Department of Epidemiology and Public Health

UCL

Life course neighbourhood deprivation effects on body mass index:
quantifying the importance of selective migration.

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LEVERHULME TRUST

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Background

- Number of studies shown higher area deprivation associated w/ higher body mass index:
  - In children and adults
  - In different countries: UK, Canada, Australia, USA, Germany, etc.
- A few have shown baseline area deprivation effects on change in body mass index over time.
- BUT…

Very large elephant in the room:

RESIDENTIAL SELECTION

Objective: Examine the role of selective migration in the relationship between life course neighborhood deprivation and body mass index.

1. Assess whether cross-sectional association between neighborhood deprivation and BMI at each age.

2. Is change in neighborhood deprivation over time associated with a change in BMI? [i.e. area effect].

3. Is there evidence of selective migration by BMI? [BMI → Change in area deprivation]

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: Body Mass Index

	Sweep Target age (date)	Assessment type	System of measurement	Precision of weight measurement	Precision of height measurement
1970 BCS	10 (1980)	Measured (medical officer)	Metric or imperial	0.028 to 0.1 kg	0.001 to 0.006 m
	16 (1986)	Measured (medical officer) or self-reported (questionnaire)	Metric or imperial	0.028 to 0.1 kg	0.005 to 0.006 m
	26 (1996)	Self-reported (postal questionnaire)	Metric or imperial	0.454 to 1 kg	0.01 to 0.025 m
	30 (2000)	Self-reported (CAPI)	Metric or imperial	0.454 to 1 kg	0.01 to 0.025 m
	34 (2004)	Self-reported (CAPI)	Metric or imperial	0.454 to 1 kg	0.01 to 0.025 m
	42 (2012)	Self-reported (CAPI)	Metric or imperial	0.454 to 1 kg	0.01 m

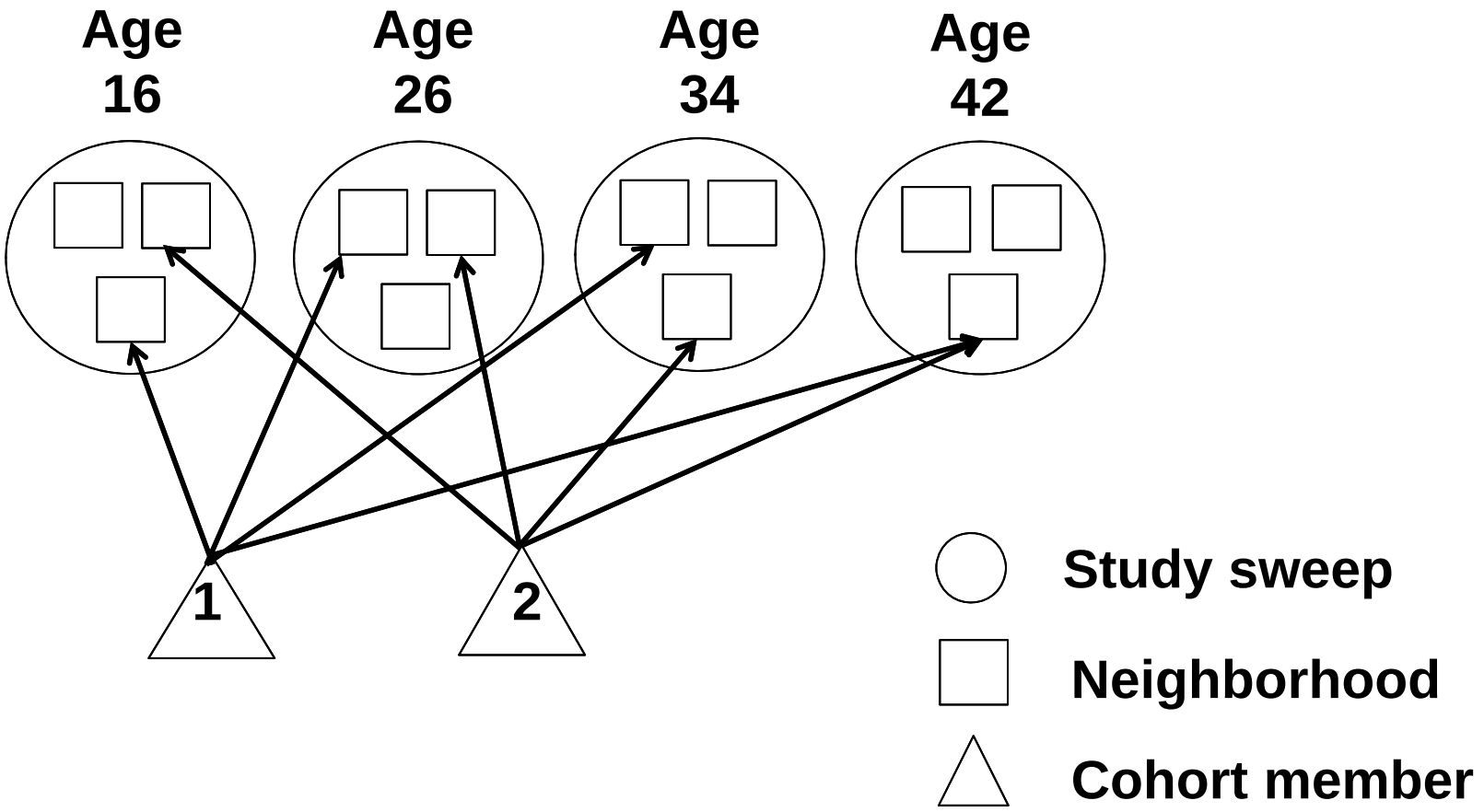
CAPI: Computer-Assisted Personal Interviewing, NCDS National Child Development Study, BCS: British Cohort Study.

* To add: NCDS: 7, 11, 16, 23, 33, 42, 44 and 50 years

Exposure: Townsend deprivation index

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

Statistical analysis: Cross-classified multilevel model



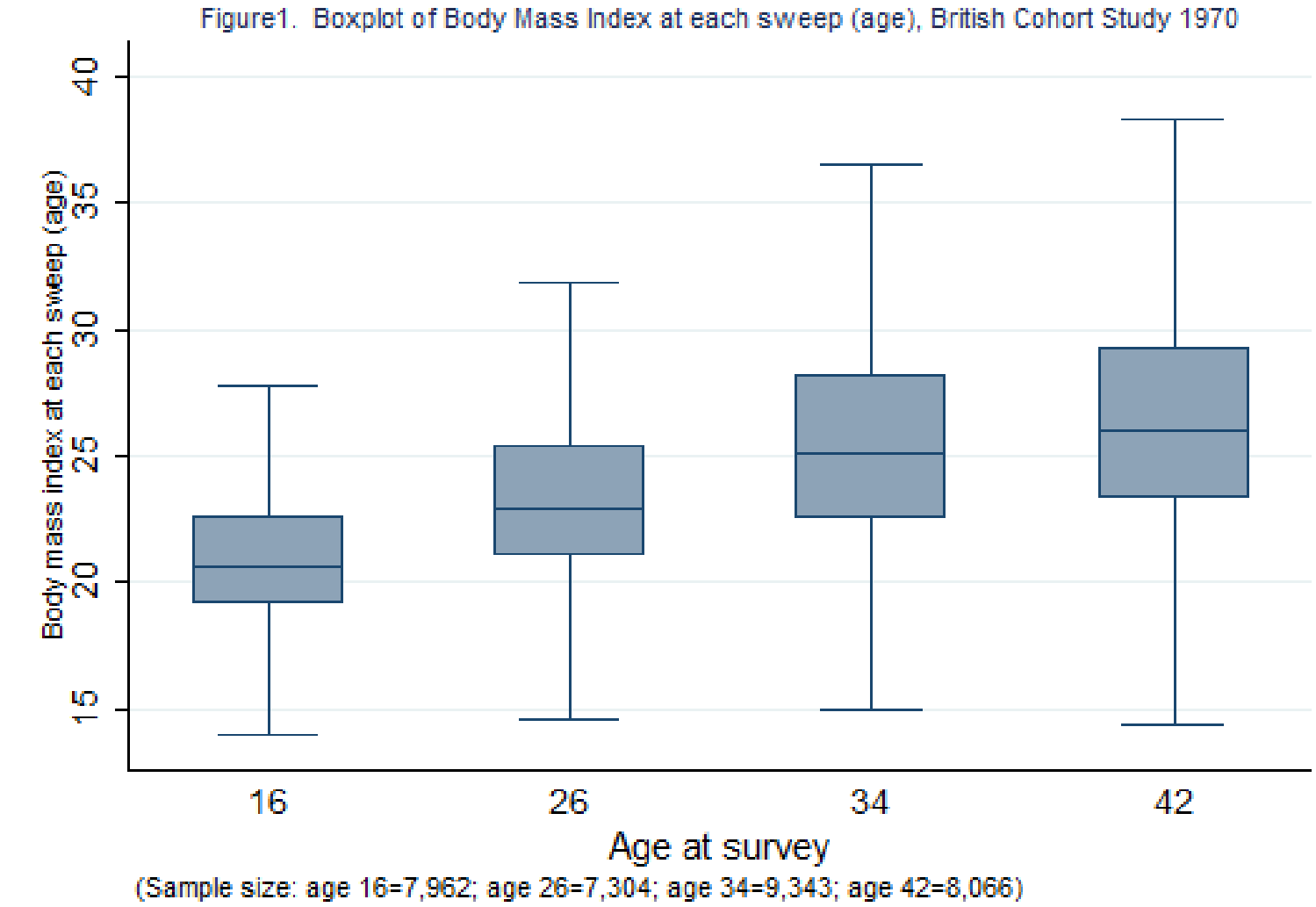


Figure1. Boxplot of Body Mass Index at each sweep (age), British Cohort Study 1970
Body mass index at each sweep (age)
15
20
25
30
35
40
16
26
34
42
Age at survey
(Sample size: age 16=7,962; age 26=7,304; age 34=9,343; age 42=8,066)

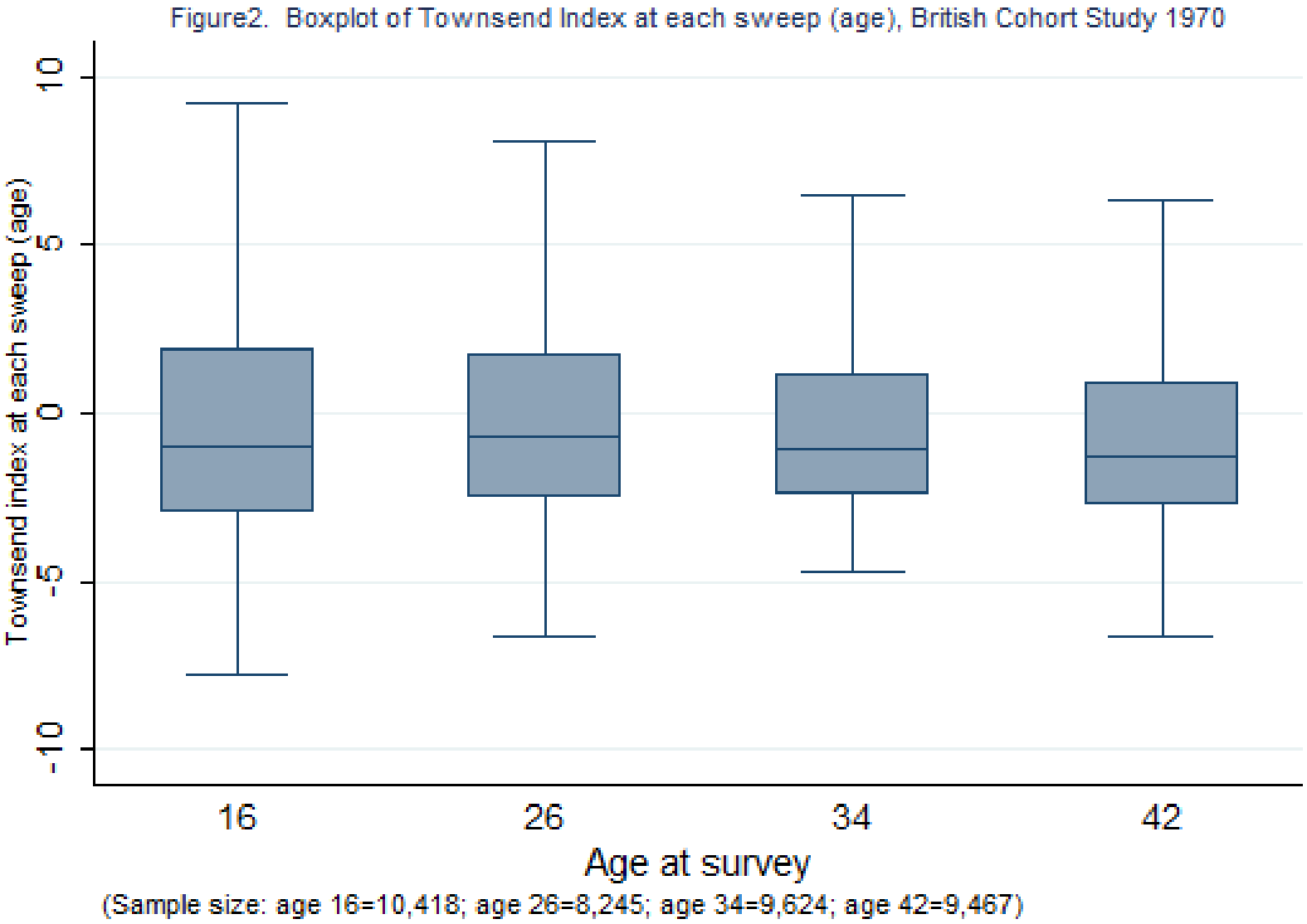
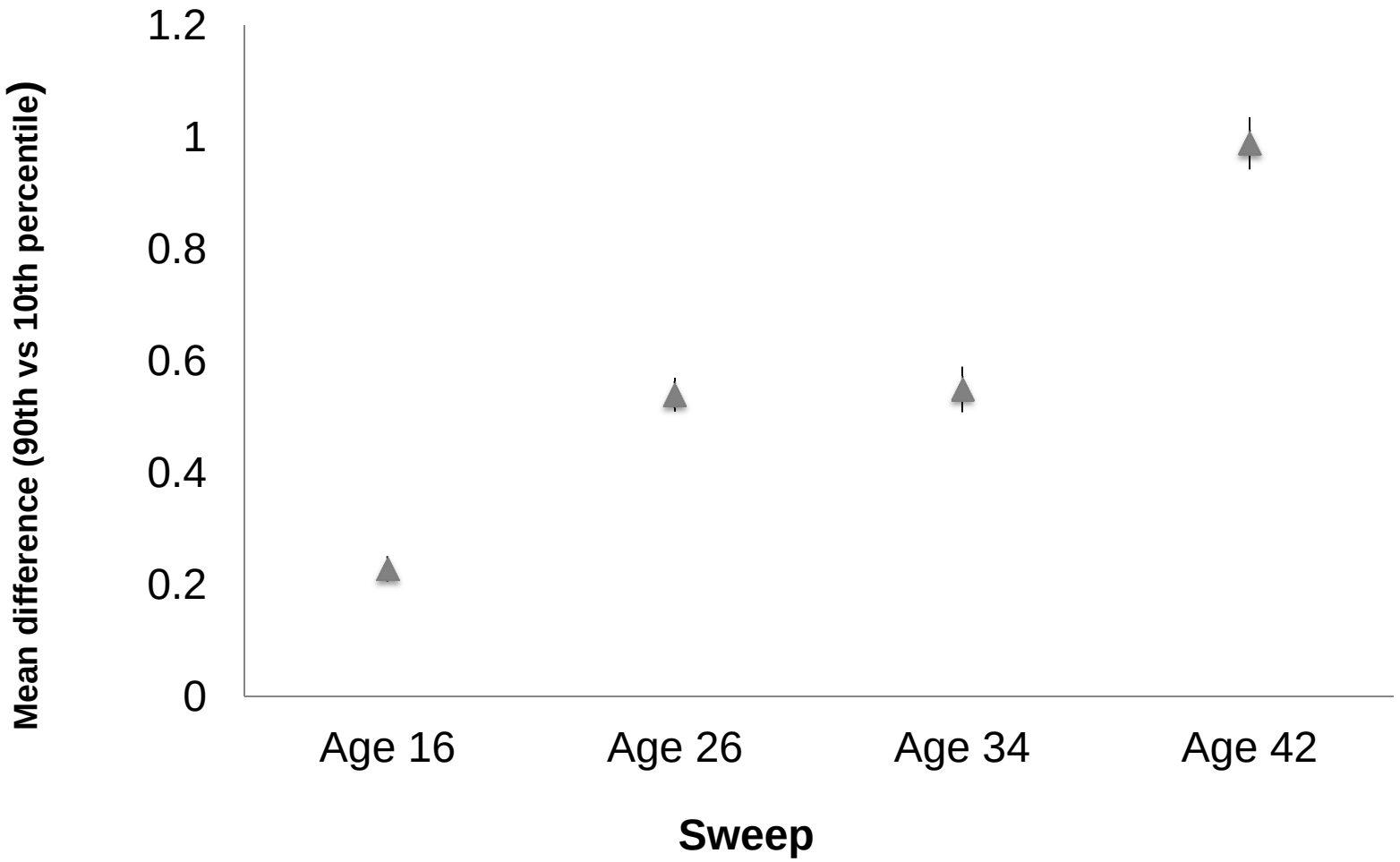
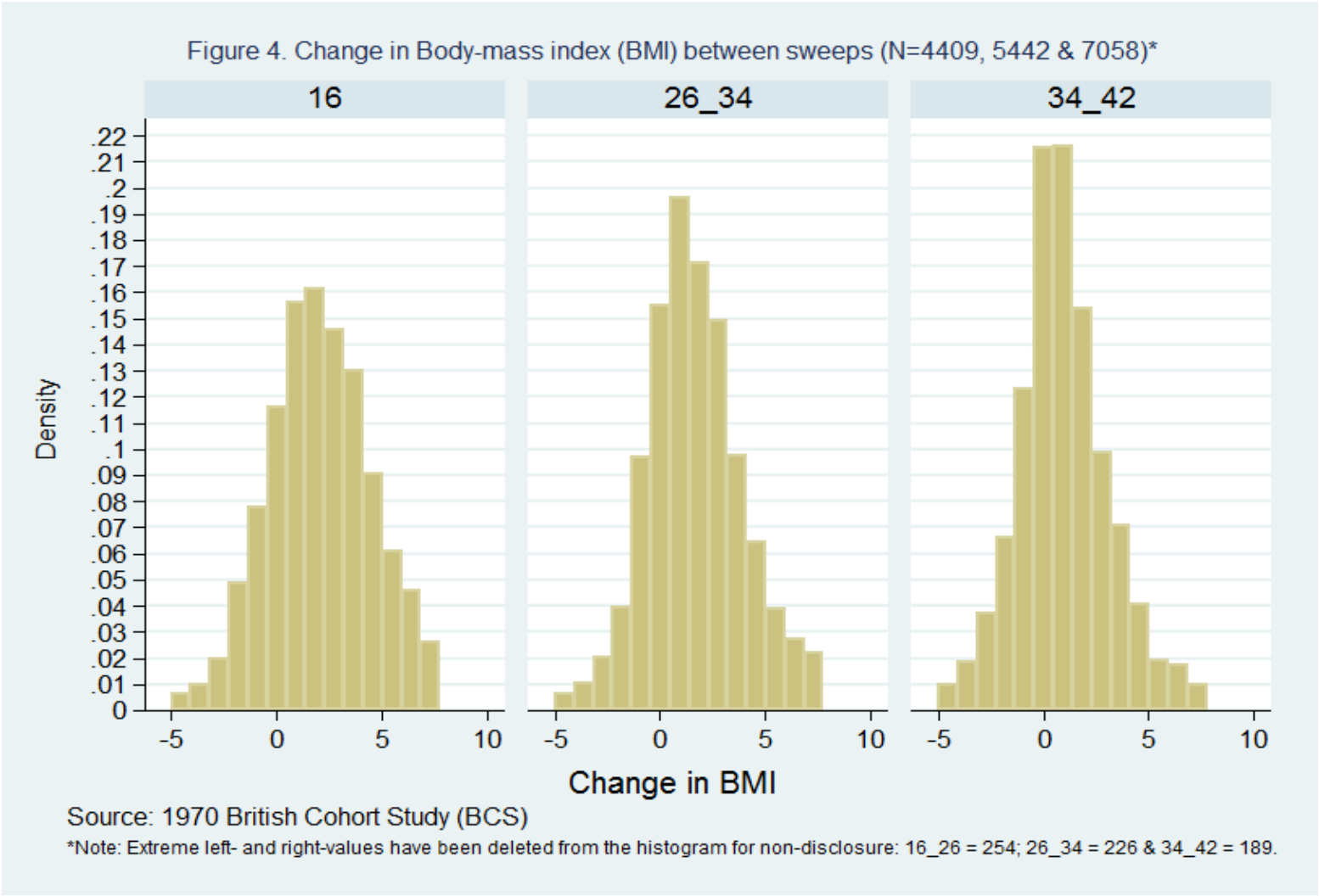


Figure2. Boxplot of Townsend Index at each sweep (age), British Cohort Study 1970
Townsend index at each sweep (age)
10
5
0
-5
-10
16
26
34
42
Age at survey
(Sample size: age 16=10,418; age 26=8,245; age 34=9,624; age 42=9,467)

Figure 3. Mean difference in BMI between 90th and 10th percentile (95% CI) of Townsend Index, separate model for each sweep.



Change in BMI between sweeps.



Change in neighbourhood deprivation score.

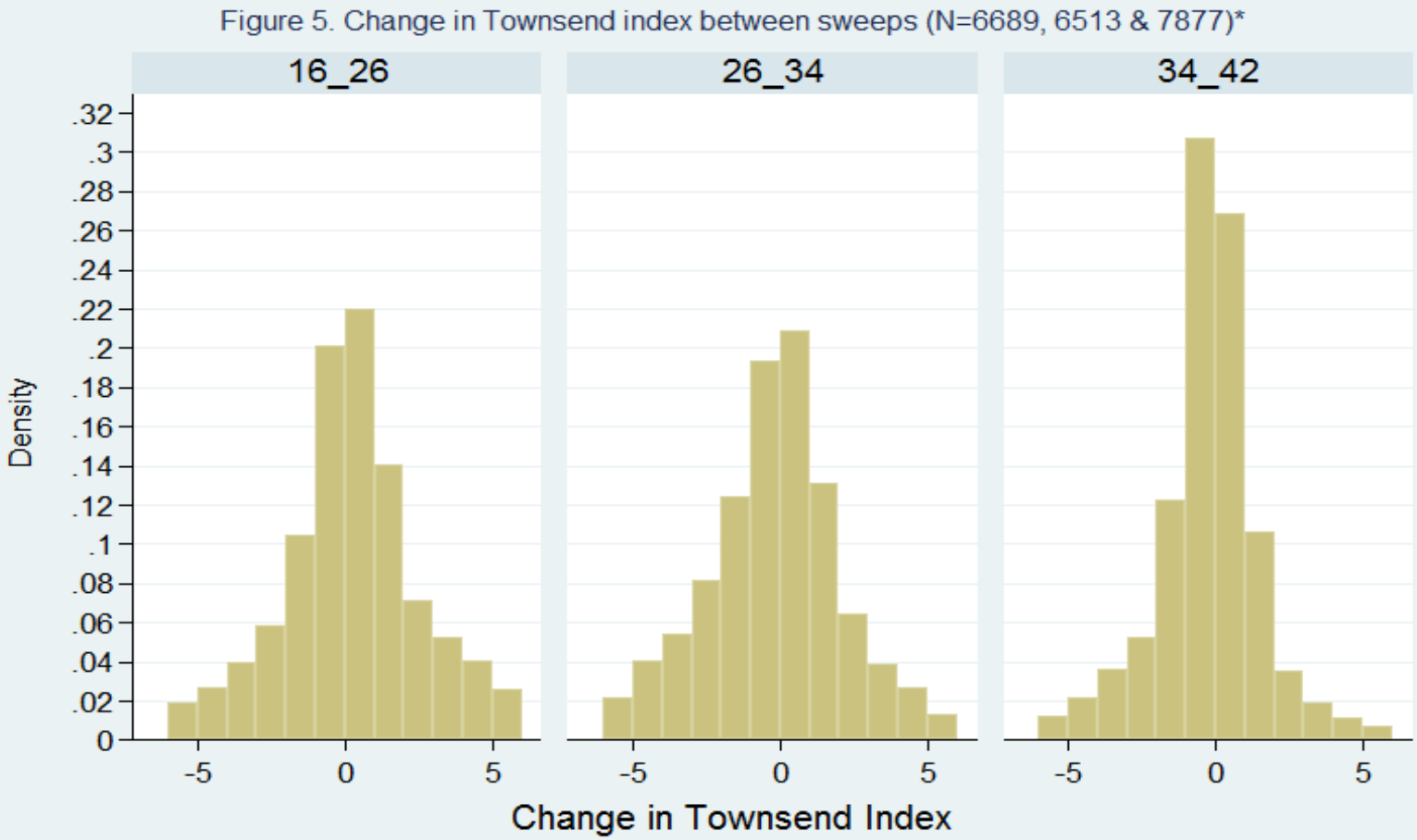


Figure 5. Change in Townsend index between sweeps (N=6689, 6513 & 7877)*

Source: 1970 British Cohort Study (BCS)

*Note: Extreme left- and right-values have been removed for non-disclosure: 16_26 = 596, 26_34 = 342 & 34_42 = 196.

Figure 6. Mean change in BMI between sweeps, by change in Townsend Index category, separate model for each sweep change.

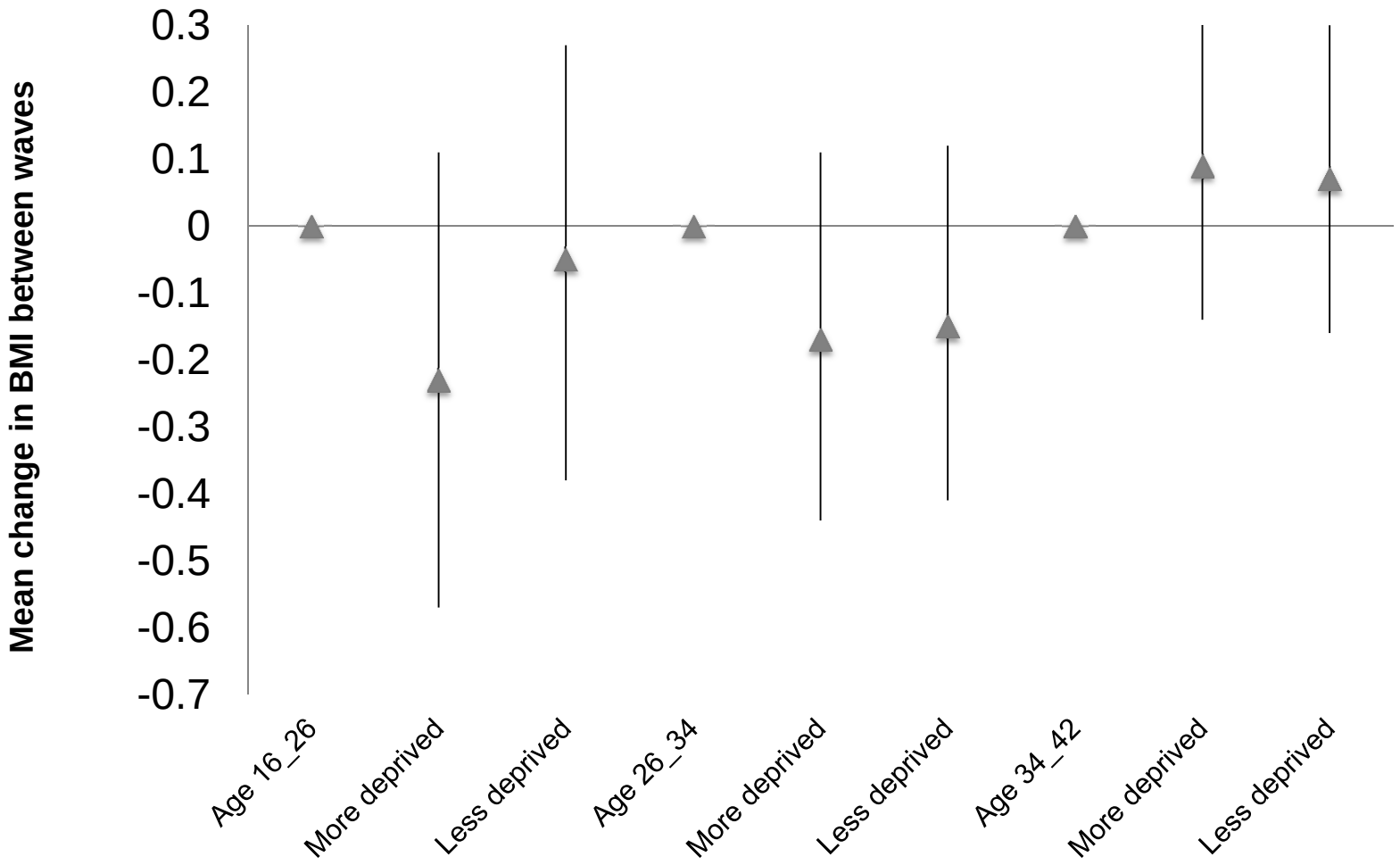


Figure 7. Mean change in BMI between sweeps, by change in Townsend Index category (+baseline Townsend), separate model for each sweep change.

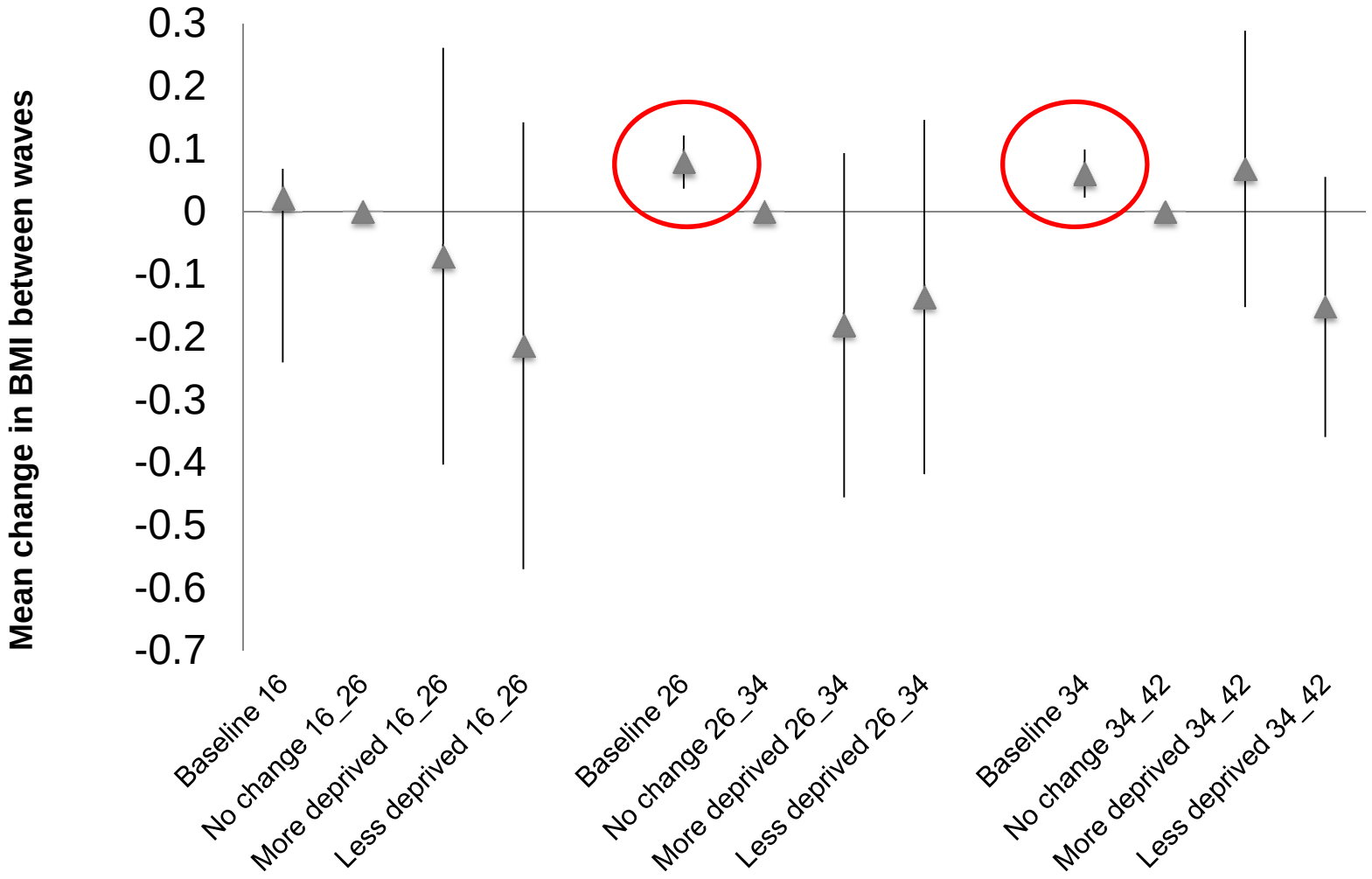
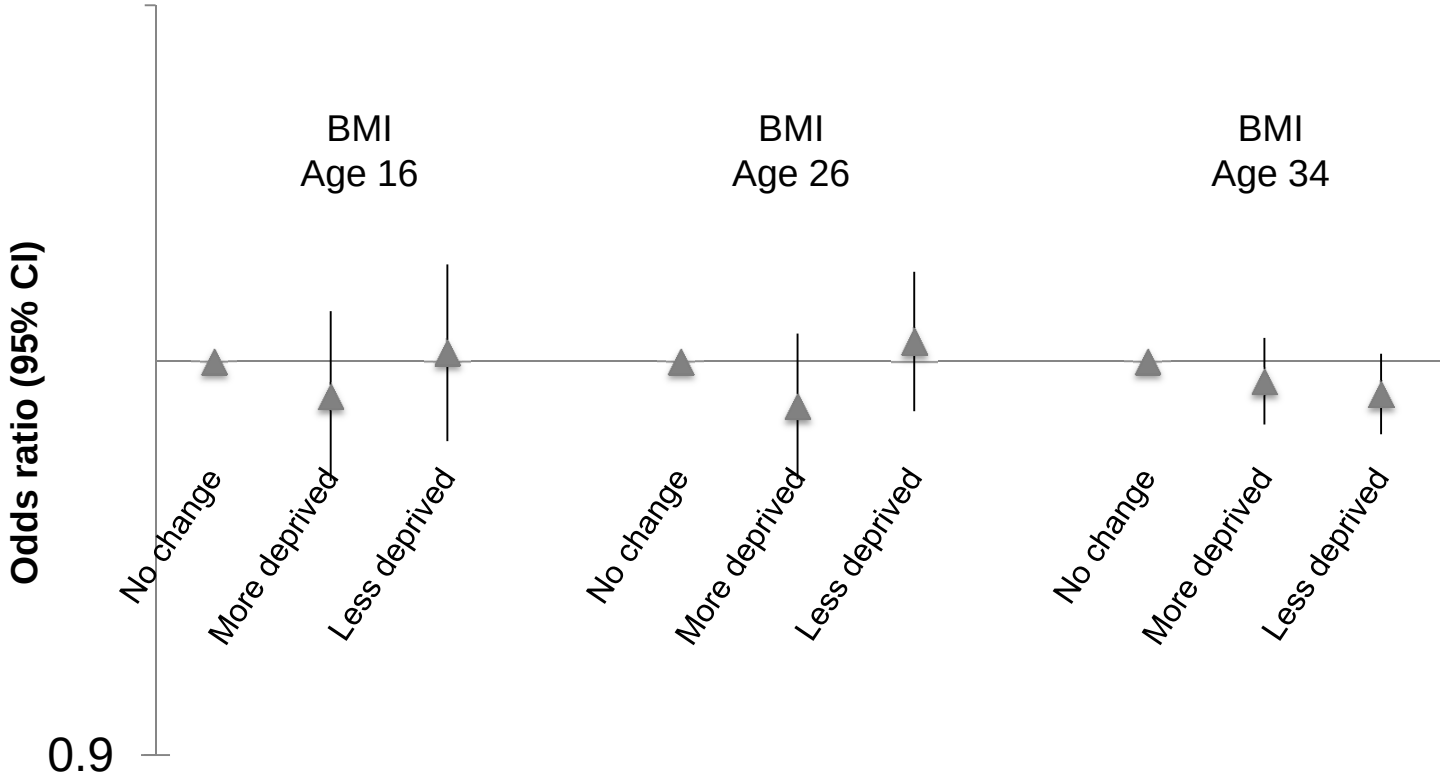


Figure 8. Direct Selection: Association of BMI at baseline with change in neighbourhood deprivation.



Summary

1. Higher neighborhood deprivation = higher BMI at each age.
2. Association stronger at higher ages.
3. No evidence that changing area deprivation = change in BMI.
4. Higher baseline area deprivation = increase in BMI.
5. No evidence of direct health selection.
6. Some evidence for indirect selection (e.g. by education) [not shown].

Next Steps:

- Re-run analysis in 1958 cohort.
- Develop a more sophisticated selection model (e.g. propensity scores).
- Assess whether area deprivation associations remain after adjustment for indirect.