GENETICS AND HEALTH INEQUALITIES

Johan Mackenbach
Dept. of Public Health
Erasmus MC
OUTLINE

• Socioeconomic inequalities in health in Europe: patterns and trends
• Explanations for socioeconomic inequalities in health: conventional wisdom
• Contribution of genetic factors: tentative hypotheses
SELF-REPORTED MORBIDITY BY EDUCATIONAL LEVEL

Figure 1: Relative index of inequality for perceived general health by level of education (95% CI)
MORTALITY BY OCCUPATIONAL CLASS
CAUSES OF DEATH BY OCCUPATIONAL CLASS
TREND IN MORTALITY BY OCCUPATIONAL CLASS, MEN 30-59 YEARS

mortality rate per 1000

period


- Finland manual
- Finland non-manual
- England manual
- England non-manual
- Sweden manual
- Sweden non-manual
### REVERSAL OF IHD MORTALITY BY SES

<table>
<thead>
<tr>
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<th>Number of studies by association with socioeconomic status</th>
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<tbody>
<tr>
<td></td>
<td>Consist Negative</td>
<td>Unclear</td>
<td>Consist positive</td>
<td></td>
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<tr>
<td>Ischemic Heart Disease</td>
<td>&lt;1966</td>
<td>6</td>
<td>7</td>
<td>5</td>
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<tr>
<td></td>
<td>&gt;1966</td>
<td>25</td>
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EXPLANATIONS OF HEALTH INEQUALITIES

• Selection and causation
• Material/psychosocial/behavior
• Life-course perspective
Selection and causation

Socioeconomic status → Health (causation)

Socioeconomic status ← Health (selection)
Chronic conditions and downward social mobility (Odds Ratios x 100)
Material/psychosocial/behavior

- Socioeconomic status
- Material factors
- Psychosocial factors
- Health behavior
- Health
Mortality
(Relative Risk x 100)
Inequalities in smoking
(age-adjusted %)

![Graph showing smoking rates by education level and smoking status.]

- Current smokers
- Former smokers
- Never smokers

Education levels:
- High educ
- 2
- 3
- Low educ
Inequalities in mortality: adjustment for mat/behavior
SMOKING BY EDUCATIONAL LEVEL

The chart illustrates the absolute difference in current smoking (%) between different educational levels across various countries. The data shows a range of smoking rates from positive to negative values, indicating both higher and lower smoking rates compared to a reference level. Countries listed include Great Britain, Norway, Sweden, Finland, Denmark, Netherlands, West Germany, Switzerland, France, Italy, Spain, and Portugal.
EDUCATIONAL RR’S FOR LUNG CANCER MORTALITY IN NORWAY
EDUCATIONAL RR’S FOR LUNG CANCER MORTALITY IN MADRID
PROPORTION OF EXCESS TOTAL DEATHS DUE TO SMOKING, MEN AND WOMEN 40-89
Father’s social class, psychological attributes, and self-assessed health
ROLE OF GENOTYPE: CONSIDERATIONS (1)

• Genotype will play a role in explanation of socioeconomic inequalities in health:
  • IF socioeconomic status is associated with a particular genotype, AND
  • IF that genotype is associated with health, either directly or indirectly
ROLE OF GENOTYPE: CONSIDERATIONS (2)

• Socioeconomic status will be associated with genotype:
• IF genotype determines inter- or intragenerational social mobility
• (No need to assume intergenerational transmission of social class adherence)
INTERGENERATIONAL SOCIAL MOBILITY: SON’S VS. FATHER’S OCCUPATIONAL CLASS, NETHERLANDS, 1977
ROLE OF GENOTYPE: CONSIDERATIONS (2)

• Direct genetic risk factors for disease are unlikely to play more than incidental role, because:
  • Disease-specific inequalities are variable across time, even within a generation, and
  • Disease-specific inequalities are variable between populations
ROLE OF GENOTYPE: CONSIDERATIONS (3)

• However, genetic factors acting ‘indirectly’ and generically might be more important, particularly factors that act as:
  • determinants of health-related behavior
    AND
  • determinants of social mobility
• such as cognitive ability (e.g. intelligence) and personality characteristics (e.g. neuroticism)
AVAILABLE EVIDENCE: INTELLIGENCE

- Intelligence is complex trait, multiple genes involved, far from elucidated
- Twin studies suggest ‘heritability’ of 0.60 to 0.80 -- interpretation remains contested
- Intelligence is associated with educational achievement and health behavior
- Few studies on role of intelligence in health inequalities -- potentially important
FATHER’S OCCUPATIONAL CLASS AND ADOLESCENT’S SMOKING: CONTRIBUTION OF INTELLIGENCE
AVAILABLE EVIDENCE: NEUROTICISM

• Neuroticism is complex trait, multiple genes involved, far from elucidated
• Twin studies suggest ‘heritability’ of 0.20 to 0.40 -- interpretation remains contested
• Neuroticism is associated with social class and health outcomes
• Studies suggest role of neuroticism in inequalities in self-reported health
NEUROTICISM AND SELF-REPORTED HEALTH

![Bar chart showing self-assessed health and NHP-mobility across different neuroticism levels.

- Low
- 2
- 3
- 4
- High

The chart displays a comparison between self-assessed health and NHP-mobility with neuroticism levels. Each bar represents a group categorized by neuroticism (Low, 2, 3, 4, High), showing variations in health scores across different neuroticism levels.]
Hypothetical pathways

- Material and psychosocial factors
  - Socioeconomic status
  - Health behavior
  - Intelligence Personality
  - Health

- Genotype
CONCLUSIONS

• Explanations for socioeconomic inequalities in health correctly emphasize environmental factors.

• Nevertheless, a role for genetic factors cannot be excluded, particularly in cognitive ability and personality.

• Further research should be encouraged, but with a view to optimizing interventions.