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# The life course prospective design: an example of benefits and problems associated with study longevity

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## Abstract

Although the life course prospective study design has many benefits, and information from such studies is in increasing demand for scientific and policy purposes, it has potential inherent design problems associated with its longevity. These are in particular the fixed sample structure and the data collected in early life, which are each determined by the scientific principles of another time and the risk over time of increased sample loss and distortion through loss. The example of a national birth cohort in Britain, studied from birth so far to age 53 years is used to address these questions. Although the response rate is high, avoidable loss, which was low in childhood, increased in adulthood, and was highest in those in adverse socio-economic circumstances and those with low scores on childhood cognitive measures. Recent permanent refusal rate rises may be the result of better tracing and/or a response to increased requests for biological measurement. Nevertheless, the responding sample continues in most respects to be representative of the national population of a similar age. Consistency of response over the study's 20 data collections has been high. The size of the sample responding in adulthood is adequate for the study of the major costly diseases, and for the study of functional ageing and its precursors.

This study's continuation has depended not only on scientific value but also policy relevance. Although the problems inherent in the prospective design are unavoidable they are not, in the study described, a barrier to scientific and policy value. That seems also likely in Britain's two later born national birth cohort studies that have continued into adulthood.

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## Introduction

First interpretations of the importance of early life socio-economic and developmental experience to adult physical and mental health tended to imply that the future pattern of life was fixed in those early years (Erikson, 1963; Reid, 1969; Barker, 1992). However, it also quickly became clear that later experience and

exposure and their interaction with early life experience affect the processes of staying healthy and getting sick (Forsdahl, 1978; Mann, Wadsworth, & Colley, 1992; Barker, 1998; Bifulco & Moran, 1998; Kuh & Ben Shlomo, 1997). Thus, the importance of having data about all periods of life became evident, and sources of data to study the pathways from early life to adult outcomes are now sought (Susser, Terry, & Matte, 2000; Eaton, 2002).

In epidemiology and the social sciences ingenious discoveries of populations studied in early life but not later, have led investigators to find those populations in adult life in order to study health, behaviour and

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survival in relation to whatever early developmental measures and exposures were recorded. For example, in Britain Barker (1998) used register data on size at birth to study a range of adult health outcomes, Gunnell, Frankel, Nanchahal, Braddon, and Davey Smith (1996), Gunnell et al. (1998) and Blane, Montgomery, and Berney (1998) traced the population of the Boyd–Orr study of childhood nutrition and growth for studies of adult health and survival and Deary, Whalley, Lemmon, Crawford, and Starr (2000) traced participants in the Scottish Mental Survey of childhood mental ability in 1932. In the US the Berkeley Guidance study is also of this design (Caspi & Elder, 1988). These catch-up designs have the value of data from early life and/or childhood, but rely on recollection for data in the years between childhood and the first adult recontact.

A second life course design is of a study that begins in childhood and continues into adult life. In the US the high IQ child sample of the Terman study has been valuable in the study of factors associated with survival (Friedman et al., 1995; Tucker et al., 1997).

A third life course design is of a prospective study that begins follow-up in middle life and collects retrospective data on earlier adulthood and on childhood. This has been particularly favoured for studies of ageing since it greatly reduces the waiting time until later life (Dawber, 1980; Palmore, Busse, Maddox, Nowlin, & Siegler, 1985; Rudinger & Thomae, 1990; Baltes & Baltes, 1990; Brunner, Shipley, Blane, Davey Smith, & Marmot, 1999; Nazroo, 2001). It has the disadvantage of relying on recollection for 50 or more years of earlier life.

A fourth design is the prospective study that begins at birth and continues to collect data thereafter into adulthood. These are mostly European (European Commission, 1999). Britain has three such studies, still in progress, that have collected data from birth (in 1946, 1958 and 1970) and continue to do so on the same population during childhood, adolescence and adulthood (Wadsworth, 1991; Wadsworth & Kuh, 1997; Ferri, 1993; Bynner, Ferri, & Shepherd, 1997; Ferri, Bynner, & Wadsworth, 2003), and two new birth cohort studies more recently begun that plan to continue data collection into adulthood (Golding, Pembrey, Jones, & ALSPAC Study Team, 2001; Smith & Joshi, 2002). This design has the advantages of recalled data only over short periods between data collections, and response has been good (Wadsworth et al., 1992; Shepherd, 1997). However, the design has the disadvantage of a long wait for studies of life course effects on adult outcomes, and other potential disadvantages that may increase with the study's longevity. These are that the sample selection may not be appropriate for some later purposes, the data collected in childhood may not be precisely what is later required and the scale of loss of sample members may be too great and/or too distorted through loss for later requirements.

This paper asks whether the scientific value derived from longevity of the prospective birth cohort design may be compromised by the sample structure, and by population loss and possible consequent deterioration of representativeness. The appropriateness in the long-term of sample size and the value of the data collected in childhood are discussed. The example used is of the oldest national cohort study of births in 1946, with some comparison in the discussion with the national birth cohort studies begun in 1958 and 1970.

## Methods

### *The study sample*

The sample selected for the maternity study comprised all 16,695 births that occurred in England, Wales and Scotland in the week 3–9 March 1946. Information was successfully collected on 13,687 (82%) of the selected births in a study of maternity (Joint Committee, 1948).

The sample for the follow-up study (the NSHD) was selected from the births included in the maternity investigation. The aims in sampling were to reduce the total, because of cost and the limitations of the contemporary information technology, to keep the national distribution, and to achieve a similar proportion of children in each social group (Douglas & Blomfield, 1958; Wadsworth, 1991). The sampling frame excluded the 672 births outside wedlock because most were adopted and therefore impossible to trace, and excluded also the 180 multiple births, which were thought too few for the purposes of analysis. The sample selected ( $N = 5362$ ) comprised 1 in 4 of births to wives of manual workers, and all births to wives of non-manual and agricultural workers. Weighting to compensate for that initial sampling is carried out by multiplying the sampled cases by four.

This sample was selected at the time of the immediate post-war baby boom in Britain. That generation is soon to become the population boom in those reaching retirement. It is the first generation in Britain to have practically lifetime experience of a National Health Service, modern curative and preventive medicine and increased educational opportunities.

### *Data collections and contacts with the sample*

Details of data collections are given in Table 1. Information was first collected on all births in the chosen week by health visitors (community nurses) at home visits when the child was 8 weeks old. In the early years of the follow-up study (ages 0–4 years) data collections were carried out by health visitors at home visits to mothers.

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