.60 compared to not having a diagnosis, but having a diagnosis of depression does not mitigate the adverse effect of depressive symptoms.

Mechanisms

- ADHD decreases educational attainment through impairment in intermediate **cognitive skills** (decreased average GPA and higher probability of repeating grade) and **non-cognitive skills of self-regulation** (increased probability of receiving out-of-school suspension and more frequent non-excused absence) and **socialization** (higher tendency to have trouble getting along with teachers and other students).
- Depression only decreases educational attainment through lower average GPA and poorer socialization with teachers and other students.



Implications

- Educators and policymakers should monitor and address mental health issues and academic challenges in disadvantaged students, focusing on early intervention for **adolescent girls with depression** to safeguard their educational outcomes, given its prevalence and significant impact among girls.
- Psychologists and policymakers may fill the gaps in **depression-specific accommodations** in the school setting to alleviate learning problems for those affected.
- Initial screening for ADHD** could be conducted in schools since the teachers are likely to be the first to detect learning problems of ADHD demonstrated as frequently disrupting the classroom.
- Clinicians should work collaboratively with schools and parents in diagnosing and treating ADHD, such as providing **school-based interventions** and **parent management training**.

References

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