

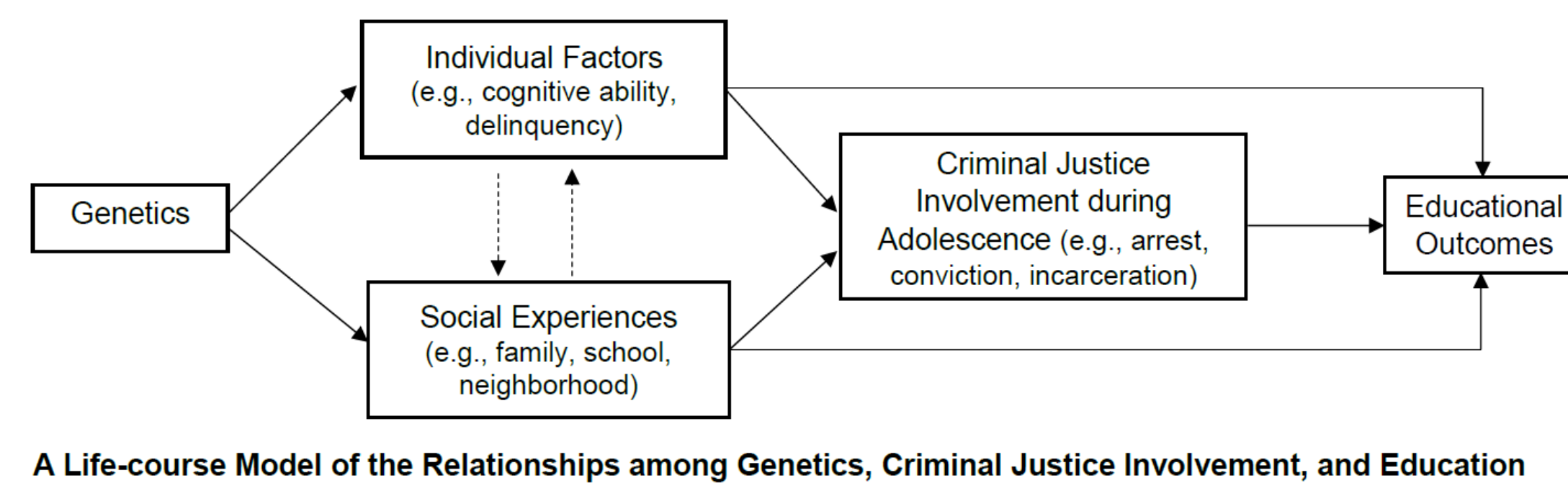
Educational Consequences of Early Crime and Punishment: Testing A Genetically Informed Life-course Model Using the Add Health Data

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Introduction

Recent research has shown that polygenic scores conducted based on genetic variants associated with educational attainment significantly predicts criminal behavior (Wertz *et al.* 2018). Accordingly, we expect that the education polygenic score (PGS) is associated with risk of involvement with the criminal justice system (e.g., arrest, incarceration, conviction, etc.). We test this hypothesis using the most recent polygenic scores on educational attainment (Lee *et al.* 2018). Further, we assess the extent to which the genetic association with educational attainment is negatively mediated by early involvement with the criminal justice system. Findings in this study also provide important insights to address genetic confounding in social science research.



A Life-course Model of the Relationships among Genetics, Criminal Justice Involvement, and Education

Data and Measures

Data

Data for this study are drawn from the National Longitudinal Study of Adolescent to Adult Health (Add Health). Add Health is a longitudinal study of a nationally representative sample of adolescents in grades 7-12 in the United States during the 1994-95 school year. Participants have been interviewed across four waves (Wave I: 1994-1995; Wave II: 1996; Wave III: 2001-2002; Wave IV: 2008).

Measures

Educational attainment: years of education completed at Wave IV.

Any adolescent criminal justice involvement: participants who reported that they have been arrested or convicted or incarcerated and whose first criminal justice involvement occurred by age 18 were coded as 1, and 0 otherwise.

Education PGS: computed using summary statistics from recent GWAS on educational attainment (Lee *et al.* 2018).

Findings

	Male	Female	Male	Female
Education PGS	-.229**	-.288*	-.106	-.221
Individual Factors				
Age			-.284***	-.344***
PVT Score			-.007	.004
Delinquency			.088***	.149***
Family Factors				
Parental Education			-.004	-.081
Parental Attachment			-.025	.022
Parental Supervision			-.07	-.099
School Experiences				
School Attachment			-.041	-.017
Repeated Grade			.210	-.844†
Received Suspension			.990***	1.089***
Neighborhood Characteristics				
Education			-.214	.998
Unemployment			-1.187	-.102
Single Parent Household			.201	.334
Log Likelihood	-674.333	-303.929	-612.838	-281.116
N	1,697	2,094	1,697	2,094

- Add Health participants with higher education PGS are significantly less likely to report criminal justice involvement during their adolescence.
- The genetic association with the risk of criminal justice involvement is attributable to a range of individual and social factors, particularly experiences at school.

	Male	Female	Male	Female	Male	Female
Education PGS	.716***	.710***			.695***	.700***
Any Adolescent CJ Involvement			-.946***	-1.377***	-.785***	-1.179***
Adjusted R ²	.138	.139	.030	.018	.156	.151
N	1,697	2,094	1,697	2,094	1,697	2,094

- Adolescent criminal justice involvement mediates the association between the education PGS and participants' educational attainment.
- Around 1/6 of the association between any adolescent criminal justice involvement and educational attainment is explained away by the education PGS.

References

Lee, James J., Robbee Wedow, and Aysu Okbay *et al.* 2018. "Gene Discovery and Polygenic Prediction from a Genome-Wide Association Study of Educational Attainment in 1.1 Million Individuals." *Nature Genetics* 50(8):1112-1121.

Wertz, Jasmin, Avshalom Caspi, and Daniel W. Belsky *et al.* 2018. "Genetics and Crime: Integrating New Genomic Discoveries into Psychological Research About Antisocial Behavior." *Psychological Science* 29(5):791-803.

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Research Hypotheses

- **Hypothesis 1:** Genetic risk of lower education predicts higher risk of criminal justice involvement during adolescence.
- **Hypothesis 2:** The genetic association with the risk of adolescent criminal justice involvement can be attributed to individual and social factors in early life.
- **Hypothesis 3:** Adolescent criminal justice involvement mediates the genetic association with educational outcomes in adulthood.