
Families over the lifecourse: Quels apports des cohortes de naissance ?

Lidia Panico (INED)

Les Rencontres de Statistique Appliquée

Statistique appliquée en sciences sociales : Révolution des données, évolution des pratiques

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1. What are birth cohorts, what innovations and challenges?

What is a birth cohort study?

- A **birth cohort study** usually involve repeated surveys of large numbers of individuals from birth and throughout their lives.
- Focus today:
 - Representative of the general population
 - Generalist
 - Multi-disciplinary

- (1937-9: Boyd Orr, based on Carnegie Survey of Diet and Health)
- 1946 National Survey of Health and Development. N=5,362
- 1958 National Child Development Study. N = 17,415
- 1970 British birth cohort study, the « BCS70 ». N = 17,198
- 2000 Millennium Birth Cohort Study (MCS). N = 19,517.
- (LIFE study – 2012)

Why birth cohorts are useful

- 'Joined up' individual life stories, across different aspects of life and across time, linked into family and social context
- Family-level processes and mechanisms
- Provide information about individual change (repeated measures)
- Temporality is established
- Can investigate associations where an unmeasured characteristic may affect the outcome, if fixed over period of observation
- Can help separate age, period, and cohort effects

Challenges for (using) birth cohorts

- Repeated observations are not independent so must take account of this dependency
- Presence of missing data
 - dropout/attrition from study
 - missing 1 or more measurement occasions
 - taking part but not answering all questions at each occasion
- Very expensive
- Wait several years before birth cohorts are useful
- Generalist studies: competition from disciplines for time

- (1937-9: Boyd Orr, based on Carnegie Survey of Diet and Health)
- 1946: MRC National Survey of Health & Development
- 1958: National Child Development Study
- 1970: British Birth Cohort Study
- 2000-1: Millennium Cohort Study (MCS)
- (LIFE study – 2012)

The Millennium Cohort Study

- 19,000 children born over 12 month period (2000-2001)
 - Longer in Scotland to make up for a shortfall in births
- Geographically clustered by electoral ward
 - 3 types of ward: advantaged, disadvantages and high minority ethnic
 - Wards being disproportionately stratified: disadvantaged and minority ethnic
- Content multi-purpose & multidisciplinary

A generalist birth cohort

	9 m	3 yrs	5 yrs	7 yrs	11 yrs
Interview (and self-completion) with both resident parents	✓	✓	✓	✓	✓
Cognitive assessments		✓	✓	✓	✓
Physical measurements		✓	✓	✓	✓
Child self-completion				✓	✓
Older Siblings		✓	✓		
Interviewer Observations		✓	✓	✓	✓
Teacher Survey			✓	✓	✓

MCS Add-on studies

- Collection of bio-markers
 - Oral fluid sample for exposure to infections at age 3
 - Shed milk teeth for lead from age 6 upwards
- Physical activity monitoring at age 7
- Sub-studies
 - Mothers who had assisted fertility treatment
 - Nursery observations at age 3
- Methodological studies

- Merging in of neighborhoods statistics (challenges: ward geography; confidentiality issues)
- Merging in of hospital records: birth registration, hospital records (challenges: comparability across countries).
- Merging in to the Consistent School Database (CSD).
- Analysis of survey non-response: administrative data such as Child Register. May provide better info for survey weights.
- Training

Cross-cohort harmonization – the Closer platform



- A government-funded initiative to support cohort study teams and maximize the use of cohort data.
- Main activity: ***data and documentation harmonization*** across the different cohorts.
- Innovative cross-cohort analyses (see for example, work by Goisis, Özcan, and Myrskylä, on the decline of the negative association between low birth weight and cognitive ability, PNAS, 2017).
- Support (comparable) data linkage.

- Interdisciplinarity and the place of biomedical research.
- Relatively large gaps between follow-ups (for example, in MCS 6 interviews in 15 years; for comparison, in Elfe, 6 interviews in 6 years). How to capture change between waves?
- «Passage» to the child: how to keep them involved and engaged?

- An ambitious research study that aimed to recruit over 80,000 babies born between 2014-5 and 2018-9 from across the UK
- Focus on interplay between biology, behaviour and environment.
- Green light in 2011, funding through the Economic and Social Research Council and the Medical Research Council; £38.4 million until 2019.

- Pregnancy component of 60,000 mothers recruited during pregnancy (not nationally representative but to include range of ethnic and social backgrounds, over-representation of minority ethnic groups); birth component, nationally-representative, of 20,000 babies recruited through birth register.
- Pregnancy component: Mothers invited to attend a Life Study centre around 28th week of pregnancy. Then invited to attend same centre with their baby at 6 & 12 months. Interviews, biology (blood and urine), tests, collection placenta, cord blood, etc.
- Birth component: home visit at 6 months old, computer or telephone interviews at 1 yr.

- Recruitment from pregnancy
- Very large size
- Integrating pregnancy and birth components for analyses – thanks to the birth register which provided a common sampling framework for weighting.
- Focus on biology: better understanding at large scale of gene-biology-environment interactions
- Use of new technologies
- A focus on fathers – and non-resident fathers

- Discontinued from early 2016 due to the challenges encountered in recruiting participants.
- Why: A midwife shortage – only 50% of women attending scans approached; Follow up contact with mothers difficult; About half mothers with booked appointments did not attend; Visit too long overall; Integration within NHS key for a pregnancy recruitment however challenges in IT; challenges in engaging deprived and difficult-to-reach communities.
 - from: Dezateux, C; Colson, D; Brocklehurst, P; Elias, P; (2016) 'LIFE AFTER LIFE STUDY' Report of a Scientific Meeting held at The Royal College of Physicians, London, UK, 14th January 2016. (Life Study Working Papers). Life Course Epidemiology and Biostatistics/ UCL Institute of Child Health: London, UK

The future of birth cohorts?

- A specific research question, or a data collection infrastructure?
- Disciplinary priorities: assessing inequalities by SES requires large, representative population samples — vs questions relating to the origin of disease requires extensive biological samples.
- Representativeness when no national sampling framework (pregnancies).
- As research and technology moves on, pressure to measure more, but participant burden may become too great. Also: balance collection of novel measures with collection of (old) comparable information
- Engaging today's participants? More use of social media, communication strategies.

→ from: Dezateux, C; Colson, D; Brocklehurst, P; Elias, P; (2016) 'LIFE AFTER LIFE STUDY' Report of a Scientific Meeting held at The Royal College of Physicians, London, UK, 14th January 2016. (Life Study Working Papers). Life Course Epidemiology and Biostatistics/ UCL Institute of Child Health: London, UK

Important to create systems through which information can be more easily extracted from such administrative databases for use in cohort and other types of research.

Camilla Stoltenberg, responsible of Norwegian birth cohort and chaired the advisory committee to LIFE Study: “We don’t have the infrastructure. We’re trying to drive sophisticated vehicles like birth-cohort studies where there are no real roads.”

2. Studying families using cohort data

What can cohort data bring to family research

- Processes : no info from administrative data; retrospective biases
- Outcomes: little info from admin data, especially for mental health, cognitive development, « general » health
- Moving beyond dyads

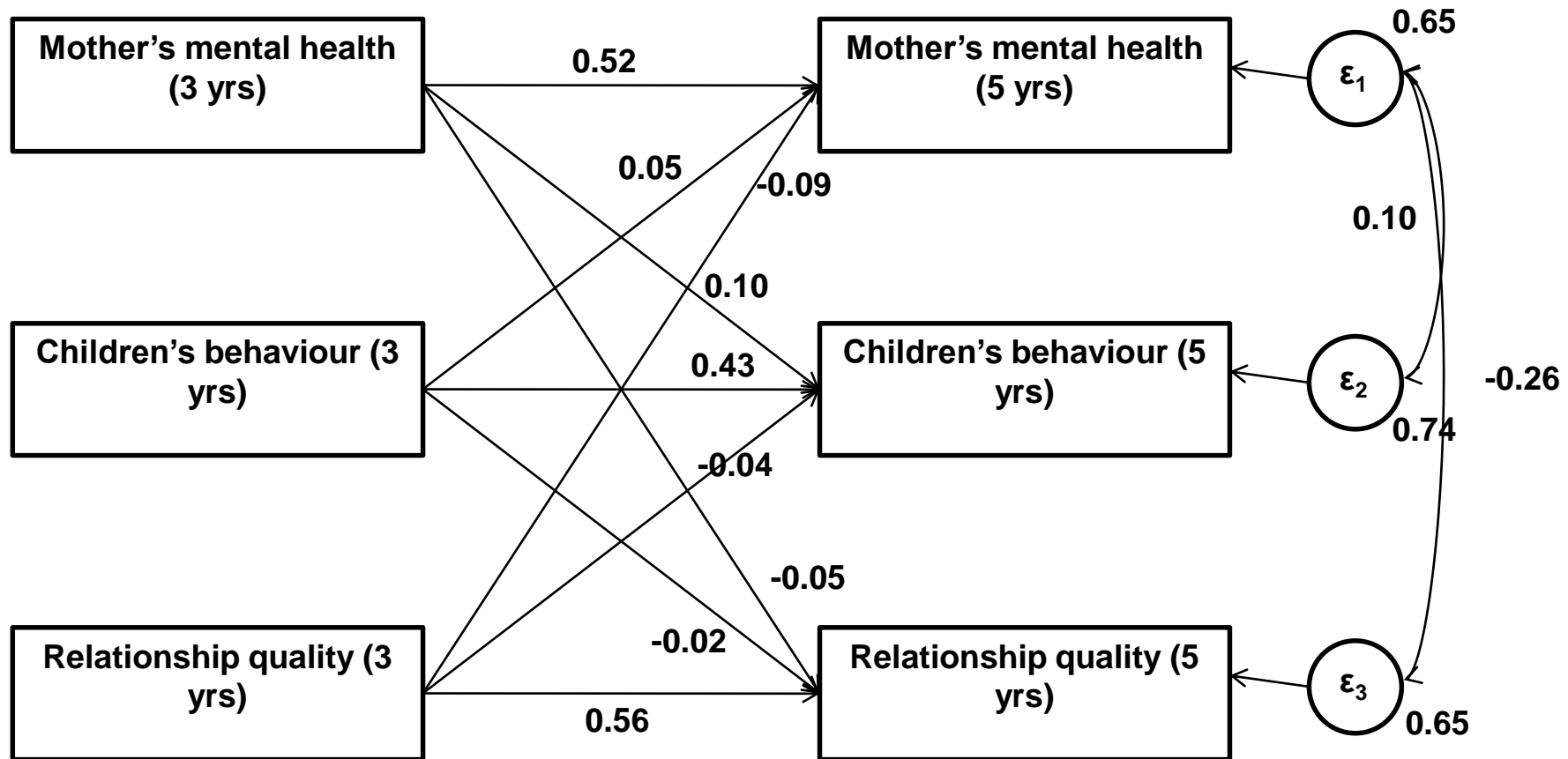
Challenges for family research

-
- Multi-informant strategy, including child own perspective
 - Information on both parents, siblings, and cohort members well-being
 - Triangulating with other sources (teachers) who don't observe child within household

- The effect of the mother's mental health on child outcomes
- Problems in the literature
 - The use of dyadic pairs when examining household relationships
 - Parental characteristic cause child outcomes, but could also be the other way around

(Panico, Becares, Webb, 2014)

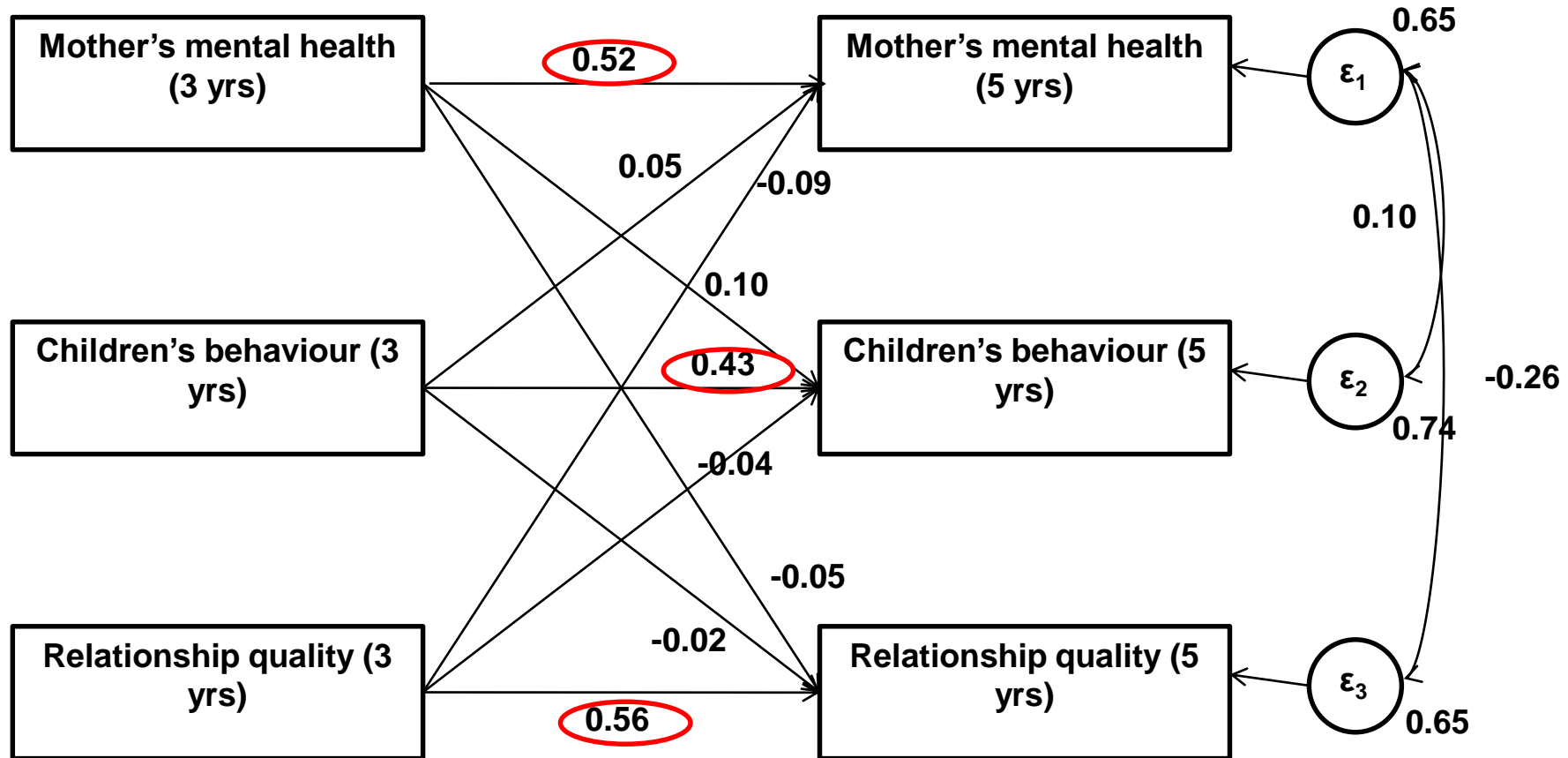
Cross lagged SEM models - Results



CFI = 0.998; TLI = 0.943; RMSEA = 0.051

Standardised estimates; bolding indicates statistical significance. Model adjusts for maternal age at birth, cohort member's age, cohort member's gender, income at sweep 3, highest educational qualification, and number of people in hhld at sweep 3.

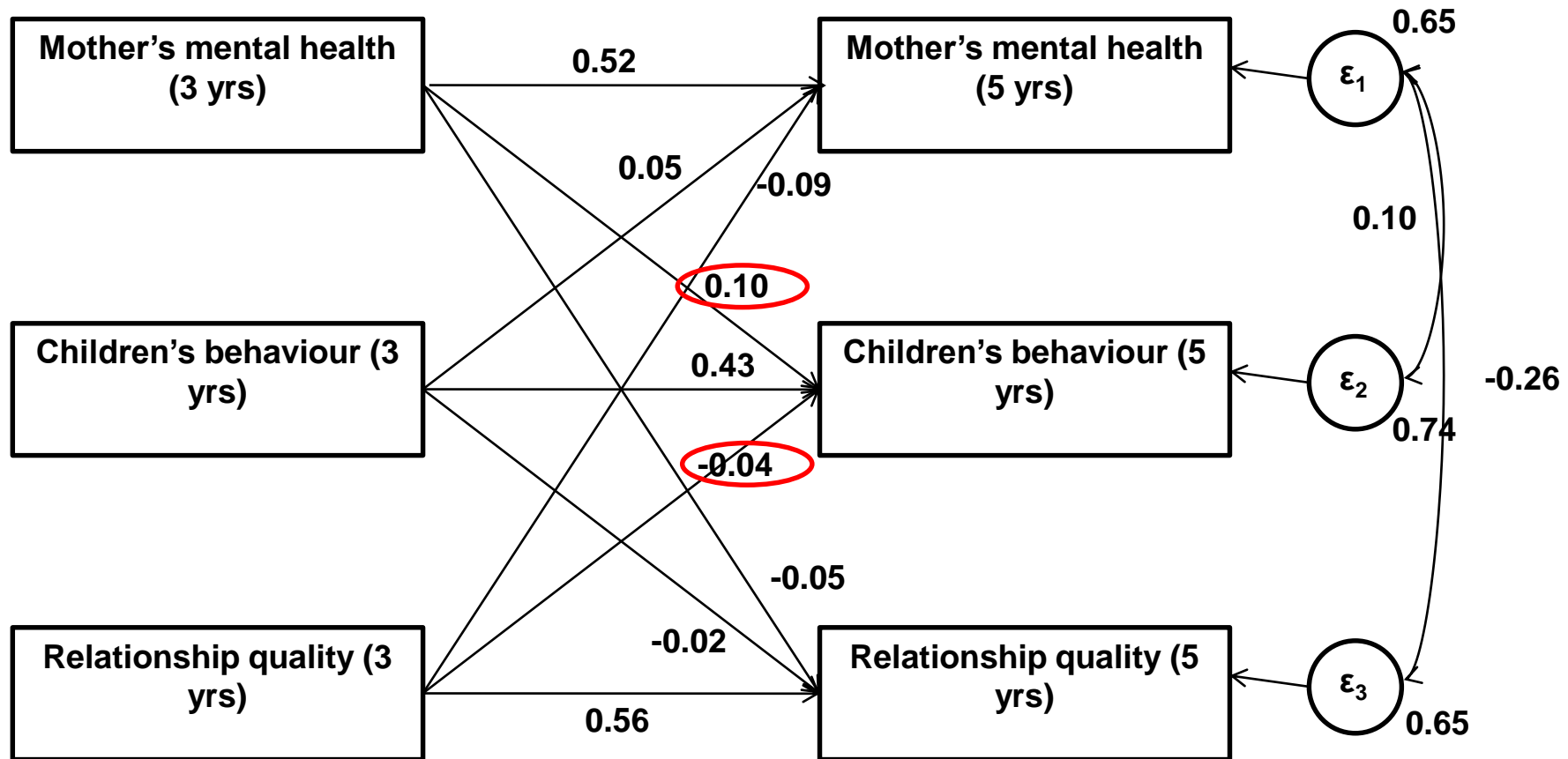
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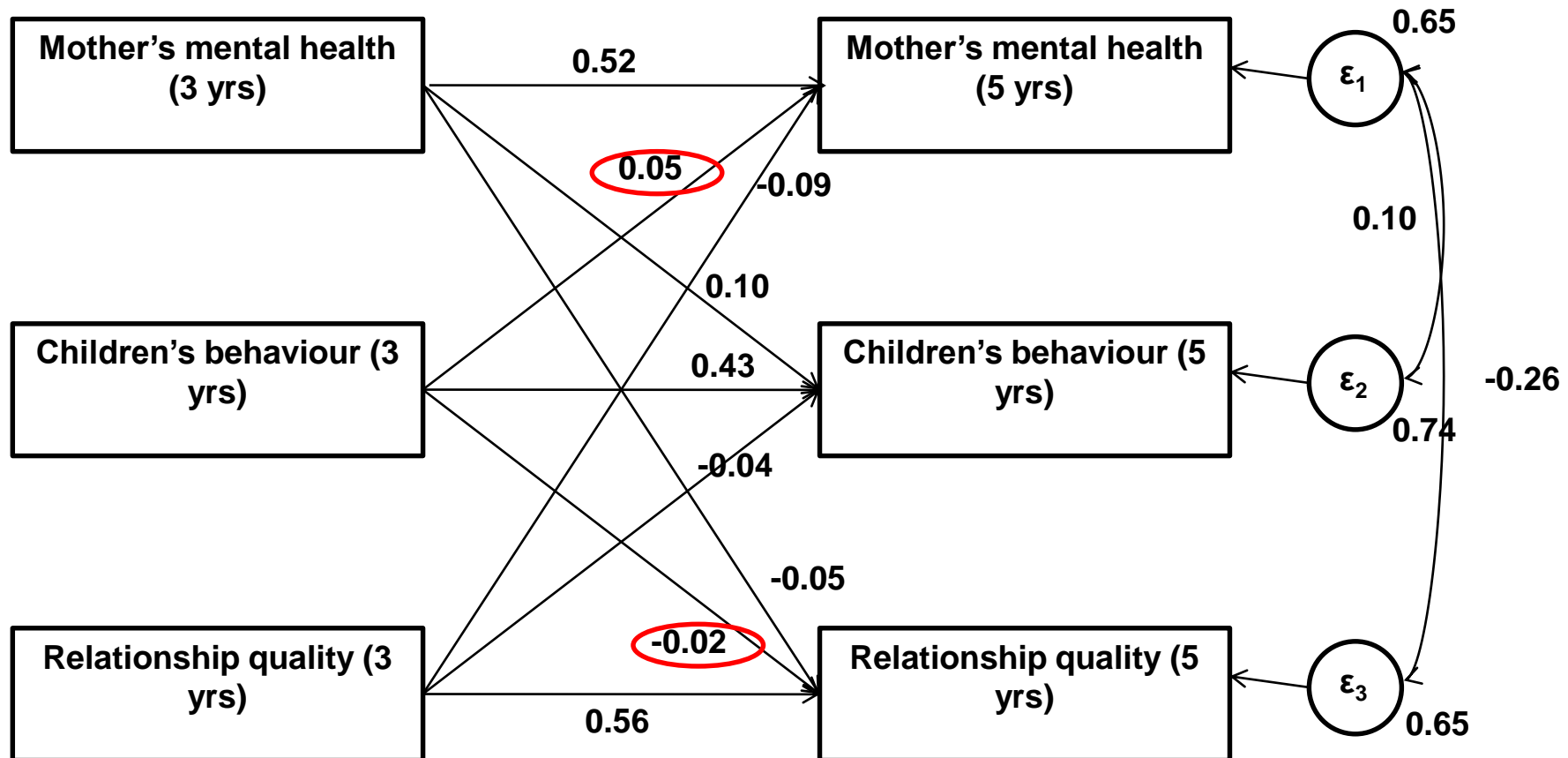
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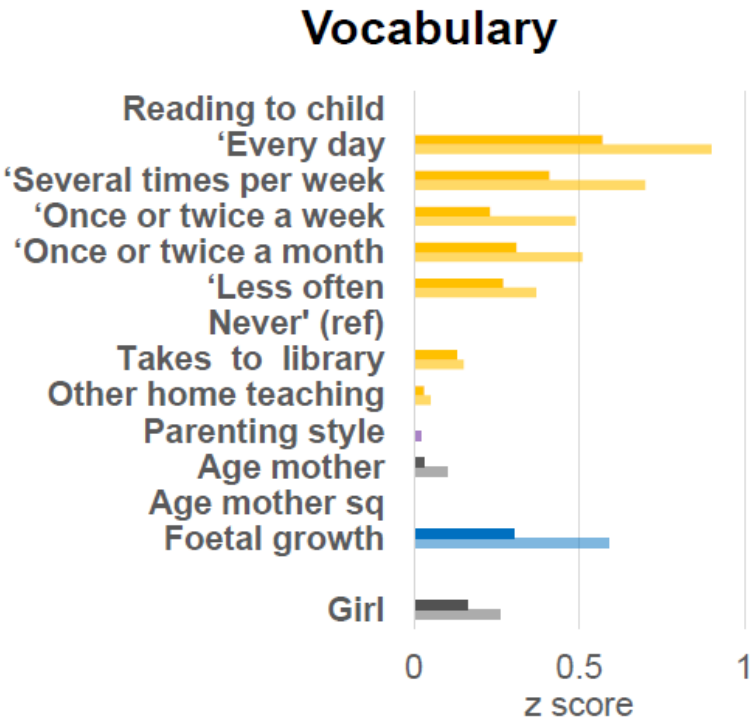


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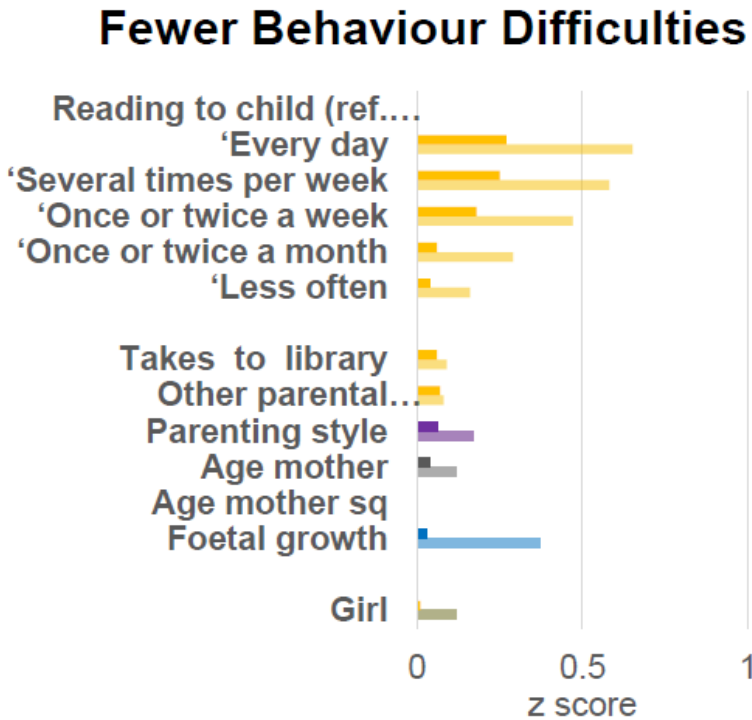
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MCS at age 3: Estimated effect of parental inputs on child development (Ermisch 2008)

Lower bounds (dark, 3SLS) and upper bounds (light, OLS) of true effects



Income gap explained: **22 - 67%**



Income gap explained: **32-66%**

MCS at Age 5: Parent behaviour predicting Cognition, Behaviour and Health (Washbrook 2010)

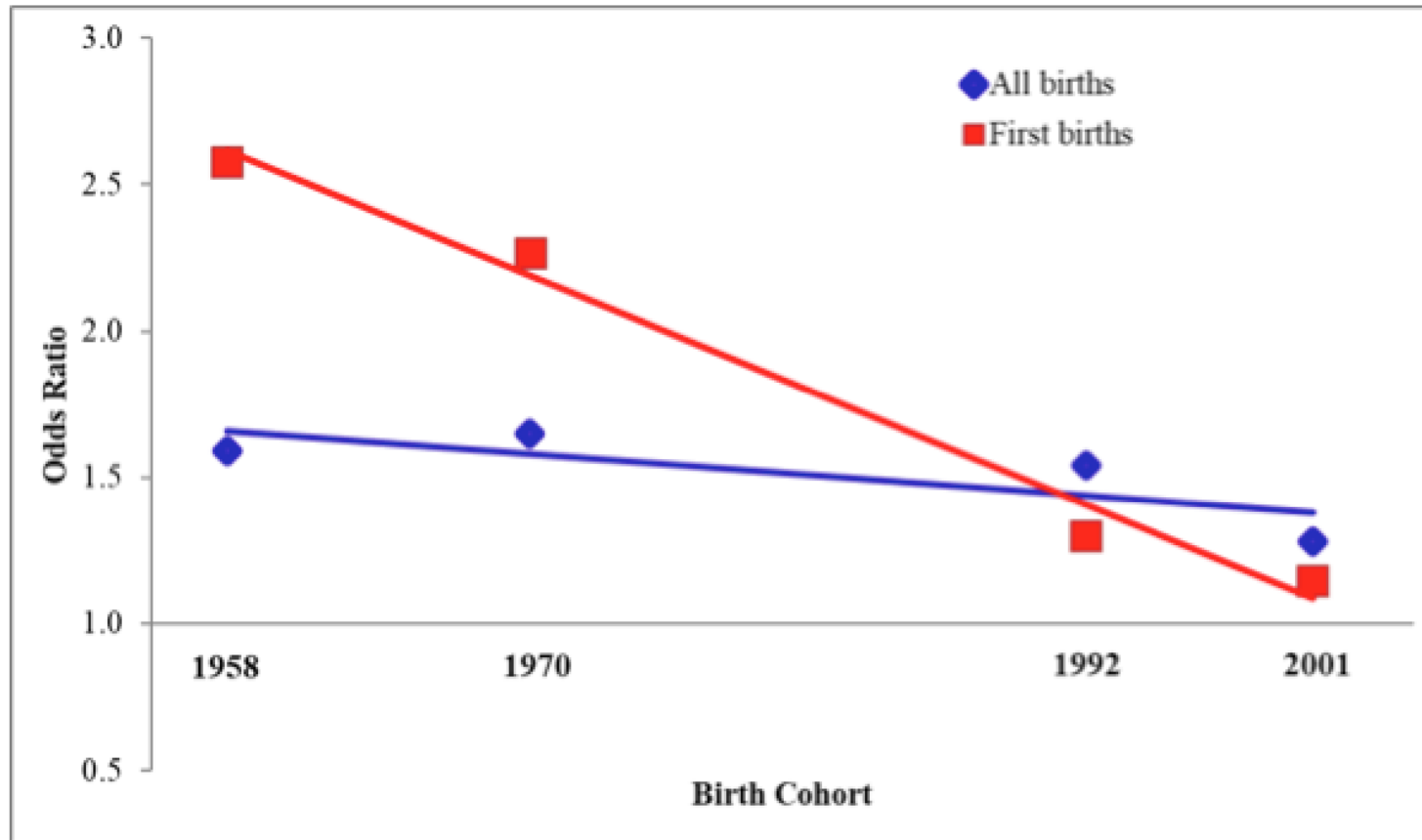
	Cog	Beh	Hlth
Home learning environment			
Home safe clean tidy		+	
Teaching in the home W2	+		
Mother's reading to child W2+3	+	+	
Father's reading to child W2	+	-	
Mother's creative activities w child W3	+		
Father's creative activities w child W3			
Mother's play activities with child W3			+
Father's play activities with child W3			
Library visits (W2 only sig)	+	+	
Weekly sports activities	+	+	+
Visits to places on interest	+	+	+
Parental warmth and sensitivity			
Mother-Child Relations (Pianta)W2	+	+	
Father-Child Relations (Pianta)W2		+	
Interviewer obs mum-child interaction	+	+	
Mother's child-rearing beliefs			+
Father's child-rearing beliefs			

	Cog	Beh	Hlth
Authoritative parenting			
Regular bedtimes W2+3	+	+	+
Regular mealtimes W2+3	+	+	+
Nonviolent discipline W2+3	+	+	+
Harsh discipline W2+3		+/-	
Obedience W3	+	+	+
TV watching > 3 hrs per day W2	+		
TV watching > 3 hrs per day W3	-	+	-
Computer games >1hr per day		-	
Health behaviours (W 1-3)			
Birth weight	+		+
Breast feeding	+	+	
Health care utilization	+		
Smoking in same room /pregnancy			-
Mother's alcohol and drug consumption	+	+	
Mother overweight/obese	+		
Father's alcohol and drug consumption	+		+
Father overweight/obese	-		

Also included: parental education, family structure, parental health and disability, early education, income, housing area deprivation, region, child age, sex

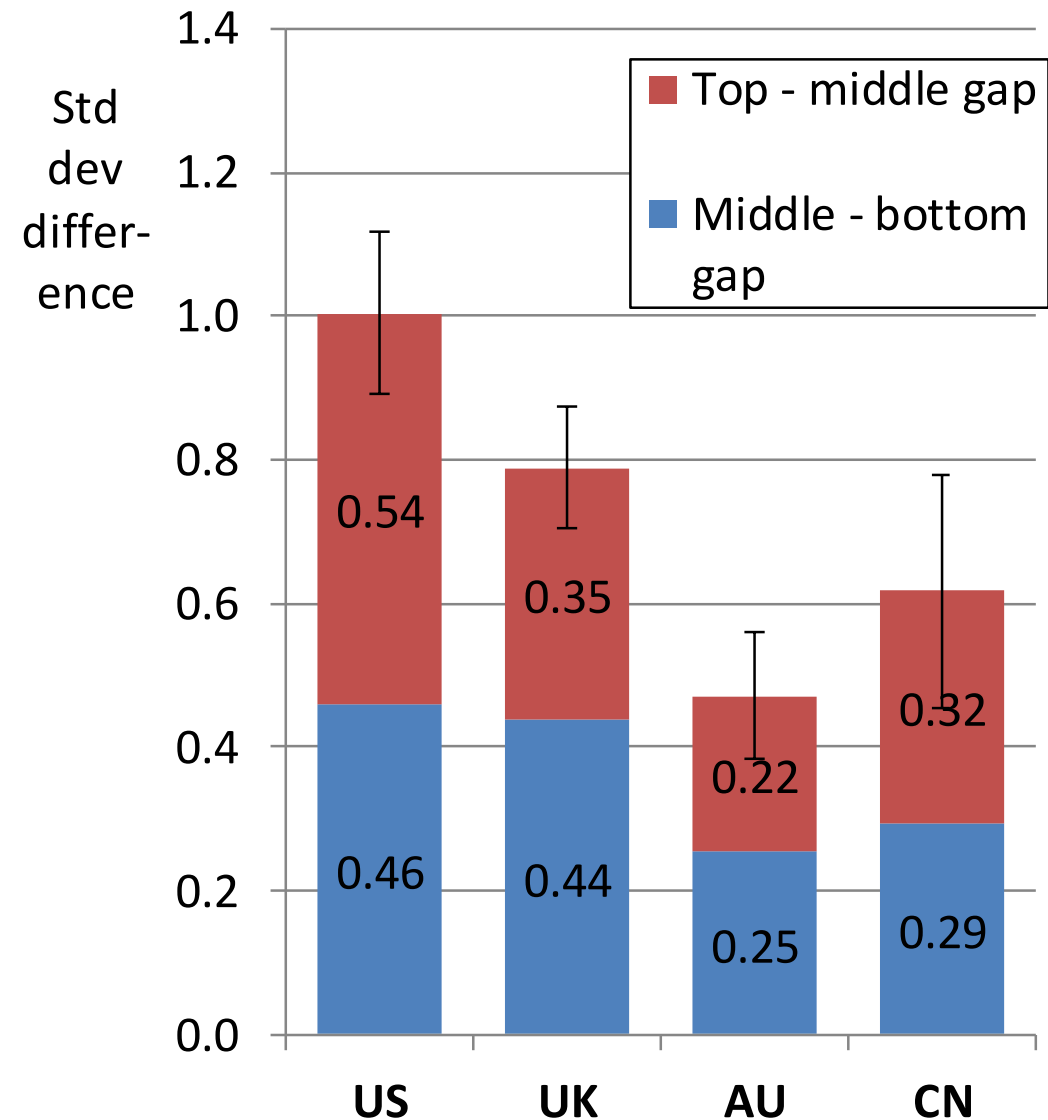
Cross-cohort research

The risk of low birthweight for mothers 40+ (Goisis, Schneider, Myrskylä. 2018)



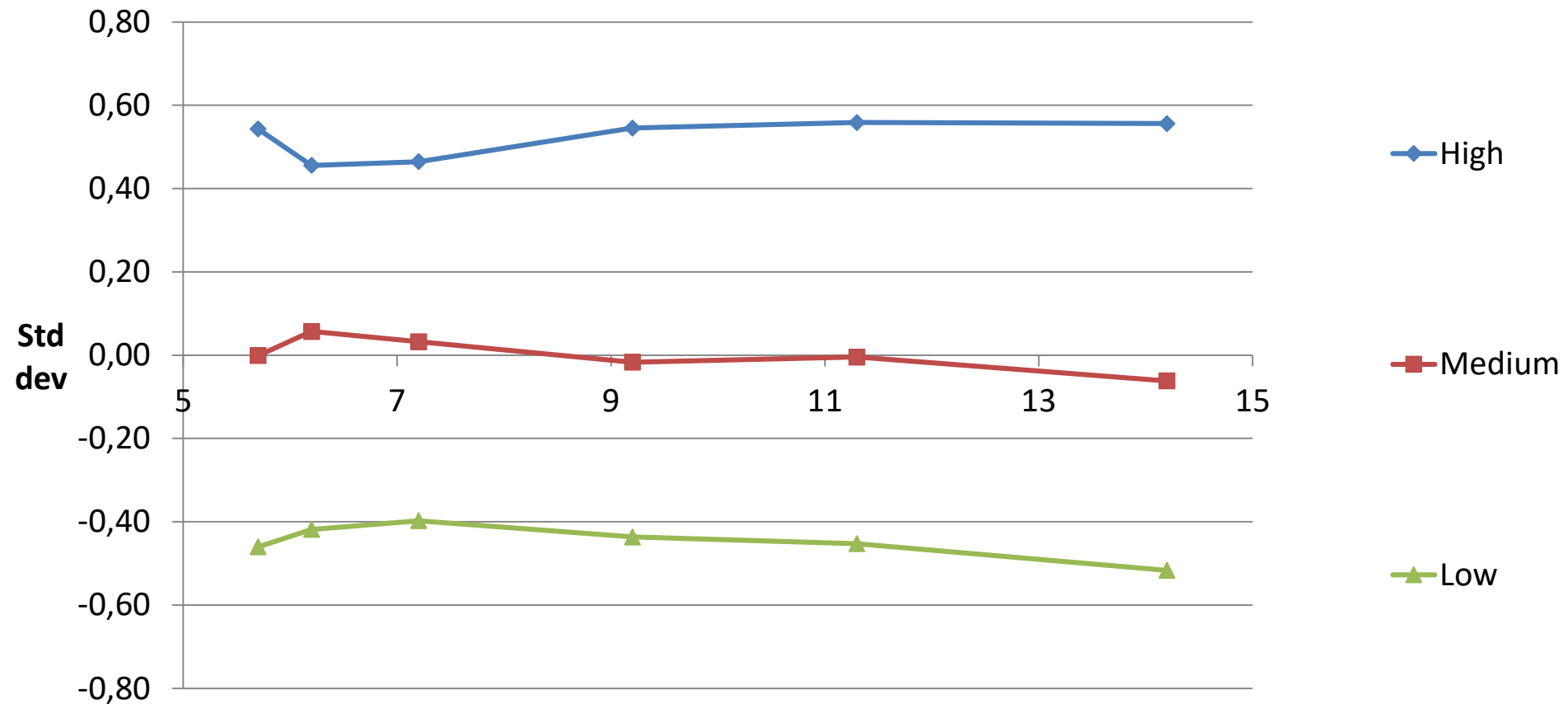
Comparative research

Differences in
vocabulary/reading at age 5,
by parental education
(Bradbury, Corak,
Waldfoegel, Washbrook,
2016)



Comparative research

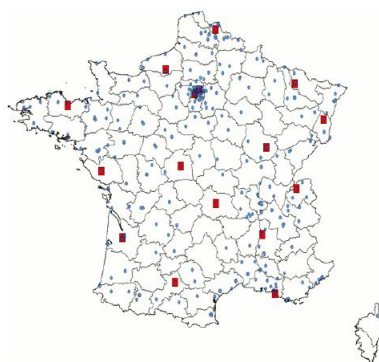
Trajectories in reading ages 5-15, by parent education (Bradbury, Corak, Waldfogel, Washbrook, 2016)



3. Birth cohorts in France

L'Etude Longitudinale Française depuis l'Enfance (Elfe)

- Cohorte représentative de 18000 enfants nés en 2011 en France métropolitaine
- Sélection aléatoire de 349 maternités (parmi 544)
- 4 périodes d'inclusions: avril; fin juin début juillet; fin septembre début octobre; fin novembre début décembre.
- Echantillons biologiques pour 211 maternités.



Ined
Inserm
EFS
InVS
Insee
DGS
DGPR
Drees
Cnaf

Study goals

**Follow-up of 20 000 children, born in metropolitan France
in 2011, from birth until adulthood**

- **Environment health:**
National biomonitoring plan
- **Social sciences:**
The impact on children of
 - Diversification of family structures
 - Parental employment conditions
 - New communication technologies
 - School career
- **Health:**
Effect of exposures in early life on the child health and

ELFE management and committees

The ELFE study is managed by:

- National Institute of Demographic Studies (Ined)
- National Institute of Health & Medical Research (Inserm)
- French Blood Service (EFS)



ELFE study is supported by:

- French Ministries of Research, Health & Ecology
- “Investissement d’avenir” program



L'Etude Longitudinale Française depuis l'Enfance (Elfe)

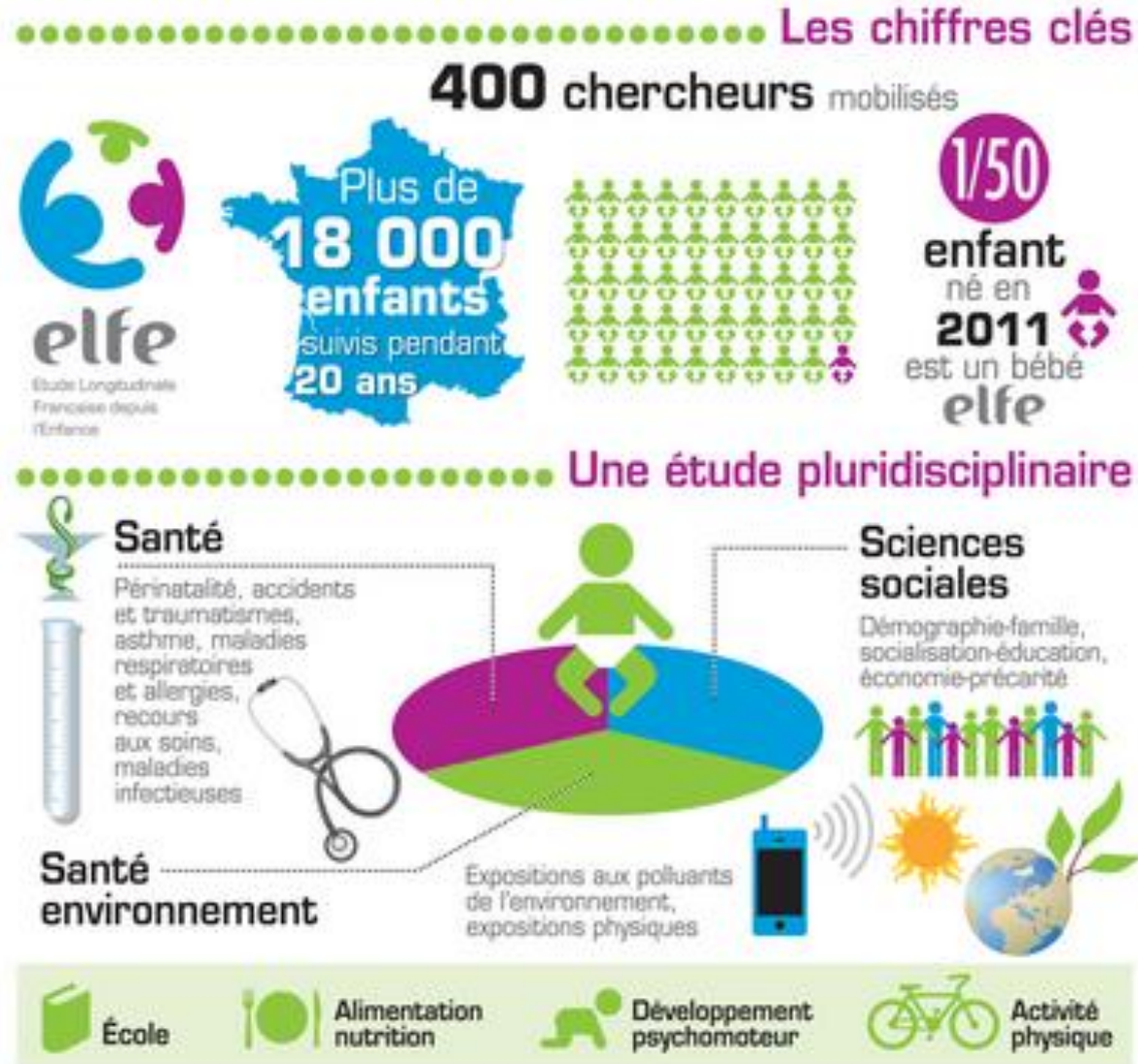


- Critères d'inclusion
 - Mère 18+ capable signer un formulaire consentement
 - 33+ semaines de grossesse
 - Naissance simple ou gémellaire
 - Intention de vivre en France au moins 3 ans

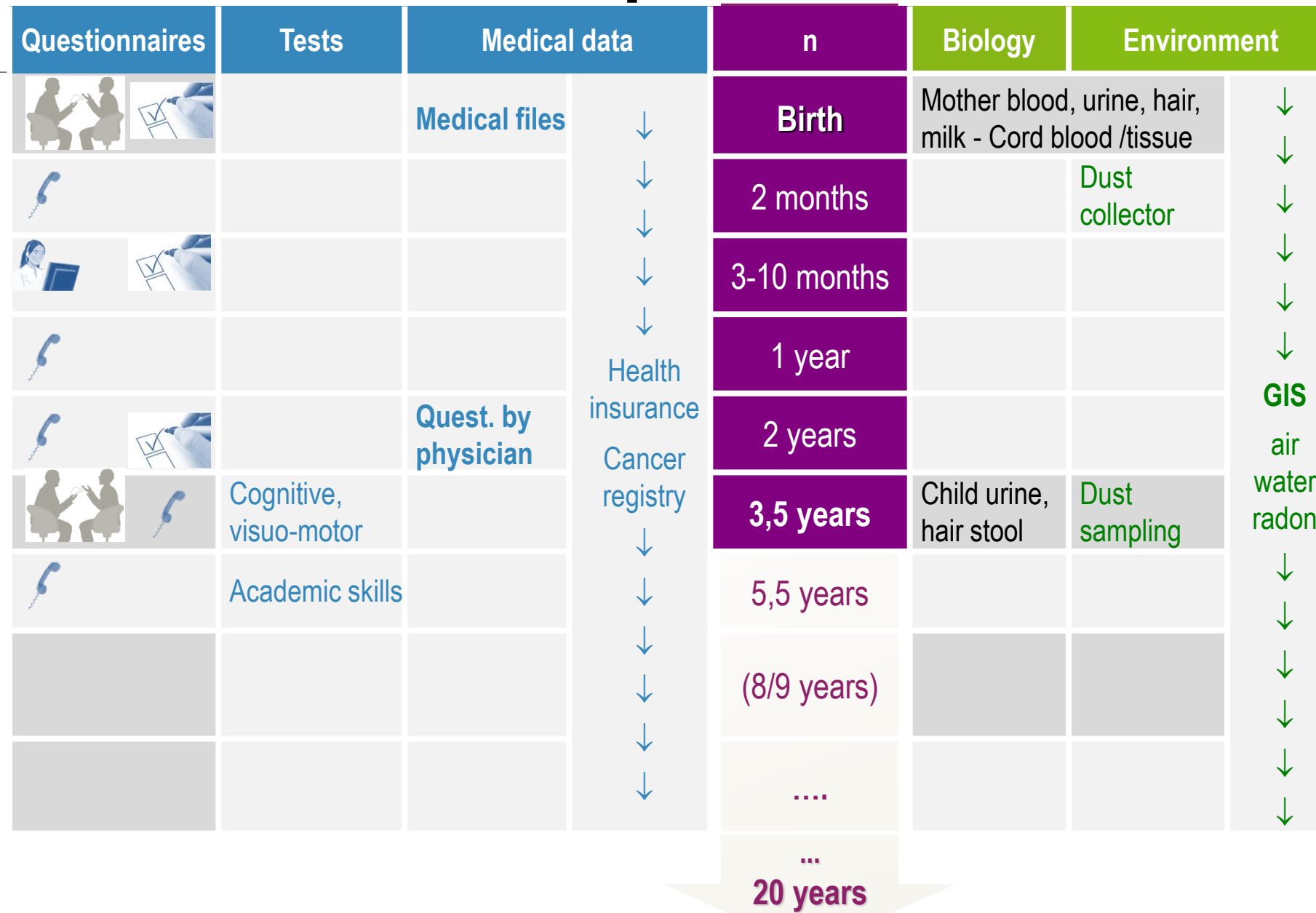


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Data collection steps



Pour en savoir plus sur Elfe....

Study page:
www.elfe-france.fr

Data platform:
www.pandora.vjf.inserm.fr/public

Socio-economic variables:
https://util_elfe.site.ined.fr/