

Psychological distress over the life course in the UK: Evidence from the 1946, 1958 and 1970 birth cohorts

Gondek D*, Bann D*, Patalay P*, Goodman A*, Richards M**, Ploubidis GB*

*Centre for Longitudinal Studies, UCL Institute of Education, University College London

**Medical Research Council Unit for Lifelong Health and Ageing at University College London

Life course distribution of psychological distress

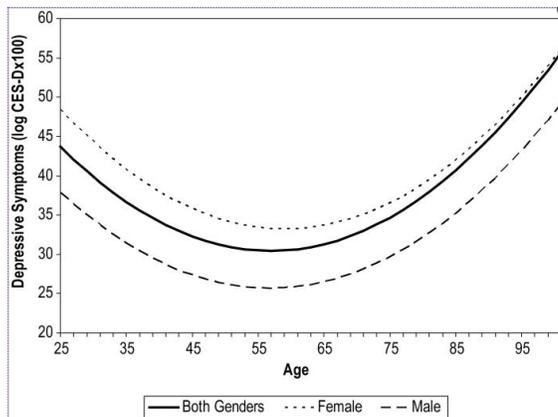
- Enormous social and economic costs of poor mental health
- More targeted allocation of resources needed
 - life course trajectories and cross-cohort comparisons can help

[Psychol Med. 2000 Jan;30\(1\):11-22.](#)

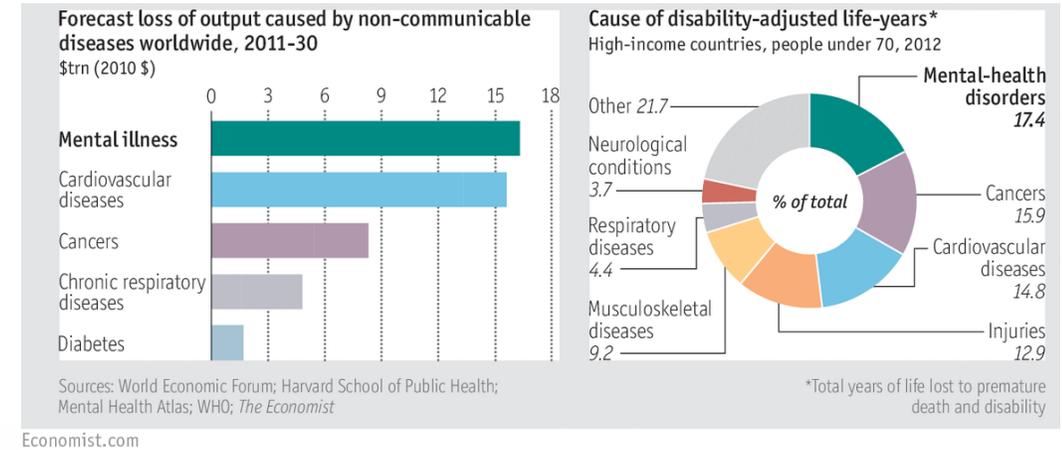
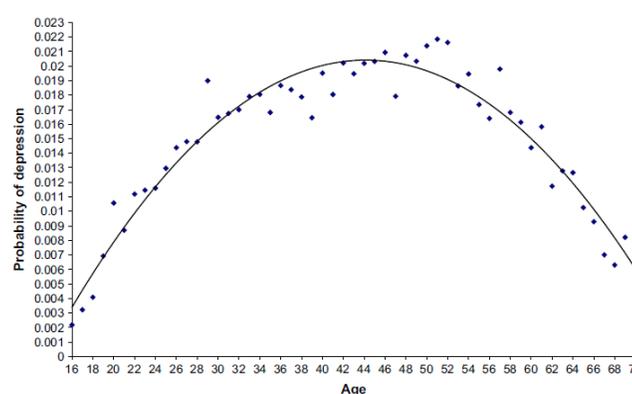
Does old age reduce the risk of anxiety and depression? A review of epidemiological studies across the adult life span.

[Jorm AF¹.](#)

Depressive Symptoms over the Adult Life Course
 Source: Americans' Changing Lives Study (1986-2001); longitudinal design

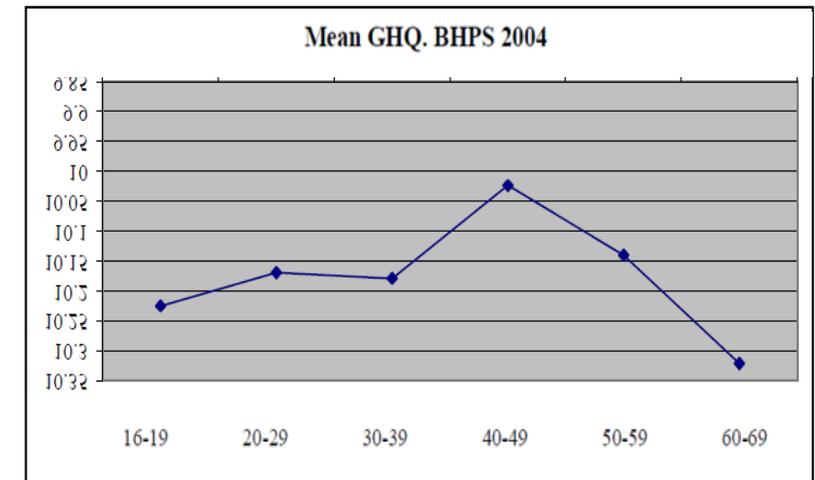


Probability of Depression over the Adult Life Course (both men and women)
 Source: UK Labour Force Survey (2004 – 2007); cross-sectional data



(Inverted) General Health Questionnaire Score

Source: British Household Panel Survey (2004); longitudinal design



Cross-cohort comparisons

- National Psychiatric Morbidity Surveys (1993–2007) worse mental health (40-60 year-old) in 1950–6 cohort than 1943–9 cohort (Spiers et al., 2011)
- Worse mental health in 1970 (BCS) than in 1958 (NCDS) at age 23/26 (Sacker & Wiggins, 2002) and at age 42 (Ploubidis, 2017)
- Gender differences reduced as males got worse to a greater extent (Ploubidis, 2017; Sacker & Wiggins, 2002)

Literature gaps and study aims

- Modest evidence on the life course trajectories (based on cross-sectional studies or synthetic cohorts collected within a short time period)
- Lack of cross-cohorts studies including 1946 NSHD, allowing for comparison with 1958 NCDS participants who are approaching older age.

Aims:

1) To investigate life course trajectories of psychological distress across three British Birth cohort studies (1946, 1958, 1970) over the total period between 1951-2015

2) To examine gender differences in psychological distress across the age and cohorts

Methods

Measures dichotomised to indicate “caseness” (validated thresholds – except of internalising symptoms measure at age 15/16)

Data (analytical sample)	Age 15-16	Age 23-26	Age 30	Age 33-36	Age 42-43	Age 50-53	Age 60-64	Age 69
1946 NSHD (N=3824)	Internalising (teacher)			Present State Examination	Psychiatric Symptoms Frequency	GHQ28	GHQ28	GHQ28
1958 NCDS (N=14291)	Rutter (mother)	Malaise Inventory		Malaise Inventory	Malaise Inventory			
1970 BCS (N=13806)	Rutter (mother)/ Malaise Inventory	Malaise Inventory	Malaise Inventory	Malaise Inventory	Malaise Inventory			

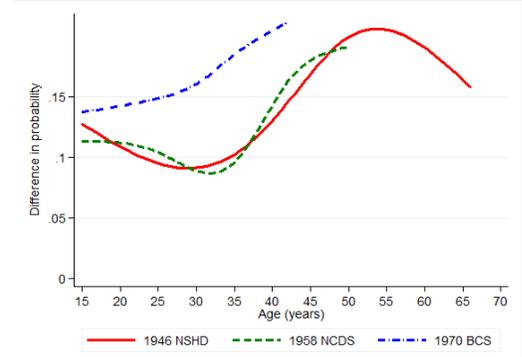
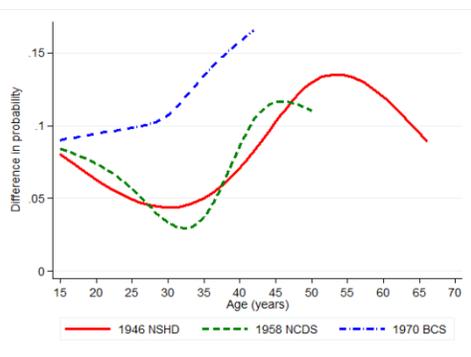
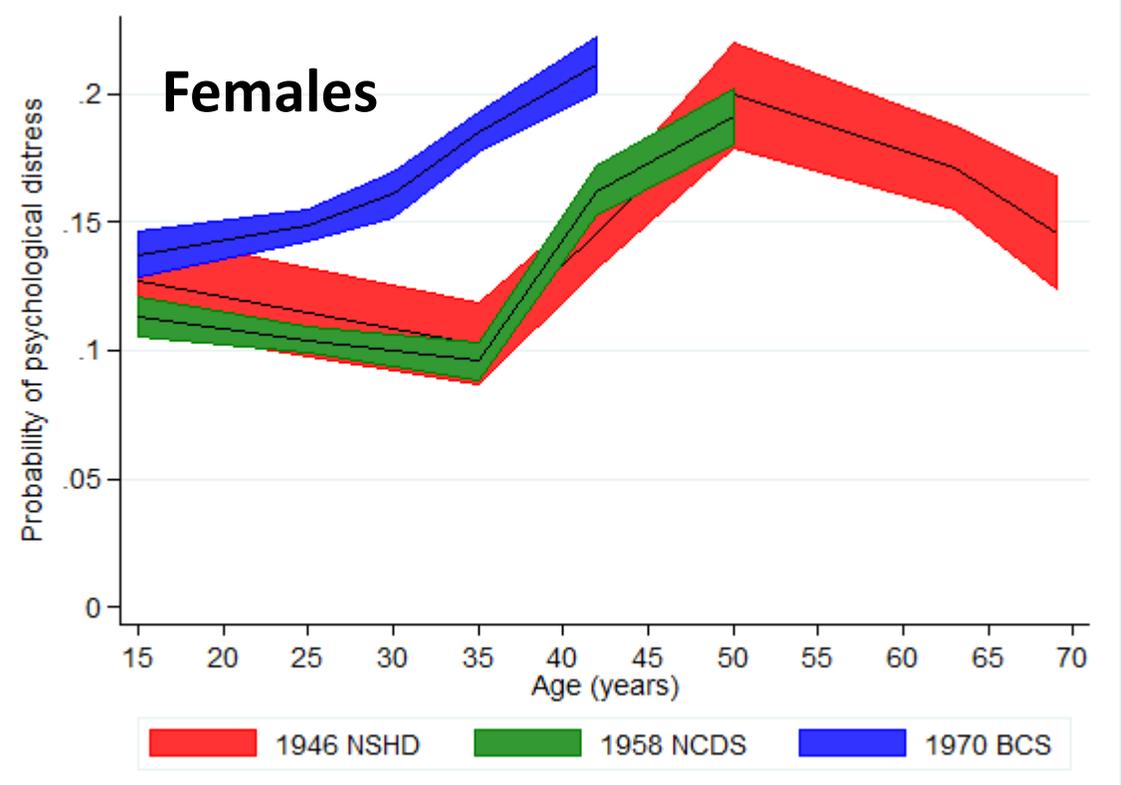
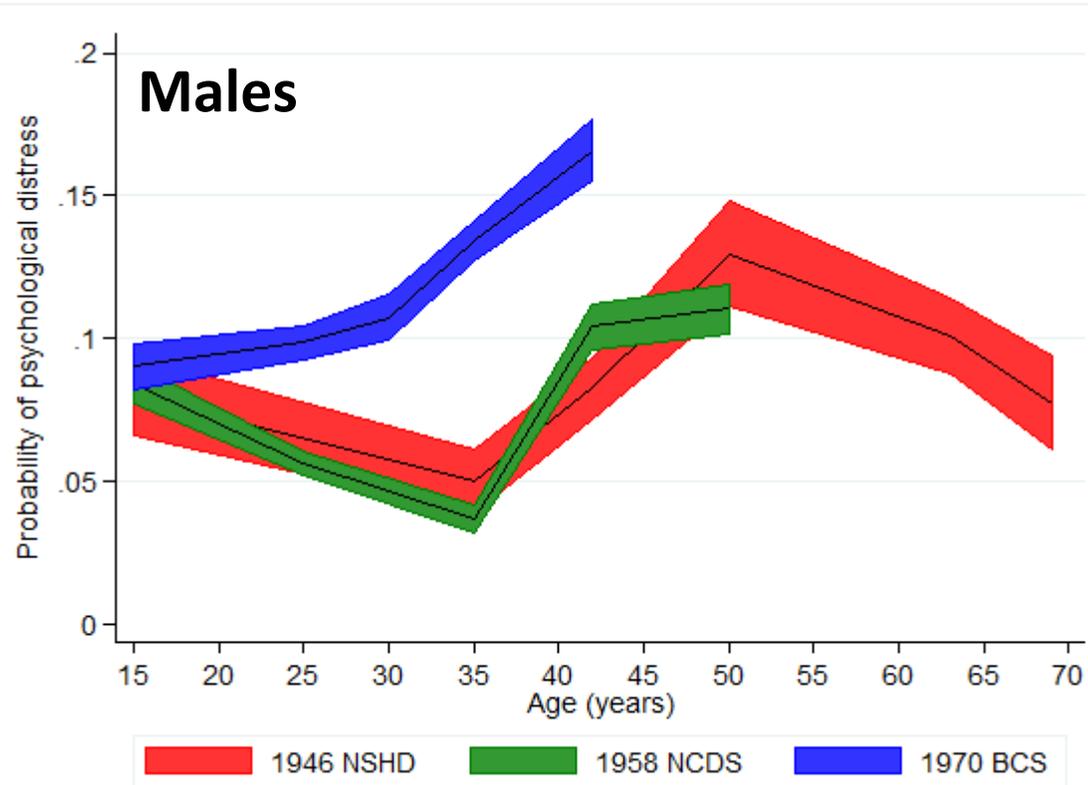
Analytical strategy

- 1) Gender and cohort stratified logit piecewise growth models - psychological distress (level 1) nested within individuals (level 2) (ML under MAR assumption)

	'Knots'	Age intervals
1946 NSHD	2	1) adolescence to early-adulthood (age 15-36) 2) early adulthood to mid-adulthood (age 36-53) 3) mid-adulthood to early old age (age 53-69)
1958 NCDS	2	1) adolescence to early-adulthood (age 16-33) 2) early adulthood to mid-adulthood (age 33-42) 3) mid-adulthood (age 42-50)
1970 BCS	1	1) adolescence to early-adulthood (age 15-30) 2) early adulthood to mid-adulthood (age 30-42)

- 2) Differences across time and cohorts: gender*age; cohort*gender*age
- 3) 1946 NSHD – probability weights used to account for stratified sampling

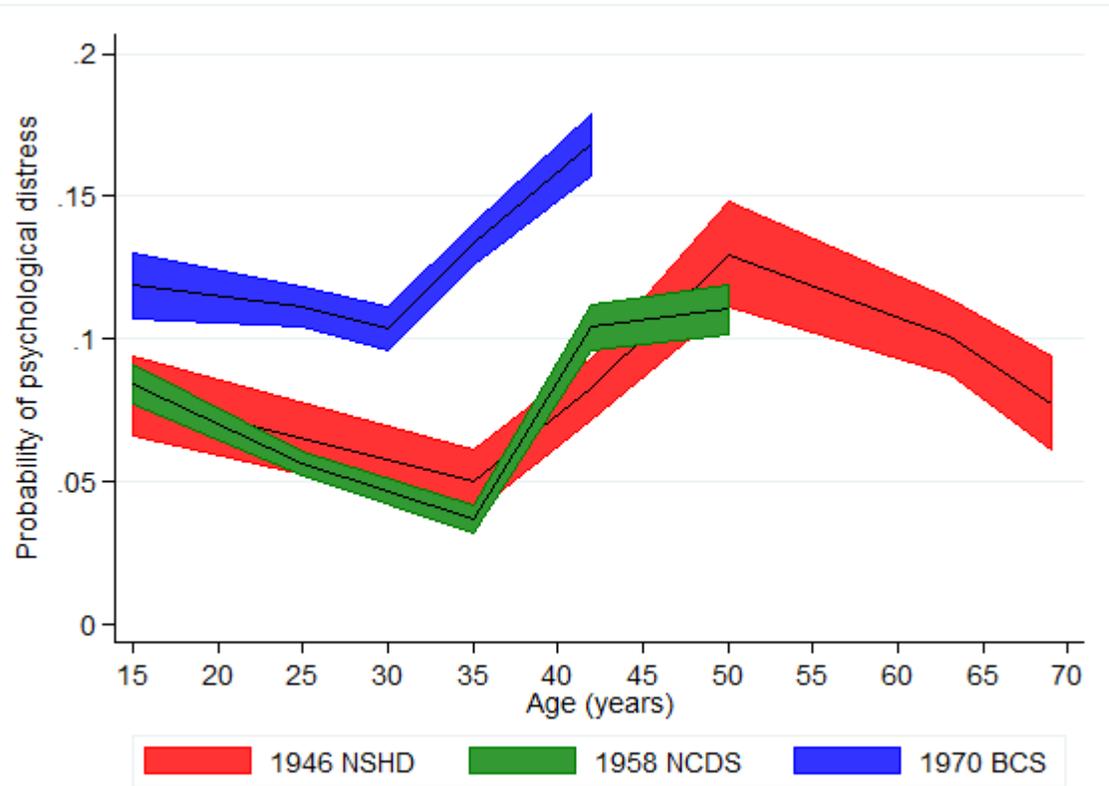
Age trajectories of psychological distress



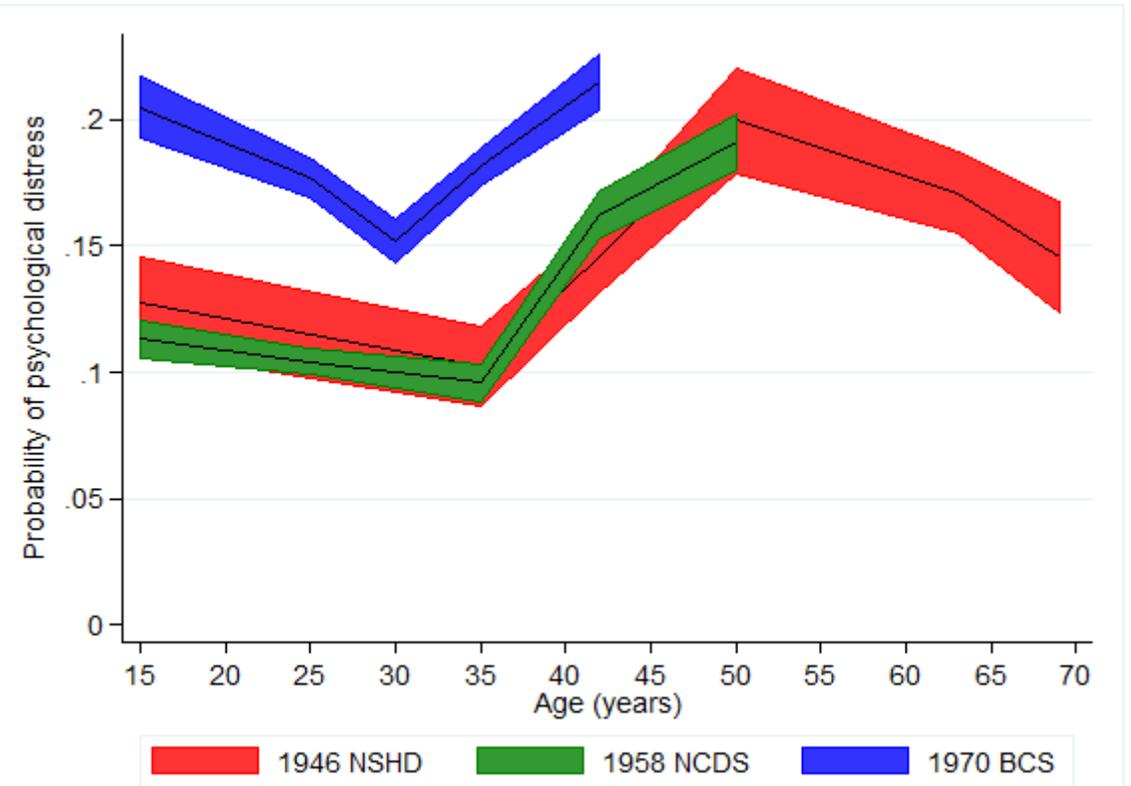
Rutter scale at age 16 in 1970 BCS

Age trajectories of psychological distress

Males



Females

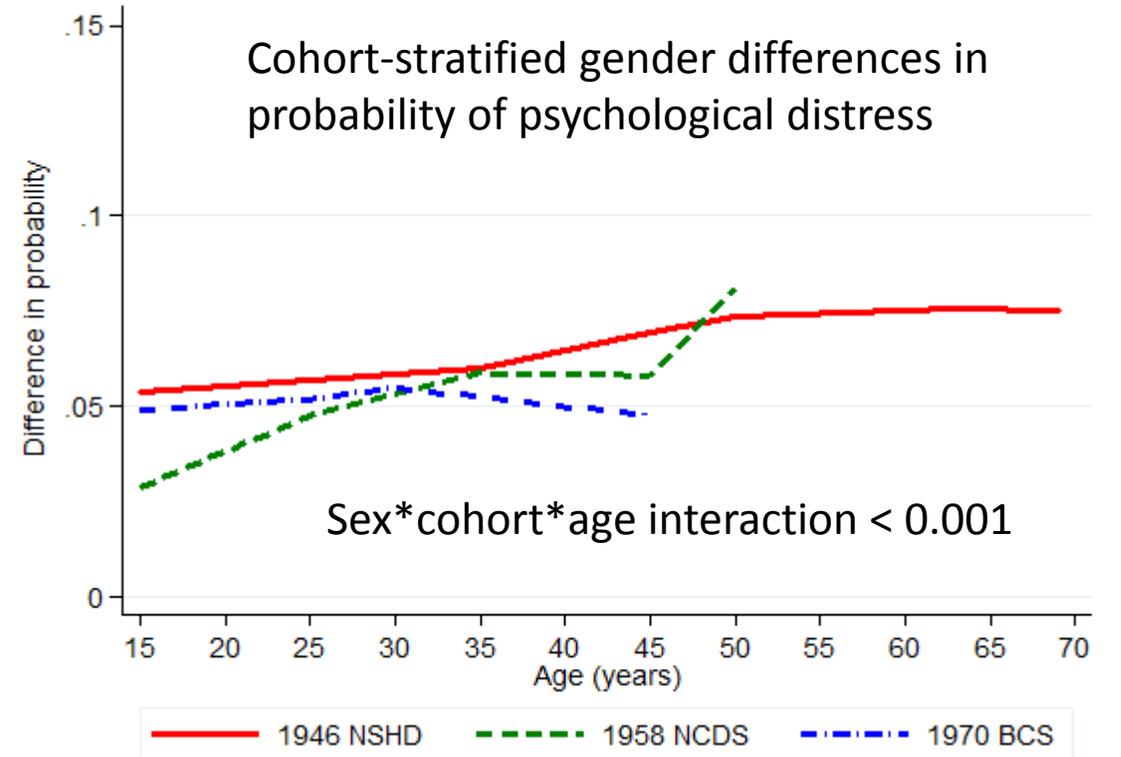


Malaise Inventory at age 16 in 1970 BCS

Gender differences

- Logistic model – complete cases analysis
- Age 42/43: Sex*cohort interaction < 0.001
- Age 50/53: Sex*cohort interaction > 0.05 (only 1946 NSHD and 1958 NCDS)

Men - 1958 vs 1970: 5.9% (4.5, 7.3) ↑
 Women - 1958 vs 1970: 4.3% (2.8, 5.8) ↑



Age 43/43	N	Relative difference (OR, CI95%)	Absolute difference (% , CI95%)
1946 NSHD	7306	1.79 (1.55, 2.07)	6.7 (5.1, 8.3)
1958 NCDS	11260	1.66 (1.49, 1.86)	5.8 (4.5, 7.0)
1970 BCS	8576	1.32 (1.18, 1.48)	4.2 (2.5, 5.8)
Age 50/53		Relative difference (OR, CI95%)	Absolute difference (% , CI95%)
1946 NSHD	6634	1.75 (1.52, 2.01)	7.4 (5.6, 9.2)
1958 NCDS	8076	1.88 (1.68, 2.12)	7.7 (6.3, 9.1)

Summary - Life course trajectories of mental health

U-shape trajectory between young adulthood and older age (e.g. Jorm, 2000; found in 72 countries (Blanchflower & Oswald, 2008))

- Lack of deterioration from adolescence into young adulthood – (somewhat) at odds with the literature
- **Peak (or a rise) in psychological distress in middle-adulthood**
- Improvement in mental health from mid-adulthood into older age (based on 1946 NSHD)

Peak (or a rise) in psychological distress in middle-adulthood

- **Period effects** - economic downturn in early 90s (1946 NSHD) (ONS, 2015); economic and cultural boom in early 2000s (1958 NCDS) (ONS, 2015; Sullivan, 2015); and crisis in 2008 (1970 BCS) (Palmer et al., 2016)
- **Age effects** – U-shape trajectory remained when cohort effects statistically controlled for (Blanchflower & Oswald, 2008); lack of biological explanation; ‘Midlife crisis’ (e.g. career, family)
- **Cohort effects** – (somewhat) universal across cohorts; however may lead to a peak at different age

Summary – Cross-cohort comparison

Increase in distress in 1970 BCS

- Extension of previous findings
- Particularly problematic in the context of ageing population

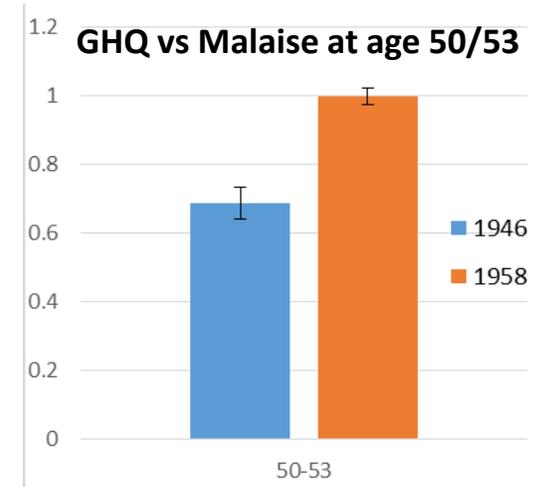
Gender differences – reduced at age 43/44 in the 1970 BCS

- Gender differences fluctuate slightly over the lifespan across cohorts, reducing at age 43/44 in the younger cohorts (due to greater increase in prevalence among men); consistent with (Sacker & Wiggins, 2002; Ploubidis, 2017)

Limitations and next steps

Limitations

- Arbitrary 'caseness' cut-off point of internalising disorder at age 15/16 – low convergent validity between Malaise and Rutter scales (based on 1970 BCS); also no clear patterns in latent class analyses
- Different response scales used in 1970 BCS at age 16 (Malaise 0-2 Likert vs binary yes/no)
- Different measures used in 1946 and in 1958/1970 – GHQ-28 vs Malaise
- Few data points (not always overlapping, e.g. age 33 in NCDS and 36 in NSHD)
- Attrition and non-response (MAR assumed in all 3 cohorts); also greater attrition in 1970 BCS



Limitations and next steps

Next steps – in progress

Life course trajectories/cross cohort comparisons

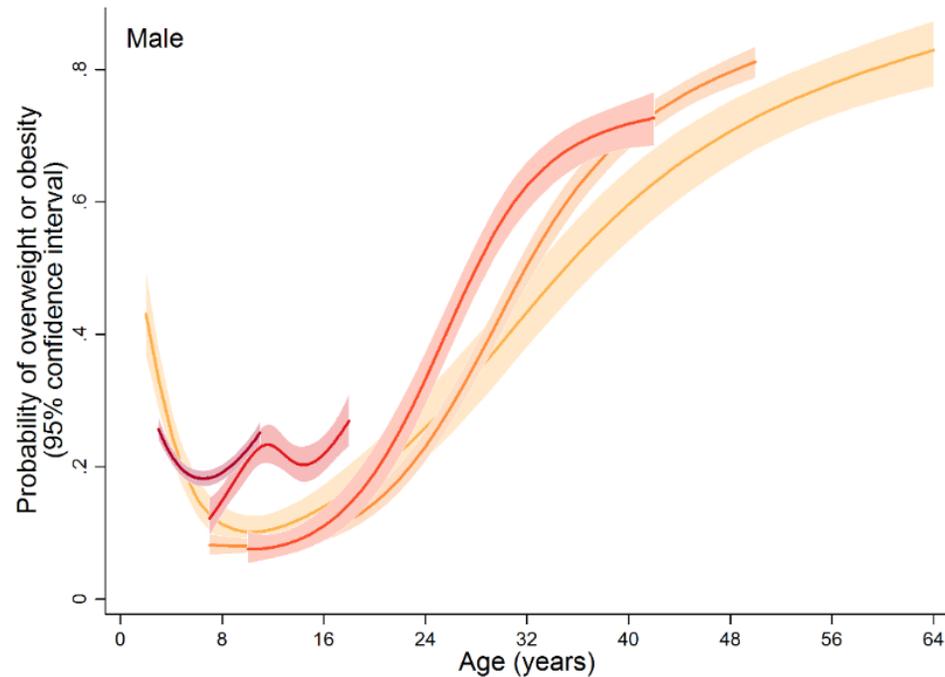
- Comparison with models including fractional polynomial terms
- Measurement invariance (BCS Malaise age 16 and other ages)
- Multiple imputation to address selection/attrition bias
- Comparable items across ages (5 items identified – NOT IDENTICAL)
- Comparison of other available mental health outcomes (GHQ-12 in NCDS age 42; BCS age 30; Rutter reported by teacher in BCS)
- Including period effects

Explaining the differences in life course trajectories

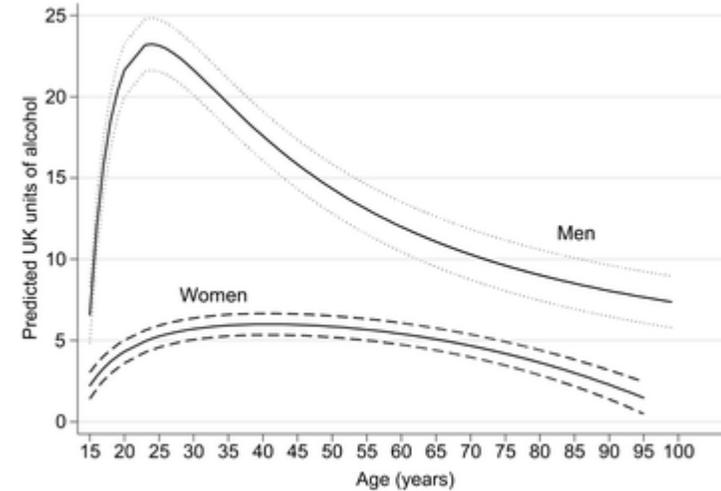
- E.g. considering maternal education, harmonised income across cohorts

How about life course trajectories of other health outcomes?

2001 MCS 1991 ALSPAC 1970 BCS 1958 NCDS 1946 NSHD



BMI (Johnson et al., 2015)



Alcohol consumption (Britton et al., 2015)

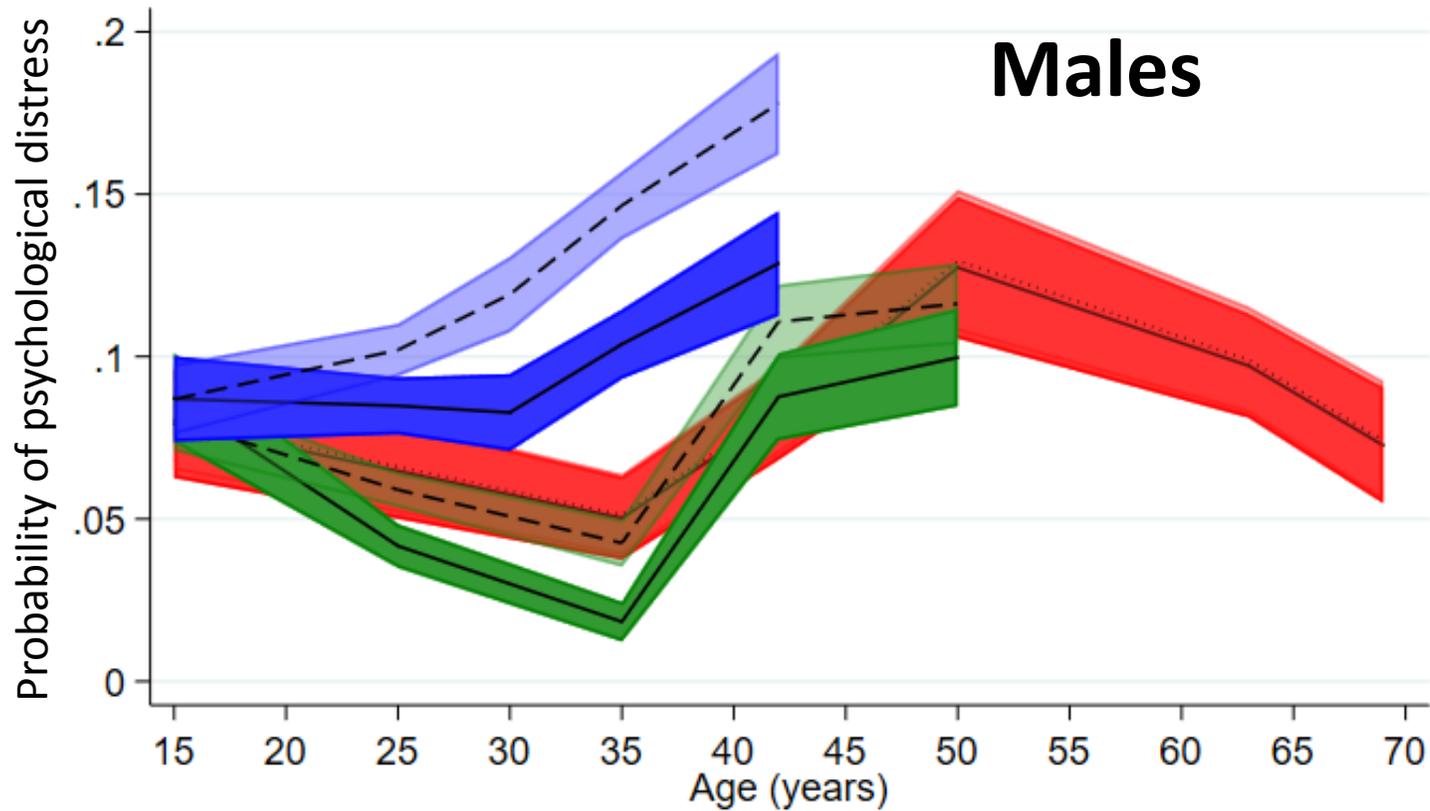
Main Findings

Our analysis describing the unadjusted pattern of SBP over life in population-based studies showed four chronological phases: (1) a rapid increase in SBP coinciding with peak adolescent growth, (2) more gentle increases in early adulthood, (3) a midlife acceleration beginning in the fourth decade, and (4) a period of deceleration in late adulthood, where increases in SBP slowed. These phases were

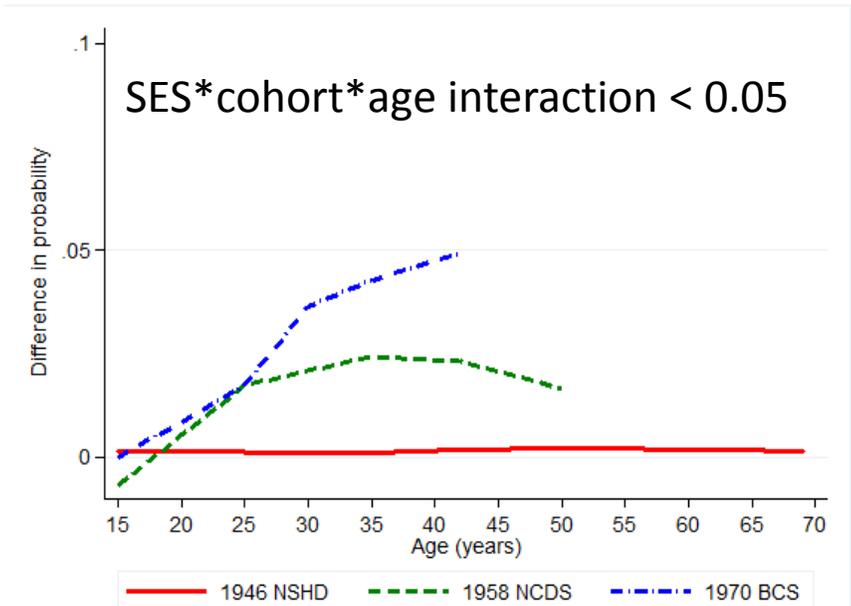
Blood pressure (Wills et al., 2011)

THANK YOU

Life course trajectories – Non-manual child SES vs Manual child SES



Cohort-stratified SES differences in probability of psychological distress



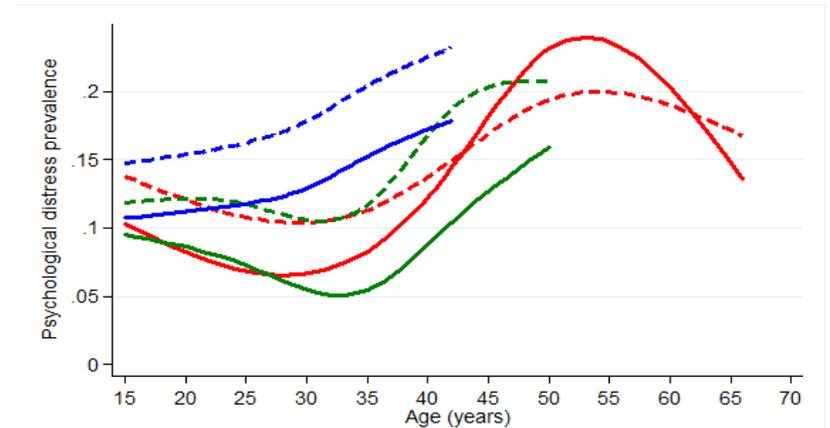
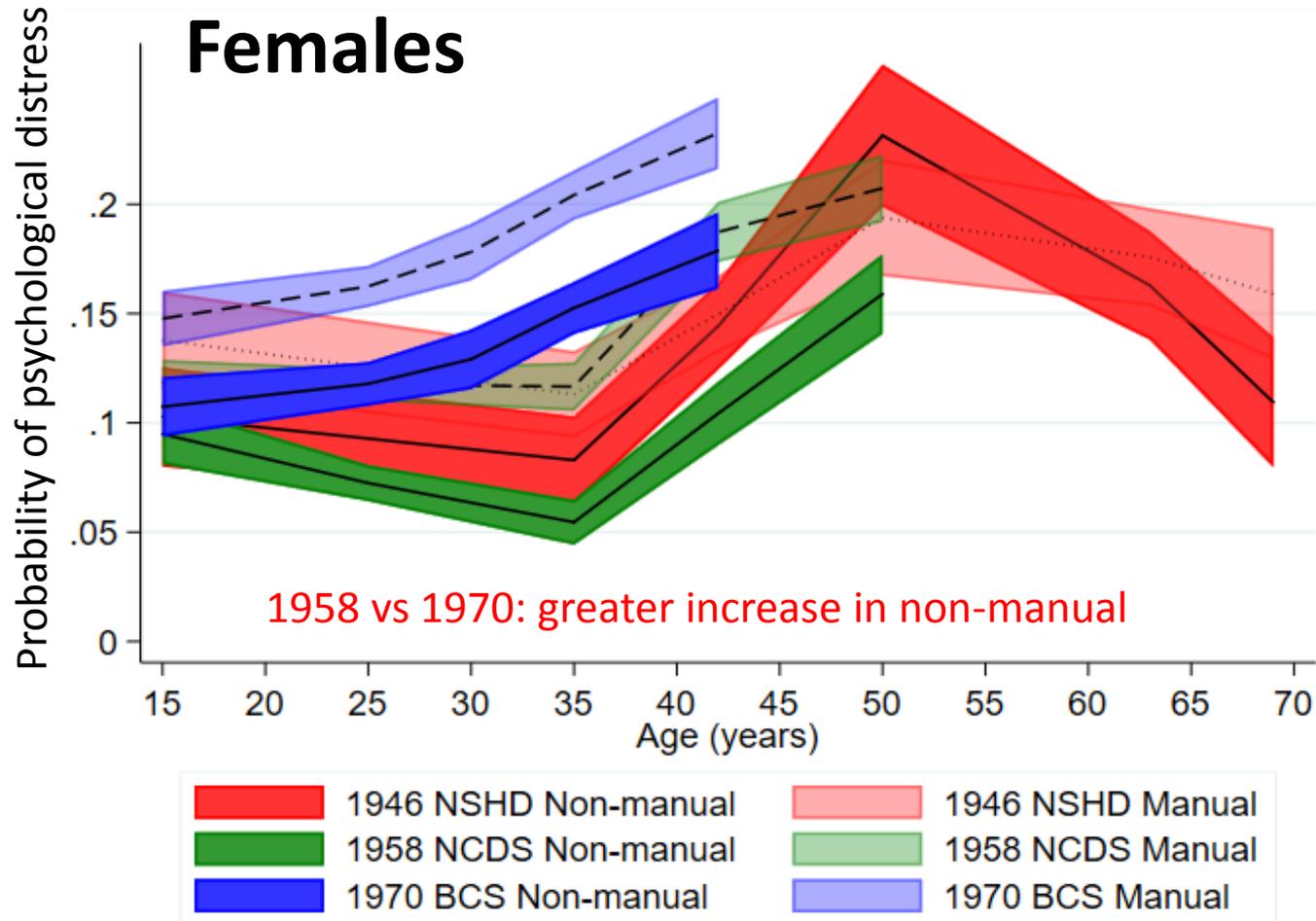
SES differences at age 42/43 and 50/53

Males

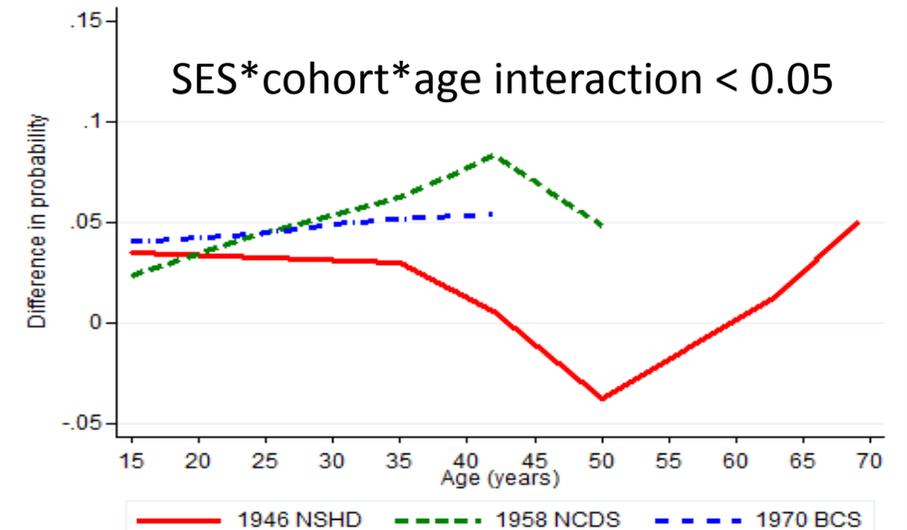
- Logistic models – complete cases analyses
- Age 42/43: SES*cohort interaction > 0.05
- Age 50/53: SES*cohort interaction > 0.05 (only 1946 NSHD and 1958 NCDS)

Age 43/43	N	Relative difference (OR, CI95%)	Absolute difference (% , CI95%)
1946 NSHD	3533	1.72 (1.25, 2.35)	4.5 (0.2, 6.7)
1958 NCDS	4522	1.29 (1.05, 1.59)	2.2 (0.4, 3.9)
1970 BCS	3322	1.45 (1.19, 1.76)	4.6 (2.2, 7.0)
Age 50/53		Relative difference (OR, CI95%)	Absolute difference (% , CI95%)
1946 NSHD	3136	0.95 (0.75, 1.20)	-0.06 (-0.3, 2.0)
1958 NCDS	3964	1.13 (0.93, 1.41)	1.3 (-0.08, 3.1)

Life course trajectories – Non-manual child SES vs Manual child SES



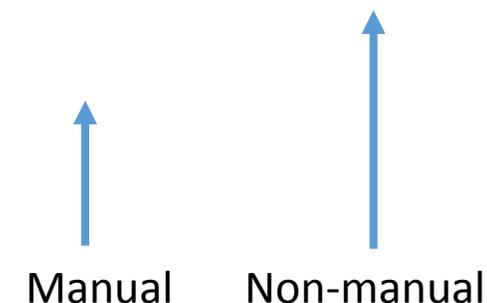
Cohort-stratified SES differences in probability of psychological distress



SES differences at age 42/43 and 50/53

Females

- Logistic model – complete cases analysis
- Age 42/43: SES*cohort interaction < 0.05
- Age 50/53: SES*cohort interaction < 0.05 (only 1946 NSHD and 1958 NCDS)



Manual - 1958 vs 1970: 4.3 (2.0, 6.5)
 Non-manual - 1958 vs 1970: 6.6 (4.3, 9.0)

Age 42/43	N	Relative difference (OR, CI95%)	Absolute difference (% , CI95%)
1946 NSHD	3054	1.28 (1.02, 1.61)	3.4 (0.4, 6.3)
1958 NCDS	4679	1.97 (1.64, 2.36)	8.1 (6.1, 10.1)
1970 BCS	3788	1.41 (1.20, 1.67)	5.5 (2.9, 8.0)
Age 50/53		Relative difference (OR, CI95%)	Absolute difference (% , CI95%)
1946 NSHD	3222	0.92 (0.76, 1.11)	-1.4 (-4.5, 1.7)
1958 NCDS	4091	1.34 (1.13, 1.58)	4.3 (1.9, 6.7)

A structural equation modelling approach
to understanding childhood influences on
happiness , cognitive functioning and
well-being in early old age

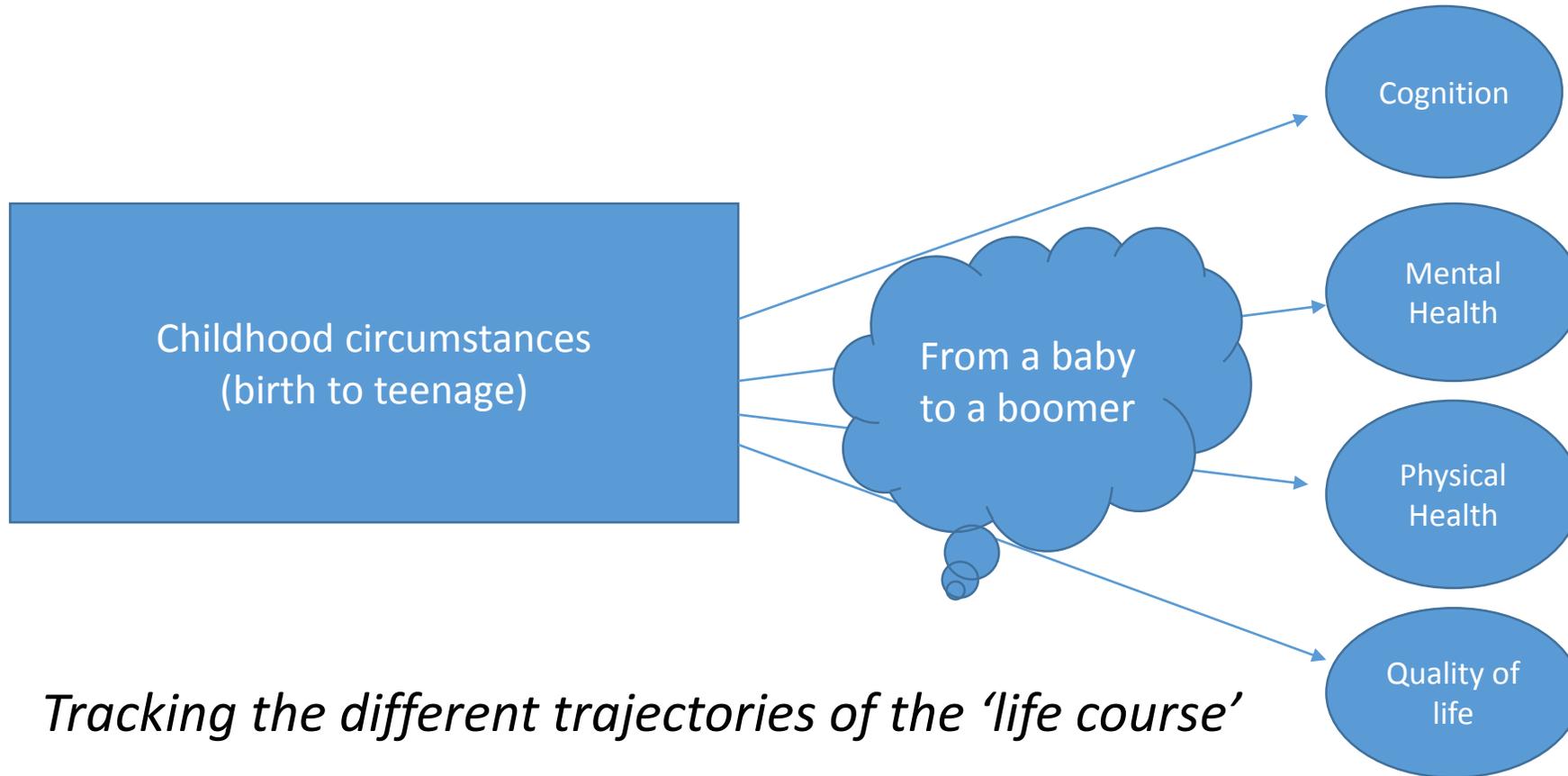
Brian Dodgeon, Praveetha Patalay, George Ploubidis
& Dick Wiggins

Aims and objectives

Our aim is to explore the impact of aspects of childhood and early life on later 'life' (aka early old age, EOA) for a group of 50-year olds living in the UK in 2008. In particular to:

- Examine EOA outcomes including cognitive performance and key measures of health and well-being based upon the joint effect of :
- Early life indicators of social (dis)advantage, performance in cognitive assessments, family disruption, child and adolescent behaviour and expressions of unhappiness in childhood

Expressed as a 'life course paradigm'



Operationalising our conceptual framework in a Structural Equation Model (SEM)

- *Combining the interplay of relationship between latent and manifest variables. See Everitt (1984), Bijleveld et al (1998) & Little (2013).*
- *Modelling objective is to reproduce the correlation(covariance) matrix amongst our manifest variables;*
- *In the context of maximising the amount of information available*
- *All this translates into:*
 - *Specifying the model*
 - *Assessing 'goodness of fit'*
 - *Having a strategy to handle item missingness*

Goodness of fit criteria

- **Root Mean Square Error of Approximation (RMSEA)**; values < 0.05 regarded as 'good fit'; <0.08 'reasonable fit'
- Also, comparative fit indices the **Tucker Lewis Index (TLI)** and the **Comparative Fit Index (CFI)** independent of sample size acceptable values >0.90

Handling item missingness

- Use of **Full Information Maximum Likelihood (FIML)** technique maximises all available information under the assumption that data are Missing At Random (MAR). Adjusts mean and covariance structure. Anderson (1957), Arbuckle (1996), Woithke (1998)
- Unlike, **Multiple Imputation** which generates replicates of filled-in data. Again operates under the MAR assumption.
- For a debate on pros and cons see
Enders, C.K. and Bandolos, D.L. (2001)

Participants

- 8555 at age 50 years from the **1958 British Cohort (NCDS)** who have the four outcomes at this sweep and are also present for the childhood sweeps
- Whole cohort: everyone born in GB in one week in 1958 (N=17415)
 - augmented up to age 16 by 925 immigrants born in that same week
- Attrition (not traced, refusal, emigration, death) reduces numbers:
 - Age 7: N=15425
 - Age 11: N=15337
 - Age 16: N=14654
 - Age 50: N= 9790
- Full Information Maximum Likelihood estimation (FIML) is applied wherever there are one or more items per life domain with a genuine response

Early-Life (childhood) circumstances -1

Starting to build our structural equation model, we first take four indicators of very-early circumstances:

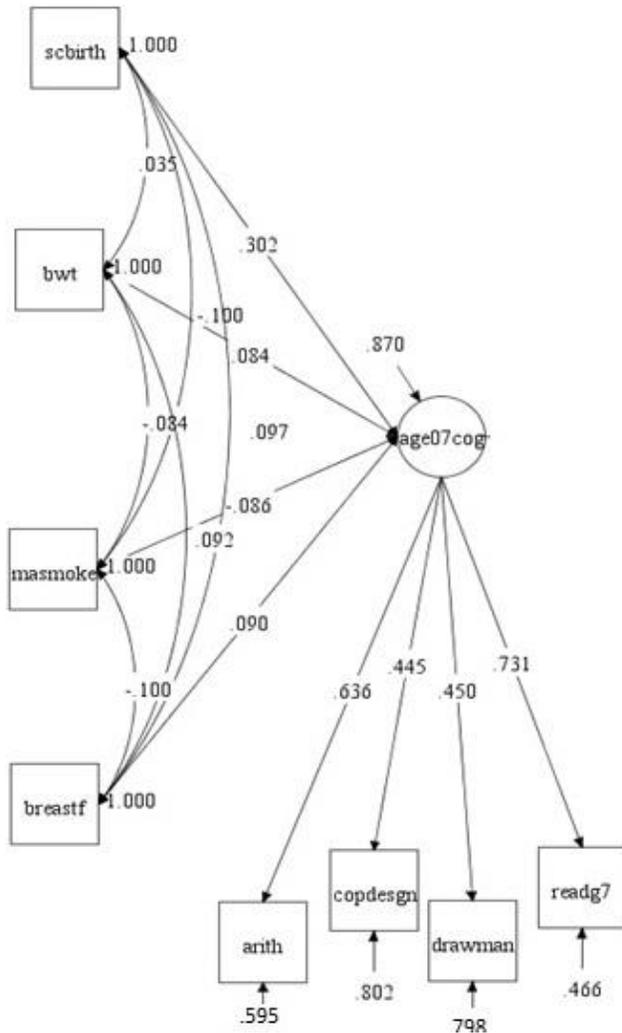
- Social class of parents at birth (variable 'scbirth')
- Birthweight (bwt)
- Whether mother smoked during pregnancy (masmoke)
- Whether breastfed (breastf)

Early-Life (childhood) circumstances -2

Our first childhood latent variable is 'Age 7 success at cognitive tests' (Age07cog), based on four manifest variables indicating test results:

- Problem Arithmetic test score (arith)
- Copying Designs test (copdesgn)
- 'Draw-a-Man' test (drawman)
- Southgate Reading Group test score (readg7)

Early-Life (childhood) circumstances -3



Age07 cognition is defined as a Latent Variable (LV) with four indicators. We regress Age07cognition on the four early-childhood variables.

Social class (.302) at birth has a relatively strong relationship with performance in cognitive ability tests at age 7 years; other predictors matter: breastfeeding (.090) and birthweight (.084) have positive loadings; mother smoking has a negative effect (-.086)

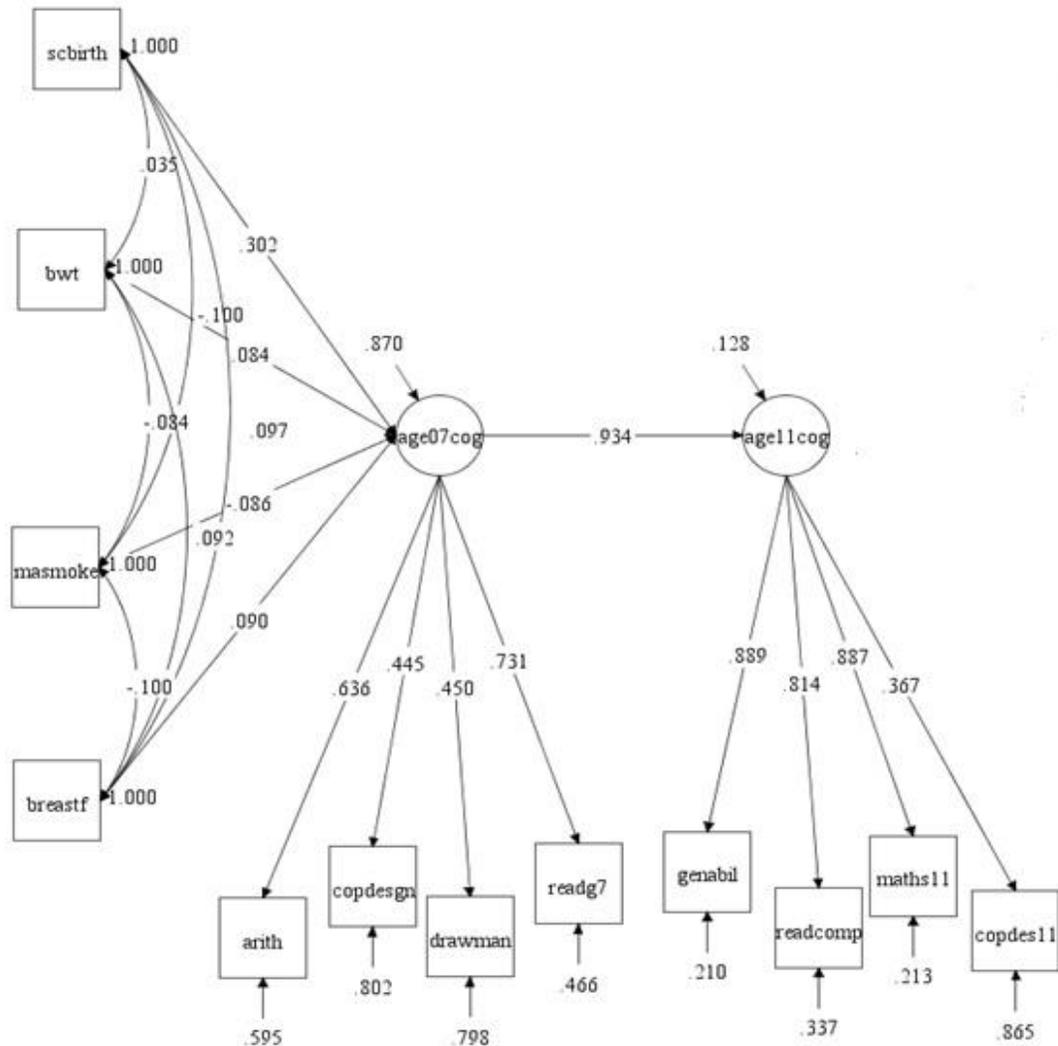
Early-Life (childhood) circumstances -4

Our second childhood latent variable for childhood cognition is 'Age11cognition', based on a child's performance across four tests:

- NFER* General Ability Test (genabil)
- Copying Designs Test (copdes11)
- NFER Reading Comprehension Test (readcomp)
- NFER mathematics Test Score (maths11)

* National Foundation for Educational Research

Early-Life (childhood) circumstances -5



The model structure begins to deepen – we now model a direct path between Age07cog and Age11cog, unsurprisingly (perhaps) there’s a strong relationship between the two performance measures (.934)

Defining our specific life domains and (global) life space measures in 'early old age' (EOA)

Specific Life Domains

Cognitive function at age 50 years

Physical Health (SF36 items)

Mental health (SF36 items)

General Life Space Domains

Quality of Life (CASP12v2)

Cognitive functioning

Tests at age 50

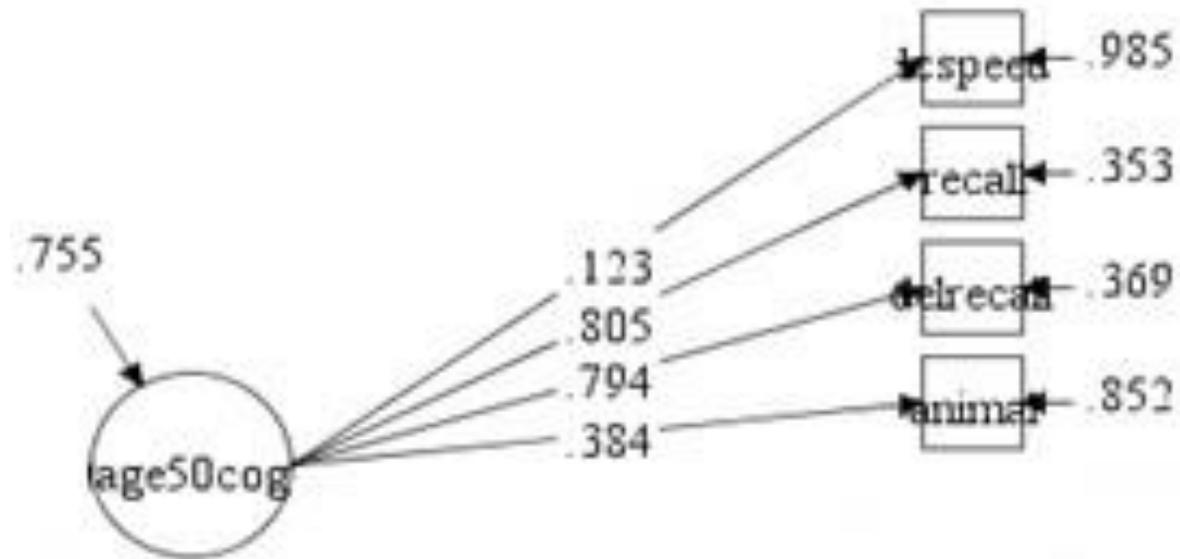
- Memory (10-word recall)
 - Instant (variable 'recall')
 - After 5 minutes' delay (delrecall)
- Executive function
 - Number of animals named in 60 seconds (animal)
- Mental acuity
 - Visual scanning of pages of letters
 - Objective - cross out all letters P and W encountered (lcspeed)

Our first EOA latent variable is based on these four manifest variables:

Recall; delrecall; animal; lcspeed

BROWN, M and DODGEON, B. (2010) [NCDS Cognitive Assessments at Age 50: Initial Results](#). CLS Working Paper 2010/1. London: Centre for Longitudinal Studies.

EOA: Cognitive functioning Latent Variable (Age50cog)



Reasonably well defined

Self-rated health

SF36 scale consists of 8 scores on health status (range 0-100 each):

- Physical functioning (phys_func)
- Role-limitations due to physical health (lim_phys)
- Pain score (pain)
- General health (gen_hlth)
- Role-limitations due to emotional problems (lim_emot)
- Energy/fatigue (fatig)
- Emotional Well-Being (em_wb)
- Social Functioning (soc_func)

We separate the items as two domains covering physical and mental health:

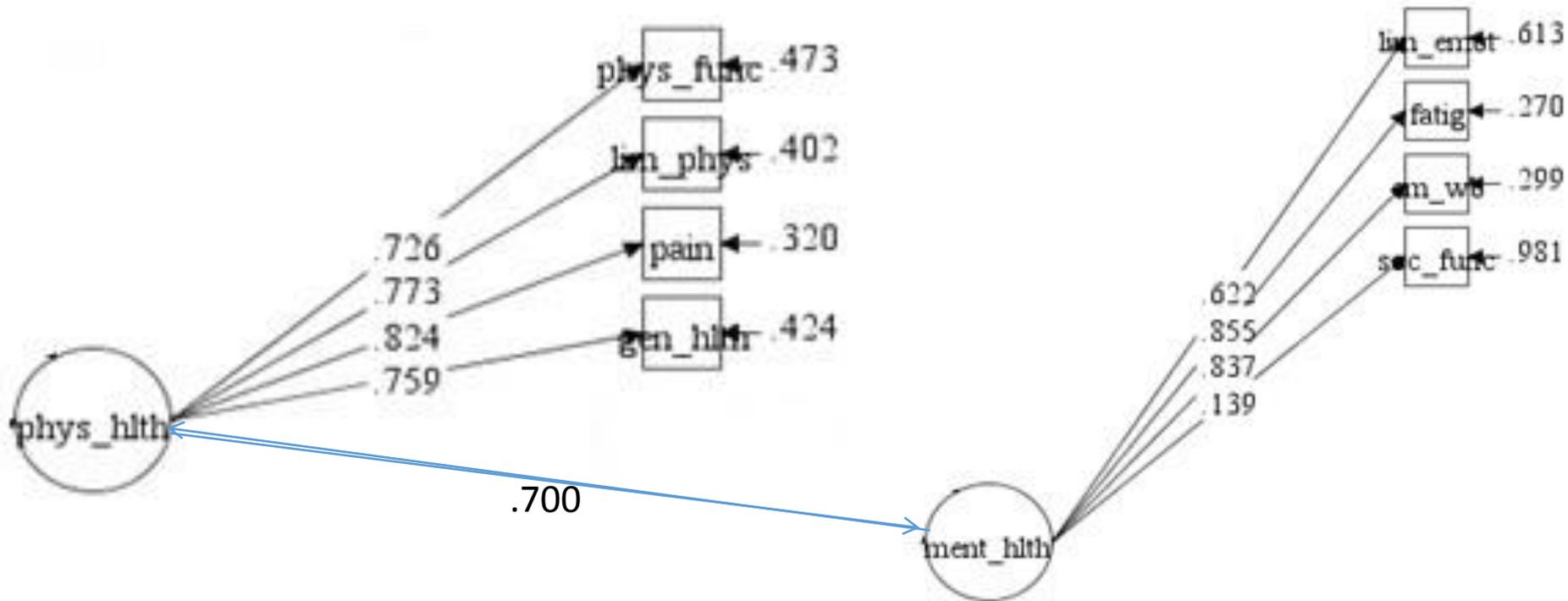
PHYS_HLT based on the first four (phys_func to gen_hlth);

MENT_HLTH based on the last four (lim-emot to soc_func) in the list above.

Jenkinson, C., Wright, L. and Coulter, A. (1994). Criterion validity and reliability of the SF-36 in a population sample. Quality of Life Research 3.1 : 7-12.

Brazier, J.E. et al (1992). Validating the Sf-36 health survey questionnaire: new outcome measure for primary care. BMJ 305.6846: 160-164.

EOA: Latent Variables for physical (Phys_hlth) and mental health (Ment_hlth) taken from eight self-rated items in SF36



General Life Space : Quality of Life (CASP12v2)

CASP12v2

12 item 4-point Likert scale (3 questions for each area)

C- control - *I feel what happens to me is out of my control* (vars 'control1-3')

A- autonomy – *I can do the things I want to do* (autonomy1-3)

S- self realisation – *I feel that life is full of opportunities* (selfreal1-3)

P – pleasure – *I feel that my life has meaning* (pleasur1-3)

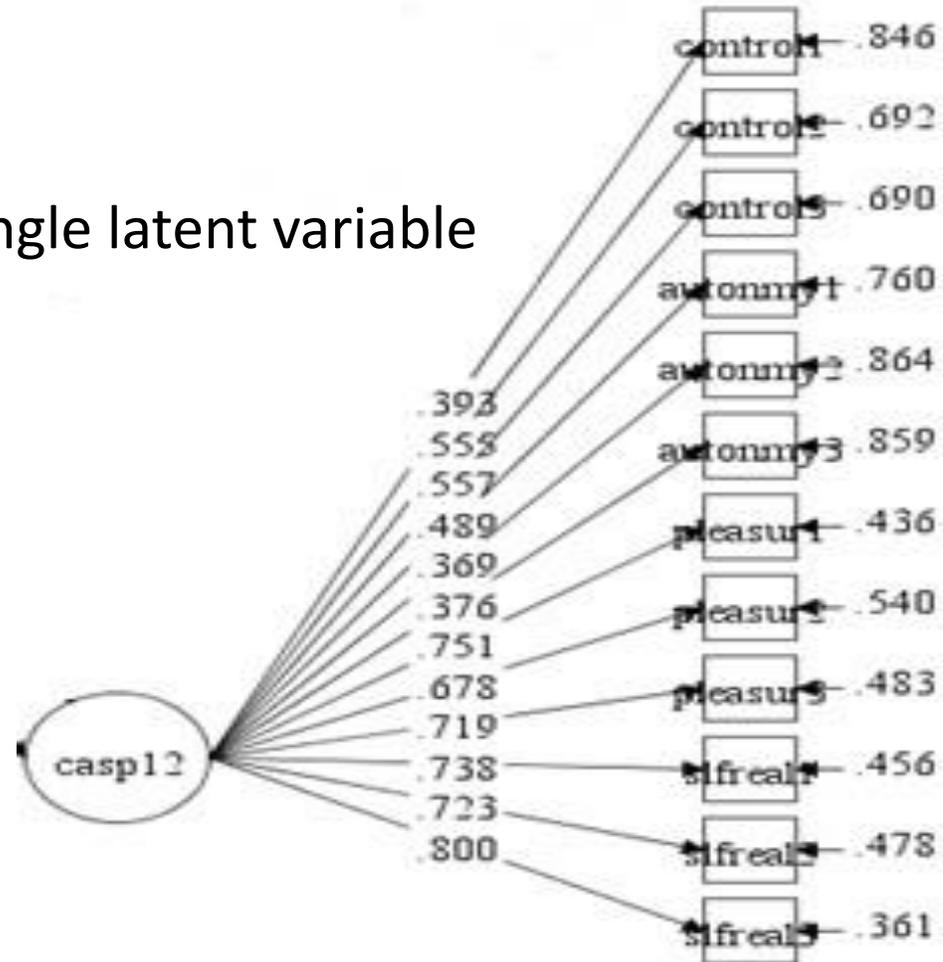
Our final EOA latent variable is based on these twelve manifest variables.

Wiggins, R.D., Netuveli, G., Hyde, M., Higgs, P. And Blane, D. (2008). The evaluation of a self-enumerated scale of quality of life (CASP-19) in the context of research on ageing: a combination of exploratory and confirmatory approaches. Social Indicators Research 89, 1, 61-77.

Also, for history and development see www.casp19.com

EOA: Quality of Life Latent Variable (CASP12)

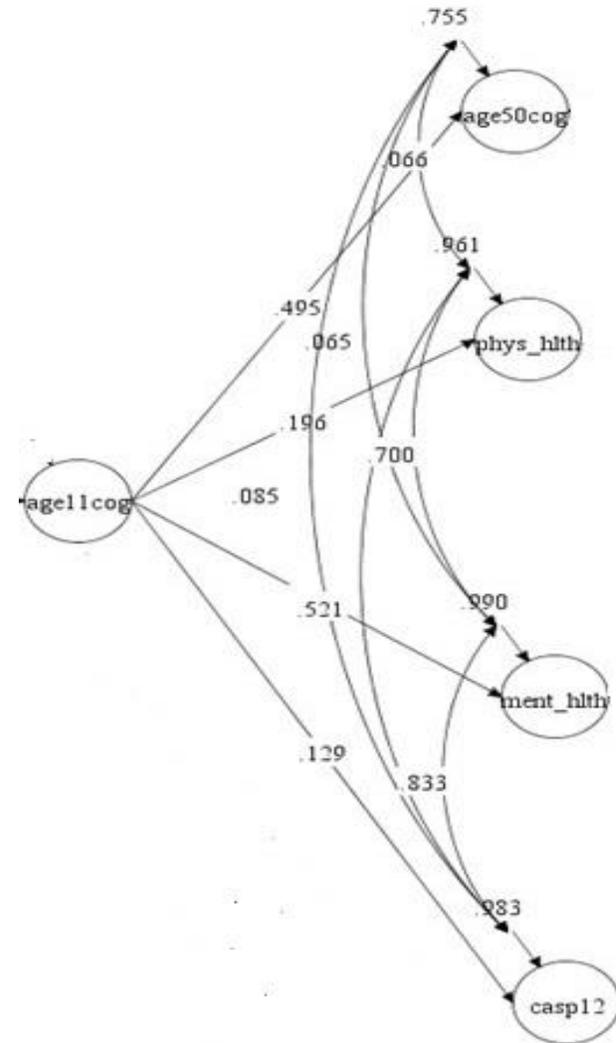
Applied here as a single latent variable



Modelling our Early-Old Age (EOA) domains as a 'first order factor analytic' model

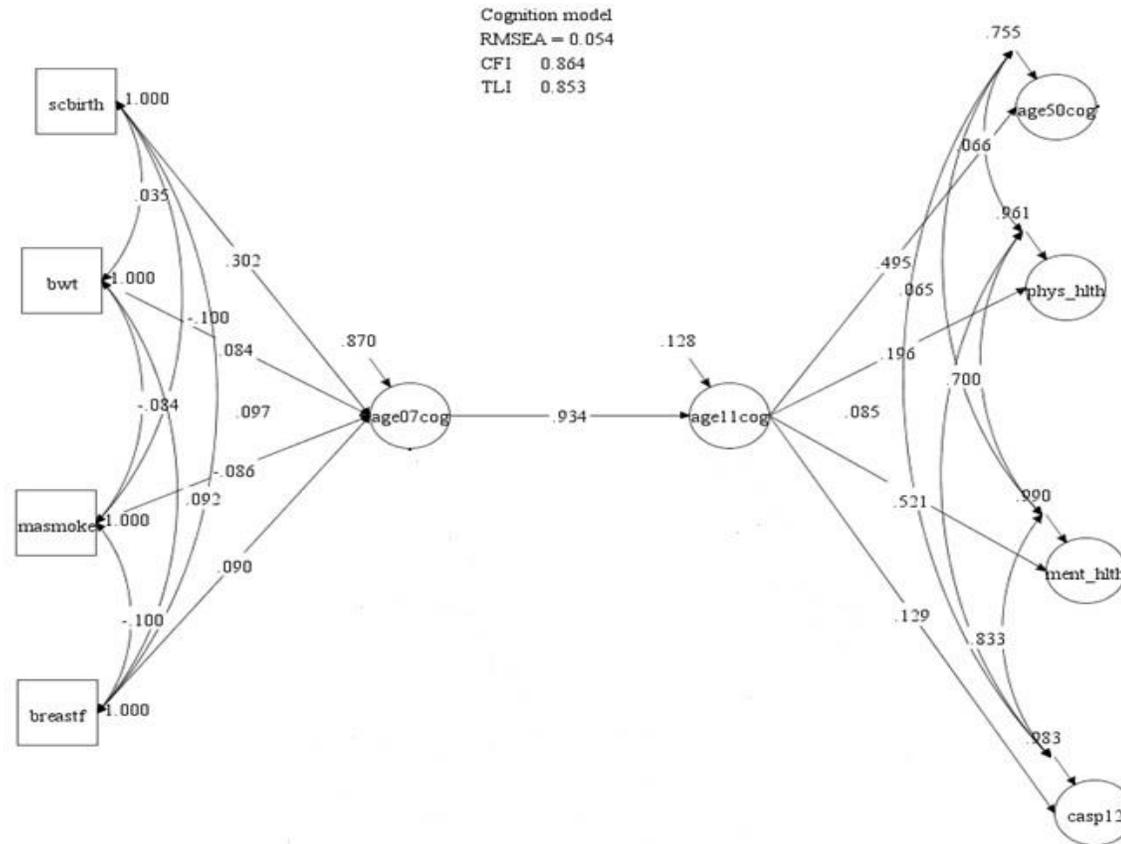
We regress our four 'outcome' LVs onto age11cog:

The four direct paths are all positive: 0.495 for Age50 cog, 0.196 for Phys_hlth, 0.101 for Ment_hlth and ,0.129 for CASP12v2. 'All other things being equal over four decades' your cognitive performance at age 11 years has benefits for your performance at age 50 years, your physical and mental health as well as your quality of life.



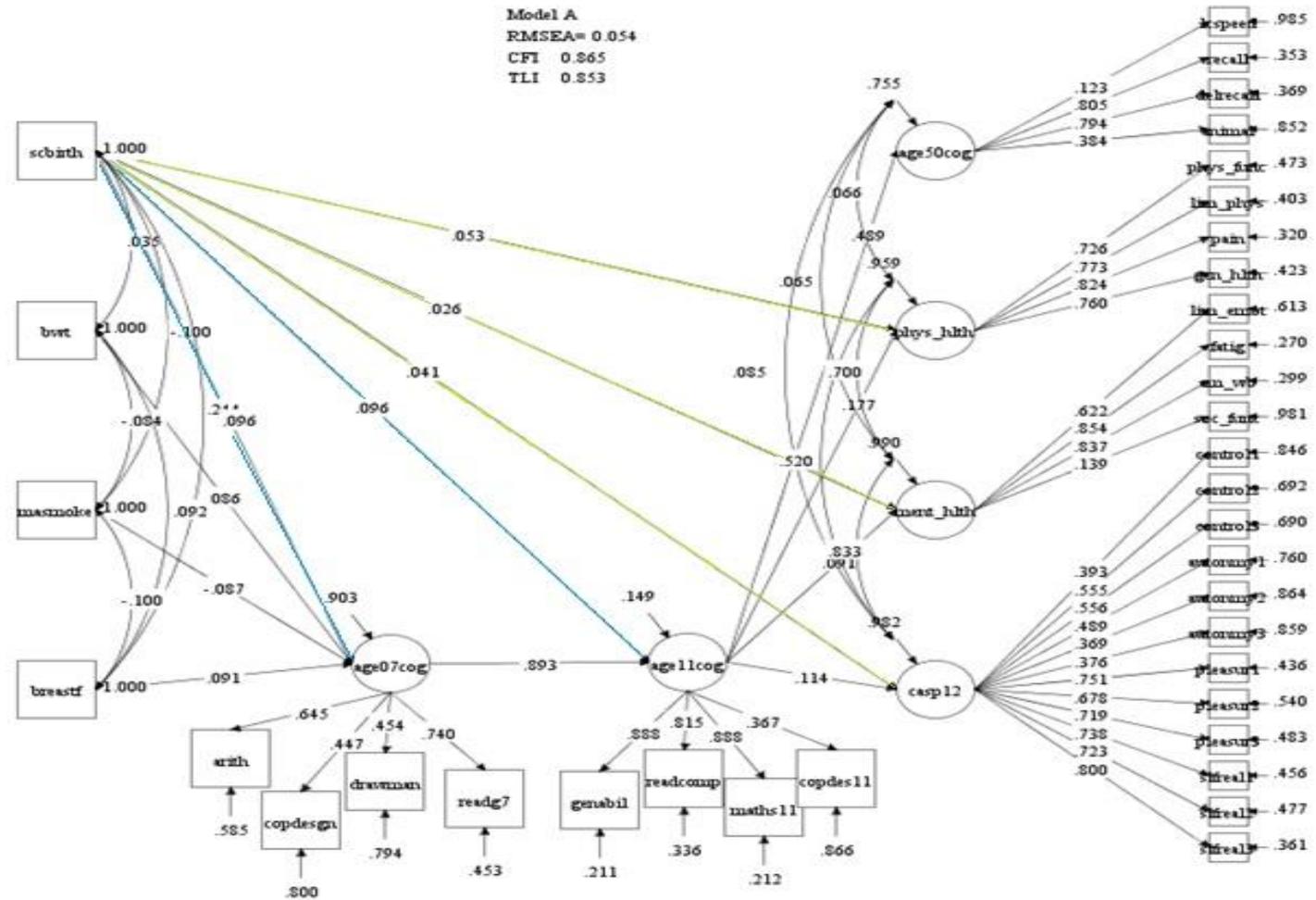
Connections between early life and early old age

We join the EOA outcomes to the rest of the model



A full SEM focusing upon birth circumstances, age 07 and age11 cognition performance and EOA outcomes

The model fits reasonably well;
 RMSEA=0.054,
 TLI=0.87, CFI=0.85.



More about childhood and adolescence

Behaviour (parental view)

Rutter scores at age 7, 11 and 16

Family difficulties

We create a latent variable from three age 7 variables:

- Housing problems
- Financial problems
- Unemployment

Cognition at age 16

Maths & English tests (age16mat, age16eng) + teacher's ratings of Maths and English ability (mathabil, engabil)

Mid-life SES destinations

Qualifications

Lifetime qualifications (academic & vocational)

Variable 'Quals' coded 0-5: 0=No quals, 1=NVQ1, 5=NVQ5-6

[Code 5 also represents degree or higher degree]

Social Class at Age 42 (1990-style classification from SOC90)

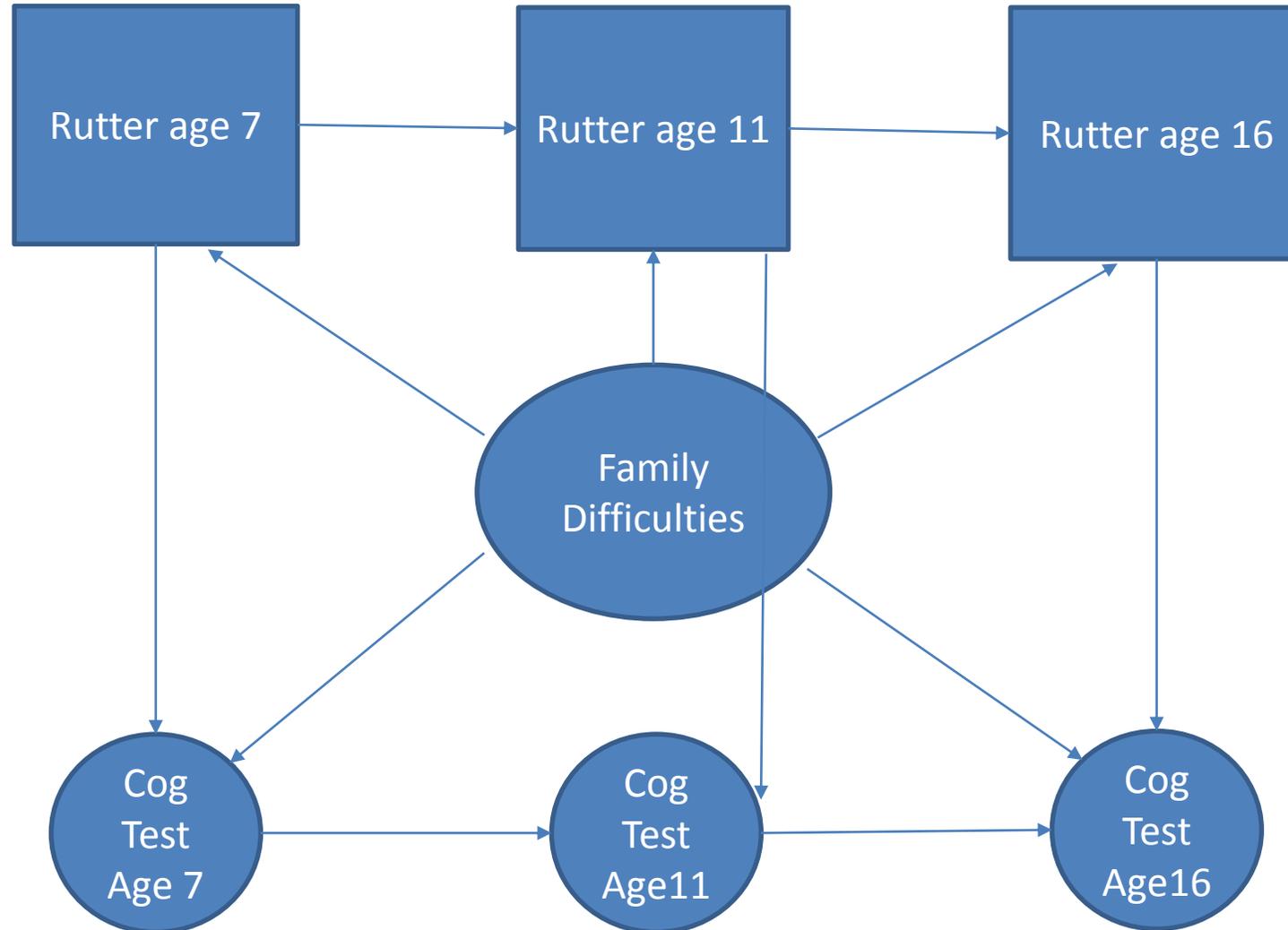
Variable 'SC42yrs' coded 1-6: 1=unskilled manual, 6=Professional

Rutter 14-point score (ages 7 & 11)

- To what extent is it true that the child:
(0 does not apply/1 applies somewhat/2 certainly applies')
 - has difficulty in settling to anything for more than a few moments
 - is bullied by other children
 - is miserable or tearful
 - worries about many things
 - is irritable, quick to fly off the handle
 - has twitches or mannerisms of the face, eyes or body
 - fights with other children
 - bites nails

Rutter, M (1967) *A children's behaviour questionnaire for completion by teachers: preliminary findings. Journal of Child Psychology & Psychiatry 8(1) 1-11.*

Family difficulties, behaviour and cognition



Cognition legacy

- The latent variable for age 16 years cognition is important as a 'second order factor' in its relationship with all four early old age outcomes
- A driver of age 50 cognition performance (.471) but also relates to physical health (.144) and mental health (.047)
- Also a driver of the mid-life variables 'Social class at 42 years' and 'Lifetime Qualifications,' which in turn have significant links to Quality of Life (CASP: .101, .109) as well as the above three age 50 outcomes

Social Class legacy from Birth

- Social class at birth (scbirth) drives cognition from an early age (.268 at age 7)
- Cognitive scores at age 7, 11, 16 drive Lifetime Qualifications (Quals, .588) and Social Class at 42yrs (SC42yrs, .504)
- But there are also small direct links from scbirth to Quals (.039) and to SC42yrs (.052)
- Although Quals and SC42yrs strongly affect the age 50 outcomes, there are additional direct links from scbirth to physical health (.035) and to Quality of Life (CASP, .027)

Conclusions

- Social advantage at birth has a positive return for performance in cognitive testing from an early age
- Performance in cognitive tests is sustained throughout the 'teenage' years
- Cognitive performance at age 16 years is strongly predictive of cognitive performance at age 50 years
- Cognitive performance at age 50 years relates to both physical and mental health as well as quality of life

More conclusions

- Family difficulties impact upon childhood and adolescent behaviour, affect cognitive performance and have small negative consequences for EOA outcomes

Thank you !!



Contact : b.dodgeon@ucl.ac.uk