Socioeconomic inequalities in health among Swedish men and women born 1915-2010: life course and intergenerational effects across the twentieth century

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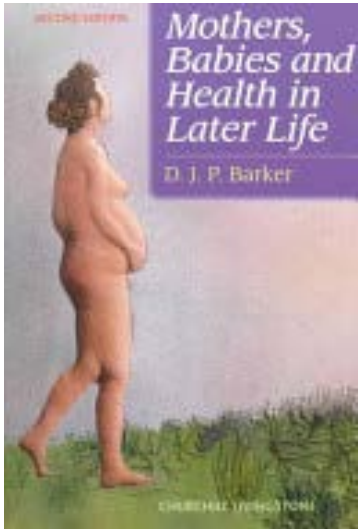
Outline

- Developmental origins of health and disease and health equity studies
- Setting up the Uppsala Birth Cohort Study (UBCoS)
- Early life and intergenerational origins of health, education and reproductive outcome (UBCoS Multigen)
- Methodological issues and challenges for further research and implementation

The ”developmental origins of disease” paradigm

- ”A reflection of the persistence of immediate homeostatic responses and predictive adaptive responses in humans who now live in very different environments from those whithin which they evolved” (Gluckman & Hanson, 2004; Gluckman et al. 2005; Bateson et al. 2004)
- Builds upon evidence on ”fetal origins of adult disease” (Barker 1980s-)



Prof Dr David Barker (1938-2013)

Evidence from Swedish studies on ”developmental origins of disease”

Reduced fetal growth rate and increased risk of death from ischaemic heart disease: cohort study of 15 000 Swedish men and women born 1915-29

David A Leon, Hans O Lithell, Denny Vågerö, Ilona Koupilová, Rawya Mohsen, Lars Berglund, Ulla-Britt Lithell, Paul M McKeigue

BMJ 1998

Paternal age and schizophrenia: a population based cohort study

Attila Sipos, Finn Rasmussen, Glynn Harrison, Per Tynelius, Glyn Lewis, David A Leon, David Gunnell

American Journal of Epidemiology
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Vol. 165, No. 12
DOI: 10.1093/aje/kwm028
Advance Access publication March 10, 2007

Original Contribution

Growth Trajectory Matters: Interpreting the Associations among Birth Weight, Concurrent Body Size, and Systolic Blood Pressure in a Cohort Study of 378,707 Swedish Men

Debbie A. Lawlor[1], David A. Leon[2], and Finn Rasmussen[3,4]

Int. J. Epidemiol. Advance Access published April 29, 2010

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International Journal of Epidemiology 2010;1–10
doi:10.1093/ije/dyq064

Familial factors confound the association between maternal smoking during pregnancy and young adult offspring overweight

Anastasia Nyman Iliadou,[1]* Ilona Koupil,[2] Eduardo Villamor,[3] Daniel Altman,[1] Christina Hultman,[1] Niklas Långström[1] and Sven Cnattingius[1,4]

ELSEVIER
Evolution and Human Behavior 30 (2009) 329 – 341
Evolution and Human Behavior

Social and biological determinants of reproductive success in Swedish males and females born 1915–1929☆

Anna Goodman[a], Ilona Koupil[b,*]

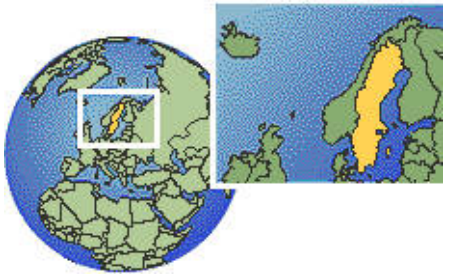
© Davidsson Å. Akademiska Sjukhuset 1867-1967: en bildkrönika. Stockholm: Almqvist & Wiksell, 1967

Circulation
JOURNAL OF THE AMERICAN HEART ASSOCIATION
American Heart Association.

Associations of Gestational Age and Intrauterine Growth With Systolic Blood Pressure in a Family-Based Study of 386 485 Men in 331 089 Families

Debbie A. Lawlor, Anna Hübinette, Per Tynelius, David A. Leon, George Davey Smith and Finn Rasmussen

Persistence of health inequalities in Sweden



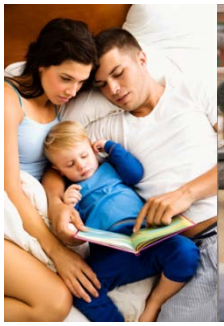
- Welfare policies reduced inequalities in income, housing quality, and access to health care (Kautto et al. 2001)
- Inequalities in health are not smaller in Sweden than in other European countries with less generous welfare arrangements (Mackenbach 2012).

- 'Social causation' and developmental origins of health: "the roots of health inequalities in adult life may lie in social or biological differences experienced in the womb and during childhood"
- 'Social selection': people may be socially mobile (or stable) partially on the basis of health-relevant characteristics

- Both models emphasize **how early circumstances and exposures can shape later outcomes**

Modelling health determinants and pathways to health inequities

- **Social causation** perspective: social position determines health through intermediary factors
  - material conditions, psychosocial mechanisms, behaviours, social cohesion, health care...
- **Social selection** perspective: health determines socioeconomic position
- **Life course** perspective: importance of time and timing in understanding causal links between exposure and outcomes
  - within an individual's lifecourse
  - across generations
  - in population-level disease trends




Life course and intergenerational determinants of health

↓ ”social causation”

↑ ”social selection”

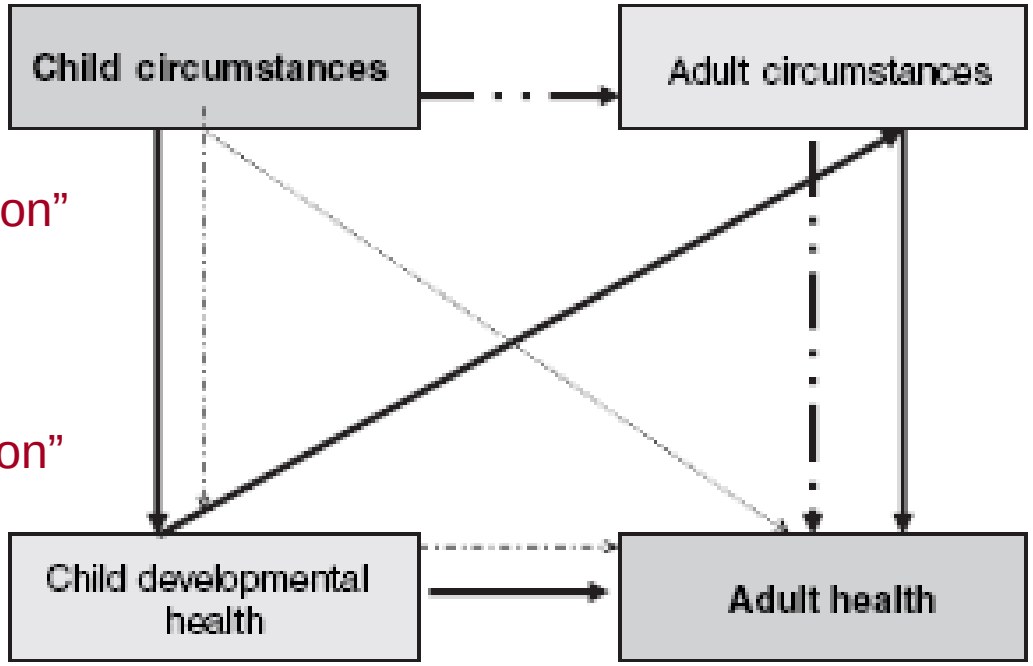


Figure 2. How poor childhood circumstances may compromise adult health.

Graham & Power 2004

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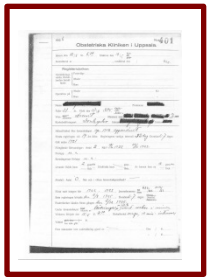
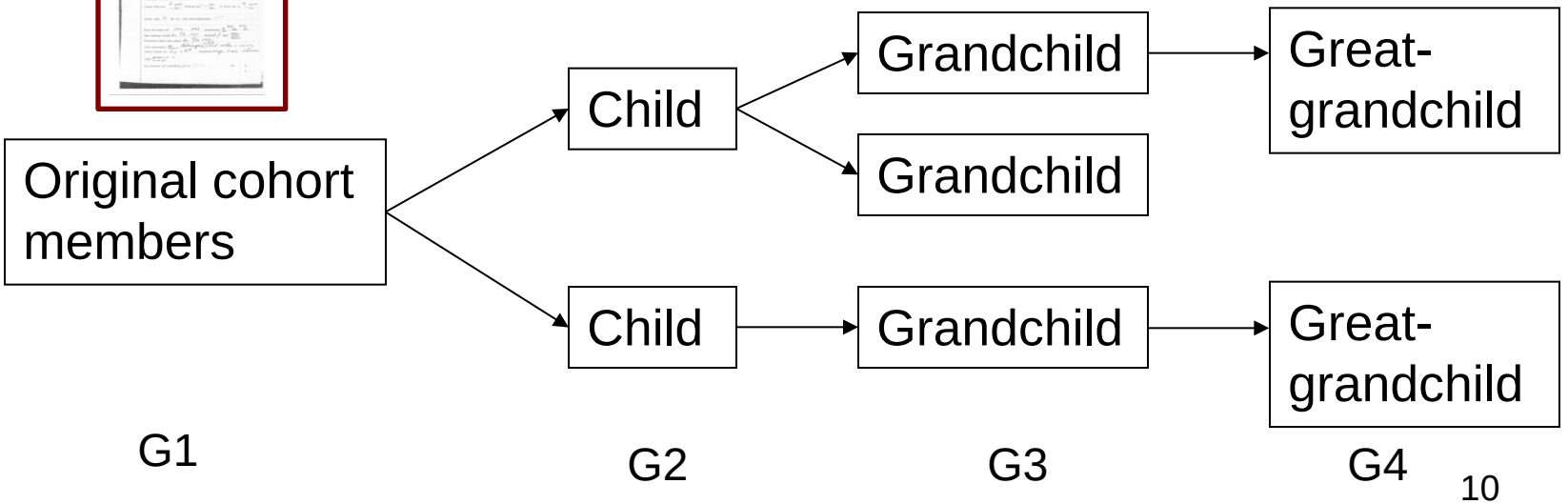
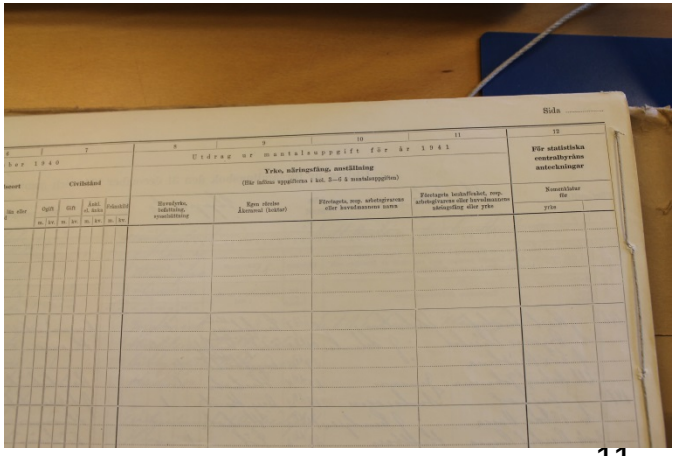
Uppsala Birth Cohort Multigenerational Study (UBCoS Multigen)

- 14,192 live births at the Uppsala Academic Hospital in 1915-1929 – “generation 1” (Leon et al. 1998)
- Subsequent generations born up till 2009 traced through Multi-Generation Register (Koupil 2007; Koupil & Goodman 2010)

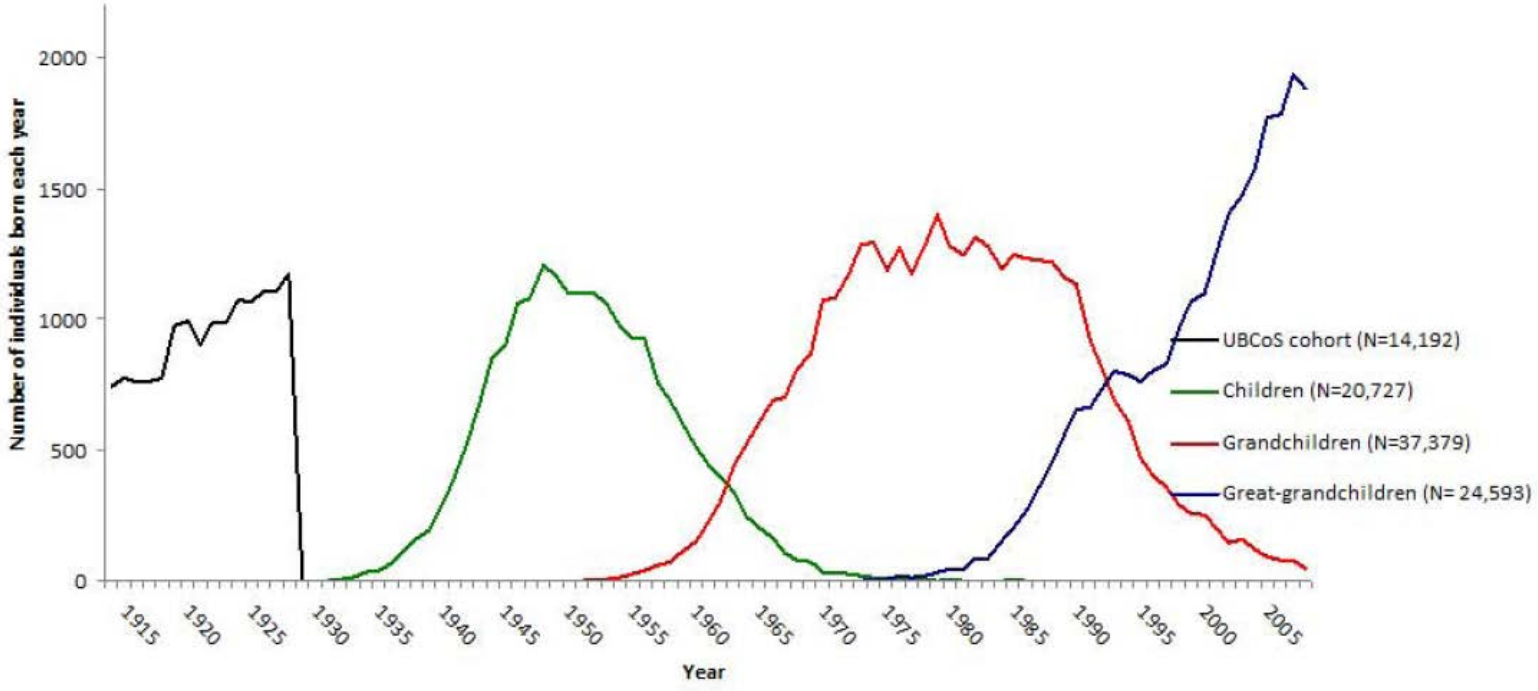




Data collection from
Census 1930 and 1940



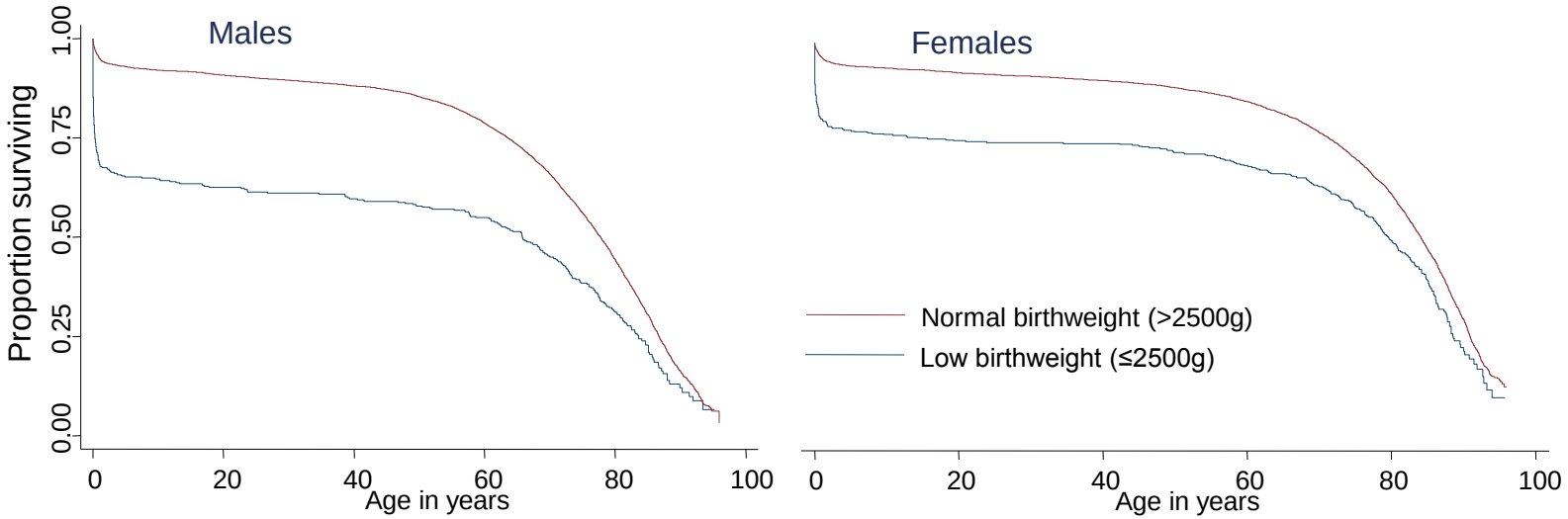
Uppsala Birth Cohort Multigen Study (UBCoS Multigen)



Main social and health indicators used in analyses of UBCoS study subjects

Generation	Main socioeconomic and demographic indicators (from archive and register data)	Main health indicators (from archive and register data)
Parents (born 1867-1913)	Education, occupation, income, wealth, marital status, family composition, reproduction, place of residence	Reproductive health and pregnancy complications, early adult mortality
Original 'UBCoS' cohort (born 1915-1929)	Education, occupation, income, marital status, family composition, reproduction, residence	Birth characteristics, mortality from childhood to old age, inpatient and outpatient care, cardiovascular risk factors, pregnancy complications and outcomes
Children, grandchildren, great-grandchildren, great-great-grandchildren , (born 1932-2010)	School performance (only for those born 1973 onwards), education, occupation, income, marital status, family composition, reproduction, residence [NB data on adult characteristics missing for the youngest descendants]	Birth characteristics (complete for births in Sweden in 1973-2009, ongoing data collection for births in 1932-1972), mortality, inpatient and outpatient care, cardiovascular risk factors, pregnancy complications and outcomes, smoking and other health behaviours

Effect of low birth weight on mortality across the lifecourse in UBCoS Multigen cohort members born 1915-1929



Koupil & Goodman, Public Service Review: European Union 2011;22:382-3.

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Reduced fetal growth rate and increased risk of death from ischaemic heart disease: cohort study of 15 000 Swedish men and women born 1915-29

David A Leon, Hans O Lithell, Denny Vågerö, Ilona Koupilová, Rawya Mohsen, Lars Berglund, Ulla-Britt Lithell, Paul M McKeigue

BMJ 1998;317:241–5

The effect of early life factors on 28 day case fatality after acute myocardial infarction

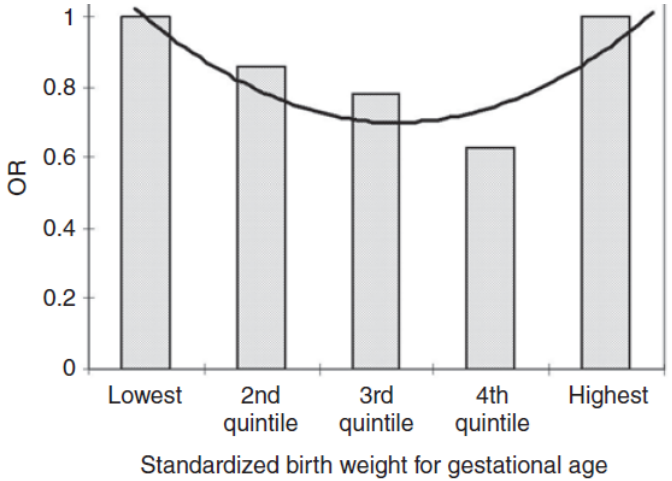

Figure 3. Age and time adjusted odds ratios of death within 28 days after acute myocardial infarction and fitted quadratic trend line in 1,133 men born 1915 and 1929 in Uppsala, Sweden, and followed up between 1964 and 2002.

Rajaleid, Hallqvist, Koupil. Scand J Public Health 2009

Does the strength of the association between foetal growth rate and ischaemic heart disease mortality differ by social circumstances in early or later life?

K Rajaleid, O Manor and I Koupil

J. Epidemiol. Community Health 2008;62;6-
doi:10.1136/jech.2006.059147

Conclusions: Weight for gestational age was inversely associated with the risk of IHD death in men and women; this effect was present in men of non-manual adult social class only but did not appear to be modified by adult social class in women or by social class at birth in either men or women.

... effect strongest among men of non-manual adult social class...

Length of gestation is associated with mortality from cerebrovascular disease

Ilona Koupil, David A Leon, Hans O Lithell

J Epidemiol Community Health 2005;59:473–474. doi: 10.1136/jech.2004.026518

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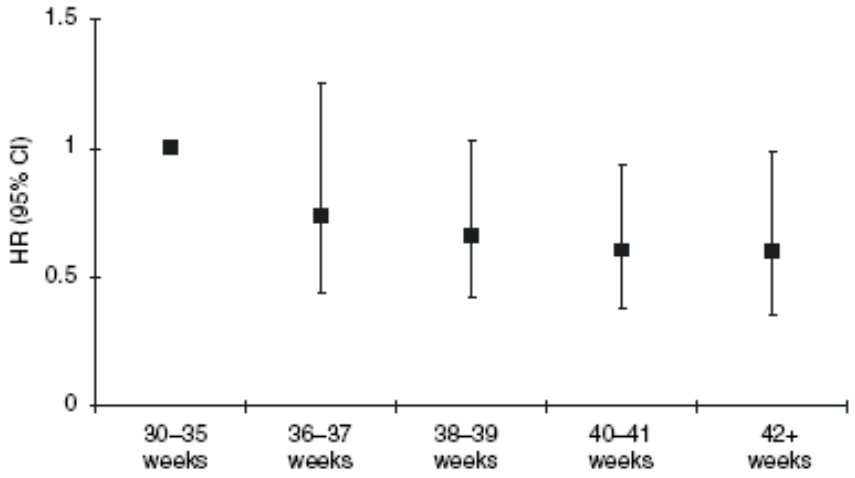


Fig. 3 Hazard ratios for deaths from cerebrovascular disease in 11 474 men and women born 1915–1929, by length of gestation. Adjusted for age, period, gender, social characteristics, and weight for gestational age. Adapted from Koupil *et al.* J Epidemiol Community Health 2005; 59: 473–4 with permission from the BMJ Publishing Group.

- Shorter length of gestation is associated with higher mortality from cerebrovascular disease but not with ischaemic heart disease.
- The risk of death from occlusive stroke in particular is decreased in subjects born after 36 or more weeks of gestation.

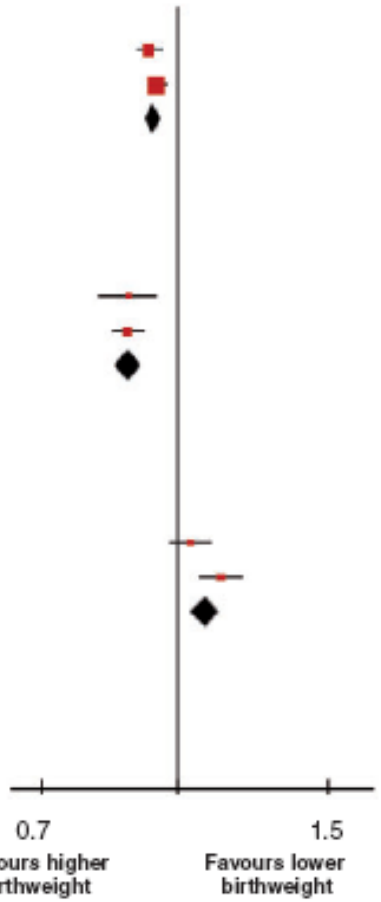
Further findings on circulatory disease:

Low fetal growth rate rather than placental weight predictive of IHD (and thrombotic stroke) but strong effect of social class at birth not mediated by fetal growth rate
(Heshmati & Koupil J DOHaD 2014)

Offspring whose mothers had a small or flat pelvis at increased risk of stroke
(Heshmati et al. under review)

Balancing multiple outcomes

Outcome and subgroup	Participants	Deaths	HR[a] IV, fixed, 95% CI
Results for all-cause mortality			
All causes women	185 553	12 995	0.93 (0.90–0.96)
All causes men	208 509	23 839	0.95 (0.93–0.97)
All causes total	394 062	36 834	0.94 (0.92–0.97)
Heterogeneity: χ^2=1.02 (P=0.31) I^2=2%			
Test for overall effect: Z=5.80 (P<0.00001)			
Results for CVD mortality			
CVD women	149 452	2796	0.88 (0.82–0.95)
CVD men	176 530	8570	0.88 (0.84–0.91)
CVD total	325 982	11 366	0.88 (0.85–0.91)
Heterogeneity: χ^2=0.00 (P=1.00) I^2=0%			
Test for overall effect: Z=7.03 (P<0.00001)			
Results for cancer mortality			
Cancer women	132 820	4208	1.04 (0.98–1.10)
Cancer men	144 803	4176	1.13 (1.07–1.19)
Cancer total	277 623	8384	1.09 (1.05–1.13)
Heterogeneity: χ^2=4.71 (P=0.03) I^2=79%			
Test for overall effect: Z=4.06 (P<0.0001)			



UBCoS studies on cancer: Sovio et al 2012, Silva et al 2008, McCormack et al 2005...

[a]The most fully adjusted estimate from studies were entered analyses

Figure 2 Forest plots with sex-stratified results of meta-analyses assessing the association between birthweight and adult mortality from all-causes, CVD and cancer. HRs with 95% CIs per kg increase in birthweight

Risnes et al 2011

”Negative outcome control” ???

Eur J Epidemiol
DOI 10.1007/s10654-011-9592-3

DEVELOPMENTAL EPIDEMIOLOGY

Fetal growth, early life circumstances, and risk of suicide in late adulthood

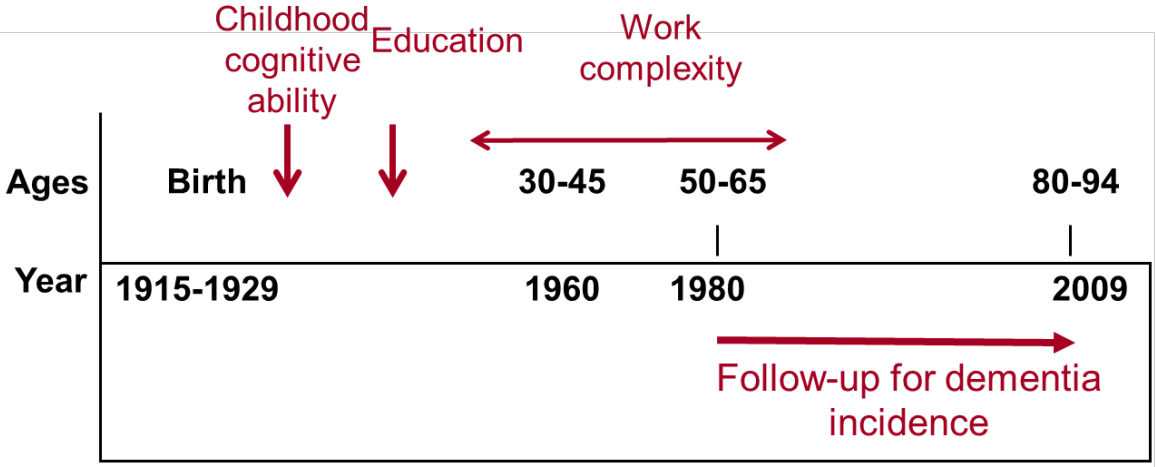
Phoebe Day Danziger · Richard Silverwood · Ilona Koupil

Suicide and fractures

…among adult and old people, early life characteristics found to be associated with suicide rates in adolescents and young adults in previous studies may no longer be as significant. …**adult life circumstances**, such as social class and marital status, were found to be most strongly related to suicide in our cohort (Danziger et al., 2011).

Birth weight is associated with bone mineral content but this association does not translate into an association with risk of fracture in men and women aged 50-94 years (Byberg et al., In press).

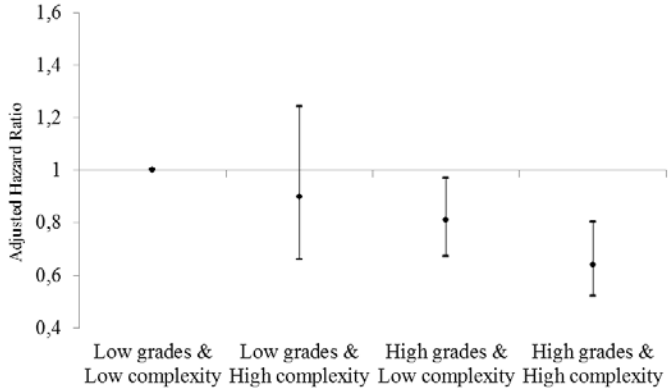
Life-course determinants of dementia: childhood cognitive ability, education, and occupational complexity.



Dekhtyar, Wang, Scott, Goodman, Koupil & Herlitz. Submitted.

Adjusted hazard ratios and 95% confidence intervals of dementia due to the combined effect of childhood cognitive ability and work complexity with data

Adjusted for sex, birth cohort (5 years) and education.
Occupational complexity dichotomized as "analyzing"/higher vs. rest.
Childhood cognitive ability dichotomized as lowest grades quintile vs. rest.

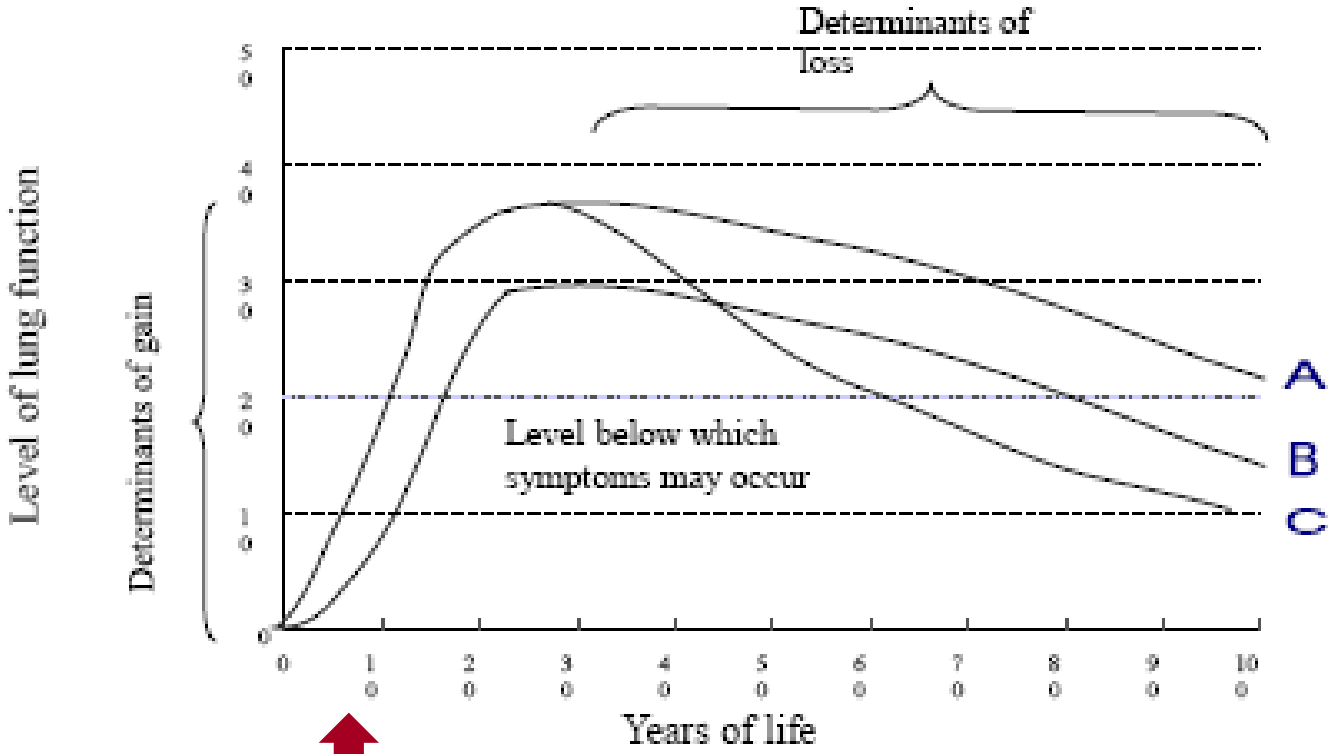


Lowest risk was found in the group with both higher childhood cognitive ability and high occupational complexity with data.

High occupational complexity could not compensate for the effect of low childhood cognitive ability, whereas dementia risk was reduced in those with higher cognitive ability, irrespective of occupational complexity.

Schematic representation of life course of function (e.g lung, muscle)

... cognitive function ...



taken from Strachan (1997)

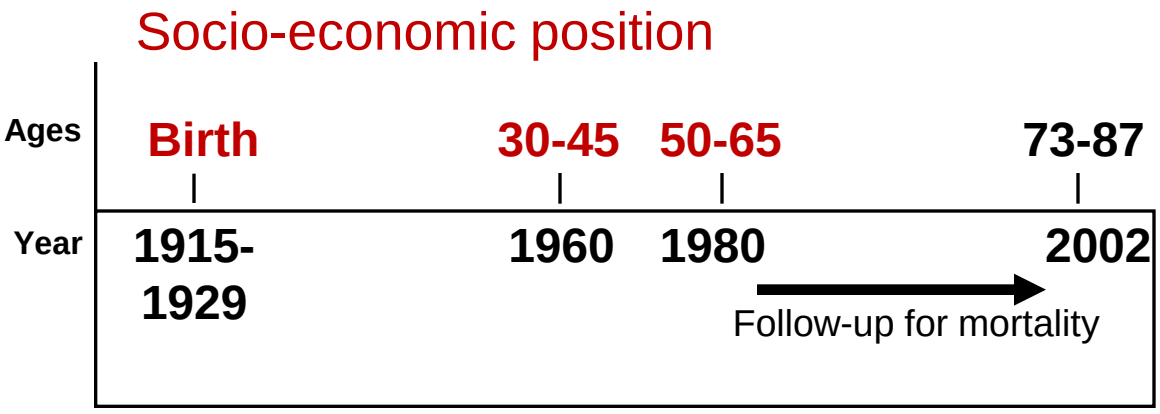
Ben Shlomo & Kuh 2002

Eur J Epidemiol
DOI 10.1007/s10654-013-9777-z 2013

MORTALITY

Socio-economic position over the life course and all-cause, and circulatory diseases mortality at age 50–87 years: results from a Swedish birth cohort

Gita Devi Mishra · Flaminia Chiesa · Anna Goodman · Bianca De Stavola · Ilona Koupil



All-cause mortality in both genders: the sensitive period model best described influence of SEP across the life course with a heightened effect in later adult life.

Circulatory disease mortality: effect of SEP in males was cumulative while a sensitive period model due to SEP in later adult life was selected for women.

Method developed by Mishra G, Nitsch D, Black S, De Stavola B, Kuh D, Hardy R. Int J Epidemiol. 2009;38(2): 528–37.

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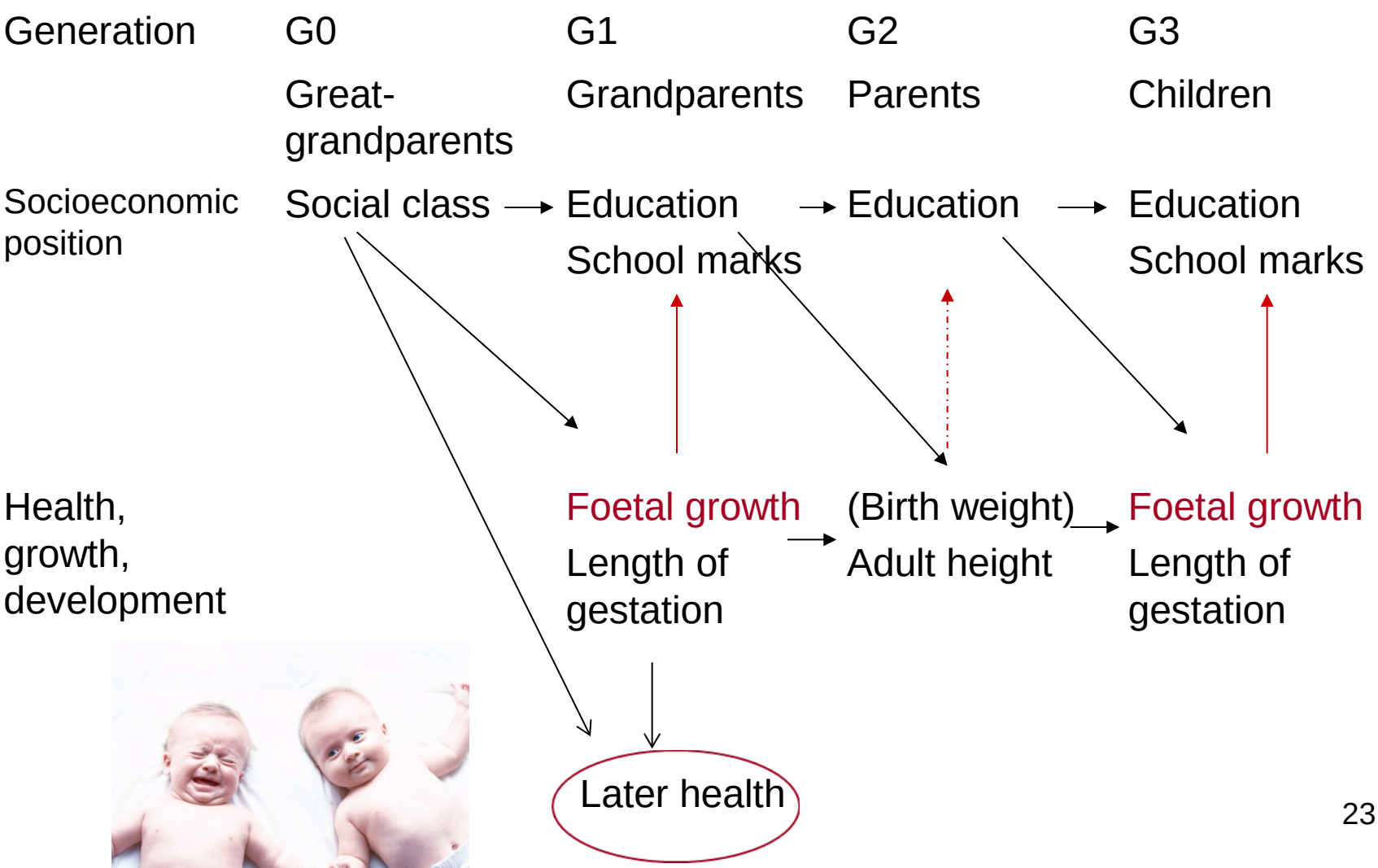
Intergenerational transfer of health inequalities in UBCoS Multigen



Education and social inequalities

- Educational inequalities predict adverse future health across the life-course
- Early life characteristics linked to educational outcomes in earlier studies (Record et al.1969, Bhutta et al. 2002, Shenkin et al. 2004, Bjerkedal et al. 2007, Lawlor et al. 2006, Björklund et al. 2003…Yang et al. 2010)
- Education a major route whereby social inequalities are recreated across generations in Sweden (Jonsson 2004)
- Equalising educational opportunities and outcomes a major political goal in Sweden during the twentieth century (Husén and Boalt 1967, Björklund et al. 2003)

Longitudinal and Life Course Studies 2010 Volume 1 Issue 4 pp 317-338

Birth characteristics and early-life social characteristics predict unequal educational outcomes across the life course and across generations

Data from a Swedish cohort born 1915-1929 and their grandchildren born 1973-1980

Anna Goodman
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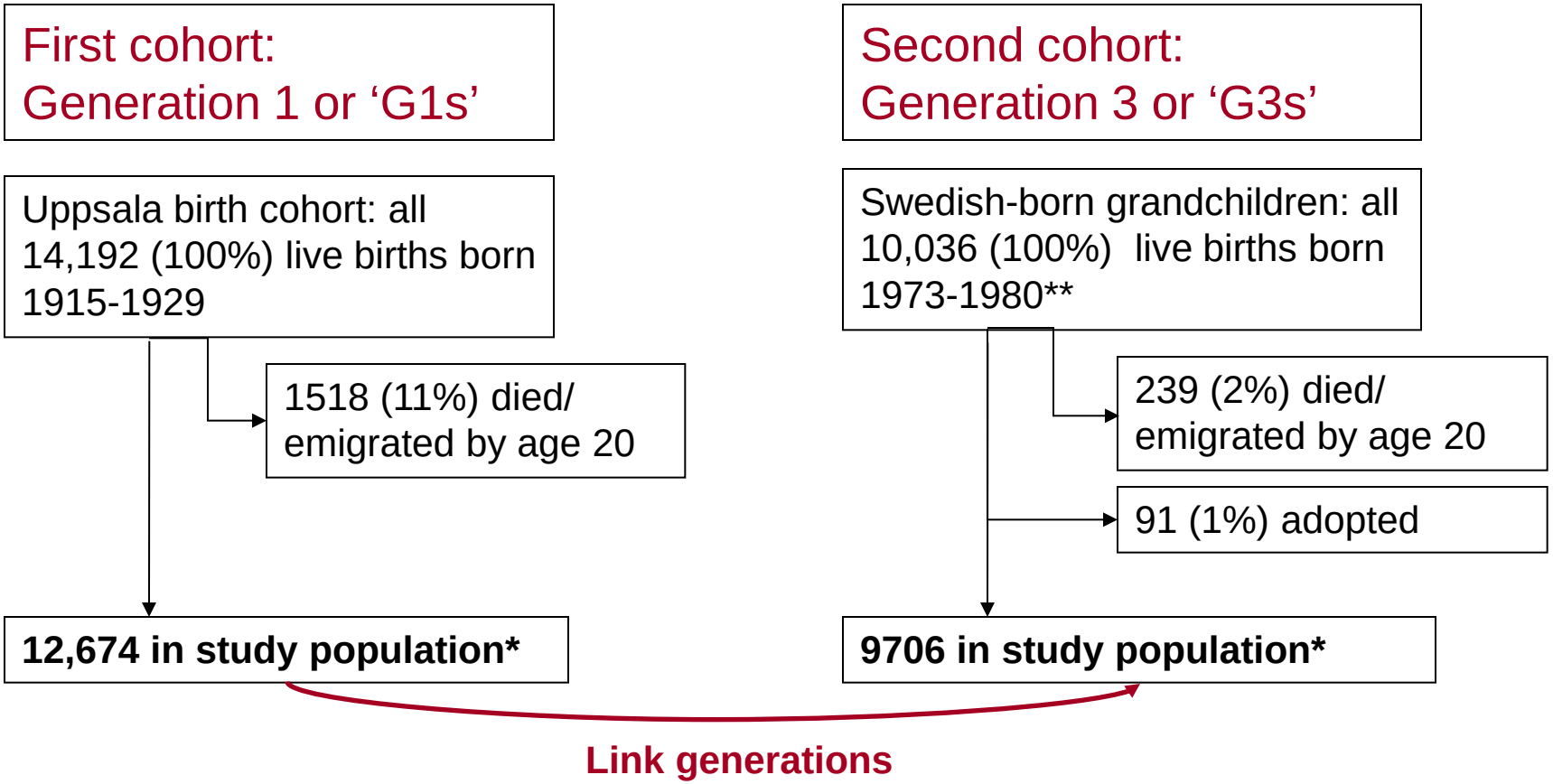
Which early-life characteristics independently predict

- school achievement?
- education continuation?

Uppsala Multigenerational Birth Cohort Study



**multiple imputation rather than exclude 18.5% with missing education data*

*** Years determined by coverage of register information*

Goodman, Gisselman & Koupil. Longit Life Course Studies 2010;1:317-338

Educational outcomes

- School achievement: Standardised mean grades in primary school
  - Third grade (age 10) in G1s
  - Ninth grade (age 16) in G3s

Limitation: grades from different ages - birth characteristics have stronger effects at younger ages

Educational outcomes

- School achievement: Standardised mean grades in primary school
  - Third grade (age 10) in G1s
  - Ninth grade (age 16) in G3s

Limitation: grades from different ages - birth characteristics have stronger effects at younger ages

- Education continuation 1: Completing senior school
- Education continuation 2: Entering higher education.

Similar results: focus on higher education

Early-life characteristics of study subjects from the Uppsala Birth Cohort (G1s, born 1915-1929) and their grandchildren (G3s, born 1973-1980).

Birth chars

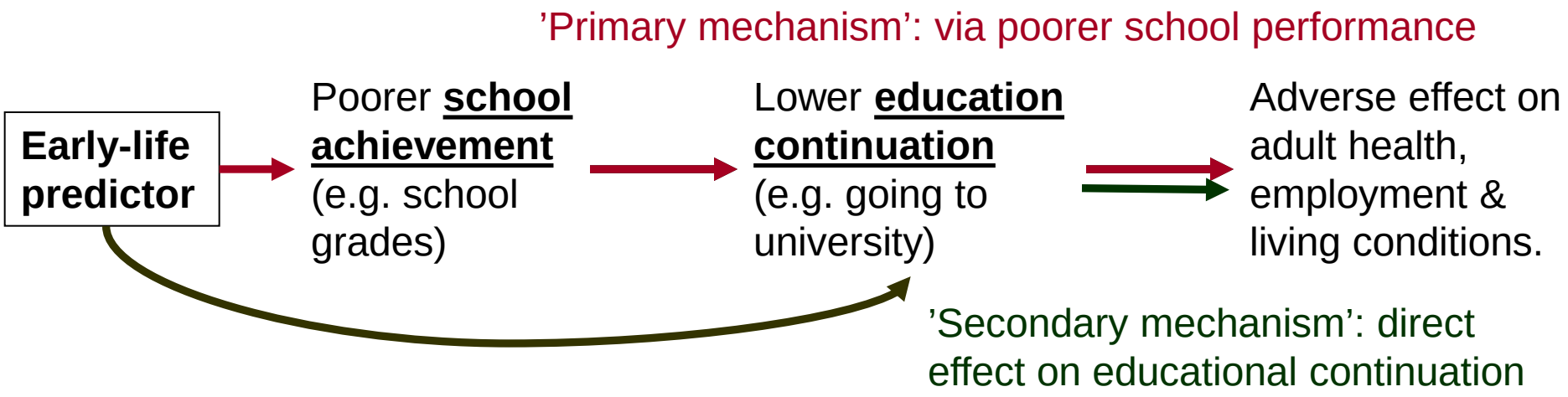
Social chars

Early-life characteristics	Range/categories	Percent in G1 (N=12674)	Percent in G3 (N=9706)
Gender	Male/Female		
Birthweight	<2500g	4.4	3.5
	2500-3000g	14.3	13.0
	3000-3500g	36.1	34.2
	3500-4000g	32.7	33.8
	≥4000g	12.5	15.6
Gestational age	Pre-term (≤36 weeks)	7.3	4.5
	Term (37-42 weeks)	80.6	81.4
	Postterm (≥42 weeks)	12.0	14.0
Birth multiplicity	Singleton	97.3	98.4
	Twin/triplet	2.7	1.6
Birth order	1	39.2	47.2
	2-3	36.8	49.6
	4-5	13.5	3.0
	6-16 [G1] / 6-7 [G3]	10.5	0.2
Mother's age at birth	Five year categories		
Mother's marital status	Married	79.6	59.4
	Unmarried	19.6	39.0
	Widowed/divorced	0.8	1.6
Family social class	High/mediate non-manual	8.7	38.0
	Low non-manual	6.8	13.3
	Skilled manual	14.3	19.1
	Semi/unskilled manual	47.1	16.7
	Self-employed	3.2	7.2
	Farmer	14.5	2.2
	Housedaughter	5.5	[not used]
	Retired, student, other	[not used]	3.6

Additional adjustments for family size, maternal and paternal education in G3

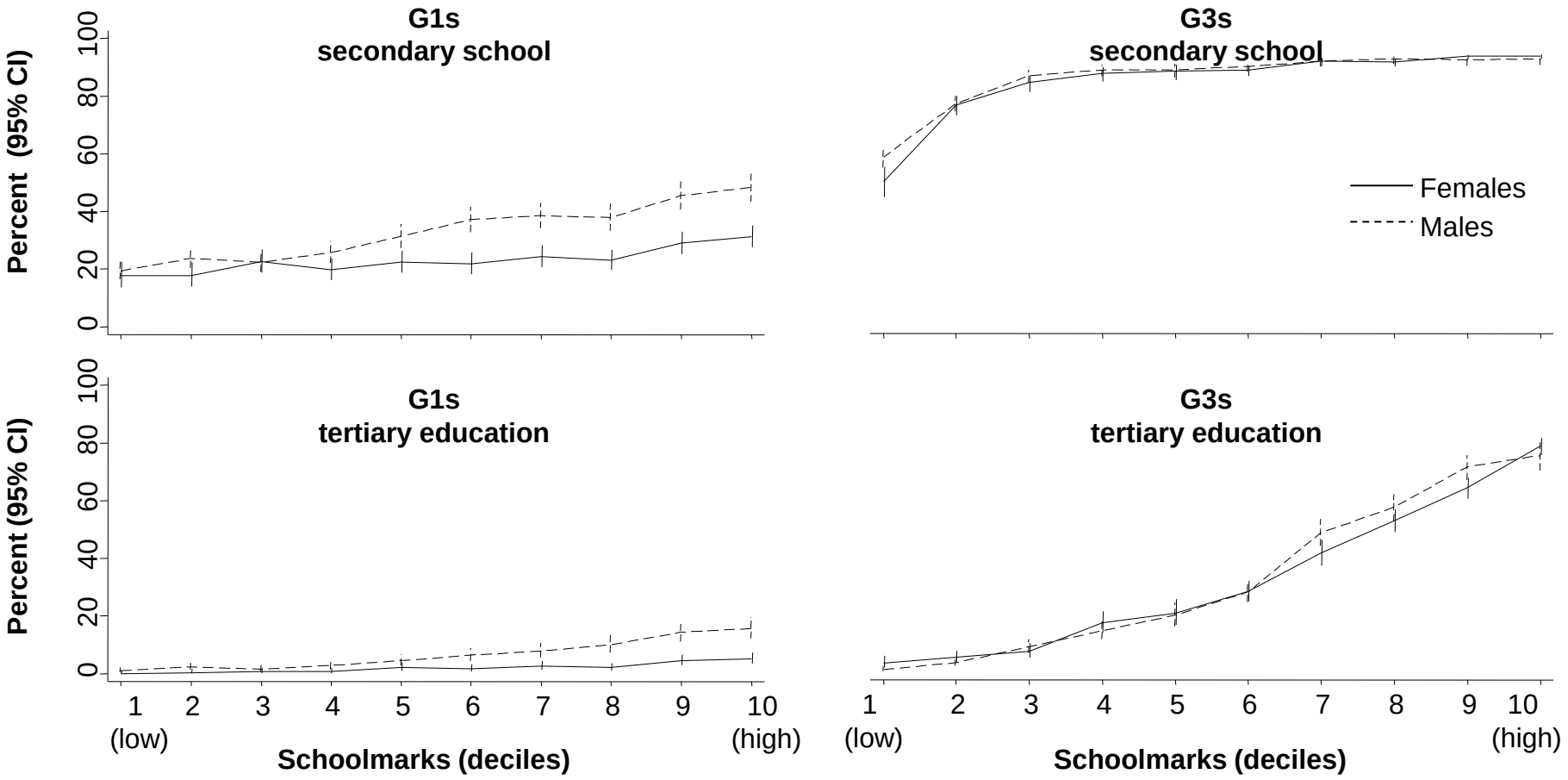
Goodman et al. 2010

Two mechanisms for creating educational inequalities



How far are effects on education continuation mediated by school achievement?

Some good news!



- Education continuation became more common, more 'meritocratic' & less gender discriminating...

Goodman et al. 2010

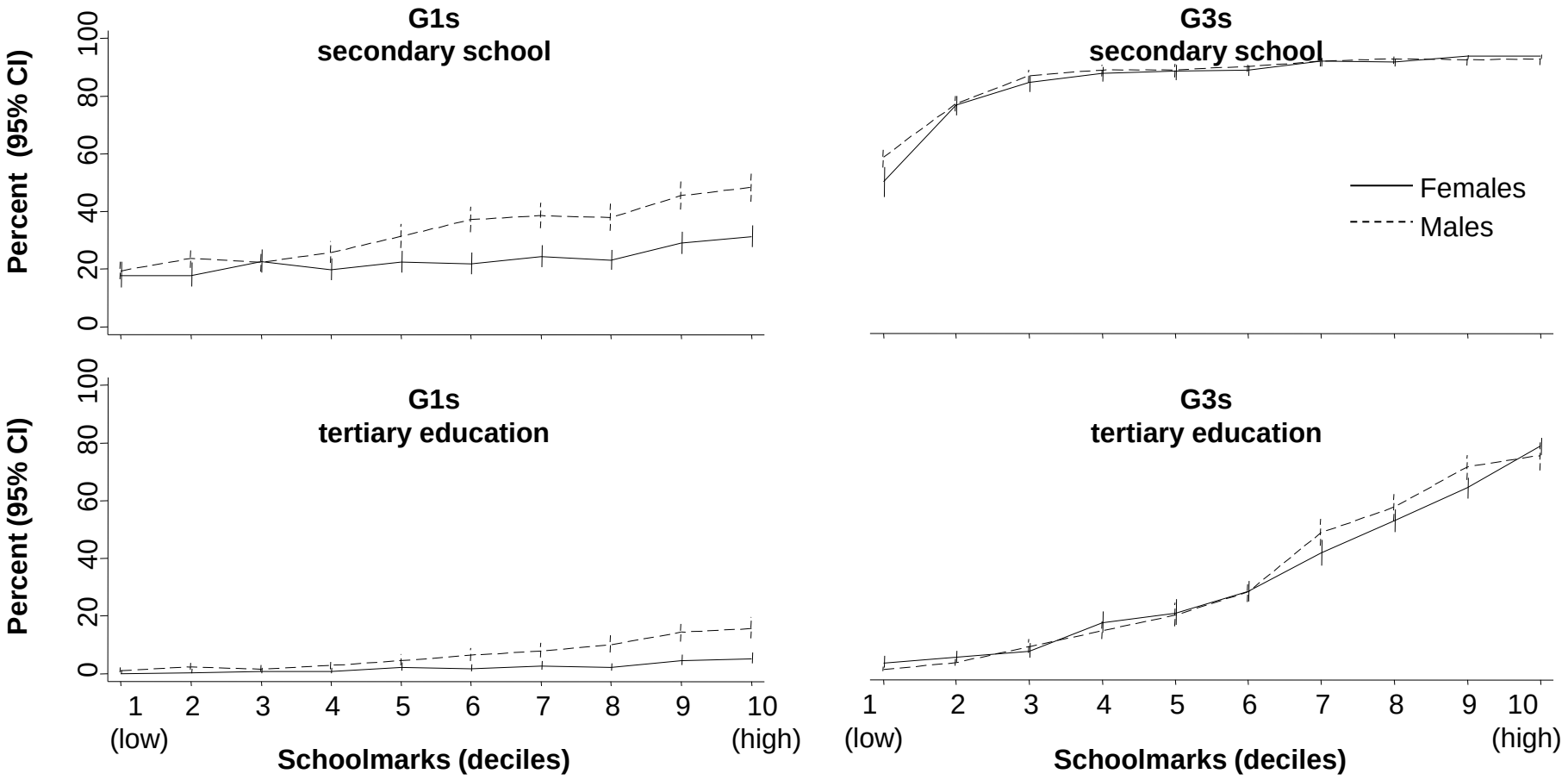
Table 2: Early-life characteristics and school achievement among subjects from the Uppsala Birth Cohort (G1s, born 1915-1929) and their grandchildren (G3s, born 1973-1980)

		G1 characteristics predicting G1 schoolmarks: linear regression, regression coefficients and 95% CI		G3 characteristics predicting G3 schoolmarks: linear regression, regression coefficients and 95% CI	
		Minimally adjusted†	Multivariable: all early-life characteristics	Minimally adjusted†	Multivariable: all early-life characteristics
N		12,674	12,674	9,706	9,706
Gender	Male	0***	0***	0***	0***
	Female	0.35 (0.30, 0.41)	0.37 (0.32, 0.43)	0.42 (0.38, 0.46)	0.43 (0.39, 0.47)
Birth-weight	<2,500g	-0.13 (-0.22, -0.04)	-0.13 (-0.23, -0.04)	-0.22 (-0.35, -0.10)	-0.22 (-0.34, -0.09)
	2,500-3,000g	-0.09 (-0.17, -0.01)	-0.09 (-0.17, -0.02)	-0.10 (-0.17, -0.04)	-0.10 (-0.17, -0.04)
	3,000-3,500g	0**	0**	0***	0***
	3,500-4,000g	0.01 (-0.04, 0.05)	0.02 (-0.03, 0.07)	0.10 (0.05, 0.15)	0.08 (0.04, 0.12)
	≥4,000g	0.01 (-0.06, 0.08)	0.04 (-0.04, 0.11)	0.11 (0.05, 0.17)	0.12 (0.06, 0.18)
Gesta-tional age	Pre-term	-0.10 (-0.17, -0.02)	-0.02 (-0.09, 0.05)	-0.09 (-0.20, 0.02)	0.10 (-0.01, 0.22)
	Term	0**	0	0	0*
	Post-term	-0.06 (-0.11, 0.00)	-0.05 (-0.10, 0.01)	-0.04 (-0.10, 0.02)	-0.06 (-0.12, -0.01)
Birth multiplicity	Singleton	0	0	0	0
	Twin/triplet	-0.10 (-0.24, 0.05)	-0.02 (-0.17, 0.13)	-0.02 (-0.21, 0.17)	0.12 (-0.04, 0.29)

Minimal adjustment for gender and birth year.

Multivariable model includes birth order, mother's age, civil status, family social class.

Some good news!?



- Education continuation became more common, more 'meritocratic' & less gender discriminating...?

Goodman et al. 2010

...AND schoolmarks only partly explain why family & social class predict education continuation

Multivariable analyses of education outcomes

	G1 early-life to G1 outcome			G3 early-life to G3 outcome		
	School-marks, early-life only	Higher education, early-life only	Higher education, Early-life + schoolmarks	School-marks, early-life only	Higher education, early-life only	Higher education, early-life + schoolmarks
Lower birthweight	↓**	↓*	-	↓***	↓**	-
Preterm birth	-	-	-	-	-	-
Postterm birth	[↓*]	↓*	↓*	↓*	-	-
Twin status	-	-	-	-	-	-
High birth order	↓***	↓***	↓***	↓***	↓***	↓***
Younger mother	↓**	↓***	↓**	↓***	↓***	↓***
Unmarried mother	↓***	↓*	-	↓***	↓***	↓**
Low social class	↓***	↓***	↓***	↓***	↓***	↓***

**p<0.05, **p<0.01, ***p<0.001*

All analyses adjust for sex and birth year

Goodman et al. 2010

Effects also seen across generations

Multivariable analyses of G1 characteristics predicting G3 education

	G3 schoolmarks		G3 tertiary education	
G1 characteristic	**Early-life only**	**Early-life + G3 childhood SEP†**	**Early-life only**	**Early-life + G3 childhood SEP†**
Lower birthweight	↓*		↓*	
Preterm birth	-		-	
Postterm birth	↓**		-	
Twin status	-		-	
High birth order	↓***		↓***	
Younger mother	-			
Unmarried mother	-		↓*	
Low social class	↓***		↓***	

*p<0.05, **p<0.01, ***p<0.001

4 generations!

† G3 SEP = mother's education, father's education, family social class in childhood

...but almost totally explained by intervening socio-economic position

Multivariable analyses of G1 characteristics predicting G3 education

	G3 schoolmarks		G3 tertiary education	
G1 characteristic	**Early-life only**	**Early-life + G3 childhood SEP†**	**Early-life only**	**Early-life + G3 childhood SEP†**
Lower birthweight	↓*	-	↓*	-
Preterm birth	-	-	-	-
Postterm birth	↓**	-	-	-
Twin status	-	-	-	-
High birth order	↓***	-	↓***	-
Younger mother	-	-	-	-
Unmarried mother	-	-	↓*	-
Low social class	↓***	↓**	↓***	-

(4-fold decrease in effect size)

**p<0.05, **p<0.01, ***p<0.001*

† G3 SEP = mother's education, father's education, family social class in

Reproductive success associated with social and biological characteristics at birth

A higher birthweight for gestational age, a term birth and a younger mother were independently associated with a greater number of descendants in both sexes.

A married mother and higher family socio-economic position were also associated a greater number of descendants in males, while in females higher birth order was associated with higher reproductive success.

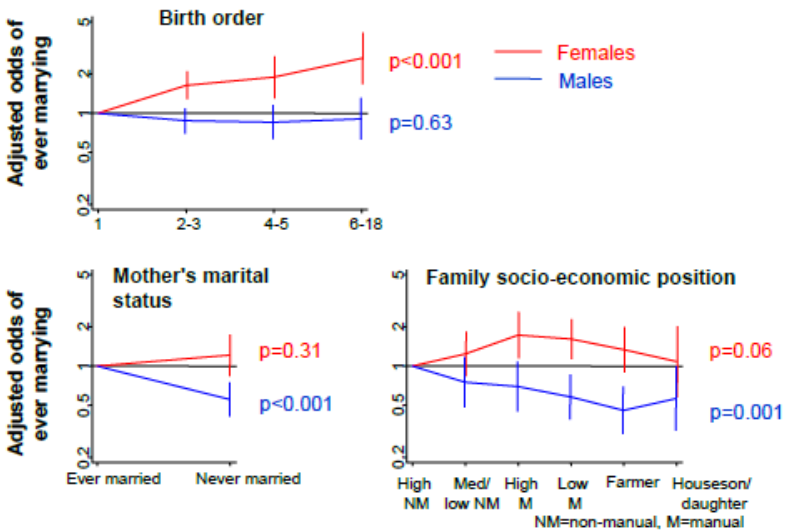
These effects were **mediated by sex-specific effects upon the probability of marriage**.

The effect of school performance on probability of marriage in men was largely mediated by adult SEP.

Marriage was also affected by other early life characteristics including birthweight, indicating how 'biological' characteristics may operate via social pathways.

Number of grandchildren increased with increasing number of children in both sexes.

Sex specific effects on marriage:



Goodman & Koupil. Evolution and Human Behavior 2009, 2010.

Effect of parental (G0) fertility and socioeconomic position on descendant socioeconomic success:

PROCEEDINGS OF THE ROYAL SOCIETY B BIOLOGICAL SCIENCES

Low fertility increases descendant socioeconomic position but reduces long-term fitness in a modern post-industrial society

Anna Goodman, Ilona Koupil and David W. Lawson

Proc. R. Soc. B published online 29 August 2012
doi: 10.1098/rspb.2012.1415

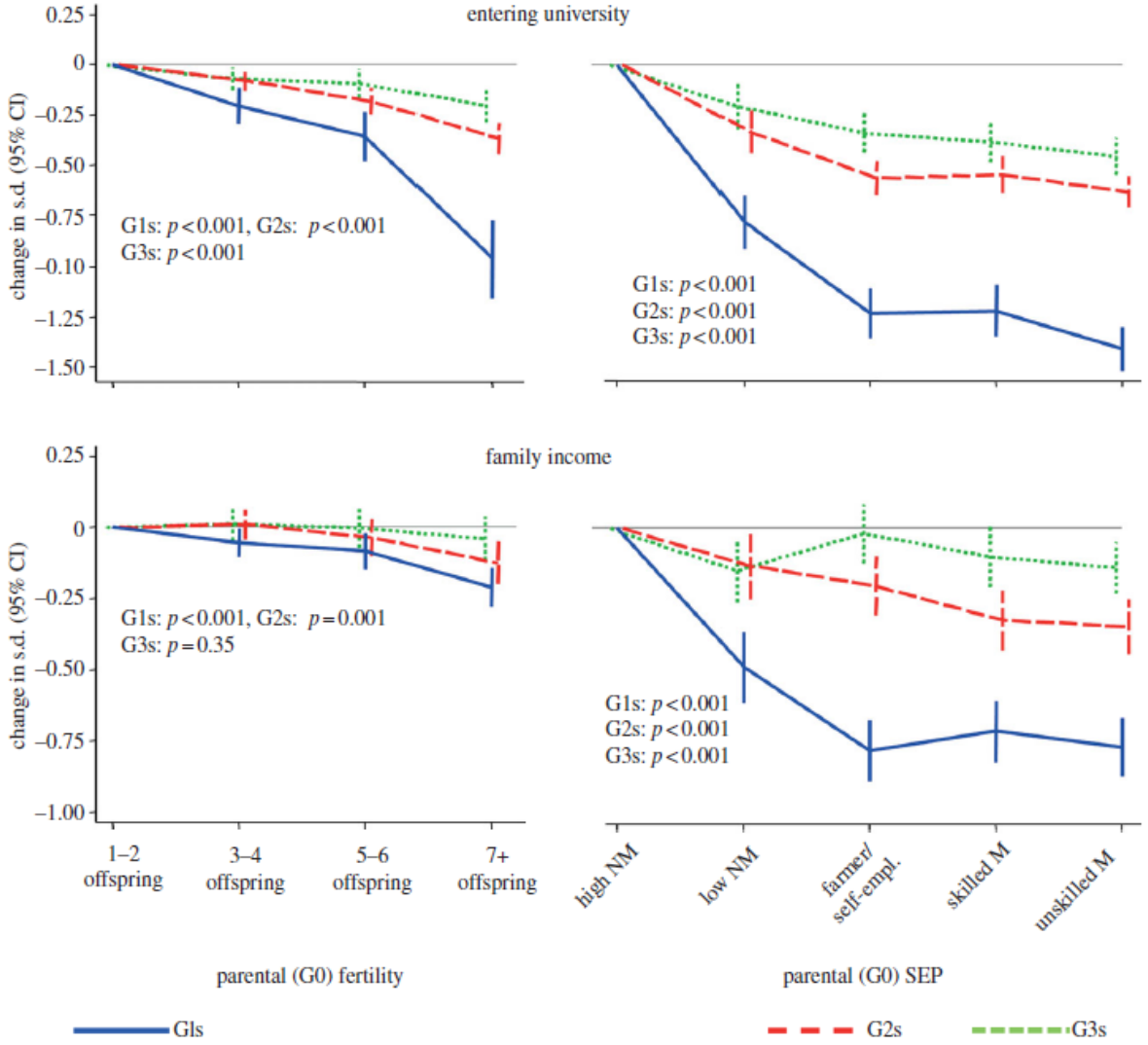


Figure 2. Effect of parental (G0) fertility and SEP upon descendant socioeconomic success. CI, confidence interval; s.d., standard deviations; SEP, socioeconomic position; high NM, high/mediate non-manual; low NM, low non-manual; farmer/self-empl., farmer or self-employed; skilled M, skilled manual; unskilled M, unskilled manual. *p*-values are from regression models adjusting for G1 early-life characteristics, and are for heterogeneity for SEP and for linear trend for parental fertility.

- Low fertility and high SEP predict increased descendant socioeconomic success across four generations.
- Low fertility and higher SEP do not, however, predict increased descendant reproductive success.
- Differences in fertility and SEP can have important long-term effects on the persistence of social inequalities across generations.

(Goodman et al. Proc R Soc B 2012)

G1

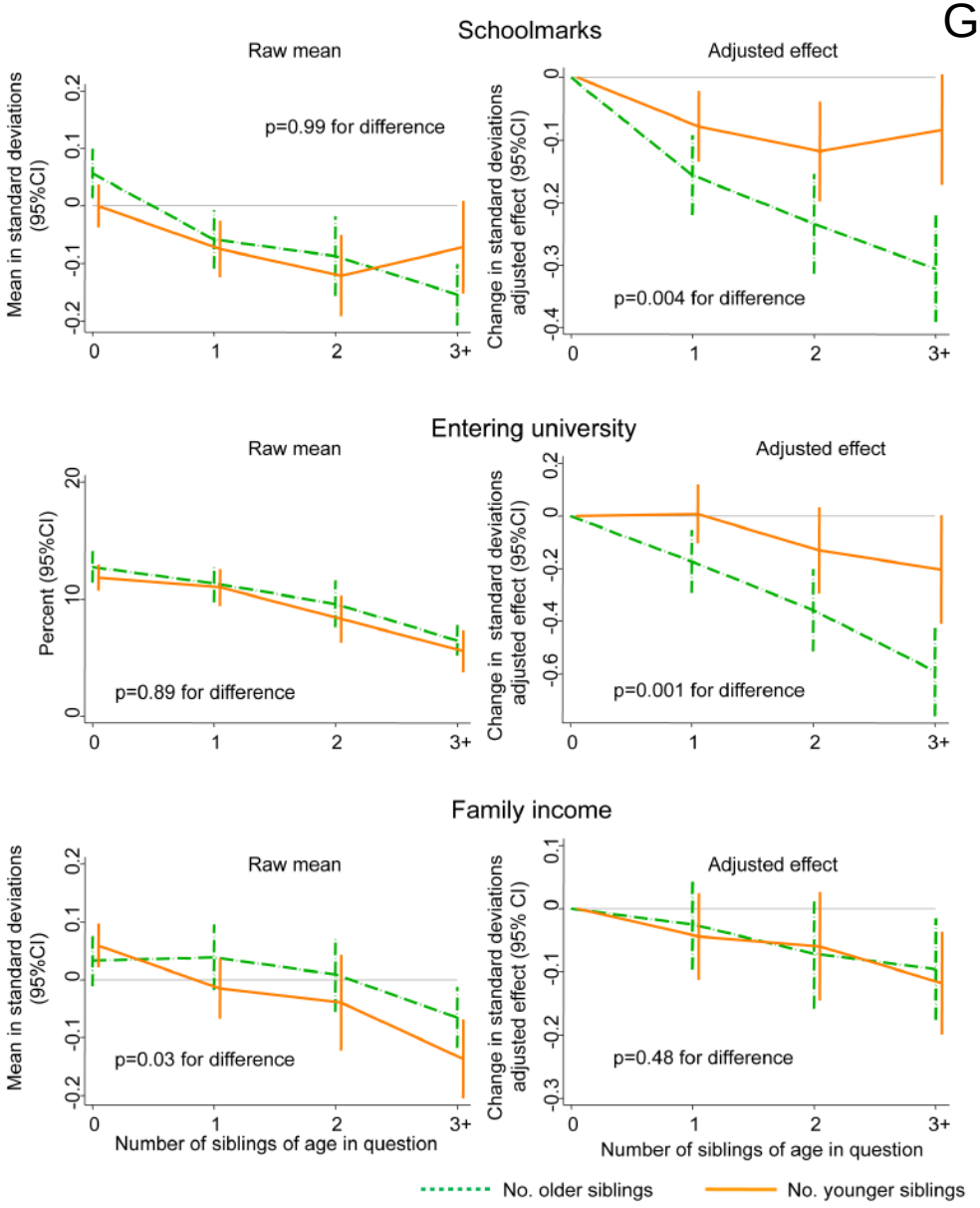


Figure 3. Association of the cohort members' number of older versus younger siblings with the cohort members' schoolmarks, educational attainment and adult income. p-values presented are for the difference in the effect of number of older versus younger siblings. In the left-hand column these p-values come from models only adjusting for these two sibling variables. In the right-hand column the p-values come from multivariable models additionally adjusting for the early-life characteristics shown in Table 1.
doi:10.1371/journal.pone.0073698.g003

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Sibling Configuration Predicts Individual and Descendant Socioeconomic Success in a Modern Post-Industrial Society

David W. Lawson[1]*, Arijeta Makoli[2], Anna Goodman[2,3]

Growing up with several older (as opposed to several younger siblings) is predictive of relatively poor performace on school tests and a lower likelihood of progression to tertiary education.

(Lawson et al. PLOS One 2013)

OPEN ACCESS Freely available online PLOS ONE

Sibling Configuration Predicts Individual and Descendant Socioeconomic Success in a Modern Post-Industrial Society

David W. Lawson[1]*, Arijeta Makoli[2], Anna Goodman[2,3]

The later-born disadvantage also holds across generations, with the children of those with many older siblings achieving lower levels of educational attainment.

(Lawson et al. PLOS One 2013)

G2 G3

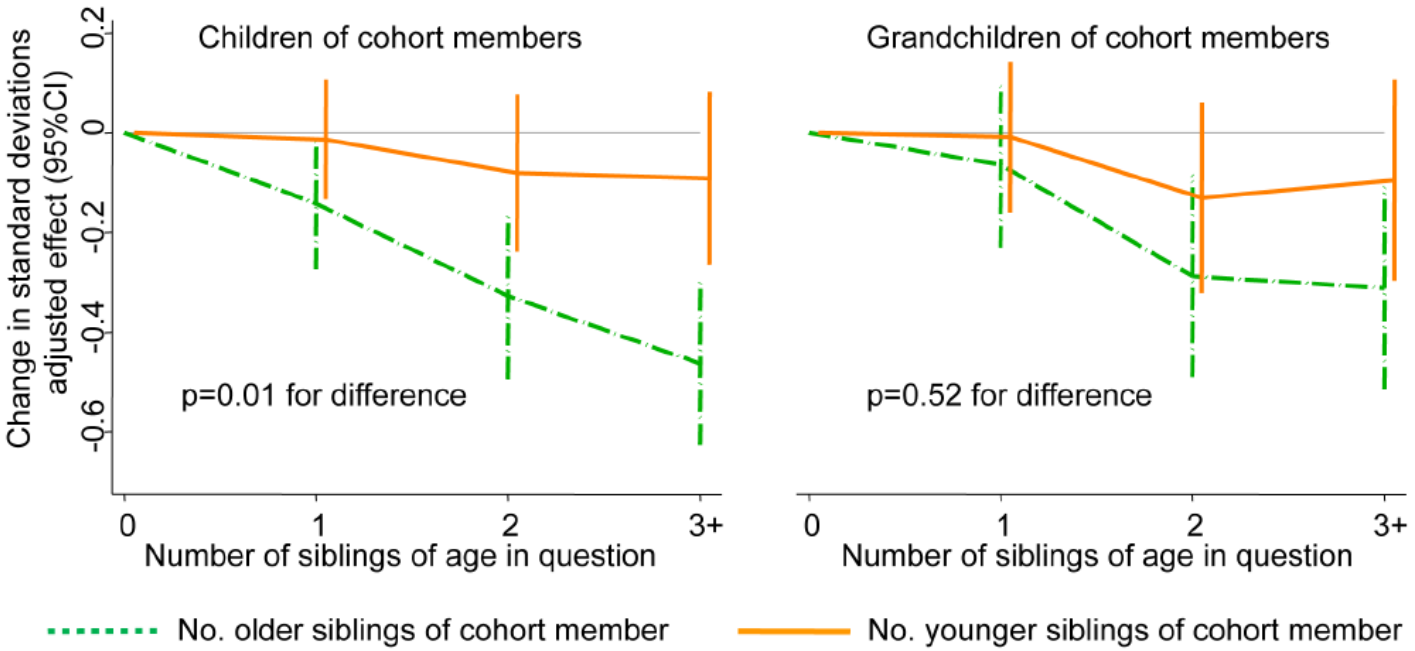


Figure 4. Association of the cohort members' number of older versus younger siblings with the probability of entering university among their children and grandchildren. p-values presented are for the difference in the effect of the cohort members' number of older versus younger siblings, from multivariable models adjusting for both sibling variables plus the other early-life characteristics shown in Table 1.
doi:10.1371/journal.pone.0073698.g004

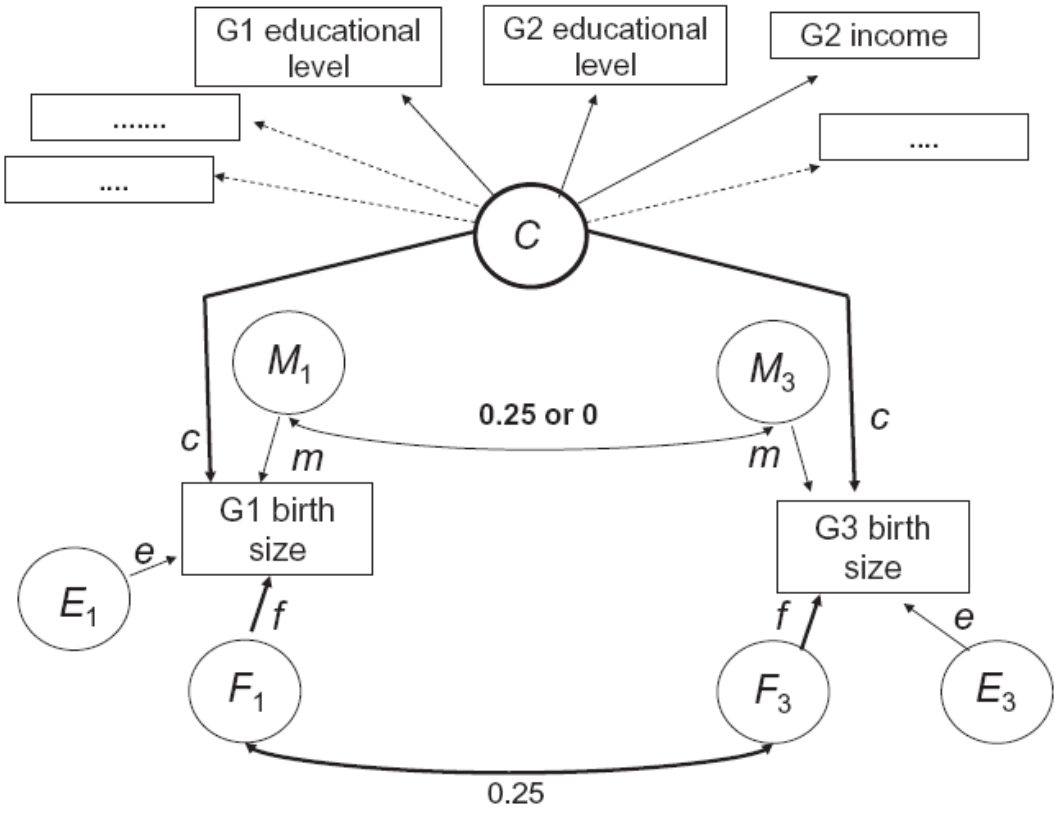


Figure 1. Biometric model for size at birth in first generation (G1) and third generation (G3) participants in the Uppsala Birth Cohort Study, Uppsala, Sweden, 1915–2002. Circles represent latent variables and rectangles represent observed variables. Dotted lines within rectangles represent other manifest variables for the latent variable *C*. *F*, shared fetal genetic component; *M*, shared maternal genetic component; *C*, shared intergenerational (common) environment; *E*, unshared environment.

How much intergenerational continuities in size at birth depend on social disadvantage?

shared environment ~12-14% of the intergenerational correlations in standardized size at birth

no substantial difference between grandparental type

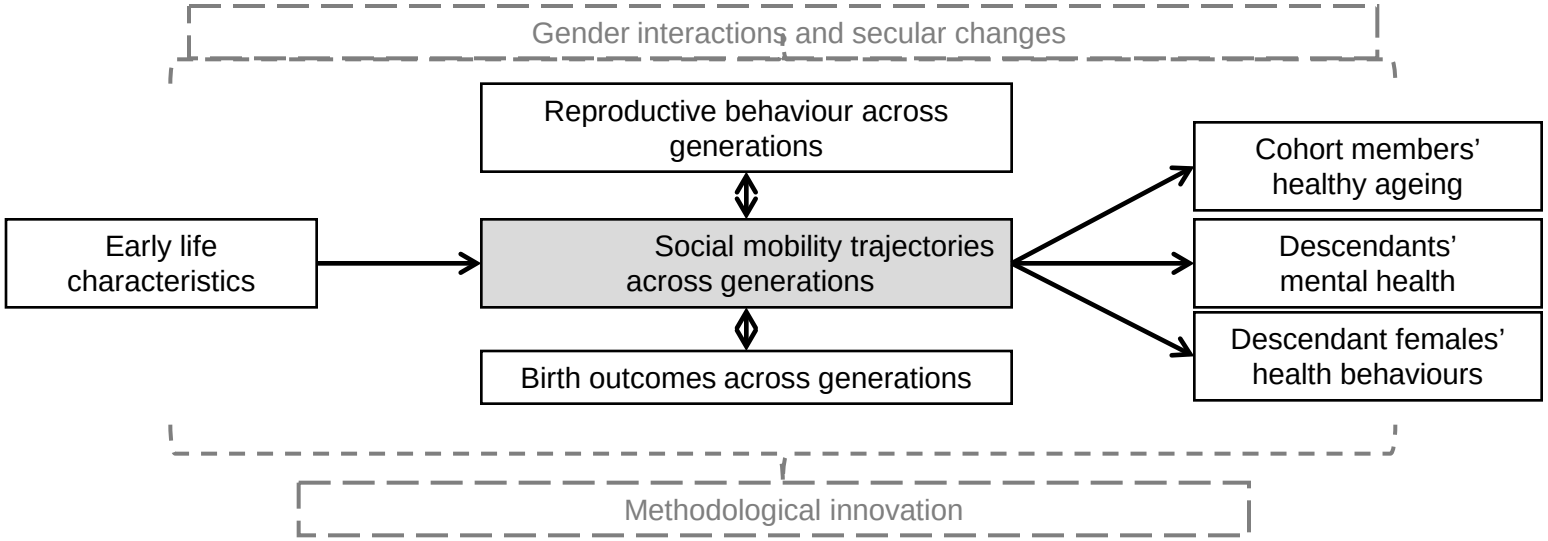
De Stavola, Leon & Koupil. AJE 2011

Outline

- Developmental origins of health and disease and health equity studies
- Setting up the Uppsala Birth Cohort Study (UBCoS)
- Early life and intergenerational origins of health, education and reproductive outcome (UBCoS Multigen)
- Methodological issues and challenges for further research and implementation

Methodological challenges to be resolved…

- Address issues in register based research
- Implement developments from causal inference into life course and intergenerational research
- Identify and compare life course models across historical and social contexts (and gender)
- Balance multiple, short- and long term outcomes
- Integrate genomics (epigenetics) into health equity research
- Model social mobility across generations



Social causation and social selection models **both draw on a life course perspective**, in that both emphasize how early circumstances and exposures can shape later outcomes.

Although often presented as alternatives, the two processes are in fact both **likely to operate simultaneously** to some extent.

However, **their relative contribution may differ to an important degree across time and place**.

Prof Dr Clyde Hertzman (1953-2013)

”A new science of human development is emerging, which has the capacity to transform the way we understand the origins of health and disease...

Despite the fact that biological embedding has established credibility in the scientific literature, ***the transformative power of the new science has yet to be fully realized in policy and practice.”***

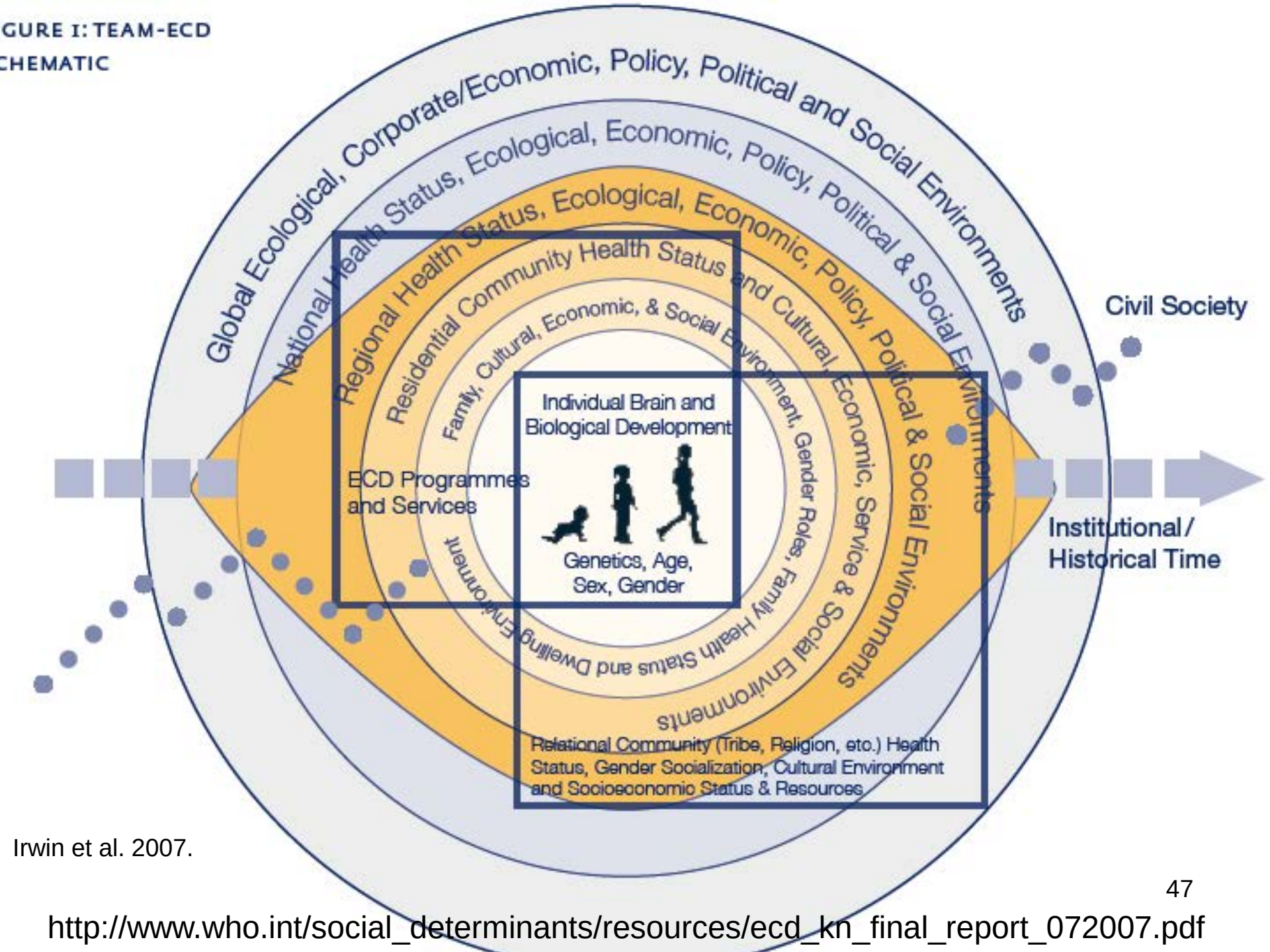
Annu Rev Public Health 2013

- http://www.earlylearning.ubc.ca/WHO

Importance of early child development

- Pregnancy as a sensitive period in life course and intergenerational perspective
- Early childhood period is considered to be the most important developmental phase throughout the lifespan.
- Healthy early child development (physical, social/emotional and **language/cognitive**) is fundamental to success and happiness throughout the life course.
- Early child development strongly influences health, obesity/stunting, mental health, heart disease, educational achievement, criminality and economic participation throughout life (Maggi et al 2010)
- ”Investment in early childhood is the most powerful investment a country can make” (Schweinhart 2004)

GURE I: TEAM-ECD
CHEMATIC



Irwin et al. 2007.

http://www.who.int/social_determinants/resources/ecd_kn_final_report_072007.pdf

Thank you

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- **Current funding:** Swedish Research Council; Swedish Research Council for Health, Working Life and Welfare; Stockholm University, Sweden
- **Study web site:** www.chess.su.se/ubcosmg/