# EDITORIAL

# Causation and association from grave to cradle

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This issue contains one theoretical article about causality in life course research and five empirical studies. These are arranged in ascending order of the birth dates of the cohorts they follow, and hence descending age of the various outcomes analysed. Their geographical coverage moves south from Sweden and Scotland, ending in France, and their topics cover health, economic and family domains.

In his keynote talk to the 2018 SLLS Conference in Milan, Ross Macmillan questioned whether life course researchers did enough to establish causality. The opening paper here, by Ross Macmillan and Carmel Hannan, 'Causality in life course research: the potential use of "natural experiments" for causal inference', has grown out of that talk, after much pruning of its original literature survey. That documented in greater detail how life course research typically fails to question whether the temporal sequence in longitudinal evidence is sufficient to establish causality, and uses the language of 'effects', 'determinants' and 'influence' where this may not be warranted. The argument here is that observational data may contain all sorts of biases – from omitted variables, selection, anticipatory behaviour, reverse causation and so on – that deserve methodological attention.

The Randomised Control Trial design has long been a rival of population-based cohorts, and it has now gained currency, not to mention a Nobel Prize, in development economics. While not advocating RCTs, Macmillan and Hannan recommend looking for 'natural experiments'. There are a range of methodological approaches that might be usefully applied in life course analyses: difference-in-difference estimators, regression discontinuities, instrumental variables and the comparison of cohorts. The authors recognise that 'causal claims are not necessary for social explanation', but they care enough about the issue to recommend the methodological toolkit to complement the more traditional approaches. Reading the articles that follow through the lens of this best practice guide would be a way to take on board these recommendations to improve the 'pursuit of causal explanation in life course research'.

The first empirical article concerns the end of the life course – the grave – using evidence from the oldest cohort in this issue. Amy Heshmati, Gita Mishra, Anna Goodman and Ilona Koupil contribute 'Socio-economic position at four time points

across the life course and all–cause mortality: updated results from the Uppsala Birth Cohort Multigenerational Study'.

This Swedish cohort was born around a century ago, 1915 to 1929, and their deaths or survival are analysed between 1980 and 2010, when their ages spanned 50 to 95. The cohort have been picked up in census and register data, such that there is also information on their social circumstances in childhood and midlife. Social advantage, derived from the head of household occupational status, is indicated as a binary score at four points over time. The paper confirms previous findings of a social gradient in adult mortality, and investigates the period during which social disadvantage may be most crucial. The authors find that social advantage in the recent past, ages 50 to 59, offers the strongest prediction of later-life mortality, although the earlier phases of the life course were also related to eventual survival. Women had consistently lower mortality than men, but both showed improved survival with higher socio-economic position. For women the protective association of social advantage was less concentrated on the most recent period, and less associated with education – where their qualifications were even lower than their male contemporaries.

The third paper has a rather similar structure to the second, making secondary use of censuses and administrative data to relate childhood circumstances to later life. Here the outcome is economic activity at the end of the labour force years, and the cohort are people born in Scotland in 1936. Matthew Iveson, Chris Dibben and Ian Deary report on 'Childhood socio-economic circumstances, cognitive function and education and later-life economic activity: linking the Scottish Mental Survey 1947 to administrative data'. This paper tests whether economic activity around retirement age can be predicted by far-reaching influences of early life. The evidence is based on people who at the age of 11 in 1947 took an all–Scotland mental ability test. The sample for whom the results are linked are those in the one in 20 taken from the 1991 census for the Scottish Longitudinal Study. There is forward linkage to their census records when they were aged 55, 65 and 75 in 1991, 2001 and 2011 respectively. More remarkably, there is backward linkage to age three. This exploits the 1939 National Register of the civilian population, compiled in anticipation of identity cards being needed for rationing should war break out. The register lists the occupation of every civilian adult, from which an index of household social occupational status has been coded for this study. Latent growth curves link early circumstances with the chances of being in the labour force at age 55 and of making transitions out of it up to age 75. The models were fitted separately for men and women, given their different rates of economic activity at 55 and their different state pension ages. There were also different patterns in the lifetime pathways. What for men would be abnormally low economic activity at 55 was directly linked to both low ability at 11 and lower qualifications. For women, the significant links did not include qualification, but did include household occupational status in 1939 as well as poorer results in the age 11 test. This irrelevance of female qualifications in a pre-war cohort echoes the finding from Uppsala. The authors build on the temporal sequence of their evidence to discuss the mechanisms though which cognitive ability may propel progress in the labour market.

The next cohort to appear in this issue is the one born in a week of 1946 in Great Britain, also concerned with 'Lifetime trajectories of socio-economic adversity and their associations with psychosocial factors and attitudes towards social class'. Its authors, Almar Kok, Rachel Cooper, Theodore Cosco, Martijn Huisman,

Dorly Deeg, Diana Kuh and Mai Stafford, relate their estimates of inter-individual heterogeneity in socio-economic trajectories to attitudinal and personality factors in childhood and early adulthood rather than later-life outcomes. After reviewing various theoretical models of patterns of adversity over the life course, such as Cumulative Disadvantage and Critical Period also investigated by Heshmati et al (this issue), these authors propose a data-driven typology of experience up to age 53. This latent class growth analysis takes evidence from six waves between ages 4 and 53. Household occupational class, housing tenure, housing amenities in childhood, and financial stress in adulthood are summarised in the number of binary adversities at each of six points.

Between 1950 and 1999 conditions on average improved for the 1946 cohort. Of the seven trajectory types, the most common was 'gradually decreasing adversity' (30%) and the next largest group was those recording no adversity over all seven surveys (23%). At the other extreme, 'persistent adversity' (at virtually all surveys) accounted for 8%. The authors note that this is likely to be an understatement, given selective attrition. In contrast to the two previous papers, no gender differences emerge as significant in these analyses. This is presumably because social adversity is measured at the level of the household, whose members are conventionally assumed to share social conditions.

Among the psychosocial factors in childhood related to the trajectories is parental interest in education. This was an important predictor of favourable adult outcomes, as was a teacher rating of self-management in adolescence. Low self-management and higher neuroticism at 26 were related to the pathways where adversity stayed high or did not decline. There is also a set of other variables, collected when the cohort was 26, on their beliefs about social mobility. These are even more difficult to interpret in a causal framework, but they give some food for thought, provided it is seasoned with the caveat that the mobility opportunities facing a cohort of young adults in the early 1970s are not typical of those facing the generation entering the labour force after 2000.

The penultimate article, 'Ethnic differences in height growth trajectories and early life factors: findings from the UK Millennium Cohort Study' by Yi Lu, Anna Pearce and Leah Li, jumps to a cohort born some 55 years later, and to the observation of another outcome variable – height – and a new dimension of inequality – ethnicity. Height was measured at ages 3, 5, 7, 11 and 14. It is crucial for estimating body mass index, but it is also of interest in itself. The authors use cubic growth models to describe trajectories and differences by ethnic group. There is sufficient sample size to distinguish three of these: White, South Asian and Black. South Asians show faster growth in childhood than Whites, despite their lower birthweight. There is also a consistent lead over others in the height of Black children. Gender and socio-economic circumstances are controlled but the focus is on ethnicity. The authors conclude that the evidence on different growth patterns will have relevance for future health conditions, but that causal factors, possibly genetics and culture, will also need further investigation.

The final article, by Ariane Pailhé, Lidia Panico and Marieke Heers, 'Being born to a single mother in France: trajectories of father's involvement over the first year of life' brings us to the cradle. The paper takes evidence from the cohort study started in France in 2011 (*Étude longitudinale française depuis l'enfance*, Elfe) (Charles et al, 2019). It focuses on those children in the cohort (8%) who had no resident father at the first home interview, at two months, and asks what sort of contact those children

had with their biological fathers at the 12-month follow-up. Latent class analysis is used to summarise the heterogeneous situations in which a two-month-old child did not live with a father. The seven categories include parents in a stable 'LAT' non-co-residential union, young mothers living with their own parents, migrant mothers, and higher educated, older, solo mothers. The authors stress that the circumstances of apparently fatherless family are diverse, not automatically to be equated with social disadvantage. The chances of the child and non-resident father remaining in contact over the first year were quite high, though lowest for fathers not recorded as having shown any interest at the time of birth by being present at delivery or recognising paternity. Although whether the child was a boy or a girl was included in the model predicting incidence and frequency of father contact at 12 months, it did not appear to 'make any difference'. This study contrasts with those of earlier cohorts reporting here, in that single motherhood in infancy has emerged as something that can be recorded and studied in the 21st century. In 1946 the stigma of illegitimacy meant that most births to single mothers were destined for adoption, and there was no attempt to include them in the cohort study. This is first piece of research from the Elfe Cohort to appear in this journal. I hope there will be more to come.

I also hope that the opening paper from Macmillan and Hannan will inspire life course researchers to raise standards of writing about causality for this journal. Meanwhile I recommend our selection of more conventional approaches in this issue, and that readers find in it plenty to think about causation, association and the comparison of cohorts.

**Conflict of interest**
The author declares that there is no conflict of interest.

**Reference**
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