CLOSER Conference

Health 2: Socioeconomic influences on health

Chair: **Kate Northstone**

- Changes over time in the associations between early-onset myopia and key early life factors
  Vasiliki Bountziouka

- Social influences on health-related behaviour clustering during mid-adulthood in two British birth cohort studies.
  Claire Mawditt

closer

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Password: BLgue5T23

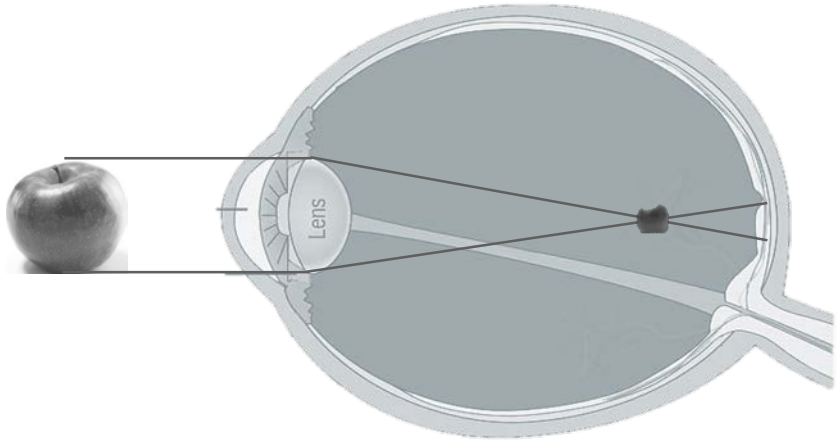
Is there evidence for changes over time in the associations between early-onset myopia and key early life factors?

Vasiliki Bountziouka, Phillippa Cumberland, Jugnoo Rahi

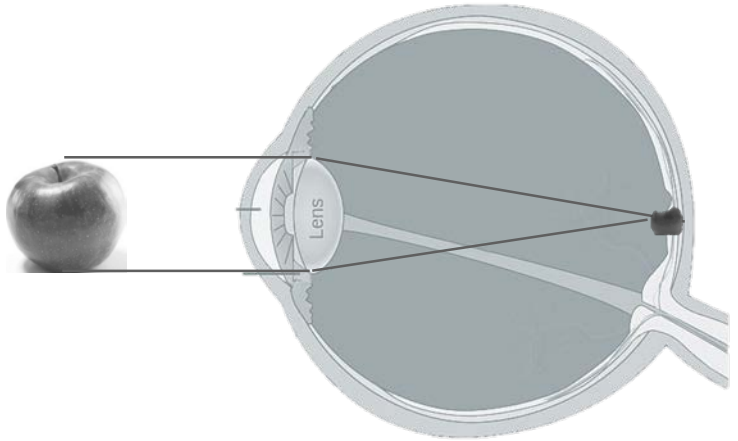
Vision and Eyes research group
Life Course Epidemiology and Biostatistics
Population, Policy and Practice
UCL GOS Institute of child health

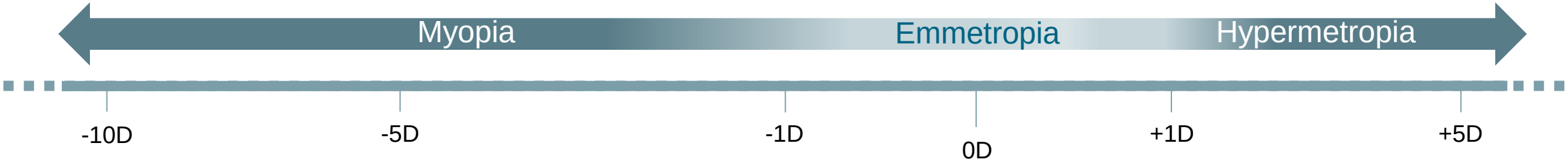
Definitions

Myopic eye



Normal (emmetropic) eye





Measurements

- Refractive error (RE) was measured using non-cycloplegic autorefraction

- The average of the SE of the two eyes (i.e. Mean spherical equivalent, MSE), in dioptres (D) was used to classify participants in one of the categories of RE (i.e. myopia, emmetropia, hypermetropia)

- Early onset (childhood) myopia is defined as the onset of myopia by the age of 15/16yrs

Background

- As ~1/6 of the world's population is myopic a substantial **burden** occur from the *high financial costs* of the treatment and the *complications* of the disorder

- Recent findings from studies in Asian populations suggest rapid increases in the prevalence of childhood (*early-onset*) myopia
  - affecting >80% of school-leavers in East Asia

- Myopia risk, severity, and timing of onset are associated with key *environmental influences* on prenatal growth and health

Rahi JS, Cumberland PM, Peckham CS. Myopia Over the Lifecourse: Prevalence and Early Life Influences in the 1958 British Birth Cohort. Ophthalmology 2011;118:797–804.

Research questions

- Is there an increasing temporal trend in early-onset myopia in the UK?
- Has the pattern of association between early life factors and early-onset myopia changed over time?

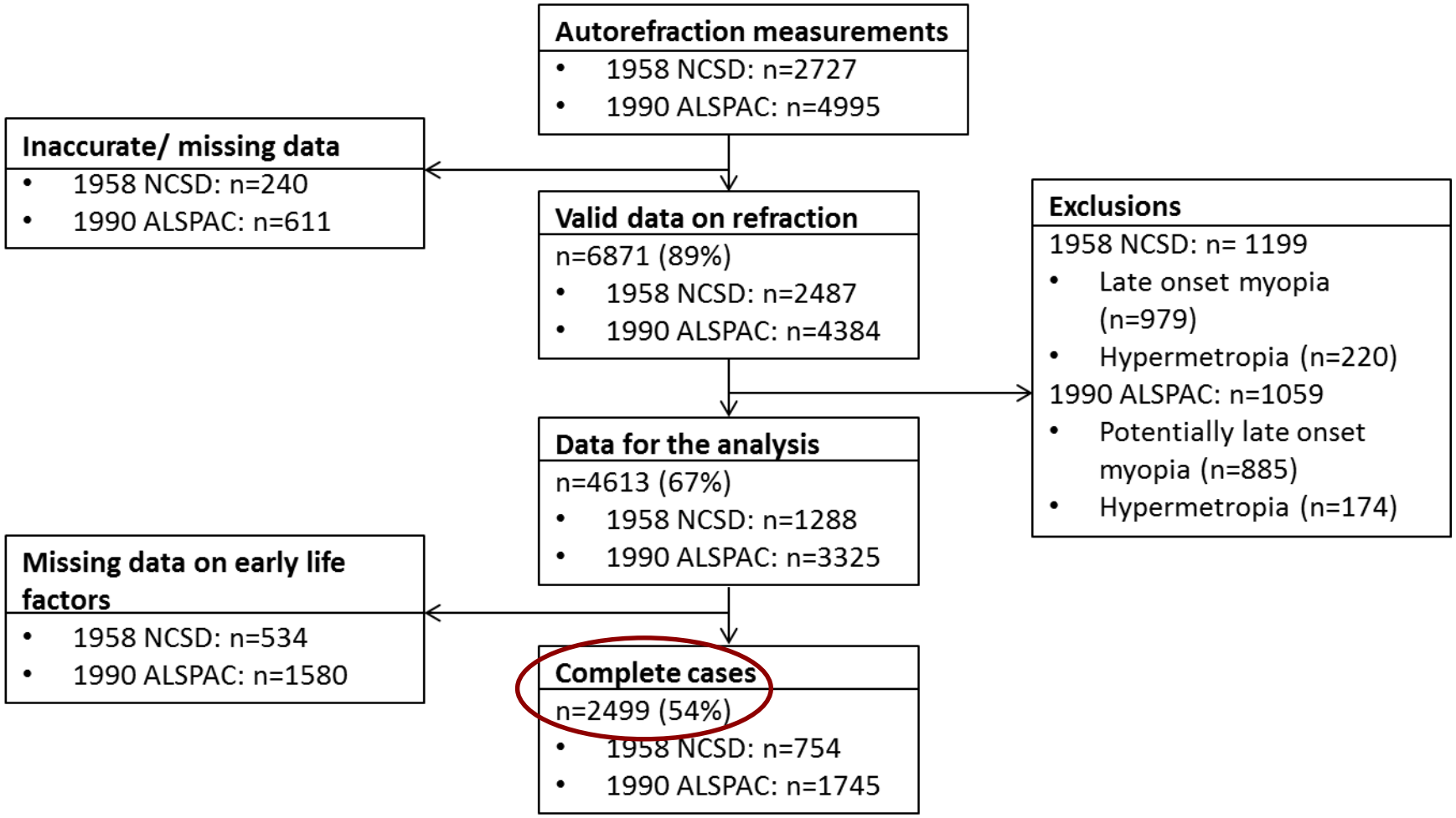
Data used

Two cohort studies:

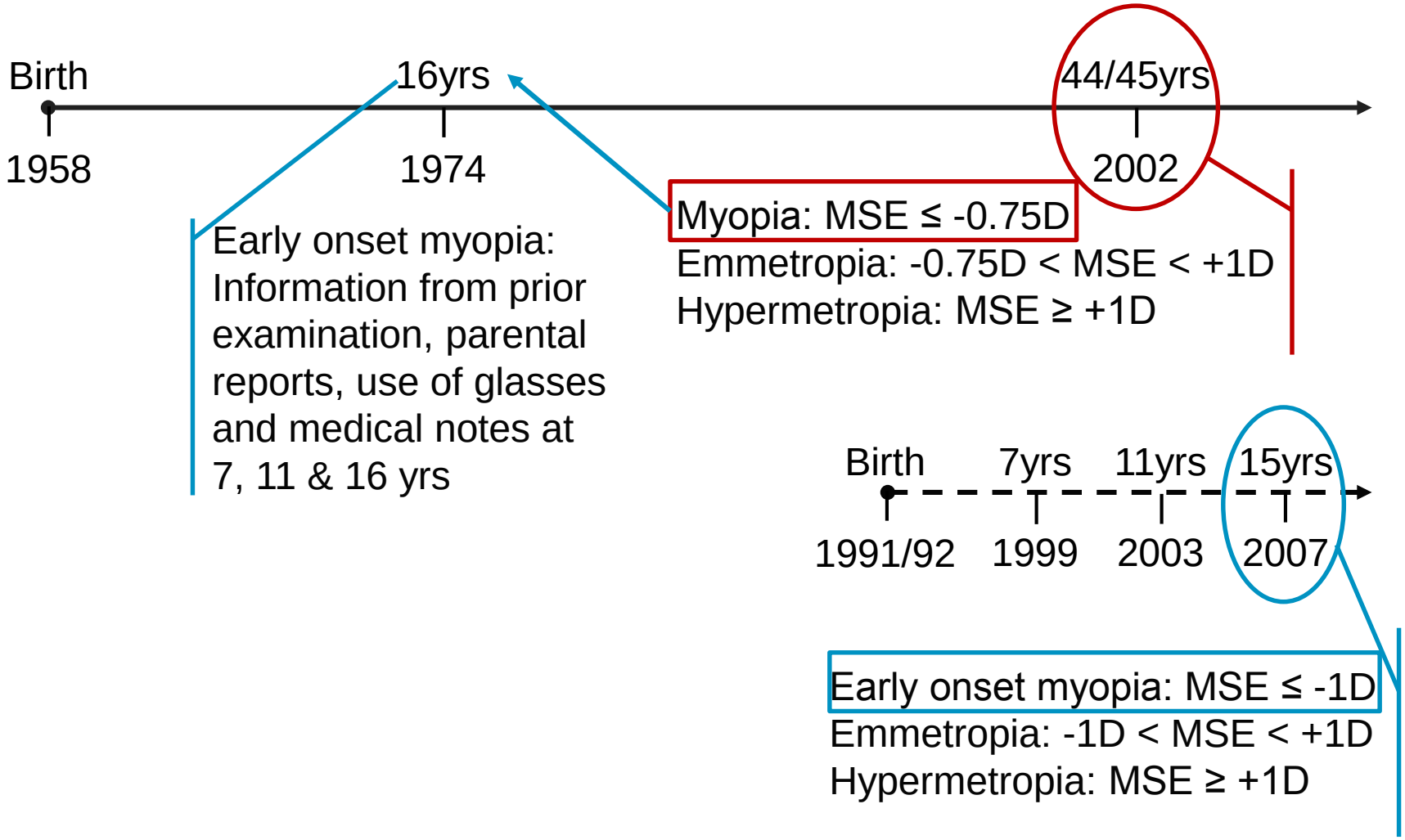
- the 1958 British birth cohort (1958BC) study
  - which recruited all those born in Britain during one week in March 1958, and

- the Avon Longitudinal study of Pregnancy and Childhood (ALPSAC or “Children of the 90’s” study)
  - which recruited all pregnant women residing in a geographically defined area of England with estimated delivery date between April 1991 and December 1992 inclusive

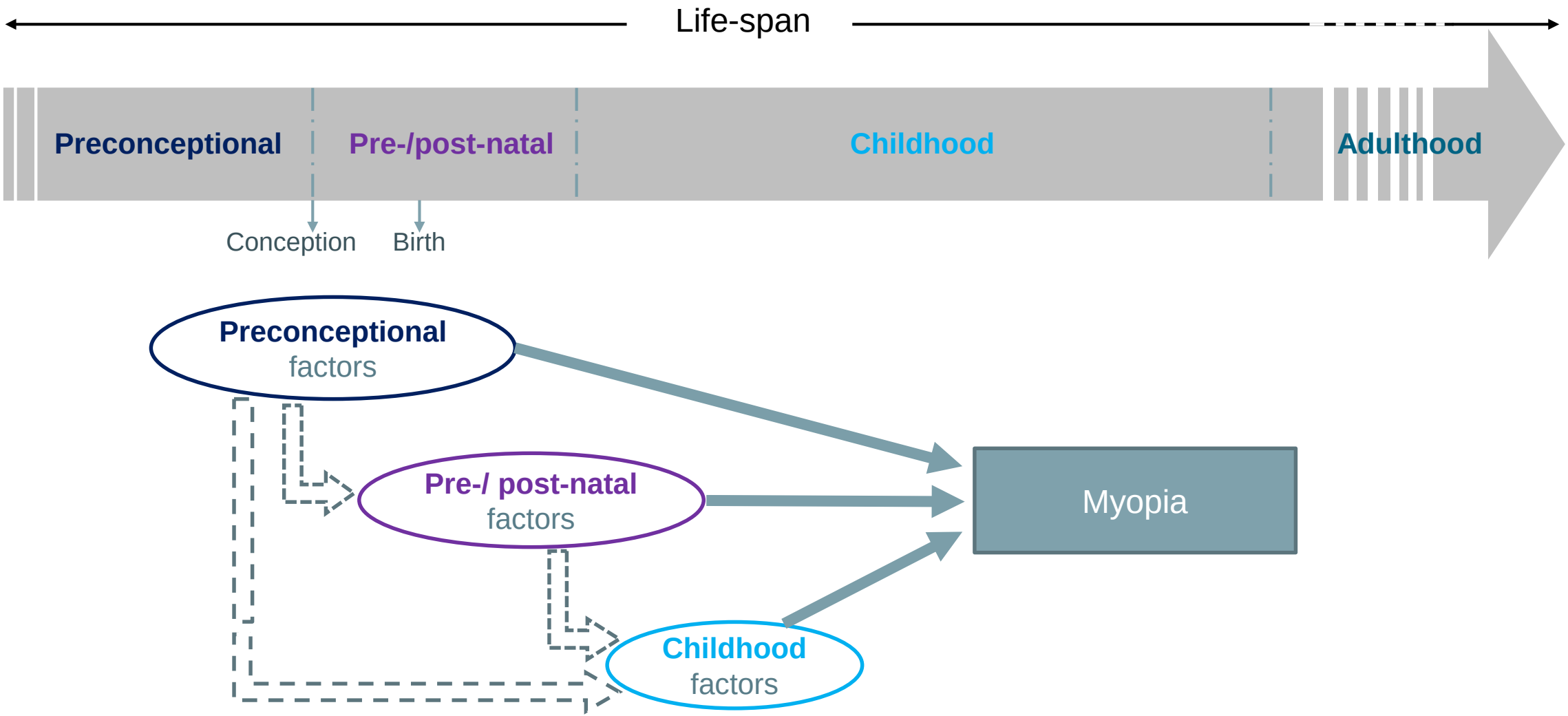
Sample size


Autorefraction measurements
• 1958 NCSD: n=2727
• 1990 ALSPAC: n=4995
Inaccurate/ missing data
• 1958 NCSD: n=240
• 1990 ALSPAC: n=611
Valid data on refraction
n=6871 (89%)
• 1958 NCSD: n=2487
• 1990 ALSPAC: n=4384
Exclusions
1958 NCSD: n= 1199
• Late onset myopia (n=979)
• Hypermetropia (n=220)
1990 ALSPAC: n=1059
• Potentially late onset myopia (n=885)
• Hypermetropia (n=174)
Data for the analysis
n=4613 (67%)
• 1958 NCSD: n=1288
• 1990 ALSPAC: n=3325
Missing data on early life factors
• 1958 NCSD: n=534
• 1990 ALSPAC: n=1580
Complete cases
n=2499 (54%)
• 1958 NCSD: n=754
• 1990 ALSPAC: n=1745

Measurements



Methodology



Methodology

Life-stage	Models		
	M1	**M2**	**M3**
Preconceptional	Preconceptional only	Pre-/post-natal adj. for preconceptional factors	Childhood adj. for preconceptional & pre-/post-natal factors
Pre-/post-natal		Pre-/post-natal adj. for preconceptional factors	Childhood adj. for preconceptional & pre-/post-natal factors
Childhood			Childhood adj. for preconceptional & pre-/post-natal factors

Methodology

Life-stage	Models		
	M1	**M2**	**M3**
Preconceptional	Pre… …ly Maternal age at birth Social class at birth Occupational Educational Maternal smoking	Pre-/post-natal adj. for preconceptional factors	Childhood adj. for preconceptional & pre-/post-natal factors
Pre-/post-natal		F… …or …s Sex Birth weight Gestational age Breast feeding	Childhood adj. for preconceptional & pre-… …l fac… …s Social class Crowding index Height/ Height change Reading score General ability Near work & Outdoor activities
Childhood			

Distribution of refractive errors

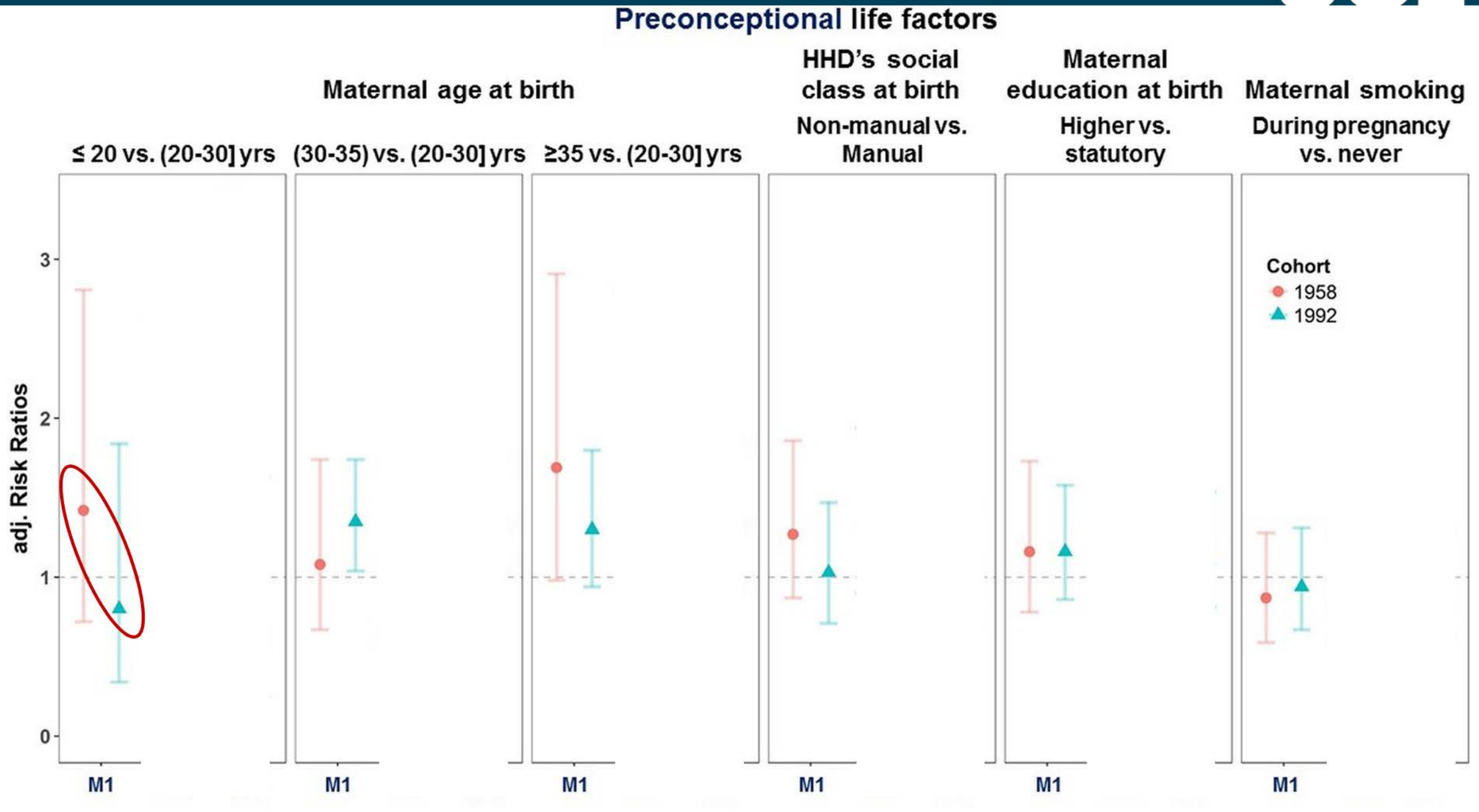
	1958 BC n=2487 n [% (95% CI)]	ALSPAC n=4384 n [% (95% CI)]
Refractive error category:		
Late/ potentially late onset myopia	979 [39 (37; 41)]	885 [20 (19; 21)]
Early onset myopia (by 16yrs)	235 [9 (8; 11)]	829 [19 (18; 20)]
Emmetropia	1053 [42 (40; 44)]	2496 [57 (56; 58)]
Hypermetropia	220 [9 (8; 10)]	174 [4 (3; 5)]

Results summary

- The **size** (& the direction in some cases) of the association between early life influences & early onset of myopia changed over time

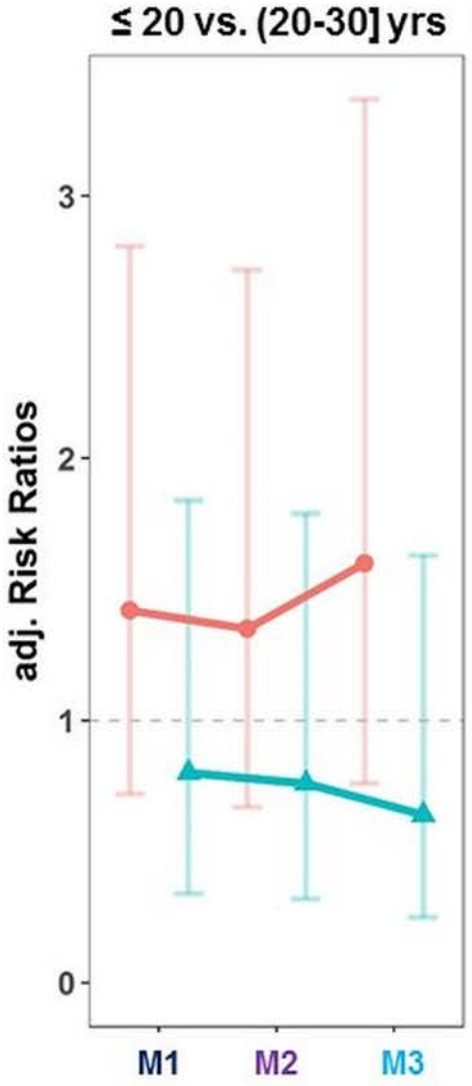
- Adjustment for factors from **subsequent life stages** had a different effect in the two cohorts, which resulted in

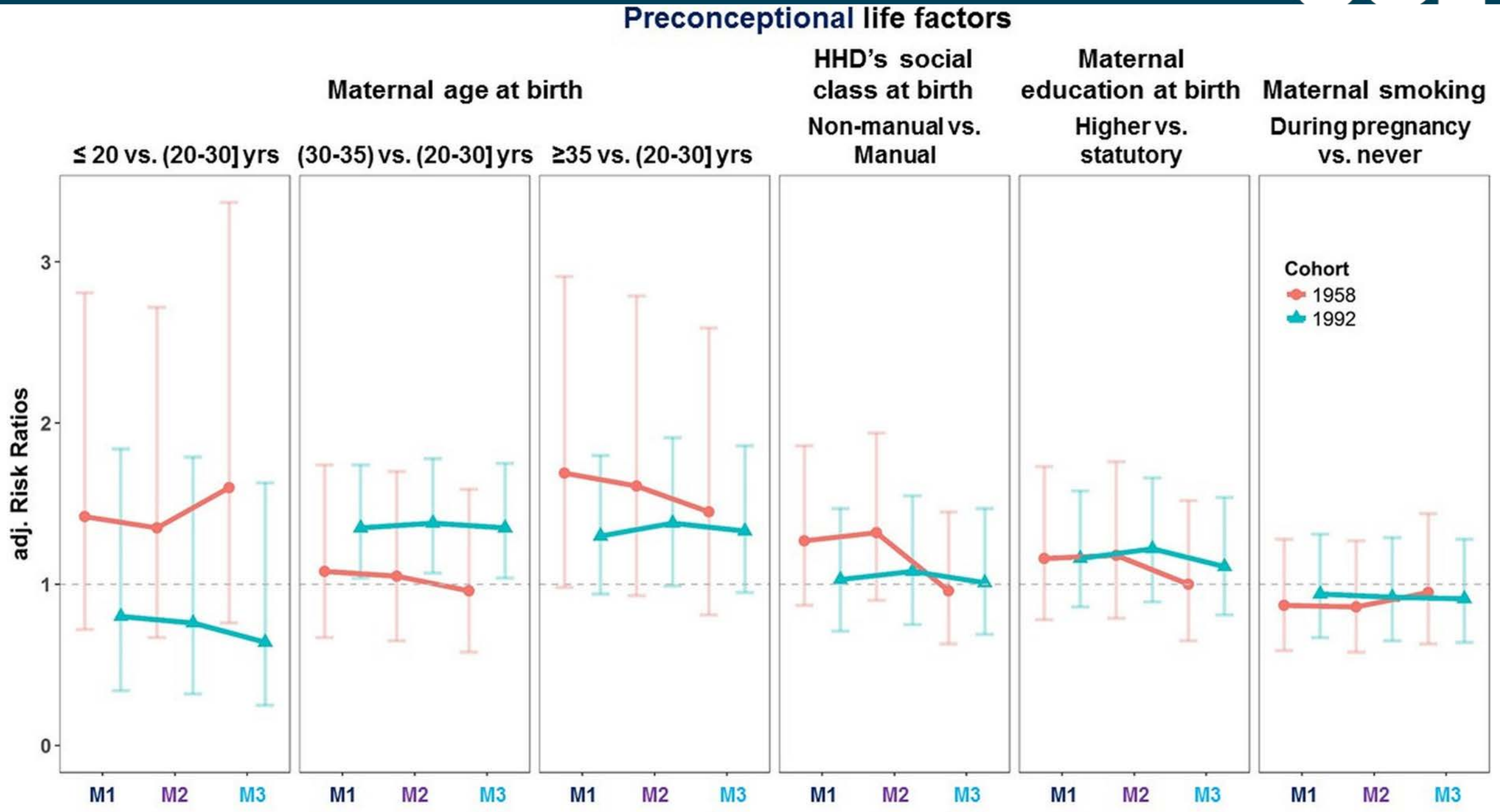
  – changes of the **size of the difference** between the two cohorts over the life-course


Preconceptional life factors
Maternal age at birth
≤ 20 vs. (20-30] yrs
(30-35) vs. (20-30] yrs
≥35 vs. (20-30] yrs
HHD's social class at birth
Non-manual vs. Manual
Maternal education at birth
Higher vs. statutory
Maternal smoking
During pregnancy vs. never
adj. Risk Ratios
0
1
2
3
M1
Cohort
1958
1992

Preconceptional life factors

Maternal age at birth | HHD's social class at birth | Maternal education at birth | Maternal smoking




Preconceptional life factors
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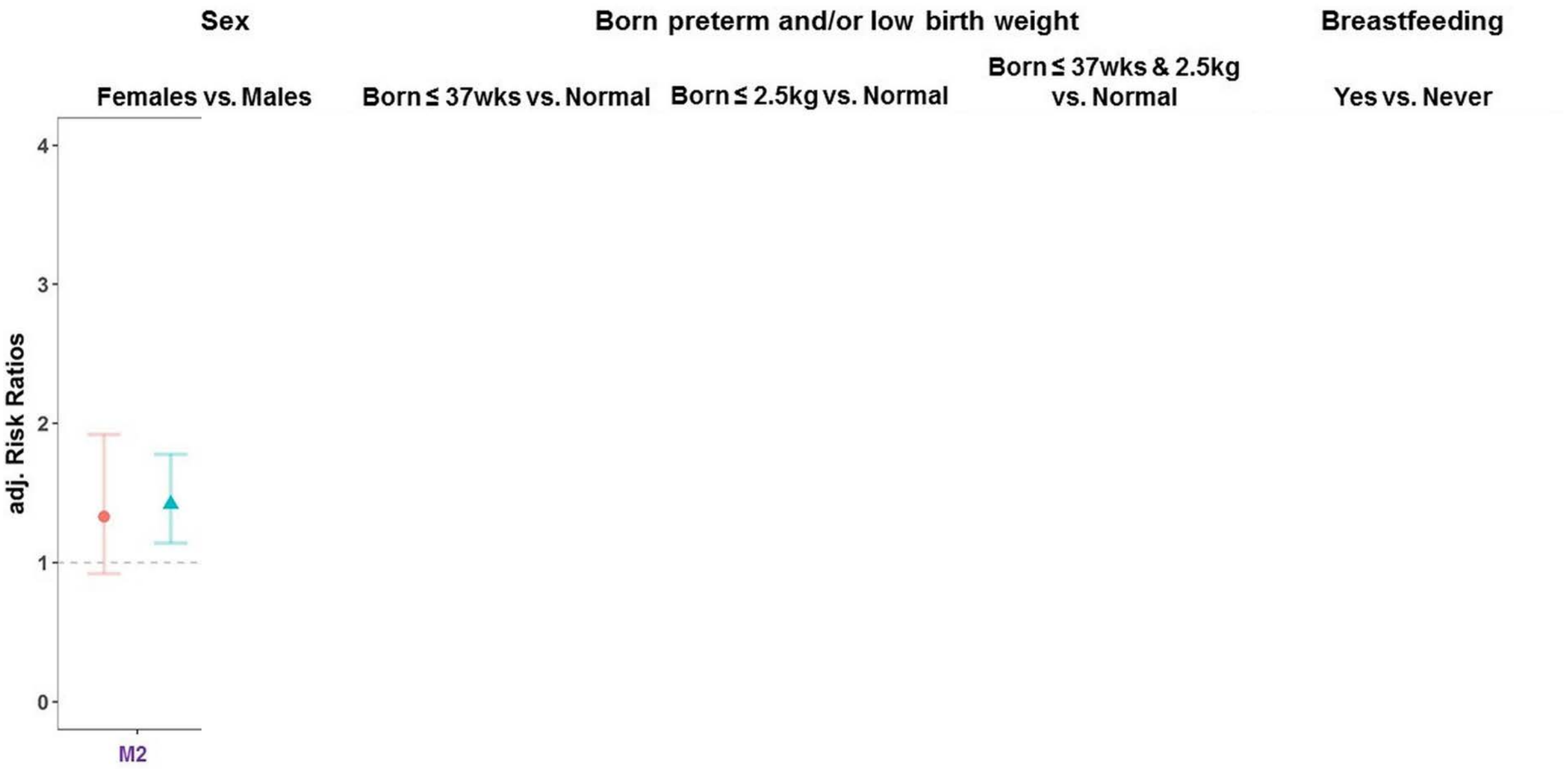
Non-manual vs. Manual
Higher vs. statutory
During pregnancy vs. never
adj. Risk Ratios
0
1
2
3
Cohort
1958
1992
M1
M2
M3

Pre-/post-natal life factors



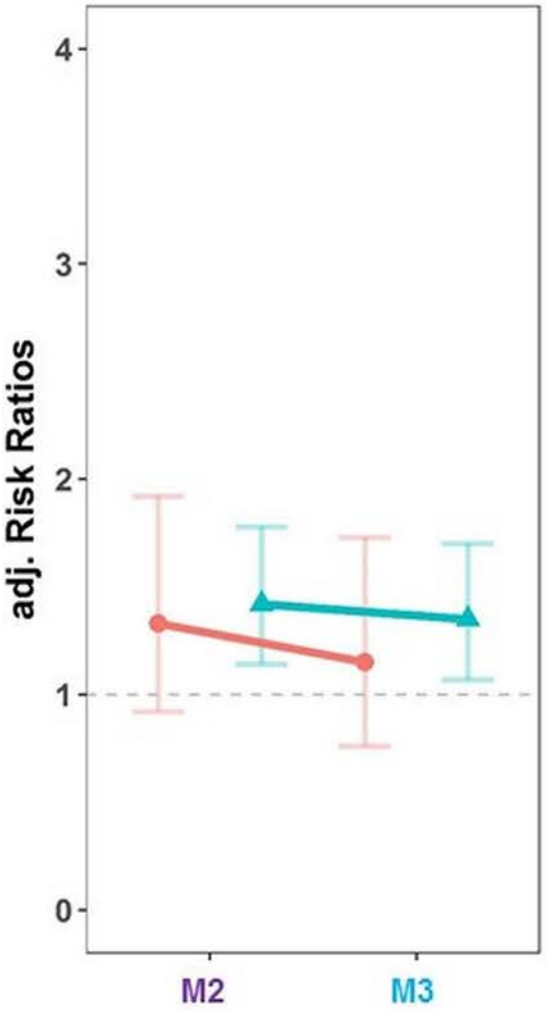
Pre-/post-natal life factors

Sex

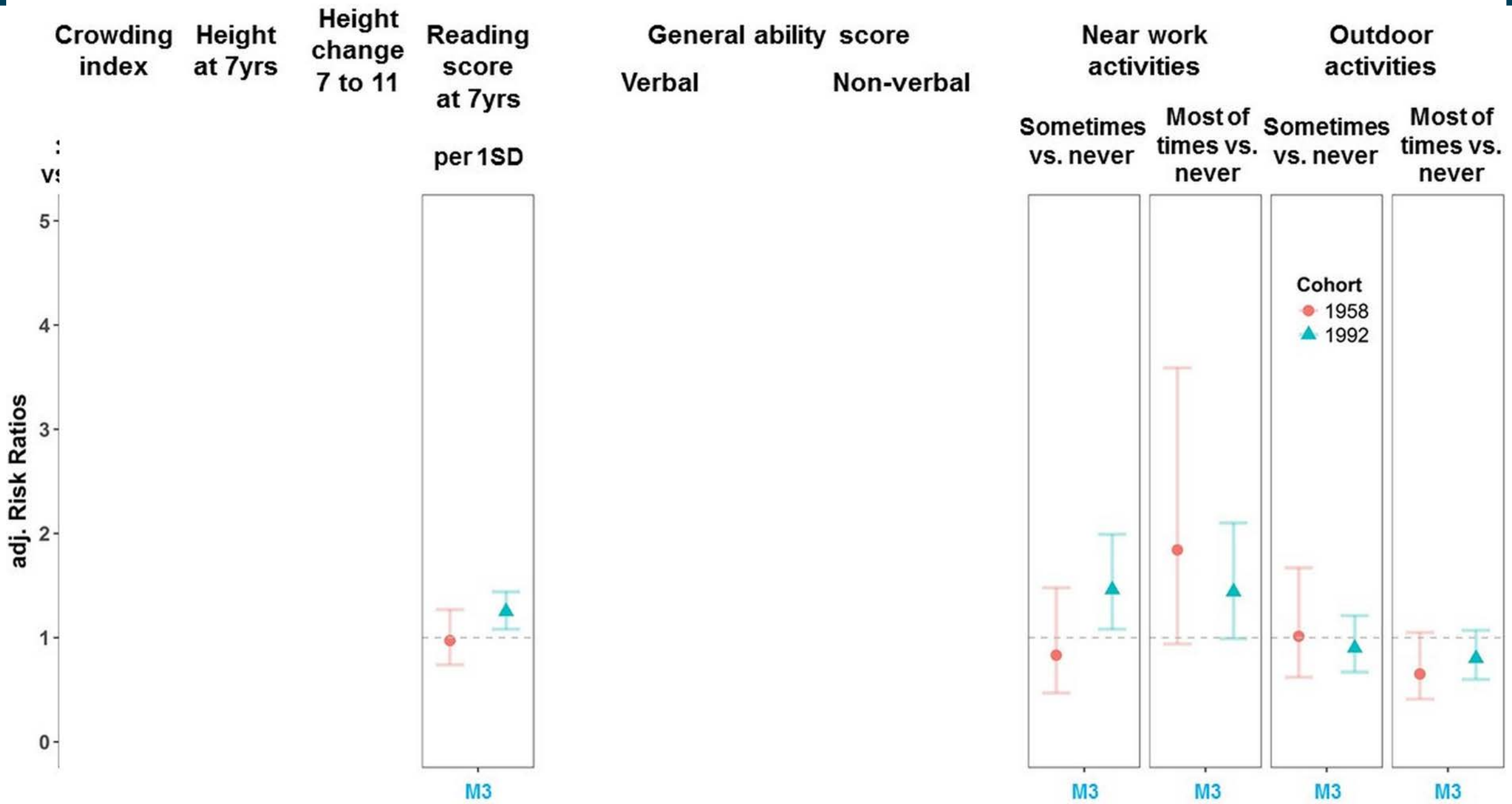
Born preterm and/or low birth weight

Breastfeeding

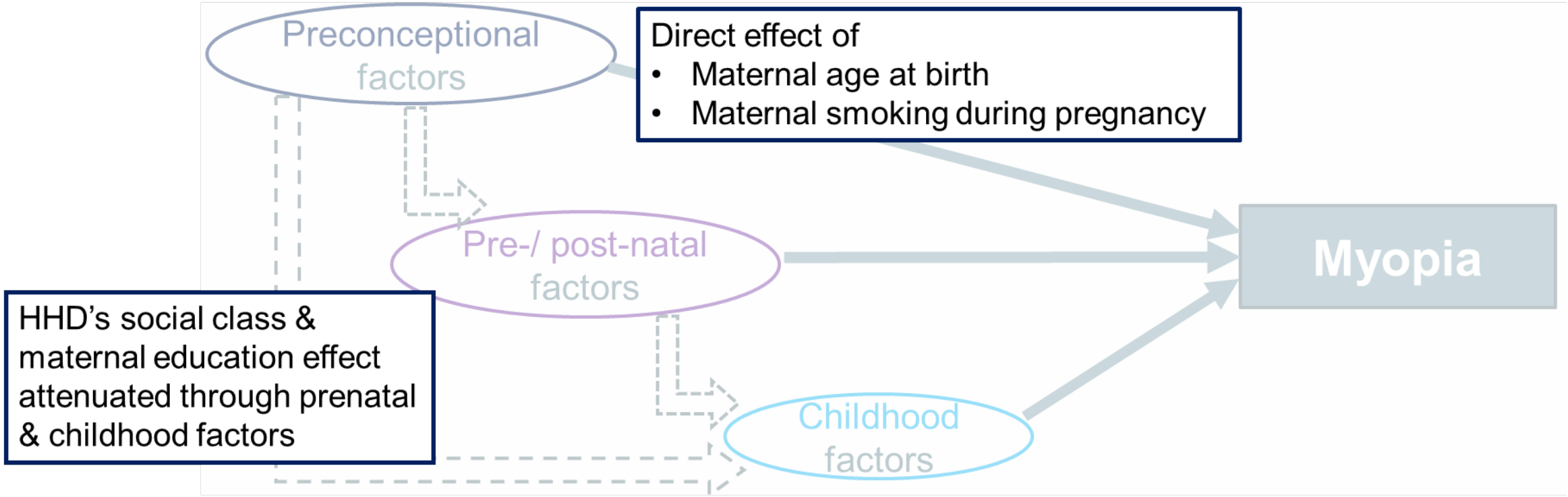
Females vs. Males	Born ≤ 37wks vs. Normal	Born ≤ 2.5kg vs. Normal	Born ≤ 37wks & 2.5kg vs. Normal	Yes vs. Never



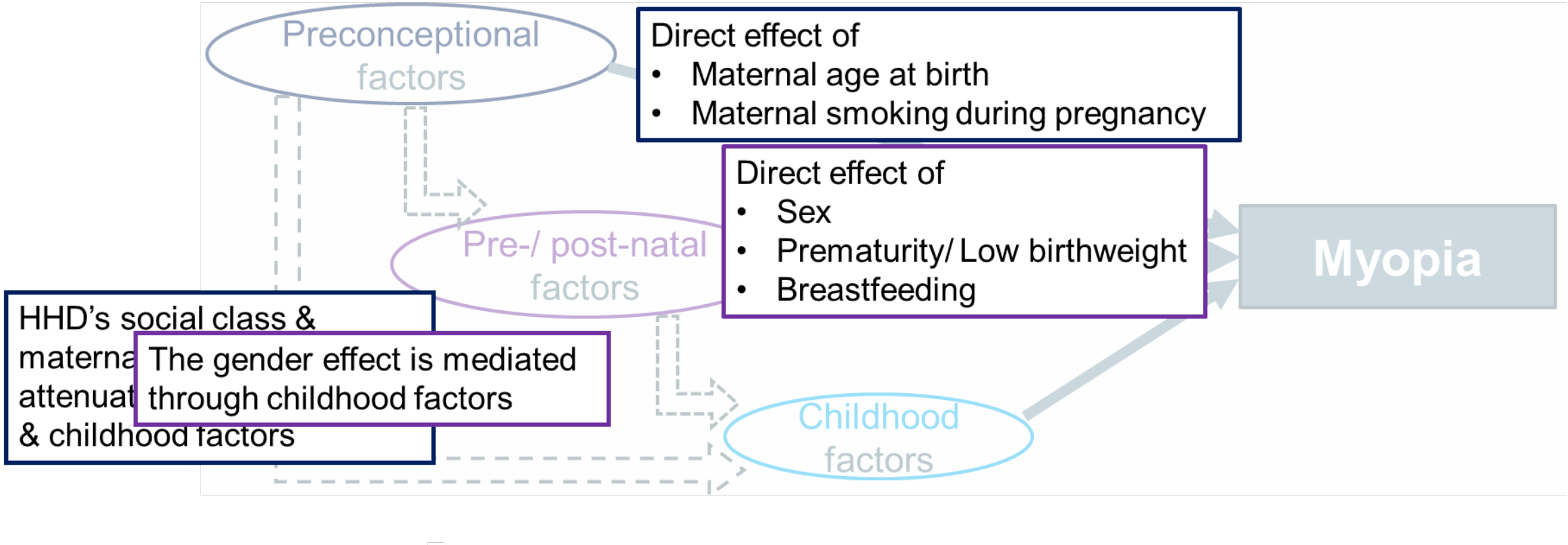
Childhood life factors



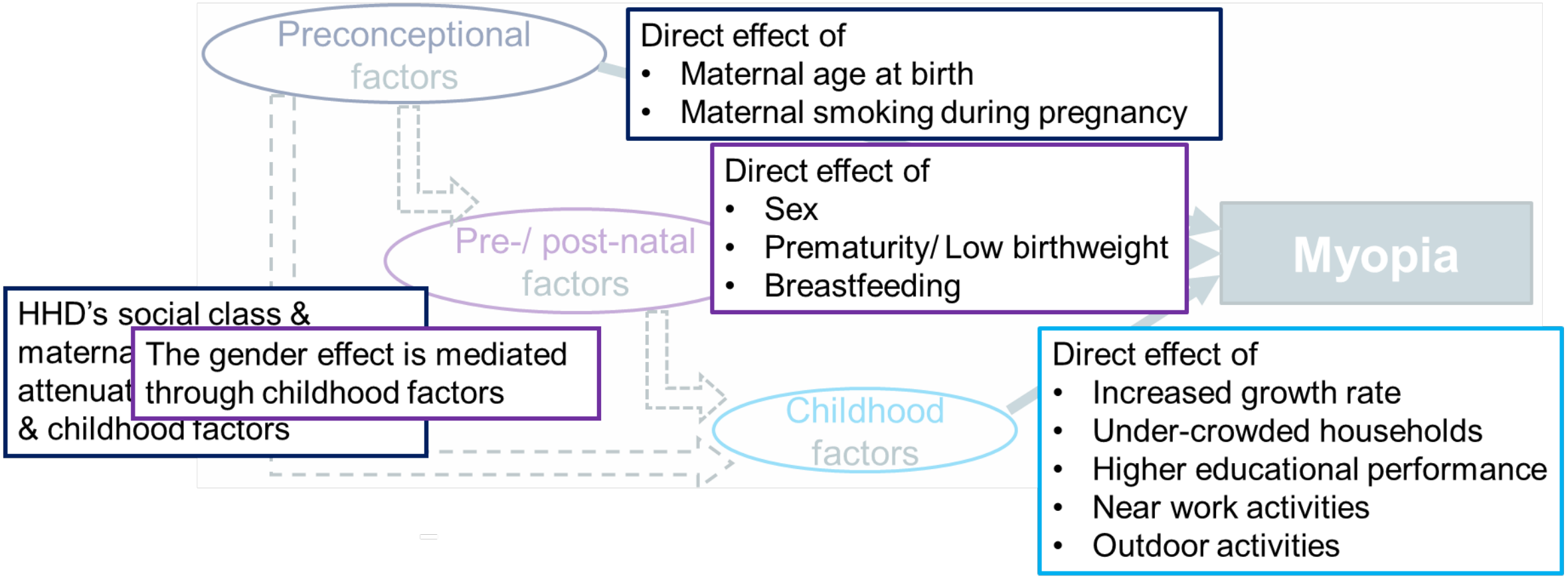
Summary


Preconceptional factors
Direct effect of
• Maternal age at birth
• Maternal smoking during pregnancy
Pre-/ post-natal factors
Myopia
HHD's social class & maternal education effect attenuated through prenatal & childhood factors
Childhood factors

Summary


Preconceptional factors
Direct effect of
• Maternal age at birth
• Maternal smoking during pregnancy
Direct effect of
• Sex
• Prematurity/ Low birthweight
• Breastfeeding
Pre-/ post-natal factors
Myopia
HHD's social class &
materna
attenuat
& childhood factors
The gender effect is mediated through childhood factors
Childhood factors

Summary


Preconceptional factors
Direct effect of
• Maternal age at birth
• Maternal smoking during pregnancy
Direct effect of
• Sex
• Prematurity/ Low birthweight
• Breastfeeding
Pre-/ post-natal factors
Myopia
HHD's social class &
materna
attenuat
& childhood factors
The gender effect is mediated through childhood factors
Childhood factors
Direct effect of
• Increased growth rate
• Under-crowded households
• Higher educational performance
• Near work activities
• Outdoor activities

Conclusion

- Increase over the time span of these cohorts in the risk of myopia onset by the age of 15/16 years old

- We have shown a mediating effect through other pathways linking early life influences on growth and eye-specific environmental factors
  - Different effect between cohorts

- Educational attainment along with any type of near work activity, and (at some extent) any type of outdoor activities, are the environmental factors associated with the risk of myopia

Acknowledgment

- **Participants** in the two birth cohorts

- **Staff** involved in data collection and data management

- **Funders**

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THANK YOU FOR YOUR ATTENTION

Social influences on health-related behaviour clustering during adulthood in two British birth cohort studies.

Claire Mawditt: 3rd Year ESRC funded PhD Student

International Centre for Lifecourse Studies in Society and Health
Department of Epidemiology and Public Health
University College London

UCL CLOSER Inequalities conference
Wednesday 1st November 2017

Contents

- Introduction
- Research Questions
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Introduction

- Health-related behaviours (HRBs) are also known as ‘health habits’ ‘lifestyle behaviours’ or ‘lifestyle factors’.

- Four common HRBs in the United Kingdom are: Smoking, alcohol, diet and physical activity.

- Strong associations with mortality *(Khaw et al, 2008; Kvaavik et al, 2010)* and morbidity *(Chow et al, 2010).*

Introduction

- Clustering:

"Implies that they [HRBs] are not independent of each other and may therefore reflect an underlying causal or pathogenetic mechanism"

Ebrahim et al (2004), pp 4.

Introduction

Two systematic reviews of studies examining HRB clustering *(Noble et al, 2015; Meader et al, 2016)*.

Included four negative HRBs: Smoking, poor diet, heavy alcohol consumption and physical inactivity.

Disadvantaged socio-economic position (SEP) = negative HRB cluster membership.

BUT what about childhood SEP and HRB clustering?

Introduction

- Research suggests disadvantaged SEP in childhood is associated with negative HRBs in adulthood *(Clouston et al, 2015; Wadsworth et al, 1997; Schooling & Kuh, 2002; Blane et al, 1996).*
- Some studies find this relationship is fully mediated by disadvantaged SEP in adulthood *(Kvaavik et al, 2012; Kestila et al, 2013; Paavola et al, 2004).*
- Others find a direct effect of disadvantaged childhood SEP on HRBs remains *(Kamphuis et al, 2013; Yang at al, 2008; Van de mheen et al, 1998; Watt et al, 2009; Pudrovska & Anishkin, 2013).*

Introduction

- A Swedish study found disadvantage SEP in childhood and adulthood were together predictive of membership to clusters characterised by multiple negative HRBs *(Falkstedt et al, 2016).*

Gap in evidence: The role of childhood SEP on HRB clustering within a British context.

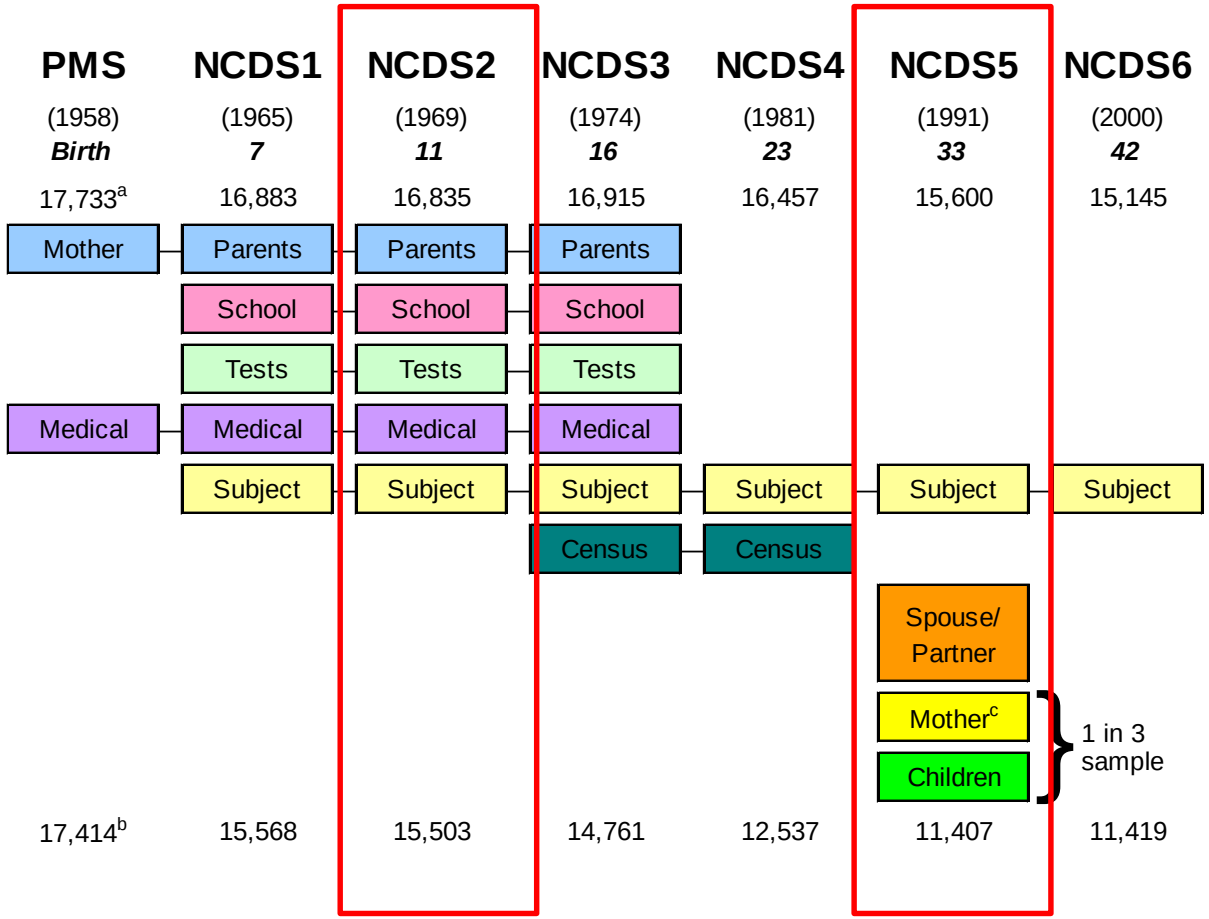
Research questions

- Does pre-adolescent SEP predict adulthood HRB cluster membership?

  A. Does SEP at age 10/11 predict HRB cluster membership at age 33/34?

  B. Does SEP at age 33/34 mediate the relationship between SEP at age 10/11 and HRB cluster membership at age 33/34?

NCDS data



Notes

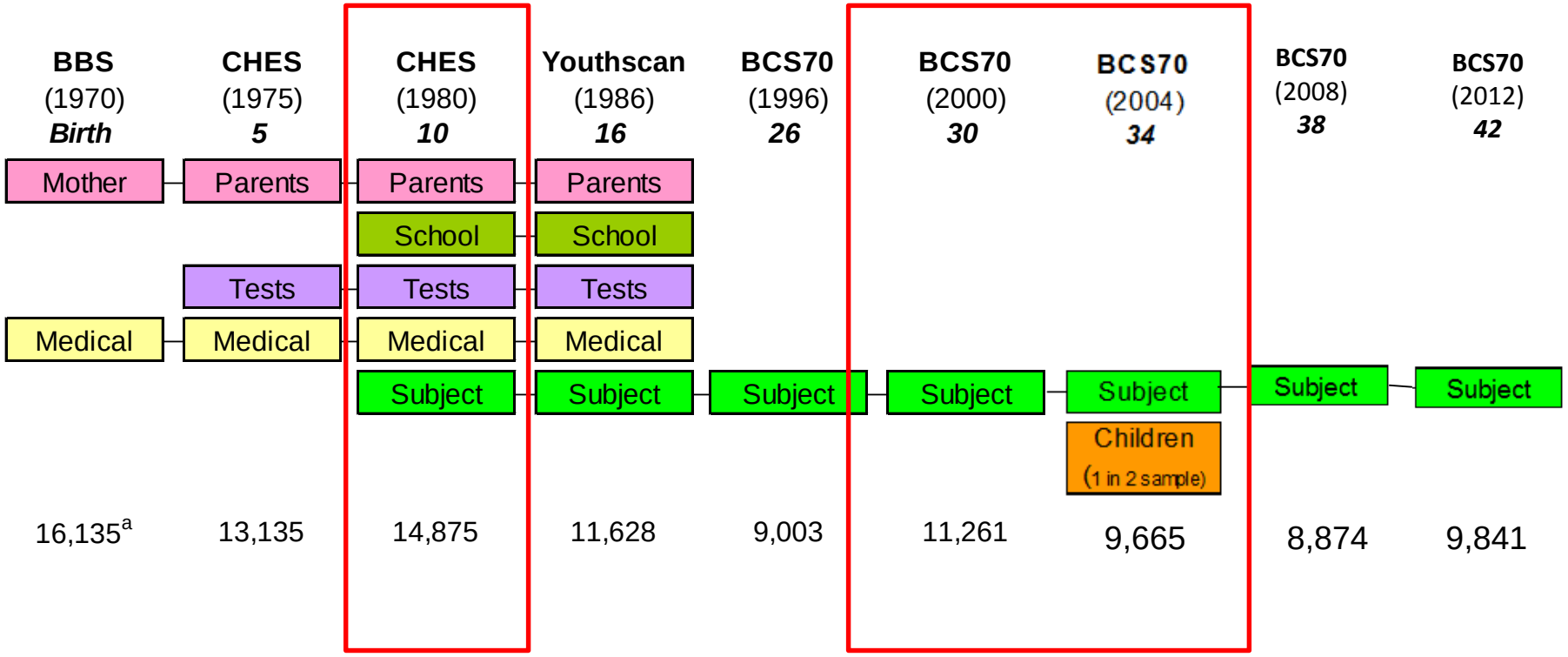
a: Target sample - Excludes emigrants, refusals & deaths. Includes immigrants at NCDS1-3.

b: Achieved sample - At least on survey instrument partially completed

c: Mother - Could be Cohort Member or spouse/partner

Source: http://www.cls.ioe.ac.uk/

BCS70 data



Notes

a: Achieved sample. NB: Target sample excluded emigrants, refusals & deaths; and included immigrants in 1975 & 1980.

Source: http://www.cls.ioe.ac.uk/

Outcome variable

- Most likely cluster membership to one of three distinct HRB clusters:
  - Risky
  - Moderate Smokers
  - Mainstream

Mainstream cluster HRBs tend to be more beneficial for health *(Mawditt et al, 2016).*

‘Mainstream’

Men

1958 n= 3,818 (68.3%)

1970 n= 3,410 (73.9%)

Women

1958 n= 3,980 (68.8%)

1970 n= 3,866 (76.8%)

- **Non-smokers** (0 cigarettes daily).
- **Light drinkers** (lowest % drinking above recommended guidelines).
- **Highest** frequency of **fruit and vegetables** consumption.
- **Highest** frequency of leisure time **physical activity**.
- **Lowest** frequency of **fried food** consumption.
- BUT tended to have **higher** frequency of **sweet food** consumption.

'Risky'

Men

1958 n= 82 (1.5%)

1970 n= 79 (1.7%)

Women

1958 n= 515 (8.9%)

1970 n= 183 (3.6%)

- **Daily smokers** (20-40 cigarettes daily).
- **Heaviest drinkers** (highest % drinking above recommended guidelines).
- **Lowest** frequency of **fruit and vegetables** consumption.
- **Highest** frequency of **fried food** consumption.
- **Lowest** frequency of leisure time **physical activity**.
- BUT tend to have **lower** frequency of **sweet food** consumption.

‘Moderate Smokers’

Men

1958 n= 1,686 (30.2%)

1970 n= 1,124 (24.4%)

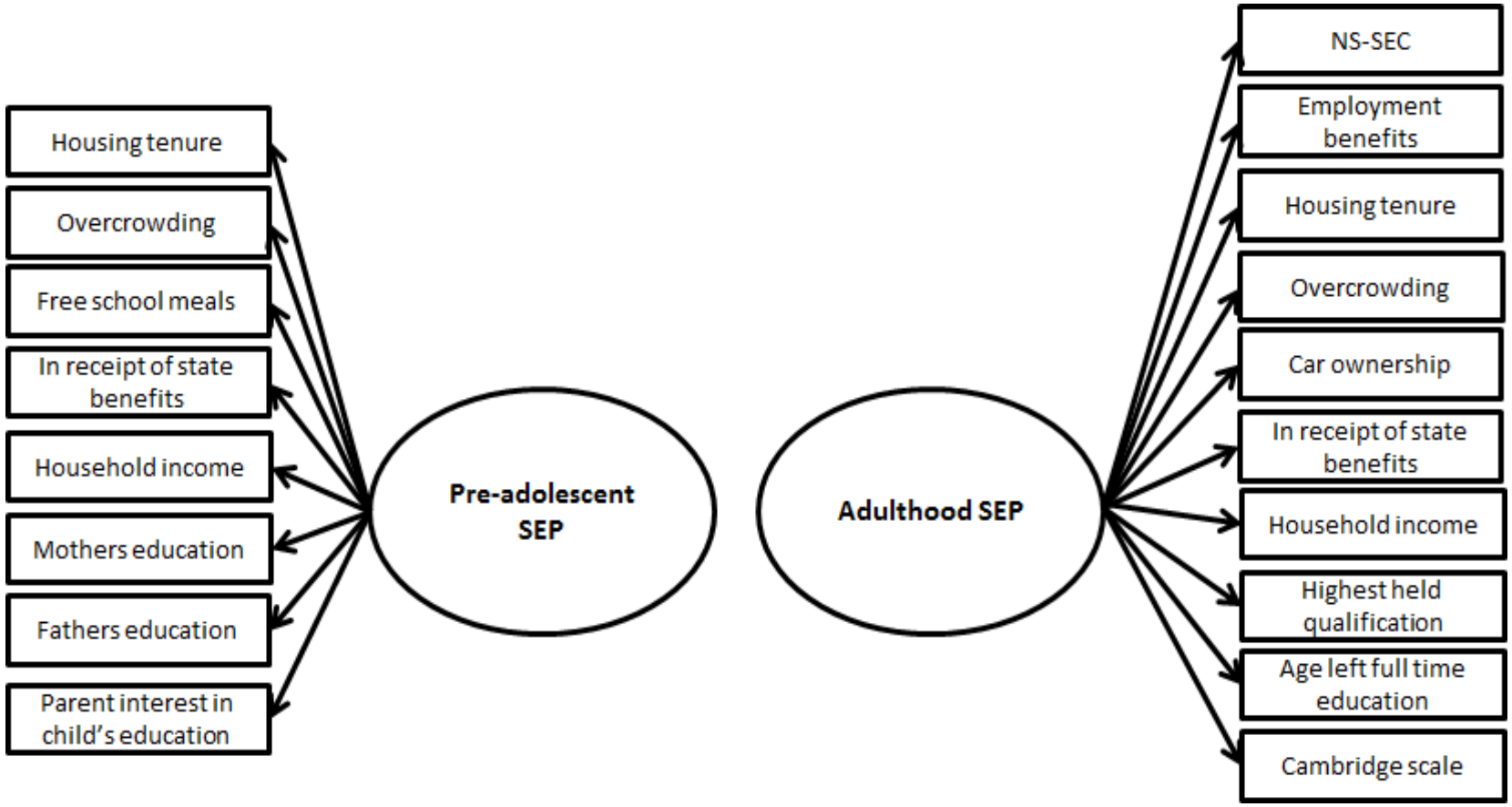
Women

1958 n= 1,292 (22.3%)

1970 n= 984 (19.6%)

- **Daily smokers** (12-17 cigarettes daily).
- **Diet** frequency consumption, **alcohol** consumption and leisure time **physical activity** frequency **similar to Mainstream cluster**.

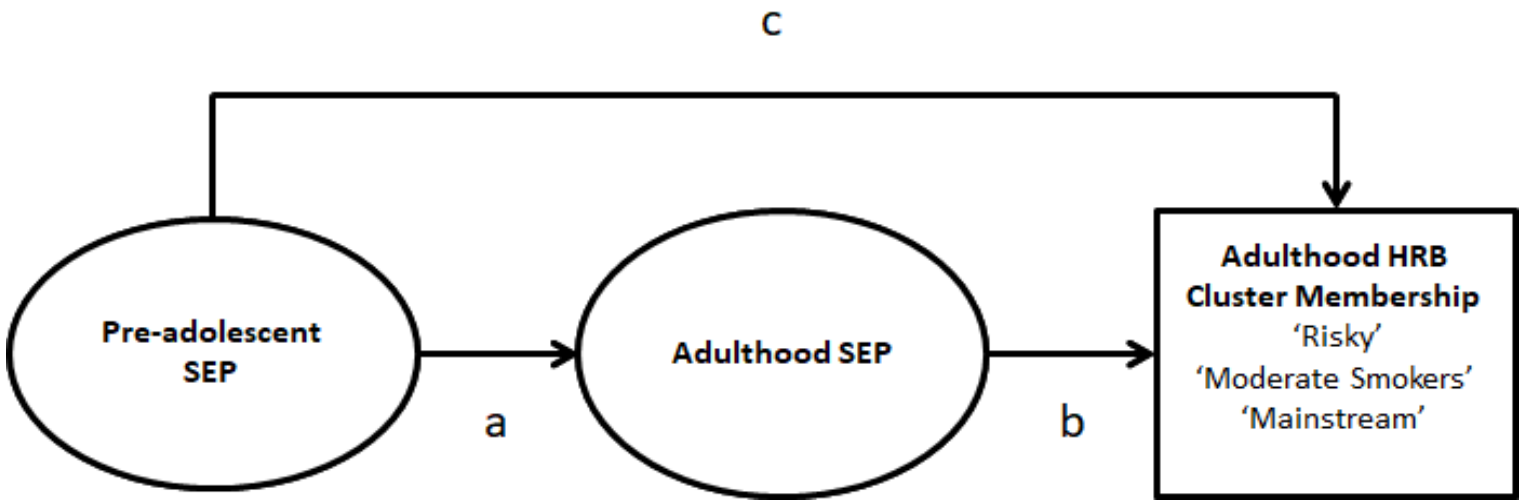
SEP constructs



Adequate model fit = CFI > 0.9, RMSEA < 0.05.
A higher score on the SEP construct = more disadvantaged SEP.
Ovals represent the latent variables. Rectangles represent the observed variables.

Direct and indirect effects

Total effect = ab + c



Adequate model fit = CFI > 0.9, RMSEA < 0.05.

Path a x b = indirect path between pre-adolescent SEP and HRB cluster membership.

Path c = direct path between pre-adolescent SEP and HRB cluster membership.

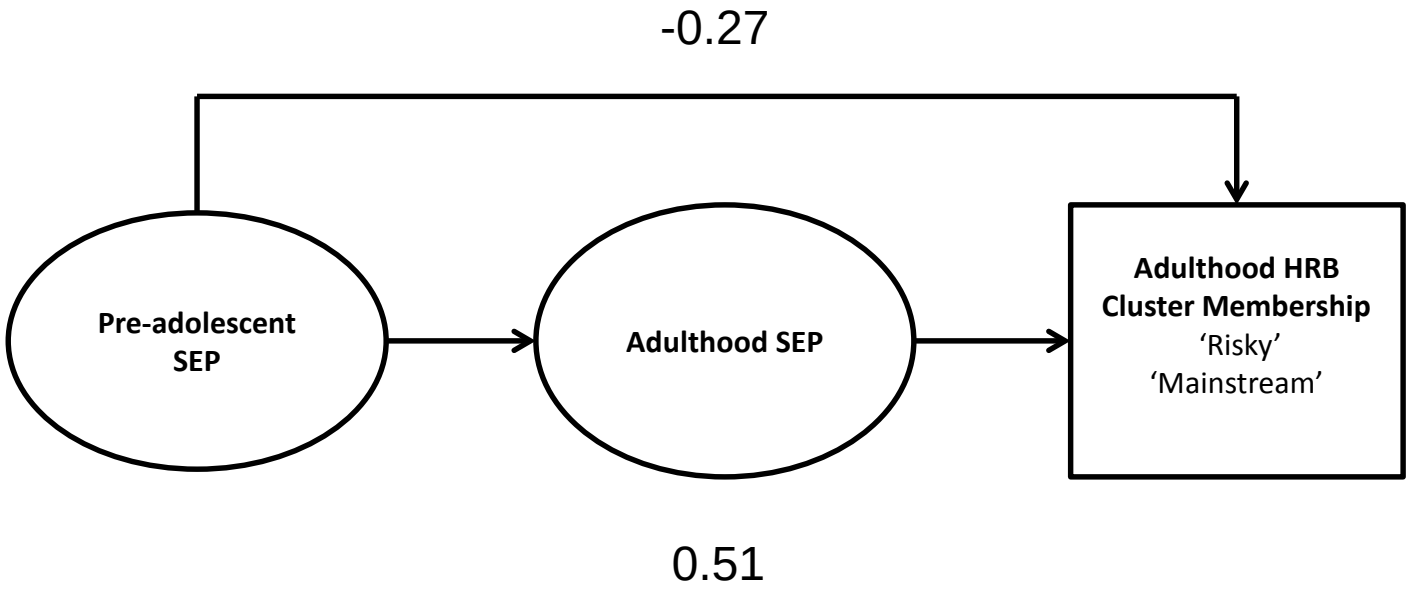
Path ab + path c = total effect of pre-adolescent SEP on HRB cluster membership.

Ovals represent the latent variables. Rectangles represent the observed variables.

Results

NCDS MEN (‘Risky’ vs ‘Mainstream’ cluster membership).

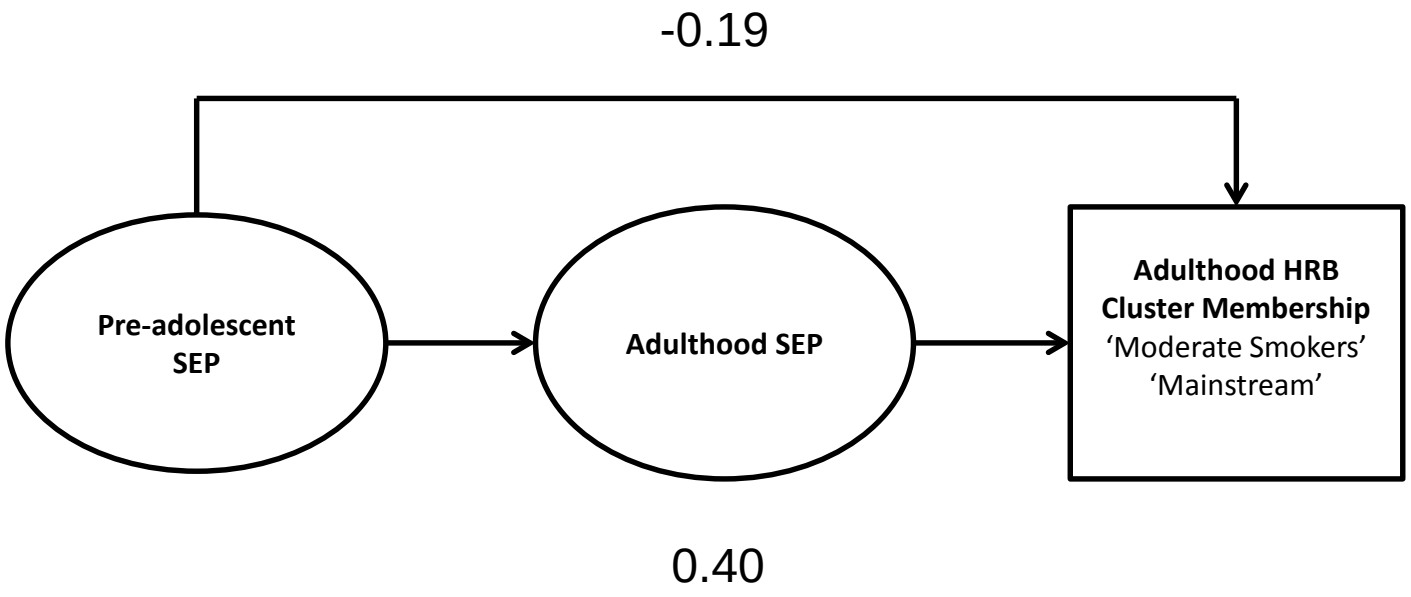
Total effect = 0.25



Note: Standardised probit regression coefficients. Solid bold arrows represent tested pathways. Bold arrows represent significant paths (p≤0.01).

NCDS MEN (‘Moderate Smokers’ vs ‘Mainstream’ cluster membership).

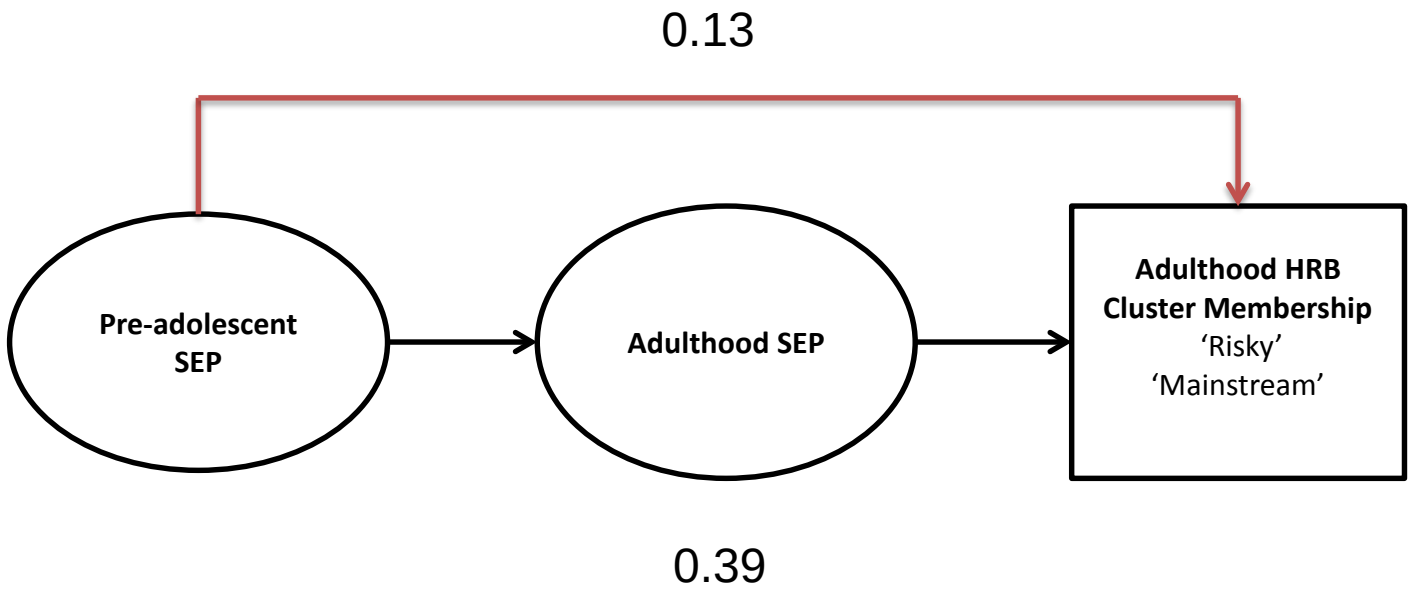
Total effect = 0.21



Note: Standardised probit regression coefficients. Solid bold arrows represent tested pathways. Bold arrows represent significant paths (p≤0.01).

NCDS WOMEN (‘Risky’ vs ‘Mainstream’ cluster membership).

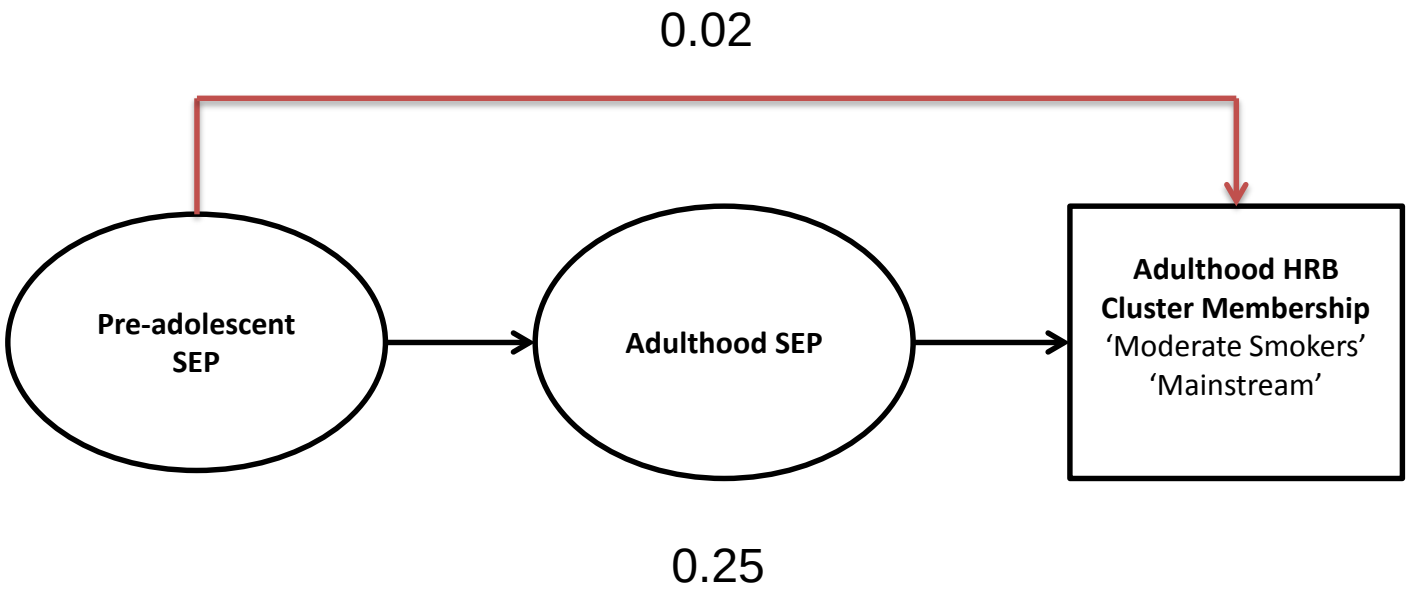
Total effect = 0.52



Note: Standardised probit regression coefficients. Solid bold arrows represent tested pathways. Bold arrows represent significant paths (p≤0.01). Red arrows represent non-significant paths (p>0.01).

NCDS WOMEN (‘Moderate Smokers’ vs ‘Mainstream’ cluster membership).

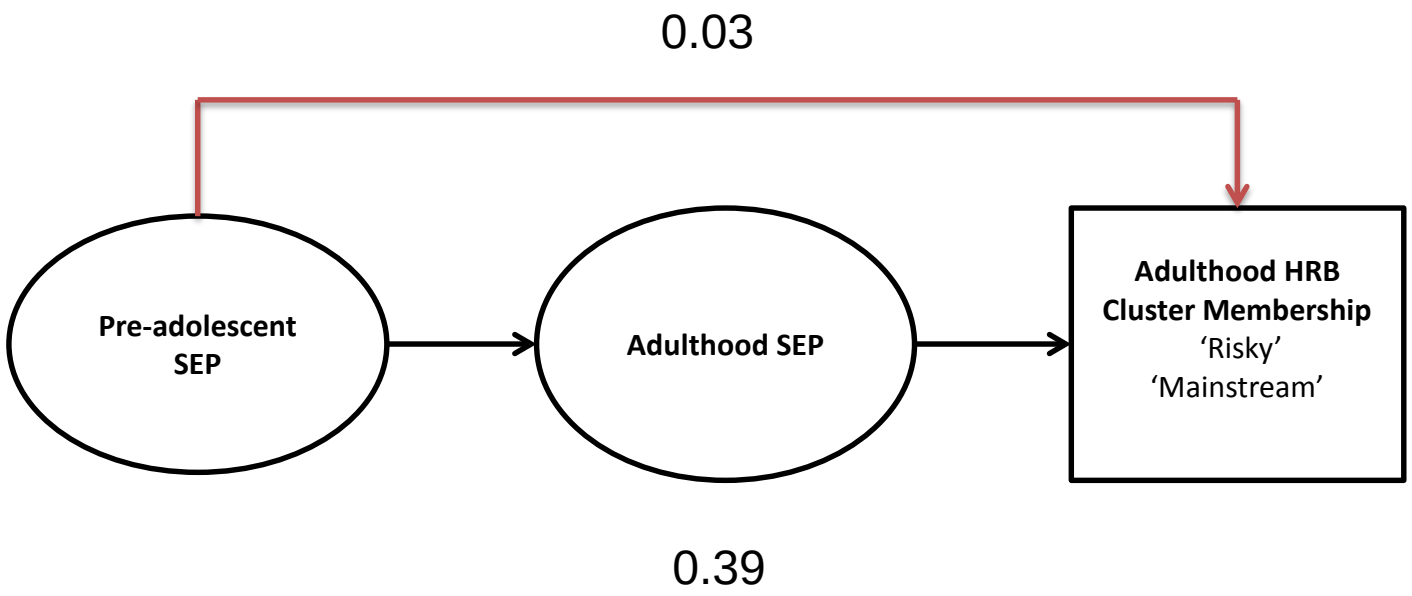
Total effect = 0.27



Note: Standardised probit regression coefficients. Solid bold arrows represent tested pathways. Bold arrows represent significant paths (p≤0.01). Red arrows represent non-significant paths (p>0.01).

BCS70 MEN (‘Risky’ vs ‘Mainstream’ cluster membership).

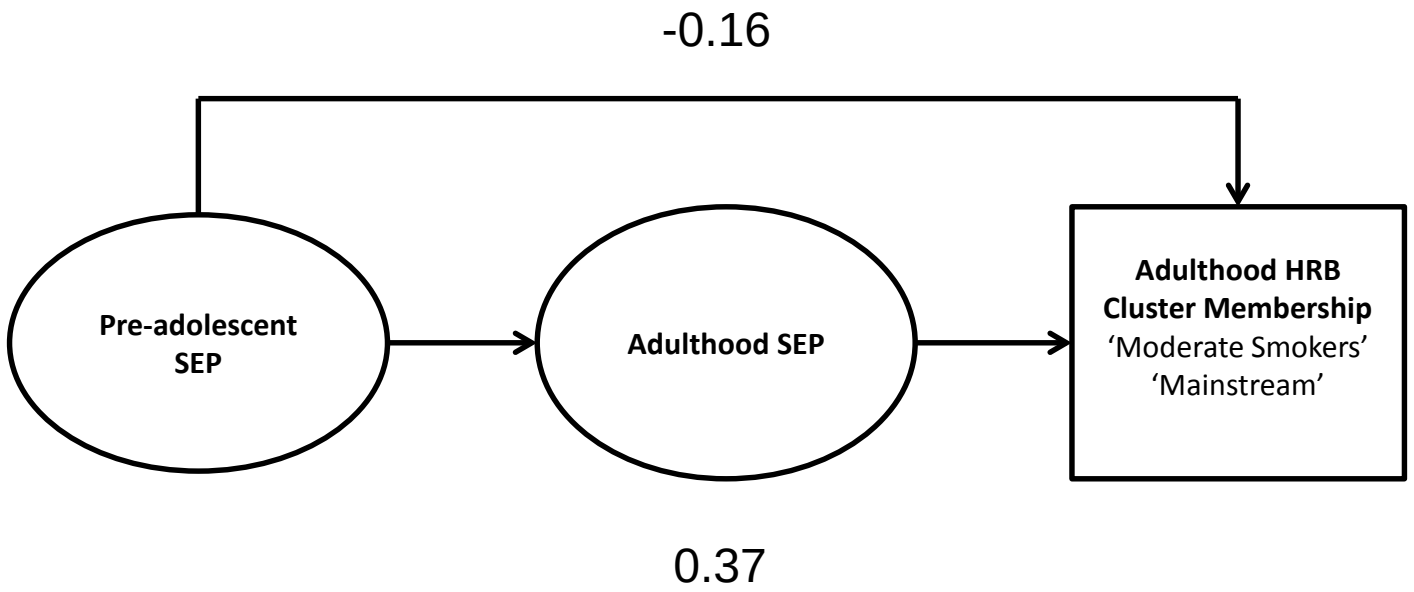
Total effect = 0.41



Note: Standardised probit regression coefficients. Solid bold arrows represent tested pathways. Bold arrows represent significant paths (p≤0.01). Red arrows represent non-significant paths (p>0.01).

BCS70 MEN (‘Moderate Smokers’ vs ‘Mainstream’ cluster membership).

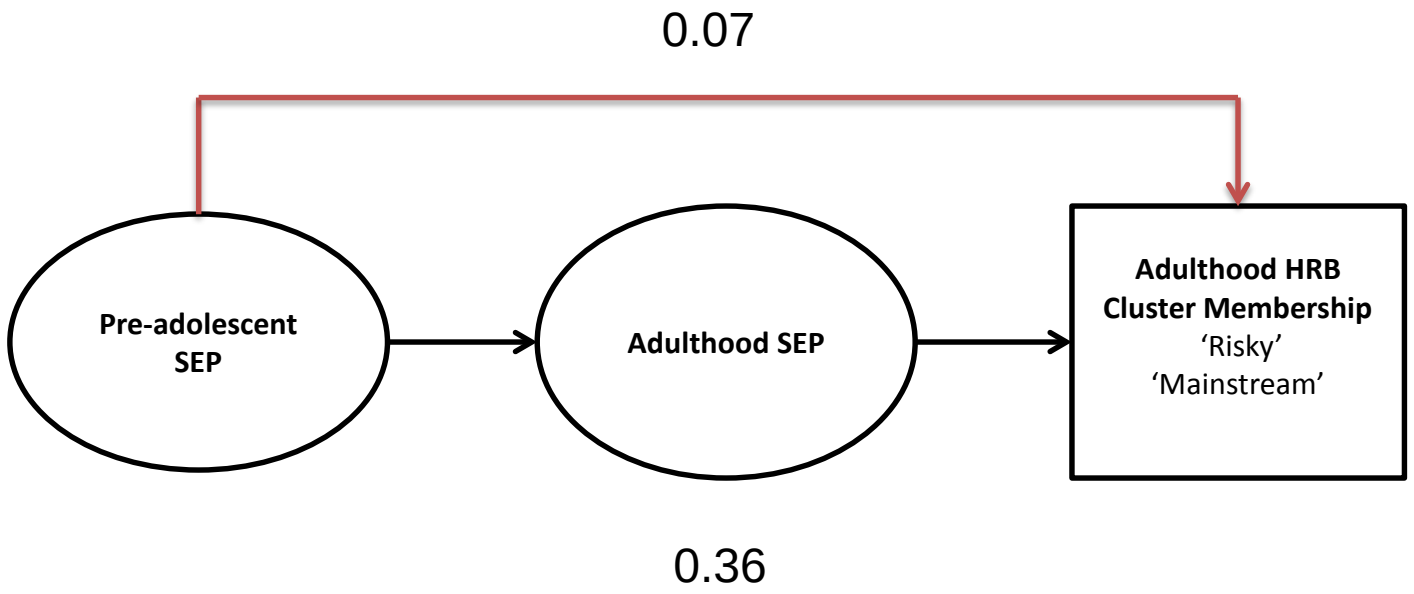
Total effect = 0.21



Note: Standardised probit regression coefficients. Solid bold arrows represent tested pathways. Bold arrows represent significant paths (p≤0.01).

BCS70 WOMEN (‘Risky’ vs ‘Mainstream’ cluster membership).

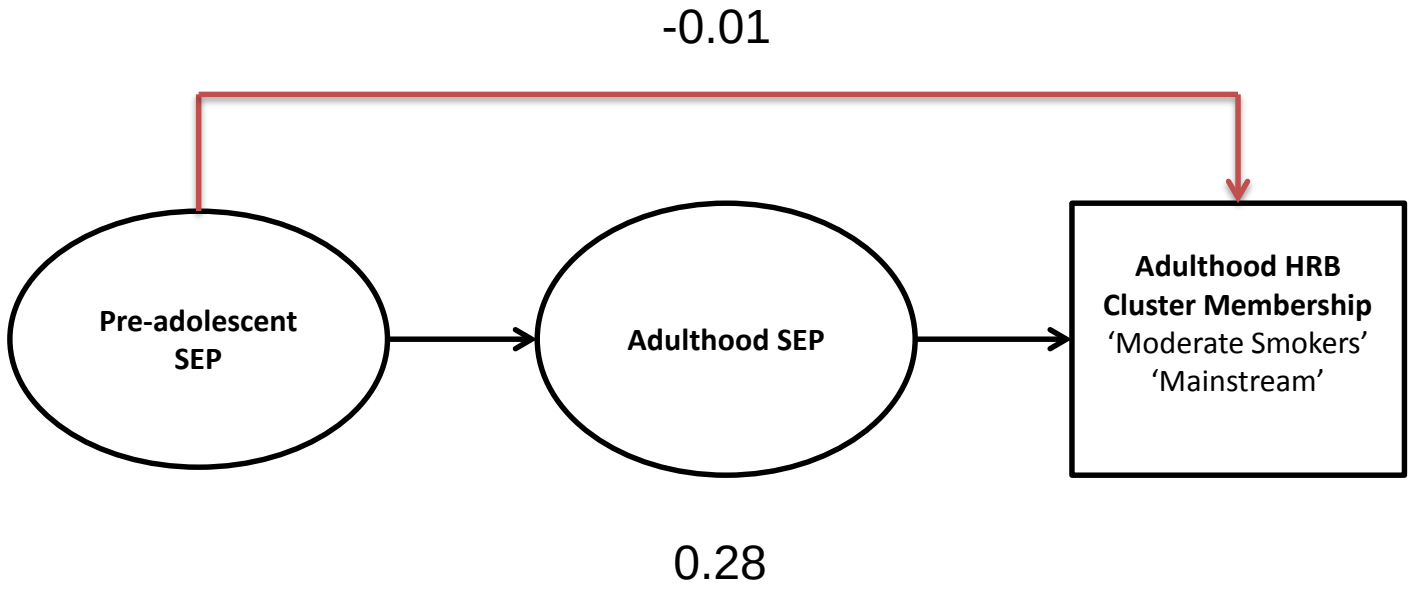
Total effect = 0.44



Note: Standardised probit regression coefficients. Solid bold arrows represent tested pathways. Bold arrows represent significant paths (p≤0.01). Red arrows represent non-significant paths (p>0.01).

BCS70 WOMEN (‘Moderate Smokers’ vs ‘Mainstream’ cluster membership).

Total effect = 0.27



Note: Standardised probit regression coefficients. Solid bold arrows represent tested pathways. Bold arrows represent significant paths (p≤0.01). Red arrows represent non-significant paths (p>0.01).

Conclusions

- Adult SEP mediated the path between pre-adolescent SEP and adult HRB clusters.
- Adult lifestyles are not pre-determined by earlier social circumstances.
- Results were consistent across two cohorts, twelve years apart and by gender.

Policy Implications

- Optimism for interventions relevant to reducing social gradients in HRBs.
- Highlights a ‘chain of risk’ between pre-adolescent SEP and adult lifestyle.
- Consistent findings imply inequalities in lifestyle persist across time.
- ‘Upstream’ policies and interventions that address the social structure could break the link between SEP and adult HRBs.

Acknowledgements

- UCL CLOSER Inequalities conference organisers and attendees.
- The International Centre for Lifecourse Studies in Society and Health.
- Cohort participants and the Centre for Lifecourse Studies.
- My PhD supervisory panel.
- Economic and Social Research Council.

Contact me!

Email: claire.mawditt.11@ucl.ac.uk

Twitter: @ClaireMawditt

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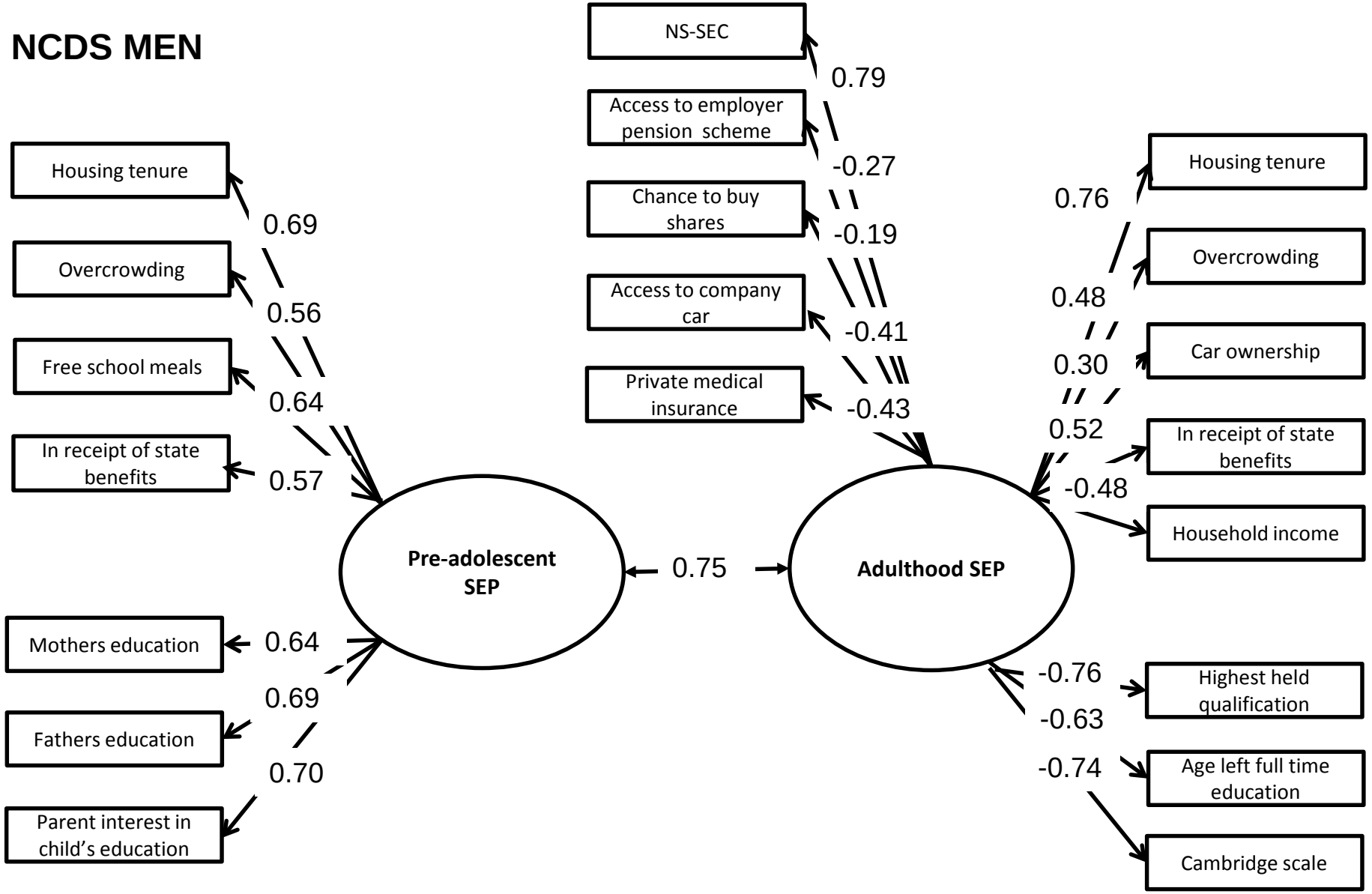
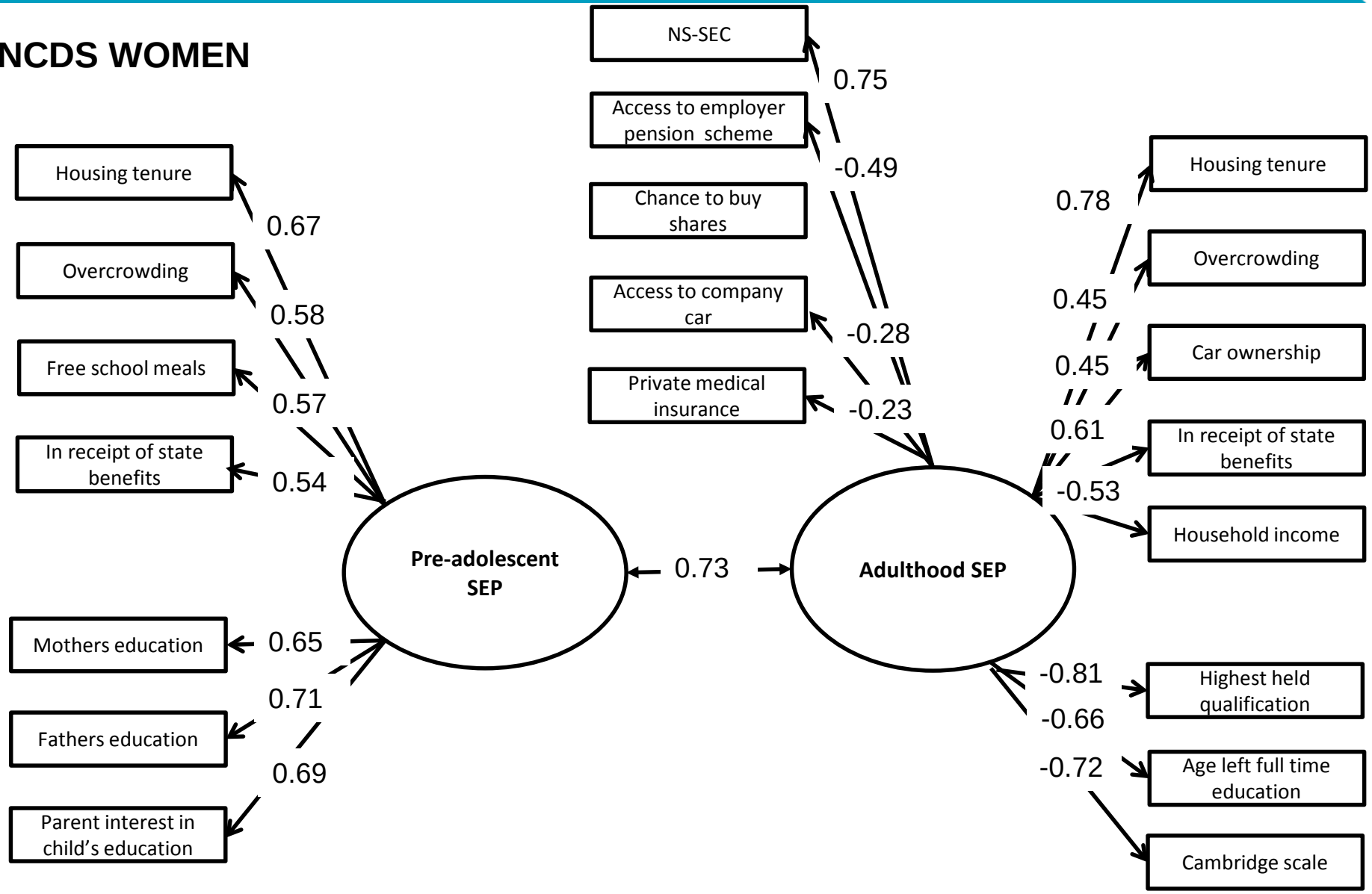
NCDS MEN



Notes: Six correlations between indicator measurement errors not indicated for parsimony. One headed arrows between SEP latent constructs (oval) and observed indicator variables (rectangles) are statistically significant ($p<0.001$) standardised factor loadings.
Two headed arrow between the SEP latent constructs is a Pearson r correlation ($p<0.001$).

NCDS WOMEN



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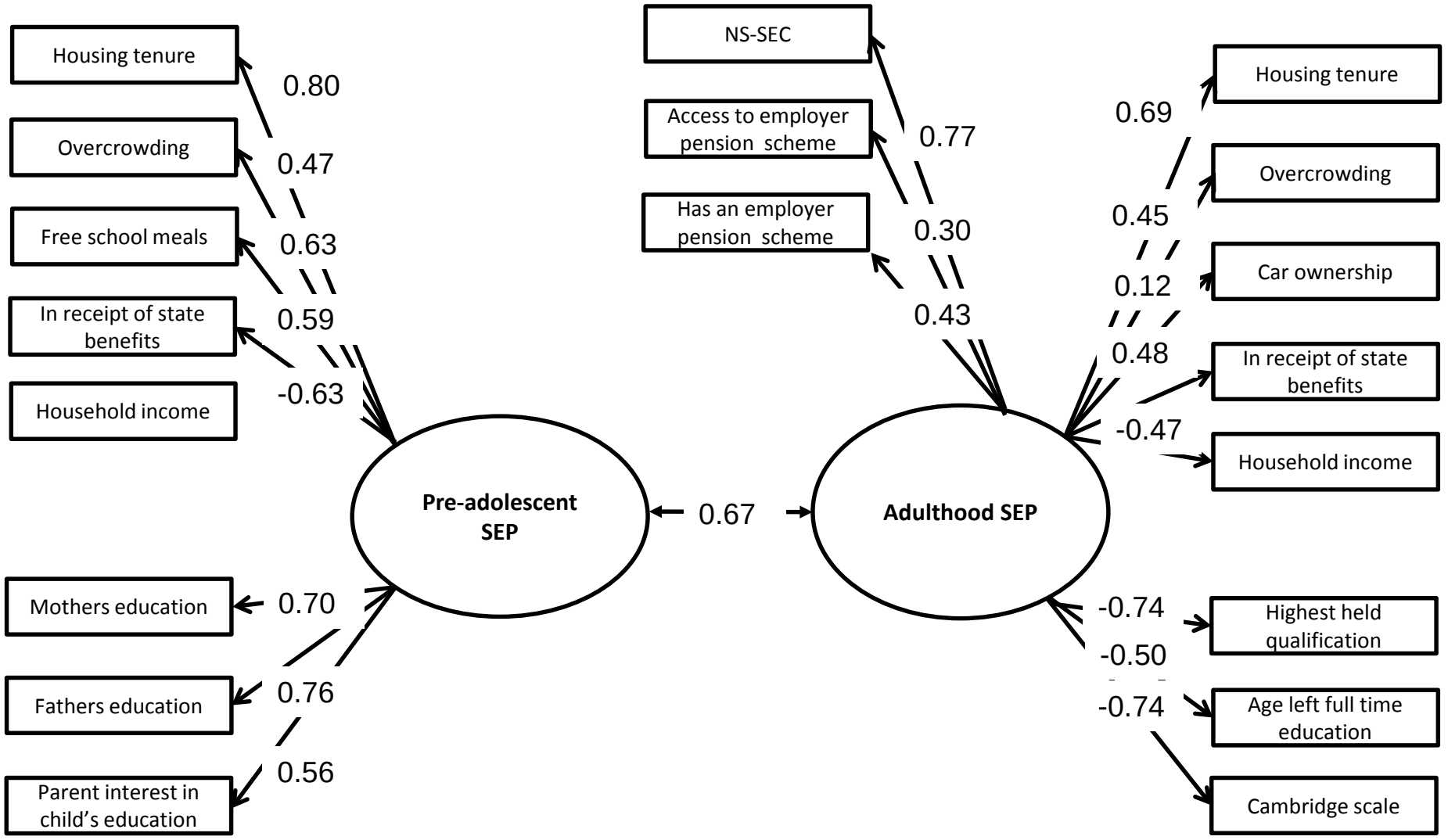
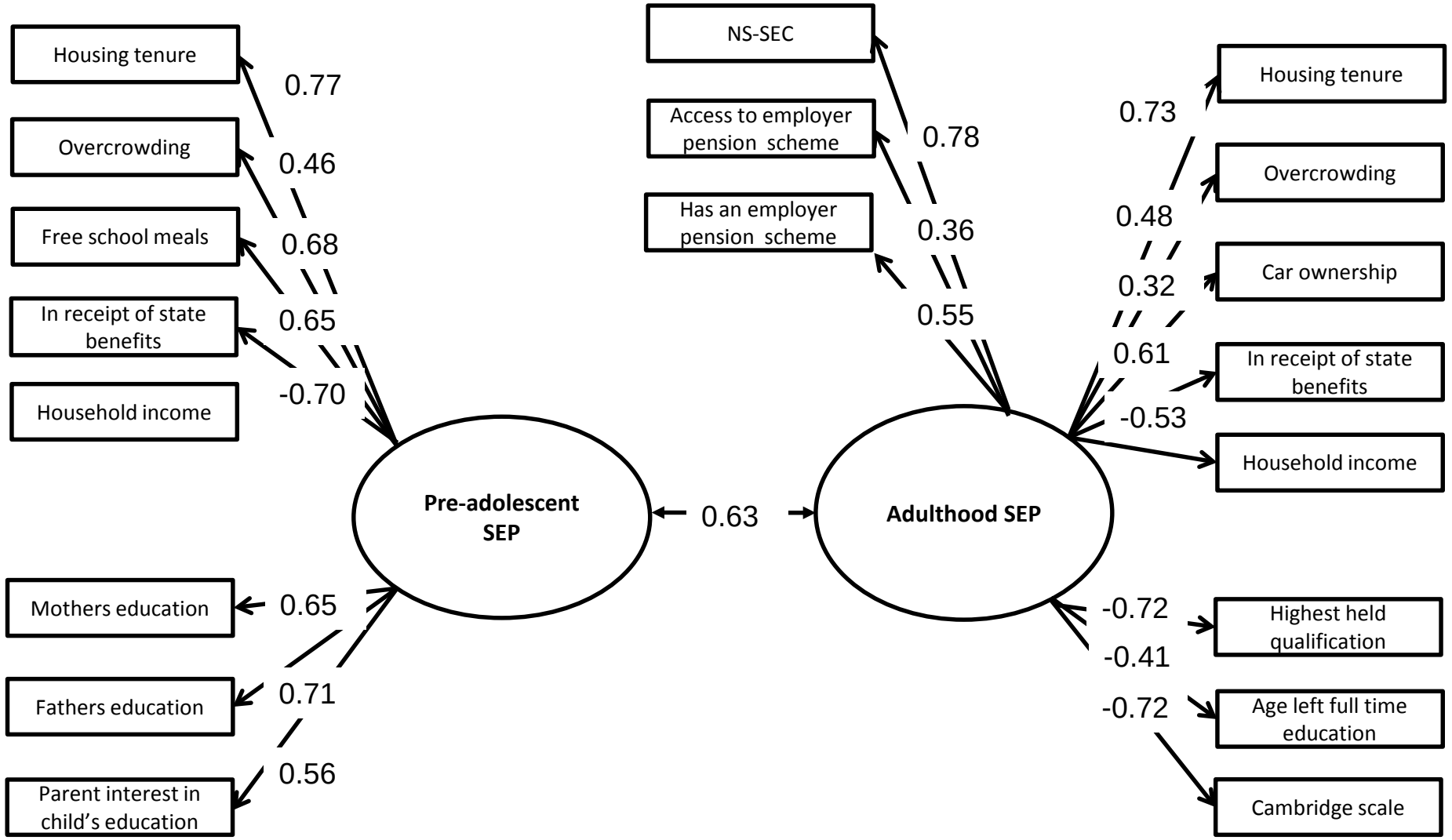
BCS70 MEN



Notes: Five correlations between indicator measurement errors not indicated for parsimony. One headed arrows between SEP latent constructs (oval) and observed indicator variables (rectangles) are statistically significant ($p<0.001$) standardised factor loadings. Two headed arrow between the SEP latent constructs is a Pearson r correlation ($p<0.001$).

BCS70 WOMEN



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