CLOSER Conference

Neighbourhood 1: Neighbourhood & mental health

Chair: **Emily Murray**

- Does your childhood neighbourhood have a bearing on self-rated health in later life?
  Owen Nicholas
- A longitudinal study of neighbourhood effects on trajectories of depressive symptoms using data from the Avon Longitudinal Study of Parents and Children (ALSPAC)
  Alex Kwong
- "Does my neighbourhood make me ill?" Exposure to small-area disadvantage and health trajectories over time
  Lucy Prior
- Testing for critical periods of neighbourhood effects across the life course on mid-to-later life health and well being
  Stephen Jivraj

closer

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Would growing up in neighbourhoods with less material deprivation have led to better later life self-rated health in the National Child Development Study cohort (1958)?

Owen Nicholas[1], Emily Murray[1], Paul Norman[2], Stephen Jivraj[1]

“A lifecourse approach to Neighbourhood Effects” Leverhulme Trust Grant

[1] University College London, UK.

[2] University of Leeds, UK.

SECURE DATA SERVICE
enabling the research community

The Leverhulme Trust

Leverhulme grant data

National Child Development Study (NCDS)

- 1958 1-week birth cohort
- England Scotland and Wales
- N=18,554
- followed through their lives to present day

linked to

Leverhulme grant data

Census

- England, Scotland and Wales
- 1971,1981,1991,2001, and 2011

Geography

- Lower Super Output Area/Data Zones, 1,500 people, 2011 boundaries
- 40,000 “neighbourhoods”

Townsend index combines levels of:

- unemployment (of those who are economically active)
- non-car ownership
- non-home ownership and
- household overcrowding (of all households)

to measure neighbourhood material deprivation

Outline

Birth cohort

Data

Questions

Operational framework (crude)

Answers

Conclusions

Birth cohort

The interdependence of neighbourhood characteristics and mother’s/family characteristics

In a week in 1958…

For a given neighbourhood, women in that neighbourhood were more or less likely to give birth depending on their characteristics.

Those chances varied from neighbourhood to neighbourhood depending on contemporary neighbourhood characteristics.

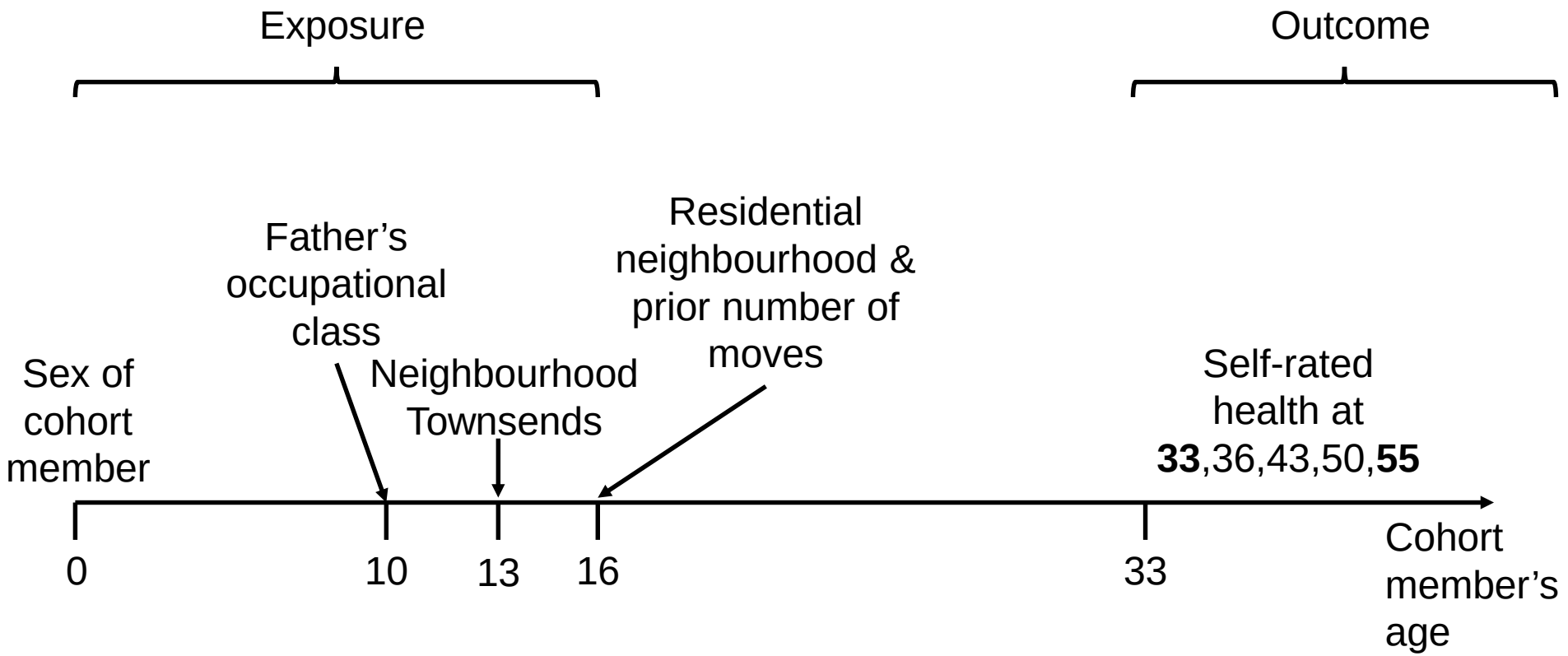
Births were assigned randomly according to these chances and the characteristics at birth of the cohort member depended on contemporary woman's family and neighbourhood characteristics.

In this talk I will conflate "woman" and "family".

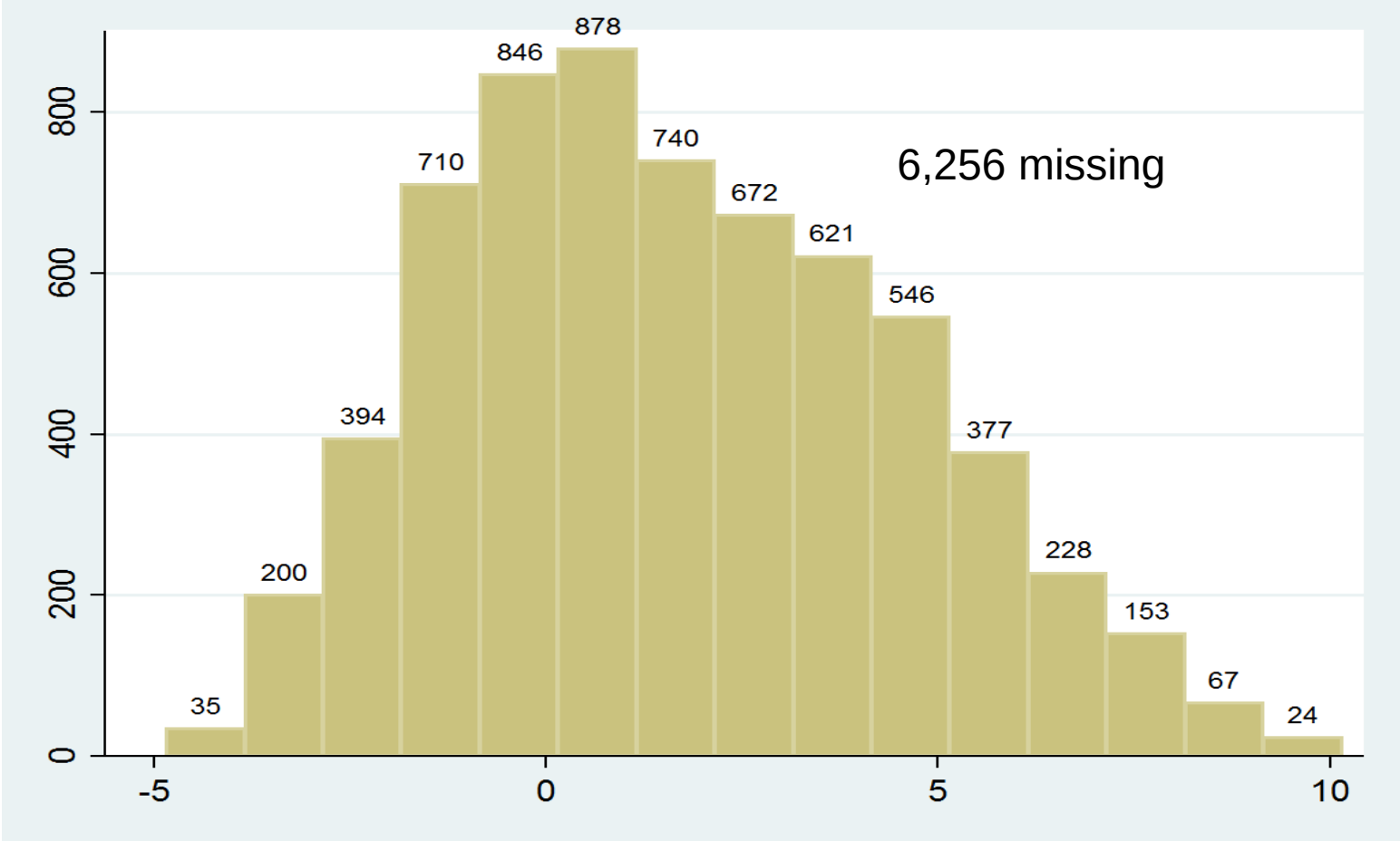
Data

What data am I going to use in this talk? Not very much.

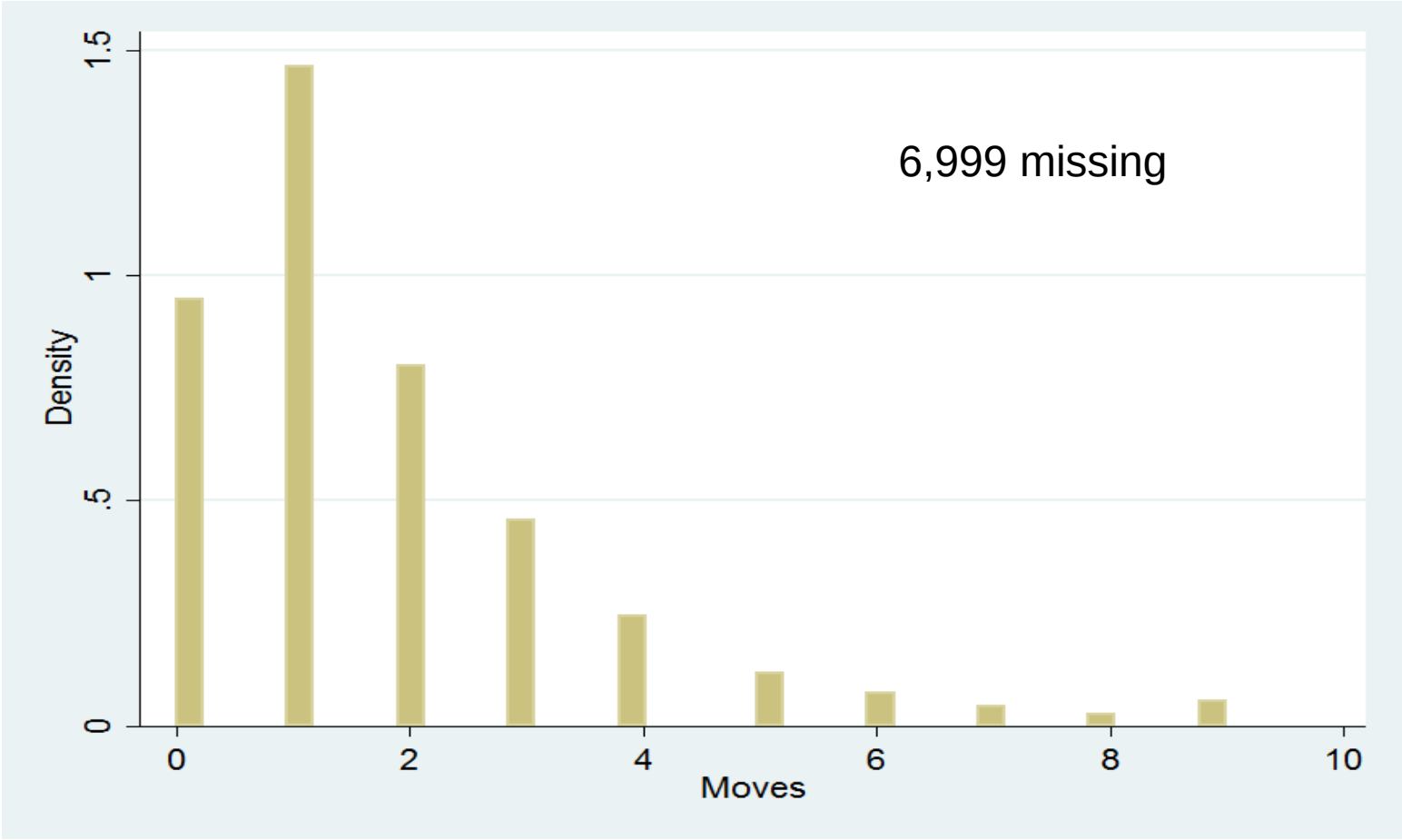
Timeline of data



Townsend deprivation measure. What if decrease it by 1 unit (1/3 SD), i.e. shift everyone one bin to the left?



Number of moves over cohort member's first 16 years. What if no moves during childhood?



Sex

Sex	
Male	9,596
Female	8,958

Father’s occupational class

3,283 missing

Class	
Not applicable	625
SC III manual	2,575
SC III non-man.	582
SC IV manual	913
SC IV non-manual	104
Social class I	295
Social class II	1,073
Social class V	327

Outcome various measures of self-rated health (SRH) at 33 and 55.

7,283 missing

Self-rated health at 33	Count
Excellent	2,213
Good	3,445
Fair	733
Poor	103

I will assume that missing data in self-rated health is not an effect of contemporaneous self-rated health

Stability of data

Under time and motion

For convenience I am going to assume that

Father's occupational class is stable under moves and time

- so I can take value at age 10 to be value at age 0

and so too is Townsend

- the data tells us that the variability of neighbourhood Townsend over 13 years is 15% of between neighbourhood variability in Townsend so good correlation
- however there is evidence from BHPS[1] that new births lead to moves to better areas, and unemployment leads to moves to worse areas

I will take the value of Townsend age 13 for neighbourhood age 16 to be the value at age 0

- "measurement error" which might lead to regression dilution bias
- it would be better to impute both quantities for age 0

[1] Birgitta Rabe (2010) JRSS A

Interventional questions

What might have happened if…?

Perhaps we can address the following two interventional questions

(1) If each cohort member had been born in a neighbourhood with 1 unit better Townsend

(2) and had grown up without moving

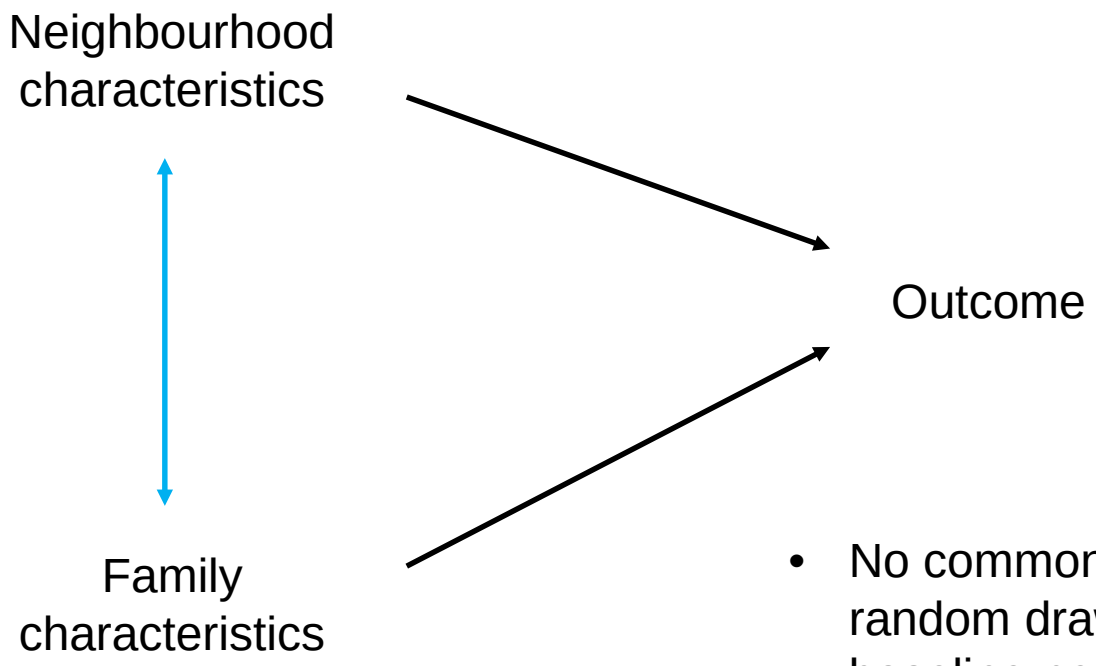
would later life self-rated health have been better in this cohort?

(2) is appealing because it might provide convincing information about “childhood neighbourhood effects” as the birth neighbourhood remains counterfactually unchanged during childhood

Operational framework

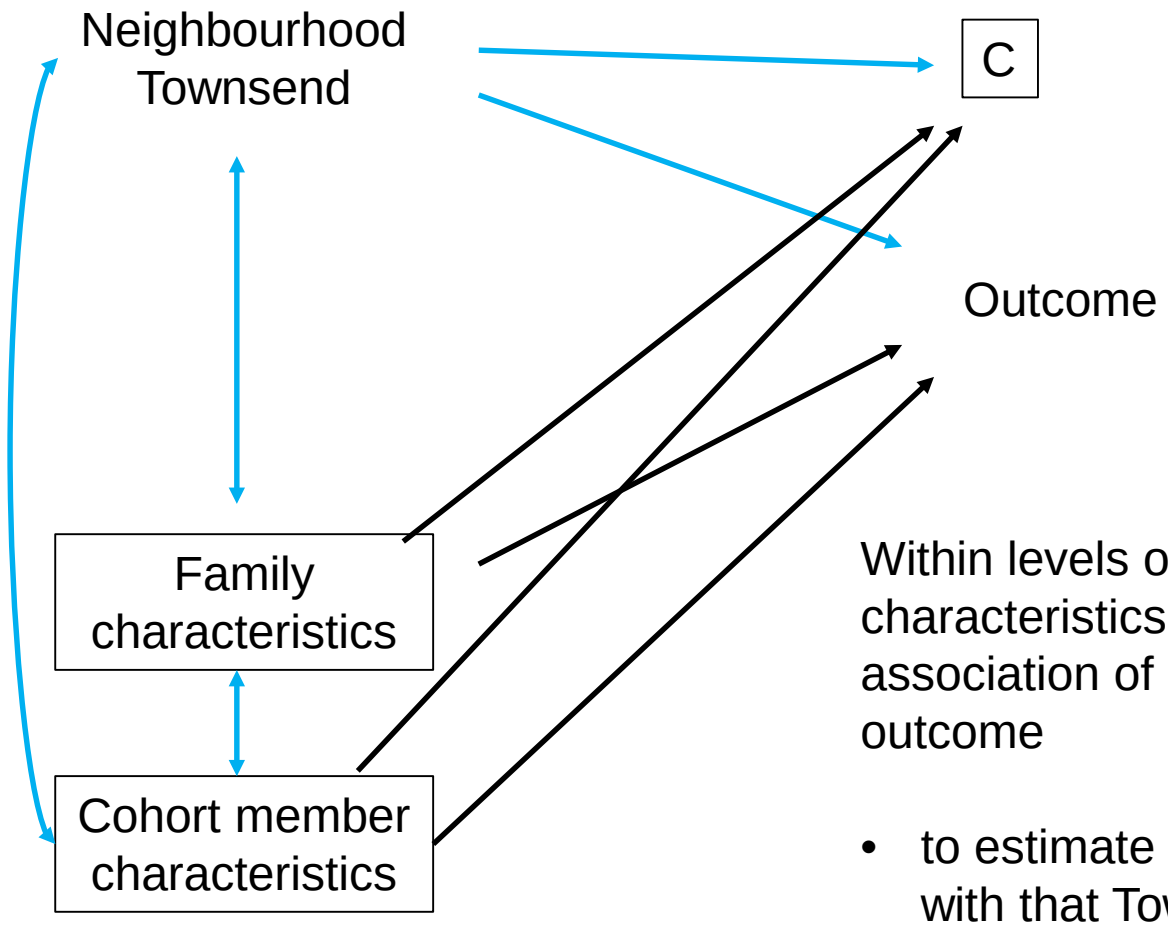
Ignoring a lot of detail at my peril

Question 1: Baseline and follow up



- No common causes since we had a random draw from a joint distribution of baseline neighbourhood and family characteristics
- Within levels of family characteristics, back door paths from neighbourhood characteristics to outcome are blocked

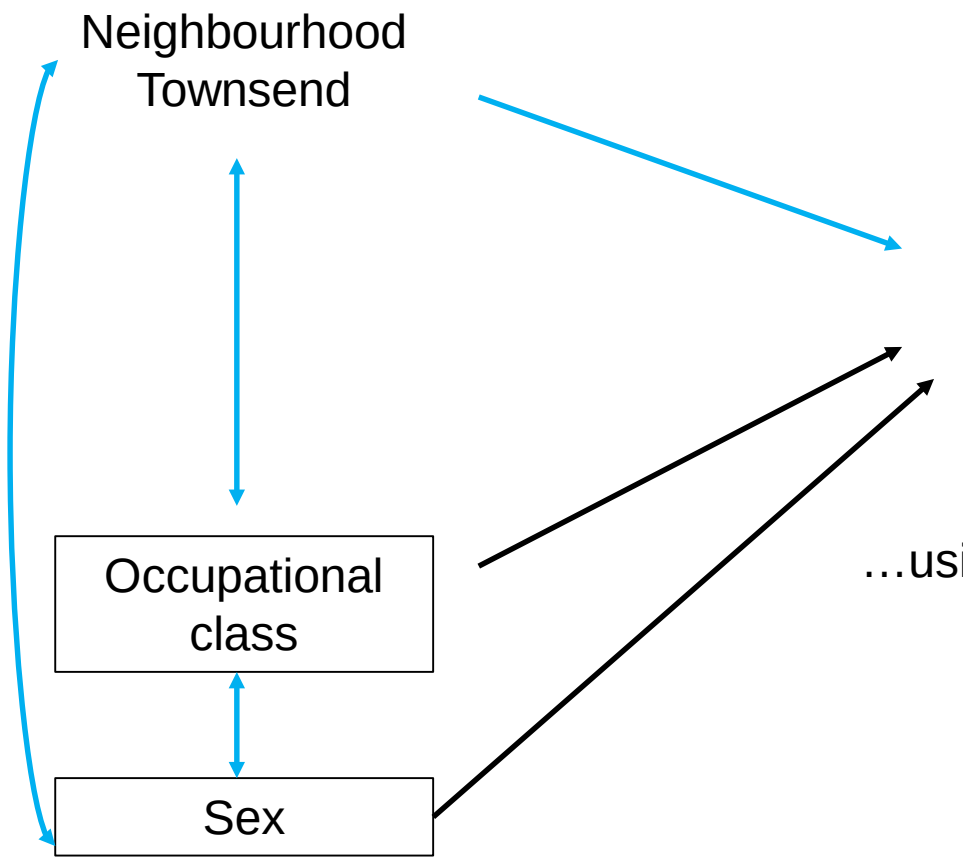
Effect of neighbourhood characterised by its Townsend measure



Within levels of family and member characteristics and C we can estimate the association of neighbourhood Townsend with outcome

- to estimate the effect that a neighbourhood with that Townsend has on the outcome

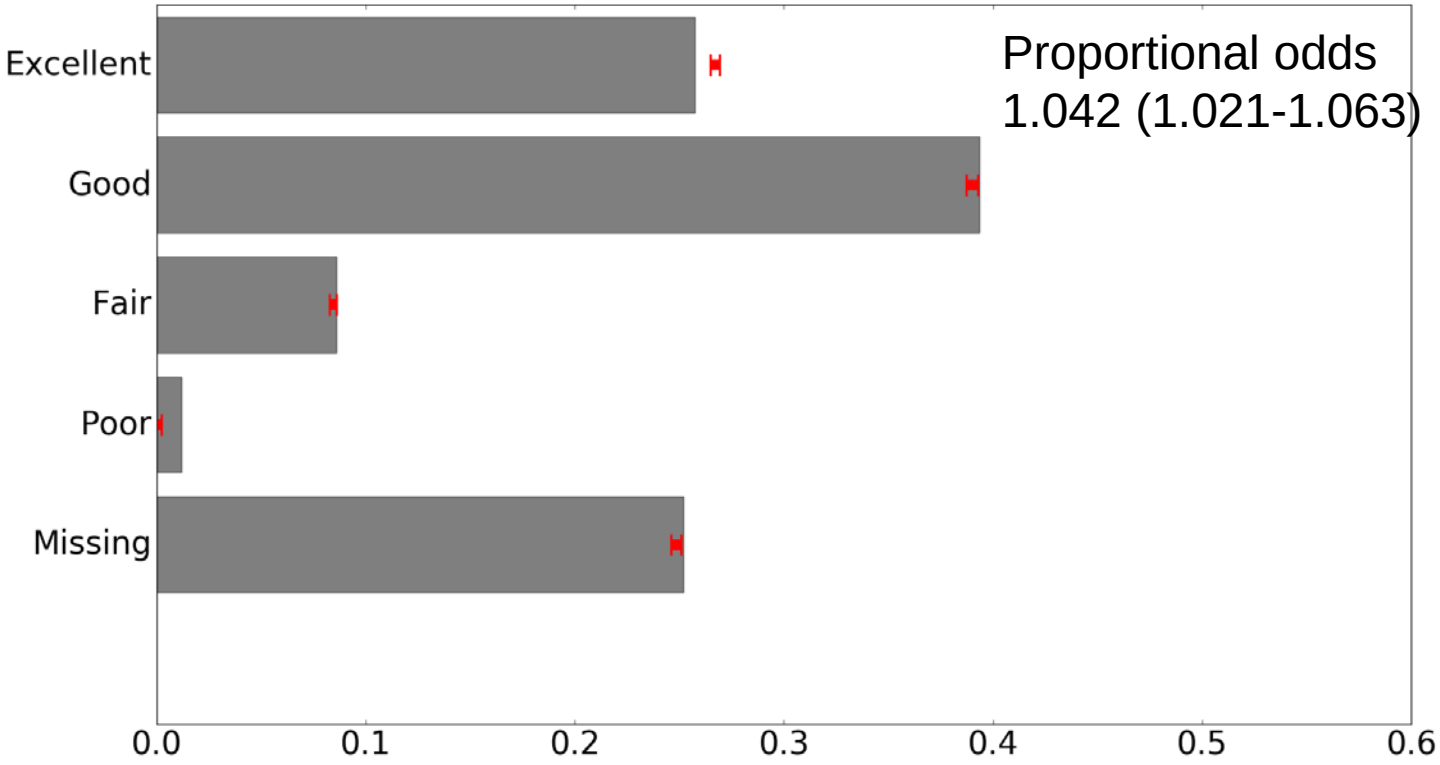
For complete cases



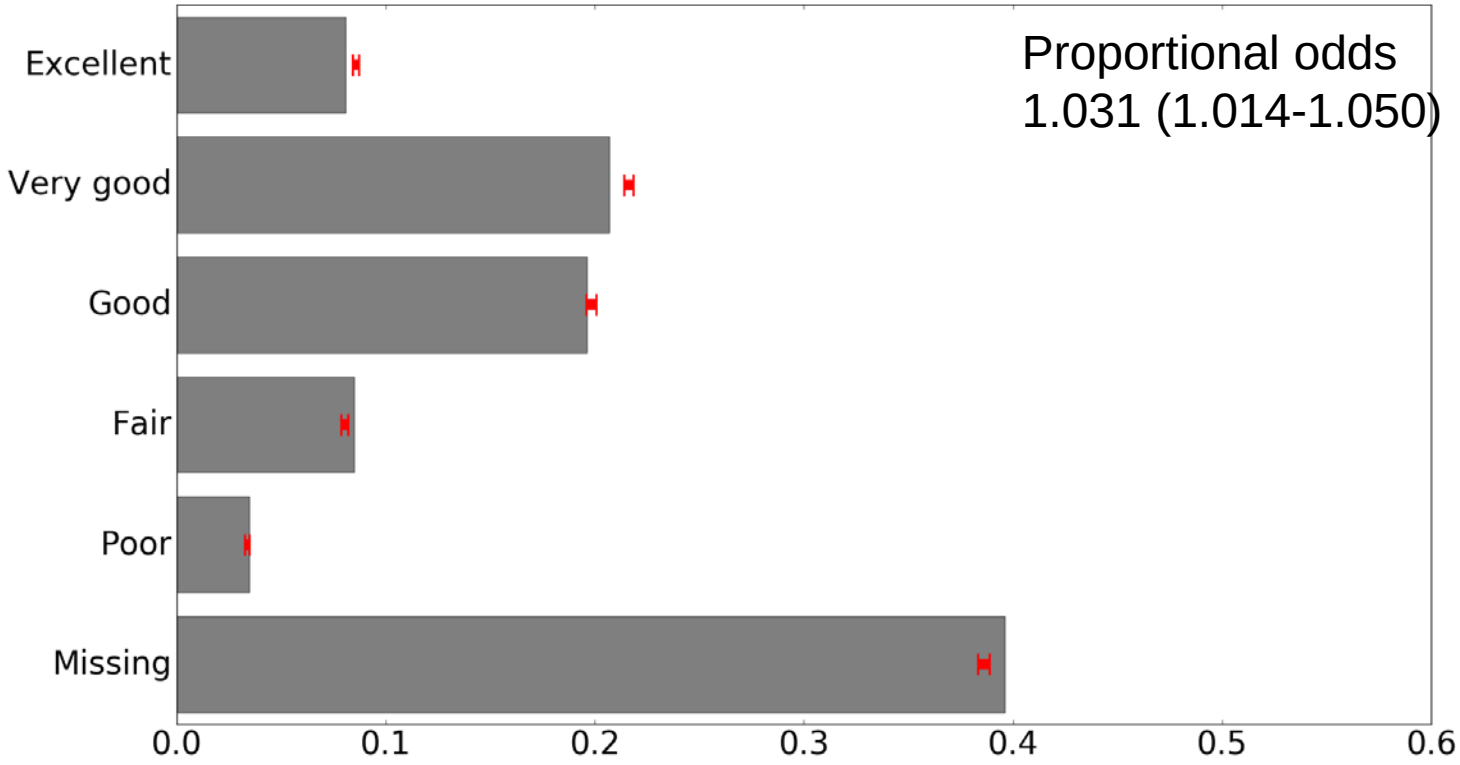
Outcome

…using the “minimum” of blocking variables

Self-rated health at age 33. N = 11,291.
Red bars are estimates of 1 unit change in Townsend.



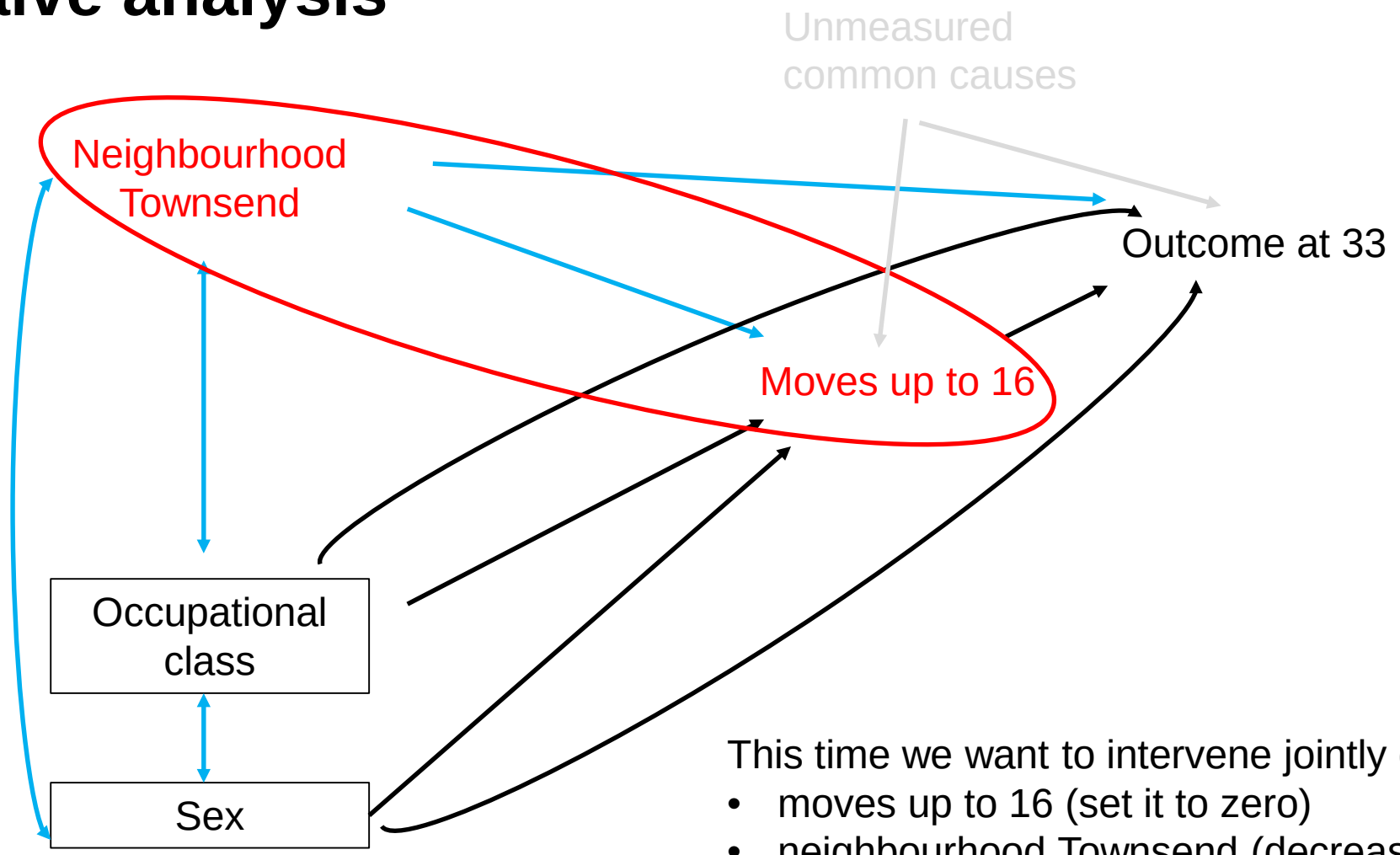
Self-rated health at age 55. N = 11,291.



Question 2

We need to include moves as an intermediate variable

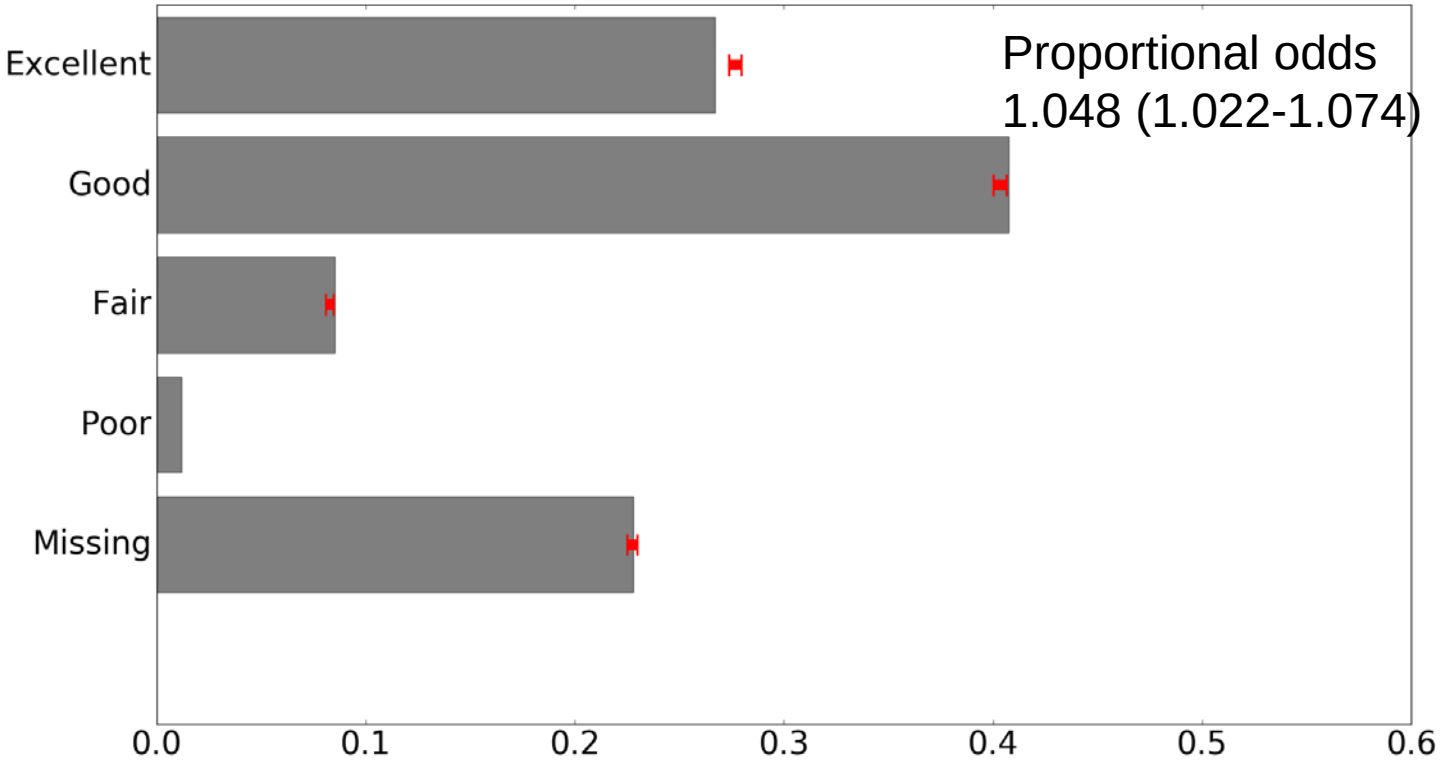
The naïve analysis



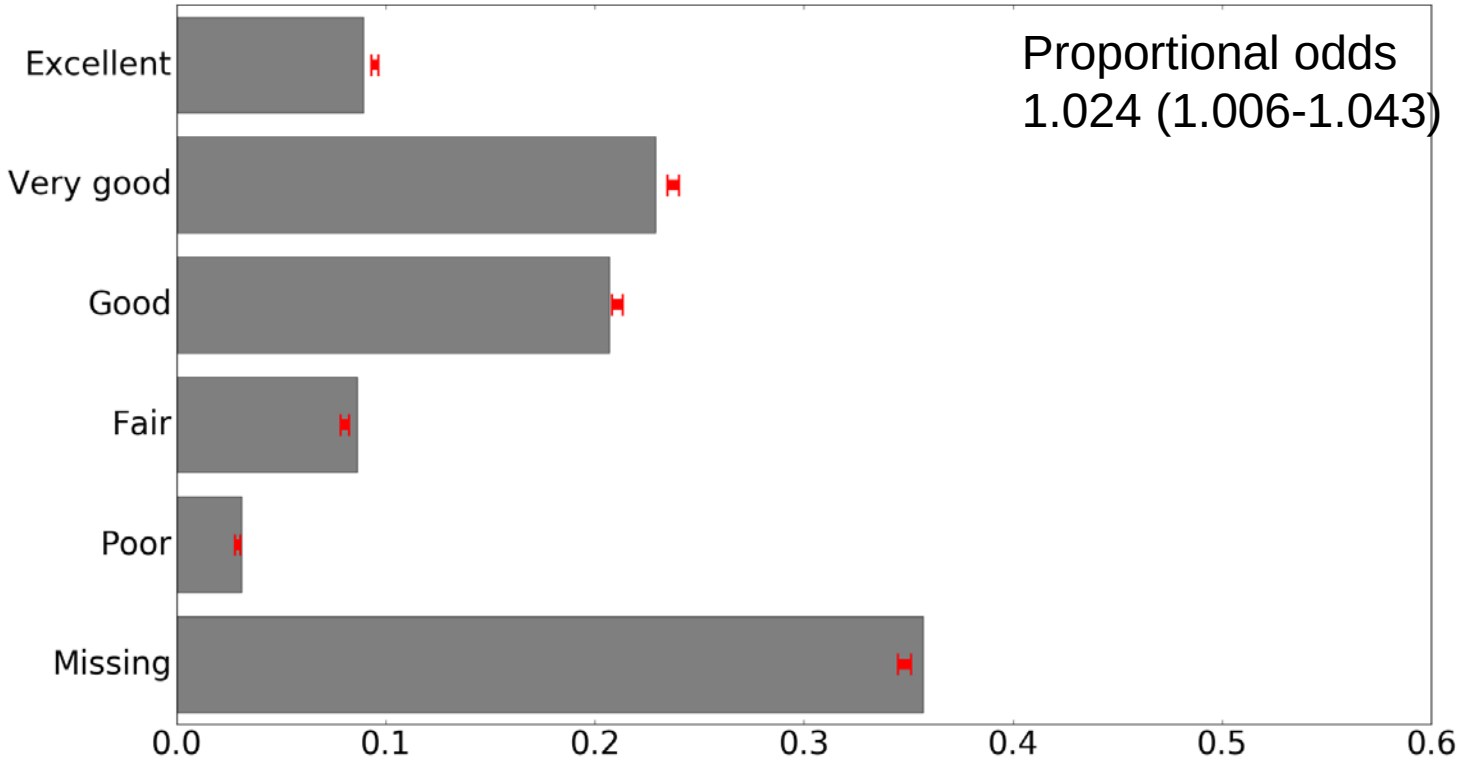
This time we want to intervene jointly on

- moves up to 16 (set it to zero)
- neighbourhood Townsend (decrease it by 1)

Self-rated health at age 33. N = 11,291.
(i) Moves = 0
(ii) Townsend = Townsend-1



Self-rated health at age 55. N = 11,291.
(i) Moves = 0
(ii) Townsend = Townsend-1



Conclusions

At last

I assumed that

- father’s occupational class and cohort member’s sex are sufficient to block back door paths
- there were no strong extra common causes
  - both these assumptions are questionnable

and that father’s occupational class and neighbourhood Townsend are stable

  - probably ok, but need some imputation

and that there was no effect of the final outcome on missing data.

I found having a birth neighbourhood of lower Townsend to lead to sustained improvement on self-rated health in cohort members of the National Child Development Study who had sufficient relevant data

  - this needs to be extended to the full cohort.

Thank you!

o.nicholas@ucl.ac.uk

A longitudinal study of neighbourhood effects on trajectories of depressive symptoms using data from the Avon Longitudinal Study of Parents and Children (ALSPAC)

Alex Kwong, George Leckie, Nic Timpson & David Manley

School of Geographical Sciences/Centre for Multilevel Modelling/
MRC Integrative Epidemiology Unit

1/11/2017

Contents

- Why study depression?
- Neighbourhood effects on depression
- Current study: Neighbourhoods and trajectories of DS

Why study depression?

- Depression is a common mental illness which affects more than 300 million people worldwide (World Health Organisation, 2017)
- Associated with:
  - Increased substance use
  - Impaired educational attainment
  - Increased risk of suicide (Thapar et al., 2012)
- Predicted by:
  - Gender
  - Genetics
  - Early life experiences
- Identifying mechanisms is important for treatments and interventions

Neighbourhood effects on depression

- Research indicates that neighbourhood deprivation (ND) is positively associated with depression & depressive symptoms (DS)
  - People living in high ND are more likely to be exposed to:
    - Violence/criminal behaviour
    - Noise pollution
    - Fewer access to health resources
  - ND may act as a buffer or stressor for DS (Kim, 2008)
  - Females at greater risk of DS from ND (O'Campo et al., 2015)
- HOWEVER – not universal across the literature
  - Mixed findings from systematic reviews – perhaps no neighbourhood effects (Richardson et al., 2015)

Neighbourhood effects on depression (cont…)

- ALSO:
  - Most studies use cross sectional designs OR
  - Case-control studies OR
  - Poorly modelled using inadequate models
- Problems with reverse causation/selection bias
- Can use longitudinal data (with repeated measures) to overcome some of the challenges
  - Neighbourhood stress positively associated with depressive symptoms at 13 and 18 (Solmi et al., 2017)
    - Can extend this to examine how depressive symptoms change over a period of time

The current study

- How neighbourhood deprivation at birth might influence DS trajectories across childhood, through adolescence and into young adulthood:
  - Lasting effects of early ND?
  - Greater susceptibility for females?
- Use rich longitudinal data over a 24ish year period
  - With DS data over a 14 year period
- Use multilevel modelling to estimate trajectories

- Disclaimer:
  - So far we have only explored ND at birth and trajectories
    - Will be getting more data soon

Methods

- Participants were from the Avon Longitudinal Study of Parents and Children (ALSPAC)
- Outcome:
  - Depressive symptoms – measured via the short mood and feelings questionnaire (SMFQ)
    - A 13 item questionnaire, validated in numerous studies (Turner et al., 2014; McKenzie et al., 2012)
      - 0-26 where 26 is max depression
    - Measured on 8 occasions – from late childhood (10.65 years) to young adulthood (22.8 years)

Methods (cont…)

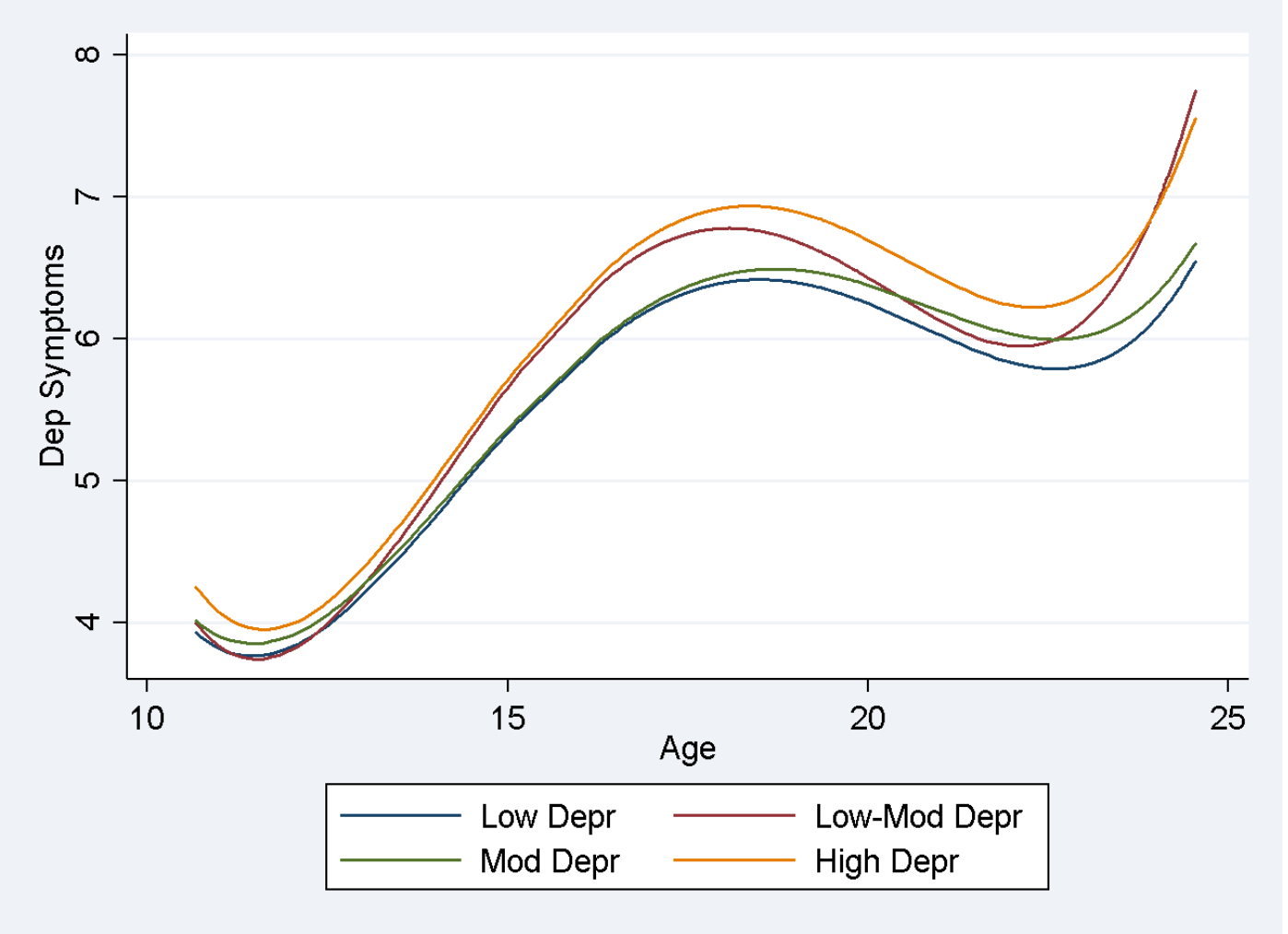
- Predictors/covariates
  - Townsend deprivation index (quartiles)
    - Low, low to moderate, moderate & high
  - Gender – Identified at birth
  - Maternal SES at birth

- Used multilevel modelling with a random intercept and random slope model to estimate trajectories of DS
  - 3 level longitudinal model
    - **Occasions** within **individuals** within **neighbourhoods**

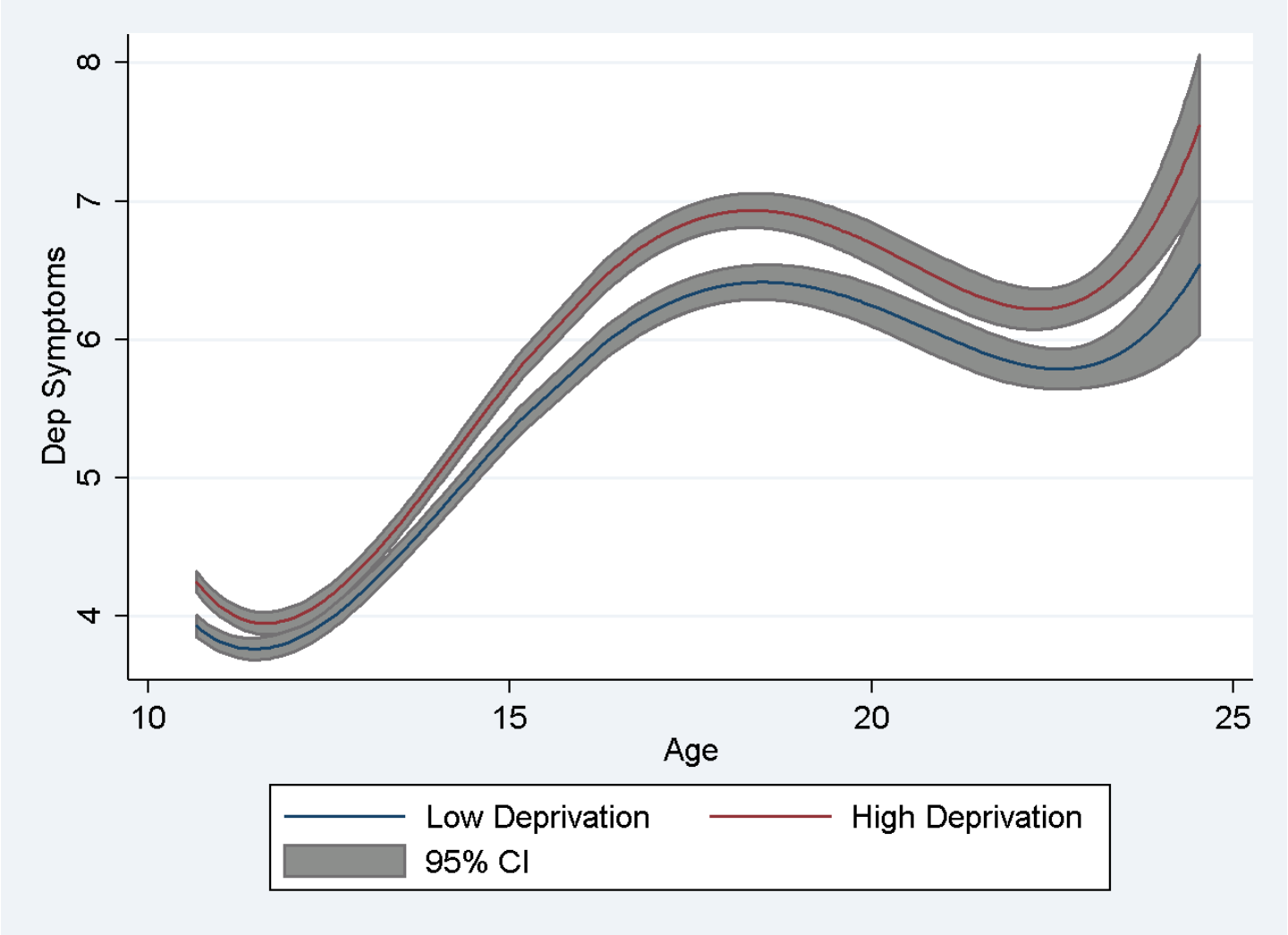
Sample description

- We had 8172 individuals with data on ND and at least one measurement of the SMFQ:
  - Resulting in 35,149 measurements
- We had 6690 individuals when including SES as a covariate
  - Resulting in 30,074 measurements
  - Graphs reported are adjusted for SES

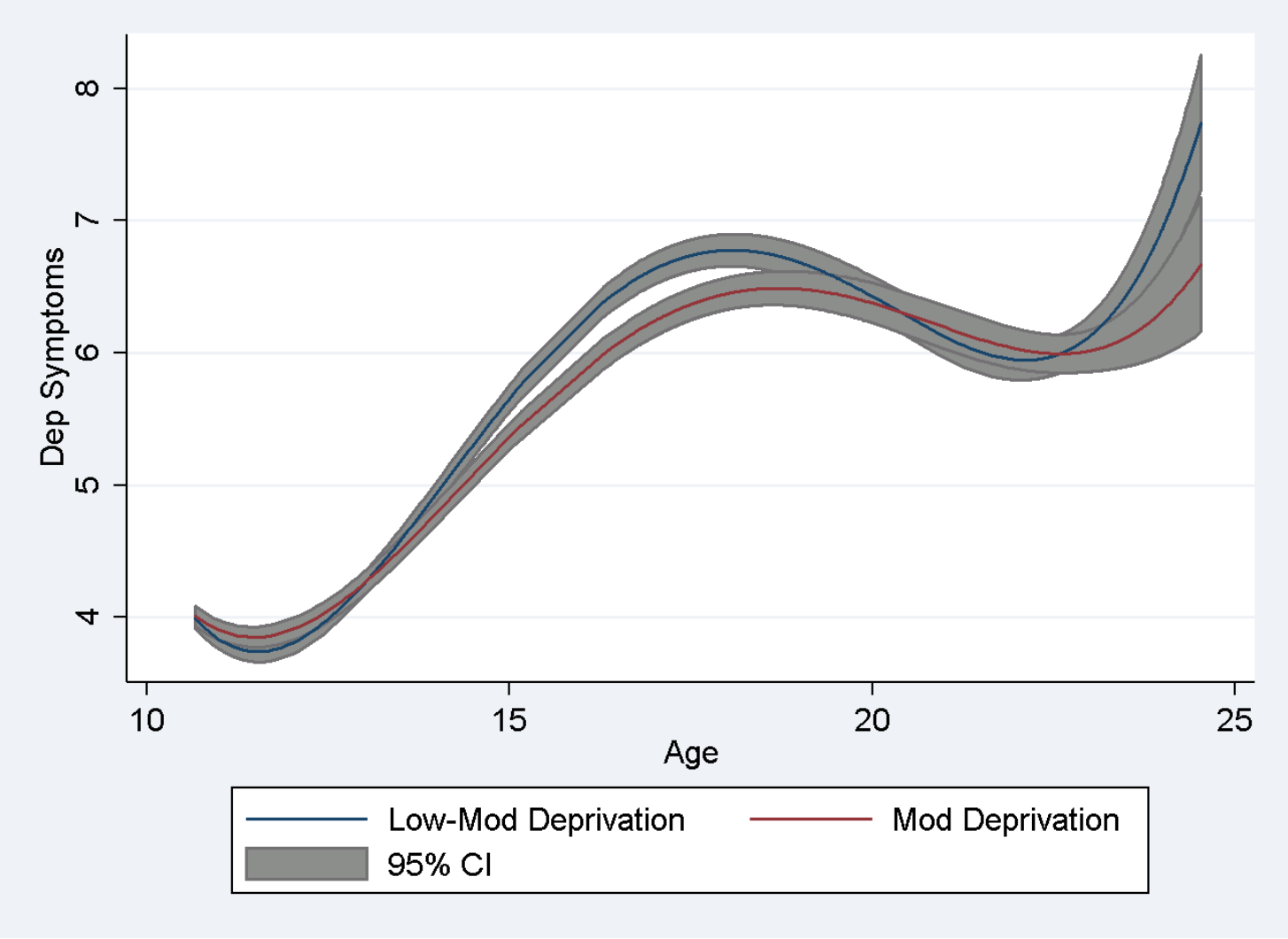
Results – All deprivation with DS



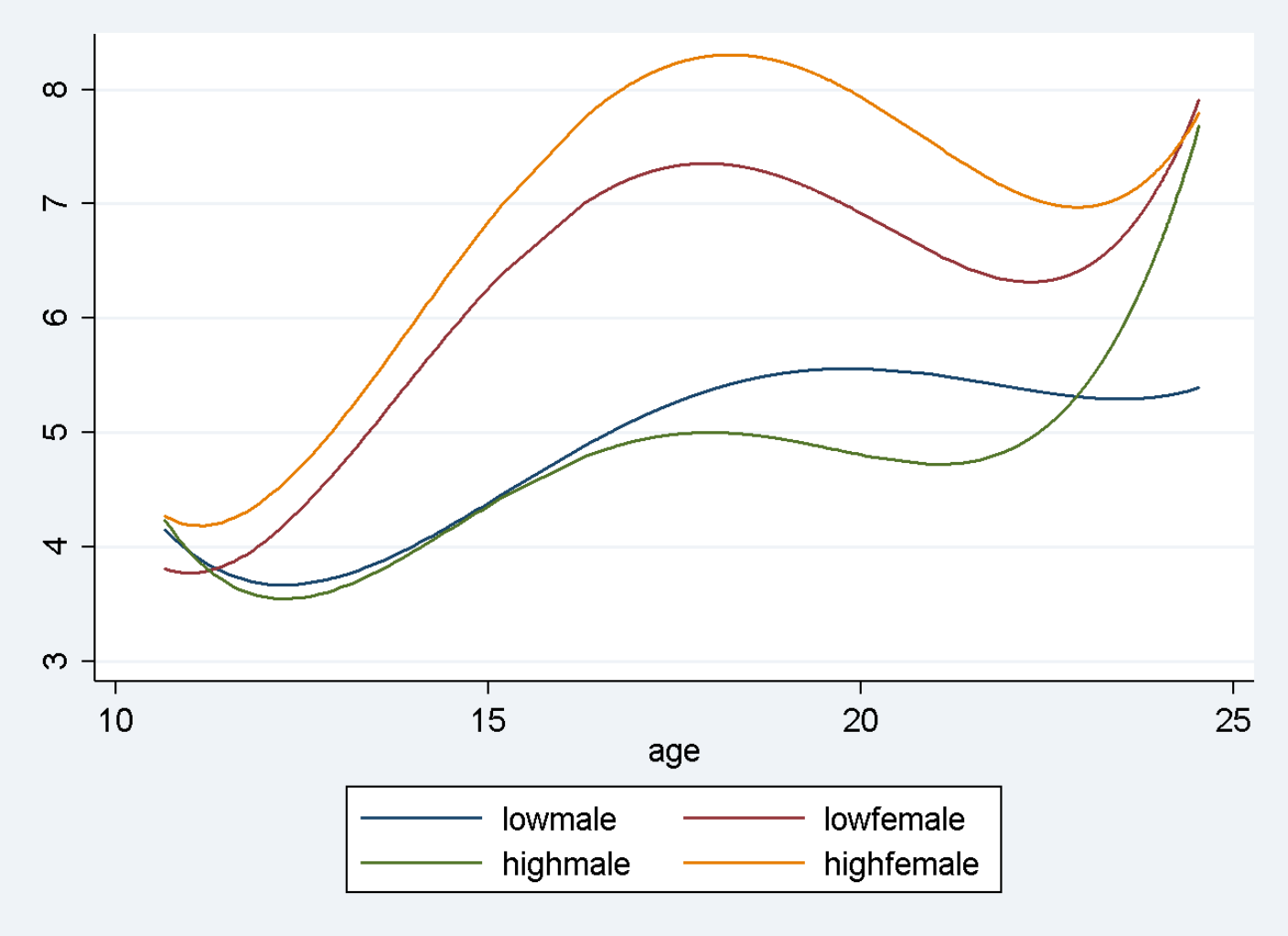
Results – Low vs high deprivation



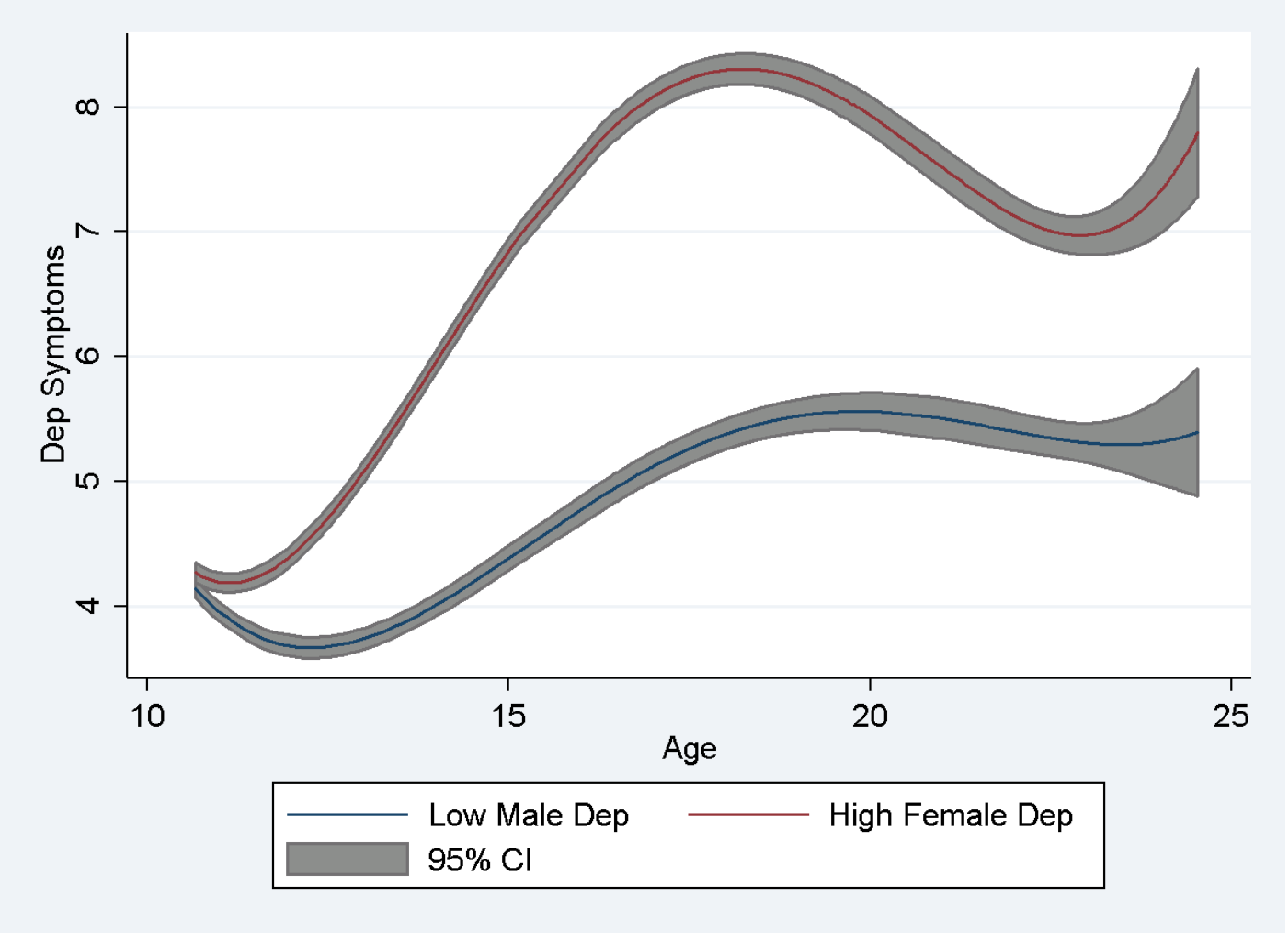
Results – Low-to-mod vs moderate deprivation



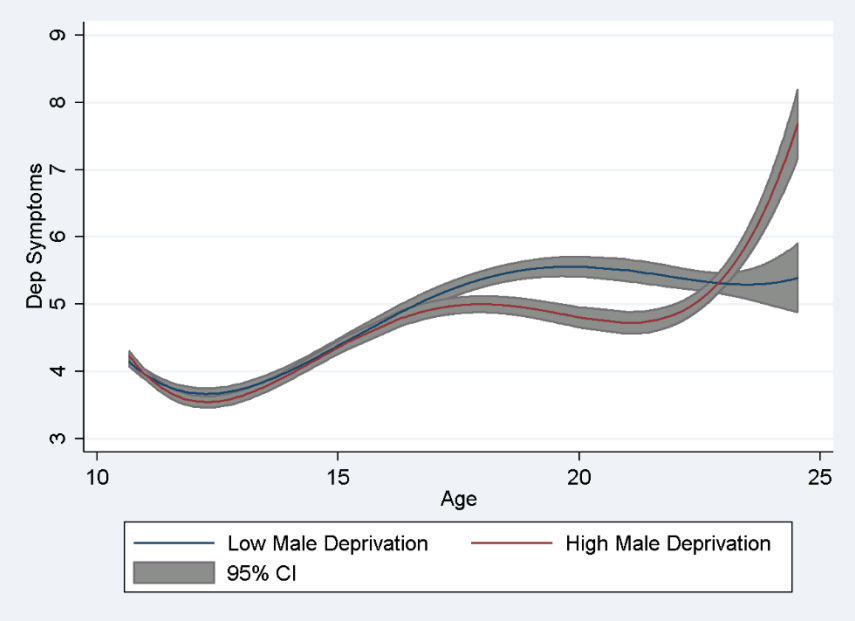
Results – Low vs high deprivation with gender

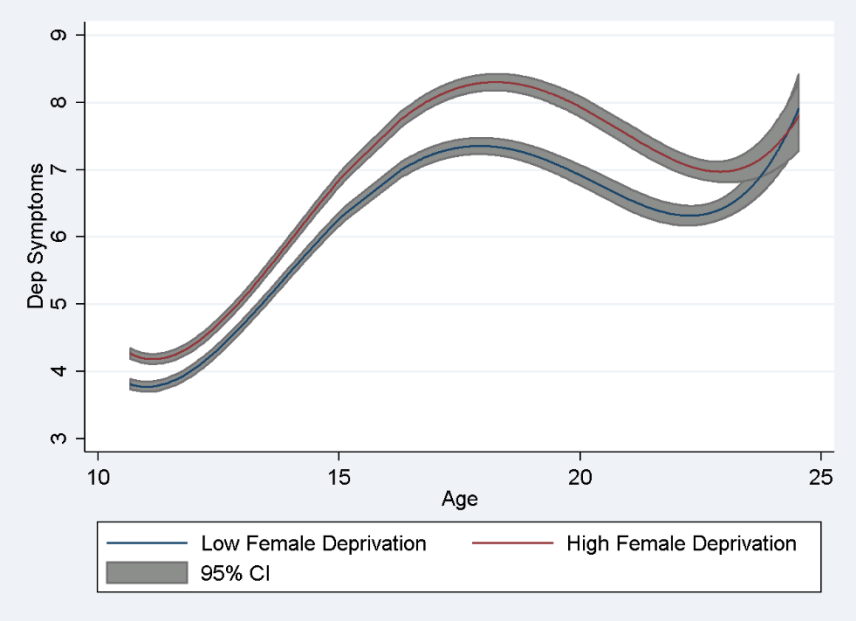


Results – Low males vs high females



Results – Males & females





Discussion

- Neighbourhood deprivation (ND) seems to be positively associated with trajectories of depressive symptoms
  - Effect mainly driven between low and high ND
  - But also through gender as well
    - Highlighted by low male deprivation vs high female deprivation
    - Females more susceptible to ND that has lasting effects on DS?
- Results remain after adjusting for SES
  - Some evidence that ND at birth is independent of personal and household characteristics

Discussion (cont…)

- Low ND early in life may protect against later DS
  - High ND early in life may predispose someone to higher DS
  - Not enough to establish causality
    - But ND may be one mechanism that contributes to DS
- Gender may play a role in the association between ND and DS
  - High ND females had the highest trajectories
    - Support and interventions could be aimed at females early on to prevent/reduce this
  - BUT:
    - Contrasts previous research that females moving into high ND at birth have better DS (Brazil & Clark, 2017)
      - Need to untangle this relationship further

Strengths and weaknesses

- We use individual level longitudinal data over a 24ish year period
  - With repeated measures of DS
- Large sample size > 6000
- Appropriately modelled using MLM

- BUT:
- Only have ND data at birth
  - Results may change when we include later ND
- Only have included SES but some evidence suggests life course events remove association between ND and DS
  - Will need to explore this further in our analysis

Conclusion

- The ND research is mixed and findings still unclear
- ND may act as a stressor or buffer for depression or DS
  - OR no effects of ND on DS at all…
- We provide evidence for higher ND impacting on trajectories of DS
  - High deprivation females maybe at the most risk of DS
    - Interventions/support to help those at risk
- In order to establish causality we need rich longitudinal data
  - With better methods

Acknowledgements

- Thank you!

- Hannah Sallis
- Evie Stergiakouli
- Oliver Davis

- The ALSPAC team and families & the ESRC

Does my neighbourhood make me ill?

Exposure to small-area disadvantage and health trajectories over time

Lucy Prior, David Manley, and Kelvyn Jones

This work is funded by a PhD Scholarship on the Advanced Quantitative Methods pathway by the ESRC

Background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Health
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More
Health
One in three 'sick notes' for mental health, says NHS
Top Stories
By Katie Silver
Health reporter, BBC News
1 September 2017
Health


Mental health
Two-thirds of Britons have had mental health problems - survey
Figures suggest problem is getting worse, with younger adults more likely than older people to say they have experienced illness


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Quarter of girls are depressed at 14 in mental health crisis
Chris Smyth, Health Editor
September 20 2017, 12:01am,
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Healthcare Network
Why mental health services in England are finally receiving attention
With the promise of an extra £1.3bn a year and reform of legislation on the cards, the mental health sector is getting the political backing it needs


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BBC News
30 September 2017
Health
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Research Questions

- How does mental health change over time?
- What is the variation in mental health trajectories over time?
- Are mental health inequalities evident in terms of sex, socioeconomic position and low social capital?
- Does heightened exposure to area deprivation relate to worse mental health over time?

Data

British Household Panel Survey (BHPS) (1991-2009)

~10,000 individuals

~5,000 households

Understanding Society (UKHLS) (2010-2015)

BHPS sample joined at Wave 2

UK Census 1991, 2001 and 2011

Data

Response: **Mental Health (GHQ)**

Sex, Marital status, Education, **Financial situation**, Economic status, Tenure

Social participation (Member of organisation)

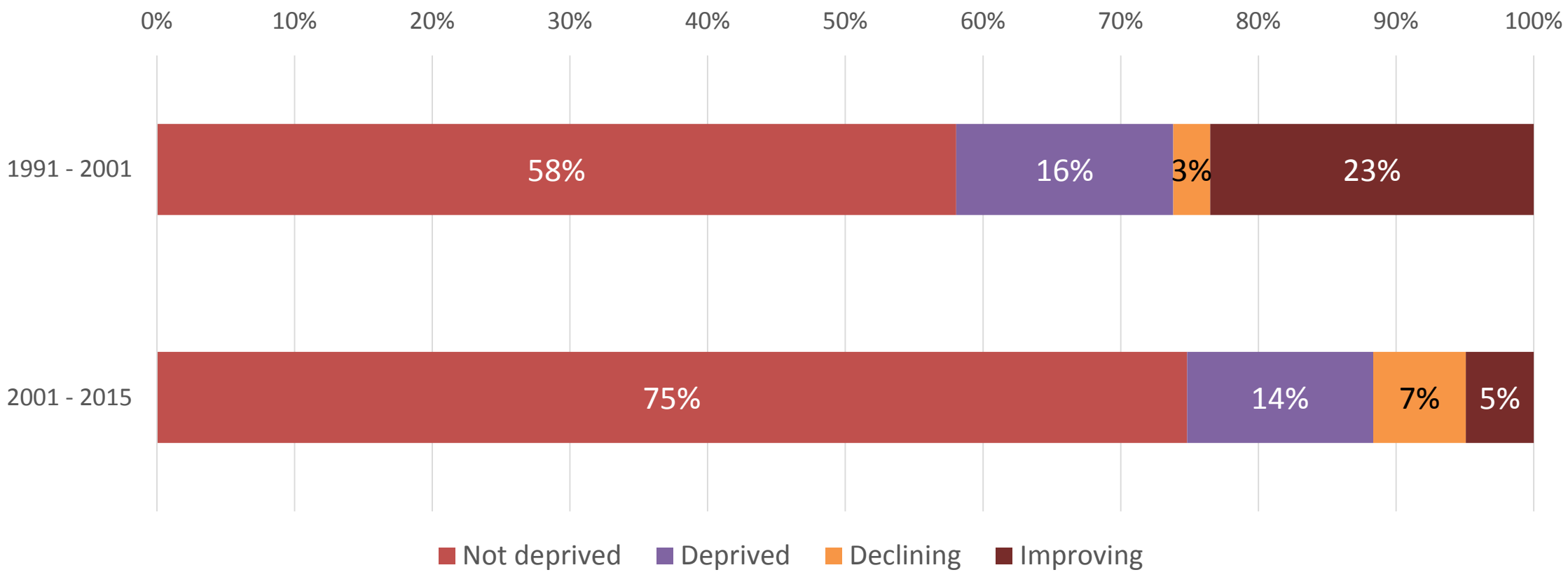
Social activity (Active in organisation)

Social contact (Frequency of contact with friends)

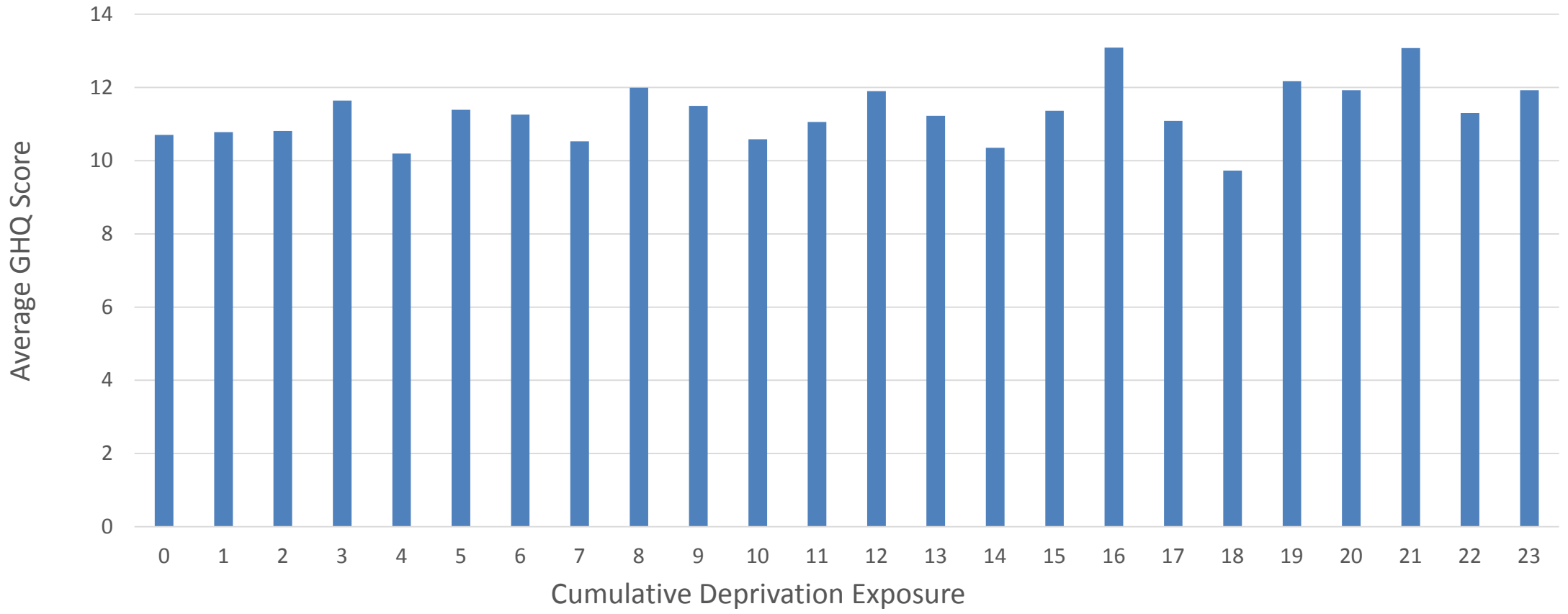
Deprivation (Townsend deprivation)

(Norman 2016; Norman and Darlington-Pollock 2017)

Area Deprivation



Area Deprivation and Mental Health



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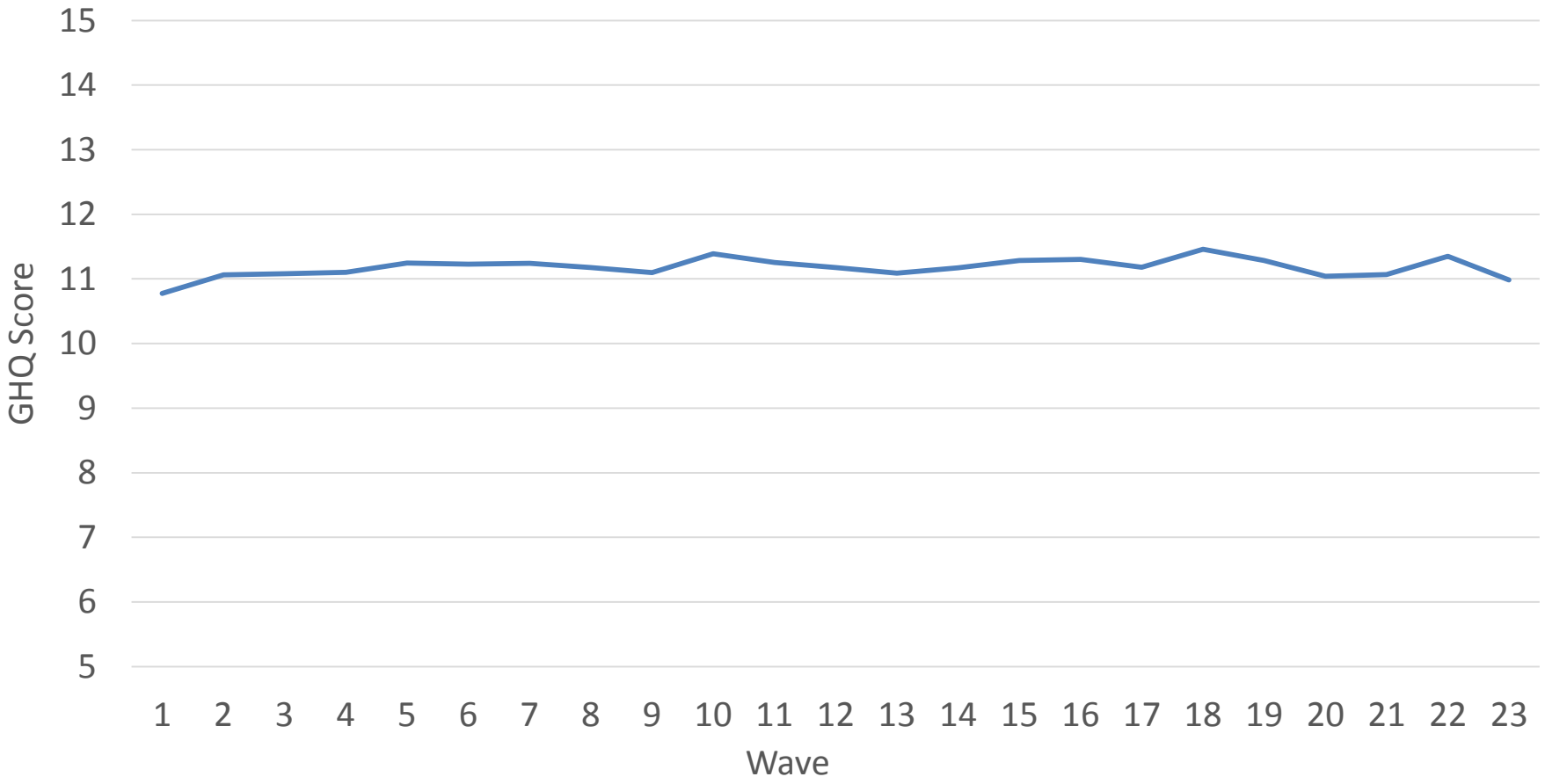
Health over time



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Methods

Life-course

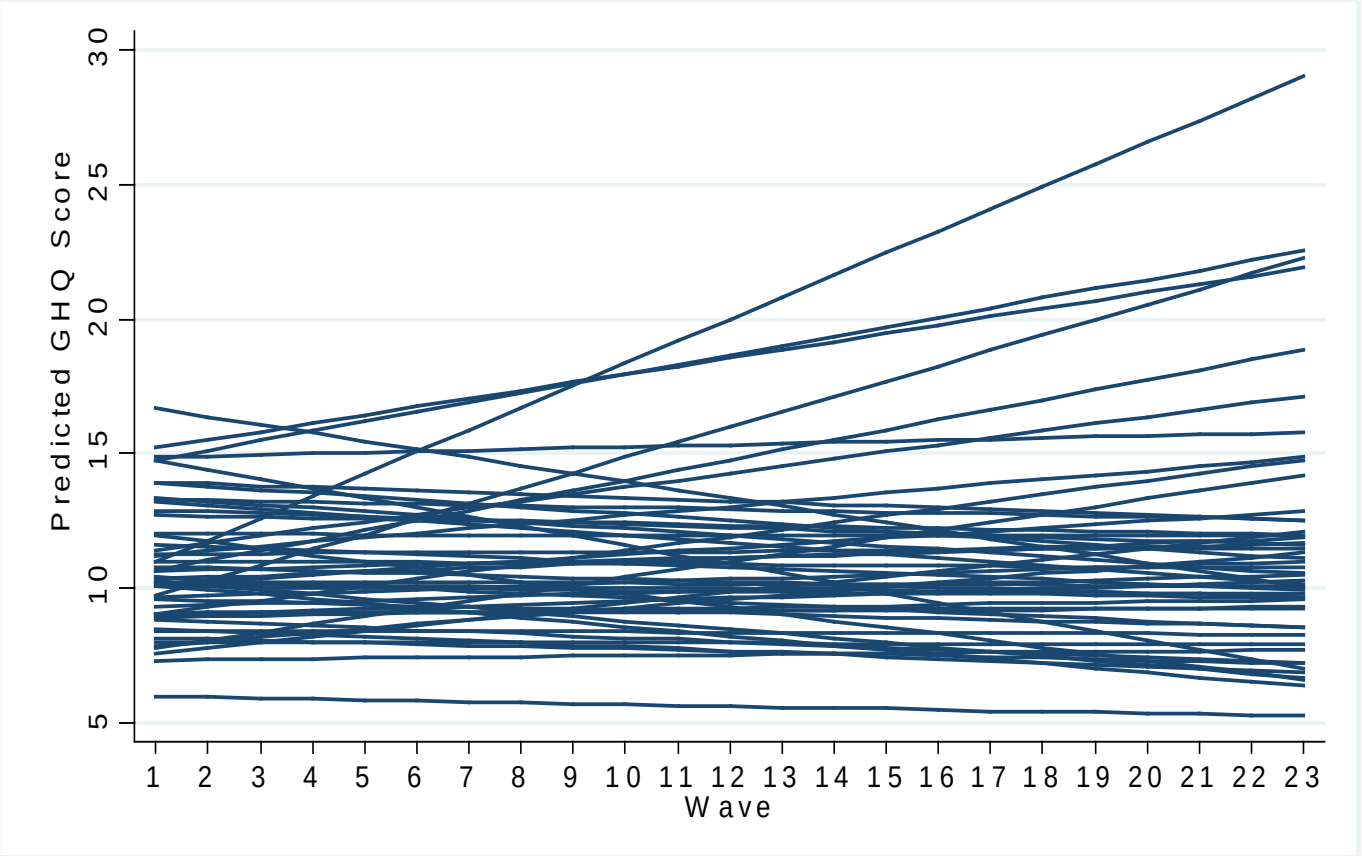
- Young adults (16-39)
- Middle aged (40-64)
- Older adults (65+)

Multilevel model growth curves

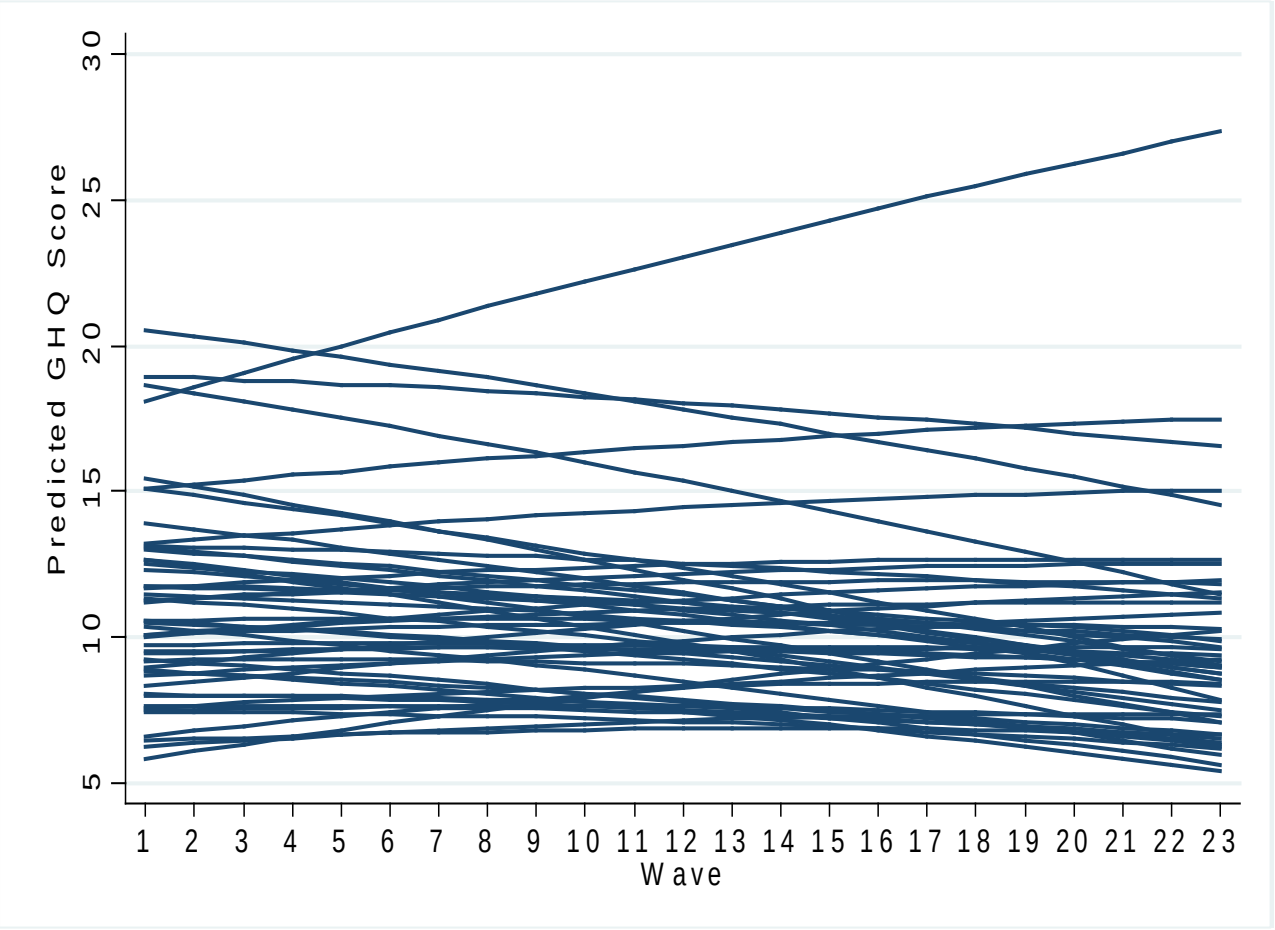
- Level 1 – Observations
- Level 2 – Individuals
- Level 3 – Neighbourhoods

$$y_{ij} = \beta_0 x_{oij} + \beta_1 x_{1ij} + \beta_n x_{nij} + \beta_n x_{nj} + \mu_{0j} + \boldsymbol{\mu_{1j}} + \varepsilon_{0ij}$$

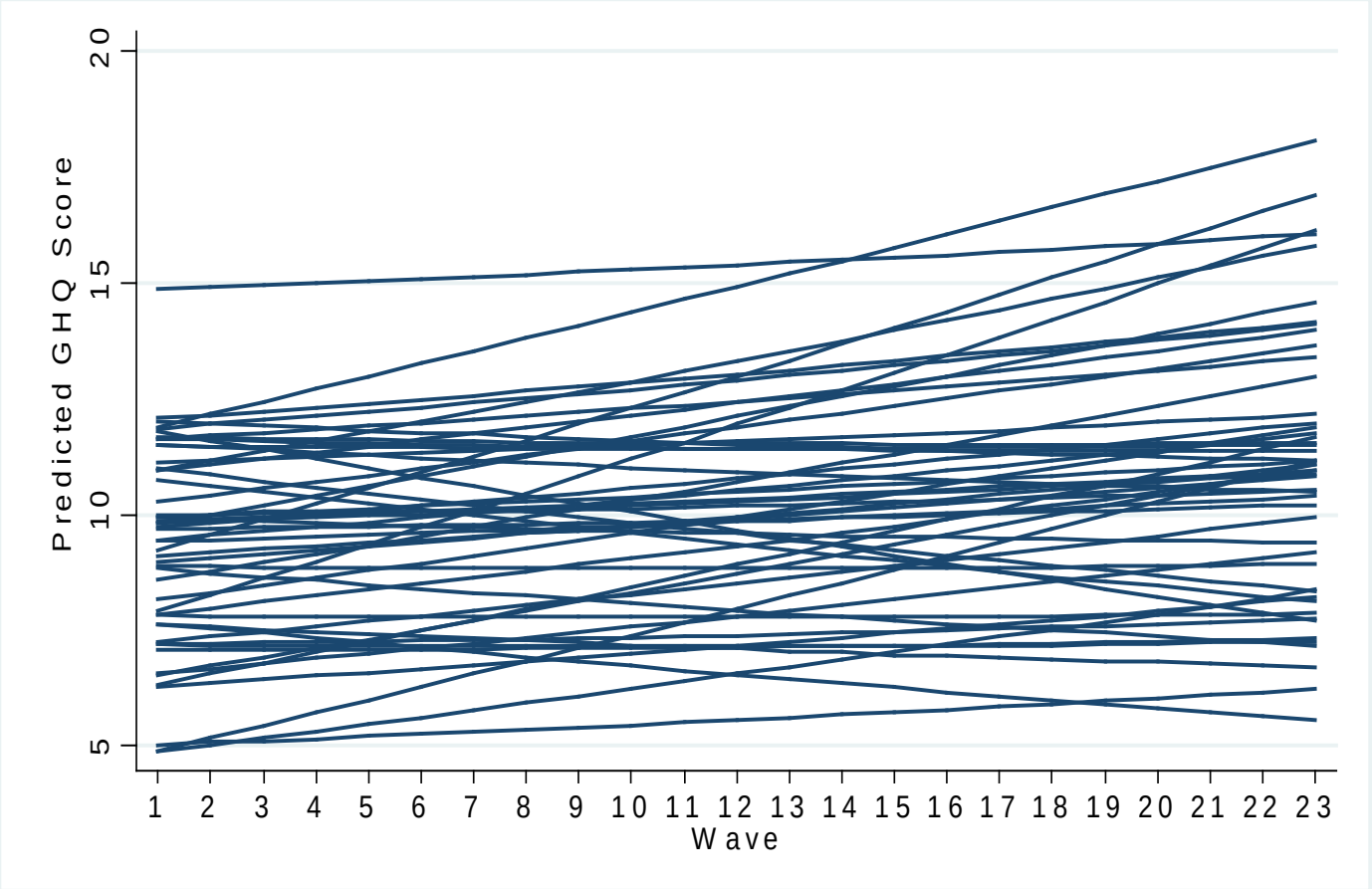
Results – Young Adults 16-39



Results – Middle Aged 40-64



Results – Older Adults 65+



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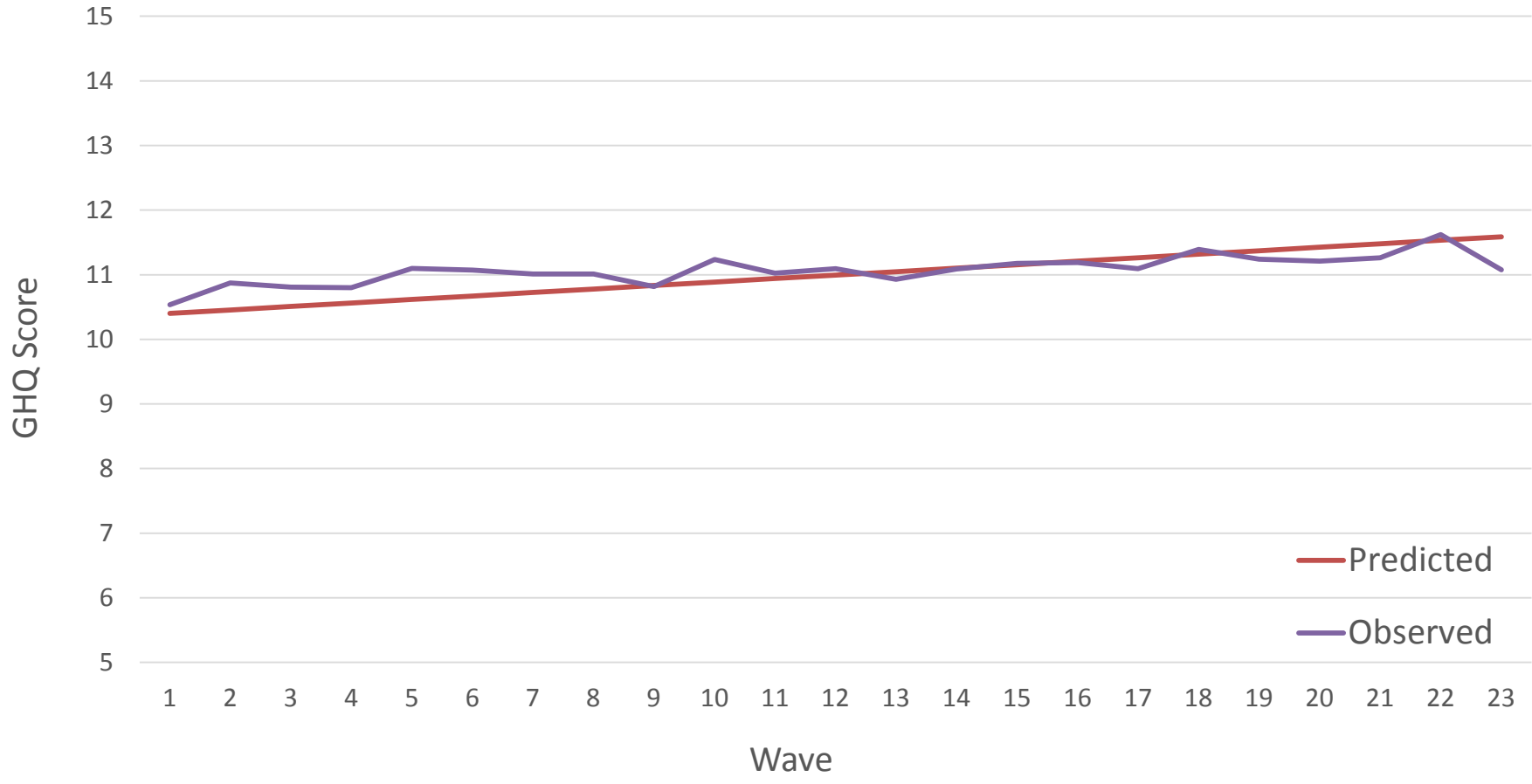
Time – Young Adults



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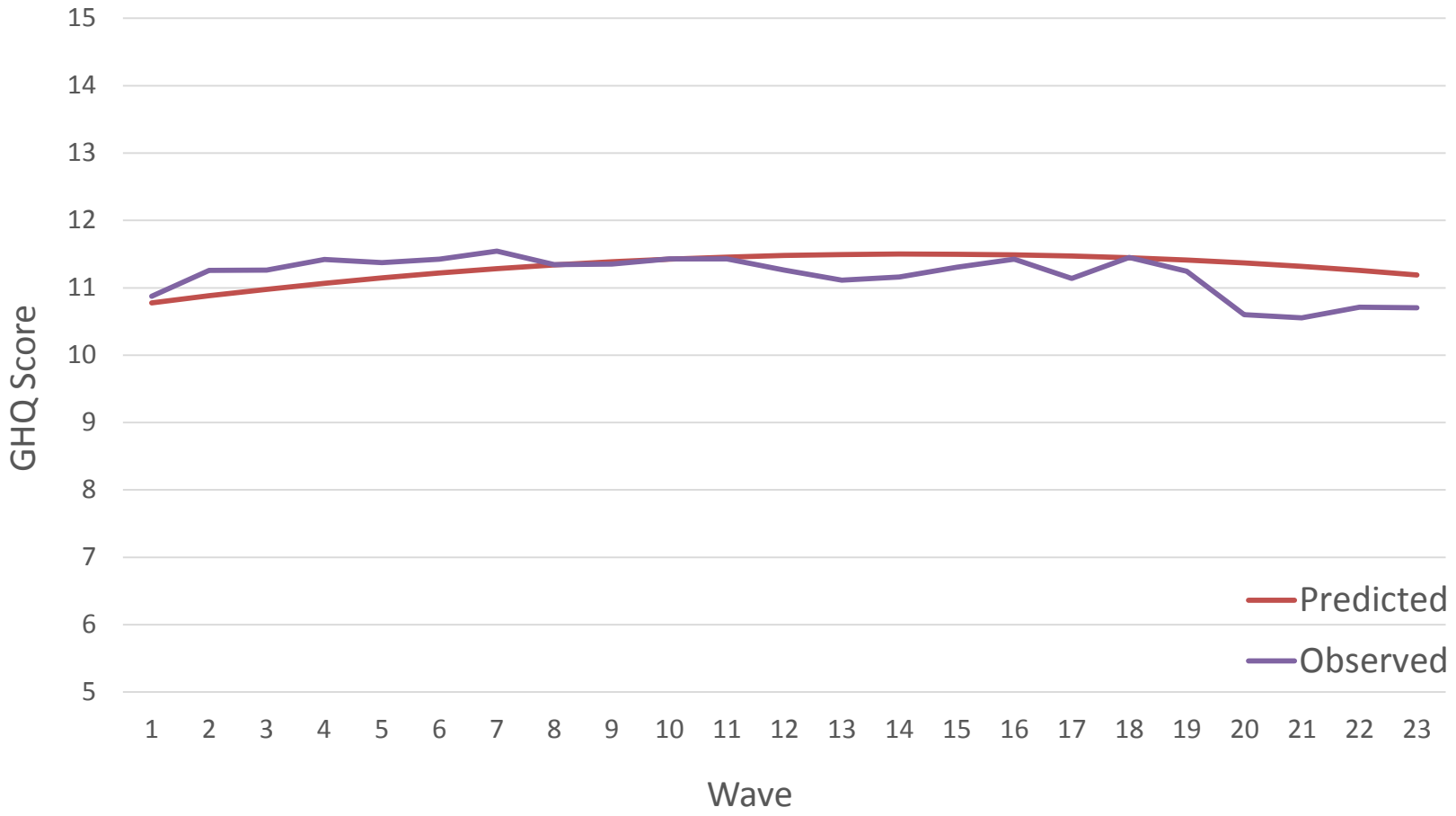
Time – Middle Aged



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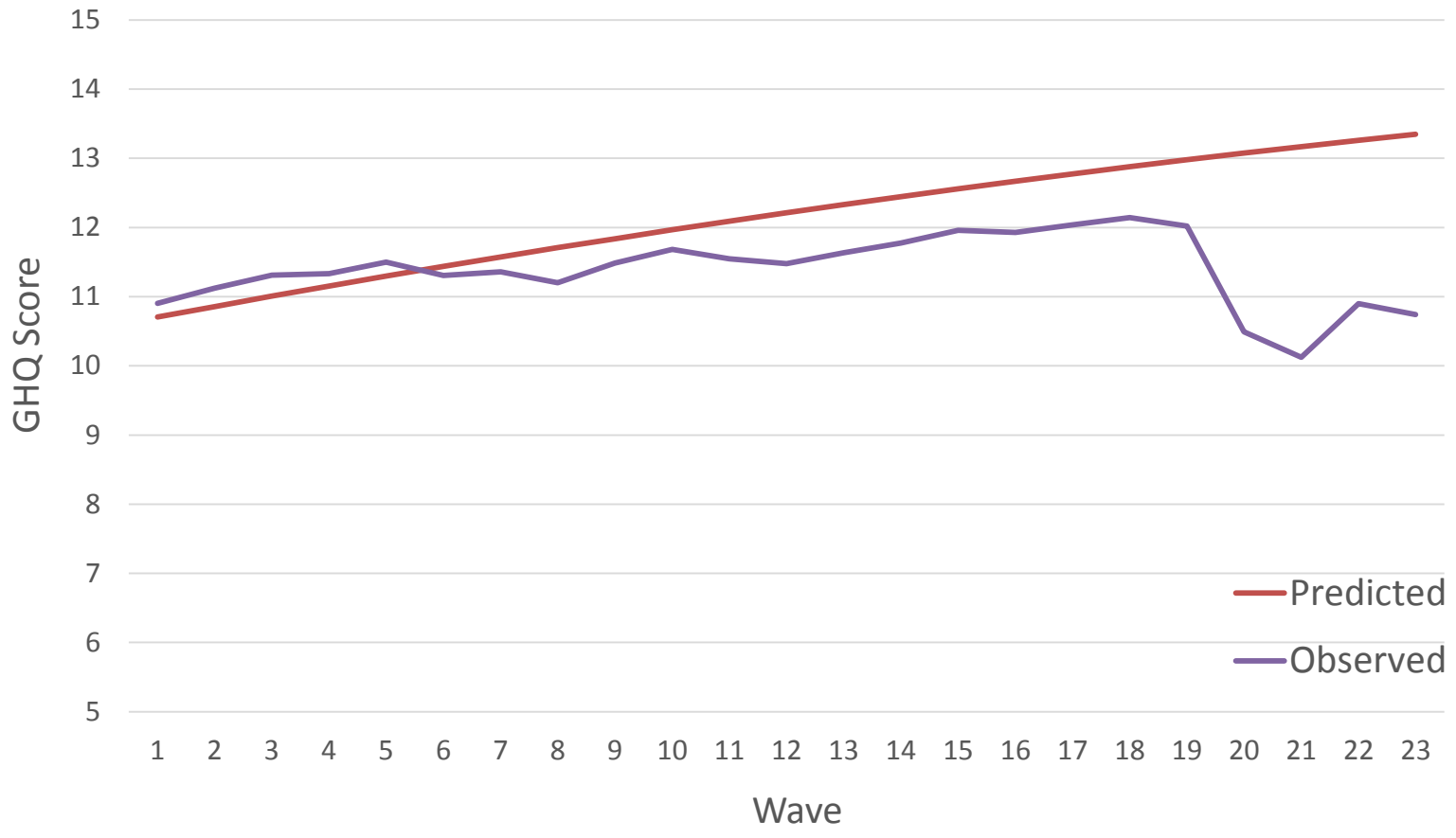
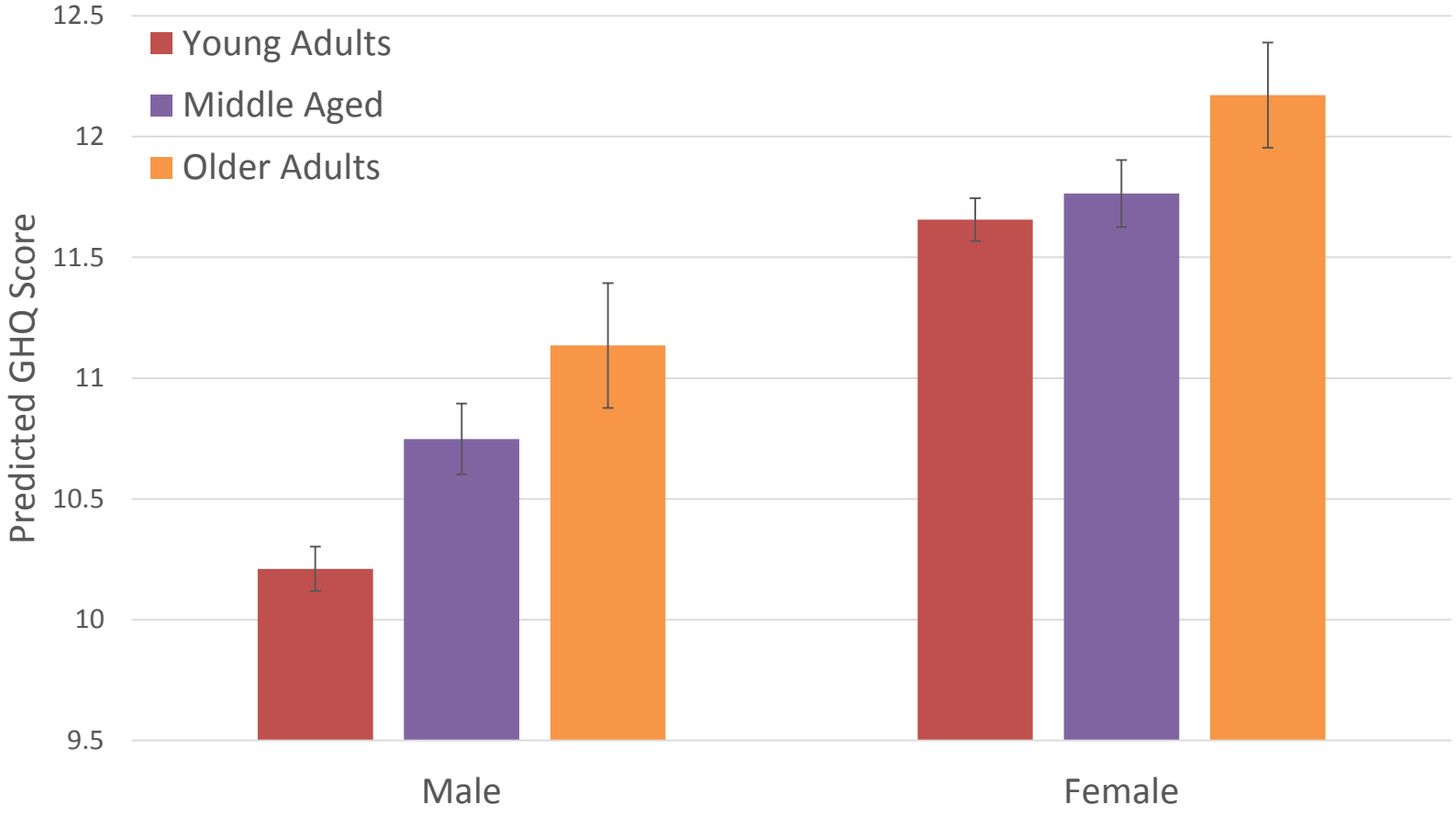
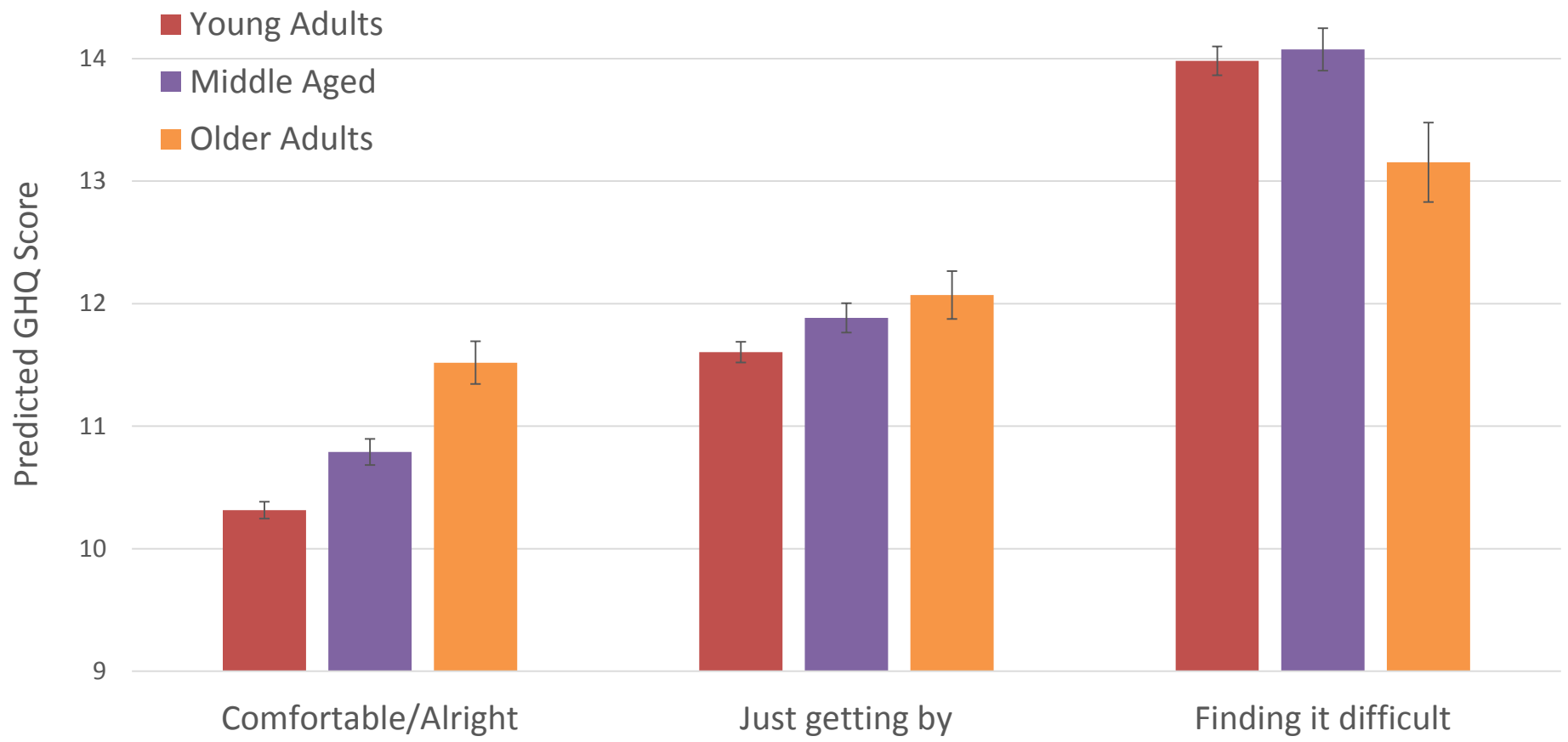
Time – Older Adults



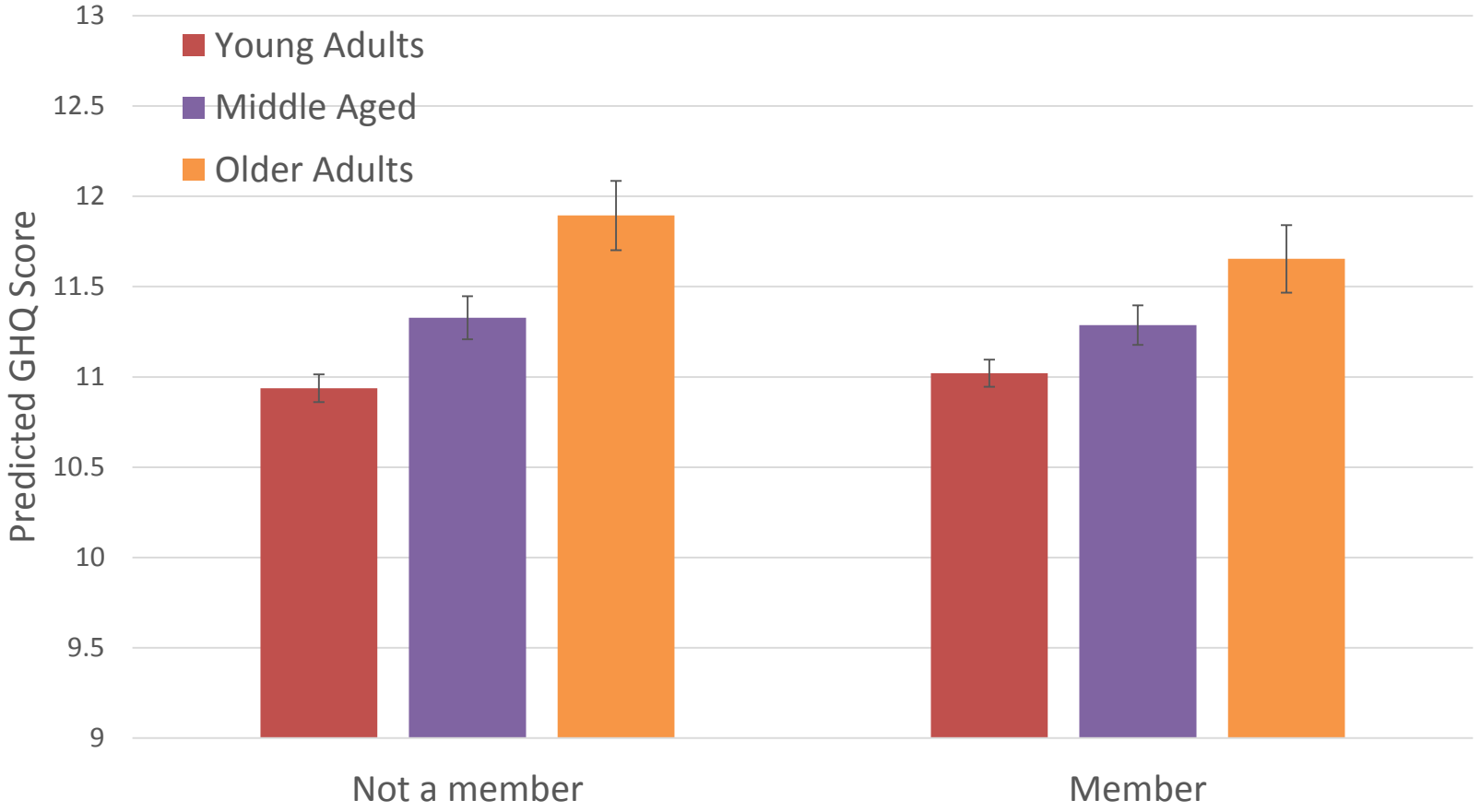
Sex/Gender


12.5
12
11.5
11
10.5
10
9.5
Predicted GHQ Score
Young Adults
Middle Aged
Older Adults
Male
Female

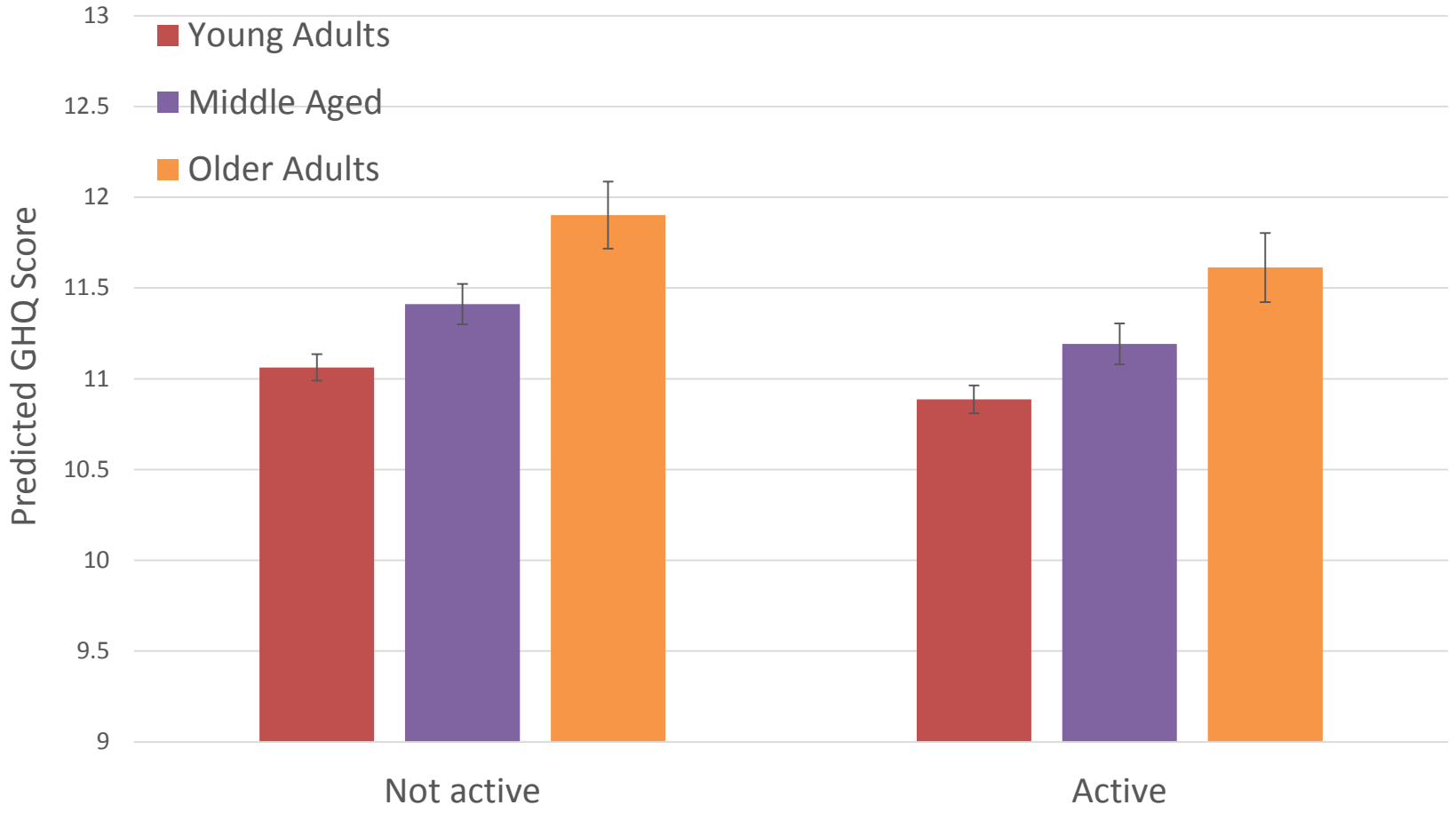
Financial Situation



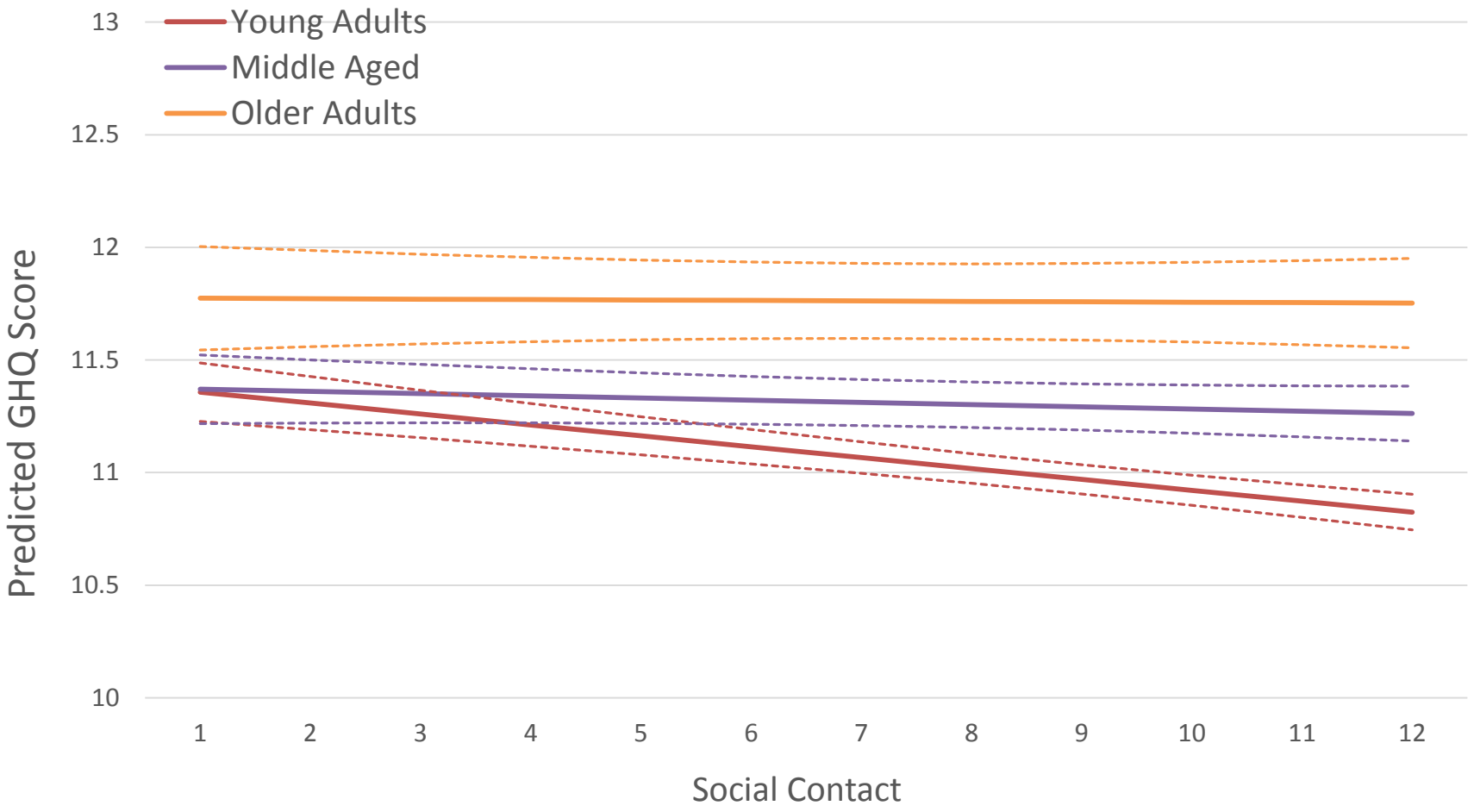
Social Participation



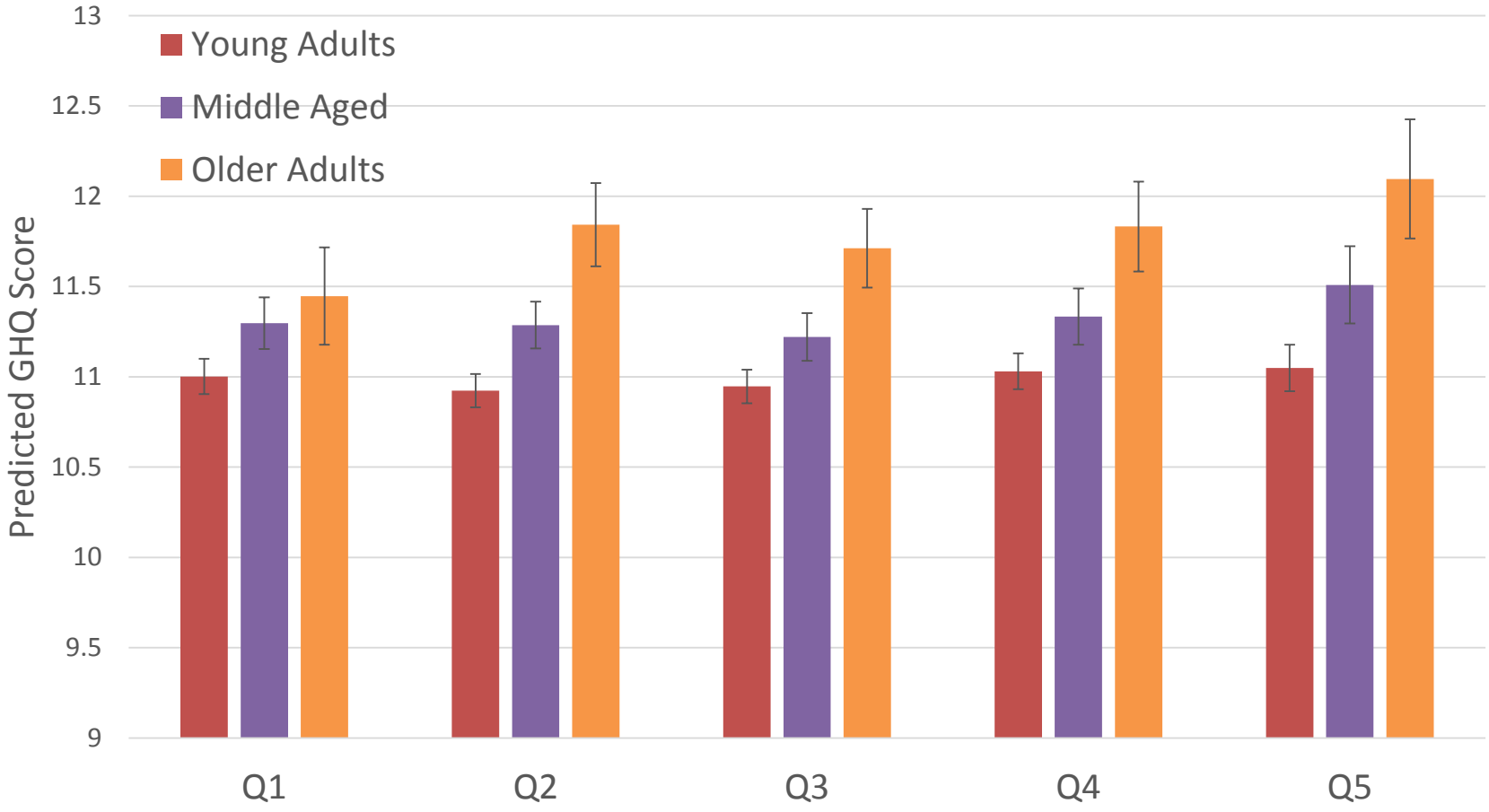
Social Activity



Social Contact



Area Deprivation



Email: lp0841@bristol.ac.uk

Summary

- There is considerable variation in trajectories of mental health over time
- Women consistently demonstrate worse mental health
- Those finding it difficult to get by have substantially worse mental health
- Social activity and social participation are similarly related to mental health.
- Degree of social contact relates to mental health, but only for the 16-39 year old age group.
- Exposure to area deprivation did not relate significantly to mental health over time

Thank you

Questions?

Testing for critical period of neighbourhood effects across the life course on later life wellbeing

Stephen Jivraj
Department of Epidemiology and Public Health
University College London
With Owen Nicholas, Emily Murray and Paul Norman

The Leverhulme Trust

CLOSER Conference
British Library
1-2 November 2017

Research questions

- How important are neighbourhood effects across the life course on health and wellbeing?

- Are these effects more important at certain points during the life course?

Data

- **1958** National Child Development Study and British Cohort Study **1970** birth cohort studies
- Linked to **Townsend** deprivation scores measured at censuses, **1971-2011** at 2011 lower super output boundaries

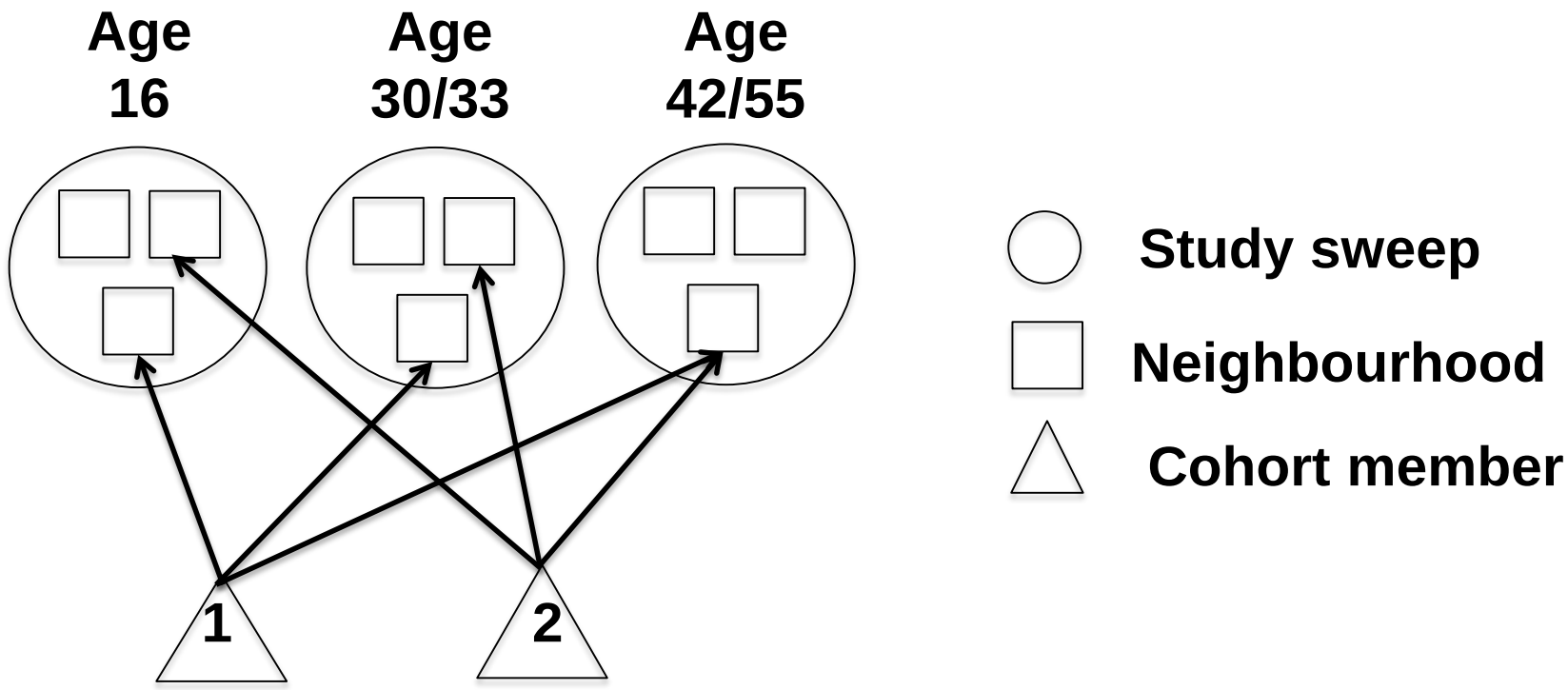
Outcome variables at age 42/55

- Self-rated health: in general, would you say your health is...
  - excellent, very good, good, fair or poor
- BMI: self-reported height and weight
- Mental wellbeing: Warwick-Edinburgh Mental Well-being (BCS70) and Control, Autonomy, Self-realisation and Pleasure (NCDS)

Exposure: Townsend deprivation index

- Inputs
  - Unemployment
  - Non-home ownership
  - No car access
  - Overcrowding

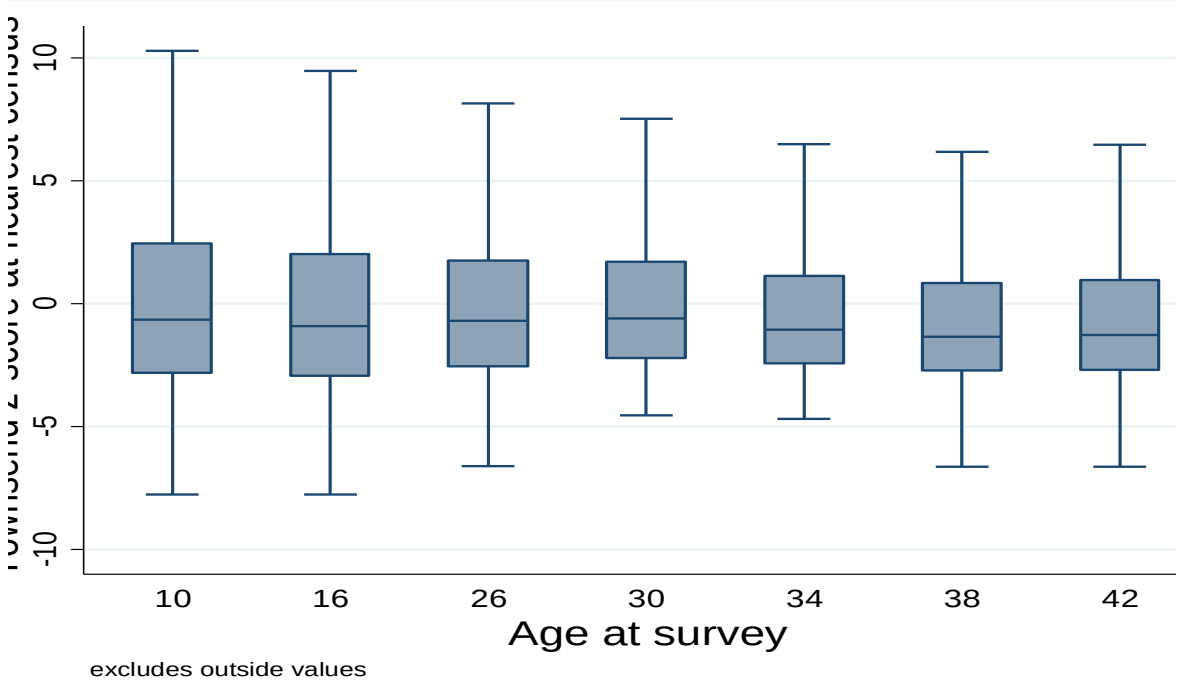
Statistical analysis



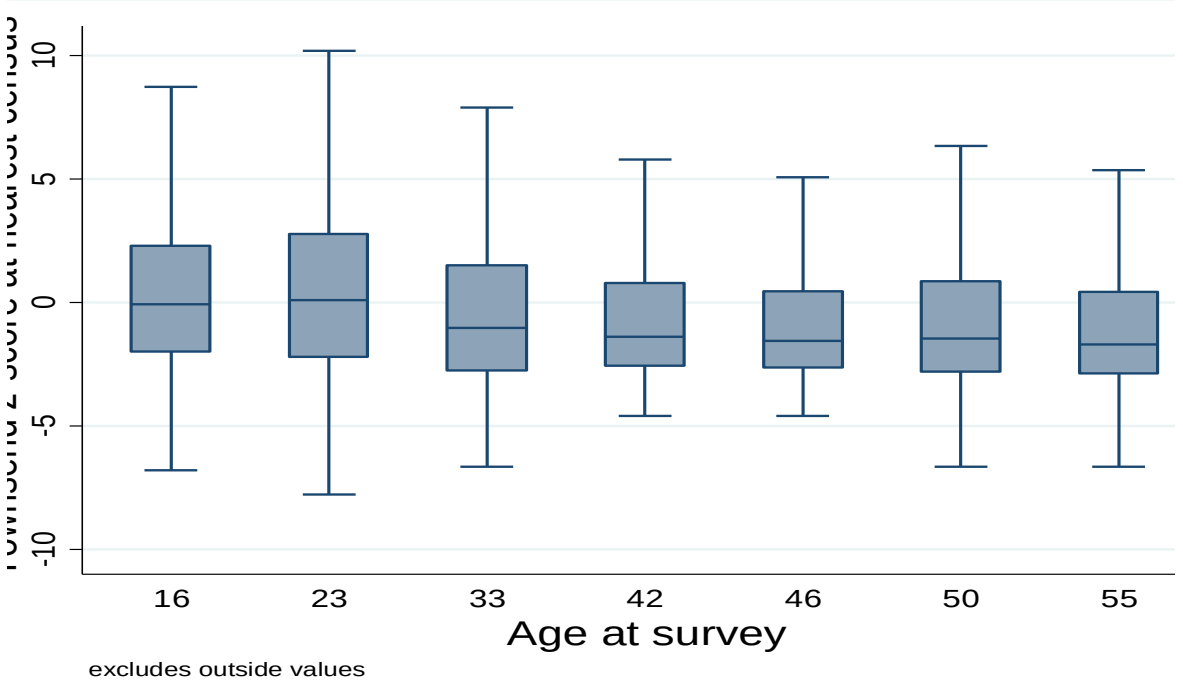
- Cross-classified multilevel model

Neighbourhood deprivation score by sweep

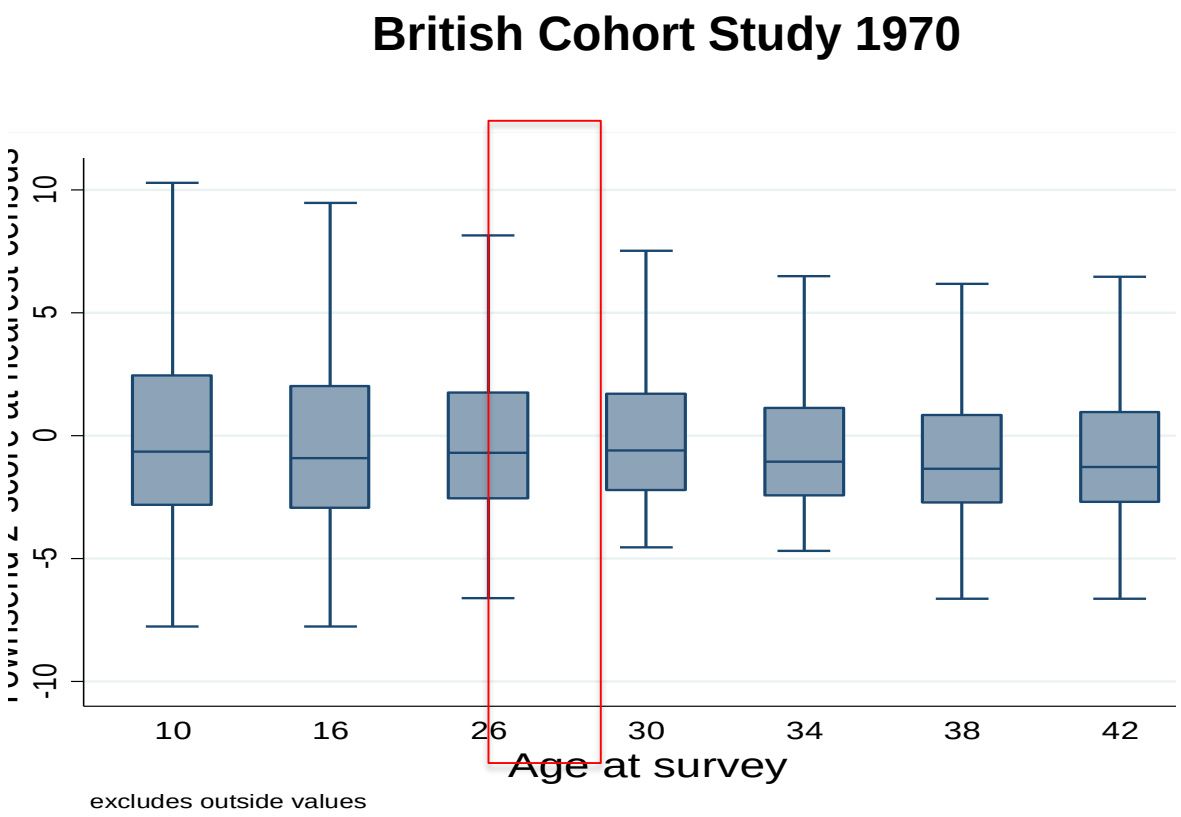
British Cohort Study 1970

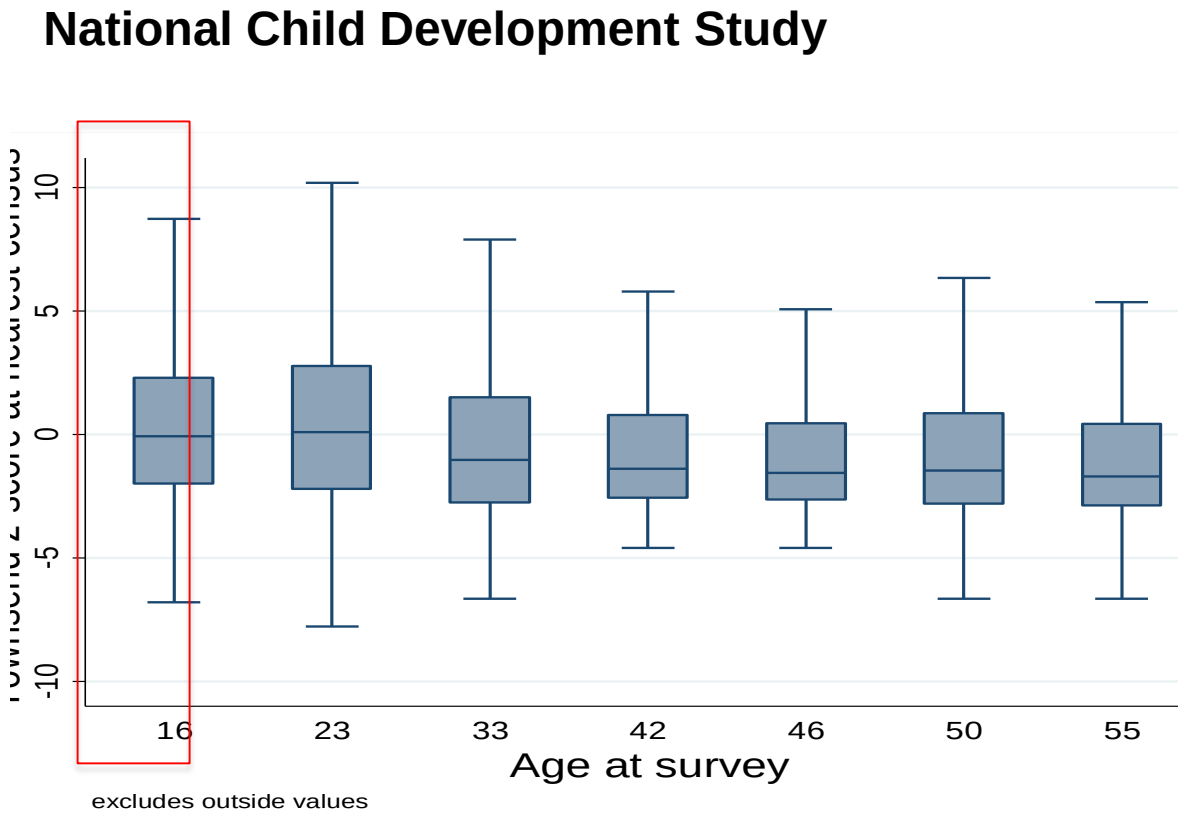


National Child Development Study



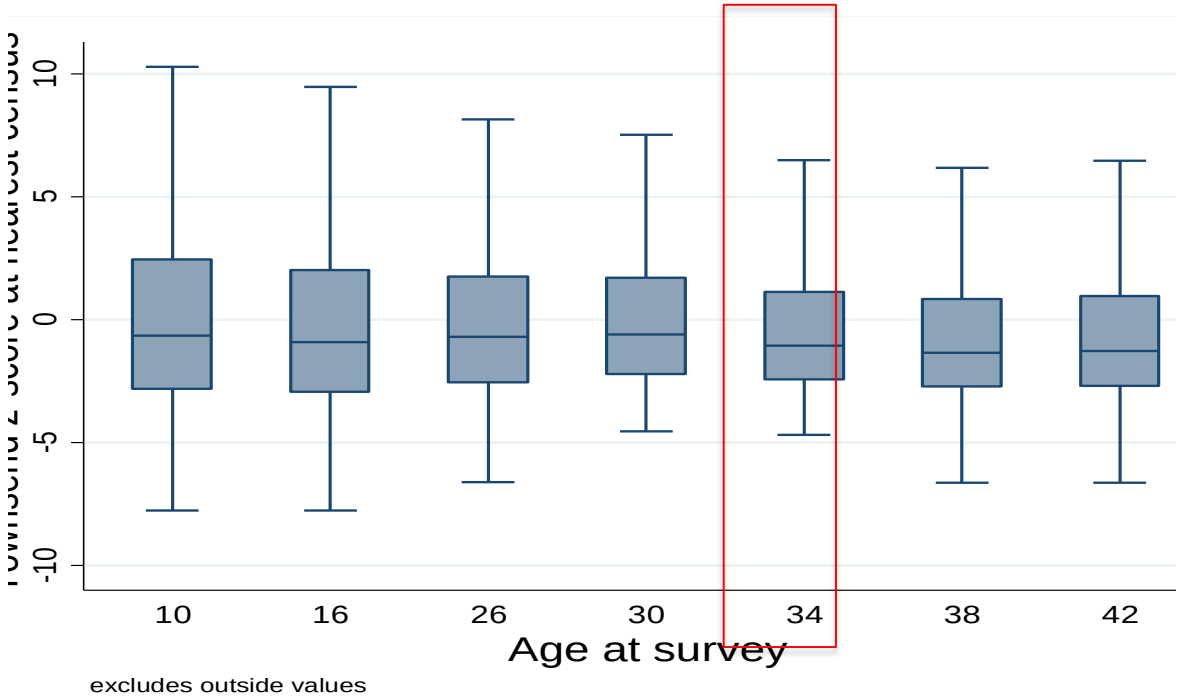
Neighbourhood deprivation score by sweep



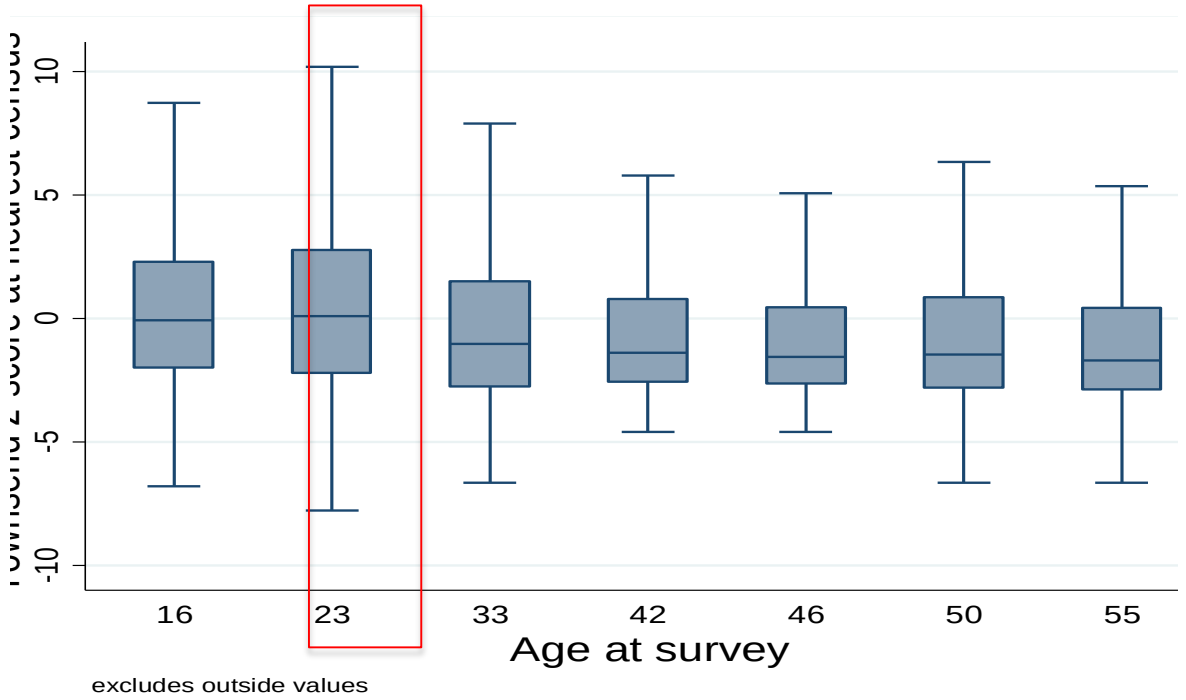


Neighbourhood deprivation score by sweep

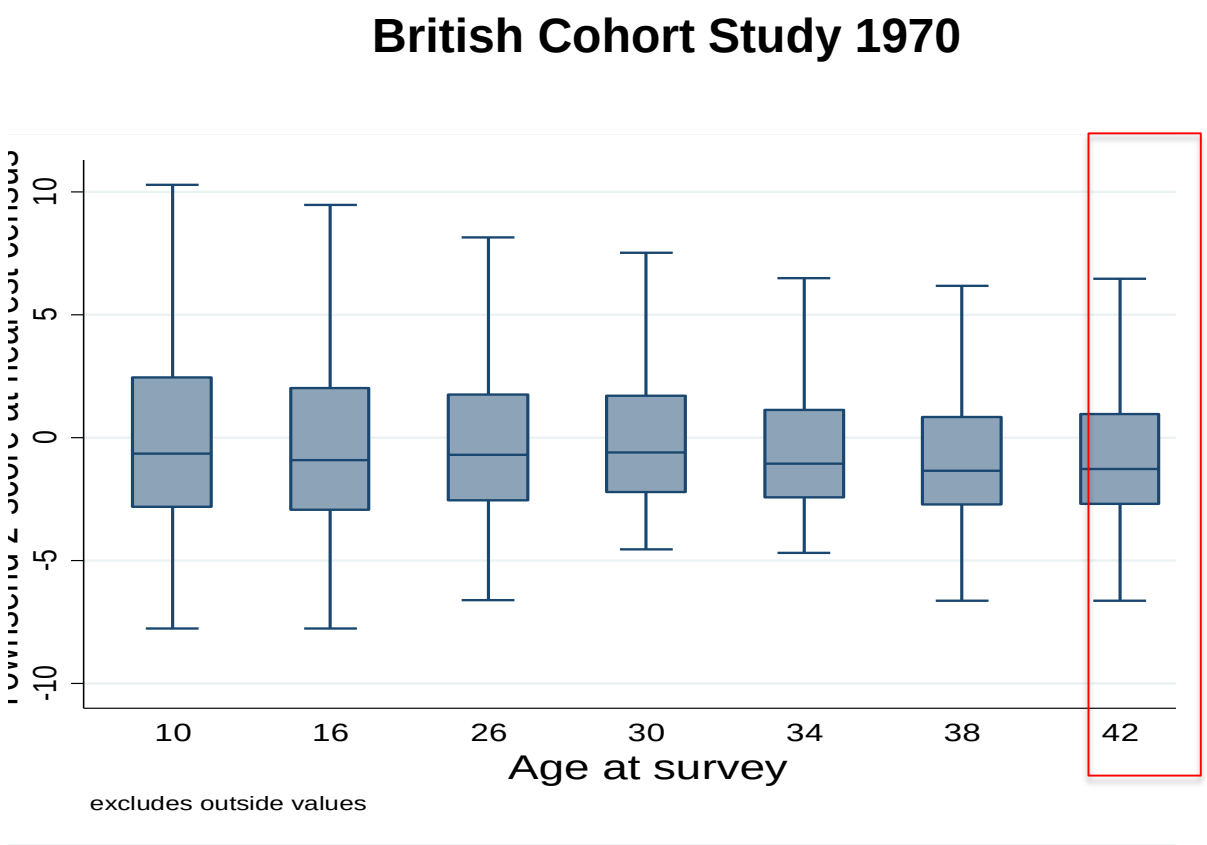
British Cohort Study 1970

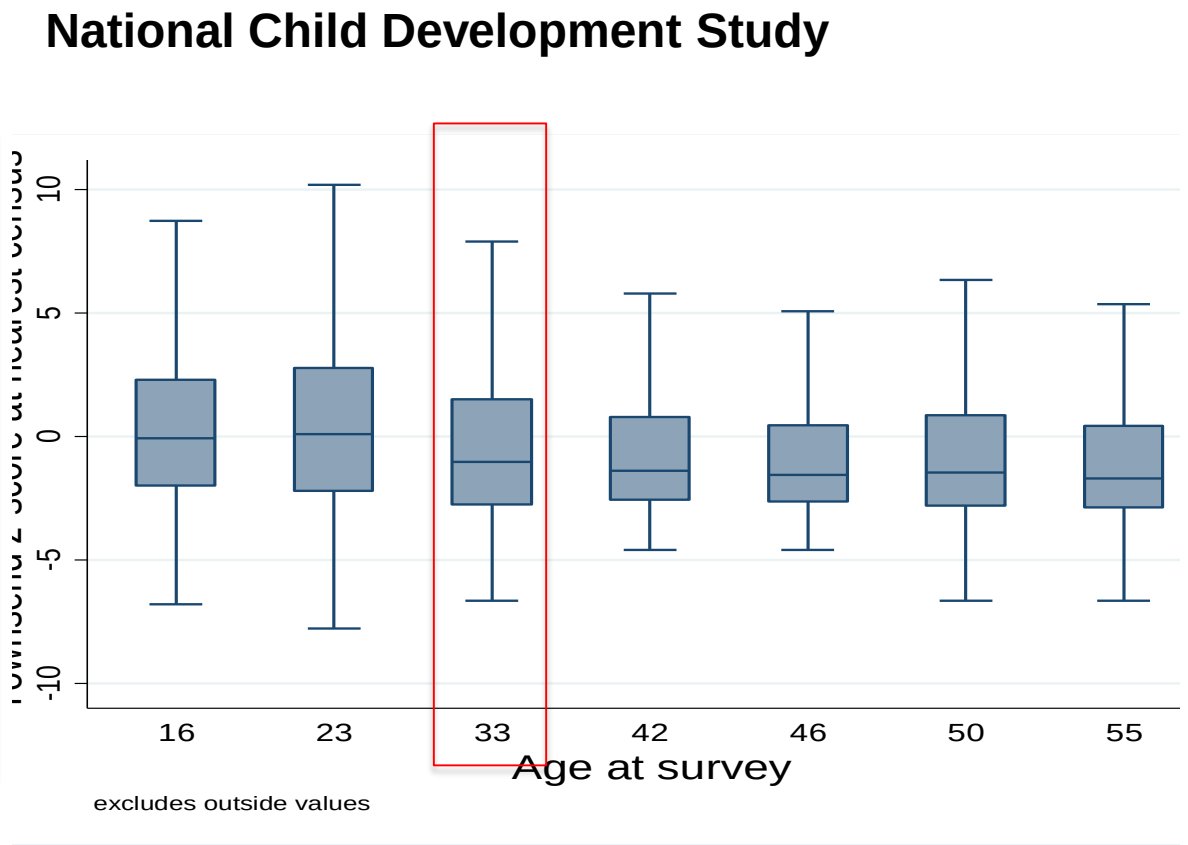


National Child Development Study

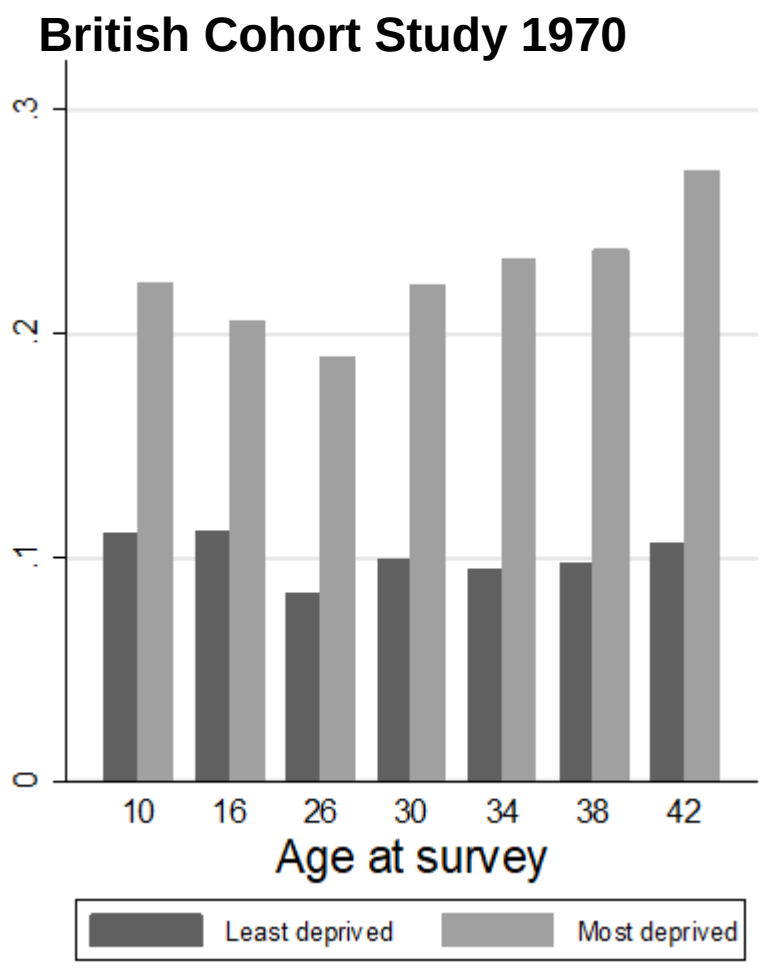


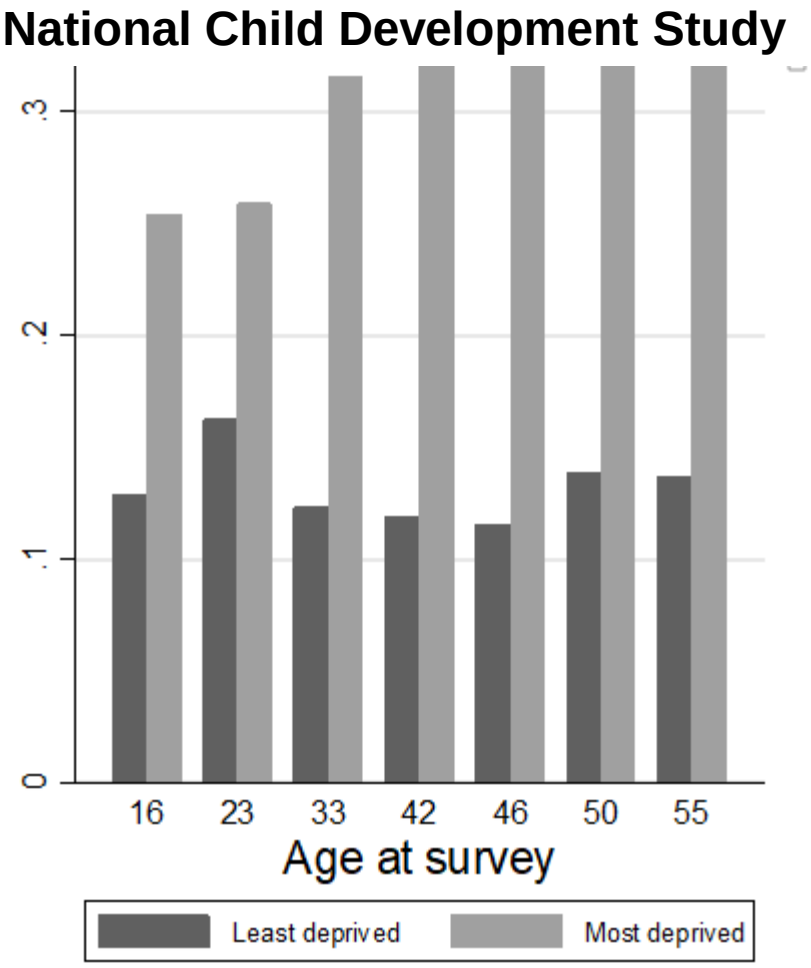
Neighbourhood deprivation score by sweep





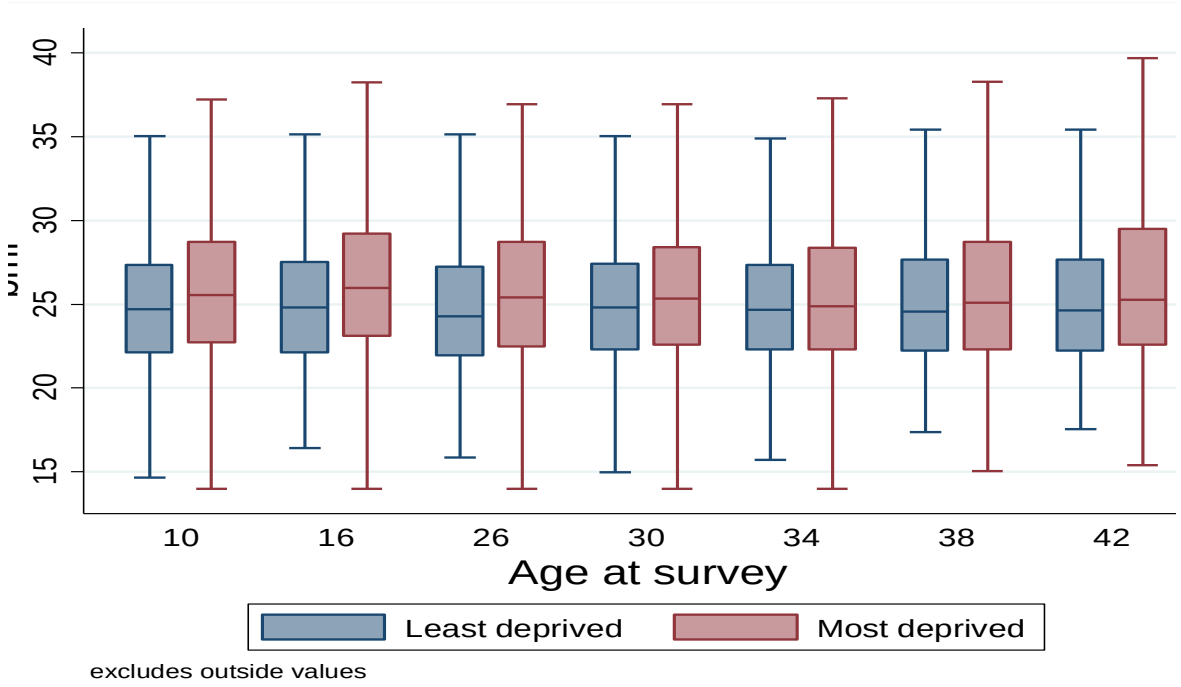
Poor-rated health (%) by neighbourhood deprivation decile



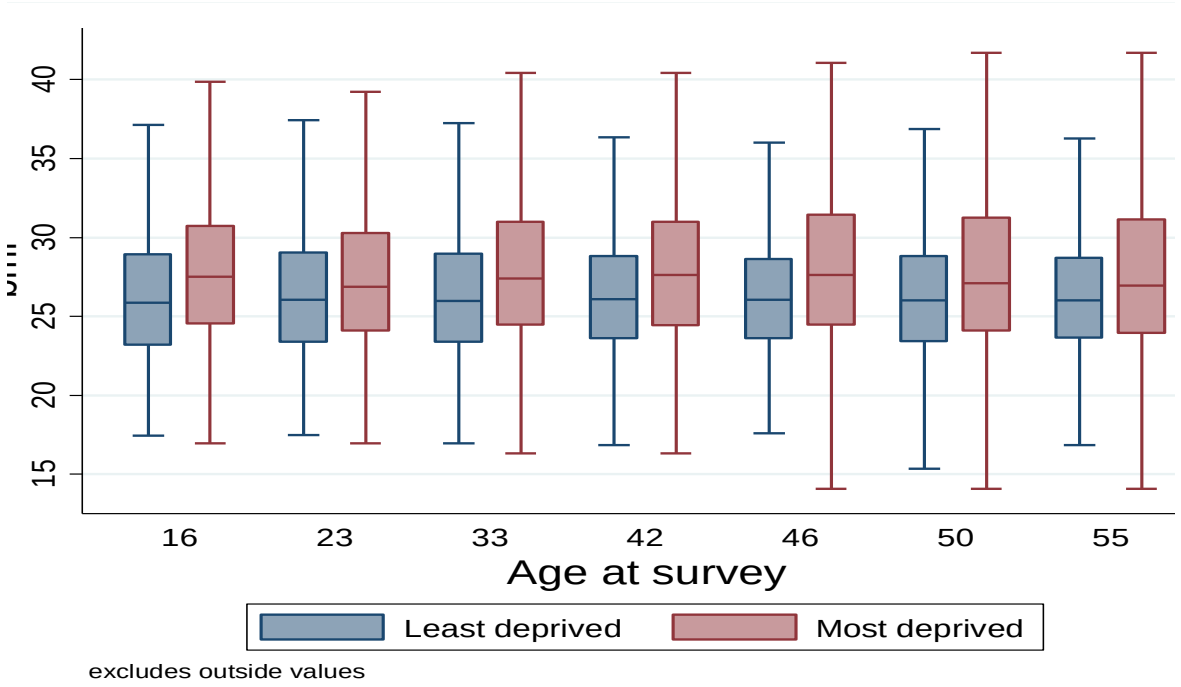


Mean BMI by neighbourhood deprivation decile

British Cohort Study 1970

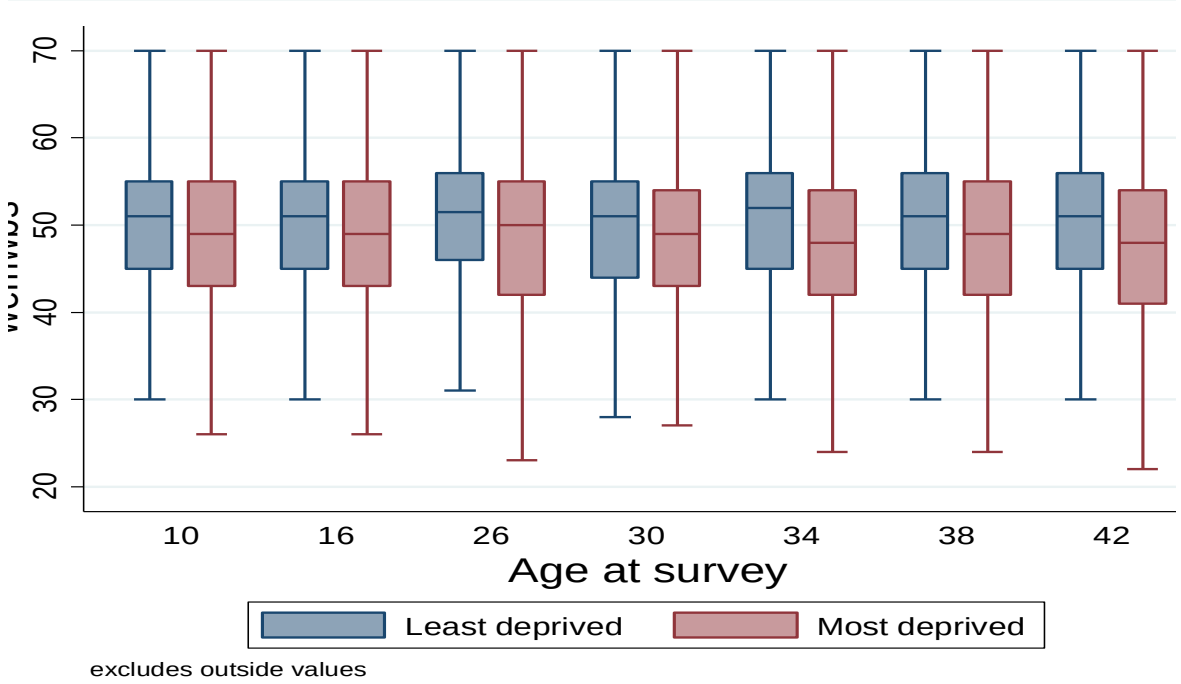


National Child Development Study

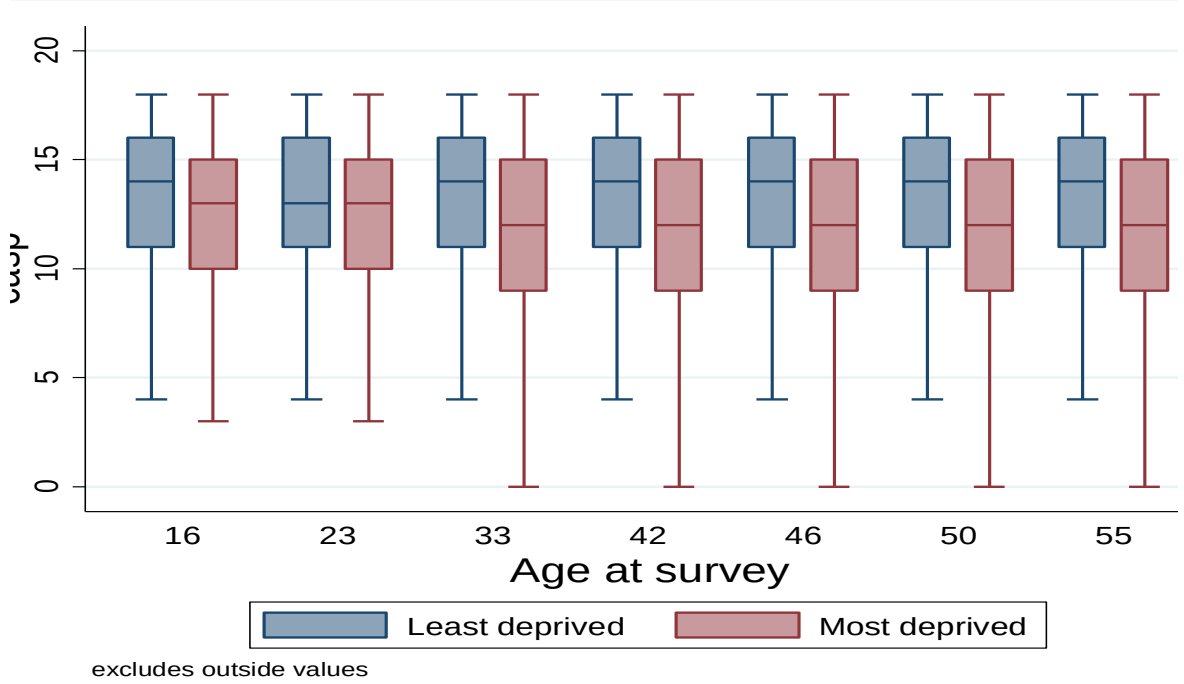


Mean mental wellbeing by neighbourhood deprivation decile

British Cohort Study 1970

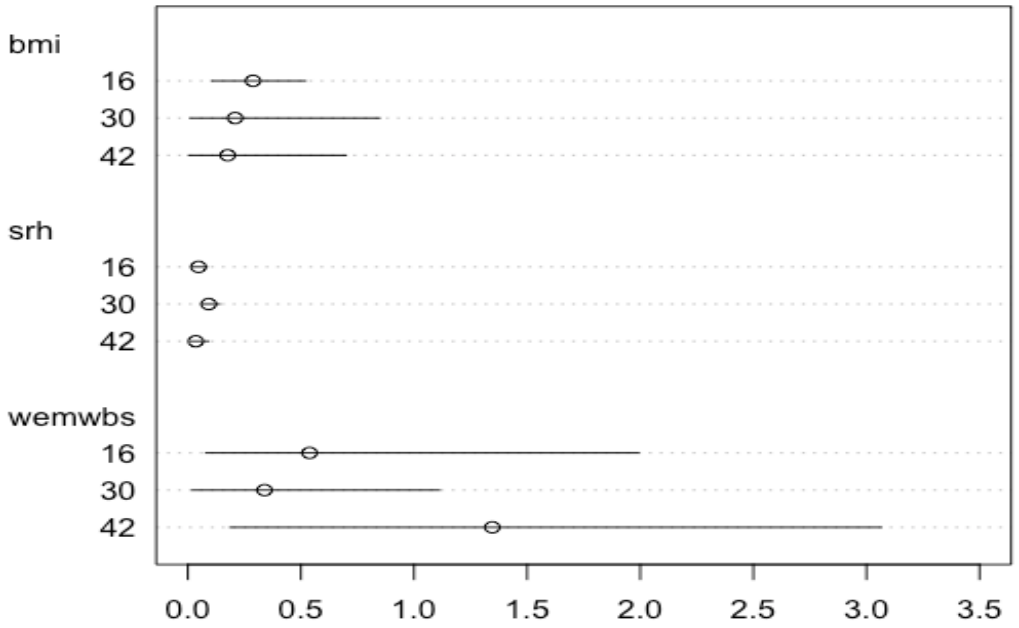


National Child Development Study



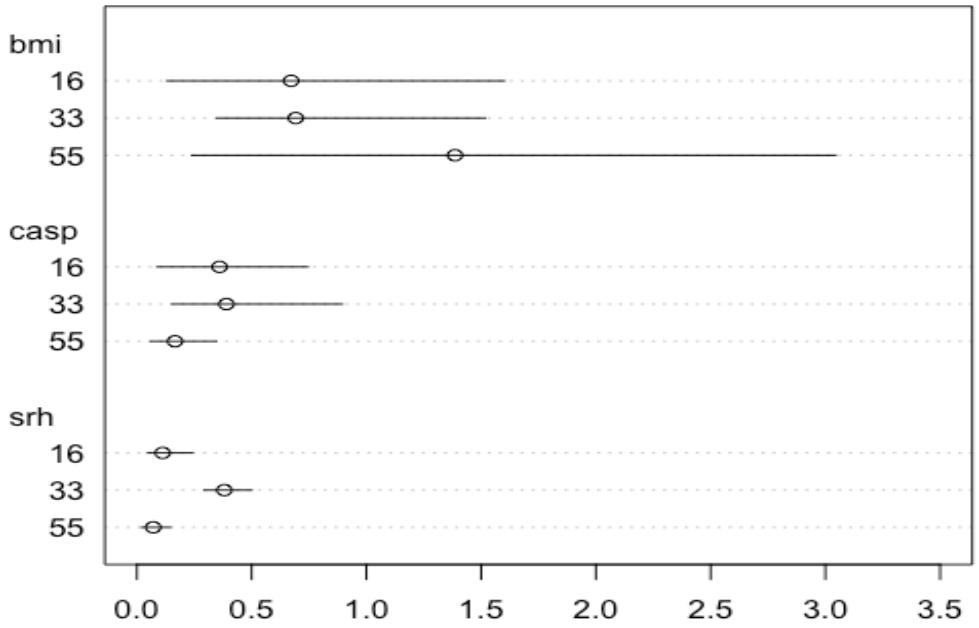
Neighbourhood variance cross-classified variance components models

British Cohort Study 1970



Neighbourhood σ^2

National Child Development Study



Neighbourhood σ^2

Summary

- Neighbourhood effect is small across the life course (3-9% total variance)
- Neighbourhood variation is constant across the life course
- Neighbourhood deprivation-later life wellbeing association stronger in later life, except for BMI