Incarceration Risk, Genetic Inheritance, And Depression Over The Life-Course

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Introduction

Incarceration has been implicated as a contributor to depression later in adulthood. However, depression is also a risk factor for incarceration itself—suggesting the presence of selection effects. To disentangle the depression-incarceration relationship, two questions must be addressed: 1) to what extent do early depression/genetic depression risk contribute to later incarceration (i.e., through genetic confounding) and 2) to what extent does incarceration mediate the relationship between early depression/genetic depression risk and later depression. To investigate these questions, we develop a life-course model of depression and incarceration and test the model using socio-genomic data and methods.

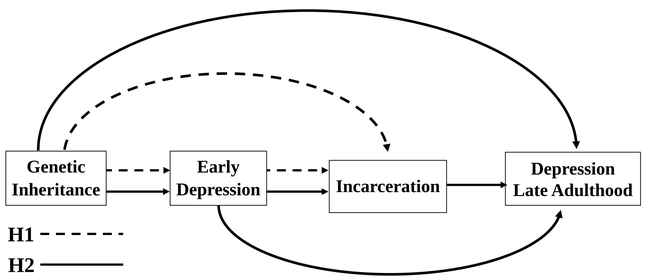

Figure 1. Life-course model of depression and incarceration.

Hypotheses

Drawing on our proposed life-course model, we test the following hypotheses:

H1: *Depression early in life as well as polygenic depression risk both predict incarceration risk.*

H2: *Incarceration will mediate early risk factors for depression and depression later in adulthood.*

Data and Measures

Data

Health and Retirement Study (HRS). Of the collected samples, around 16,000 were put into genotyping production with coverage of approximately 2.5 million single nucleotide polymorphisms (SNPs), and 15,708 passed standardized quality control processes. To minimize confounding effects of population stratification, this study focuses on non-Hispanic whites.

Measures

Adult depression: Summative index of the 8-item Center for Epidemiological Studies Depression Scale (CESD).

Lifetime incarceration: Participants were asked "Have you ever been an inmate in a jail, prison, juvenile detention center, or other correctional facility?" (0=no, 1=yes).

Early depression: Participants were asked "Before you were 16 years old, did you have depression?" (0=no, 1=yes).

PGS for depression: Computed using summary statistics from recent GWAS on depression (Okbay et al., 2016) using the formula $PGS_i = \Sigma_{j=1}^{J} \beta_j G_{ij}$, where PGS_i represents the PGS for individual i, $ß_j$ is the beta coefficient for SNP j as estimated by GWAS analysis, and G_{ij} is the number of "risk" alleles on SNP j that individual i possesses.

Results

Incarceration	Male	Female
	b (SE)	*b (SE)*
Early Depression	**0.789 (0.434)***	**1.038 (0.145)****
Depression PGS	**0.204 (0.081)****	-0.013 (0.145)
n	1,513	2,281

*p<.1, **p<.05, ***p<.01

Respondents who reported early depression had statistically significant higher odds of later incarceration. Additionally, male respondents who scored higher on the PGS for depression had statistically significant higher odds of experiencing incarceration at some point in their lifetime. These findings support H1 and suggest the presence of selection effects for males and females into the incarceration experience. For the males in the sample, the presence of genetic confounding is also supported.

Adult Depression	Male	Female
	b (SE)	*b (SE)*
Incarcerated	**0.283 (0.135)****	**0.902 (0.277)*****
Early Depression	**1.557 (0.290)*****	**1.768 (0.225)*****
Depression PGS	**0.101 (0.041)****	**0.093 (0.040)****
n	1,513	2,281

*p<.1, **p<.05, ***p<.01

In support of H2, incarceration significantly mediated the relationship between the depression PGS and depression in late adulthood (Sobel test p < .05). The addition of early depression and polygenic depression risk to the model reduced the relationship between incarceration and late adulthood depression by 15% for both males and females. Interestingly, the effect size for the incarceration-depression relationship was much larger for females, even after including all covariates.

Conclusions

- We find support for a life-course model of depression and incarceration integrating multiple criminological theories (e.g., strain theory, labelling theory, etc.).
- Specifically, we find evidence that early depression and polygenic depression risk both contribute to selection into the incarceration experience.
- We also show that early depression and genetic factors have a significant impact on estimating the influence of incarceration on later depression outcomes.
- Additionally, we find evidence of marked sex differences in the analysis:
  - Polygenic depression risk predicted later incarceration for males but not females. This finding supports previous literature suggesting that strategies for coping with depressive symptoms differ by gender, with males employing more criminogenic strategies.
  - Incarceration was a statistically significant predictor of later adult depression for the whole sample: however, females experienced a much larger effect compared to males.

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