Can community resources mitigate the effects of household poverty on adverse childhood experiences (ACE) incidence?

Results from the Growing Up in Scotland cohort

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Disclosure Statement

I have no affiliation (financial or otherwise) with a pharmaceutical, medical device or communications organization.

What are ACEs?

Physical, sexual, emotional abuse

Substance use

Mental health issues

Divorce or separation

Neglect

Incarceration

Domestic violence

Health and social outcomes

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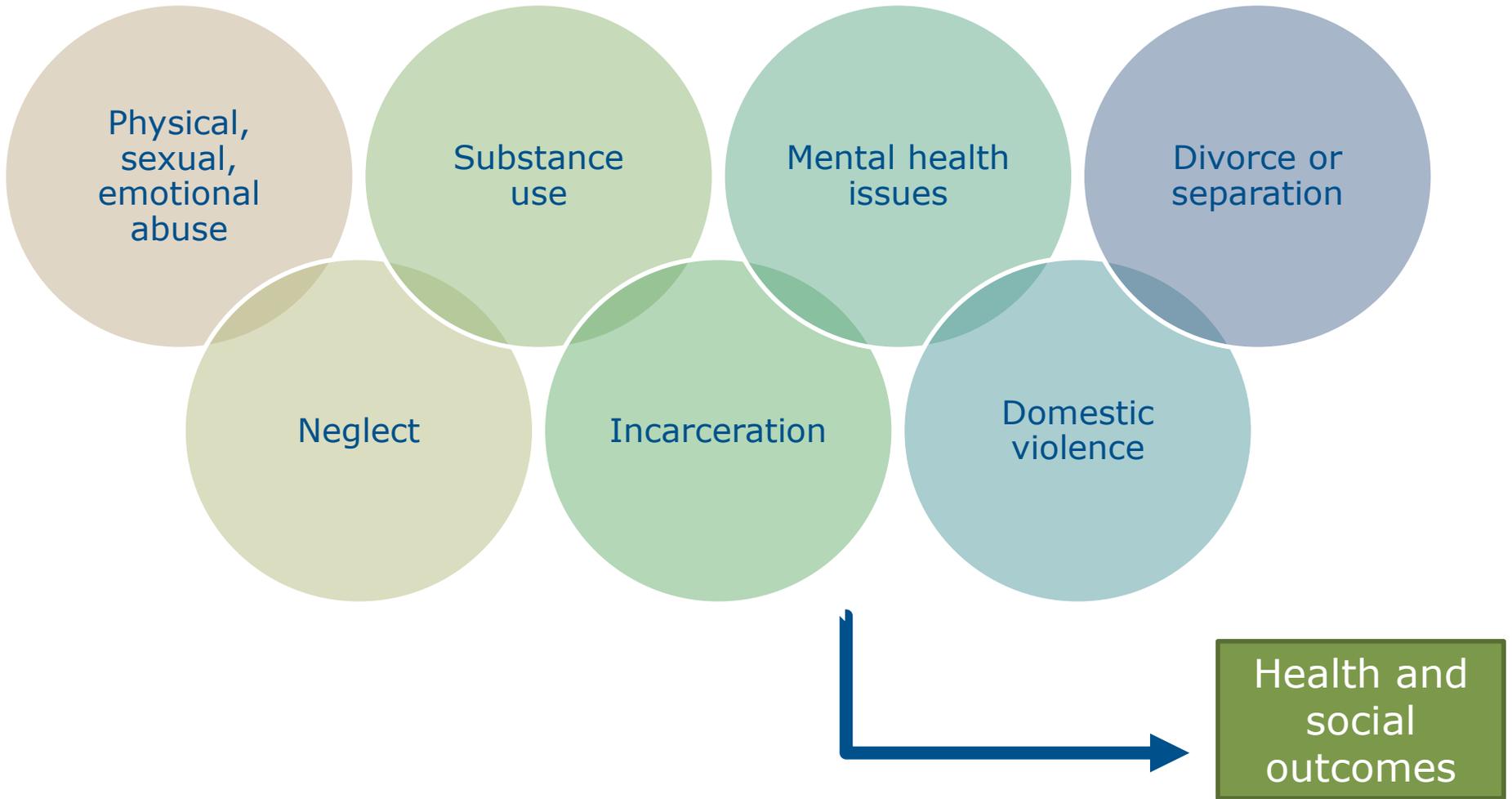
Background

- ACEs in Scotland:
  - Prevalence is high
    - 65% of 8 year-olds have experienced ≥ 1 ACEs

  - Clustering in low-income households
    - 53% of high-income children are ACE-free
    - 8% in low-income children are ACE-free

(L. Marryat & J. Frank, Forthcoming)

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Background
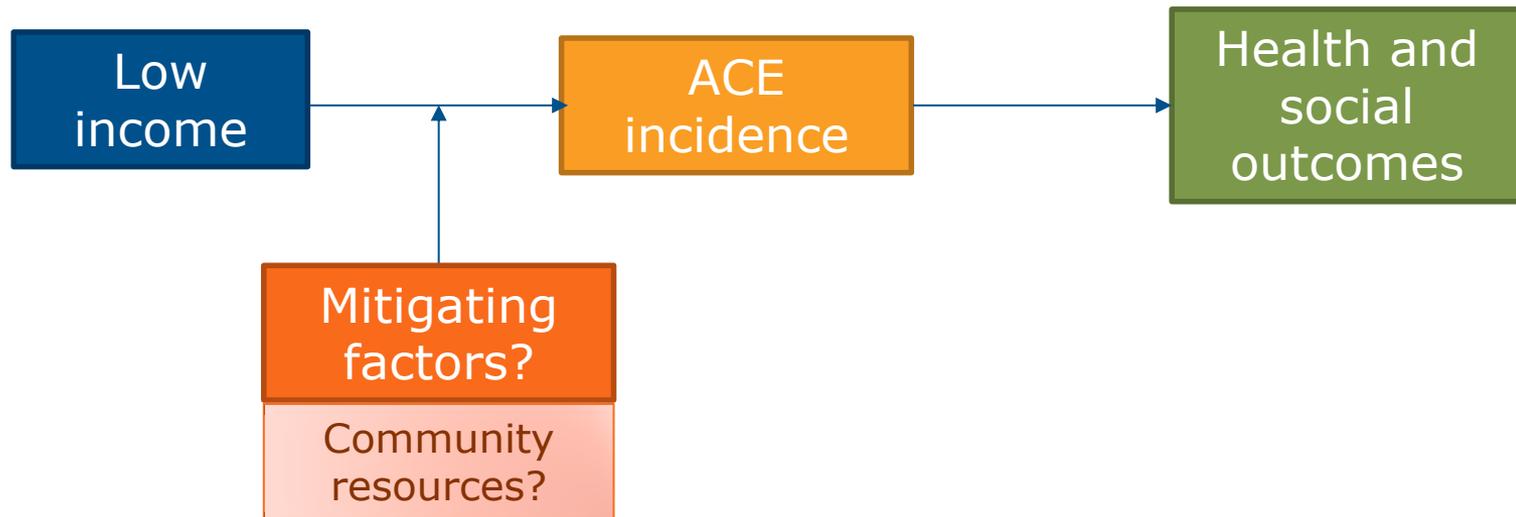
The experience of low-income can vary according to the relative generosity of state investment in benefits, policies and resources

(Bambra & Eikemo 2009, Bambra 2011, O'Campo et al. 2015)

Research question

Is the association between household poverty and cumulative ACE incidence modified by families' access to community resources?

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Community resources

Housing

Transportation

Childcare

Parks

Breastfeeding Counselling

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Objectives

1. **Protective effects?** Assess whether resources are protective against cumulative ACE incidence in households above and below the poverty line

2. **Proportion eliminated?** Assess the extent to which income inequalities in cumulative ACE incidence could be eliminated if the identified resources were available to all

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Methods

Sample: Growing Up in Scotland (GUS) cohort, respondents followed from 10 months (in 2004/5) to 8 years (2013/4) (N=2,816)

Exposure: Households' baseline low-income status (<£11,000 in 2004/5)

Covariates: Child's sex, and mother's education, visible minority status, age at first pregnancy, employment at pregnancy, and rural residence.

Outcome: Cumulative 8-year incidence of ACEs
- 0 ACEs vs 1 or more
- <3 ACEs vs. 3 or more

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7 ACEs in GUS

1. **Physical abuse:** Child smacked slapped after doing something wrong, <u>often or always</u>

2. **Emotional neglect:** Child <u>never</u> asked about day or well-being, played with, helped with homework, congratulated.

3. **Household domestic abuse**: Parent reporting being hit, pushed, held down, choked, strangled, smothered, bit, have a weapon used against them, or forced into sexual activity <u>four or more times</u>

4. **Use of street drugs** (any) or elevated use of **alcohol** (≥14 units per week);

5. **Separation, divorce**

6. **Incarceration of a parent**

7. **Mental health issues:** Elevated score of negative affective health symptoms

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Analyses

Objective 1: Protective effects of resources?

- Inverse probability-weighted (IPW) identity-link Poisson regression models, <u>stratified by income</u>

Objective 2: Proportion of inequality eliminated?

- Inverse probability-weighted (IPW) identity-link Poisson regression models
    - **Total effect** (TE) of income on ACE incidence
    - **Controlled direct effect** (CDE) if all had the resource
   - **Proportion eliminated** (PE) = (TE- CDE) / TE

VanderWeele 2009

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RESULTS

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Descriptive results

Low-income households characteristics:

Lower education

•Visible minority

Less access to housing, transportation, childcare

Unemployed at pregnancy

Lower access to breastfeeding counselling

Urban-dwelling

Young at first pregnancy

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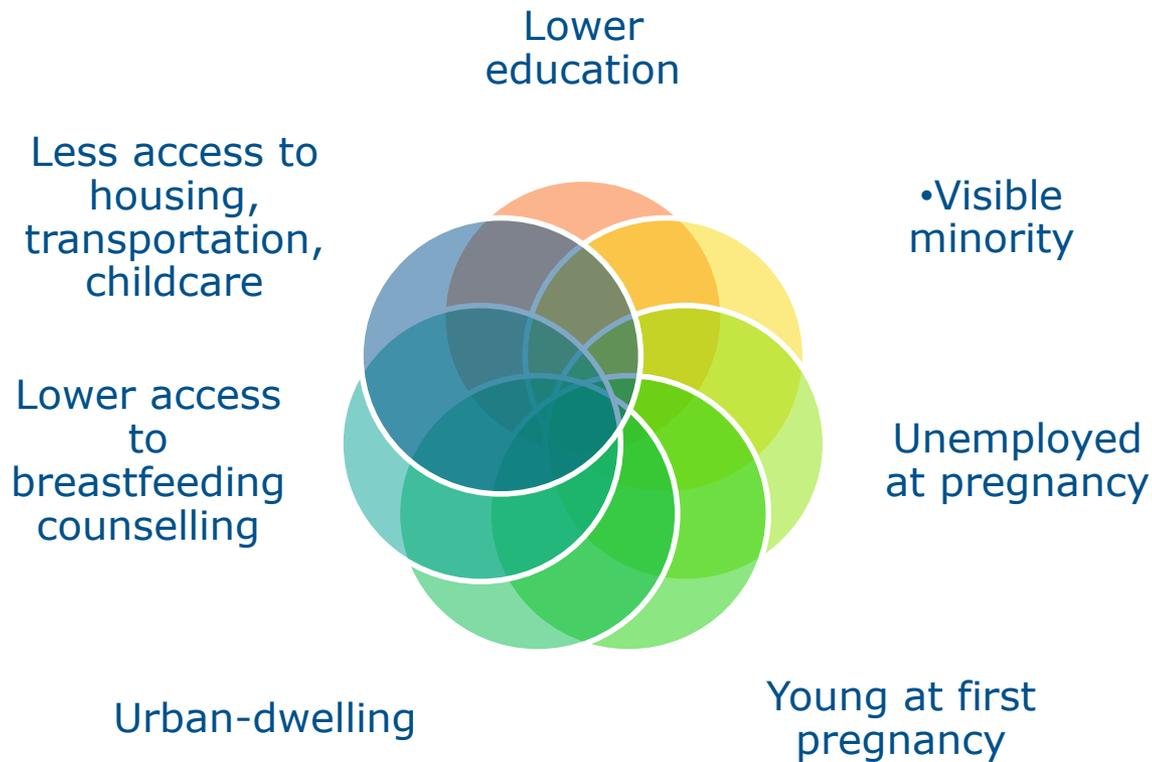
Cumulative ACE incidence
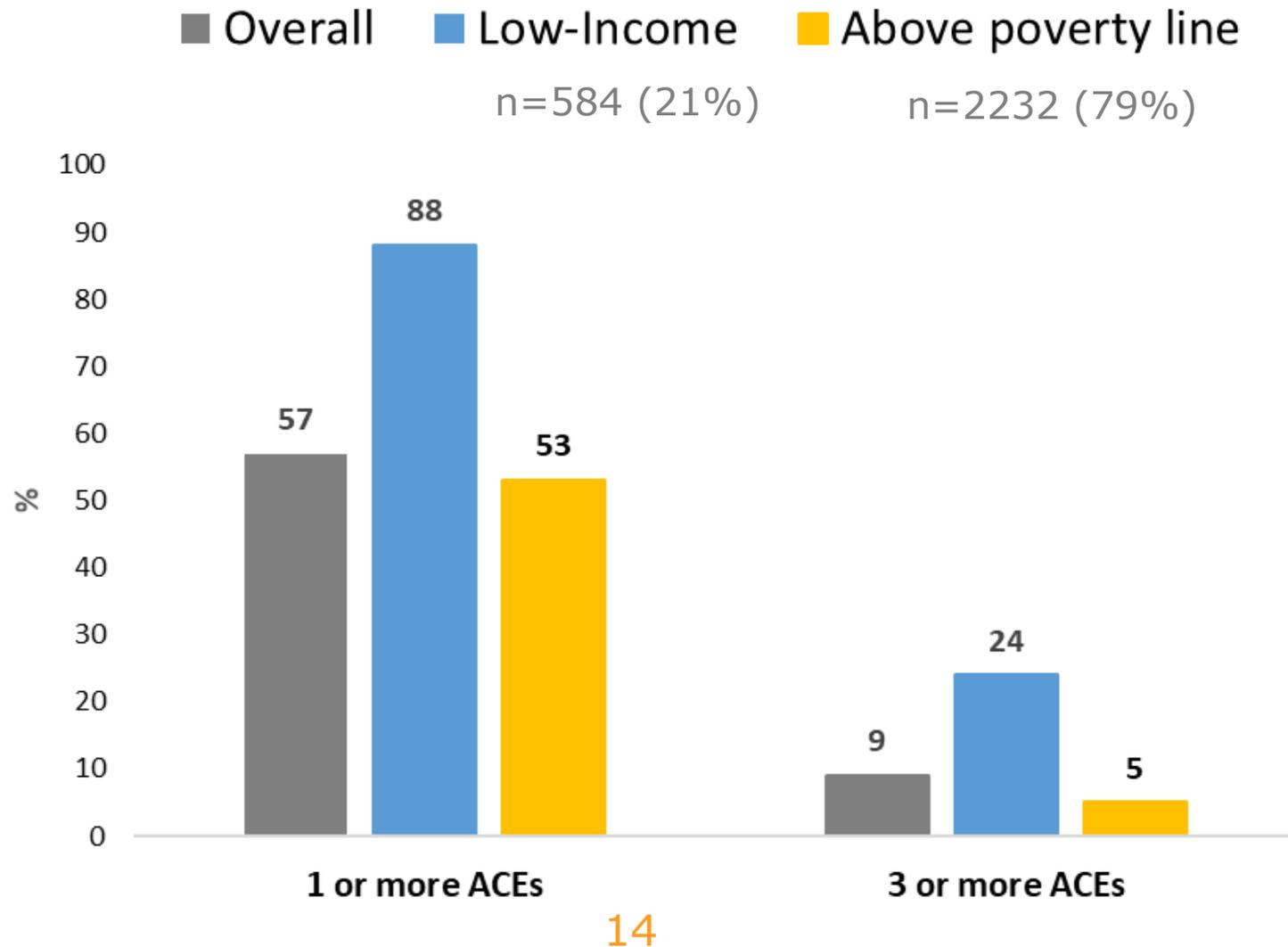
Effects of resources: **1 or more ACEs**

| **Above poverty line**	**RD % (95% CI)**
Housing	-10.0 (-14.4, -5.7)
Parks	1.0 (-4.1, 6.2)
Transport	-13.9 (-18.6, -9.3)
Breastfeeding Ed.	-8.5 (-13.0, -3.9)
Childcare	-2.6 (-6.9, 1.7)

Low-Income	**RD % (95% CI)**
Housing	0.5 (-7.8, 8.9)
Parks	-2.1 (-12.1, 7.8)
Transport	-11.0 (-19.9, -2.2)
Breastfeeding Ed.	-7.2 (-15.9, 1.4)
Childcare	3.9 (-4.6, 12.4)

RD (95% CI)
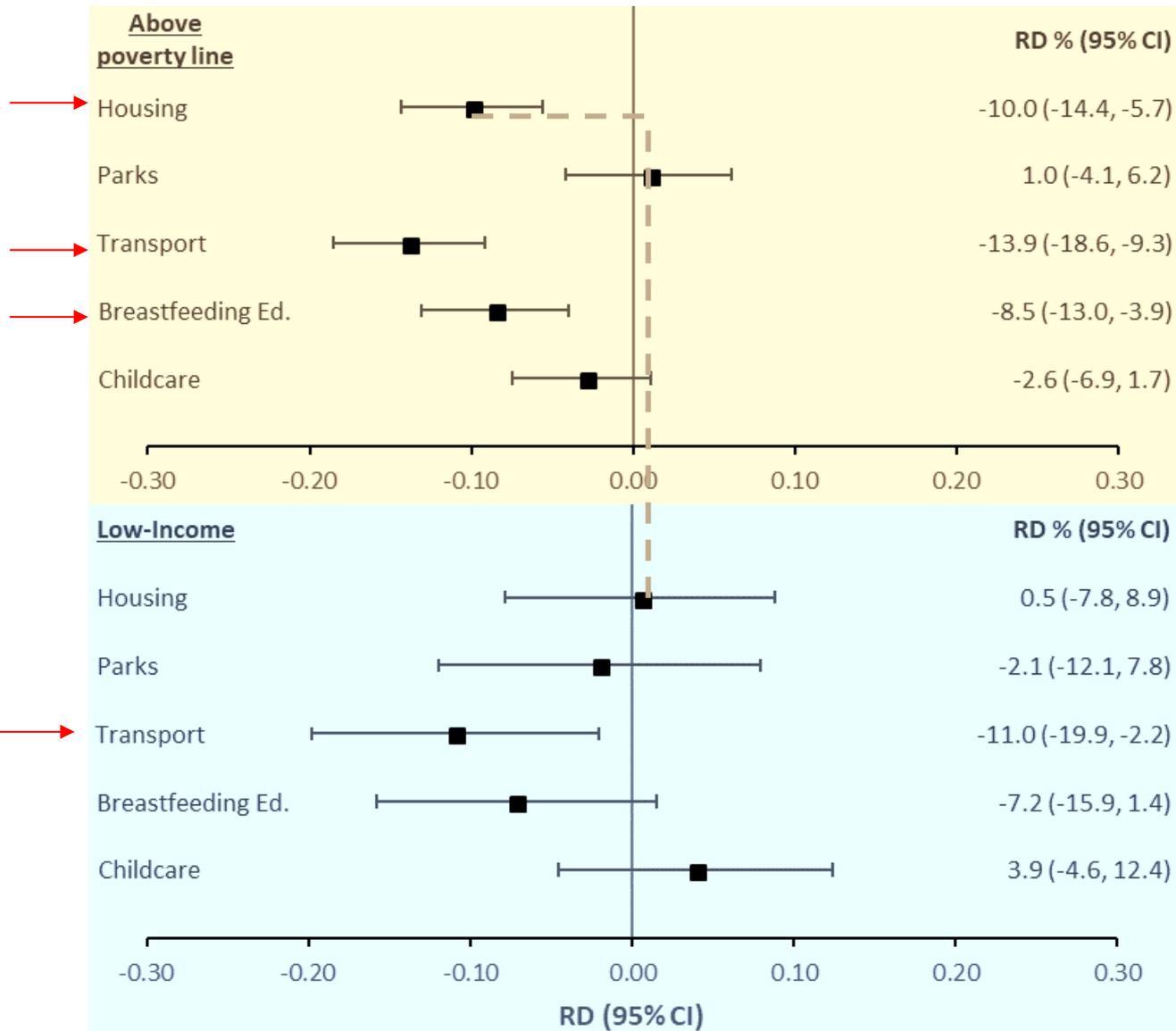
Proportion eliminated: **1 or more ACEs**

Increasing inequality

Resource	% (95% CI)
Housing	-6.8 (-16.6, -0.3)
Parks	2.1 (-2.1, 6.6)
Transport	2.1 (-4.9, 10.0
Breastfeeding Ed.	-1.4 (-8.6, 5.7)
Childcare	-14.7 (-32.0, 3.5)

Proportion eliminated (%)

-50   -30   -10   10   30   50

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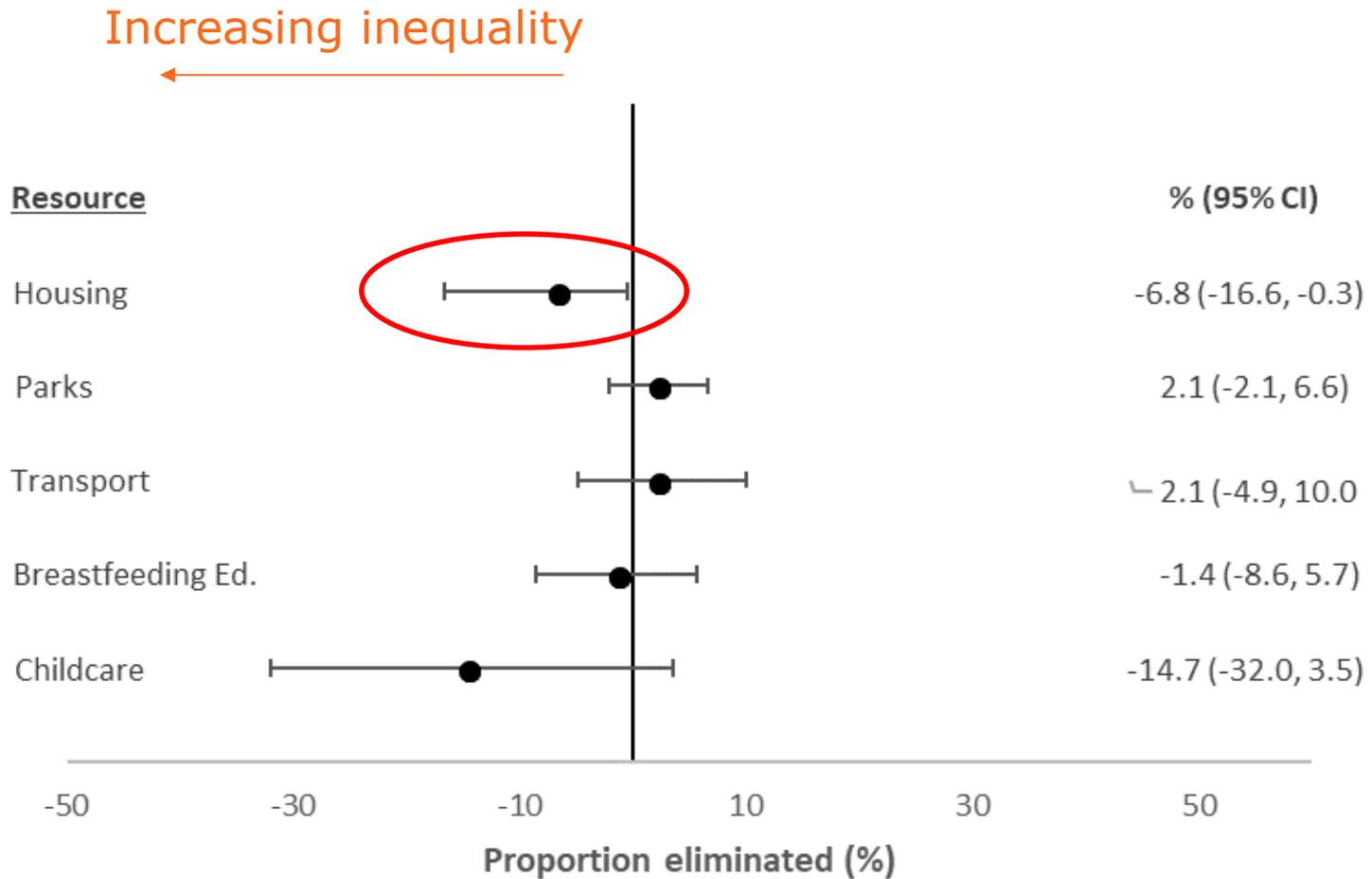
Effects of resources: **3 or more ACEs**

	RD % (95% CI)
Above poverty line	
→ Housing	-3.3 (-4.7, -1.9)
Parks	1.5 (0.0, 3.0)
→ Transport	-3.9 (-5.5, -2.4)
→ Breastfeeding Ed.	-1.6 (-3.0, -0.1)
Childcare	0.4 (-1.0, 1.7)
Low-income	
Housing	1.4 (-3.2, 5.9)
Parks	4.0 (-1.3, 9.5)
→ Transport	-8.0 (-12.9, -3.2)
Breastfeeding Ed.	-3.7 (-8.0, 1.0)
Childcare	4.5 (0.0, 9.0)
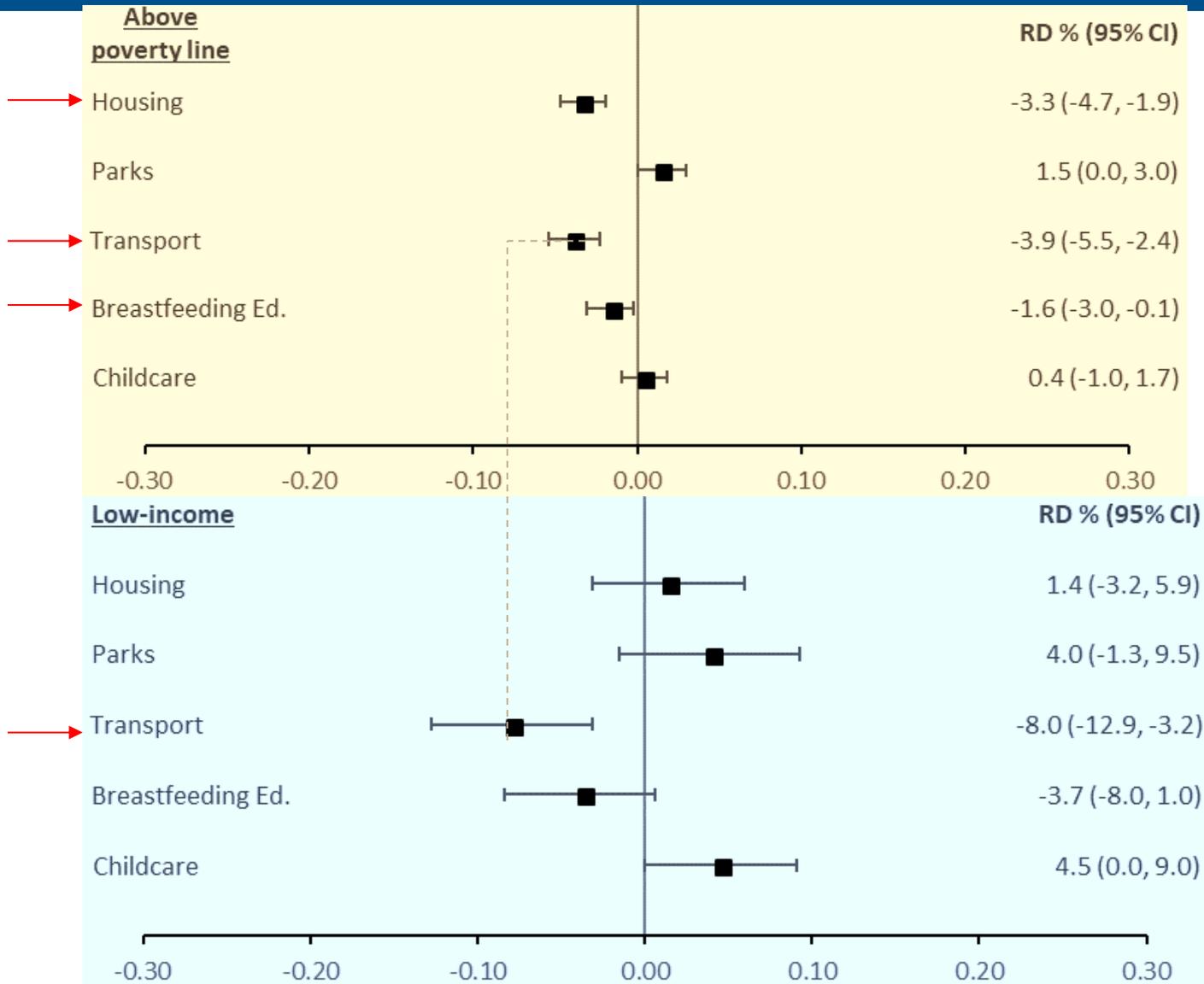
Proportion eliminated: **3 or more ACEs**

Decreasing inequality

Resource	% (95% CI)
Housing	-0.8 (-15.0, 13.0)
Parks	-1.0 (-8.2, 5.5)
Transport	20.8 (3.4, 41.0)
Breastfeeding Ed.	7.5 (-7.8, 24.0)
Childcare	-20.0 (-40.0, 5.1)

Proportion eliminated (%)

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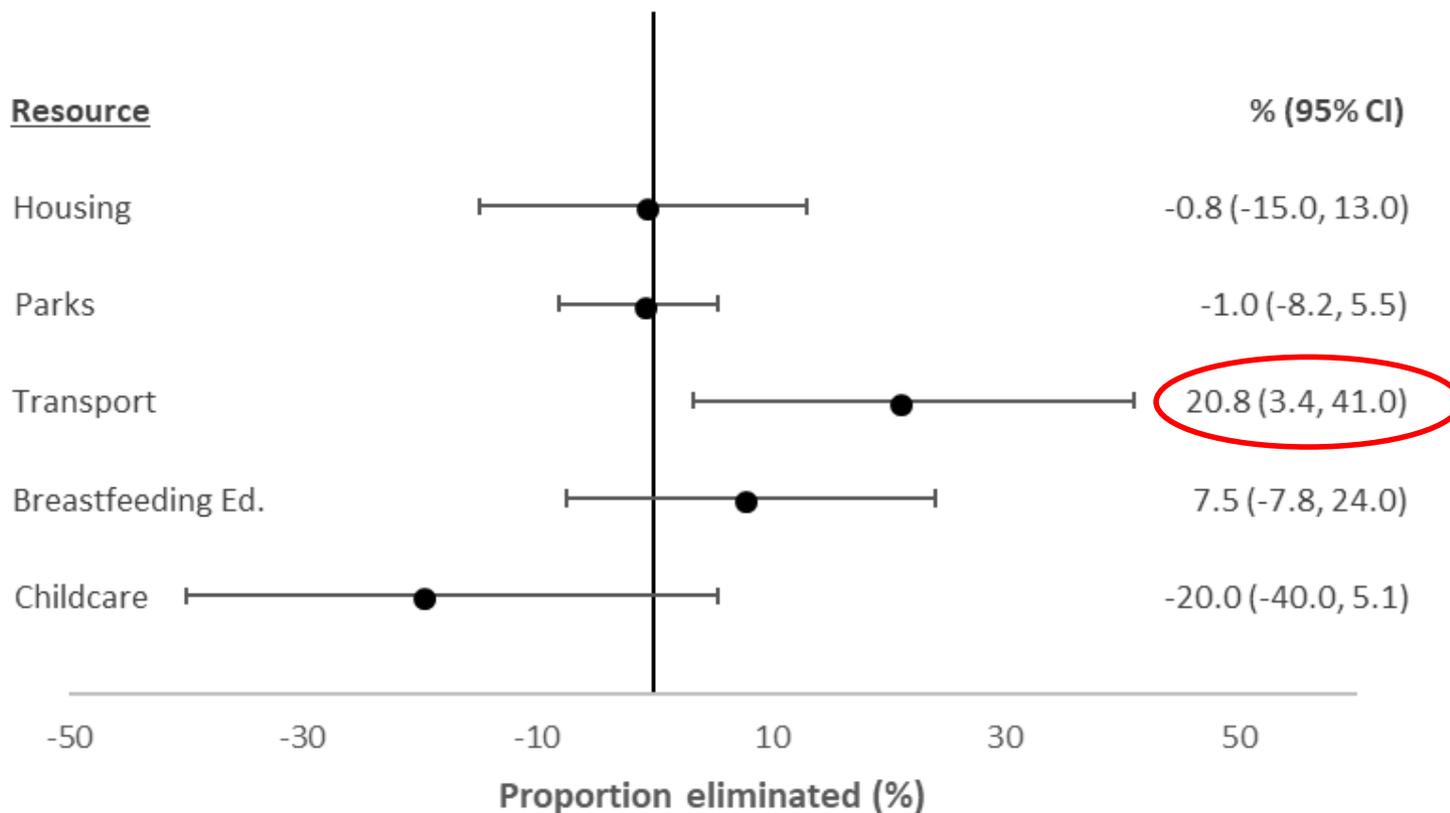
Discussion

- 57% 1 or more ACEs, 9% 3 or more ACEs:

    - Improving access to **transportation**, **housing**, and formal **breastfeeding counselling** may lead to population-level decreases in ACE incidence

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Discussion

Housing

- Stability, security
- Self-worth

Transportation

- Self-efficacy
- Less stress and fatigue from compulsory walking
- Access to resources outside local-area

Breastfeeding Counselling

- Proxy for access to supportive health resources

Decisional latitude   Empowerment   Independence

Syme 1996, Markovich 2011, Bostock 2001, Bambra 2007, Fairburn 2005, Dieterich 2013, Chapman 2004

Discussion

How to reduce income inequalities in ACE incidence?

Second best to the elimination of child poverty:

Improving access to community resources such as **transportation** may mitigate the effects of poverty on ACE incidence.

Syme 1996, Markovich 2011, Bostock 2001, Bambra 2007, Fairburn 2005, Dieterich 2013, Chapman 2004

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Discussion

Low income → ACE incidence

?

Parks

Measure did not capture park quality (aesthetics, safety, vegetation, equipment)

Measured at baseline – later exposure may be more relevant

Childcare

Measure did not capture childcare quality, or amount (critical dose)

Measured at baseline – later exposure may be more relevant

Fairburn 2005, Mitchell 2007, Siraj 2015, Geddes 2011

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References

Methods:

VanderWeele TJ. Marginal structural models for the estimation of direct and indirect effects. Epidemiology (Cambridge, Mass.). Jan 2009;20(1):18-26.

VanderWeele T. Explanation in causal inference: methods for mediation and interaction. Oxford University Press; 2015.

Naimi AI, Schnitzer ME, Moodie EEM, Bodnar LM. Mediation Analysis for Health Disparities Research. American Journal of Epidemiology. 2016;184(4):315-324.

VanderWeele TJ. Mediation Analysis: A Practitioner's Guide. Annual Review of Public Health. 2016;37(1):17-32.

Westreich D, Cole SR. Invited Commentary: Positivity in Practice. American Journal of Epidemiology. 2010;171(6):674-677.

Richiardi L, Bellocco R, Zugna D. Mediation analysis in epidemiology: methods, interpretation and bias. International Journal of Epidemiology. 2013;42(5):1511-1519.

VanderWeele TJ, Robinson WR. On causal interpretation of race in regressions adjusting for confounding and mediating variables. 2014;25(4):473-484.
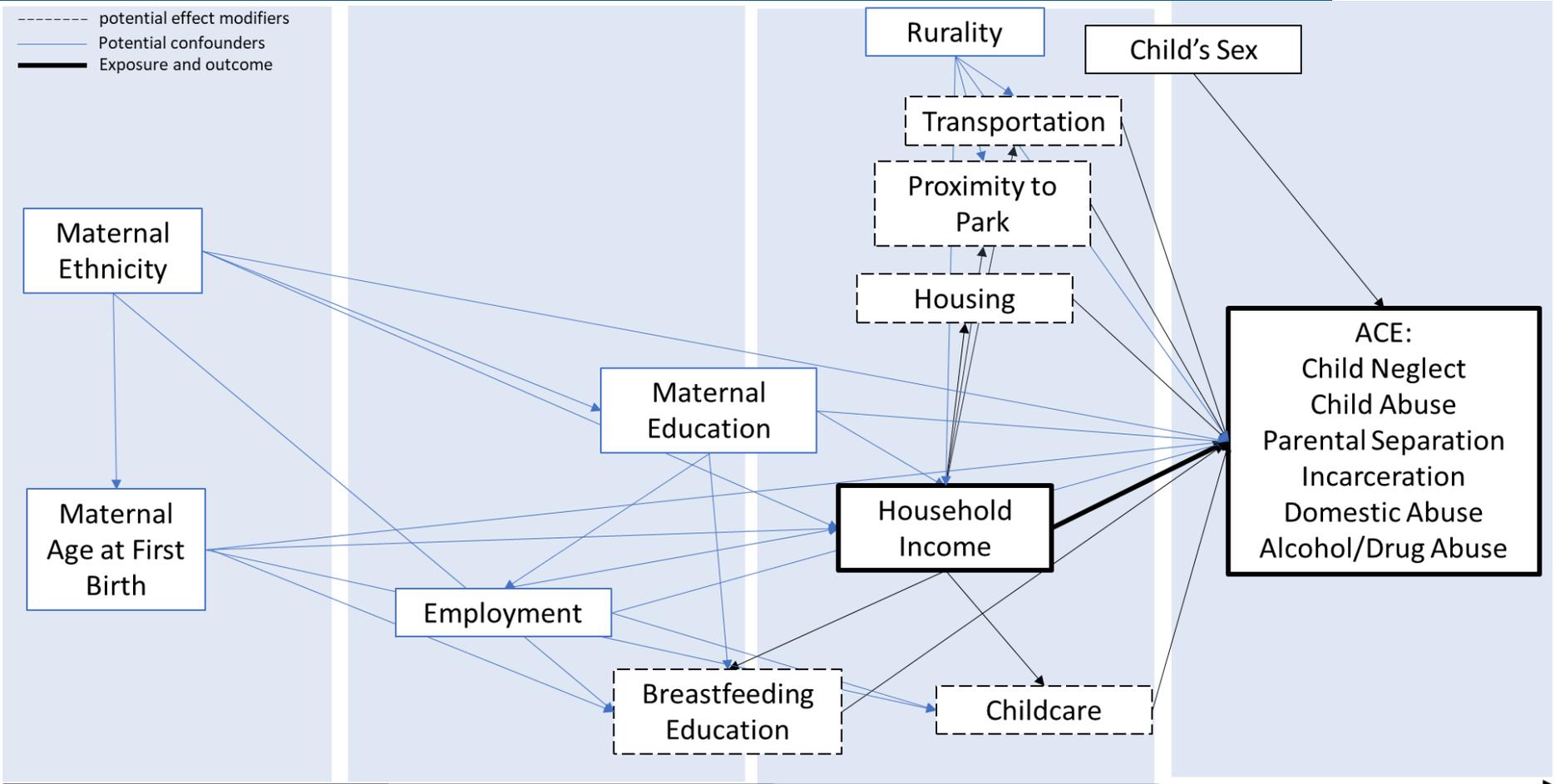
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Directed Acyclic Graph

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The Growing Up in Scotland study sample

- Used Birth Cohort 1 – born 2004/5

- Data from sweeps 1-7 (10 months to age 8)

- At sweep 1 there were 5,217 children recruited

- At Sweep 7 there were 3,456 children in the study (66% of sweep 1 children)

- Calculated ACE scores using data from every sweep

- Longitudinal weights used to account for selection at baseline and attrition

7 ACEs in GUS

Data availability

Physical abuse

Emotional abuse

Witnessed domestic abuse

Live with someone with mental health problems

Sexual abuse

Physical Neglect

Lived with substance misuser

Parents separated or divorced

Emotional neglect

Household member in prison
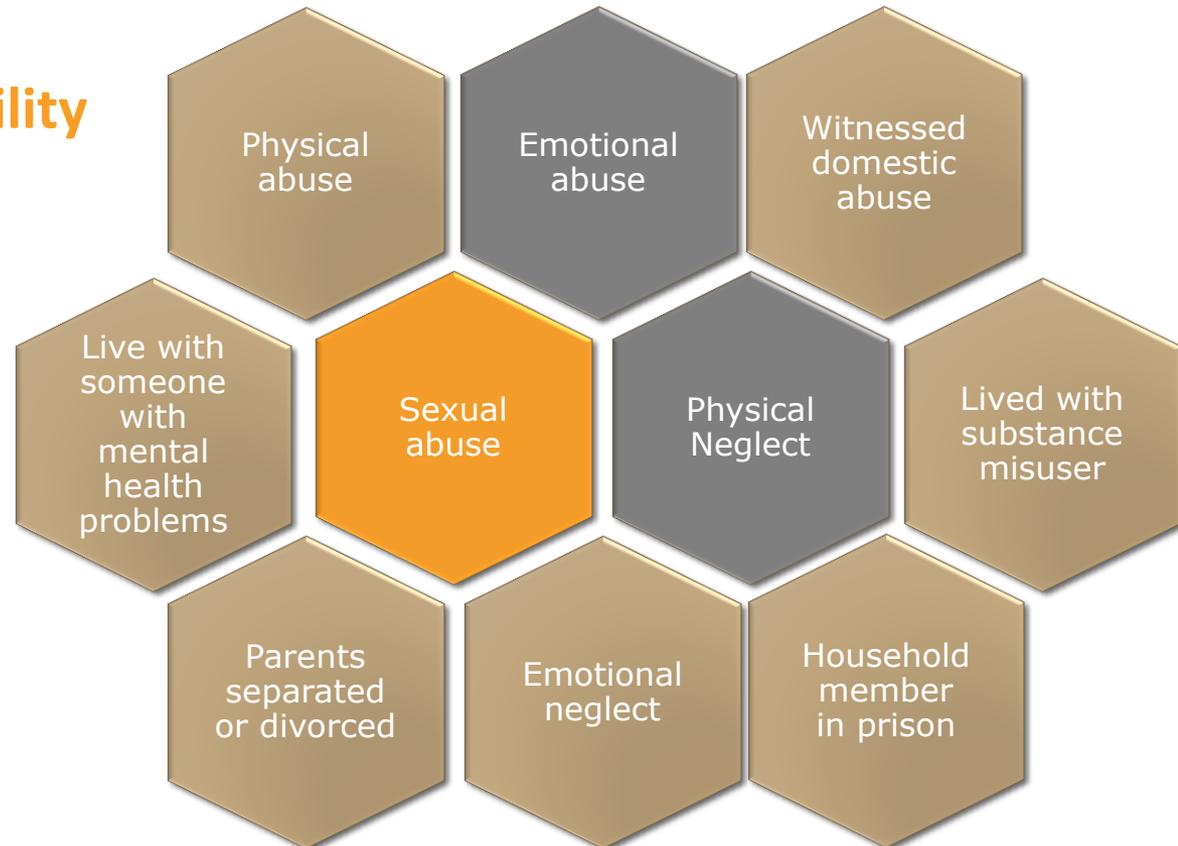
7 ACEs in GUS

1. Physical abuse:

- "My parents smack me when I have done something wrong" [Often or always]
- "You slap [child's name] when they have done something wrong" [Often or always]

2. Emotional neglect:

- "My parents ask about my day in school," [never]
- "my parents play games or do other fun things with me," [never]
- "my parents help me with my homework," [never]
- "my parents tell me when I'm doing a good job with something," [never]
- "my parents check to make sure I'm doing okay." [never]

3. Household domestic abuse: "A since the child was born, has any partner or ex-partner ever:

- "pushed you or held you down?" [yes, ≥ 4 times]
- "Kicked, bitten or hit you?" [yes, ≥ 4 times]
- "Used a weapon against you?" [yes, ≥ 4 times]
- "choked or tried to strangle or smother you?" [yes, ≥ 4 times]
- "forced you or tried to force you to take part in any sexual activity when you did not want to." [yes, ≥ 4 times]

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7 ACEs in GUS (cont'd)

4. Use of street drugs [any] or **alcohol** (≥14 units per week);

- "Did you live with anyone who was a problem drinker or alcoholic or who used street drugs?" [Yes]

5. Separation, divorce [only 1 parent present in the household at any sweep]

6. Incarceration: "Did a household member go to prison?" [Yes]

7. Mental health issues:

- "Was a household member depressed or mentally ill, or did a household member attempt suicide?" [Yes]
- Score of 36 or higher on the SF-12 scale's mental health component
- 1 standard deviation above the mean (z-score ≥ 1) on a restricted DASS scale

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Regression-based method:

Model 1: Model of the effect of low income (A) on ACE incidence (Y) adjusted for covariates (C)

<u>Coefficient for A = total effect (TE)</u>

Model 2: Model of the effect of low income (A) on ACE incidence (Y) adjusted for covariates (C), mediating factor (M) and the product term with low income (AM); **where M=0 means everyone has the resource**.

<u>Coefficient for A = Controlled Direct Effect (CDE)</u>

Proportion Eliminated = [TE-CDE]/[TE]

VanderWeele 2013

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