

ODISSEI Community Conference

22 October 2019 | Galgenwaard, Utrecht



ODISSEI

Open Data Infrastructure for Social Science and Economic Innovations

Gene-environment interplay in education

The impact of school quality and tracking

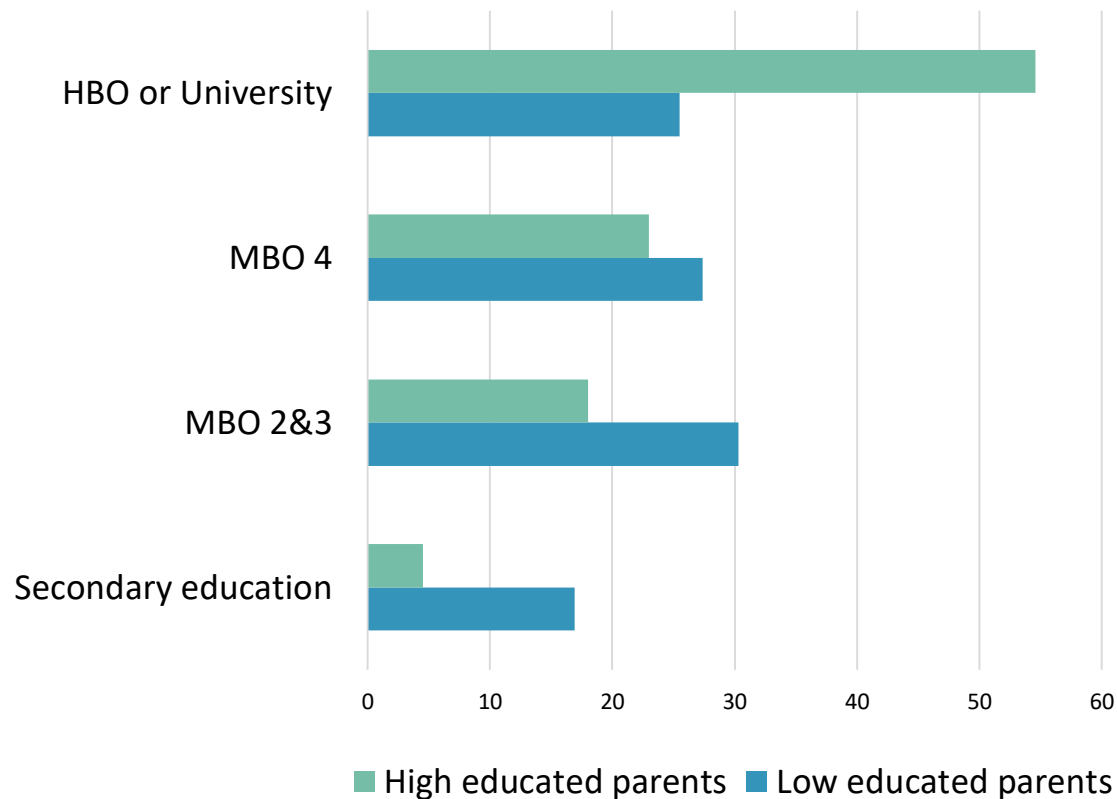
Kim Stienstra
Antonie Knigge
Ineke Maas



Utrecht University



Background



(Inspectorate of education, 2016)

- Unequal educational opportunities
- May depend on larger institutional context including the school environment
 - E.g., early tracking of children into different educational levels

Background

- Difficult to test in which school environments educational outcomes depend more on ability and less on family background
 - Measuring ability
 - Measuring family background
 - Separating the two
- Twin models



How do school quality and standardization of track advice influence the impact of genes and family background on educational outcomes of Dutch children?

Twin models

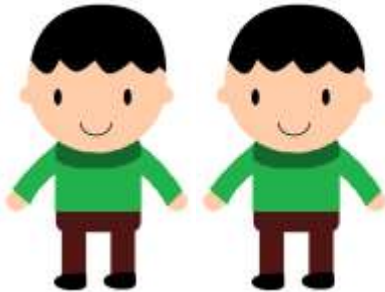
Fraternal twins (DZ)



Genes
~50%

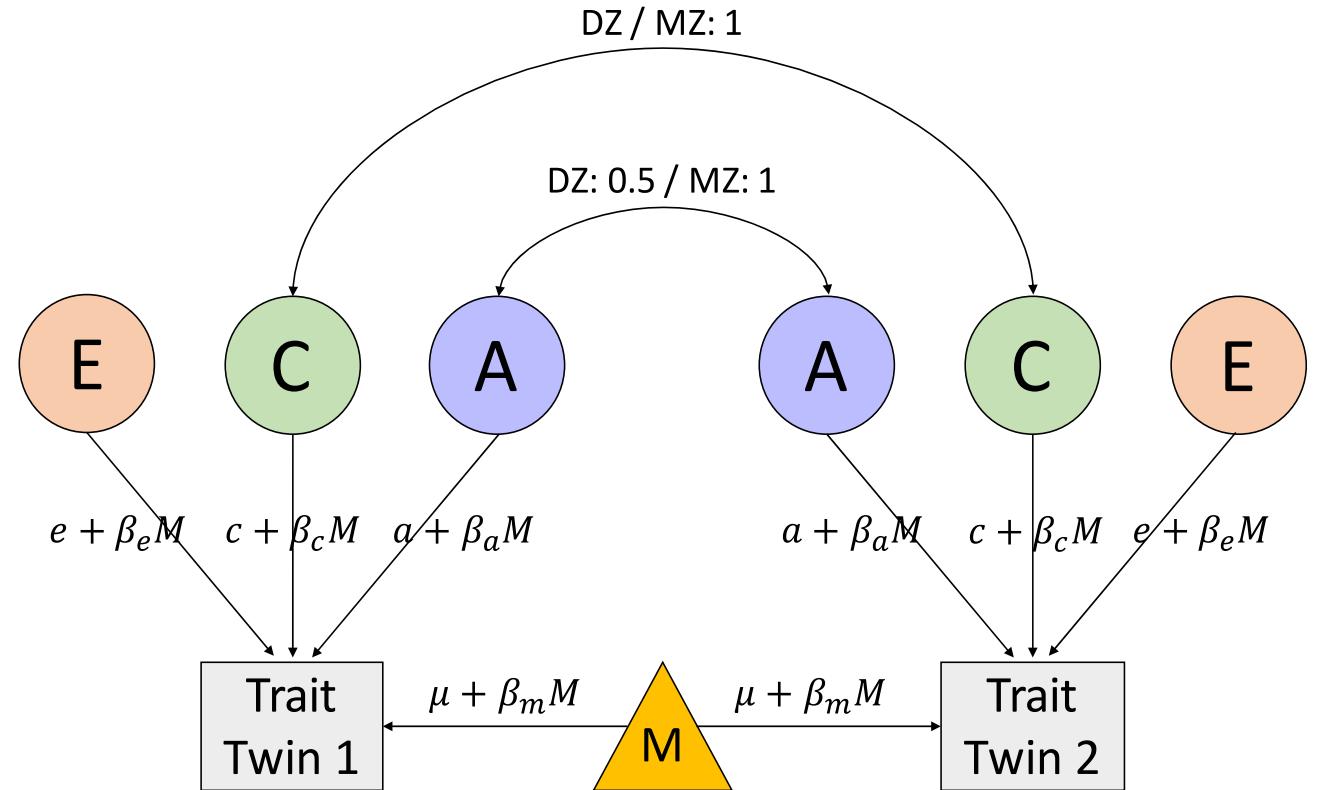
Shared environment
100%

Identical twins (MZ)



Genes
100%

Shared environment
100%

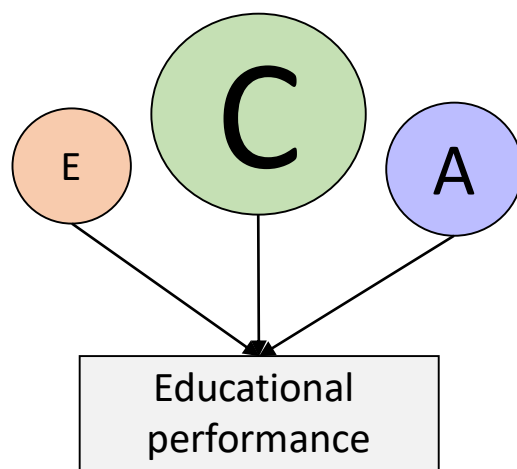




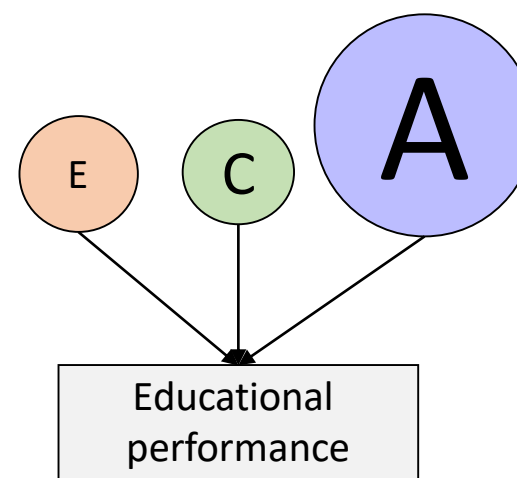
School quality

- Equality of opportunity:
large A (genes) and small C (shared environment)
- May depend on quality of schools (e.g., better teachers, more ambitious and academically oriented climate)

Low-quality school



High-quality school





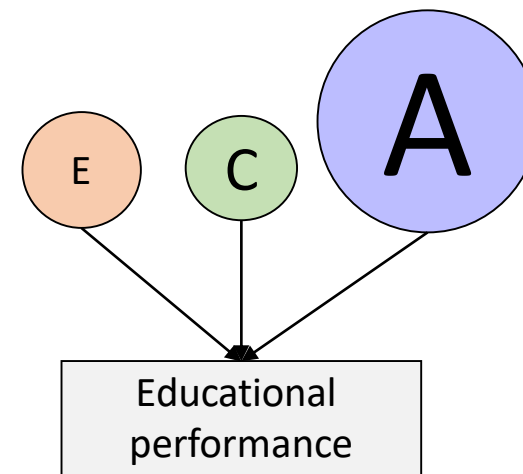
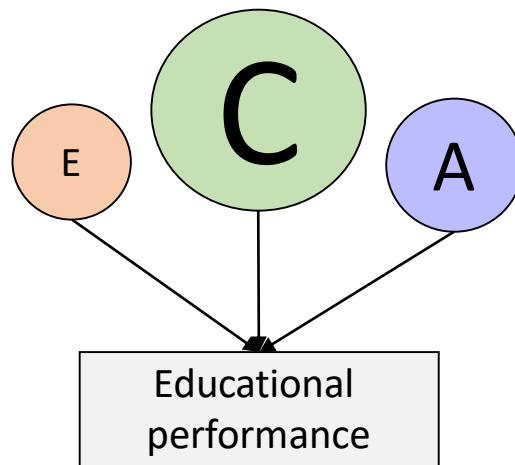
Standardization of track advice

- Secondary school track selection: teacher's advice and standardized test score (Cito)
- Order changed in 2014-2015

Less standardized

More standardized

- After 2014-2015
- Low degree of readjustment of advice



- Before 2014-2015
- High degree of readjustment of advice

Data and methods

CBS microdata

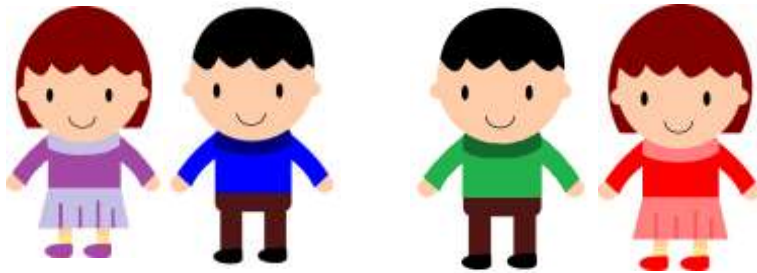
- Identify twins: birth dates of siblings within the same household
- Educational career (e.g., Cito-score, diploma)
- Socioeconomic characteristics of parents

Supplemented with school data

- Dutch Inspectorate of Education (*Onderwijsinspectie*)
- Dutch Education Executive Agency (*DUO*)

Data and methods

Opposite sex (OS) twin pairs



fraternal

fraternal

Same sex (SS) twin pairs



identical

fraternal



Fraternal (DZ) twins



Assume that number of DZ SS twins = DZ OS twins, due to the distribution of sexes (Weinberg, 1901)

Estimate proportion of identical (MZ) twins:

$$p_{MZ} = 1 - 2(p_{OS})$$

Use mixture distribution model (Neale, 2003)

- Partitions SS distribution into MZ and DZ distributions by maximum likelihood
- p_{MZ} is used to weight the likelihood

Data and methods

Advantages CBS microdata

- Representative data
- Enough power to investigate the interactions between genes, families, and schools
- Not only twins, but also all their siblings
- Cover crucial information that is not available in the twin register

To conclude

- Gene-environment interplay as another way to think about educational inequality
- Focus in the sub-studies on policies that receive a lot of attention among politicians, scientists, and in the media
- S1. Improve school quality such that all students can reach their full potential
- S2. Making standardized test scores more important relative to teacher's advice



Thank you for your attention!

Kim Stienstra, MSc (L.K.Stienstra@uu.nl)

Dr. Antonie Knigge (A.Knigge@uu.nl)

Prof. dr. Ineke Maas (I.Maas@uu.nl)



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