Health Consequences of Psychological Distress in Mid-Life:

A Longitudinal Outcome-Wide Analysis of the 1970 British Cohort Study

Martin N Danka[1, 2]

Collaborators: Dr Jess K Bone[2], Prof George B Ploubidis[1], Dr Richard J Silverwood[1]

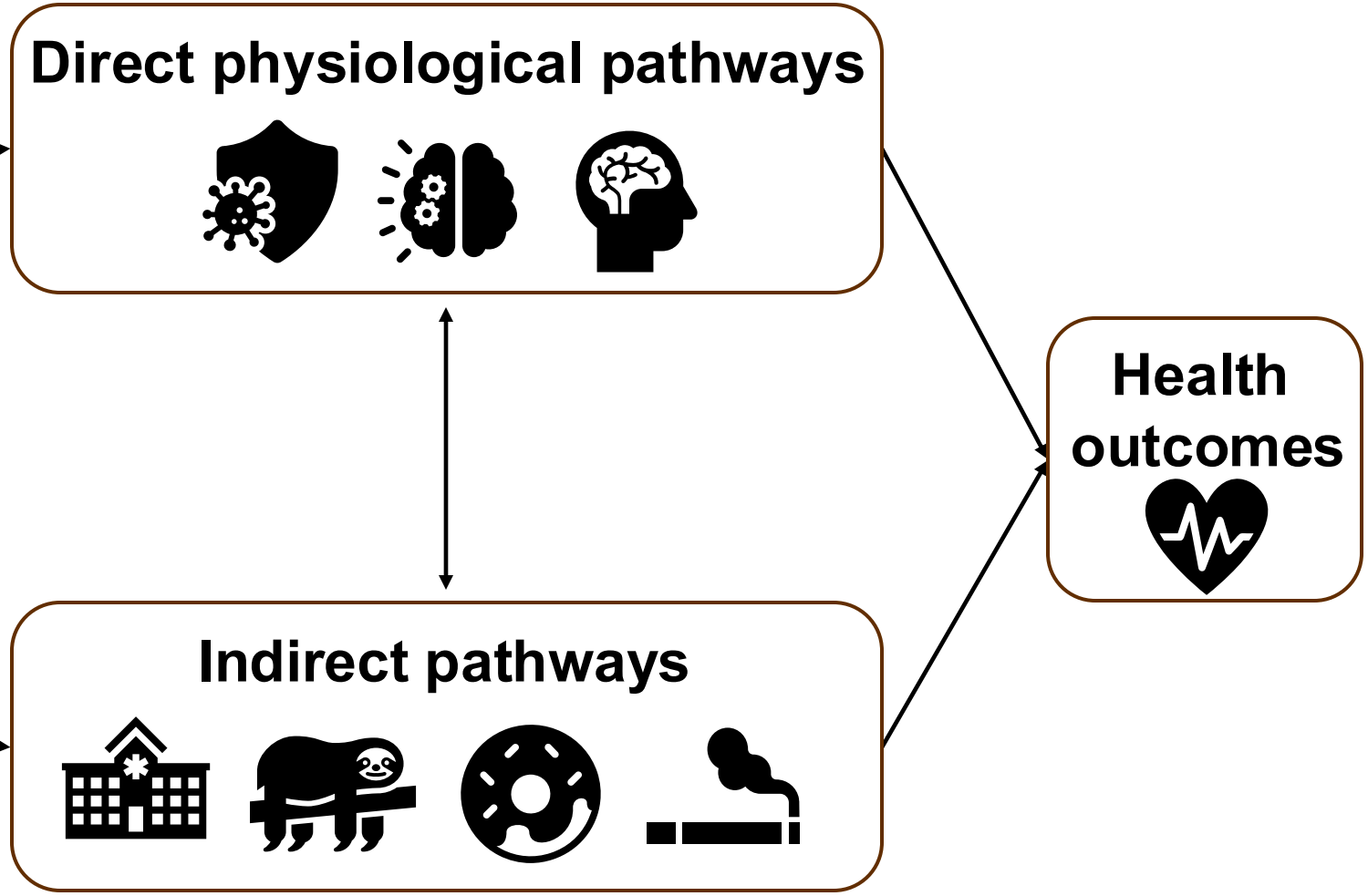
CENTRE FOR LONGITUDINAL STUDIES

[1] Centre for Longitudinal Studies, Social Research Institute, UCL
[2] Social Biobehavioural Research Group, Institute of Epidemiology and Health Care, UCL

Psychological distress

- A general discomforting emotional state (Ridner, 2004).
- Incorporates non-specific symptoms of
  - Psychological stress
  - Depression
  - Anxiety
- Linked to many disease outcomes (Barry et al., 2020).
- Mental health problems cost the UK economy ~4.9% of its GDP (OECD, 2018)

Mechanisms


Direct physiological pathways
Indirect pathways
Health outcomes

How can we study consequences to physical health?

- Approach 1: Overall health

Psychological distress → Composite health measure

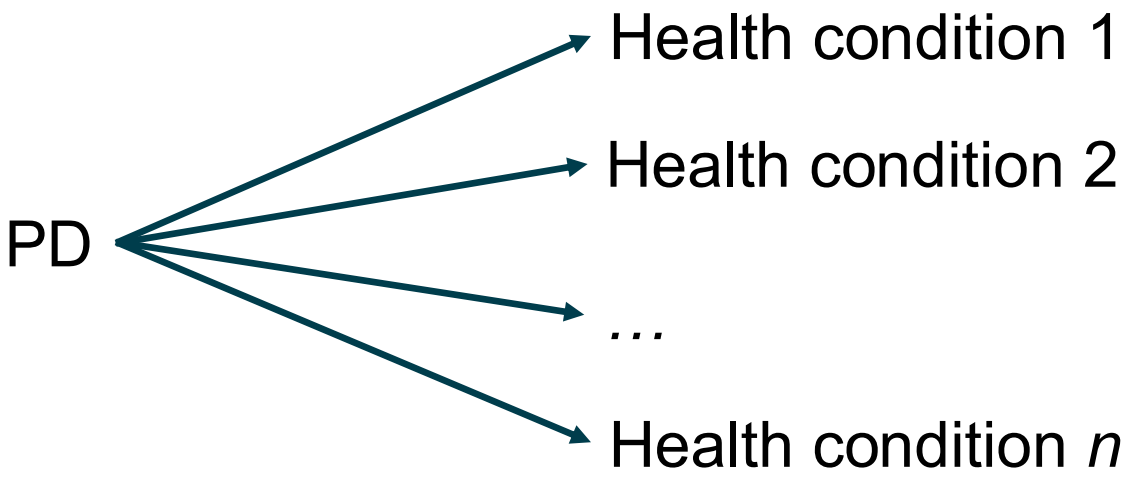
How can we study consequences to physical health?

- Approach 1: Overall health
- Approach 2: The ‘study per outcome’ approach

Study 1:	PD	→	Health condition 1
Study 2:	PD	→	Health condition 2
…	…		…
Study *n*:	PD	→	Health condition *n*

How can we study consequences to physical health?

- Approach 1: Overall health
- Approach 2: The ‘study per outcome’ approach
- Approach 3: The outcome-wide design



Open Access
August 2020

Outcome-Wide Longitudinal Designs for Causal Inference: A New Template for Empirical Studies

Tyler J. VanderWeele, Maya B. Mathur, Ying Chen

Existing OWDs on disease onset

- Most prominent links with hospital admissions for endocrine, muskoskeletal, and circulatory conditions (Frank et al., 2023).
- Several other ‘informal’ OWDs with varying disease categories (Han et al., 2011; Momen et al., 2020; Patten et al., 2008; Scott et al., 2016).

Limitations of existing OWDs

- Most of them cross-sectional.
- Lack of explicit causal reasoning.
  - Unclear causal structure.
  - Unclear effects of interest.
  - Selection bias.
  - Other biases.

Reporting of disease outcomes

Self-reports

?

≈

Medical records

ELSA: More than 50% failed to report stroke, heart attack or cancer (Stoye & Zaranko, 2020)**.**

Aims

1. Estimate the effect of psychological distress on various physical health outcomes in mid-life.
2. Compare how the effect of psychological distress varies when considering health outcomes sourced from
   - Self-reports
   - Electronic health records

Dataset

- **1970 British Cohort Study**
  - ~17,000 individuals born in England, Scotland, and Wales in 1970.
- **Hospital Episode Statistics** (NHS England)
  - Hospital admissions
  - Outpatient appointments
  - A&E attendance
  - Critical care data

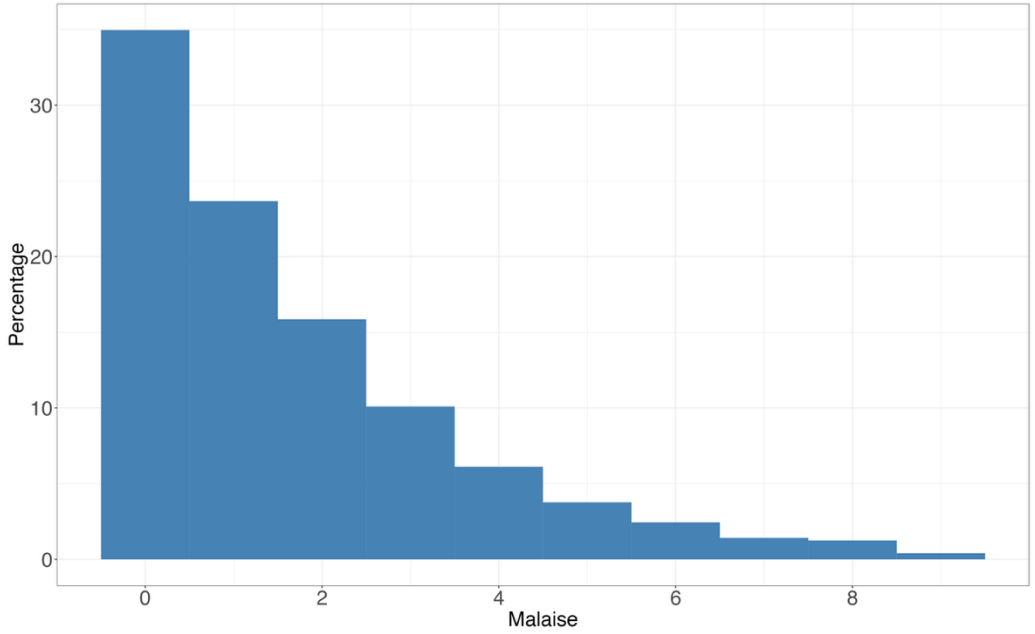
BCS70
1970 British
Cohort Study

Eligibility criteria

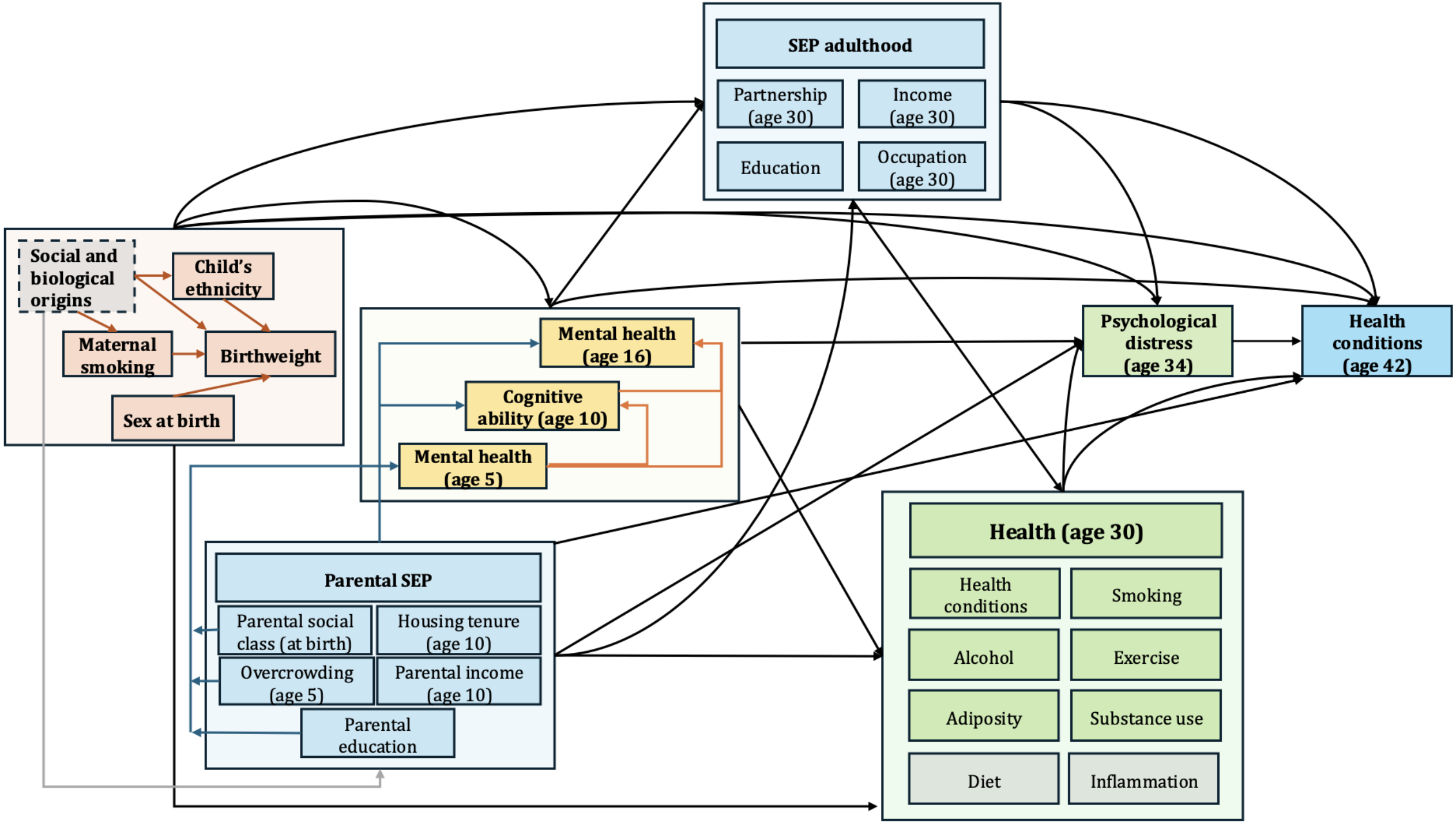
1. **Member of BCS70**
2. **Eligible for linkage**
    - Lived in England during the ‘eligibility period’.
    - Defined if true for any sweep between 2000–2012.
3. **Alive and not emigrated at the end of follow-up**
    - 2012 (age 42)

Exposure: Psychological distress

- Age 34 (sweep 2000)
- 9-item Malaise Inventory.
- Previous work on CLS cohorts (Ploubidis et al., 2019; McElroy et al., 2020):
  - Scalar invariance of the 9-item version.
  - Measurement invariance across time, cohorts, and gender.



Self-reported outcome	% New cases (age 30 → 42)	% Prevalence at age 42
Chronic back issues	14.8	19.7
Hayfever/allergic rhinitis	9.0	21.7
Conditions of stomach, bowels, or gallbladder	7.9	10.7
Migraine	7.0	12.2
Hypertension	6.4	7.6
Asthma or wheezy bronchitis	4.2	8.9
Skin conditions	4.1	9.9
Hearing problems	2.8	4.2
Kidney or bladder problems	2.6	3.3
Eye conditions (not corrected by glasses)	2.3	2.9
Diabetes	2.0	2.6
Cancer	1.1	1.1
Chronic fatigue syndrome	1.0	1.2
Convulsion, fit or epilepsy	0.6	1.3

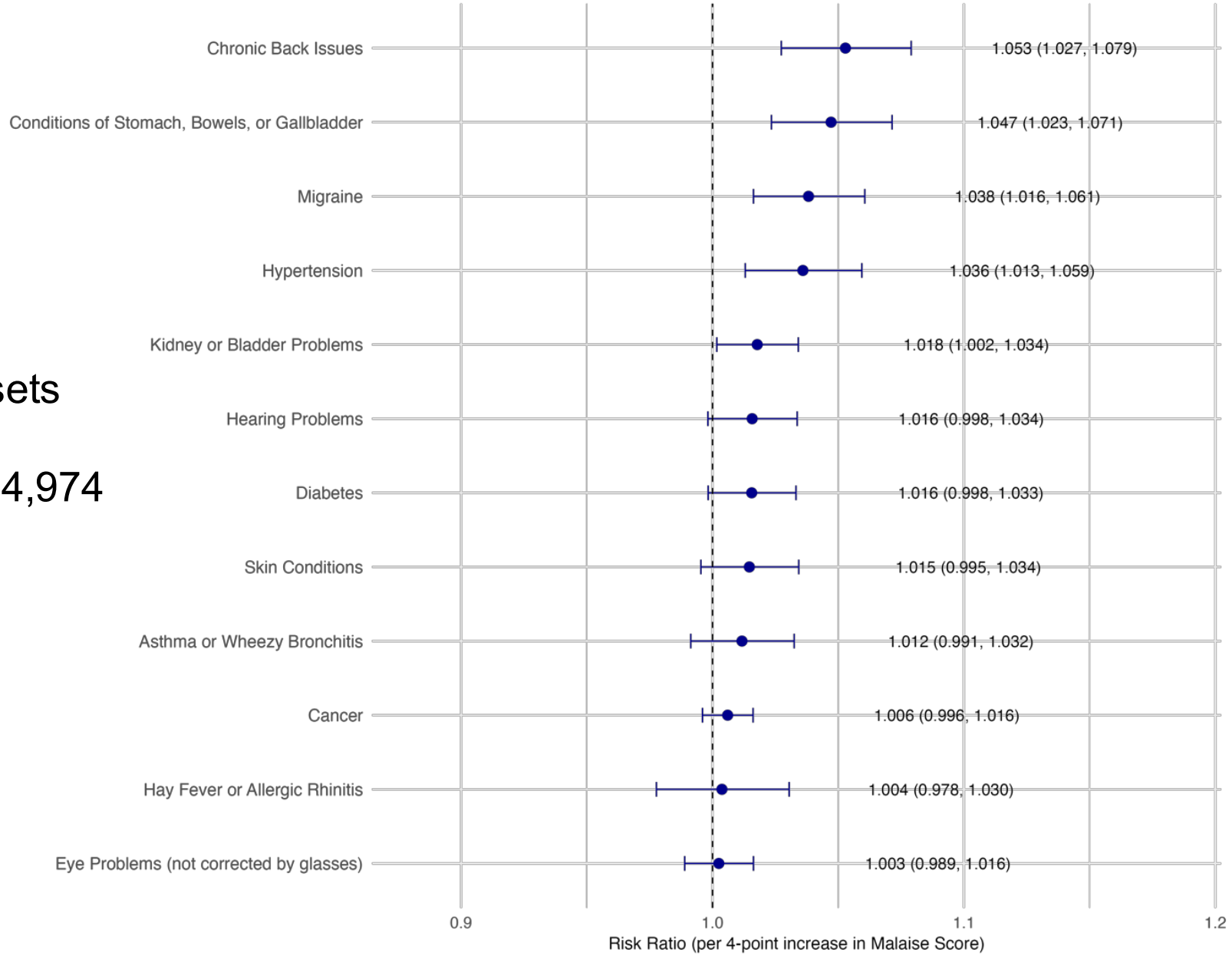

SEP adulthood
Partnership (age 30)
Income (age 30)
Education
Occupation (age 30)
Social and biological origins
Child's ethnicity
Maternal smoking
Birthweight
Sex at birth
Mental health (age 16)
Cognitive ability (age 10)
Mental health (age 5)
Psychological distress (age 34)
Health conditions (age 42)
Parental SEP
Parental social class (at birth)
Housing tenure (age 10)
Overcrowding (age 5)
Parental income (age 10)
Parental education
Health (age 30)
Health conditions
Smoking
Alcohol
Exercise
Adiposity
Substance use
Diet
Inflammation

Analysis

- **Estimand:** Risk ratios.
- **Estimator**: Modified Poisson regression with robust SE (Zou, 2004).
- **Missing data:** Multiple imputation
  - Included drivers of attrition in BCS70 (Katsoulis et al., 2024).
  - Also used to handle missing eligibility data (Giganti & Shepherd, 2020).
- **Confounding adjustment:** Inverse probability of treatment weighting
  - Weights derived via parametric covariate balancing (Fong et al., 2018).

Preliminary results

- Self-reported outcomes
- Pooled across 70 imputed datasets
- Eligible participants: 14,879 to 14,974



Sensitivity analyses

- Similar results when
  - Winsorising the weights at the 99th percentile.
  - Including participants alive and living in England, Scotland, and Wales at the end of follow-up.

Future directions

- Comparing effects with conditions in the HES data.
- Additional sensitivity checks
  - Adjustment for confounders at baseline.
  - Adjustment for past exposure levels.

Limitations

- HES datasets do not include primary care data.
- Limited granularity.
- Exploratory nature of OWDs.
- Analytical complexity

Thank you!

Email: martin.danka.21@ucl.ac.uk
Bluesky: @martindanka.bsky.social