



HERITABLE ENVIRONMENTS

Methodological Considerations for Gene-Environment Models

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ORIGINAL PAPER

Title: Gene-environment correlations in parental emotional warmth and intolerance:
Genome-wide analysis over two generations of the Young Finns Study

Socialization, Selection, or Both? The Role of Gene-Environment Interplay in the Association Between Exposure to Antisocial Peers and Delinquency

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Gene-environment correlations: a review of the evidence and implications for prevention of mental illness

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Abstract

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RUNNING TITLE: BMI polygenic score, early

Growing evidence that environments are heritable (rGE)

rGE can arise by both causal and non-causal mechanisms

Three causal mechanisms: passive, evocative, active

A Polygenic Score of Depressive Symptoms

Genes, Childhood Trauma, and Late Life Depressive Symptom

Aniruddha Das, PhD¹

Abstract
Objectives: Findings on gene-environment interactions may reflect genetic liability or the influence of childhood trauma is unclear on adulthood depressive symptoms. **Method:** Data from the Midlife Developmental International (MIDUS) study, a nationally representative sample of 4,100 U.S. adults aged 25–74 years. **Results:** Genetic liability for depression was associated with childhood trauma, and this association was mediated by adulthood depressive symptoms. **Conclusions:** Genetic liability for depression is associated with childhood trauma, and this association is mediated by adulthood depressive symptoms.

Keywords
children-of-twins

Introduction
Understood

Introduction
Gene-environment correlations
The developmental literature often focuses on the effects of the environment. There is a growing body of research on the role of genetics in child development, and these effects have been shown to exist independently of shared genes between parents and children.

Background: Genomic analysis of the child's genome-wide genotype-environment correlation (G-E correlation) model, including the child's genotype-environment correlation (G-E correlation), passive genotype-environment correlation (G-E correlation), evocative genotype-environment correlation (G-E correlation), and active genotype-environment correlation (G-E correlation). **Results:** Results showed that the child's genotype-environment correlation (G-E correlation) was significantly associated with the child's genotype-environment correlation (G-E correlation). **Conclusions:** The child's genotype-environment correlation (G-E correlation) is significantly associated with the child's genotype-environment correlation (G-E correlation).

Genetic and environmental influences on victims, bullies and bully-victims in childhood

Harriet A. Ball,¹ Louise Arseneault,¹ Alan Taylor,¹ Barbara Maughan,¹ Avshalom Caspi,^{1,2} and Terrie E. Moffitt^{1,2}

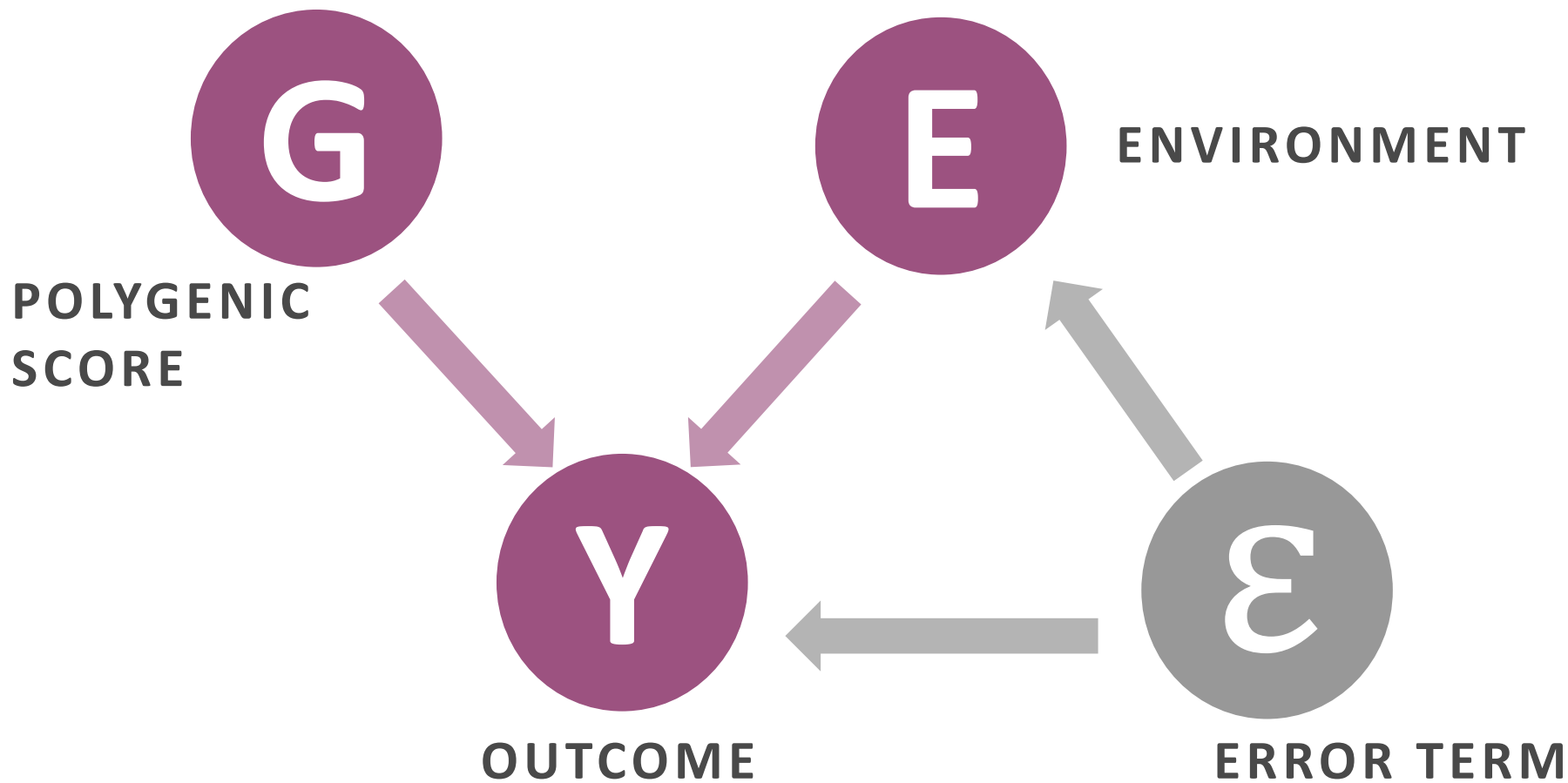
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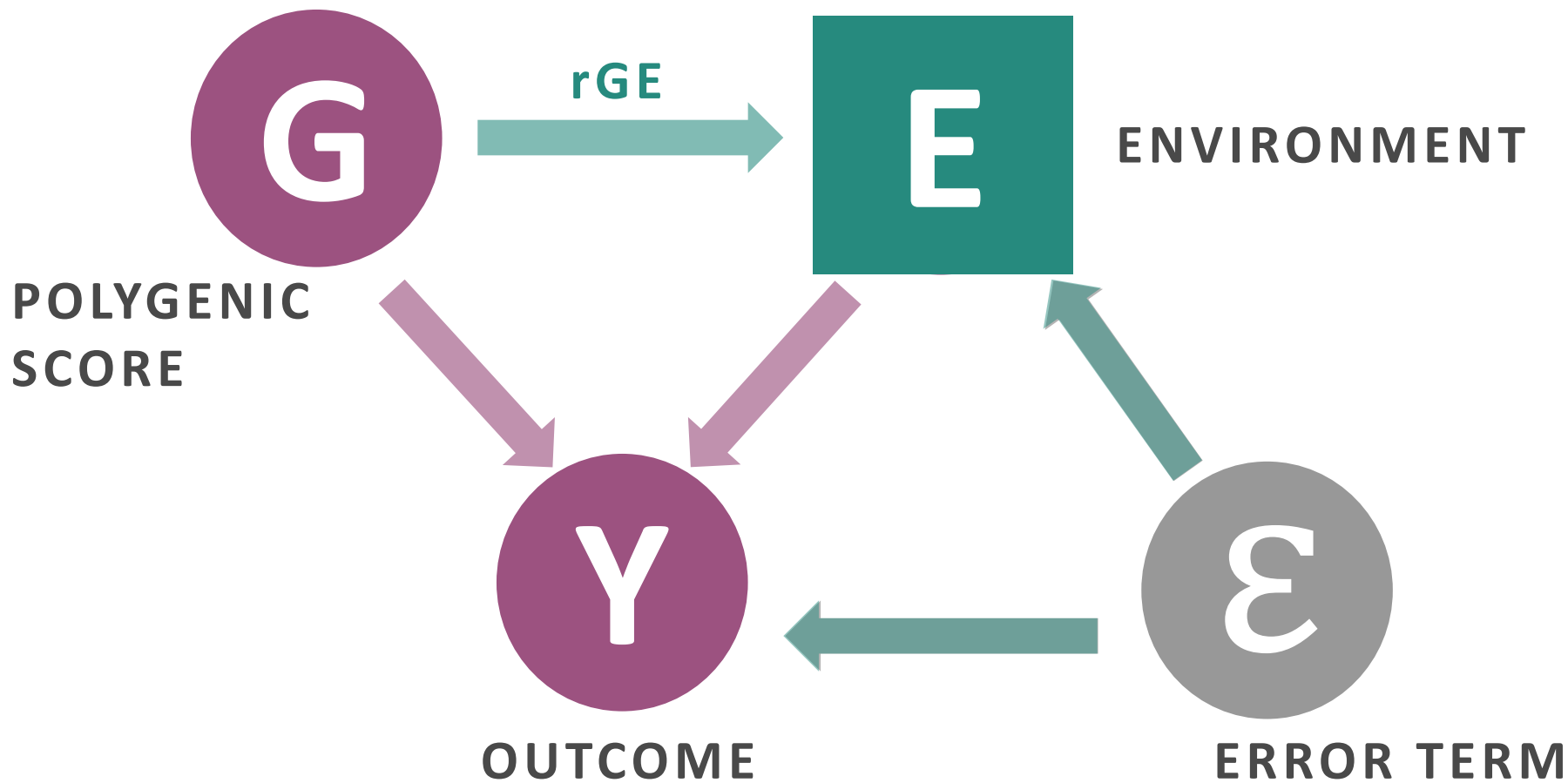
Background: Three groups of children are involved in bullying: victims, bullies and bully-victims who are both bullies and victims of bullying. Understanding the origins of these groups is important since they have elevated emotional and behavioural problems, especially the bully-victims. No research has examined the genetic and environmental influences on these social roles. **Method:** Mother and teacher reports of victimisation and bullying were collected in a nationally representative cohort of 1,116 families with 10-year-old twins. Model-fitting was used to examine the relative influence of genetics and environments on the liability to be a victim, a bully or a bully-victim. **Results:** Twelve percent of children were severely bullied as victims, 13% were frequent bullies, and 2.5% were heavily involved as bully-victims. Genetic factors accounted for 73% of the variation in victimisation and 61% of the variation in bullying.

The boundary between the two groups is important since they have elevated emotional and behavioural problems, especially the bully-victims. No research has examined the genetic and environmental influences on these social roles. **Method:** Mother and teacher reports of victimisation and bullying were collected in a nationally representative cohort of 1,116 families with 10-year-old twins. Model-fitting was used to examine the relative influence of genetics and environments on the liability to be a victim, a bully or a bully-victim. **Results:** Twelve percent of children were severely bullied as victims, 13% were frequent bullies, and 2.5% were heavily involved as bully-victims. Genetic factors accounted for 73% of the variation in victimisation and 61% of the variation in bullying.

enting, recreational drugs, or traumatic life events) might increase the individual risk of psychiatric disorders. Influential papers in the 1970s (Eaves et al. 1977; Plomin et al. 1977) on the phenomenon—gene-environment correlation (rGE)—in different genotypes systematically experience different environments (Figure 1). In many ways, this body of literature is a review of evolutionary genetics literature in that the focus is on the effects of rGE on the development of traits.

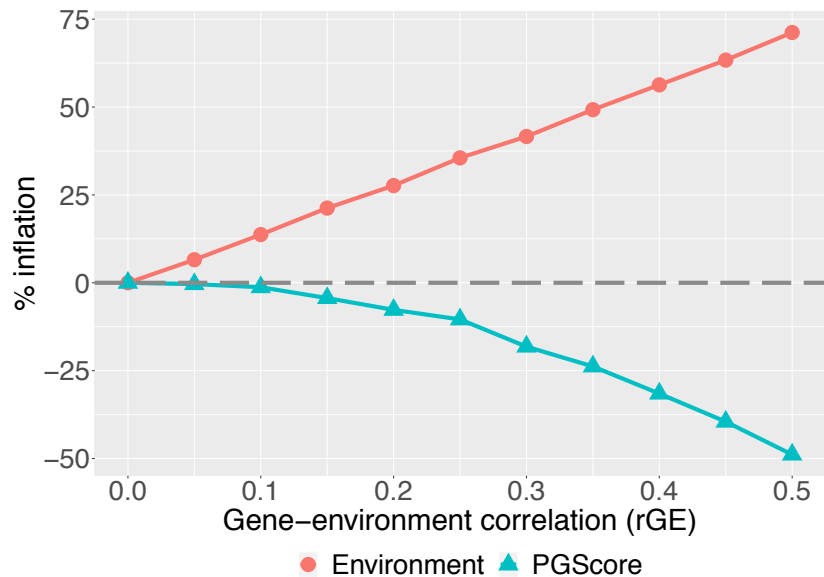
**DOES THIS BIAS OUR
CONVENTIONAL MODELS?**





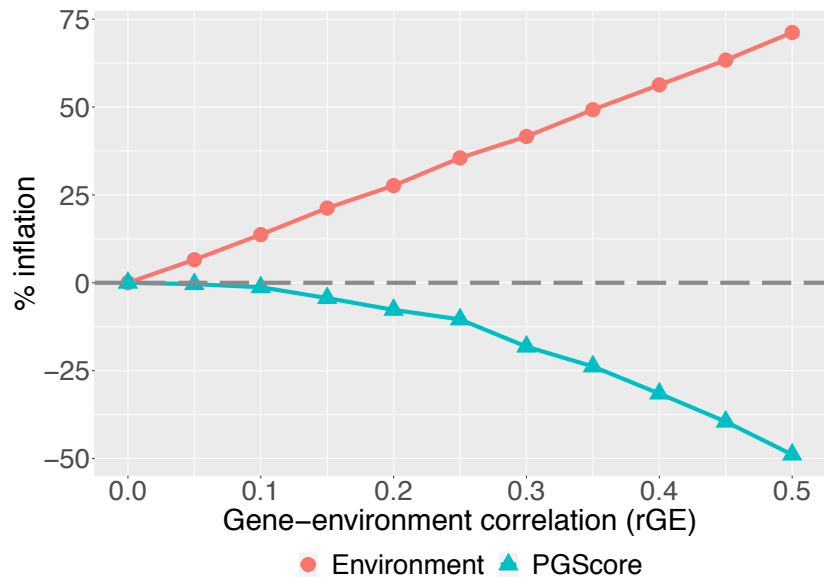
Simulation results

Inflation of estimates

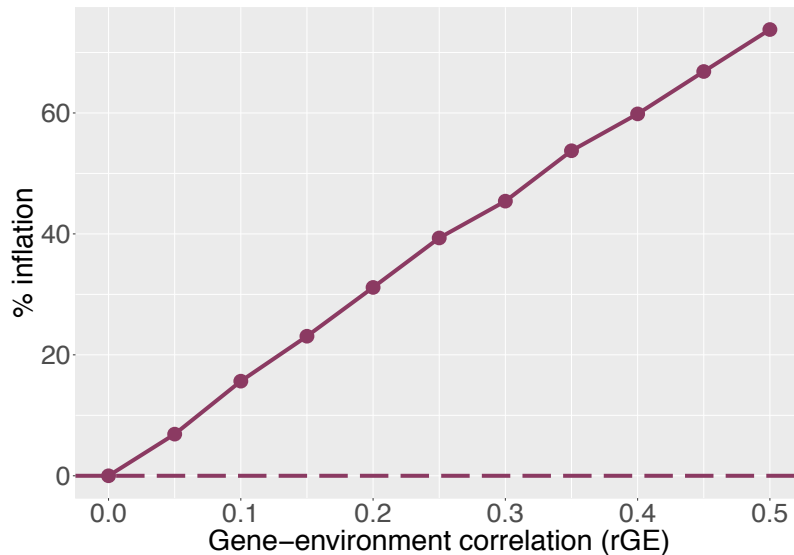


Simulation results

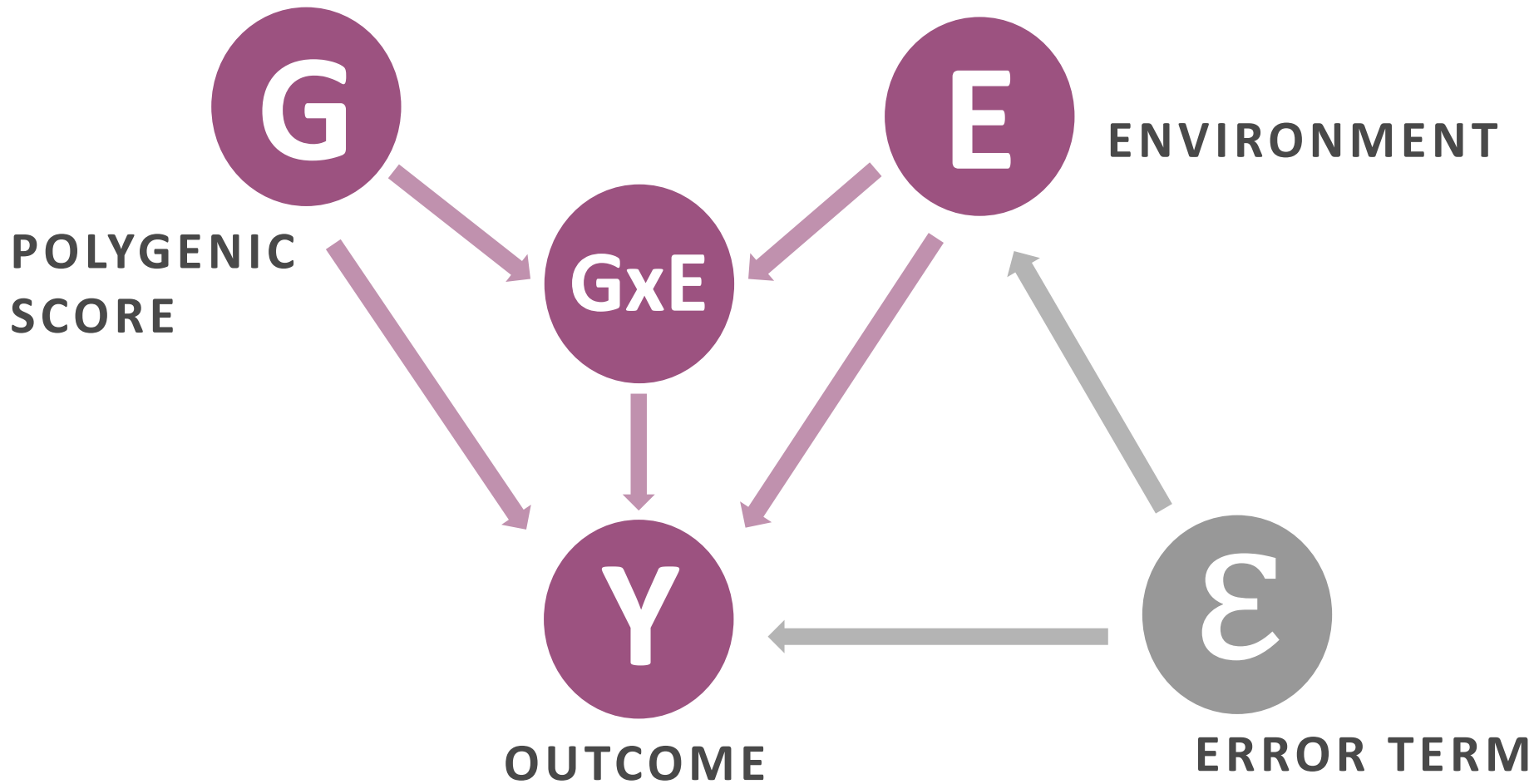
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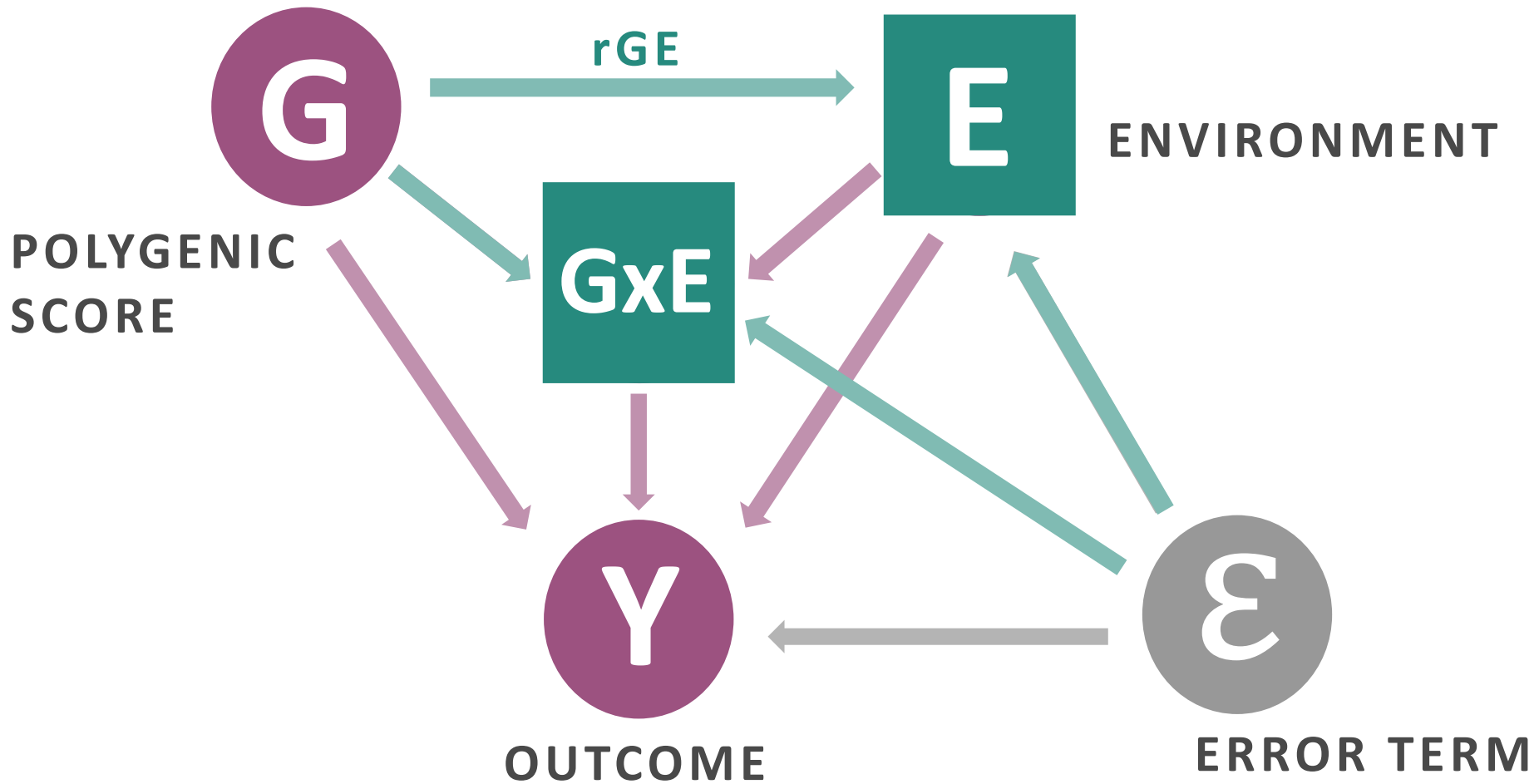


R-square statistics inflation



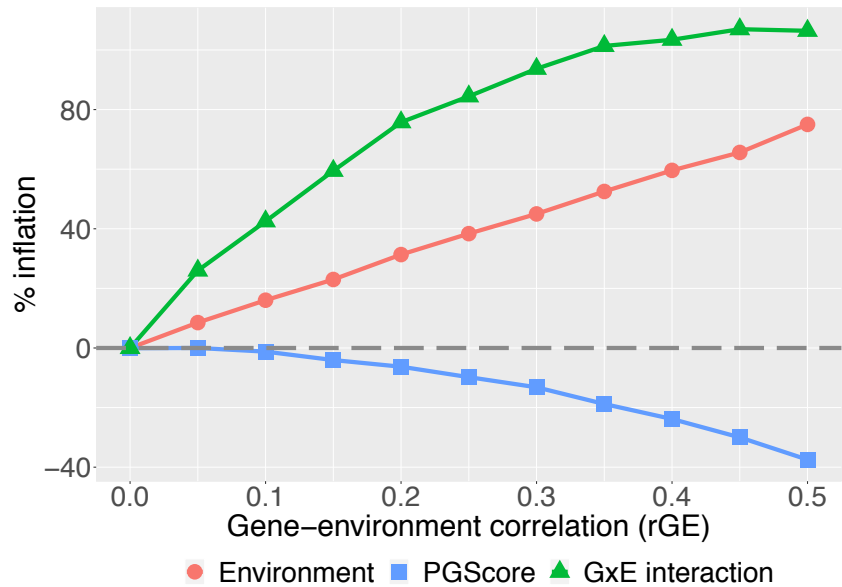
FURTHER BIAS IN GENE- ENVIRONMENT INTERACTION ANALYSIS?





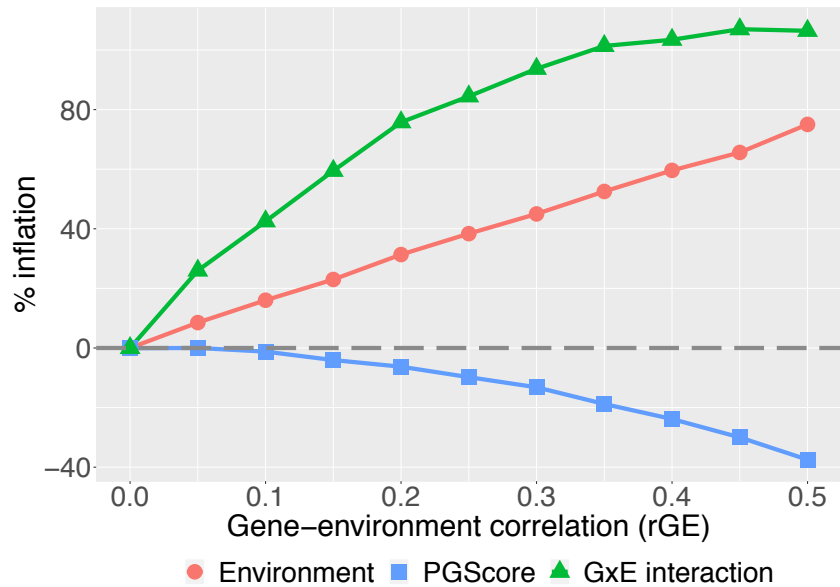
Simulation results

Inflation of estimates

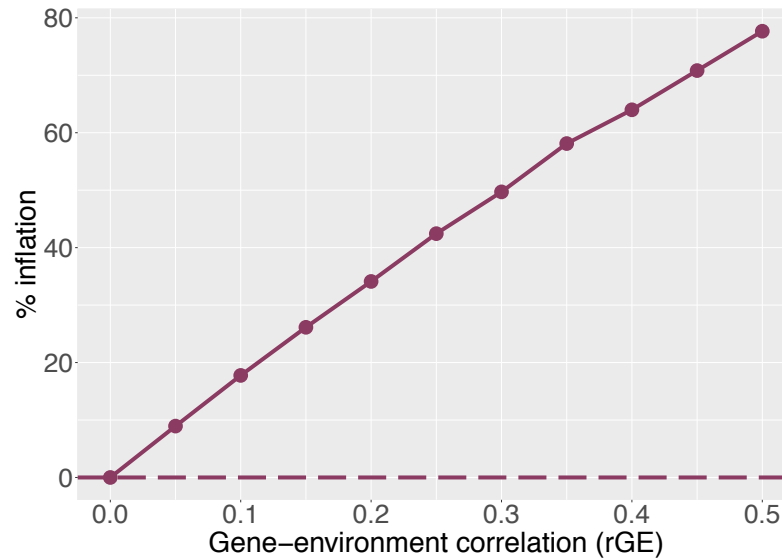


Simulation results

Inflation of estimates



R-square statistics inflation



It is important not only to address the possible presence of rGE in our models, but also to assess its type

In cases of active rGE, conventional models are biased due to conditioning on a collider, and therefore produce inflated results

THANK YOU

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