

# Social determinants of mental health in childhood – a gene-environment perspective.

Anders Hjern,

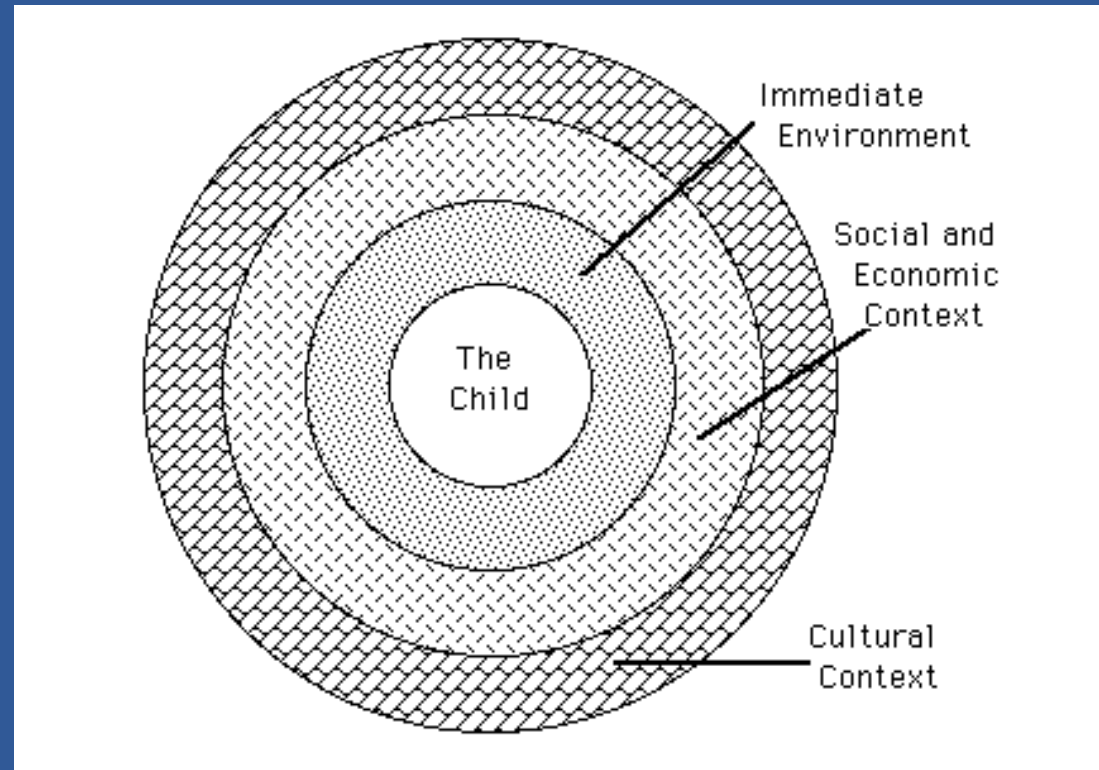
Centre for Health Equity Studies (CHESS),  
Karolinska Institutet/Stockholm University

E-mail: [anders.hjern@chess.su.se](mailto:anders.hjern@chess.su.se)

# Social determinants are many and of various kinds...

- Low SES
- Low parental education
- Unemployment
- Family size
- Chronically ill sibling
- Marital discord
- Attachment patterns
- Child abuse
- Neglect
- Single parenthood
- Poverty
- Parental addiction
- Peer relations
- Bullying
- Separation from parent
- Nursery school
- School failure
- Gender
- Etc...

# An ecological system's theory (a la Bronfenbrenner)



# Broad social categories measure summarised aspects of the social context

Social class

Parental educational level

Income categories

Neighbourhood characteristics

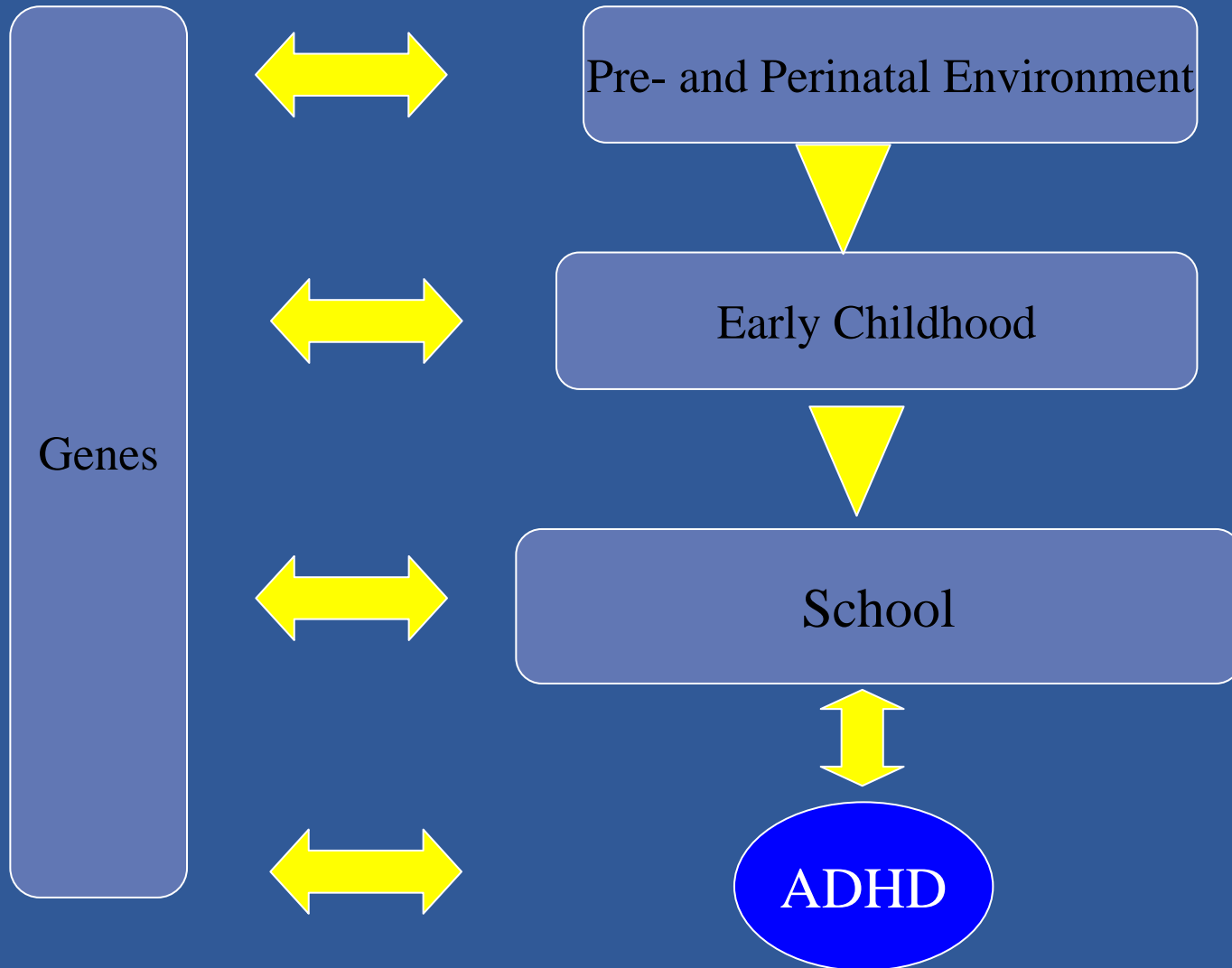
Urban vs rural

Broad social categories have been linked to

- ADHD
- Conduct disorder
- Depression and parasuicide
- Psychotic disorders
- Mental retardation and developmental delays

But links to minor mental health problems in school age are quite weak

# A life course perspective on social determinants of mental health in childhood



# Pre- and Perinatal Environment

- Maternal stress
- Toxic substances
- Infectious agents
- Nutritional deficiencies
- Hypoxia

# Early Childhood

- Attachment patterns
- Stress/Neglect

# School

- Peer relations
- Bullying
- Teacher relations
- Cognitive skills
- School failure/success

# Attention deficit hyperactivity disorder (ADHD)

American concept of behavioural disorder  
consisting of

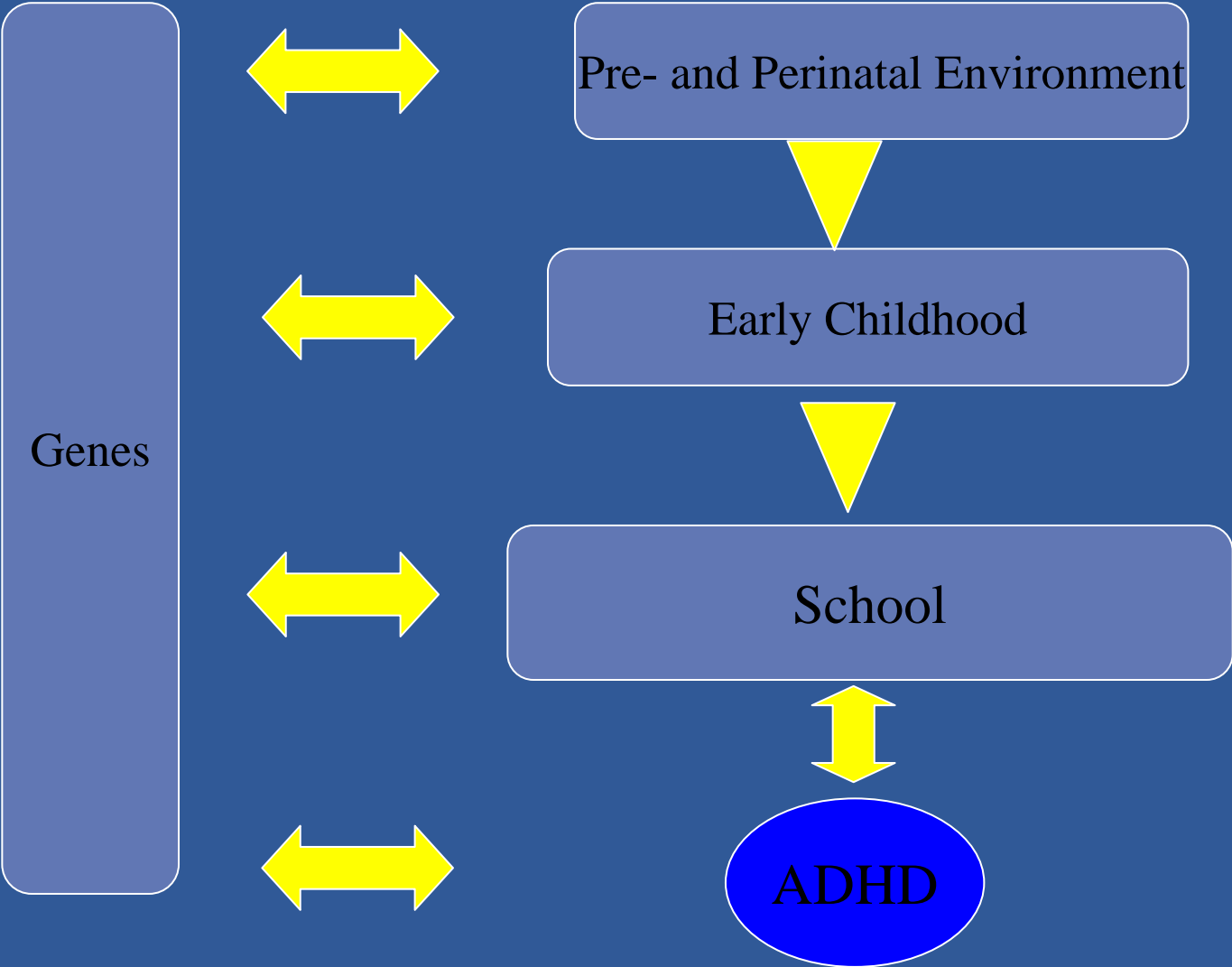
- Hyperactivity
- Koncentration difficulties
- Lack of impulse control

And **Impairment!**

# Attention deficit hyperactivity disorder (ADHD)

- Swedish population studies demonstrates a prevalence of 3-5% in school children
- Twin studies suggest 40-80% of the variation in the population is linked to genetic factors

# A life course perspective on determinants of ADHD



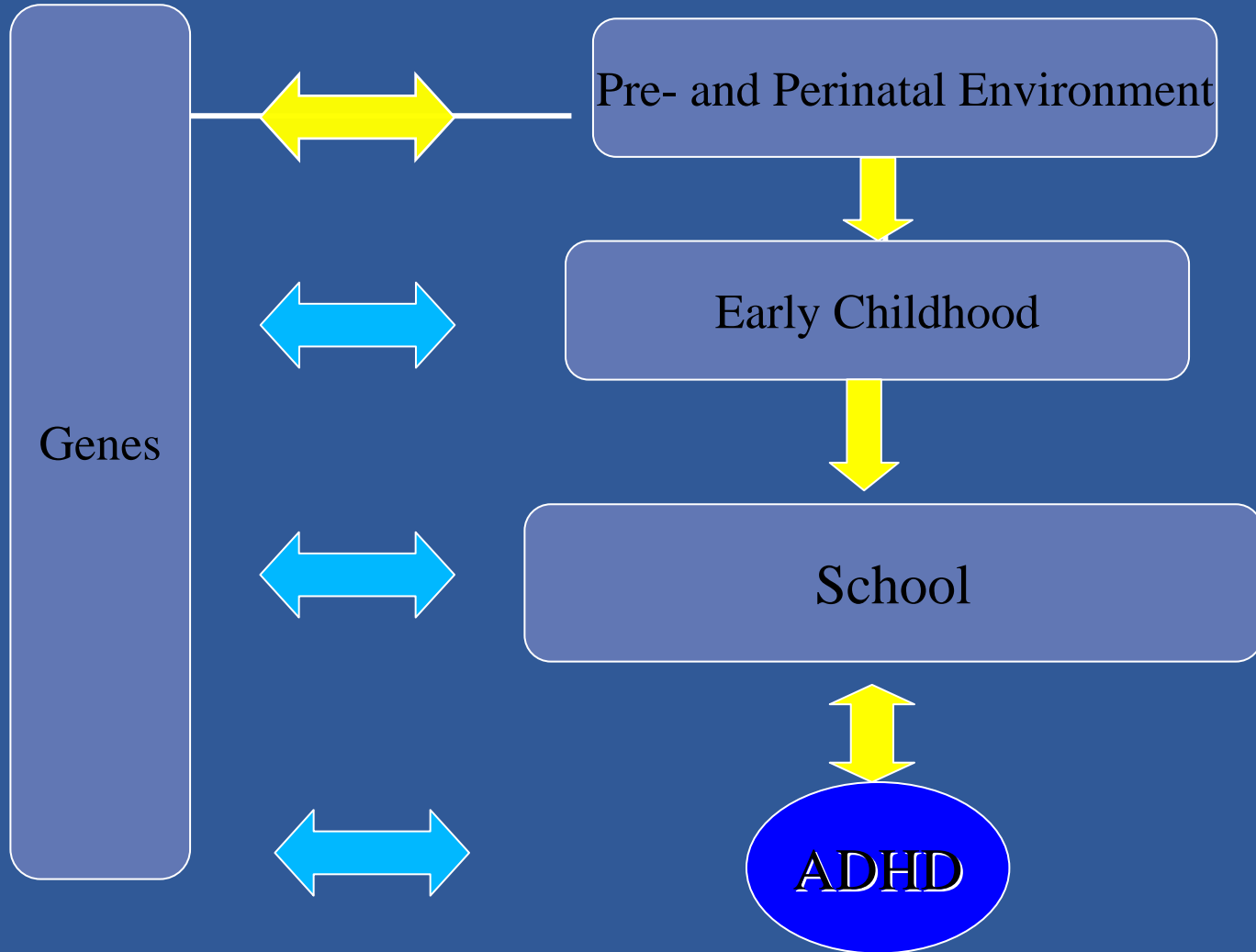
# Tentative pathways for social determinants

- Could be mediated through modification of behavior. Less impairment of similar characteristics...
- Could be mediated through modification of the neurobiological systems of the developing brain.

## Prenatal factors.

- Does exposure to maternal smoking during pregnancy cause ADHD?
- Why? Because of link of nicotine to systems responsible for treatment effect with stimulant drugs?
- Lindblad och Hjern....

# A gene-environment perspective on prenatal exposures: the case of exposure to maternal smoking and ADHD



# Perinatal and exposure data

- Medical Birth Register
- 927 000 Swedish residents born at term (w 37-41) during 1987-2000 who were residents in Sweden in December 31, 2005 according to the Register of the Total Population

# Logistic regression of maternal smoking during pregnancy and ADHD-medication in offspring

|                 | <b>Model 1<br/>OR (95%CI)</b> | <b>Model 2<br/>OR (95%CI)</b> | <b>Model 3<br/>OR (95%CI)</b> | <b>Model 4<br/>OR (95%CI)</b> |
|-----------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| <b>10+ cig</b>  | <b>2.86 (2.66-3.07)</b>       | <b>2.04 (1.89-2.20)</b>       | <b>1.90 (1.76-2.06)</b>       | <b>1.89 (1.75-2.04)</b>       |
| <b>1-9+ cig</b> | <b>2.13 (2.00-2.27)</b>       | <b>1.67 (1.56-1.79)</b>       | <b>1.60 (1.50-1.71)</b>       | <b>1.59 (1.49-1.70)</b>       |
| <b>0*</b>       | <b>1.73 (1.54-1.95)</b>       | <b>1.46 (1.29-1.63)</b>       | <b>1.42 (1.26-1.61)</b>       | <b>1.43 (1.26-1.61)</b>       |
| <b>0**</b>      | <b>1</b>                      | <b>1</b>                      | <b>1</b>                      | <b>1</b>                      |

\*= Non-smoking pregnancy in mother who reported smoking in at least one other pregnancy during 1984-2005.

\*\*= Non-smoking pregnancy in mother who reported no smoking in every recorded pregnancy during 1984-2005.

# Conditional logistic regression of maternal smoking during pregnancy in contrasting pregnancies with the same mother and father

|                       | Group effects         |                                  | Within subjects effects |                    |
|-----------------------|-----------------------|----------------------------------|-------------------------|--------------------|
|                       | Model 1<br>OR (95%CI) | Model 2<br>(95%CI)<br>OR (95%CI) | Model 1<br>(95%CI)      | Model 2<br>(95%CI) |
| Non-smoking pregnancy | 1                     | 1                                | 1                       | 1                  |
| 0-9 cig               | 0.94 (0.75-1.17)      | 0.96 (0.78-1.18)                 | 0.96 (0.76-1.16)        | 0.96 (0.73-1.13)   |
| 10+ cig               | 1.27 (0.93-1.74)      | 1.31 (0.97-1.77)                 | 1.27 (0.97-1.57)        | 1.26 (0.95-1.58)   |

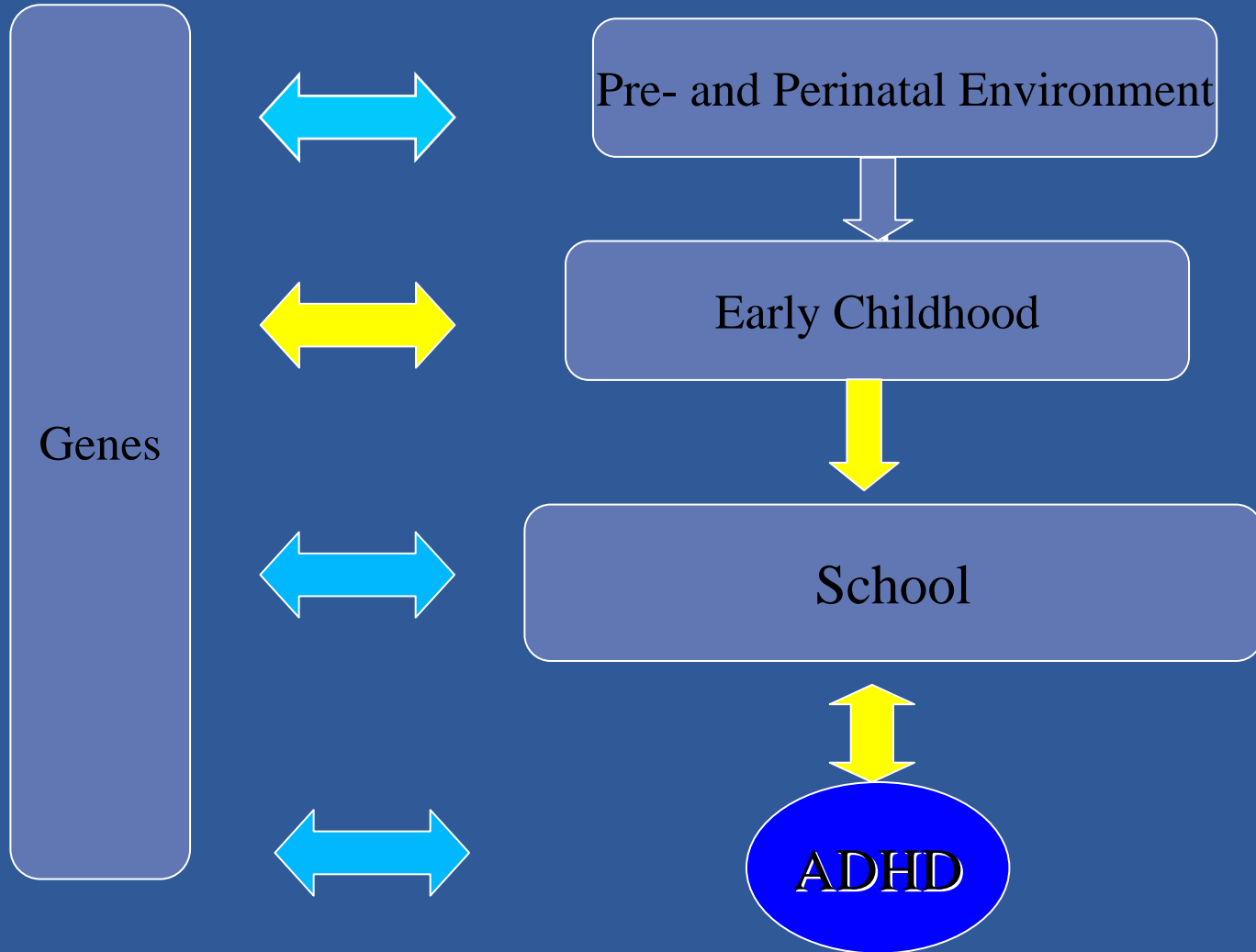
Model 1 is adjusted for sex.

Model 2 is adjusted for sex, maternal and child age and parity.

## Early childhood- Institutional rearing.

- Population: International adoptees
- Lindblad, Ringbäck och Hjern....

# A gene-environment perspective on early childhood: the case of institutional rearing and ADHD



# Table 4. Age at adoption and ADHD-medication

(adjusted for region of birth)

| Age at adoption | OR (95% CI)   |
|-----------------|---------------|
| 0               | 1             |
| 1               | 1.6 (1.2-2.2) |
| 2+              | 2.5 (1.8-3.4) |

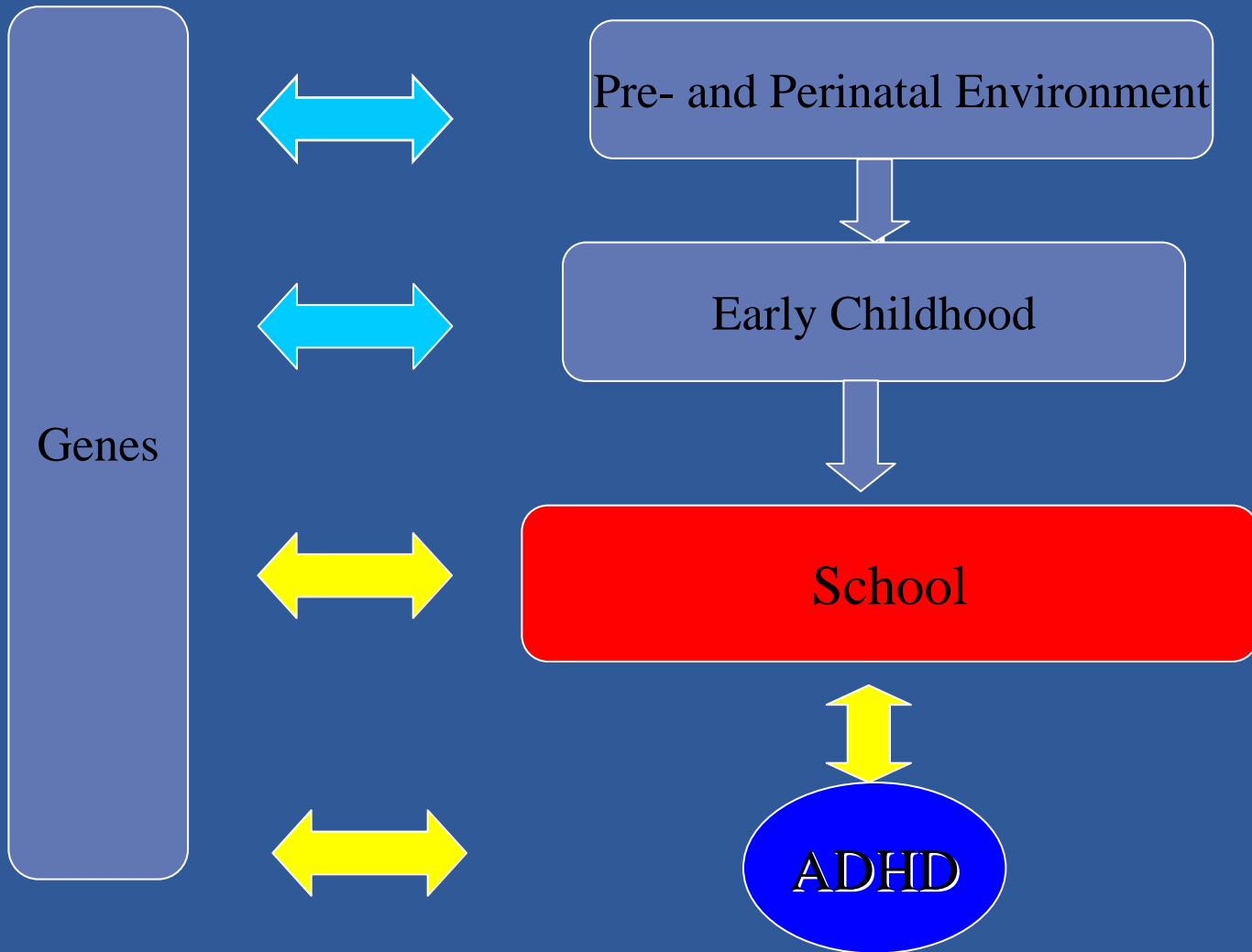
# Romanian adoptees in the UK, Rutter et al

- ~50% of children will develop ADHD in extremely deprived institutions, the other 50% will not, under any circumstances....

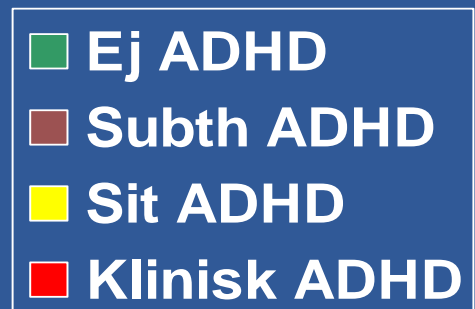
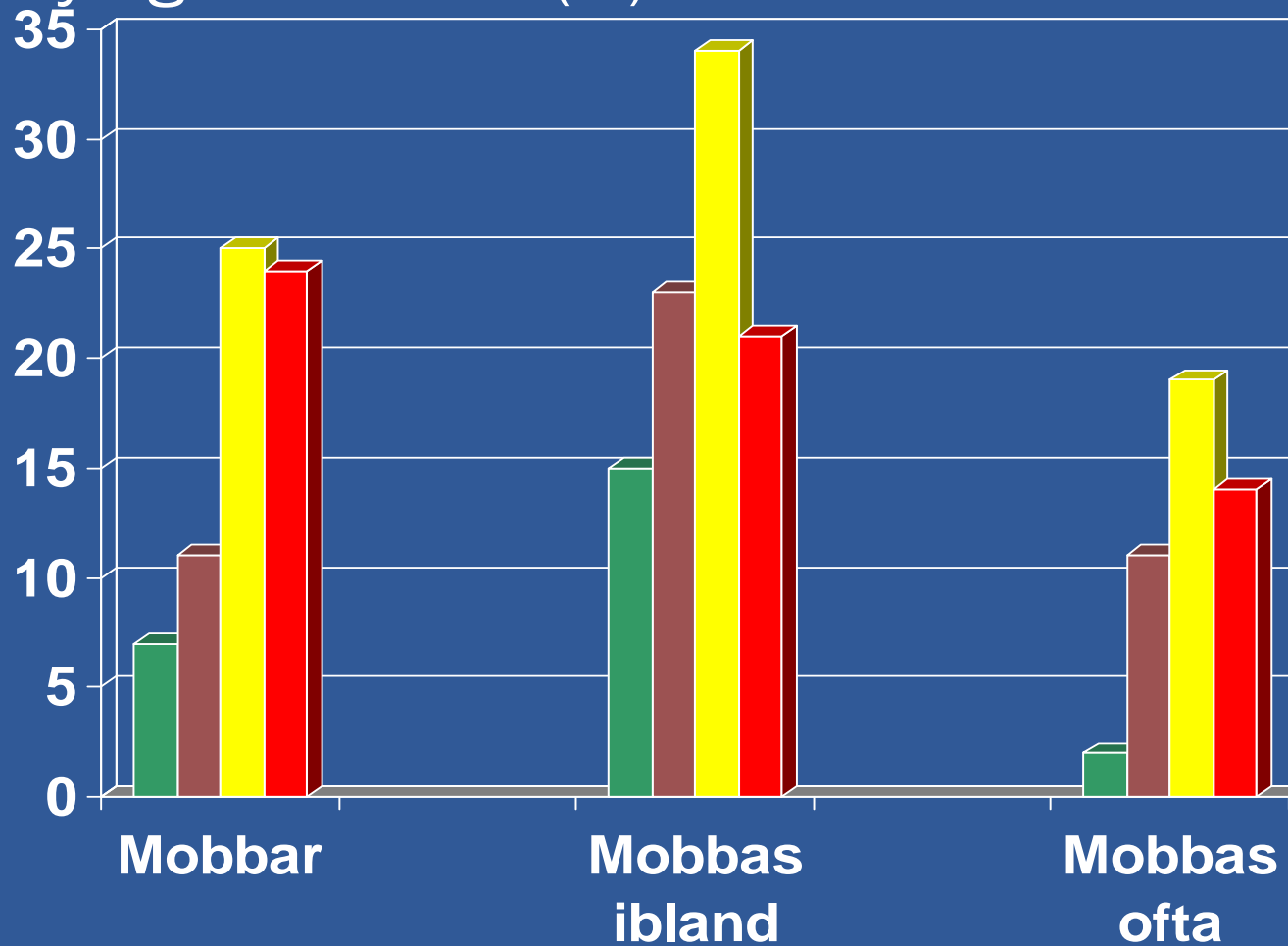
# School environment and ADHD; the case of bullying

- Population: Sigtuna cohort- 500 children
- Holmberg och Hjern....

# A gene-environment perspective on school environment: the case of bullying and ADHD



## Bullying and ADHD (%)



# Behavior at school entry and ADHD

## Bullies

- More often had behaviorial problems at school entry
- Their ADHD symptoms put them at risk for bullying?

# Behavior at school entry and ADHD

Those being bullied

- Did not have behavioral problems more often at school entry
- Their ADHD symptoms developed/were enforced by their victimisation?

# Symptoms in context

2/3 % of children with ADHD symptoms in Sigtuna were reported to be disabled by their symptoms in the school environment only

The social environment sets the stage for mental health problems in childhood

# Conclusions

- The key social determinants follow a life course pattern
- Social determinants are embedded in a complex multilayered context
- Social determinants interact with genetic factors, and genetic factors shape important aspects of the social environment

## The way ahead...

- Opening the black box of genetic risk factors for psychiatric disorders will sharpen the analysis of their social determinants
- Which opens up opportunities for more effective indicated prevention!
- With major ethical complications...

**chess**

Centre for Health  
Equity Studies



Thank you for your attention!



*CHESS is a collaboration between Stockholm University and Karolinska Institutet.*