

# Socioeconomic gradients in children's outcomes: A meta-analysis of the association of child outcomes with parental education

John Ermisch<sup>1</sup> Markus Jantti<sup>2,3</sup> Timothy M Smeeding<sup>4</sup>

<sup>1</sup>Institute for Social and Economics Research, University of Essex <sup>2</sup>Swedish  
Institute for Social Research, Stockholm University <sup>3</sup>Luxembourg Income Study

<sup>4</sup>Institute for Research on Poverty, University of Wisconsin

October 13, 2011

# Outline

Introduction

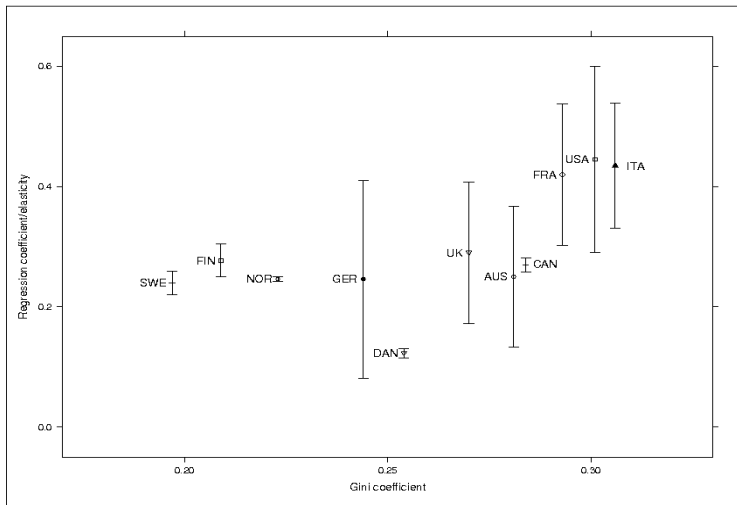
Data and methods

Parental education and child outcomes: estimated polychoric correlations

Modelling the correlations

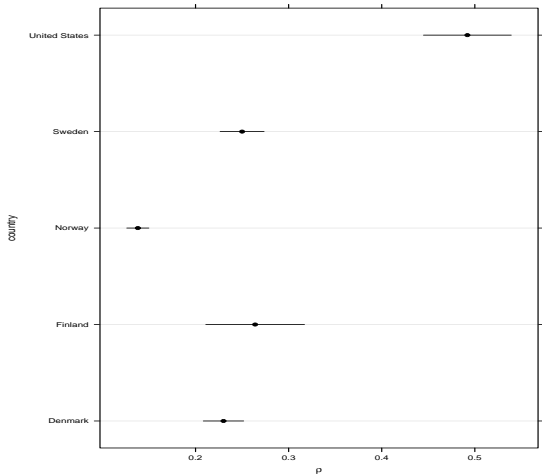
Concluding remarks

# Evidence on intergenerational income associations



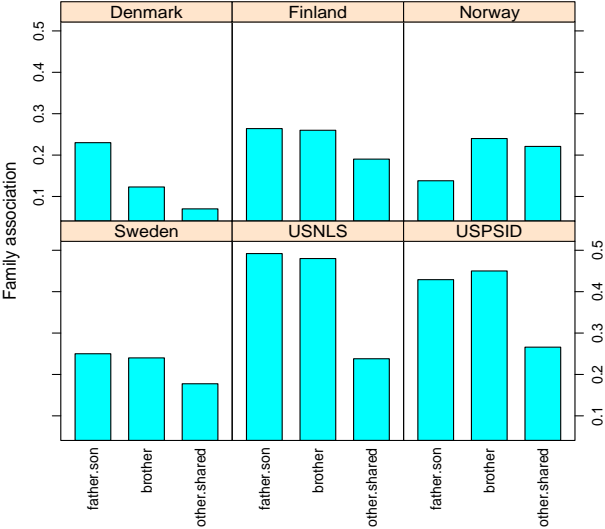
Source: Björklund and Jantti (2009)

# Evidence on sibling associations



Source: Björklund and Jäntti (2009)

# Father-son and brother correlations compared



## The CRITA project

- ▶ CRITA: Cross-national Research on the Intergenerational Transmission of Advantage (funding and support from Russell Sage Foundation; Sutton Trust; PEW)
- ▶ do observed cross-national differences in intergenerational persistence emerge early in life or e.g. at entry into labour market?
- ▶ (mostly) comparative papers on the strength of the socio-economic gradient across different outcome domains and different stages in the life cycle across different countries . . .
- ▶ . . . as *comparable* data permit
- ▶ 16 chapters (14 comparative, 2 include only a single country)
- ▶ results forthcoming in Ermisch, Jäntti, and Smeeding (2012)

## The purpose of examining cross-national tables

- ▶ country chapters provide detailed comparisons across two or more countries, but with methods and approaches that differ across chapters
- ▶ in Chapter 2, we try to take a standardized look at the socio-economic gradient at different stages of childhood across a variety of outcomes and countries
- ▶ data for examining in a “meta-analysis” kind-of-way gradients across the stages, outcome domains and countries
- ▶ → broad overview of the dependence of child outcome of parental SES

## The input data

- ▶ cross-tabulations of parental SES against child outcomes for outcomes that individual chapters had available in their data
- ▶ parental SES: the education (ISCED-classified) of the more highly educated parent measured around the time of the child's outcome
- ▶ child outcomes:
  - ▶ continuous outcomes: discretized into quartile groups
  - ▶ discrete outcomes: ordered from worse to better
- ▶ classified into stages of child development, domain
- ▶ we about 300 such tables

## Introduce the data

- ▶ what stages (i.e., broad child ages) and outcome domains are covered
- ▶ what variables are available for which countries, stages within study

## Stages and ages

Stage	Ages
C0	0-1
C1	2-6
C2	7-11
C3	12-17
C4	18-29
OA	30-

## Variable domains

Short hand	Description
P	Physical (includes health; height, birth weight, BMI etc)
C	Cognitive (IQ & other test scores etc.)
SE	Socio-emotional behavior (aka non-cognitive)
ED	Educational achievements (graduation, grades, final attainment etc.)
EC	Economic outcomes (various incomes, labor market position etc)

## Raw data tables – Countries and stages

	30-	00-01	02-06	07-11	12-17	18-29
Australia	0	1	6	6	2	0
Canada	0	5	3	4	12	3
Denmark	3	2	0	1	2	0
Finland	3	0	0	3	0	0
France	3	0	3	4	6	3
Germany	27	0	1	1	13	13
Italy	40	0	0	1	1	8
Sweden	6	2	0	5	2	8
UK	19	3	11	28	14	2
US	4	6	10	19	14	10

## Raw data tables – Countries and domains

	Economic	Cognitive	Non-cognitive	Education	Physical
Australia	0	6	7	0	2
Canada	0	7	6	4	10
Denmark	2	2	0	2	2
Finland	2	0	2	2	0
France	4	3	0	12	0
Germany	6	12	29	8	0
Italy	10	2	0	38	0
Sweden	3	5	4	4	7
UK	15	29	19	6	8
US	2	20	27	4	10

## Raw data tables – Domains and stages

	30-	00-01	02-06	07-11	12-17	18-29
Economic	40	0	0	0	0	4
Cognitive	3	0	14	38	27	4
Non-cognitive	10	0	13	27	24	20
Education	52	0	3	3	11	11
Physical	0	19	4	4	4	8

## Empirical “strategy”

- ▶ estimate correlations from the provided frequency tables
  - ▶ assume underlying bivariate normality and ordinal information of the cross-classifying variables (both of which are most likely false)
  - ▶ (the technical term is “polychoric” correlation)
- ▶ graphically examine the estimated correlations
- ▶ examine variations in strength of the association across domains, stages and countries using regressions (the uneducated person’s meta-analysis)

## Estimating the correlations

- ▶ run standard software to estimate latent (“polychoric”) correlations from the cross-classified tables (package polycor in R)
- ▶ use the correlations to compare strength of association

## Example tables: Ever attended post-secondary education (CN)/college (US)?

### Canada (NLSCY)

ISCED Parent	No	Yes	Row Total
0 – 2 (Low)	113	71	184
3 – 4 (Med)	291	403	694
5b	186	296	482
5a/6 (High)	105	450	555
Column total	695	1219	1,914

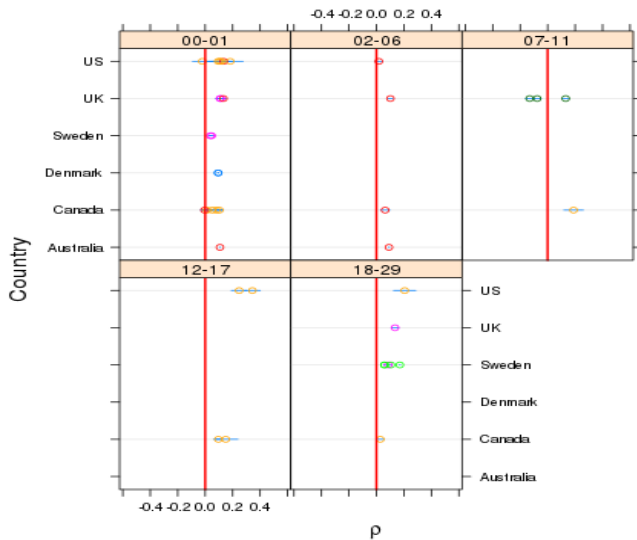
$$\hat{p} = 0.347 \quad (\text{CI}: 0.291 - 0.404)$$

### US (PSID)

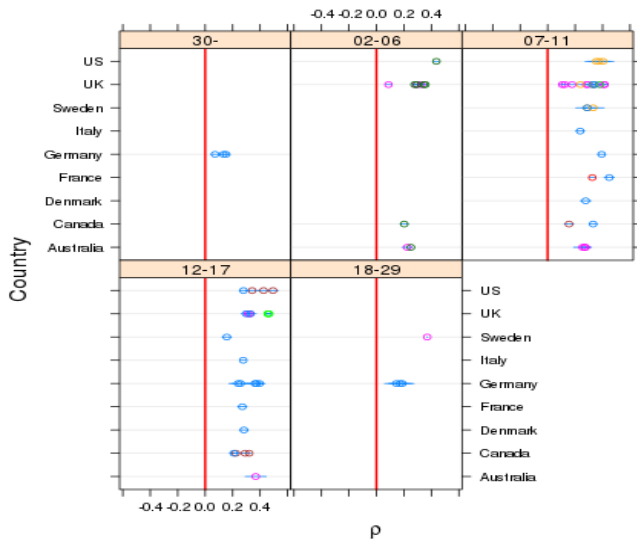
ISCED Parent	No	Yes	Row Total
0 – 2 (Low)	86	71	156
3 – 4 (Med)	213	373	586
5b	13	59	72
5a/6 (High)	17	289	306
Column Total	329	791	1,120

$$\hat{p} = 0.531 \quad (\text{CI}: 0.463 - 0.600)$$

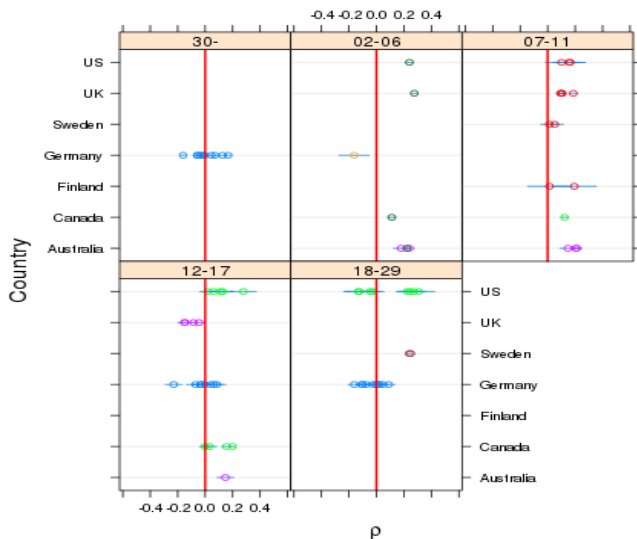
# Correlations by country by age in physical domain – P



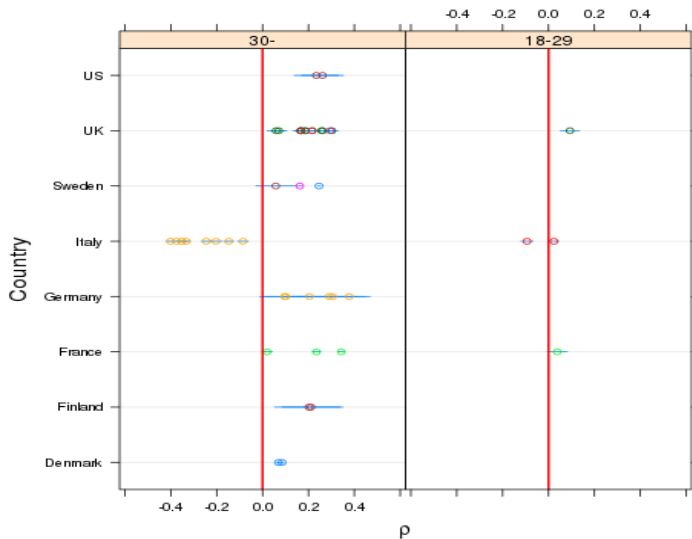
# Correlations by country by age in cognitive domain – C



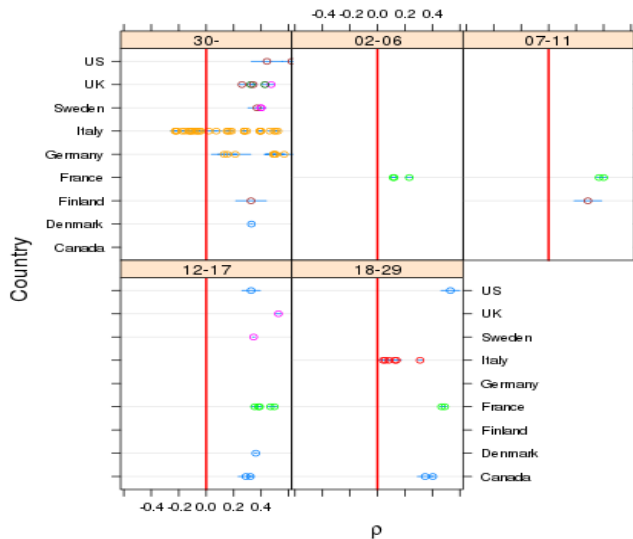
# Correlations by country by age in socio-emotional domain – SE



# Correlations by country by age in economic domain – EC



# Correlations by country by age in educational domain – ED



# Modelling the correlations

- ▶ basic specification (D=domain, G=country, C=stage):

$$\rho_{C_t, D_d, G_g} = \beta_0 + \sum \beta_{C_t} C_t + \sum \beta_{D_d} D_d + \sum \beta_{G_g} G_g + \varepsilon_{C_t, D_d, G_g} \quad (1)$$

- ▶ estimated specifications:
  1. only domain and stage (i.e., omit country intercept)
  2. add country
  3. add stage, domain interactions
  4. add country, domain interactions
  5. add country, stage interactions
- ▶ take into account the variability of  $\hat{\rho}$  (weight regressions using inverse of estimated standard error)

## Model Comparison

Model	F	Pr(> F)
Domain, Stage (1)		
+ Country (2)	16.42	0.00
+ Stage, Domain interaction (3)	2.64	0.00
+ Country, Domain interactions (4)	1.68	0.03
+ Country, Stage interactions (5)	0.63	0.92

Source: Authors' calculations from data provided by chapter authors.

## Coefficient estimates by domain – F-tests and diagnostics

		EC	C	ED	P	SE
(Intercept)		0.248 (0.134)	0.353 (0.044)	0.488 (0.164)	0.113 (0.034)	0.136 (0.049)
F-tests	Stage	1.157[1] (0.290)	1.927[3] (0.135)	2.569[4] (0.047)	1.892[4] (0.140)	13.640[4] (0.000)
F-tests	Country	23.721[7] (0.000)	1.455[8] (0.194)	4.211[8] (0.000)	0.906[5] (0.491)	9.251[6] (0.000)
n		42	70	72	38	72
k		9	12	13	10	11
$\sigma$		0.865	0.737	1.63	0.625	0.682
Adj R <sup>2</sup>		0.795	0.0852	0.31	0.0773	0.585

Source: Authors' calculations from data provided by chapter authors.

## Coefficient estimates by domain – Country coefficients

		EC	C	ED	P	SE
(Intercept)		0.248 (0.134)	0.353 (0.044)	0.488 (0.164)	0.113 (0.034)	0.136 (0.049)
Country (omitted: US)	Australia		-0.102 (0.050)		-0.002 (0.041)	-0.004 (0.050)
	Canada		-0.136 (0.049)	-0.126 (0.191)	-0.058 (0.043)	-0.013 (0.050)
	Denmark	-0.171 (0.139)	-0.119 (0.081)	-0.131 (0.182)	-0.019 (0.039)	
	Finland	-0.041 (0.209)		-0.161 (0.422)		-0.086 (0.146)
	France	-0.149 (0.145)	-0.045 (0.066)	-0.034 (0.173)		
	Germany	-0.019 (0.158)	-0.095 (0.058)	-0.055 (0.205)		-0.128 (0.044)
	Italy	-0.505 (0.137)	-0.142 (0.084)	-0.346 (0.165)		
	Sweden	-0.036 (0.138)	-0.075 (0.063)	-0.096 (0.170)	-0.061 (0.042)	0.149 (0.048)
	UK	-0.059 (0.136)	-0.057 (0.042)	-0.057 (0.179)	-0.010 (0.044)	-0.089 (0.048)
F-tests	Country	23.721[7] (0.000)	1.455[8] (0.194)	4.211[8] (0.000)	0.906[5] (0.491)	9.251[6] (0.000)

Source: Authors' calculations from data provided by chapter authors

## Coefficient estimates by domain – Stage coefficients

		EC	C	ED	P	SE
(Intercept)		0.248 (0.134)	0.353 (0.044)	0.488 (0.164)	0.113 (0.034)	0.136 (0.049)
Stage (omitted: 30-)	02-06			-0.303 (0.129)	-0.024 (0.032)	0.095 (0.056)
	07-11		0.021 (0.028)	-0.071 (0.142)	-0.084 (0.049)	0.054 (0.057)
	12-17		0.066 (0.031)	-0.026 (0.068)	0.100 (0.053)	-0.048 (0.044)
	18-29	0.118 (0.059)	0.069 (0.061)	0.007 (0.065)	0.043 (0.030)	-0.040 (0.038)
F-tests	Stage	1.157[1] (0.290)	1.927[3] (0.135)	2.569[4] (0.047)	1.892[4] (0.140)	13.640[4] (0.000)

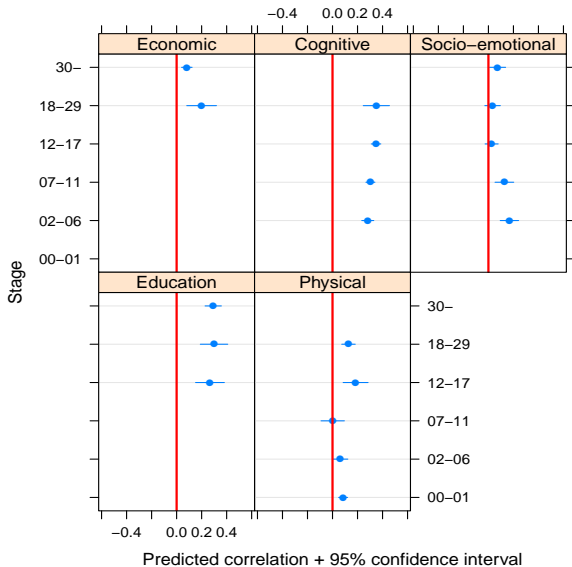
Source: Authors' calculations from data provided by chapter authors.

## Hypothesis tests that groups of countries have zero coefficients – p-values

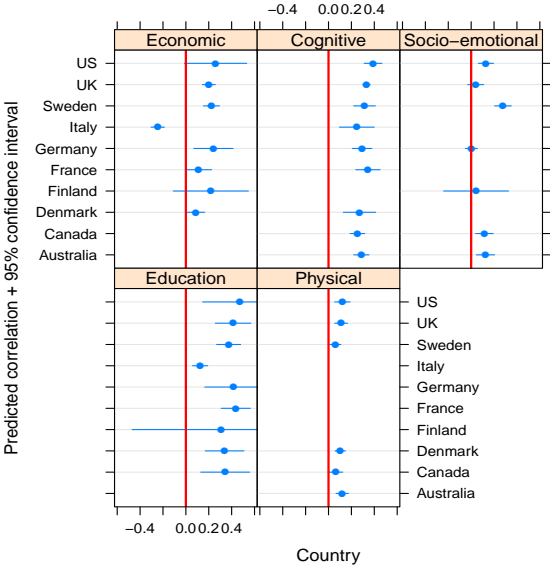
	EC	C	ED	P	SE
AngloPhone	0.67	0.03	0.78	0.49	0.15
Nordic	0.07	0.26	0.91	0.30	0.01
European	0.00	0.25	0.00	0.00	0.01

Note: Groups of countries are Anglophone: Australia, Canada, UK; Nordic: Denmark, Finland, Sweden; European: France, Germany, Italy.

# Estimated socio-economic gradients across stages of development – fitted correlations against stage



# Estimated socio-economic gradients across countries – fitted correlations against country



## Summary of findings

- ▶ the association of cognitive and educational outcomes with parental SES strong
- ▶ the association of physical and health outcomes as well as socio-emotional behavior weaker
- ▶ the SES gradient (almost) always highest in the US
- ▶ weak tendency for the SES gradient to increase as children age (?)

## Concluding remarks

- ▶ big gaps in data on early childhood outcomes – especially in countries with low persistence
- ▶ comparative data uncommon – more “PISA” data, better parental information
- ▶ comparable longitudinal data?
- ▶ causal models of parental SES on child outcomes?

Björklund, Anders and Markus Jäntti (2009). "Intergenerational income mobility and the role of family background". In: *Oxford Handbook of Economic Inequality*. Ed. by Wiemer Salverda, Brian Nolan, and Timothy M Smeeding. Oxford: Oxford University Press. Chap. 20, pp. 491–521.

Ermisch, John, Markus Jäntti, and Timothy Smeeding, eds. (2012). *Inequality from Childhood to Adulthood: A Cross-National Perspective on the Transmission of Advantage*. FOrthcoming. Russell Sage Foundation.