

# **Family Environment during Childhood and the Educational Gender Gap**

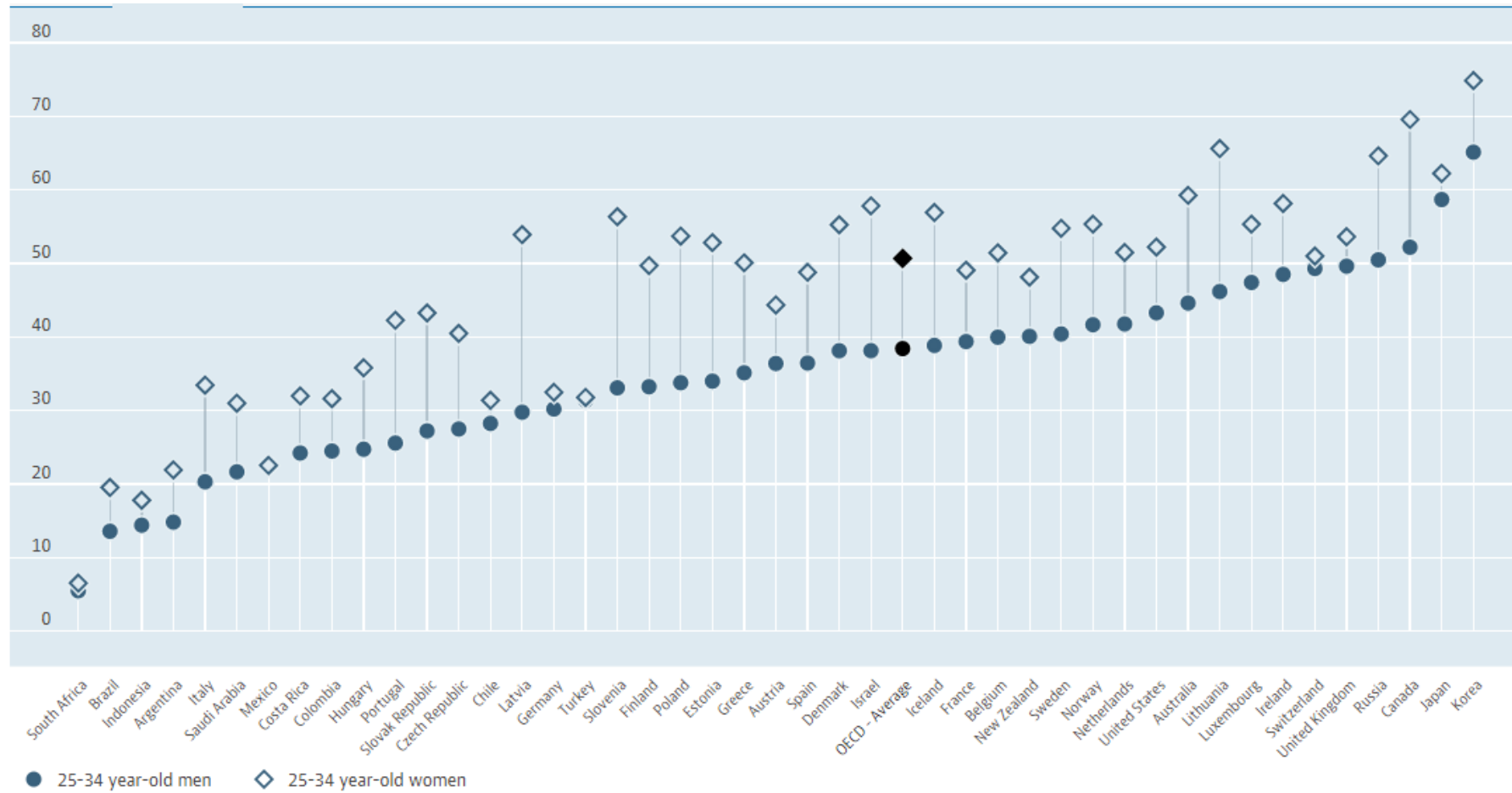
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in the Labor Market

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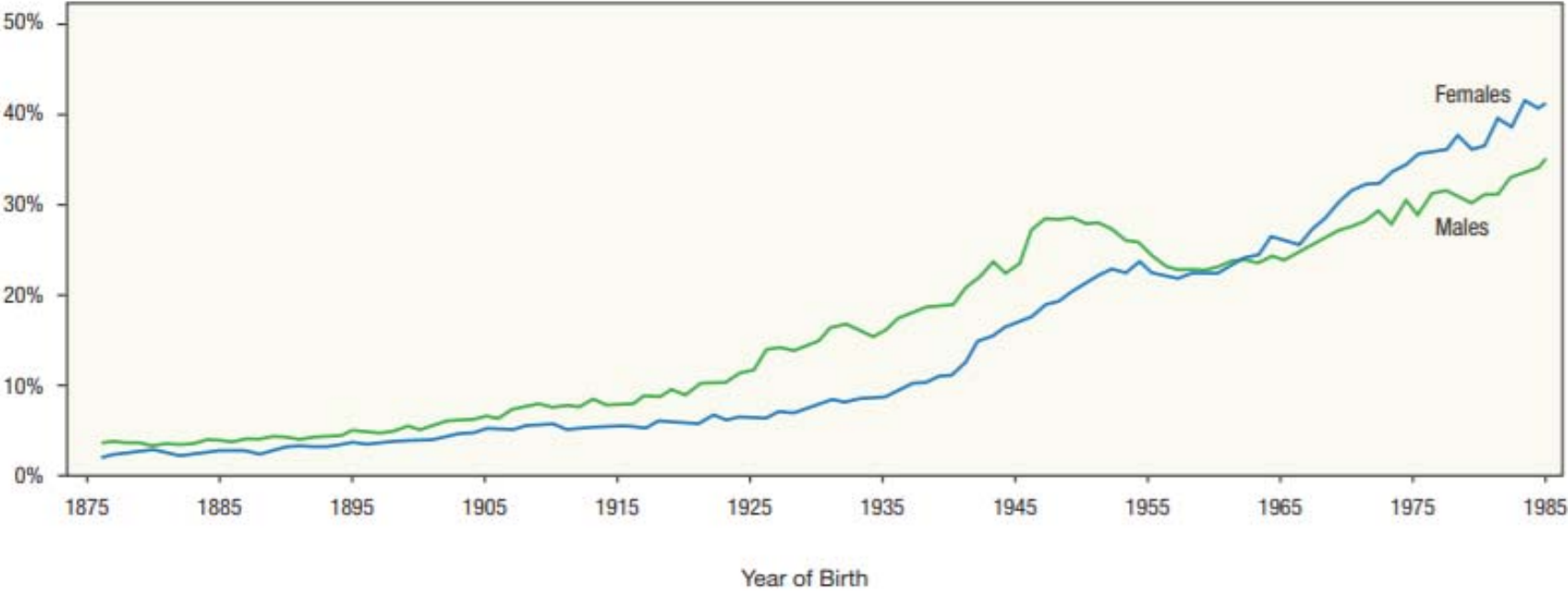
# More women than men are attending and graduating from college in many countries

Population with tertiary education: 25-34 year-old men and women (OECD 2017 or latest)



# US college graduation rates at age 30, by birth year

(Fahle & Reardon, 2018)



## Growing gender gap in educational attainment

- Men's education is lagging during a period of rising returns to human capital, contributing to growing economic inequality.
- In some countries, wages and labor force participation of less-educated men have fallen substantially.
- Marriage rates are tied to male earnings: potential implications for family formation/stability.

# Why do more women than men graduate from college?

- 1. Benefits:** Are the returns to college higher for women?

Benefits to education come through labor markets, marriage markets, investments in children's human capital.

Estimates have varied, but Becker, Hubbard, and Murphy (2010) argue no.

Instead, assert that women have a distribution of non-cognitive skills with higher mean and lower variance than men.

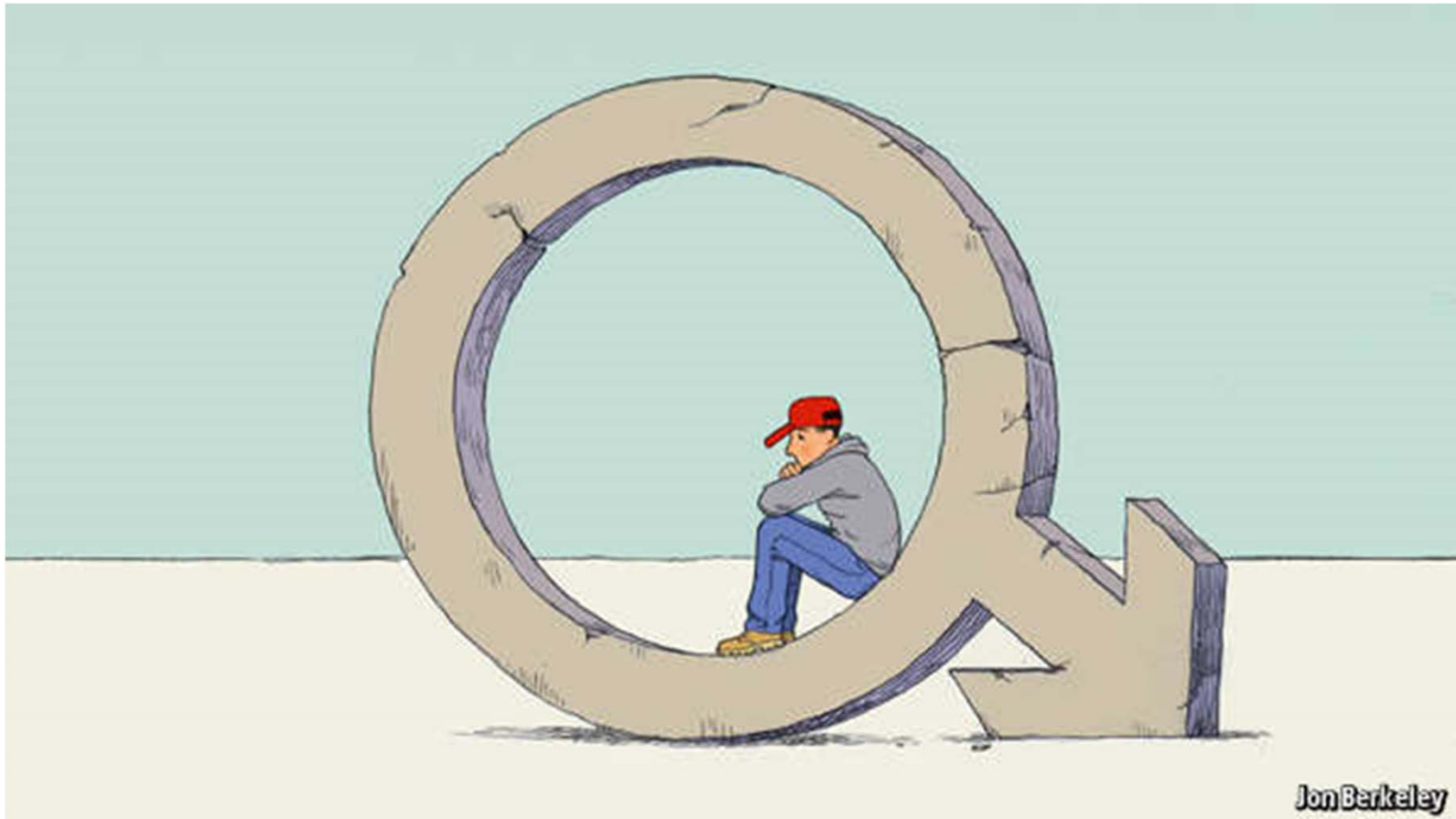
## 2. **Costs:** Are the full costs of college higher for men?

- Several studies suggest that deficits in **non-cognitive skills** make college more difficult for men
- Throughout school, girls consistently outperform boys in grades, but not achievement tests
  - girls are more self-disciplined than boys (Duckworth and Seligman (2006))
- Early gaps in social and behavioral skills explain much of the gender gap in early elementary academic outcomes (DiPrete and Jennings, 2012)
- Large gender gaps in teacher reports of disruptive behavior, grade repetition, disciplinary interventions, school suspensions

## **A new theme: boys may be more sensitive to adverse environments**

- “Differential susceptibility” hypothesis (Belsky, 1997, 2005): some individuals are more vulnerable to the negative effects of contextual adversity. Also, more likely to benefit from supportive environments. Source of GxE interactions.
  - orchids vs. dandelions.
- Do different developmental trajectories make girls more resilient to disadvantage?

**The Economist: *The weaker sex: No jobs, no family, no prospects***





## **Implication: Changes in family structure may disadvantage boys, particularly in poor or single-parent households**

- Though co-residential father's time with children has been rising in most countries, increasing rates of lone motherhood decreases paternal involvement for many children.
- Does this have a particularly negative impact on boys?

- Three recent studies argue that father absence, and increasing rates of single parenthood, may be responsible for the gender gap in college attendance/graduation.
  - Autor and Wasserman (2013)
    - changing family structure may have adverse effects for boys because less father involvement.
  - Bertrand and Pan (2013)
    - single mother household has larger effects on externalizing behavior and school suspensions for boys, compared to girls.
  - Autor et al. (2016)
    - mother's education and father absence matter more for boys in explaining school absence and suspensions
    - mother's education (esp. college grad) matters more for boys in explaining kindergarten readiness and high school graduation.

## **Missing piece: What are the empirical links between early family environment and adult outcomes?**

- Are early negative effects of father absence and family disadvantage on boys indicative of delayed skill development relative to girls?
- To what extent can excess male vulnerability early in life explain gender gaps in education, adverse labor market outcomes?
- Two sets of results from the U.S. (National Longitudinal Survey of Adolescent to Adult Health) and Denmark (administrative register data for the entire population) with Anne Ardila Brenøe.

# Identification

The average difference in outcomes for boys between father-present and father-absent families:

$$\begin{aligned} & E[Y_b | A = 1] - E[Y_b | A = 0] = \\ & (E[Y_b^1 | A = 1] - E[Y_b^0 | A = 1]) \\ & + (E[Y_b^0 | A = 1] - E[Y_b^0 | A = 0]) \end{aligned}$$

First term is causal effect for boys in father-absent families.

Second term is selection bias: Differences in unobserved child/mother characteristics across samples.

- Gender difference in effects of father presence: Observed differences in outcomes are unbiased estimates if selection terms are identical—father absence is not differentially correlated in son/daughter households.

$$\begin{aligned} & (E[Y_b^0 | A = 1] - E[Y_b^0 | A = 0]) \\ & = (E[Y_g^0 | A = 1] - E[Y_g^0 | A = 0]) \end{aligned}$$

# Empirical Strategies

- Compare male-female differences in outcome  $Y$  by family environment, *Fam Env*

$$Y_{ij} = \beta_0 + \beta_1 Male_i + \beta_2 Fam\ Env_j + \beta_3 Male_i \times Fam\ Env_j + X_i' \theta + v_{ij}$$

- Fixed-effects: Differences between brothers and sisters with same parents by *Fam Env*

$$Y_{ij} = \alpha_0 + \alpha_1 Male_i + \alpha_2 Male_i \times Fam\ Env_j + X_i' \gamma + \mu_j + \varepsilon_{ij}$$

$\mu_j$ : family fixed effects.

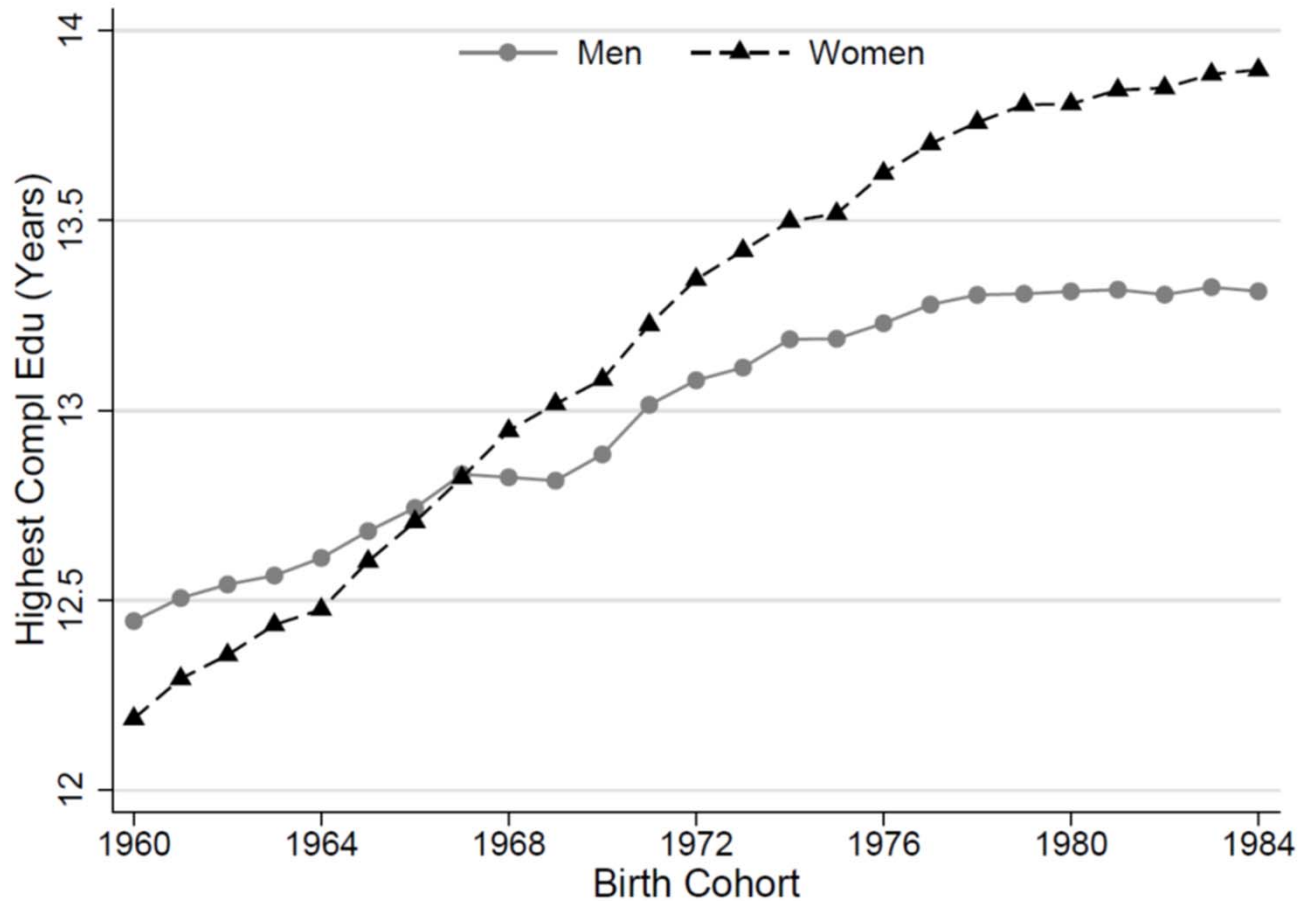
# Danish Administrative Data

(Brenøe and Lundberg, *EER* 2018)

- Entire population of Denmark born between 1966 and 1995.
- Link each child to parents and siblings.
- 2 samples: Total population and full siblings.
- Measures of family environment
  - Maternal and Paternal Education
    - BA, HS, <HS
  - Family Structure at Birth
    - Married, not married

# Reversed Gender Gap in Education—Denmark

Highest completed education by birth cohort and gender

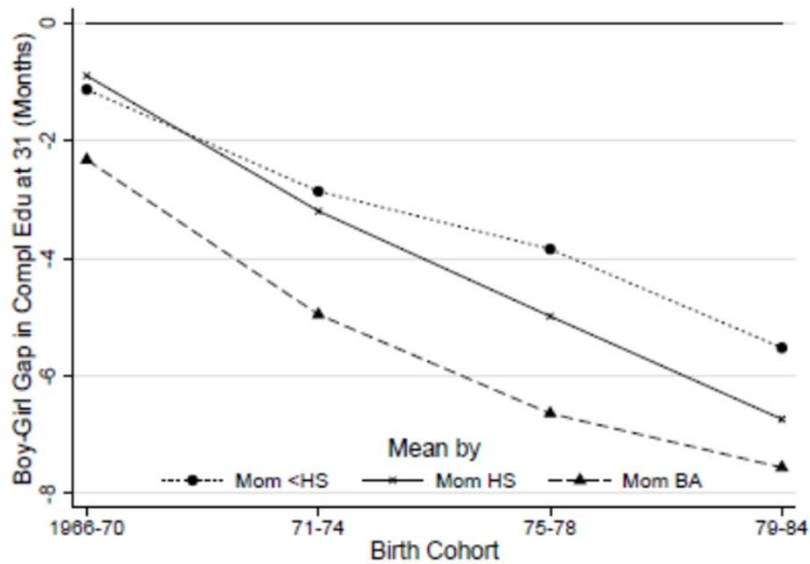




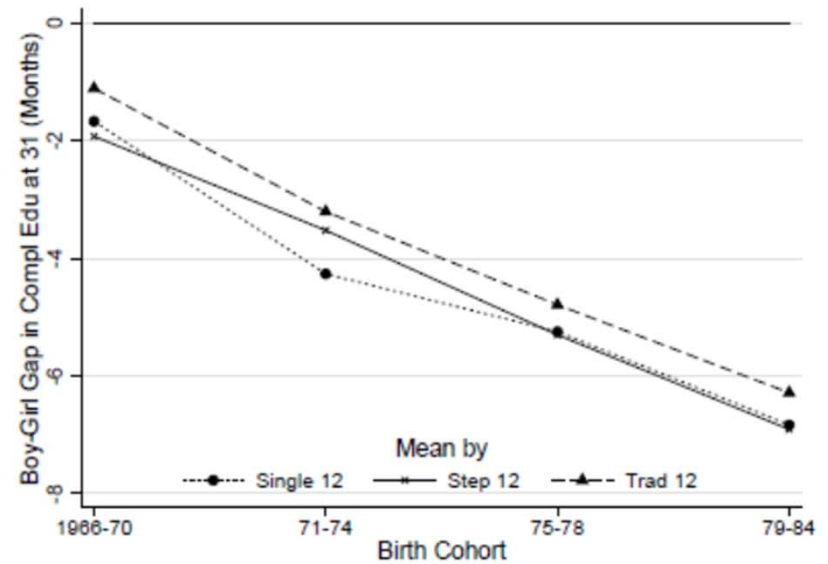
# Outcomes

- Adolescent outcomes
  - Complete Grade 9 on time
  - Grade 9 GPA
  - Diagnosis for behavioral/emotional disorder
  - Attends special education
- Adult outcomes
  - Highest completed education
  - BA degree or more
  - Employment status
  - Earnings percentile by birth cohort and gender

# Gender Gap in Highest Completed Education by Age 31 Across Cohorts



(a) By Maternal Education



(b) By Family Structure

# Adolescent Outcomes

- Evidence of excess male vulnerability in Grade 9 outcomes. Generally consistent with U.S. studies.
  - Boys benefit more than girls from maternal and paternal education.
  - Boys 9.3 percentage pts less likely to finish Grade 9 on time. Father with a BA reduces gender gap by 1.7-2.5 percentage pts.
- Consistent gender gap in effects of parental education on Grade 9 completion on time across cohorts.

# Adult Outcomes: Educational Attainment at Age 31

- Results are sharply at odds with those for adolescent outcomes
  - on most dimensions, women benefit more from a favorable childhood family environment than their brothers.
- Same-sex parent/child education effects that may reflect role-modelling.
- Evidence does not support “vulnerable boys” hypothesis.

# Highest Completed Education at Age 31 (in months)

	(1)	(2)	(3)	(4)
Male	-5.40*** (0.07)	-5.09*** (0.17)	-5.16*** (0.30)	-4.98*** (0.36)
Male X Mother HS		-1.30*** (0.15)	-1.36*** (0.21)	-1.11*** (0.25)
Male X Mother BA		-3.00*** (0.19)	-2.98*** (0.25)	-2.82*** (0.30)
Male X Father HS		0.33** (0.16)	0.70*** (0.21)	0.79*** (0.25)
Male X Father BA		1.04*** (0.22)	1.23*** (0.29)	1.52*** (0.34)
Male X Married		0.66*** (0.15)	0.43 (0.28)	0.20 (0.34)
N	632508	632508	355090	355090
Mean	162.97	162.97	164.14	164.14
Total Population OLS	x	x		
Sibling Sample OLS			x	
Sibling Sample FE				x

# Adult Outcomes: Labor Market Outcomes

- Gender gap in employment and earnings at age 31 smaller in families with better-educated parents, favoring women. Both mother's and father's education reduce the gender gap.
- Once again, no support for “vulnerable boys” hypothesis.
- Differential effects of parental education on employment of men and women fall with age, essentially disappear by age 40.

# Conclusions from Danish data

- Generally confirm U.S. findings that boys benefit more than girls from a favorable family environment during adolescence.
  - strong effects of parental education, less from family structure.
- No evidence of excess male vulnerability in adult outcomes.
  - women consistently benefit more from maternal education than men.
  - paternal education decreases gender gap in education, but smaller than effect of mother's education.
  - but, paternal education has larger positive effects on employment and earnings of daughters.

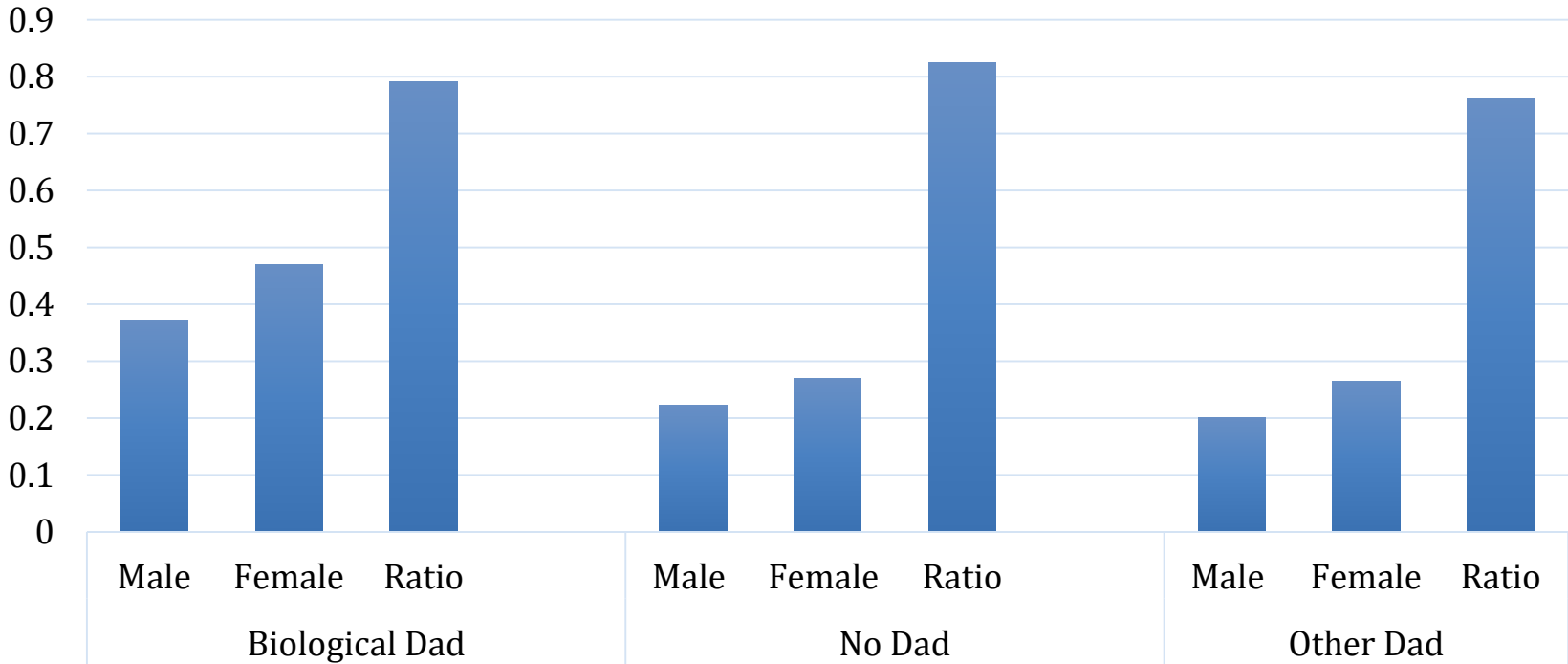
# U.S. Data: Young adult outcomes for recent cohorts

- National Longitudinal Study of Adolescent to Adult Health (Add Health).
- School-based longitudinal study of a nationally-representative sample of students
  - Grades 7 to 12 in 1994-95
  - Wave IV survey in 2007-08, respondents were 24-32 years old
  - Birth cohorts: 1976-1984
- Begin with White non-Hispanic samples.  
3868 women and 3459 men.
- Focus on father absence as a measure of family environment and college graduation as long-term outcome.



# College Graduation Rates and Male/Female Graduation Ratio

## White Non-Hispanic sample, Add Health



Note: The "No Dad" and "Other Dad" ratios are not significantly different from the "Biological Dad" ratio.

## College graduation by Wave I Living Arrangements, Non-Hispanic Whites

Male	-0.077***	-0.089***	-0.078***	-0.089***
No Father, Wave I	-0.130***	-0.149***		
Step-father, Wave I	-0.108***	-0.126***	-0.108***	-0.127***
Male*No Father		0.040		
Male*Step-father		0.0365		0.0364
No Father Recently			-0.090***	-0.106***
No Father Always			-0.175***	-0.192***
Male*No Father Rec.				0.033
Male*No Father Als.				0.037
Observations	7,327	7,327	7,327	7,327
Mother's characteristics	YES	YES	YES	YES

## College graduation by Wave I Living Arrangements, Non-Hispanic Whites

	Mother High School	Mother Some College	Mother College Grad
Male	-0.060***	-0.091**	-0.136***
No Father, Wave I	-0.129***	-0.133***	-0.235***
Step-father, Wave I	-0.107***	-0.0958	-0.207***
Male*No Father	0.0351	-0.0212	0.069
Male*Step-father	0.0229	0.00945	0.0800

# High School Graduation

Male	-0.029***	-0.024***
No Father, Wave I	-0.049***	-0.034**
Step-father, Wave I	-0.029**	-0.038**
Male*No Father		-0.033
Male*Step-father		0.017

# College Graduation in a Different Sample

National Longitudinal Survey of Youth, 1997

Birth Cohorts 1980-1984, White Non-Hispanic sample

	College Graduate or More
Male	-0.118***
No Father, Wave I	-0.224***
Step-father, Wave I	-0.262***
Male*No Father	0.030
Male*Step-father	0.037
N	4315

# **Why did we think father absence was the problem?**

- Focus on behavioral outcomes of schoolchildren.
- Boys are more likely to exhibit “externalizing” behavior and girls “internalizing” behavior.

# Adolescent Outcomes in Add Health

- School problems index: absences, ever suspended, self-reported trouble getting along with teachers or students, trouble paying attention or getting homework done.
- Depression index: hopeful, depressed, happy, lonely, sad.
- Grades
- Want to attend college/expect to attend college

# Effects of Father Absence on Adolescent Outcomes in Add Health

- Male x No Father has a significant, substantial, **positive** effect on School Problems Index and several components, incl. school suspensions.
- Male x Other Father has a significant, substantial, **negative** effects on Depression Index and several components.
- No significant interaction effects for grades, but having no father in the household has a stronger negative effect on the reports of boys that they want to attend college.



# Effects of School Quality on College Graduation and Intermediate Outcomes

National Longitudinal Survey of Adolescent Health, Birth Cohorts 1976-1984, White Non-Hispanic sample

	Ever Suspended from School	Wants to Attend College	Expects to Attend College
Male	0.177***	-0.244***	-0.295***
School quality index	-0.031***	0.056**	0.094***
Male*School quality	-0.032**	0.083**	0.086***
Mother's education, fathers, male/father interactions	x	x	x
N	5468	5468	5468

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# Boys and girls behave differently in school

- Early: biological differences in development
  - Later: behavioral gender norms
- 
- School behaviors are not good proxies for underlying skills with long-term impact. Especially when comparing across groups facing different constraints.

## Interpretation of earlier studies

- Different effects of family environment on boys' and girls' behavior reflects skill development, has direct implications for future attainment.

$$Y_i^{ADOL} = f(S_g(Fam Env_i)) \longrightarrow Y_i^{ADLT} = h(S_i)$$

# Alternative mechanisms

- Family environment affects skills, but mapping into behavior depends upon gender.

$$Y_i^{ADOL} = f(S(Fam Env_i); g) \longrightarrow$$
$$Y_i^{ADLT} = h(S_i; g)$$

- Behavior reflects not just capabilities, but also incentives and constraints
  - In many situations, behaviors are misleading proxies for skill

## **Why is the gender gap in education increasing?**

- Girls have always excelled at any level of schooling they have been permitted/encouraged to enter.
- Early gender gaps in self-control, social skills.
- Now that barriers to tertiary education and the professions that it qualifies one to enter have fallen—we are perhaps seeing the predictable result.
- Probably not caused by changing family structure, single parent families.