

# The development of health inequalities across generations

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McGill University

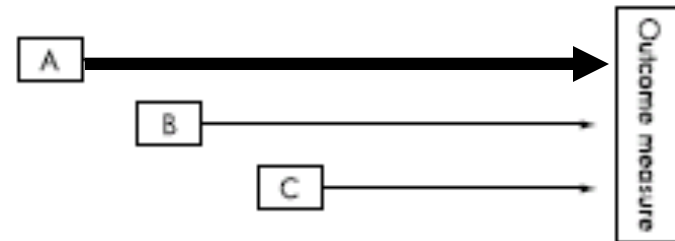


McGill Observatory on Health  
and Social Services Reforms

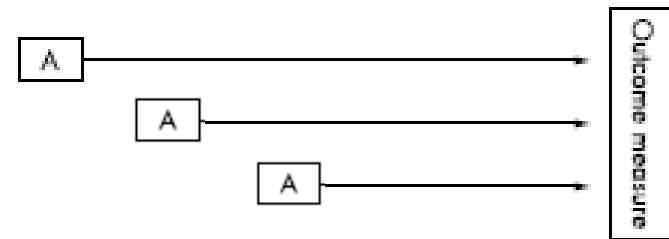
# **LIFE COURSE PROCESSES IN EPIDEMIOLOGY**

# Life course epidemiology models

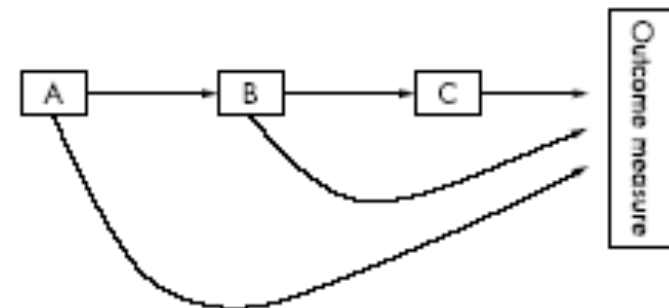
- Critical or Sensitive Period effects



- Cumulative effects

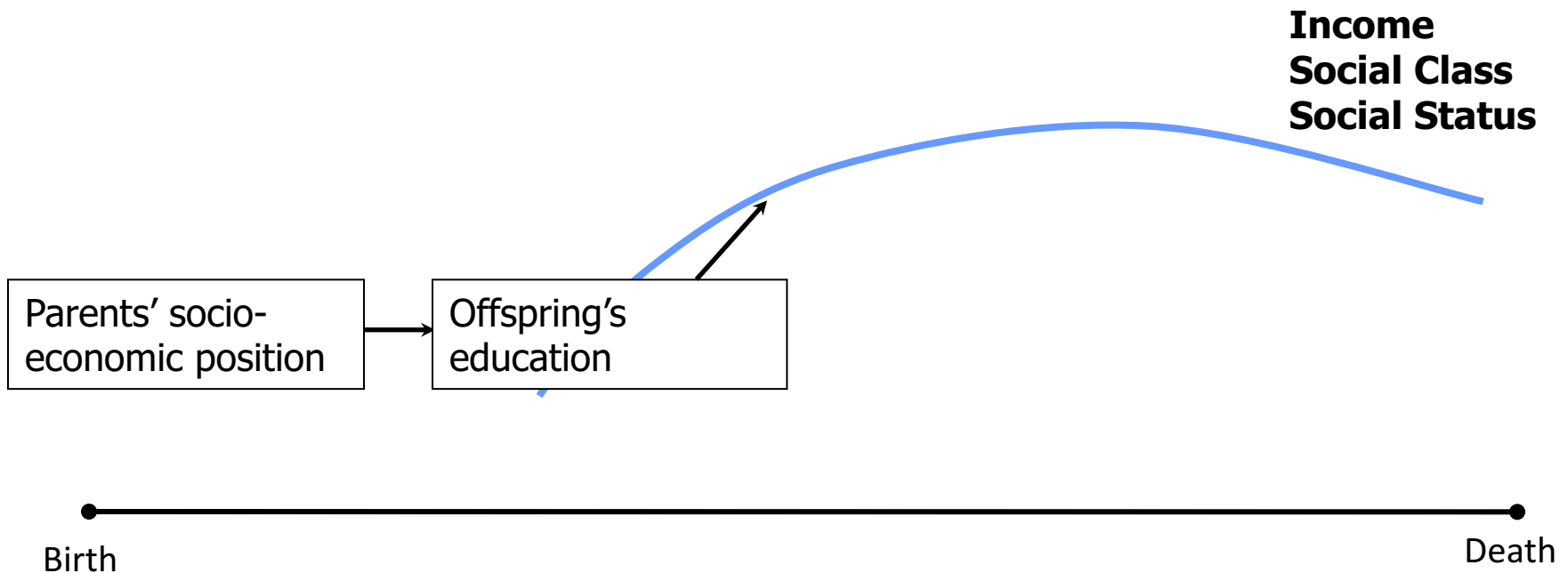


- Pathway effects



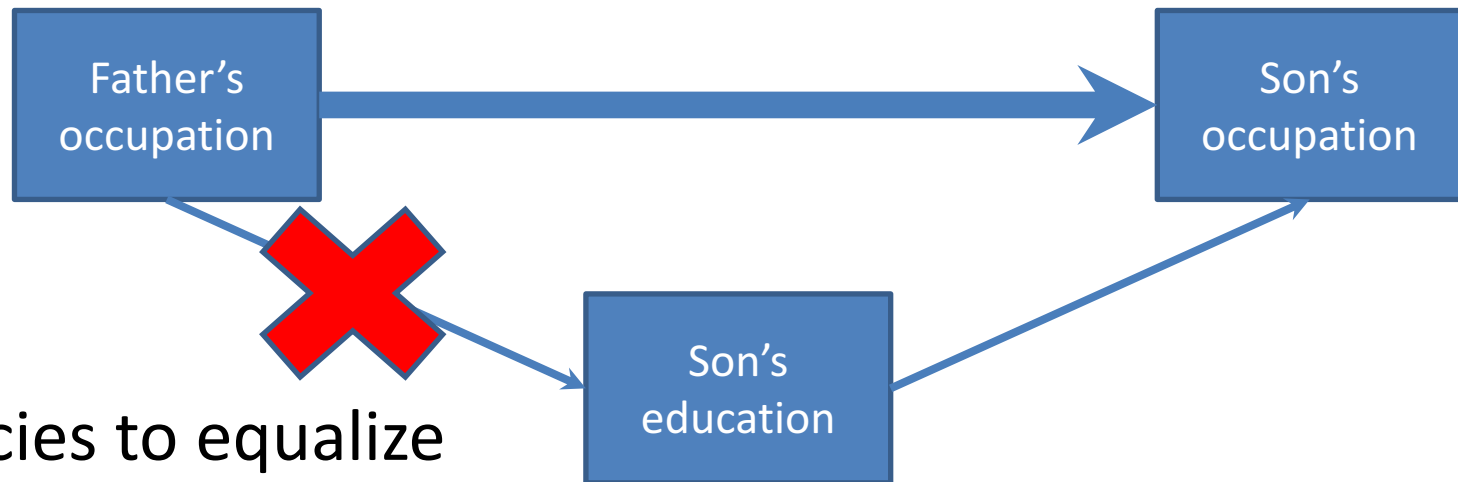
# **LIFE COURSE PROCESSES OF STATUS ATTAINMENT**

# Socio-economic position over the life course



# Intergenerational mobility

- 1967: Blau and Duncan. *The American Occupational Structure*



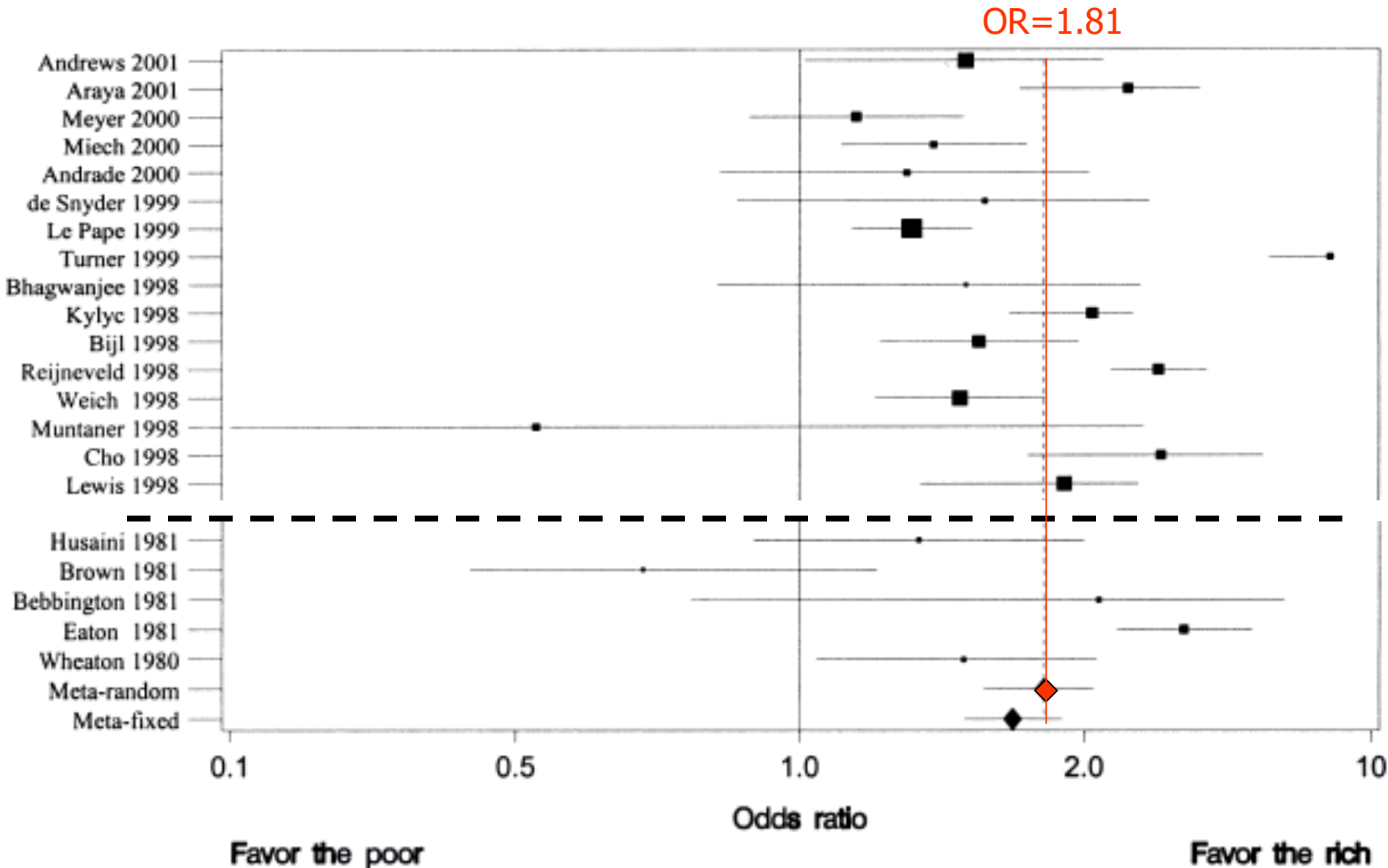
Policies to equalize  
educational opportunity

E.g. Quebec's universal educational daycare program

***Meeting Early Childhood Needs***

# **Mental health inequalities across the life course**

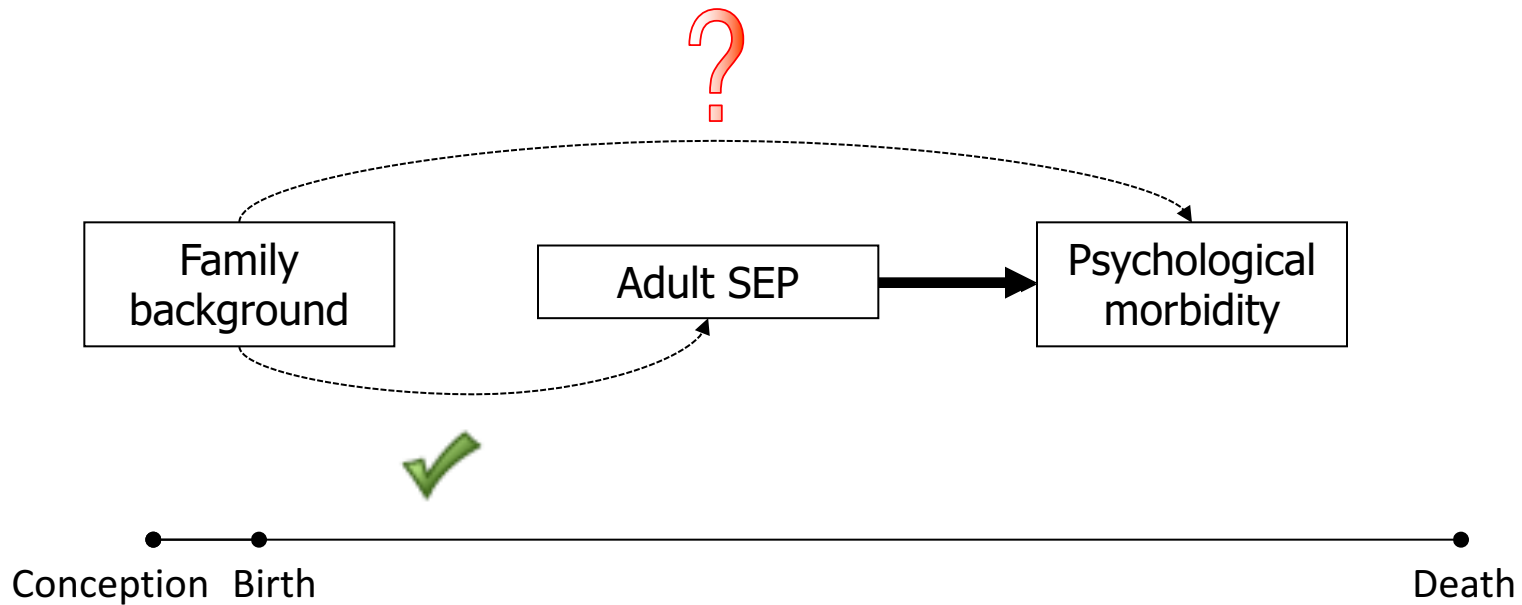
# Adult SEP and Depression





# Early SEP and adult mental health?

Power et al. 2004. *Soc. Sci and Med.*





# **Socioeconomic pathways to depressive symptoms in adulthood: Evidence from the NLSY79**

Amélie Quesnel-Vallée

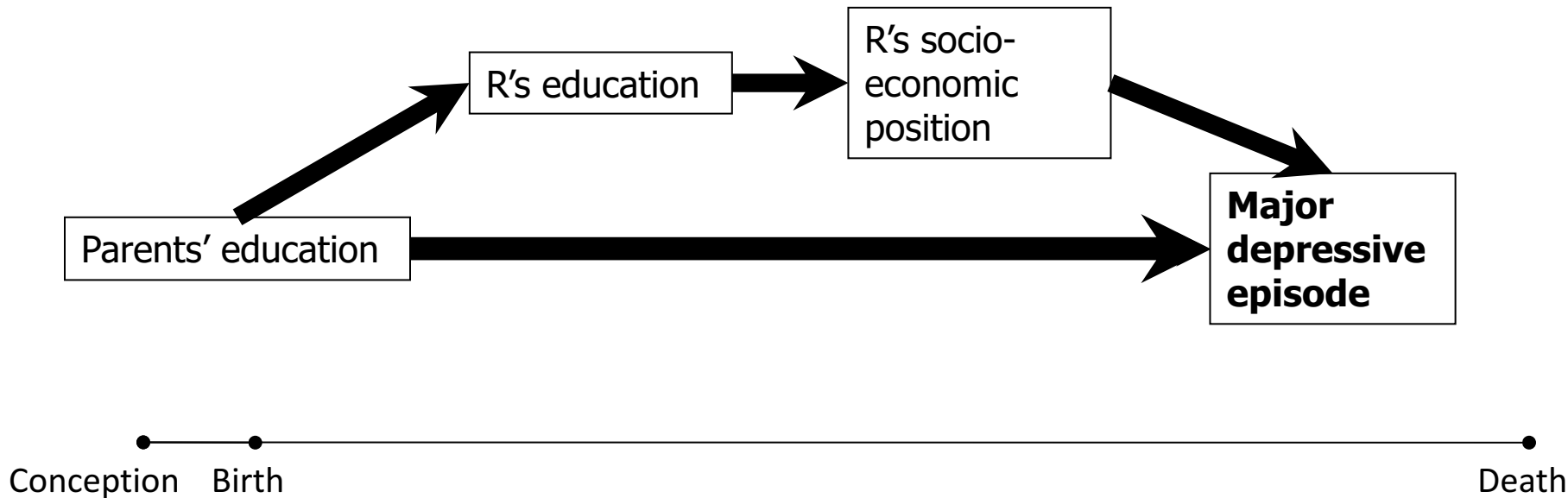
*McGill University*

Miles Taylor

*Florida State University*

2012. *Social Science & Medicine* 74(5):734-43

# Model: Major depressive episode





# **Parents' education and the risk of major depression in early adulthood in Canada**

Alison L. Park

*Institut national de santé publique du Québec*

Rebecca Fuhrer

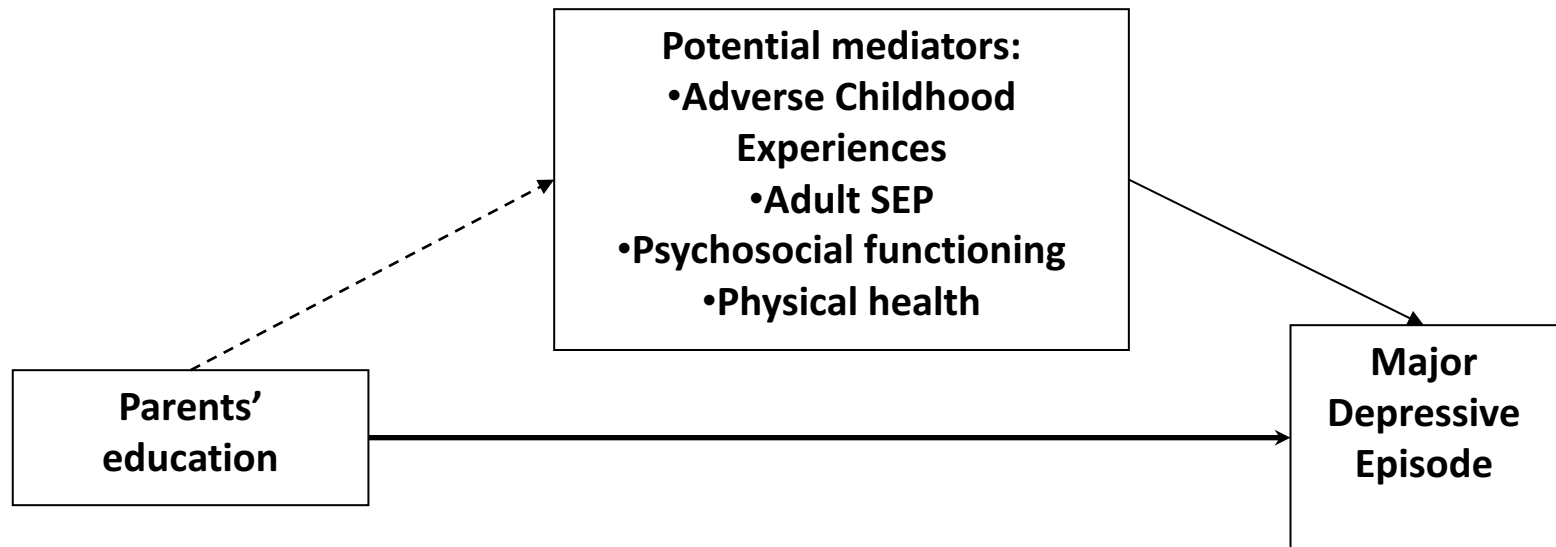
Amélie Quesnel-Vallée

*McGill University*

2013. *Social Psychiatry and Psychiatric Epidemiology*. 48:1829–1839

# Objectives

- To estimate the relationship between mother's and father's education and major depressive episode (MDE) of their adult child
- Estimate mediating effects of other risk factors

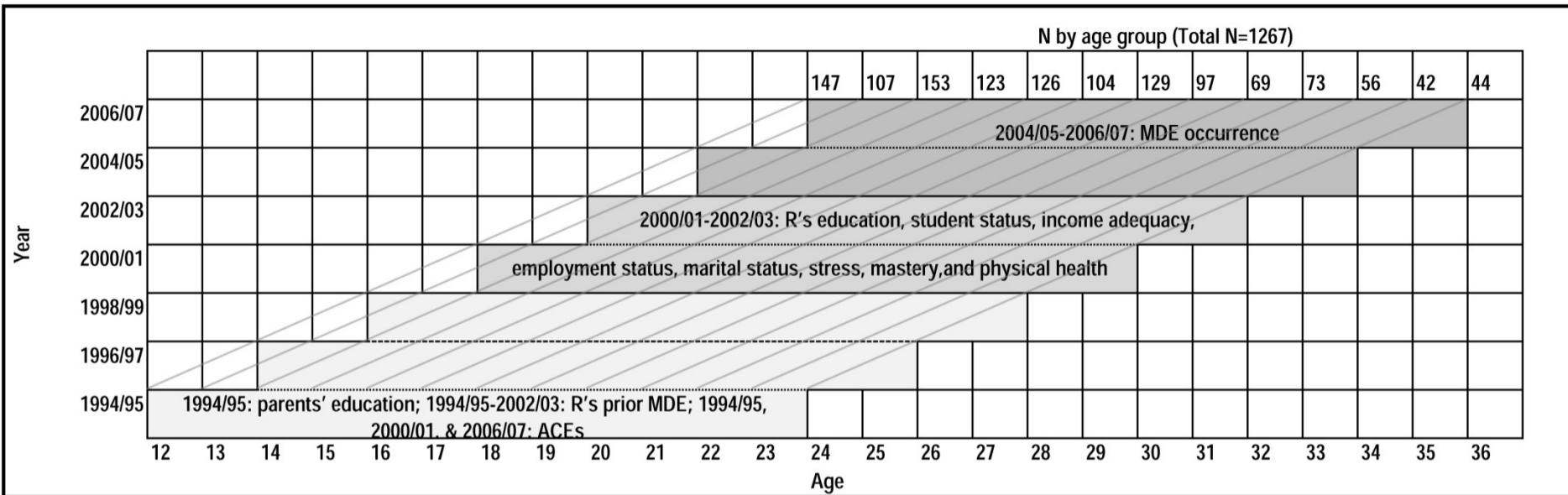


# Data and Sample

- **Survey: National Population Health Survey (NPHS), Statistics Canada**
  - Cycles 1-7: Biennial 1994/95 to 2006/07
- **Study population:**
  - **12 to 24 years-old and living with parent(s) in 1994/95**
  - Baseline MDE: reported at least once between 1994/95-2002/03
  - ACEs: reported in 1994/95, 2000/01 or 2006/07
  - Follow-up MDE: reported in 2004/05 or 2006/07
  - Marital status, education, student status, income adequacy, employment status, chronic stress, mastery, and number of chronic conditions: reported in 2000/01 or 2002/03
- Total n=1267

# Design

- Structure of longitudinal design

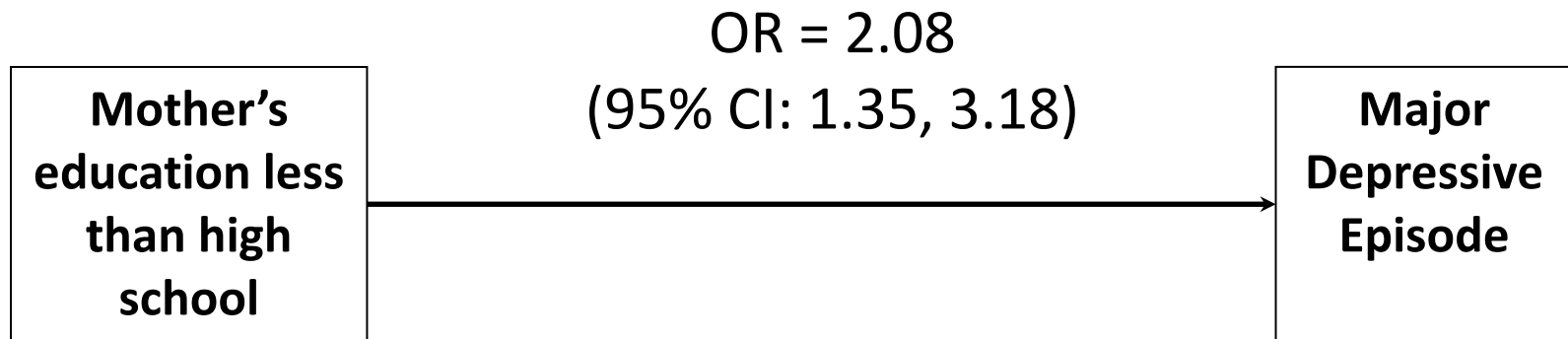


# Variables

- **Early-life SEP** (mother's and father's education)
  - $\geq$  high school (ref.), < high school, or missing
- **Potential mediators:**
  - Early-life: ACEs (*Childhood and Adult Stress Index*)
  - Adult: SEP (education, student status, income adequacy, employment status), psychosocial functioning (*General Chronic Stress Index* and *Mastery Scale*), physical health (number of chronic conditions)
- **Control variables:**
  - Baseline MDE (met criteria for MDE in any of the first 5 waves, or diagnosed by a healthcare professional)
  - Sex, age, race, marital status
  - Parental history of depression (results not shown)

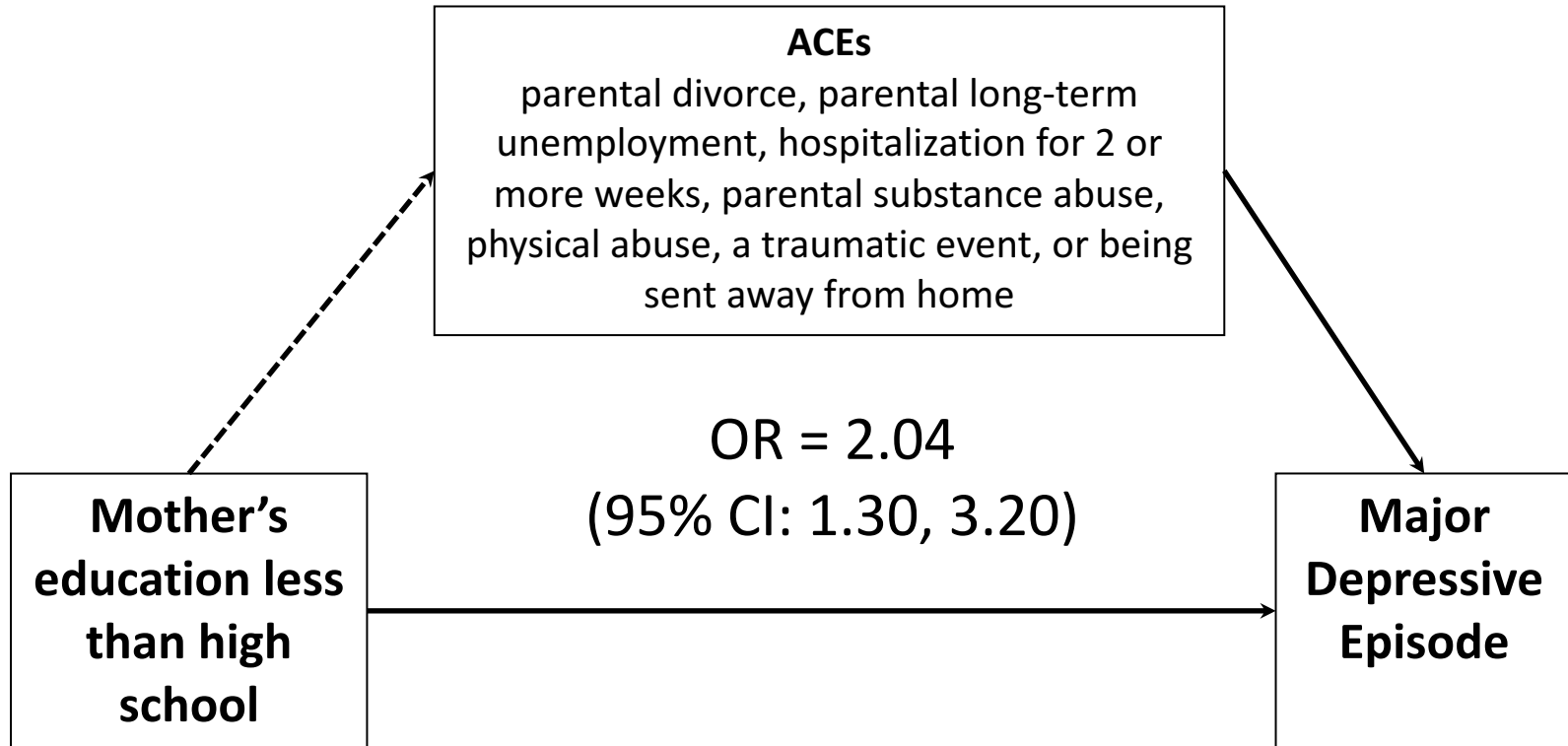


# **Mother's education: Lack of a high school diploma**



\*controlling for sex, age, ethnicity, marital status, prior MDE

# Adverse childhood events?

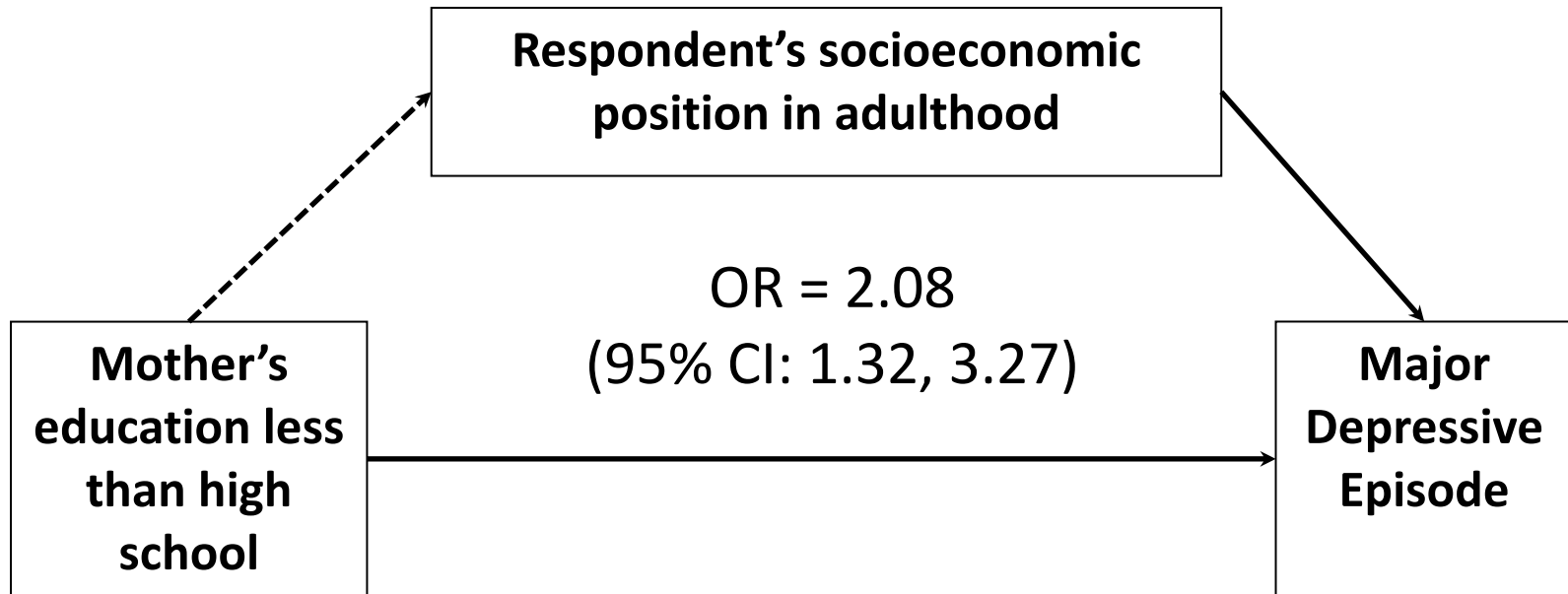


Model 1 estimates:

< HS: OR = 2.08 (1.35, 3.18)

\*controlling for sex, age, race, marital status, prior MDE

# Adult child's education and income?

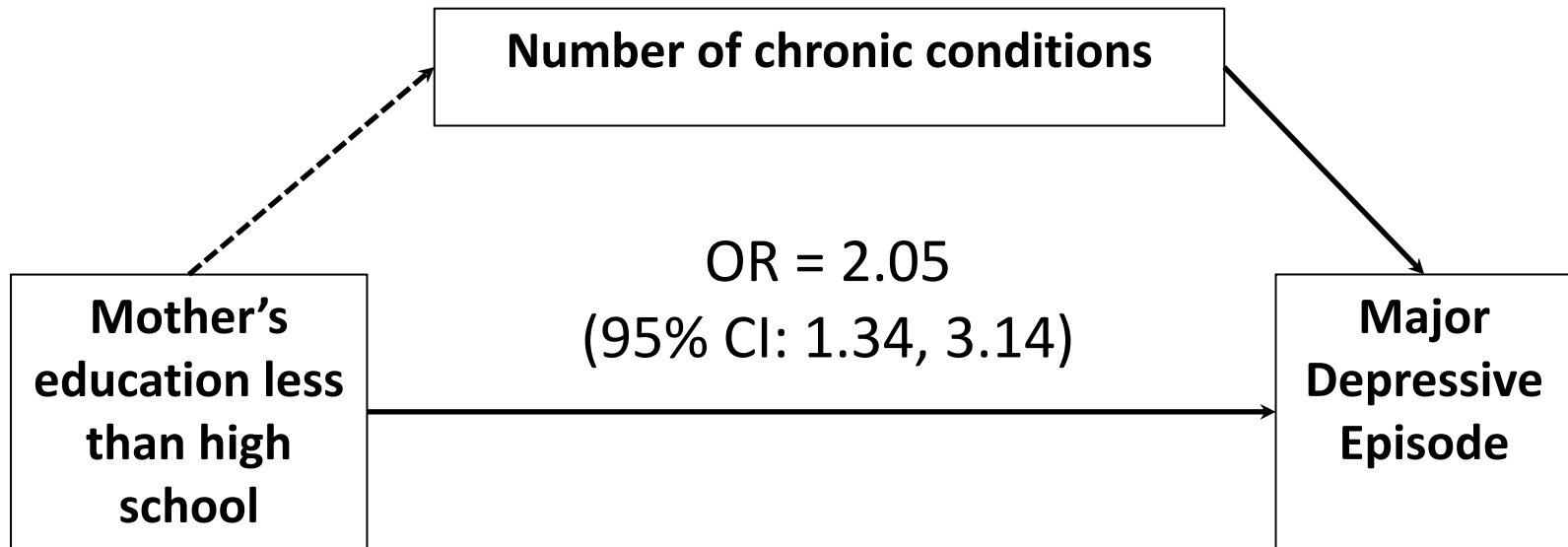


Model 1 estimates:

< HS: OR = 2.08 (1.35, 3.18)

\*controlling for sex, age, race, marital status, prior MDE

# Physical health?

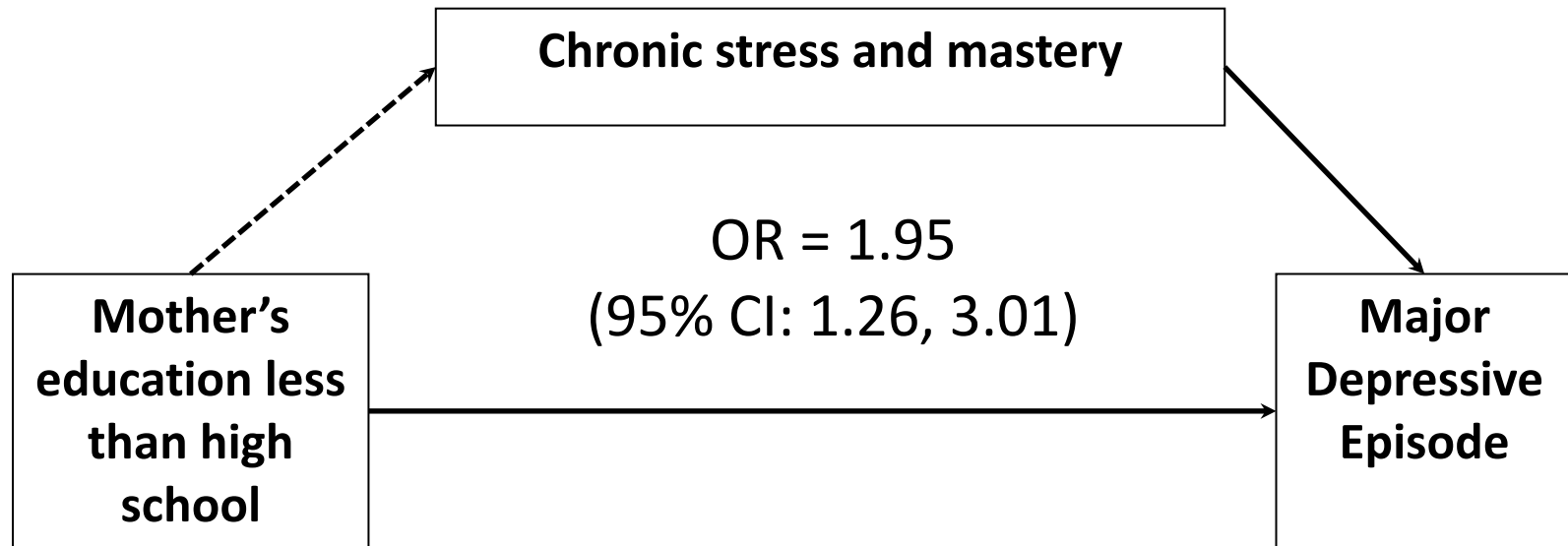


Model 1 estimates:

< HS: OR = 2.08 (1.35, 3.18)

\*controlling for sex, age, race, marital status, prior MDE

# Chronic stress and mastery?



Model 1 estimates:

< HS: OR = 2.08 (1.35, 3.18)

OR = 1.95 (95% CI: 1.26, 3.01)

\*controlling for sex, age, race, marital status, prior MDE

# What can we learn from US-Canada comparison ?



- Effect of both parents' education
- No direct effect of parents' education with mediators
- Rs 14-21 years old in 1979
- Outcome:
  - depressive symptoms
- Measured at 40+ years



- Effect of mother's less than high school education
- Direct effect of mother's education persists
- Rs 12-24 years old in 1994/5
- Outcome:
  - Major Depressive Episode
- Measured at 24-36 years

Differences in the modeling?  
Different national processes?  
Age, period, or cohort effects?

# Extending the relevance of longitudinal surveys

- LSIC, NLSY, NPHS, SLID, YITS
- Income tax data
  - Household and individual
  - Sources of income: employment, investments
  - Government transfers
    - Cash: employment insurance, social insurance, (pension)
    - Tax credit: disability
    - Child credit benefit
- Possibility of linking to cancer registry, as well as prospective mortality records



# National Population Health Survey (NPHS)

- **Linkage: 98% linked with T1FF**
- Biennial 1994/95 to 2010/11
- **Study population:**
  - 17,276 non-institutionalised, nationally representative 12 years and over
  - 69.7% retention at final survey wave
- **Content**
  - In-depth self-reported health (physical, mental), access to health care, emphasis on validated indexes
  - Data dictionary until 2006/7 available at [www.statcan.gc.ca/imdb-bmdi/document/3225\\_D11\\_T9\\_V3-eng.pdf](http://www.statcan.gc.ca/imdb-bmdi/document/3225_D11_T9_V3-eng.pdf).

# Facilitating NPHS data management

- Data quirk: the markers for survey years in the question names are
  - In the middle of the variable name (not as stubs)
  - Take the values “4” for 1994/95, “6” for 1996/97, and so on, until 2000/01: “0”, 2002/03: “2”, BUT thereafter, as the next round (2004/05) would be redundant with 1994, there is a switch to alpha years with letters “A” for 2004/05 and so on.
- With funding from the SSHRC Population and Life Course Cluster and support from the CRDCN, we developed a SAS macro to rename the data in a format suitable for longitudinal data analysis. This package is available on the CRDCN website [\[link\]](#). You can ask your RDC analyst to download it in your account.

# Thank you!

*This research was supported, in part, thanks to funding from:  
the Canada Research Chairs program*

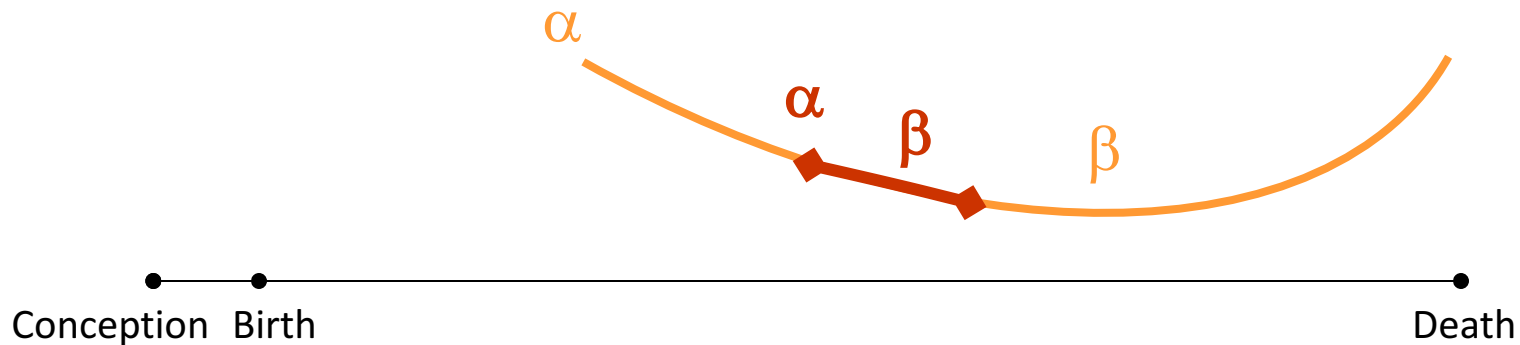


Social Sciences and Humanities  
Research Council of Canada

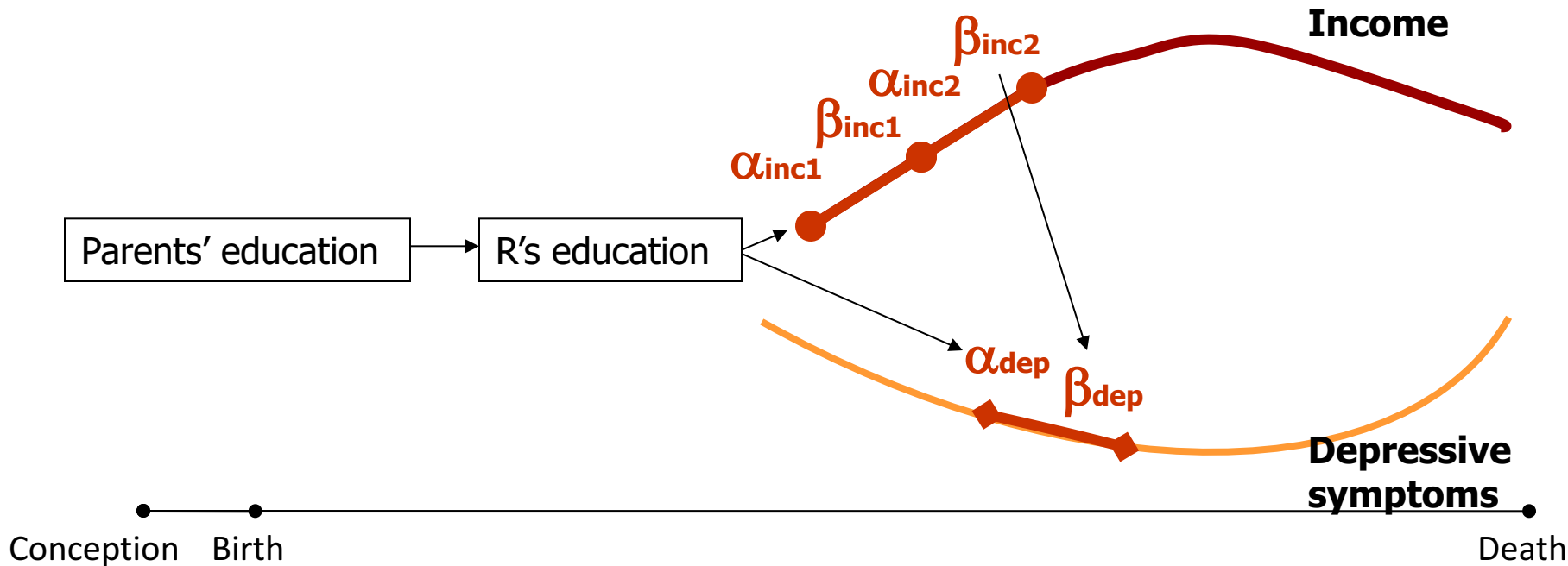
Conseil de recherches en  
sciences humaines du Canada

Canada 

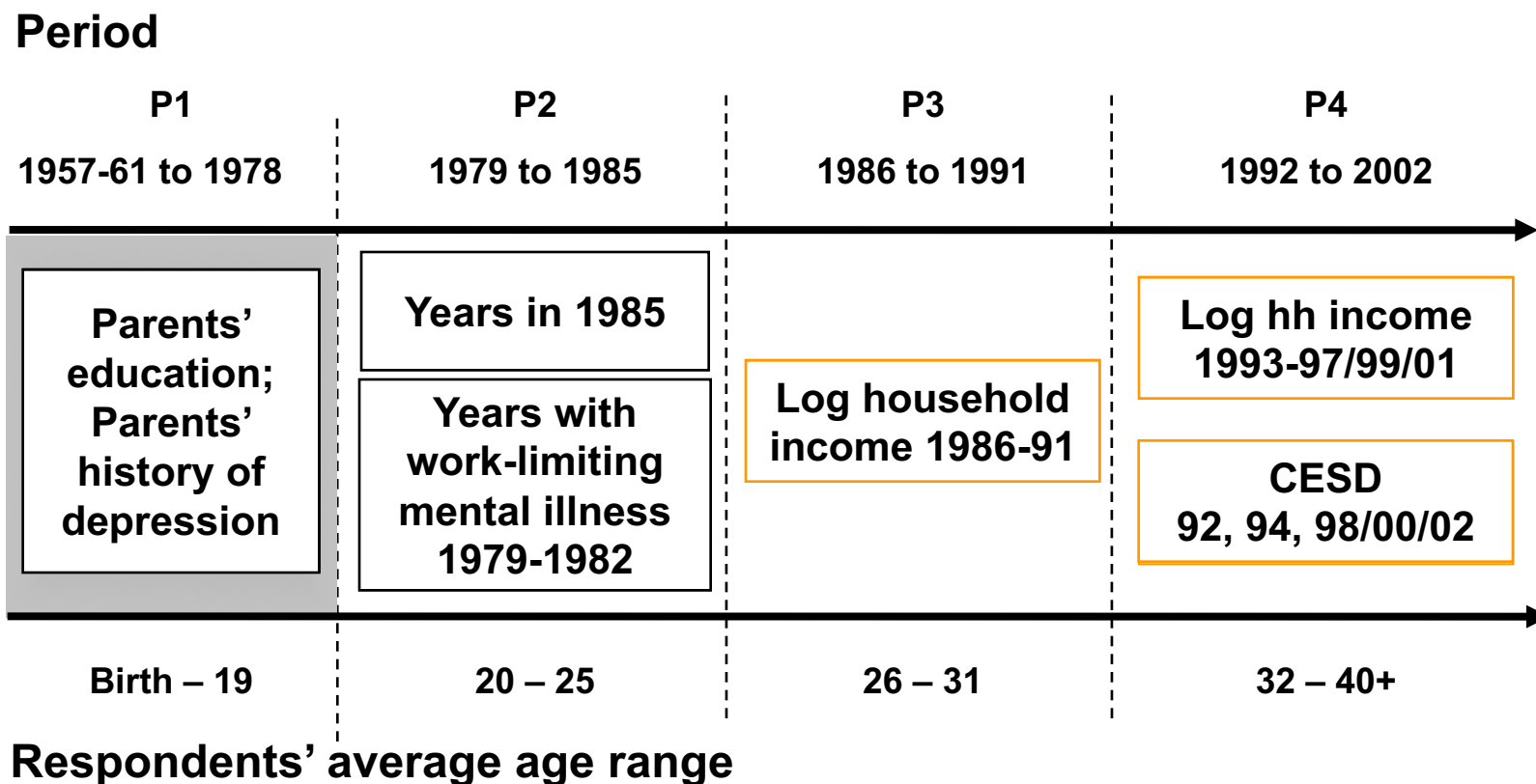
# Depressive symptoms over the life course: A trajectory



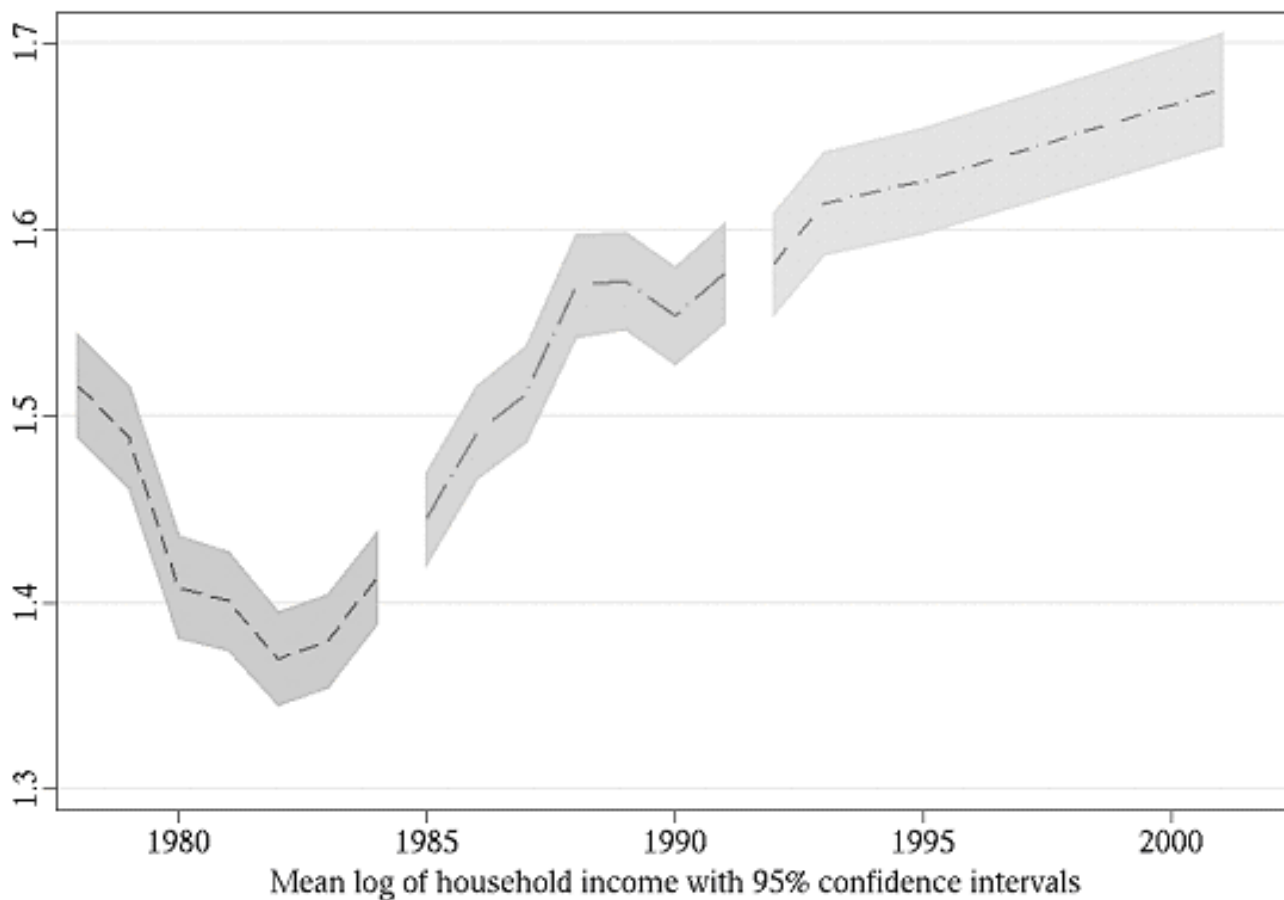
# Household income over the life course: Also a trajectory



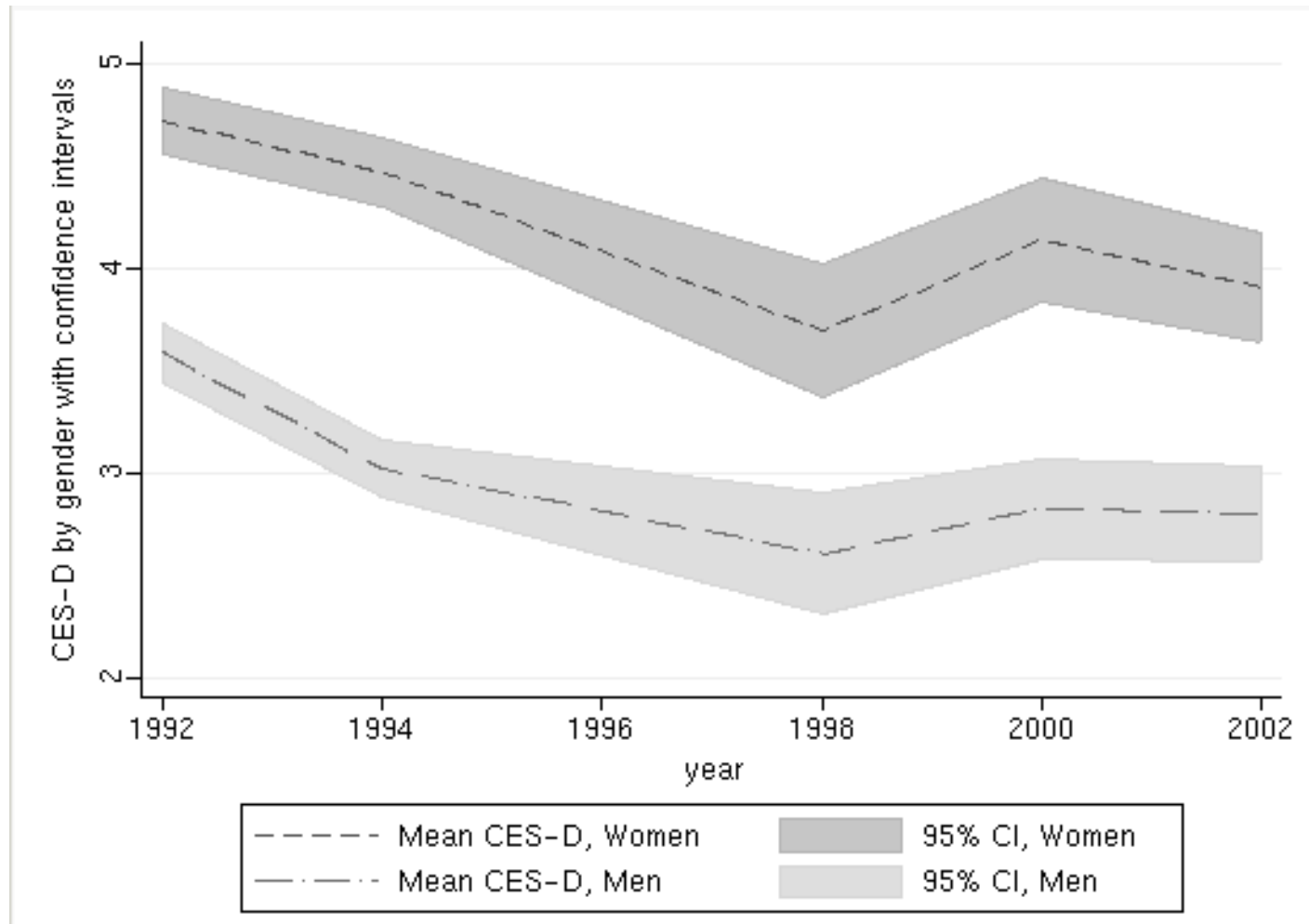
# National Longitudinal Survey of Youth 1979



# Mean log of household income, P2 - P4



# Center for Epidemiologic Studies – Depression by gender





# Methods

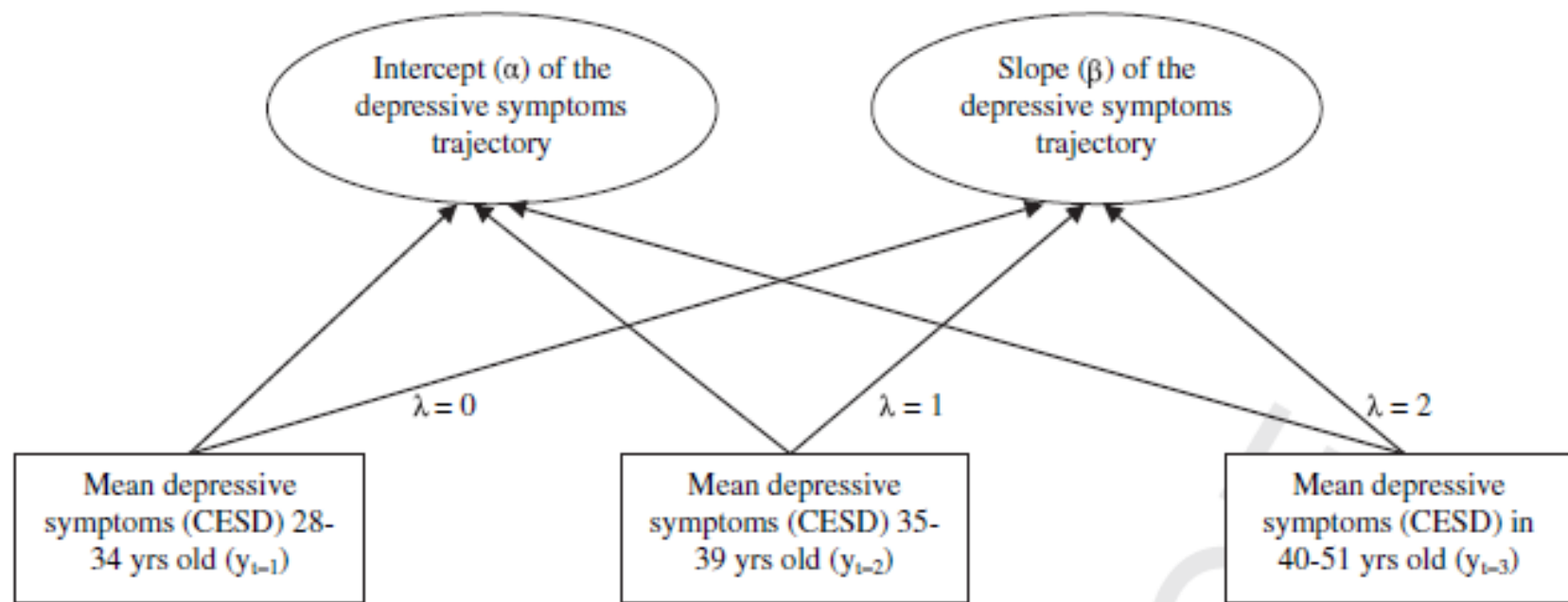
- Structural Equation Modeling (SEM)
- Latent Growth Curves (LGC)
- Level 1

$$y_{it} = \alpha_{yi} + \beta_{yi}\lambda_{yt} + \varepsilon_{yit}$$

$$\alpha_{yi} = \mu_{\alpha y} + \gamma_{\alpha y,1}male + \gamma_{\alpha y,2}black + \zeta_{\alpha yi}$$

$$\beta_{yi} = \mu_{\beta y} + \gamma_{\beta y,1}male + \gamma_{\beta y,2}black + \zeta_{\beta yi}$$





# Methods

- Structural Equation Modeling (SEM)
- Latent Growth Curves (LGC)
- Level 1

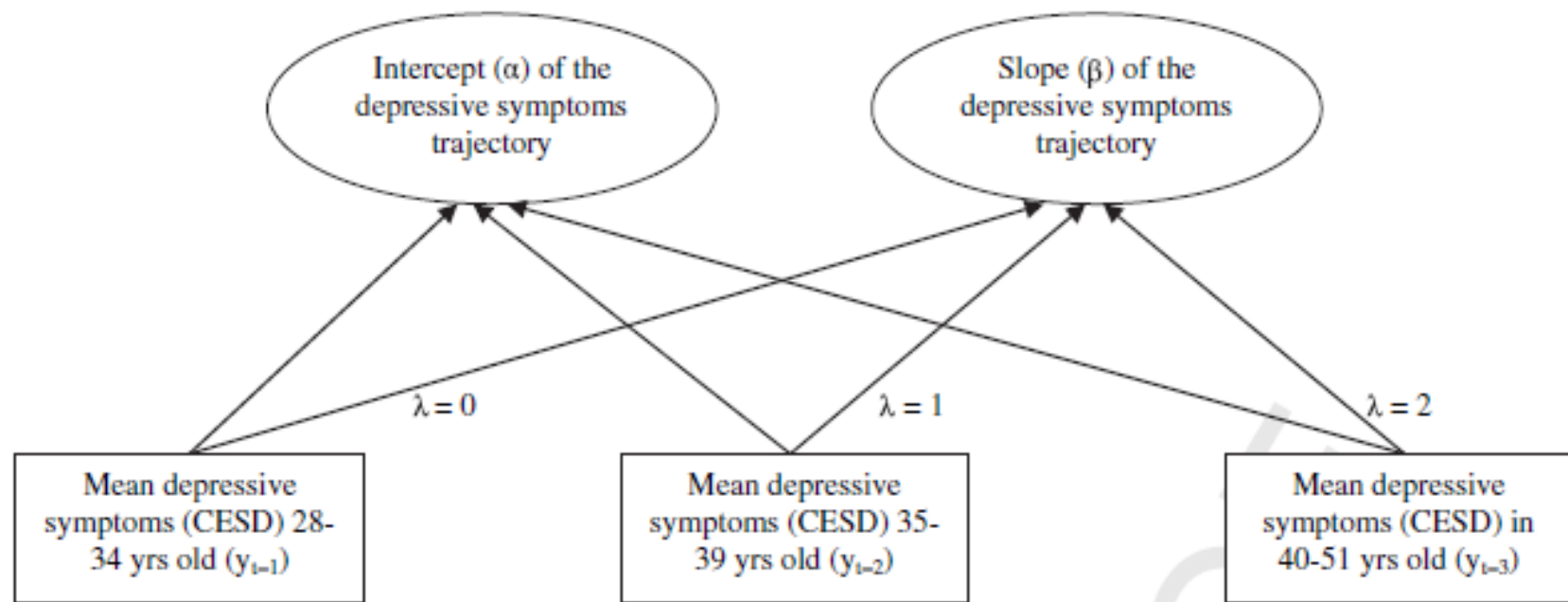
$$y_{it} = \alpha_{yi} + \beta_{yi} \lambda_{yt} + \varepsilon_{yit}$$

- Level 2

$$\alpha_{yi} = \alpha_{yi} = \mu_{\alpha_y} + \gamma_{\alpha_{yi}} X_i + \zeta_{\alpha_{yi}}$$

$$\beta_{yi} = \beta_{yi} = \mu_{\beta_y} + \gamma_{\beta_{yi}} X_i + \zeta_{\beta_{yi}}$$



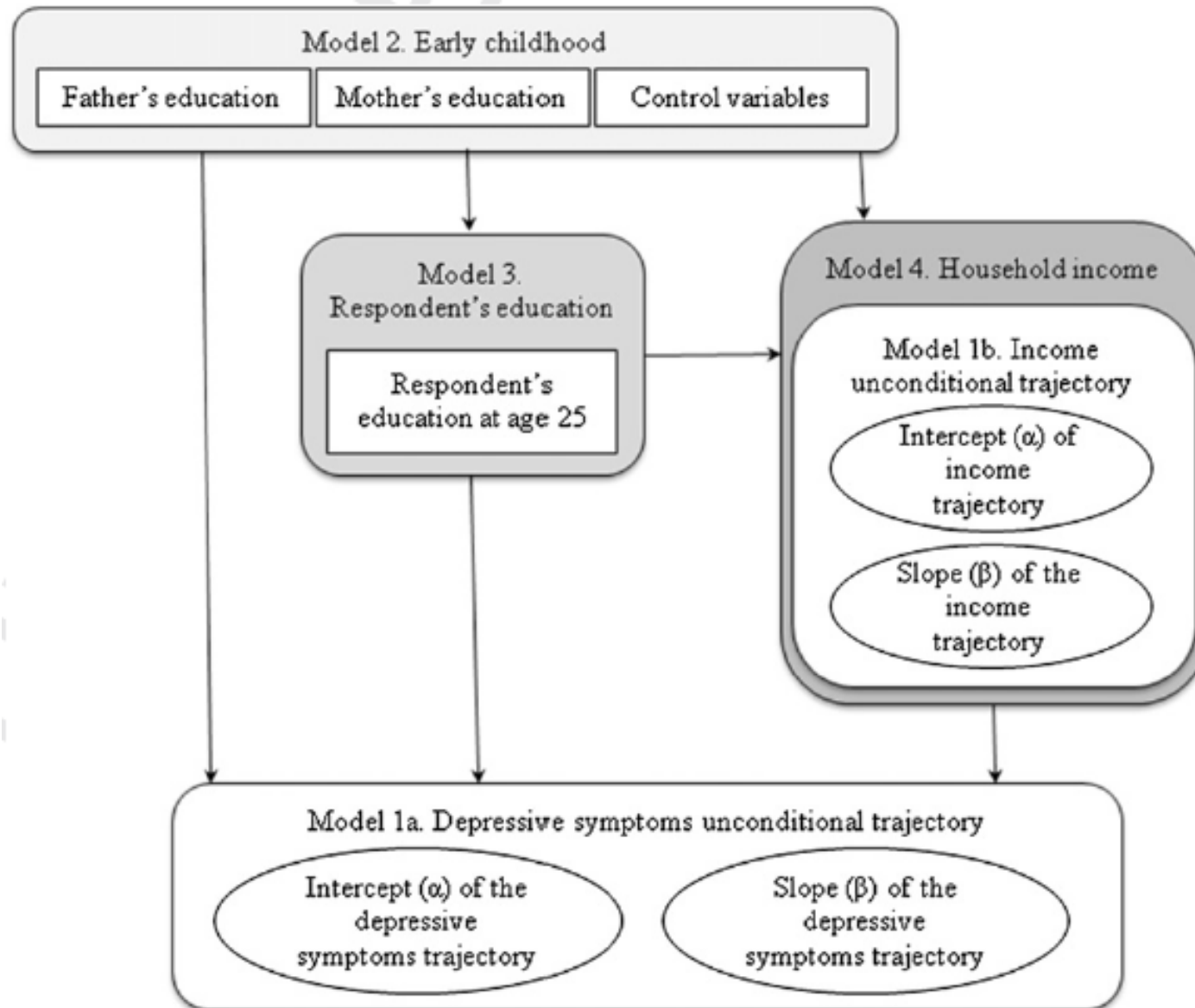


$$\alpha_{yi} = \mu_{\alpha y} + \gamma_{\alpha y 1} \text{male} + \gamma_{\alpha y 2} \text{black} + \gamma_{\alpha y 3} \text{faed} + \gamma_{\alpha y 4} \text{moed} \\ + \gamma_{\alpha y 5} \text{modep} + \gamma_{\alpha y 6} \text{fadep} + \gamma_{\alpha y 7} \text{rdep} + \zeta_{\alpha_{yi}}$$

$$\beta_{yi} = \mu_{\beta y} + \gamma_{\beta y 1} \text{male} + \gamma_{\beta y 2} \text{black} + \gamma_{\beta y 3} \text{faed} + \gamma_{\beta y 4} \text{moed} \\ + \gamma_{\beta y 5} \text{modep} + \gamma_{\beta y 6} \text{fadep} + \gamma_{\beta y 7} \text{rdep} + \zeta_{\beta_{yi}}$$



# Analytic model



**Table 3**  
Parameter estimates of models 2–4.

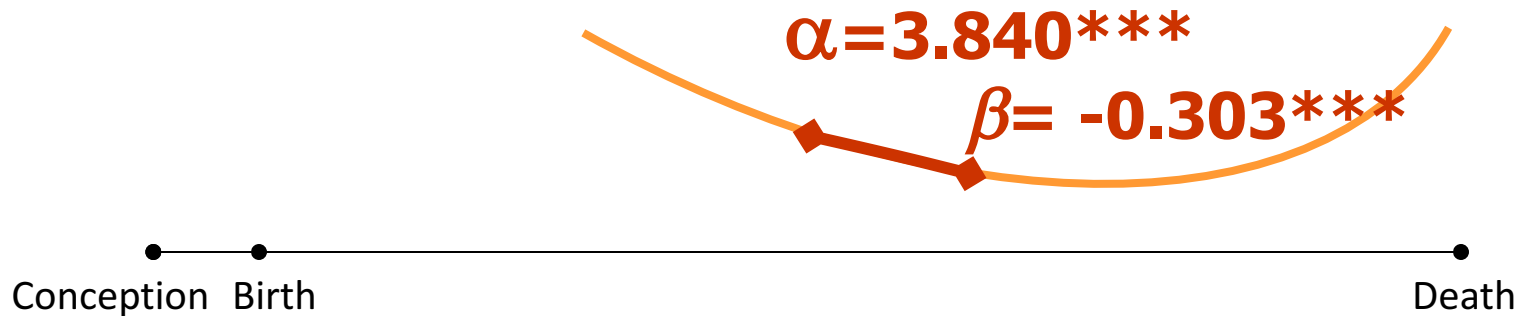
Outcomes	Model 2: Early SEP		Model 3: Respondent's education			Model 4: Household income trajectory				
	CES-D $\alpha$	CES-D $\beta$	R's Educ.	CES-D $\alpha$	CES-D $\beta$	Income $\alpha$	Income $\beta$	R's Educ.	CES-D $\alpha$	CES-D $\beta$
Black	0.602*** (0.107)	-0.079 (0.070)	0.010 (0.061)	0.605*** (0.106)	-0.079 (0.070)	-0.323*** (0.015)	-0.043*** (0.009)	0.012 (0.061)	-0.050 (0.117)	-0.098 (0.078)
Hispanic	0.182 (0.140)	-0.251*** (0.092)	0.301*** (0.092)	0.261 (0.137)	-0.246*** (0.092)	-0.058*** (0.020)	-0.016 (0.012)	0.294*** (0.091)	0.149 (0.137)	-0.267*** (0.093)
Male	-1.078*** (0.090)	0.011 (0.058)	-0.108*** (0.048)	-1.108*** (0.090)	0.011 (0.058)	0.008 (0.012)	0.020*** (0.008)	-0.108*** (0.048)	-1.093*** (0.089)	0.049 (0.059)
Father's depression	0.778 (0.438)	0.213 (0.232)	—	0.744 (0.431)	0.200 (0.232)	—	—	—	0.708 (0.391)	0.162 (0.236)
Mother's depression	0.306 (0.444)	0.611 (0.338)	—	0.281 (0.436)	0.604 (0.337)	—	—	—	0.205 (0.432)	0.573 (0.326)
Early depression	7.147*** (1.454)	-1.645 (1.035)	—	6.984*** (1.469)	-1.665 (1.044)	-0.432*** (0.115)	-0.118 (0.077)	—	6.021*** (1.414)	-1.731 (1.044)
Father's education	-0.048*** (0.016)	0.005 (0.010)	0.175*** (0.011)	0.000 (0.017)	0.008 (0.011)	0.007*** (0.003)	0.003* (0.001)	0.174*** (0.011)	0.013 (0.017)	0.012 (0.011)
Mother's education	-0.070*** (0.021)	-0.025 (0.013)	0.235*** (0.015)	-0.007 (0.021)	-0.019 (0.013)	0.010*** (0.003)	-0.001 (0.002)	0.235*** (0.015)	0.015 (0.021)	-0.023 (0.014)
Respondent's education	—	—	—	-0.275*** (0.024)	-0.017 (0.015)	0.088*** (0.004)	0.022*** (0.002)	—	-0.097*** (0.026)	0.005 (0.017)
Income $\alpha$	—	—	—	—	—	—	—	—	-2.016*** (0.140)	—
Income $\beta$	—	—	—	—	—	—	—	—	—	-1.643*** (0.214)
Intercept	5.630*** (0.272)	-0.011 (0.164)	8.322*** (0.172)	7.931*** (0.341)	0.112 (0.211)	0.345*** (0.046)	-0.199*** (0.028)	8.319*** (0.172)	8.618*** (0.342)	-0.248 (0.222)
Var.	5.142*** (0.220)	0.000 (0.000)	3.779*** (0.086)	4.824*** (0.211)	0.000 (0.000)	0.164*** (0.005)	0.039*** (0.003)	3.780*** (0.086)	4.183*** (0.191)	0.000 (0.000)
$\chi^2$ (df)	21.845 (14)		28.925 (18)			108.350 (42)				
prob.	0.082		0.049			0.000				
TLI	0.988		0.992			0.990				
CFI	0.995		0.997			0.996				
RMSEA	0.008		0.008			0.013				

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

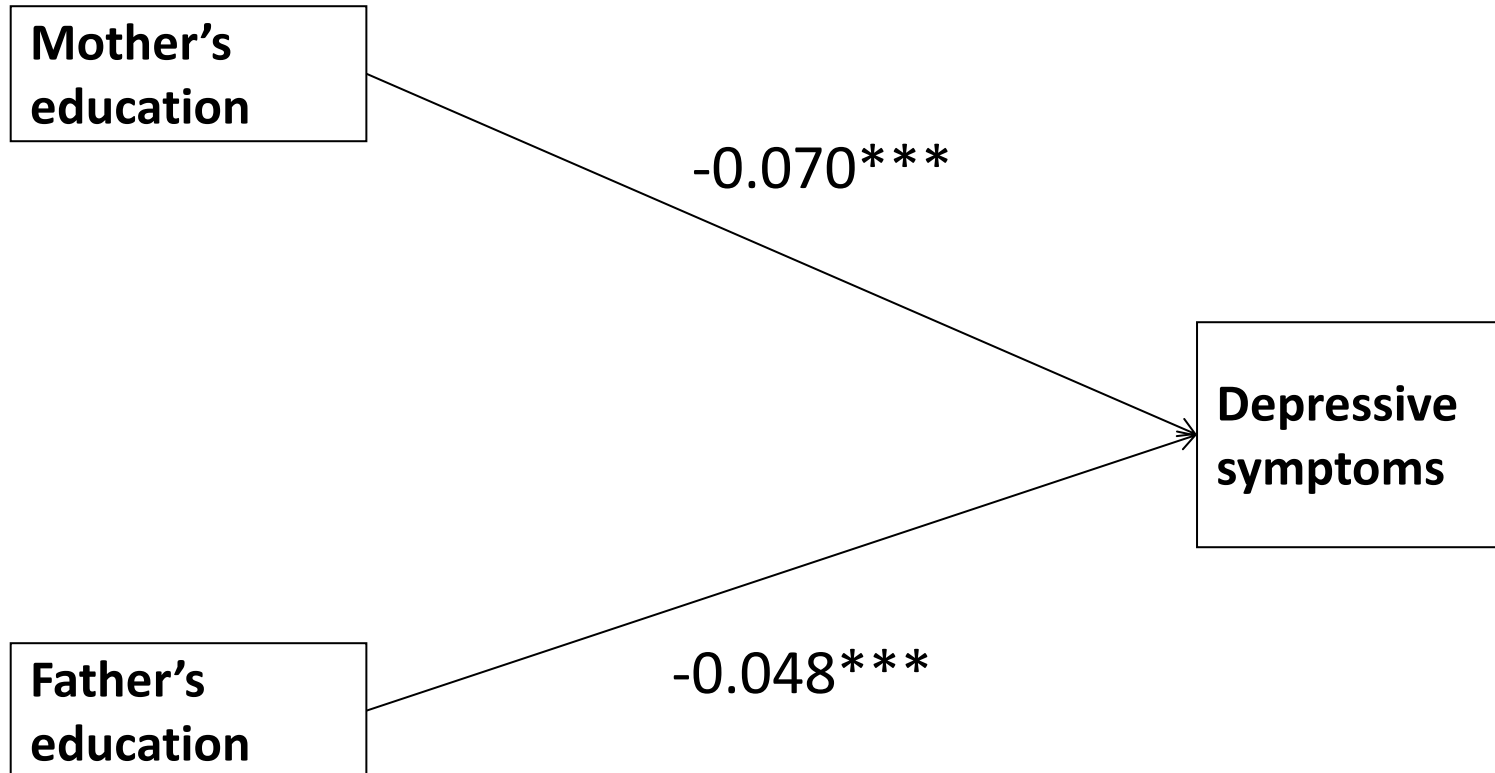


# Results

- *Depressive symptoms over time: A trajectory?*

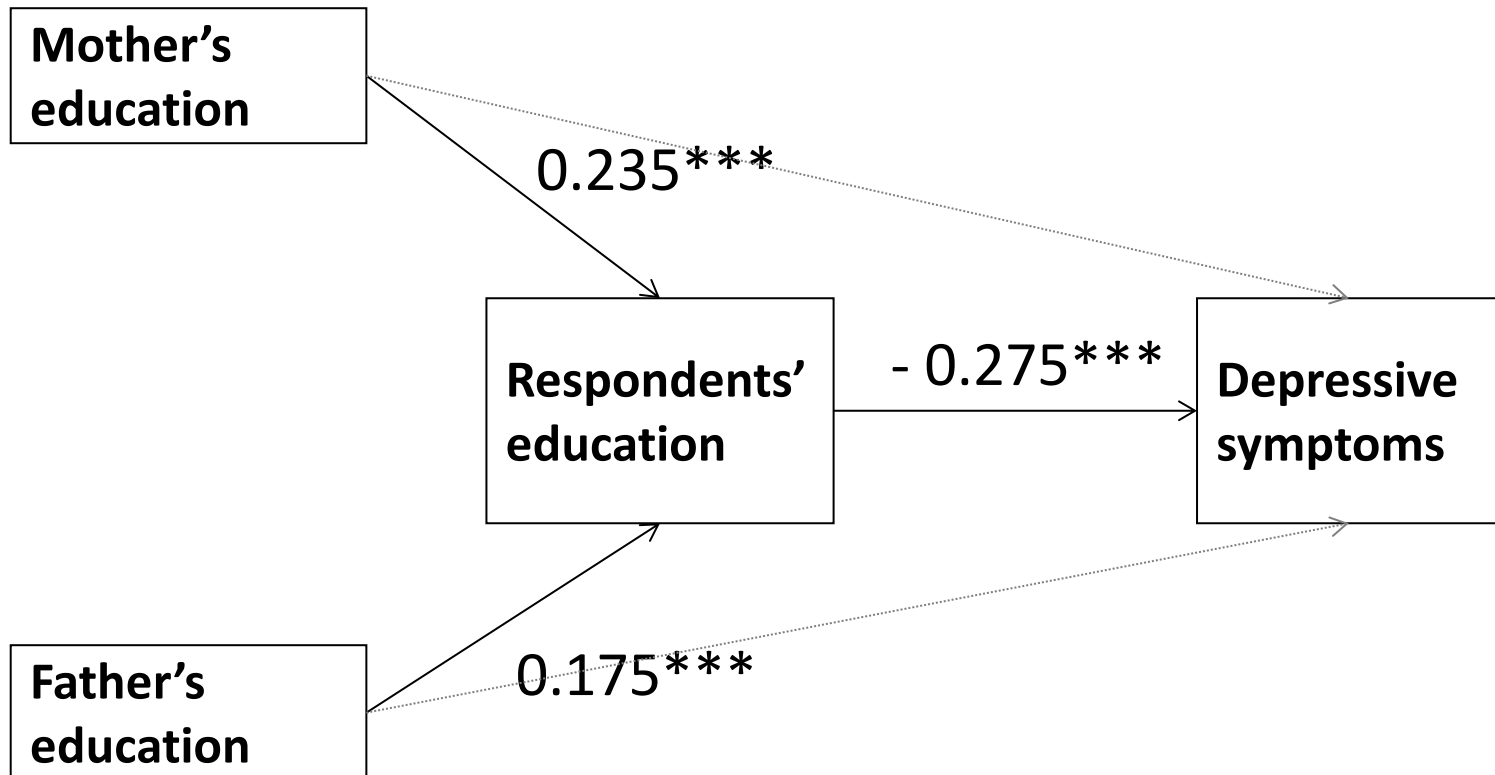


# Results: Parents' education





# Results: Respondent's education



**Table 4**  
 Direct, indirect and total effects of main SEP variables on the intercept of depressive symptoms, estimates from model 4.

	Mother's education	Father's education	Respondent's education
Direct effect	0.015	0.013	−0.097
Indirect effects			
via respondent's education	−0.023	−0.017	—
via income $\alpha$	−0.020	−0.015	−0.177
via respondent's education and income $\alpha$	−0.042	−0.031	
<i>Total effect</i>	−0.069	−0.049	−0.274

*Note:* Indirect effects are calculated by taking the product of all paths leading from the predictor to the outcome (for example for the indirect effect from Mother's education to depressive symptoms intercept going through the respondent's education:  $0.235^* - 0.097$ ), and total effects are the sum of all direct and indirect effects.



# **Discussion: Effects of parents' education on adult mental health**

- Parents' education had an inverse relationship with respondents' depressive symptoms in adulthood
- This relationship was fully explained by respondents' education
- In turn, the effect of respondent's education was also largely mediated by their household income
- Adult depressive symptoms are the outcome of life course pathways of social attainment rooted in parents' education



# Robust effect of mother's education

- Few studies distinguish between mother's and father's education
- Those that do typically find mother's education to have a stronger effect
- However, that effect tends to wane with mediating SEP
  - Different cohorts
  - Older respondents
  - Less than high school may be a more stringent measure of deprivation
- Suggestion from animal models that maternal behavior may affect offspring's reactivity to stress

# Stress during childhood

- Sonia Lupien: Stress is caused by
  - **NOVELTY**
  - **UNPREDICTABILITY**
  - **THREAT TO THE EGO**
  - **SENSE OF CONTROL**

# What's in a high school degree?

- **Parents with higher levels of education**
  - Less likely to use harsh and/or erratic discipline
  - More likely to :
    - Show greater warmth and emotional supportiveness
    - Provide cognitively stimulating learning environments and engage in educational behaviours
    - Adopt teaching strategies that promote skill and foster interest and motivation
- **A parent with less than high school education is more likely**
  - to be in a precarious socioeconomic position: job loss, frequent moves

# Longitudinal International Study of Adults

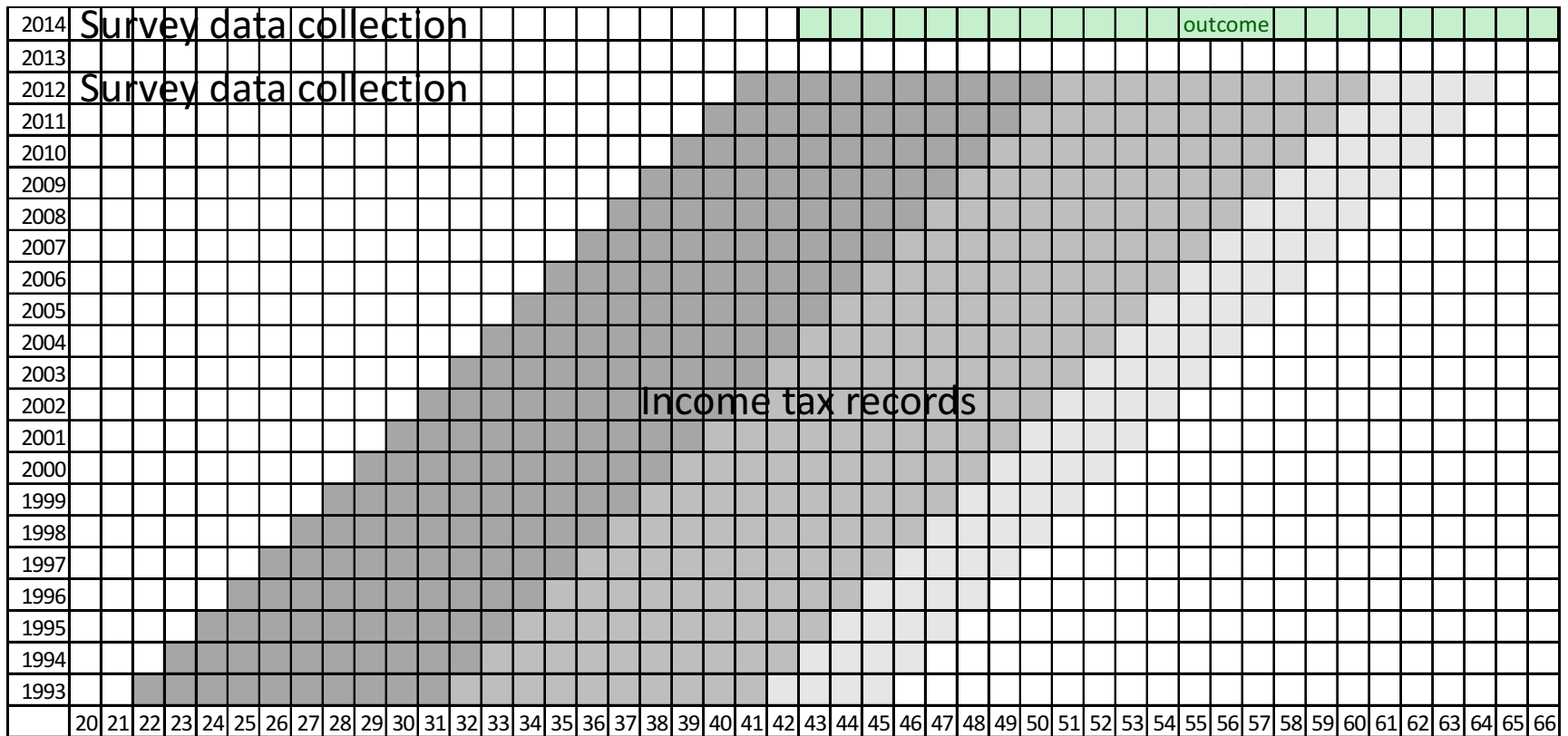
- Biennial household panel survey, began in 2012
- Sample: 18,000 households, approx. 32,000 individuals 15 years and over (+ future children)
  - ~3,400 respondents self-assessed as retired in 2012
- Linked at the outset with
  - Historical tax records since 1982 (92% of in-scope respondents linked)
  - Pension files
  - Immigration files
- Also a subsample of PIACC respondents in wave 1 (15-65 yrs old) → thorough OECD literacy assessment

# Sample

- 40 to 64 yrs old in 2012
- With a past record of employment income
- Income trajectories and government transfers from tax records 1993-2011

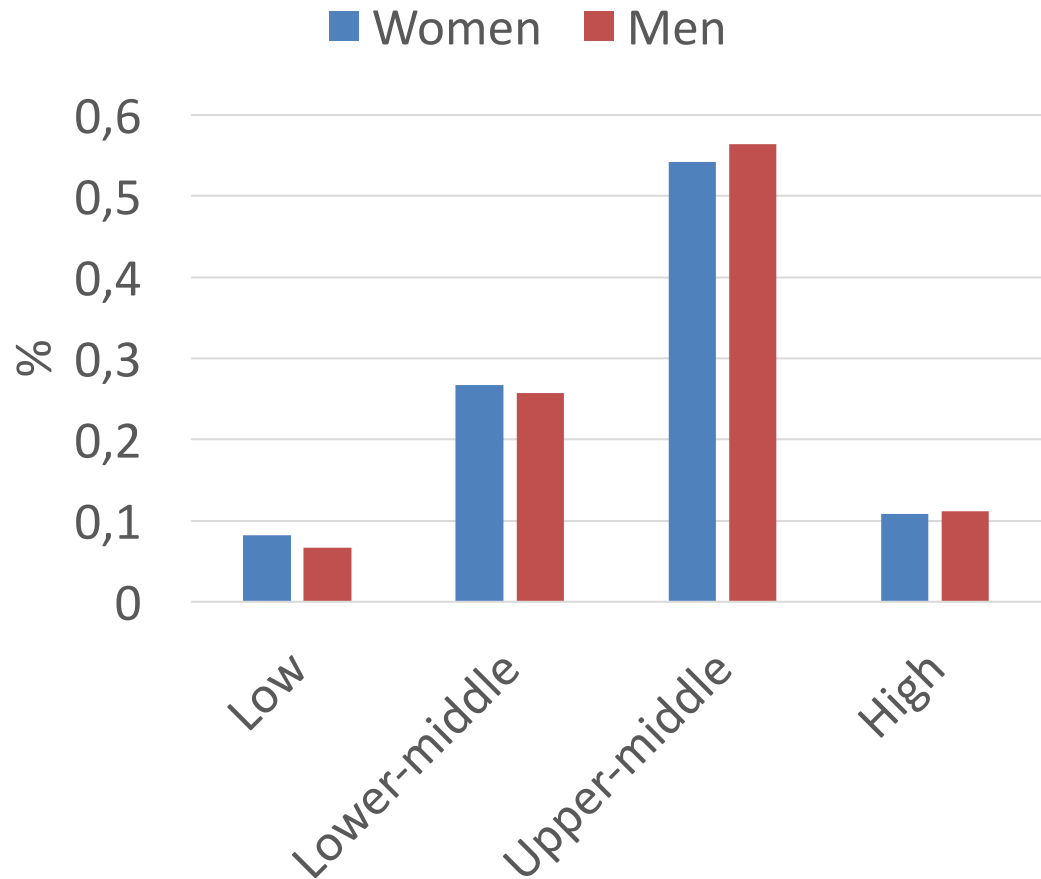


# Lexis diagram



# Household income trajectories 1993-2011

- Latent class analysis with Mplus
- Best fitting model: four latent classes stratified by sex



# Government transfers 1993-2011

