

# Lone Mother Families and Children's Cognitive Development: evidence from the 1958, 1970 and 2000 British Cohorts

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# Aims

- 1: Does single motherhood affect children's cognitive outcomes? If so, what are the mechanisms driving differences in attainment?
2. Has the association between single motherhood and child cognitive outcomes changed over time?
3. Does the timing of single motherhood matter?

# Motivation

- Children in single mother families have poorer cognitive outcomes than those living with both parents **but** once other factors, such as low income and poor maternal mental health, are accounted for the impact of family structure is small (Chapple, 2009)
- However, children who grow up in single mother families may have different socio-economic circumstances to those living with both parents **because** they live with a single mother:
  - Single motherhood is linked to reduced income; higher poverty; worse maternal mental health; poor parenting; multiple family transitions (Hill, Yeung and Duncan, 2001; McLanahan, 2009)

# Motivation

- Prior studies emphasize the importance of variables such as parenting and income in **mediating** the relationship between single motherhood and child outcomes (e.g. Carlson & Corcoran, 2001)
- But, they **do not tell us the extent to which single motherhood causes changes** in income, maternal mental health and other ‘inputs’
- They cannot, therefore, quantify the magnitude of the relationship between single motherhood and children’s outcomes

We address this problem by applying structural equation models to assess the **‘direct’** and **‘indirect’** effect of single motherhood on children’s cognitive attainment

# Motivation

- Comparing children in single mothers with those in couples with equivalent circumstances => underestimates the effect of single motherhood on child outcomes
- (and omitting contemporary socio-economic variables overestimates effects)

# Why might single motherhood affect child outcomes?

## Direct effects

- Reduced availability of **parental time** (McLanahan, 2004)
- Reduced **social control** (Hill et al, 2001)
- Fathers 'unique' role in caregiving (Carbera et al, 2000);
- Conversely, father absence linked to truancy, delinquency and crime (Autor, 2016)
- **Stigma** associated with single motherhood

And, evidence suggests **father contact** does not compensate for father absence (Amato & Gilbreth, 1999)

# Why might single motherhood affect child outcomes?

## Indirect effects:

- **Economic inputs:** reduced income and other economic resources
- **Parental inputs:** lower quality parenting; poor maternal mental health
- **Social Stress:** changes in family structure affect parent / child relationships (Amato, 2000) and are linked to further disruptions (such as school moves)

# Change over time?

## **Direct effects: reduced effect**

- Greater prevalence expected to reduced impact on children
- reduced stigma; greater institutional support for separating parents and greater parental awareness of consequences for children (Ely et al, 1999)

## **Indirect effects:**

### **Economic resources:** negative

- reduced deficits as women's economic position has improved and as support through the tax and benefit system has increased

### **Parental inputs:** ambiguous

- wider gaps between single and two parent families as father involvement in two-parent families has grown
- mental health of mothers may have improved

### **Social stress:** no change

# Prior studies on change over time

- Evidence on divorce and cognitive attainment
  - For UK find **no evidence** of change over time using 1946, 1958 or 1970 cohorts (Sigle-Rushton, Hobcraft and Kiernan 2005; Ely et al. 1999)
  - Similar finding of **no change** over time in US (Bilbarz & Rafferty, 1999)
- But, in UK, significant further change in family forms: rapid rise in single motherhood, fall in marriage, rise in birth to single mothers

# Timing of single motherhood

**Early** parental separation is expected to be **more damaging** because:

- Longer time without father inputs and less likely to have farther contact
- Greater exposure to economic hardship
- Greater risk of further family change (and therefore stress)
- Consequence of low income may be more damaging for young children (Reardon et al, 2010) and may have a lasting effect on cognitive outcomes (Heckman, 2006)

But, early separation may be beneficial in high conflict families

Outcomes may also be more adversely affected by more recent separations (but more likely the case for emotional rather than cognitive outcomes)

# METHODS

# Data

- National Child Development Study (NCDS) - 1958 Cohort.
  - Birth, 7 and 11
- British Cohort Study (BCS)- 1970 Cohort.
  - Birth, 5 and 10
- Millennium Cohort Study (MCS)- 2000 Cohort.
  - 9 months, age 3, 5, 7 and 11

# Data

- Sample:
  - children with information on family histories
  - children with information on cognitive outcomes at age 11
  - multiple imputation to deal with missing information
  
- Final Sample:

–1958 cohort	10,925
–1970 cohort	9,169
–2000 cohort	10,249

# Outcome measures and single motherhood

- Lone Motherhood:

Three groups:

- At **birth**

- At **early** childhood (0-7 or 0-5 in 1970 cohort)

- At **middle** childhood (7-11 or 5-10 in 1970 cohort)

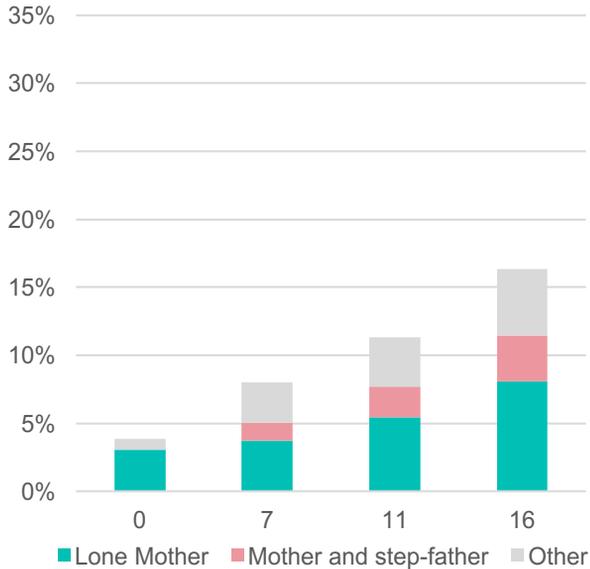
- Why not single dads?

- Fewer than 4% who experience single parenthood before age 11 are fathers

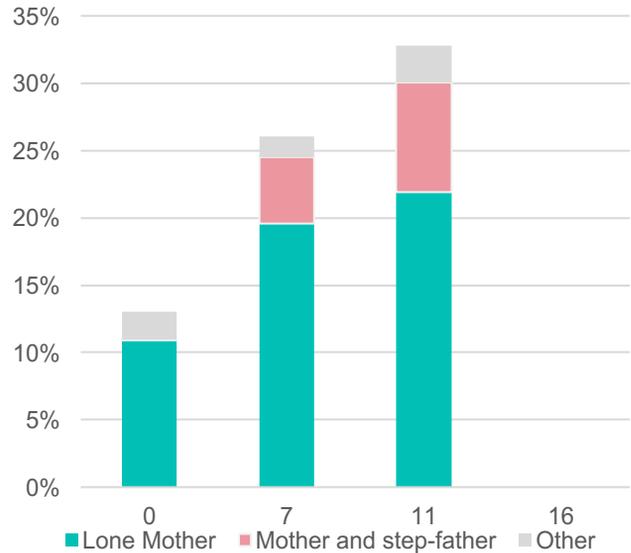
- Single dads => different parenting behaviour (Bronte-Tinkew et al, 2010) and economic circumstances (Moullin & Harkness, 2019)

# Changes in Family Structure by Age

## Family Structure: 1958 Cohort



## Family Structure: 2000 Cohort

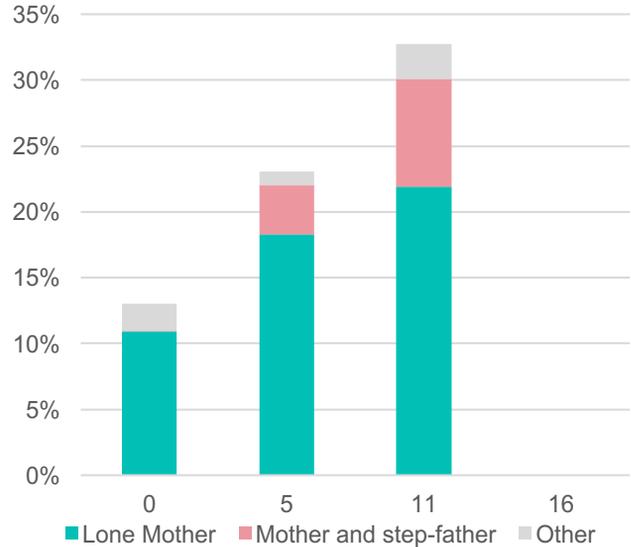


# Changes in Family Structure by Age

## Family Structure: 1970 Cohort



## Family Structure: 2000 Cohort



# Outcome measures and single motherhood

- Verbal cognitive ability at age 11:
  - For the 1958 cohort the verbal ability test is part of the General Ability Test
  - For the 1970 and 2000 cohort, it is part of the British Ability Scale.
  - Scores are standardized for age
  - Expressed in standard deviations (mean 0, SD 1)

# Covariates

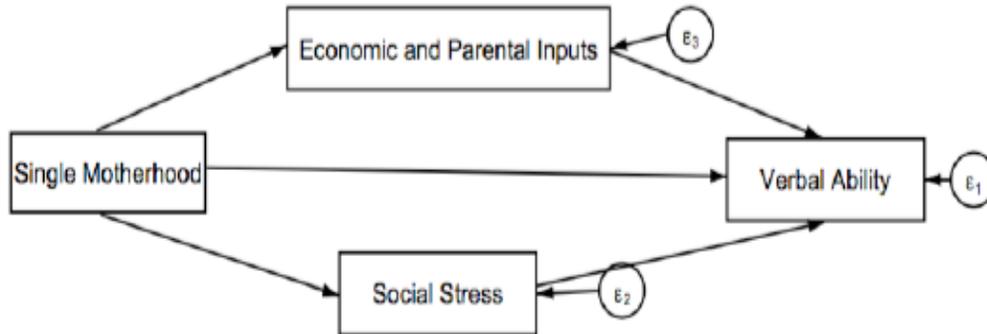
## Controls measured at birth:

- **mothers' characteristics:** age at birth, education, not white, smoked during pregnancy and socio-economic class
- **child characteristics:** sex, low birthweight, twin, having older
- siblings and region (8 dummy variables)

## Mediators at age 11:

- **Economic inputs:** mothers' employment, home ownership; logged equivalised income (financial hardship for the 1958)
- **Parental inputs:** mother's mental health; educational aspirations (staying on beyond the school leaving age in the 1958 and 1970 cohort, and for going to university in the 2000 cohort)
- Additional parental controls vary by year
- **Disruptions:** number of schools attended by 11 (also number home moves)

# Mediation model



# Empirical Strategy: Structural Equation Modelling

$$A_{ic} = \alpha_{0c} + \beta_{mc} \sum_{m=1}^n Z_{mic} + \gamma_{0c} LM_{ic} + \mu_{0c} X_{ic} + \epsilon_{0c}$$

$$Z_{1ic} = \alpha_{1c} + \gamma_{1c} LM_{ic} + \mu_{1c} X_{ic} + \epsilon_{1c}$$

⋮

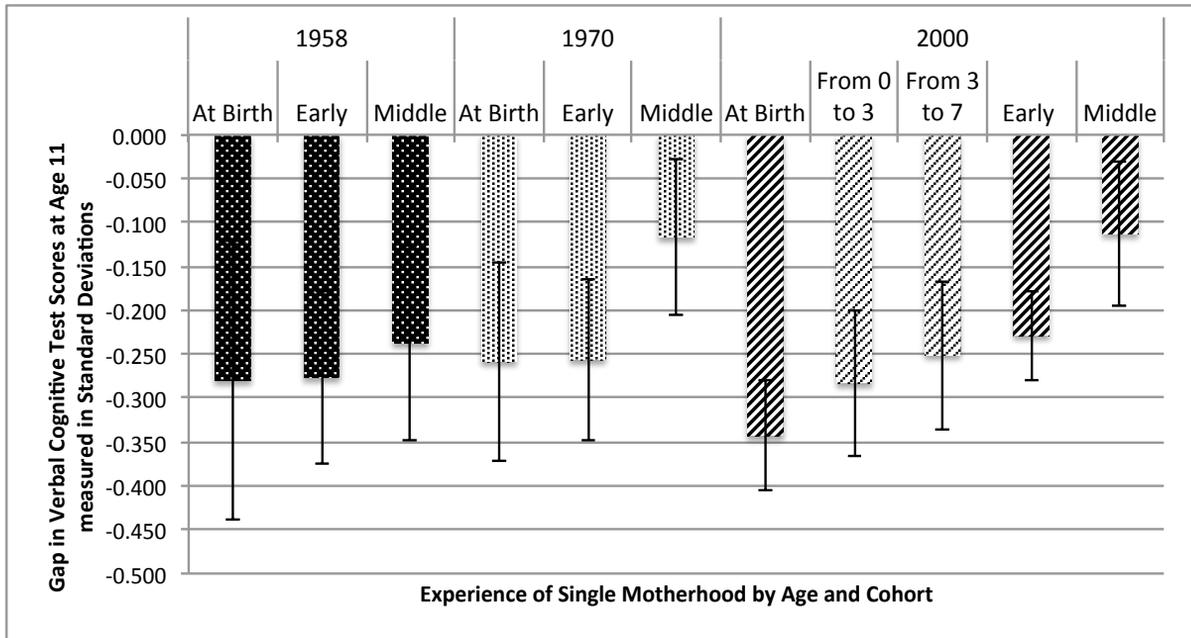
$$Z_{nic} = \alpha_{nc} + \gamma_{nc} LM_{ic} + \mu_{nc} X_{ic} + \epsilon_{nc}$$

- $A_{ic}$  represents child  $i$  in cohort  $c$ 's cognitive attainment.
- $Z_{mic}$  are the mediators (1 to  $n$ )
- $LM_{ic}$  indicates lone motherhood at birth, during early or middle childhood.
- $X_{ic}$  is a vector of exogenous control variables prior to lone motherhood
- The error terms are assumed to be randomly distributed.

**Direct Effects:**  $\gamma_{0c}$  and **Indirect Effects:**  $\gamma_{mc} \times \beta_{mc}$

- Standard errors – bootstrapped with 200 replications
- To test for significant differences in coefficients across models, we run pooled models - results in paper

# Raw Gaps in Cognitive Attainment



# SEM of the relationship between age 11 cognitive scores and living with a single mother: **1958 COHORT**

Mediating variables (measured at age 11)

Verbal cognitive score	Economic inputs			Parenting inputs		Disruption
	Mothers works	Financial hardship/ log income <sup>1</sup>	Home owner	Aspirations <sup>2</sup>	Maternal depression	School moves

**1958 cohort (n=10,925)**

*Single mother:*

.. at birth	-.020	.042	.193***	-.222***	-.059	.307***
.. in early childhood	-.085*	.061**	.192***	-.117***	-.045**	.278***
.. in mid childhood	-.045	.077**	.286***	-.105***	-.023	.218***

*Mediating variables:*

Mother works	.015
Financial hardship	-.259***
Home owner	.239***
Aspiration	.543***
School moves	-.053***

# SEM of the relationship between age 11 cognitive scores and living with a single mother: 1970

	Mediating variables (measured at age 11)						
	Verbal cognitive score	Economic inputs			Parenting inputs		Disruption
		Mothers works	Financial hardship/ log income <sup>1</sup>	Home owner	Aspirations <sup>2</sup>	Maternal depression	School moves
<b>1970 cohort (n=9,169)</b>							
<i>Single mother:</i>							
.. at birth	.064	-.066**	-.184***	-.269***	-.056**	.143***	
.. in early childhood	-.050	-.034	-.196***	-.245***	-.036	.071***	
.. in mid childhood	.043	-.048**	-.325***	-.167***	-.018	.076***	
<i>Mediating variables:</i>							
Mother works	-.006						
Log income <sup>1</sup>	.201***						
Home owner	.198***						
Aspiration	.421***						
Maternal depression	-.097***						

# SEM of the relationship between age 11 cognitive scores and living with a single mother: 2000

	Verbal cognitive score	Economic inputs			Parenting inputs		Disruption
		Mothers works	Financial hardship/ log income <sup>1</sup>	Home owner	Aspirations <sup>2</sup>	Maternal depression	School moves
<i>Single mother:</i>							
.. at birth	-.015	-.086***	-.248***	-.427***	-.014	.086***	.111***
.. in early childhood	-.046	-.051***	-.118***	-.334***	-.045	.068***	.123***
.. in mid childhood	.000	-.005	-.078***	-.254***	-.035	.109***	.039
<i>Mediating variables:</i>							
Mother works	.057*						
Log income <sup>1</sup>	.272***						
Home owner	.050						
Aspiration	.340***						
Maternal depression	-.071***						
School moves	-.021						

# Estimated direct and indirect effect of single motherhood on cognitive outcomes at age 11: 1958 and 2000

	Birth	Early	Mid	Birth	Early	Mid
	1958			2000		
Total effect	-.171**	-.201***	-.167***	-.122***	-.120***	-.054
Direct Effect	-.020	-.085*	-.045	-.015	-.046*	.000
Indirect Effect	-.150***	-.116***	-.122***	-.107***	-.074***	-.055***
Indirect effect due to...						
Mother Works	.001	.001	.001	-.005*	-.003*	-.000
Home owner	-.053***	-.028***	-.025***	-.021	-.017	-.013
Income <sup>1</sup>	-.050***	-.050***	-.074***	-.067***	-.032***	-.021***
Maternal depression				-.006	-.005*	-.008*
Aspirations	-.032	-.025**	-.012	-.005	-.015***	-.012*
Number schools	-.016***	-.015***	-.012***	-.002	-.003	-.001

# Estimated direct and indirect effect of single motherhood on cognitive outcomes at age 11: 1958, 1970 and 2000

	Birth	Early	Mid	Birth	Early	Mid	Birth	Early	Mid
	1958			1970			2000		
Total effect	-.171**	-.201***	-.167***	-.063	-.159***	-.070	-.122***	-.120***	-.054
Direct Effect	-.020	-.085*	-.045	.064	-.050	.043	-.015	-.046*	.000
Indirect Effect	-.150***	-.116***	-.122***	-.127***	-.110***	-.113***	-.107***	-.074***	-.055***
Indirect effect due to...									
Mother Works	.001	.001	.001	.000	.000	.000	-.005*	-.003*	-.000
Home owner	-.053***	-.028***	-.025***	-.053***	-.049***	-.033***	-.021	-.017	-.013
Income <sup>1</sup>	-.050***	-.050***	-.074***	-.037***	-.039***	-.065***	-.067***	-.032***	-.021***
Maternal depression				-.014***	-.007**	-.007**	-.006	-.005*	-.008*
Aspirations	-.032	-.025**	-.012	-.023**	-.015	-.008	-.005	-.015***	-.012*
Number schools	-.016***	-.015***	-.012***				-.002	-.003	-.001

# Results

- Direct effects:
- Indirect effects:
  - Consistently significant negative effect
  - Driven by economic inputs, with a smaller role for parenting which has declined over time
  - The effects are increasingly age graded, with smaller effects for those who experience later parental separation in the 2000 cohort

# Adding additional parenting controls: 1958

	Mediating variables (measured at age 11)							
	Verbal cognitive score	Goes to Library	Plays an Instrume nt	Out with parents	Goes to Museums	Plays Sports	Regular Bedtime	Rules on Time on Computer
<b>1958 cohort (n=10,925)</b>								
<i>Single mother:</i>								
.. at birth	.009	-.106***		-.143***		-.027		
.. in early childhood	-.062	-.081**		-.101***		.039		
.. in mid childhood	-.018	-.100**		-.066**		.031		
<i>Mediating variables:</i>								
Goes to library	.340***							
Out with Parents	.036**							
Plays Sports	-.019							

# 1970

	Mediating variables (measured at age 11)							
	Verbal cognitive score	Goes to Library	Plays an Instrume nt	Out with parents	Goes to Museums	Plays Sports	Regular Bedtime	Rules on Time on Computer
<b>1970 cohort (n=9,169)</b>								
<i>Single mother:</i>								
.. at birth	.069	-.020	-.028	-.051***	-.014	.015		
.. in early childhood	-.048	-.041*	-.020	-.004	-.033	-.040*		
.. in mid childhood	.054	-.046**	-.041**	-.014	-.029	-.001		
<i>Mediating variables:</i>								
Goes to library	.128***							
Plays an instrument	.185***							
Out with parents	.058							
Goes to museums	.102***							
Plays Sports	-.101***							

# 2000

	Mediating variables (measured at age 11)							
	Verbal cognitive score	Goes to Library	Plays an Instru- ment	Out with parents	Goes to Museums	Plays Sports	Regular Bedtime	Rules on Time on Computer
<b>2000 cohort (n=10,249)</b>								
<i>Single mother:</i>								
.. at birth	-.012	.049***	-.015			-.076***	-.038**	-.011
.. in early childhood	-.040	.011	-.010			-.105***	-.000	-.003
.. in mid childhood	.011	-.036*	-.039			-.105***	.002	-.011
<i>Mediating variables:</i>								
Goes to library	.016							
Plays an Instrument	.101***							
Plays Sports	.061**							
Regular Bedtime	.007							
Rules on Time on Computer	.053							

# Direct and indirect effects with additional parenting variables

	Birth	Early	Mid	Birth	Early	Mid	Birth	Early	Mid
	1958			1970			2000		
Depression				-.012**	-.006**	-.007**	-.006*	-.005*	-.007*
Aspirations	-.029	-.022**	-.011	-.021**	-.014	-.007	-.005	-.015***	-.011*
Goes to library	-.036***	-.028***	-.034***	-.003	-.005*	-.006**	.001	.000	-.001
Plays an Instrument				-.005	-.004	-.008*	-.002	-.001	-.004
Out with parents	-.005*	-.004*	-.002	-.003	.000	-.001			
Goes to museums				-.001	-.003	-.003			
Plays Sports	-.001	-.001	.001	-.001	.004	.000	-.005**	-.006**	-.006**
Regular Bedtime							-.000	-.000	.000
Rules on Time on Computer							-.001	-.000	-.001
<b>Total parenting</b>	<b>-.070***</b>	<b>-.055***</b>	<b>-.048***</b>	<b>-.046***</b>	<b>-.031**</b>	<b>-.028**</b>	<b>-.017***</b>	<b>-.027***</b>	<b>-.030***</b>
Total economic	-.095***	-.071***	-.090***	-.087***	-.083***	-.095***	-.091***	-.051***	-.034***
<i>Total Indirect Effect</i>	-.179***	-.139***	-.149***	-.132***	-.111***	-.125***	-.111***	-.080***	-.065***
<i>Direct Effect</i>	.009	-.062	-.018	.069	-.048	.054	-.012	-.040	.011
Combined effect	-.171**	-.201***	-.167***	-.063	-.159***	-.071	-.123***	-.120***	-.054

# Robustness checks

- What about other outcome measures?
  - Results for mathematics and reading show similar patterns
  
- Are there differences between widows, divorcees, and former cohabitantes?
  - Widows:
    - better outcomes in 1958 & 1970 (due to higher incomes and higher rates of home ownership);
    - in 2000 cohort widowers have deficits in attainment (and no longer have income gains or higher home ownership)
  - Cohabitation:
    - in 2000 similar indirect effects for previously married and those that cohabited.
    - some indication that the negative effect of reduced income on attainment is larger for those who were formerly married.

# Robustness checks

- Selection?
  - For those experiencing later parental separation we dig further into this question by including prior test scores

**Selection: Association of single motherhood with verbal cognitive outcomes at 11 for those whose parents separate in middle childhood, with and without controls for prior attainment at 5/7**

	Separation in Middle Childhood					
	1958		1970		2000	
	Without prior attainment	With prior attainment	Without prior attainment	With prior attainment	Without prior attainment	With prior attainment
Direct Effect	-.040	-.015	.043	.043	-.006	-.034
Indirect Effect	-.127***	-.041***	-.112***	-.074***	-.047***	-.031***
Total Effect	-.167***	-.056	-.070	-.031	-.053	-.034

**Selection: Association of single motherhood with verbal cognitive outcomes at 11 for those whose parents separate in middle childhood, with and without controls for prior attainment at 3**

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Separation between 3 and 7

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	2000	
	Without prior attainment	With prior attainment
Direct Effect	-.067	-.069
Indirect Effect	-.074***	-.037***
Total Effect	-.141***	-.106***

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Does re-partnering improve outcomes?

# Effect of re-partnering on cognitive outcomes

	1958	1970	2000
<i>Indirect effect due to...</i>			
Mother Works	-.001	-.000	-.002
Home owner	.013	.014**	.006
Financial hardship/ Income <sup>1</sup>	.030***	.052***	-.008**
Maternal depression		.006**	.003
Aspirations	-.055***	-.019	.001
Number schools	-.020***		-.003
<i>Total Indirect Effect</i>	-.034	.053***	-.004
<i>Direct Effect</i>	-.091	-.172***	.001
<i>Combined effect (indirect + direct)</i>	-.125*	-.119**	-.003

# Multiple family change?

- Focus on family instability in US
- But there is much less evidence for this in the UK
  - Fomby, Cavanagh and Goode's (2011) comparative study of the US and UK find that multiple re-partnering and social fathering is far less common in the UK
  - In 2000 cohort just 2.7% of children (n=95) experiencing single motherhood also experienced multiple family transitions

# Conclusions

- Although single motherhood has become more common it still has, on average, damaging effects for children
- Consistent with other studies we find little evidence of a '**direct**' effect
- But '**indirect**' effects are consistently negative and statistically significant
- We find little evidence of differences in parenting (particularly among the more recent cohort)
- Economic impacts are substantial and significant across all cohorts

# Conclusion

- Looking over time, negative effects have attenuated for those who experience later parental separations
- As a result, the impact of single motherhood on children's cognitive outcomes is increasingly age graded, with early separations having the most damaging consequences for children.
- Re-partnering does little to improve child outcomes

Thank-you

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