

Using occupational history calendars to capture lengthy and complex working lives: a mixed method approach with older people

Porcellato, Lorna; Carmichael, Fiona; Hulme, Claire

DOI:

[10.1080/13645579.2014.988005](https://doi.org/10.1080/13645579.2014.988005)

License:

Creative Commons: Attribution-NonCommercial (CC BY-NC)

Document Version

Publisher's PDF, also known as Version of record

Citation for published version (Harvard):

Porcellato, L, Carmichael, F & Hulme, C 2014, 'Using occupational history calendars to capture lengthy and complex working lives: a mixed method approach with older people', *International Journal of Social Research Methodology*, pp. 1-18. <https://doi.org/10.1080/13645579.2014.988005>

[Link to publication on Research at Birmingham portal](#)

Publisher Rights Statement:

Eligibility for repository : checked 16/01/2015

General rights

Unless a licence is specified above, all rights (including copyright and moral rights) in this document are retained by the authors and/or the copyright holders. The express permission of the copyright holder must be obtained for any use of this material other than for purposes permitted by law.

- Users may freely distribute the URL that is used to identify this publication.
- Users may download and/or print one copy of the publication from the University of Birmingham research portal for the purpose of private study or non-commercial research.
- User may use extracts from the document in line with the concept of 'fair dealing' under the Copyright, Designs and Patents Act 1988 (?)
- Users may not further distribute the material nor use it for the purposes of commercial gain.

Where a licence is displayed above, please note the terms and conditions of the licence govern your use of this document.

When citing, please reference the published version.

Take down policy

While the University of Birmingham exercises care and attention in making items available there are rare occasions when an item has been uploaded in error or has been deemed to be commercially or otherwise sensitive.

If you believe that this is the case for this document, please contact UBIRA@lists.bham.ac.uk providing details and we will remove access to the work immediately and investigate.

This article was downloaded by: [University of Birmingham]

On: 16 January 2015, At: 02:44

Publisher: Routledge

Informa Ltd Registered in England and Wales Registered Number: 1072954 Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



International Journal of Social Research Methodology

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/tsrm20>

Using occupational history calendars to capture lengthy and complex working lives: a mixed method approach with older people

Lorna Porcellato^a, Fiona Carmichael^b & Claire Hulme^c

^a Centre for Public Health, Liverpool John Moores University, 15-21 Webster Street, Liverpool L32ET, UK

^b Department of Management, Birmingham Business School, University of Birmingham, Birmingham B15 2TT, UK

^c Academic Unit of Health Economics, Leeds Institute of Health Sciences, University of Leeds, Leeds, UK

Published online: 17 Dec 2014.



CrossMark

[Click for updates](#)

To cite this article: Lorna Porcellato, Fiona Carmichael & Claire Hulme (2014): Using occupational history calendars to capture lengthy and complex working lives: a mixed method approach with older people, *International Journal of Social Research Methodology*, DOI: [10.1080/13645579.2014.988005](https://doi.org/10.1080/13645579.2014.988005)

To link to this article: <http://dx.doi.org/10.1080/13645579.2014.988005>

PLEASE SCROLL DOWN FOR ARTICLE

Taylor & Francis makes every effort to ensure the accuracy of all the information (the "Content") contained in the publications on our platform. Taylor & Francis, our agents, and our licensors make no representations or warranties whatsoever as to the accuracy, completeness, or suitability for any purpose of the Content. Versions of published Taylor & Francis and Routledge Open articles and Taylor & Francis and Routledge Open Select articles posted to institutional or subject repositories or any other third-party website are without warranty from Taylor & Francis of any kind, either expressed or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, or non-infringement. Any opinions and views expressed in this article are the opinions and views of the authors, and are not the views of or endorsed by Taylor & Francis. The accuracy of the Content should not be relied upon and should be independently verified with primary sources of information. Taylor & Francis shall not be liable for any losses, actions, claims, proceedings, demands, costs, expenses, damages,

and other liabilities whatsoever or howsoever caused arising directly or indirectly in connection with, in relation to or arising out of the use of the Content.

This article may be used for research, teaching, and private study purposes. Terms & Conditions of access and use can be found at <http://www.tandfonline.com/page/terms-and-conditions>

It is essential that you check the license status of any given Open and Open Select article to confirm conditions of access and use.

Using occupational history calendars to capture lengthy and complex working lives: a mixed method approach with older people

Lorna Porcellato^{a*}, Fiona Carmichael^b and Claire Hulme^c

^aCentre for Public Health, Liverpool John Moores University, 15-21 Webster Street, Liverpool L32ET, UK; ^bDepartment of Management, Birmingham Business School, University of Birmingham, Birmingham B15 2TT, UK; ^cAcademic Unit of Health Economics, Leeds Institute of Health Sciences, University of Leeds, Leeds, UK

(Received 9 January 2014; accepted 11 November 2014)

Accurately documenting the occupational biographies of older people can be challenging given their lengthy duration and the complexity of contemporary employment. This paper shows how a traditionally quantitative occupational history calendar (OHC) instrument can be adapted for use in a mixed methods research design, to gather in-depth information about long working lives. The OHCs were embedded within semi-structured interviews and recorded lifetime work histories of between 33 and 53 years for 56 participants. Sequence analysis of the calendar data was undertaken in parallel to thematic analysis of interview transcripts. This included in-depth exploration of the factors motivating occupational changes and transitions and their impact in older age. Mixing methods allowed us to collate data over relatively long periods of time and enabled an examination of the complex interplay between work, family and personal circumstances that shapes employment histories. Selected research findings are used to demonstrate how this tool can effectively facilitate the exploration of long working lives.

Keywords: occupational history calendars; work histories; older people; mixed methods research; sequence analysis

Introduction

Population ageing is a global phenomenon which poses significant social, economic and political challenges coupled with opportunities as well as pressures for labour market participation (Green, 2009). Longevity, longer working lives and in some countries the abolishment of a default retirement age also poses methodological challenges for research requiring a lifecourse perspective on employment. Green (2009) purports 'a need for more research on how the lifecourse varies for different subgroups in different regions and local areas and how the employment to non-employment transition of older people fits alongside other lifecourse transitions' (p. 57). Nevertheless, accurately documenting patterns and transitions in the occupational biographies of the elderly can be difficult, given their long duration and the transient and multifarious nature of contemporary employment (Lilley, Cryer, Firth, Herbison, & Feyrer, 2011).

*Corresponding author. Email: l.a.porcellato@ljmu.ac.uk

Employment patterns and transitions involve complex processes that are socially determined; shaped by personal and contextual factors (Wiseman & Whiteford, 2009). Decisions about retirement are similarly embedded in historical, cultural and social contexts (Kim & Moen, 2002) and careers are becoming increasingly discontinuous and characterised by instability (Tams & Arthur, 2010). Longer working lives will reflect multiple shifts in occupational and social patterns and changes in labour market conditions associated with wider institutional, demographic and macroeconomic change. The impacts of these changes are not distributed equally. For instance, the current cohort of older workers appears to be particularly vulnerable to the increasing competitive pressures associated with globalisation (Blossfeld, Buchholz & Kurz, 2011) especially in the UK where the employment system is relatively uncoordinated by European standards (Schmelzer, 2011). Capturing such variety and complexity is important to understanding how micro and macro level factors impact on older people within the context of their working lives. This requires a method of data collection that optimizes occupational recall and quality of recalled information (Lilley et al., 2011). For older people, the need is paramount. Recalling work histories over an extended trajectory can prove difficult, potentially leading to inaccurate reporting, recall bias and issues with reliability, validity and credibility. Past experiences may be distorted or merge together into partial truths. According to Parry, Thomson, and Fowkes (1999), a significant factor in minimising recall problems is the manner in which the data is collected.

A variety of methodological techniques have been developed to facilitate recall and collect accurate retrospective data on employment histories. One such method is the occupational history calendar (OHC); a grid based instrument developed by occupational epidemiologists which uses multiple recall cues such as historical markers and visual aids to facilitate recall and enhance accuracy of data (Engel, Keifer, & Zahm, 2001; Hoppin, Tolbert, Flagg, Blair, & Zahm, 1998; Lilley et al., 2011; Zahm et al., 2001). Modelled on the Life Event Calendar (LEC) approach (Axinn, Pearce, & Ghimire, 1999; Caspi et al., 1996), the OHC provides researchers with an ideal platform to capture transitions and multiple changes over the lifecourse (Scott-Ricks & Harrison, 2011; Sutton, 2010). Engel et al. (2001) used an icon calendar-based questionnaire to assess the occupational histories of farm workers and concluded that the grid based questionnaire was more effective in obtaining a complete picture of occupational histories than traditional methods. Zahm et al. (2001) adapted Engel et al.'s (2001) method in their study ascertaining occupational histories and other characteristics of migrant farm workers. Results demonstrated that it was feasible to use OHCs to capture complex work histories. Both studies corroborated previous work by Hoppin et al. (1998) who introduced the use of personal and historical landmark events in the calendars, to anchor work activities in time and facilitate the recall over the life course. More recently, Lilley et al. (2011) used an OHC with the working population in New Zealand and concluded that a calendar approach was appropriate for collecting occupational histories with the general public although cautioned that it was rather resource intensive for large scale population surveys.

In line with positivist dominated lifecourse research (Verd & Lopez, 2011), the OHC approach traditionally generates quantitative data and is typically analysed using statistical methods such as event history analysis or more recently, life sequence analysis (Eerola & Helske, 2012; Pollock, Antcliff & Ralphs, 2002; Wiggins, Erzberger, Hyde, Higgs, & Blane, 2007). This particular procedure uses

optimal matching and cluster analysis to identify the differences and similarities between the individual work histories and groups them in a systematic way taking account of different employment states and transitions between them. According to Eerola and Helske (2012), the analysis of event sequences to describe life trajectories such as employment histories provides detailed information about ‘how things are’ but not necessarily why they happen? Whilst event history analysis may address this, ‘why’ questions are often best answered using qualitative approaches.

To this end, some researchers have started to use calendar based life history review instruments qualitatively (Harris & Parisi, 2007; Martyn & Martin, 2003; Nelson, 2010). The appeal of using calendars in a qualitative context not only lies in their capacity to foster insights (Belli & Callegaro, 2009) but can lead to enhanced researcher – participant interaction and better understanding of the issues under investigation (Harris & Parisi, 2007). Nelson (2010) considered the methodological adaptation as good as the traditional quantitative method for capturing processes and complex patterns and had the added advantage of capturing explanatory data to inform the ‘hows and whys’ (p. 42) of the transitions.

This interpretative approach has been successfully used in different permutations with older participants across a range of disciplines. Berney and Blane (2003) developed the Lifegrid Method which was shown to collect socio-demographic information with useful accuracy after 50 years. Holland et al. (2000) used this method to collect full occupational, residential and household histories, from which accumulated lifetime exposures to a range of environmental hazards were estimated. Parry et al. (1999) also used the Lifegrid Method to explore associations between life experiences and smoking; to gauge life course influences on patterns of persistent smokers aged 65–85 years. Although Bell (2005) challenges the utility of the Lifegrid Method for qualitative researchers, considering it ‘non-reflective and too date and event centred’ (p. 65), he contends that it encourages participants to address the issue of change over time and may prove suitable when collecting relatively factual data. Meltzer (2001) developed the Self Discovery Tapestry to explore the occupational careers of mature women. Although not specifically designed for older people, she concluded that the tool was suitable for use with an elder population. This was borne out in the work of Feldman and Howie (2009) who used her Self Discovery Tapestry with people aged 80 years and over in Australia.

To date, the traditional OHC has yet to be used qualitatively or exclusively with older people but a number of methodological and practical considerations makes it a uniquely valuable tool for conducting research with an elder cohort. Given the tendency of older people to ‘construct their biographies using a range of meaningful reference points’ (Parry et al., 1999, p. 2), the matrix design provides an explicit framework that enables older participants to focus their attention on specific topics and acts as a stimulus for dialogue (Feldman & Howie, 2009). Calendar methodology also draws on reminiscence and potentially has therapeutic value (Berney & Blane, 2003). Importantly, the OHC is a visual tool providing a graphic representation of the participants’ occupational history that enables gaps and contradictions to be easily determined (Freedman, Thornton, Camburn, Alwin, & Young-DeMarco, 1988). This visualisation not only supports recall of previous work experiences (Meltzer, 2001) but provides opportunity for reflection and analysis of one’s own occupational biography (Feldman & Howie, 2009).

Exploring complex social phenomenon such as occupational or career transitions over long working lives is difficult to do within a single paradigm; “the messiness

of complexity demands multiple investigative tools” (DeLisle 2011, p. 89). Verd and Lopez (2011) similarly suggest that the combined use of qualitative and quantitative data provides a holistic perspective that substantially improves lifecourse research. Given the demonstrable reliability of the OHC approach in capturing lifetime occupational histories and the acknowledged value of adopting a qualitative approach to lifecourse data collection, in particular when working with older participants, both tools were selected for use in an European Social Funded project on discrimination and older workers in the North West of England (Carmichael, Hulme, Porcellato, Ingham, & Prashar, 2011; Porcellato, Carmichael, Hulme, Ingham, & Prashar, 2010).

Despite evidence that calendar based instruments provide an ideal framework for collecting multiple forms of data (Creswell & Plano Clark, 2007) and thus are amenable to mixed method research (Sutton, 2010), there is a dearth of such studies. Scott-Ricks and Harrison (2011) attribute this paucity to a ‘lack of epistemologic clarity on how to use the tool’ (p. 263). This paper seeks to address this gap in procedural knowledge by discussing the development and application of our mixed method OHC. Selected research findings will be used to illustrate how this tool can effectively facilitate the exploration of the long working lives of older people. Advantages and limitations of using this pragmatic approach will be considered.

Development and application of the OHC

A number of modifications to the conventional OHC (Engel et al., 2001; Hoppin et al., 1998; Lilley et al., 2011; Zahm et al., 2001) were required to accommodate our research. Similar to Lilley et al. (2011), A3 sheets in a landscape orientation were used and space to record demographic data (age, ethnicity, date of birth, gender, marital status and current employment status) was earmarked at the top of the first sheet. This size was considered large enough to clearly record data without being too cumbersome to populate and transport to interview locations. Moreover, when spread out in front of participants, the sheets emulated a timeline which provided a focal point for the interviews. As shown in Figure 1, there were seven fixed columns from left to right: age, year, months on a quarterly basis and significant historical events across time. Unlike traditional life event calendars, only one central domain (employment) was used and each row of the grid was one year in the work life of the participant. A time frame of at least 56 years set out in tri-monthly increments was needed, to span lifetime employment of all the participants. Similar to Hoppin et al. (1998), a series of computer generated stickers was used to represent other important domains (e.g. key life events such as first job, leaving education, graduation, marriage, births, divorce, relocation). Open ended interview questions were developed and asked upon completion of the OHC. Participants were encouraged to reflect on their employment history as documented on the OHC and to consider factors (both positive and negative) that they perceived influenced their employment experience over time.

Fifty-six men and women domiciled in North West England were interviewed in 2006–2007. Participants had responded to information flyers distributed at various publicity events for older people. The sample was selected purposefully to reflect a range of ages 50 and over, different occupations and comprise both men and women. The lower threshold of 50 years was selected to reflect existing research and policy statements which generally consider those 50 and older as the

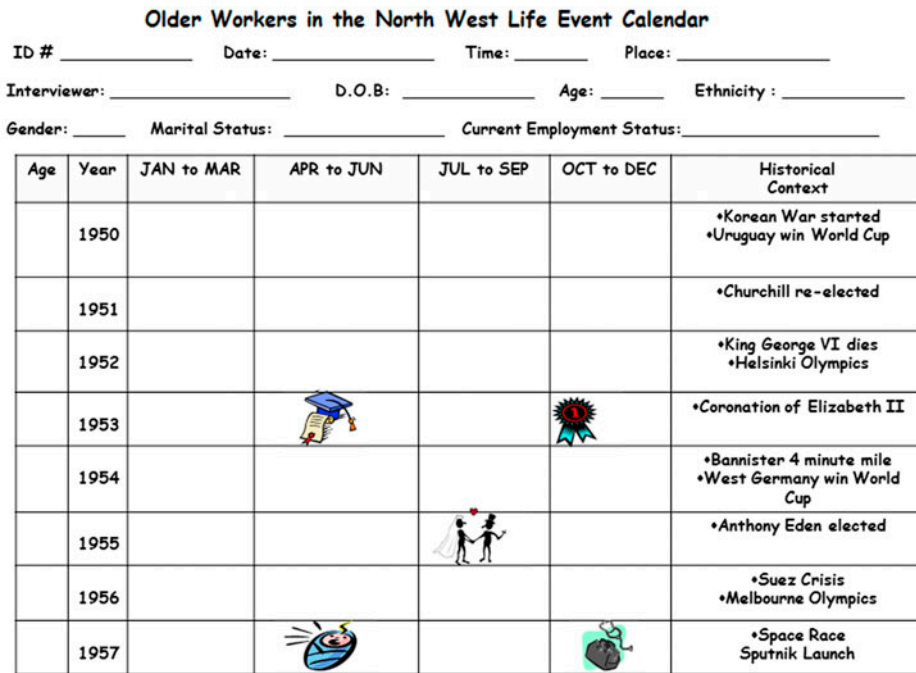


Figure 1. The Occupational History Calendar.

demographic group of interest (Khan, 2009; OECD, 2004, 2005, 2006). Table 1 summarises characteristics of the sample at the time of the interview. An interview schedule informed by the review of literature was developed to ensure consistency amongst four interviewers. Interviews were held at a location of convenience for participants. Permission to audio record the dialogue during the completion of the OHC and the follow on interview was obtained. Ethical approval for this study was obtained from the University of Salford Ethics Committee.

The OHC was introduced at the beginning of each face to face interview and positioned between the interviewer and interviewee. Not only did this provide a central focus for the process but it signified that populating the calendar was meant to be a collaborative effort and encouraged the narrative exchange of information while collecting objective data. To begin with, demographic details were recorded on the OHC and then important life events (graduation, first job, marriage, births, relocation) based on month and year were mapped using the computer generated stickers. The stickers, in conjunction with the historical markers listed on the side of the grid provided ‘anchors’ to help participants logically sequence their work histories (Figure 1).

There is little evidence about the best way to move through the calendar, but Bradburn, Rips, and Shevel (1987) suggest that better levels of recall are achieved when individuals move backwards from the present to the past. As such, detailed work histories (type of job, employment status, location, duration on a job) were recorded as horizontal lines on the OHC, on a job by job basis in reverse order from present day to first ever job (Engel et al., 2001). Different colours were used for

Table 1. Characteristics of interviewees.

Characteristic	Statistic
<i>Age (n=56)</i>	Mean years (range) 58.9 (50–68)
<i>Gender (n=56)</i>	n (%)
Male	32 (55.4)
<i>Employment status (n=56)</i>	n (%)
Employed	22 (39.3)
Employed full-time	8 (14.3)
Employed part-time	5 (8.9)
Self-employed (full or part-time)	12 (21.4)
Unemployed	16 (30.4)
Retired not looking for employment	1 (0.2)
Retired and looking for employment	6 (11)
Voluntary work	6 (11)
<i>Educational attainment (n=56)</i>	n (%)
Low; none or below GCSE ^a /equivalent	18 (32.1)
Intermediate 1; GCSE/equivalent	7 (12.5)
Intermediate 2; 'A' level/diploma/equivalent (e.g. teaching certificate, nursing certificate)	13 (17.9)
Higher; university (undergraduate and postgraduate):	18 (32.1)
<i>Annual household income (n=38)^b</i>	n (%)
Below £10,000	6 (15.8)
£10,000-£20,000	8 (21.1)
£20,000 - £30,000	8 (21.1)
Over £30,000	16 (42.1)
<i>Health status (n= 44)^b</i>	n (%)
Fair to poor	2 (4.6)
Fair	16 (36.4)
Good	10 (22.7)
Very good	11 (25)
Excellent	4 (9)

^aThe General Certificate of Secondary Education (GCSE) is an academic qualification awarded in a specified subject by students usually aged 14–16 in secondary education in England, Wales and Northern Ireland.

^bThe questions on income and health were asked at the end of the interview. The sample sizes are smaller as not all the participants responded to these questions, some because they were unable and/or unwilling to select a precise category.

different employment states (e.g. black for unemployment, pink for part time employment). A change in job or status was signalled by a short vertical line (Figure 2). With each new job recorded, participants were asked the reasons for taking the new job, the reasons for leaving/ changing the previous job and if they had remained in a job long term, the reasons for staying in this job. This information was recorded on the calendar and captured in full on the audio recording as well. Once the calendar was completed, it was spread out in front of the interviewee and used as a prompt for a series of follow on questions to collect in-depth retrospective data relating to participants' employment experiences, the barriers they may have faced in employment, particularly in later life and perceptions about how the working environment had changed over the course of their lives. The interview concluded with 3 standard demographic questions relating to educational attainment, health status and household income.

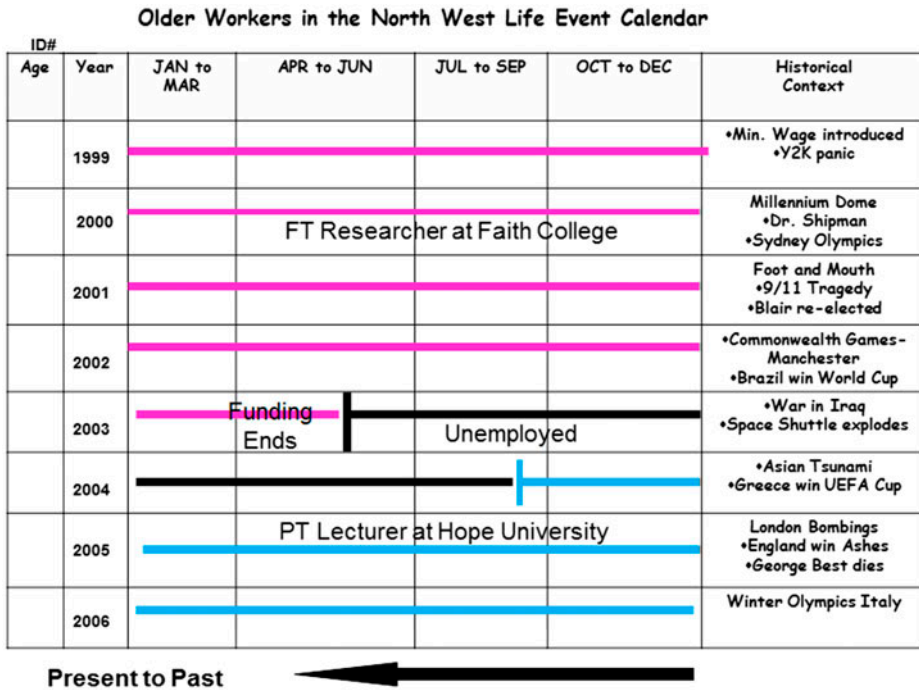


Figure 2. Recording and coding in the Occupational History Calendar.

Analysis

The data from the occupational history calendars was collated in several ways and in different stages; to facilitate a multi-method analysis of whole trajectories as well as individual transitions. Initially, the data on individual work histories were input into an excel file (see Figure 3) where we recorded the employment status of each participant from the age they started their first job to their age at the interview using colour and numerical codes for different broadly defined occupations and employment status: Professional/managerial; skilled; semi-skilled; unskilled; education/training; not in paid work; child/family care. We experimented with narrower ways of coding the data including differentiating part and full-time employment, but these alternatives suffered from infrequent observations in some categories. The coded data were input into Stata 13 and we used the SQ-Ados scripts (Brzinsky-Fay, Kohler, & Luniak et al., 2006) to analyse each of the 56 employment histories or careers as a sequence or string of employment activity states over the lifecourse of the individual.

Figure 4 provides a broad picture of life-history data using a state distribution plot. This plots the distribution of employment states by age and represents aggregated views of successive slices of time. The height of each of the coded segments at each observation is proportional to the frequency of each state at each age. The graph usefully shows how the distribution of the states changes over life histories. For example, as the sample age, incidences of time out of paid work for reasons other than family care and time in managerial/professional employment both increase. After exploring the raw sequence data we used optimal matching and

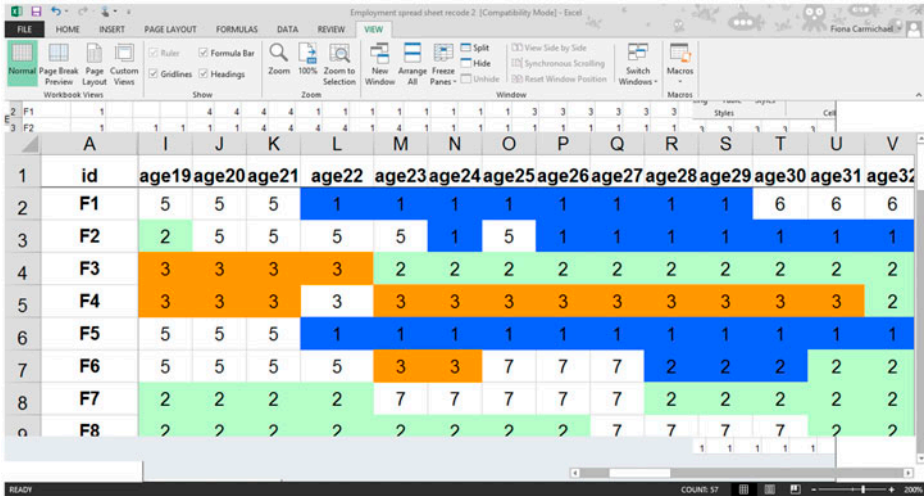


Figure 3. Screenshot of OHC data input in excel spreadsheet.

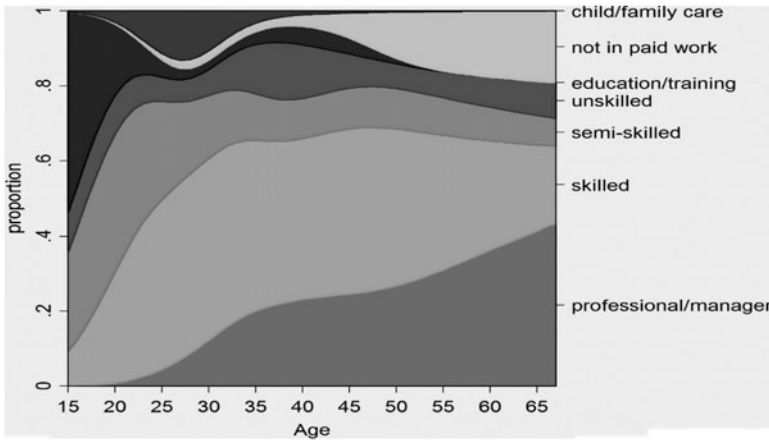


Figure 4. State distribution plot of employment status by age.

Notes: 17.98%, of employment states within the sample were recorded as professional/managerial, 39.67% as skilled, 17.00% as semi-skilled, 9.30% as unskilled, 6.67% as in education/training, 5.88%, as not in paid work and 3.50% as a family carer.

cluster analysis to create a typology of the employment histories of the sample members (Anyadike-Danes & McVicar, 2010, p. 486). The optimal matching procedure compares all pairs of sequences and uses a non-parametric algorithm to compute the minimum distance, in terms of costly operations, to turn one sequence into another. The substitution costs were generated using a symmetric transition frequency-based substitution cost matrix and insertion/deletion (indel) costs were fixed at half the maximum substitution cost and standardised by the length of the longer sequence (Brzinsky-Fay et al., 2006; Potârca, Mills, & Lesnard, 2013). The resulting distance matrix was used in the cluster analysis with the widely used Ward's algorithm.

Using an iterative process (Potârca et al., 2013) five distinct employment patterns were identified. Table 2 provides illustrative data on the five clusters which were characterised by the predominance of: (1) unskilled career paths; (2) a patch worked mix of employment states indicating varied careers with early periods as a child/family carer and higher incidences of time out of paid employment with age; (3) skilled careers with some earlier employment in semi-skilled posts; (4) skilled employment with transitions into professional/managerial careers or, alternatively non-employment (upward or out) and; (5) mainly professional and managerial careers with some early skilled employment.

Parallel to the sequence analysis of the calendar data, recorded interviews were transcribed verbatim and identifiable data was anonymised. Data management and thematic analysis was done using QSR International's NVivo 2 qualitative data software. Data was analysed using a staged thematic content analysis method espoused by Burnard (1991) and Burnard, Gill, and Stewart (2008). Based on grounded theory (Glaser & Strauss, 1967), this pragmatic approach involves the systematic process of coding transcripts and identifying themes and patterns across the data-set. The first stage involved reading the transcripts and allocating open codes to individual concepts. In the second stage, similar codes were collated together into a smaller number of conceptual categories. In the third stage, themes were identified in relation to the coded extracts and the entire data-set. Saturation was assumed to be reached as no new codes were identified in the final transcripts analysed. To establish trustworthiness of the analysis, a sample of the transcripts were also analysed manually by the other researchers and cross checked with the computer-assisted analysis to ensure congruence.

The two approaches were then integrated by using the employment trajectories embodied in the cluster groupings to explore how different career paths were associated with the themes that emerged from the qualitative analysis. One illustration is that in the thematic analysis of health and ageing, there were different experiences of mental and physical ill-health over lifecourses and in later life depending on different career trajectories. For example, people on unskilled and patchwork career paths in clusters 1 and 2 were observed to have experienced more incidences of ill-health than others with prolonged ill-health precipitating early retirement in some

Table 2. Distributional properties of the cluster groupings.

Cluster number/name	1 Unskilled	2 Patch- work	3 Skilled	4 Upward or out	5 Prof. & man.
% of employment states in each cluster recorded as:					
Managerial and professional	0.00	4.71	0.00	22.26	60.92
Skilled occupation	21.08	26.02	77.41	48.17	18.53
Semi-skilled occupation	3.01	38.29	10.97	5.98	2.57
Unskilled occupation	63.86	<i>11.65</i>	2.62	0.00	1.83
Education or training	5.42	4.34	4.91	<i>10.30</i>	<i>10.46</i>
Not in paid employment	1.81	<i>9.79</i>	0.49	11.63	4.22
Family carer	<i>4.82</i>	<i>5.20</i>	<i>3.60</i>	1.66	1.47
No. of sequences in cluster	4	19	14	7	12

Notes: Bold indicates largest percentage within cluster; italics indicates larger than sample percentage within cluster.

cases (Carmichael, Hulme, & Porcellato, 2013). People in cluster 1 also tended to view today's labour market more negatively than the labour market which had shaped their early careers in the 1960s and early 1970s. In another example, the thematic analysis of education and training revealed that transitions into professional/managerial careers in cluster 4 were linked to time spent in full-time education mid-career. Interestingly, members of cluster 4 were also particularly vocal in the thematic exploration of age discrimination.

Whilst the qualitative analysis enabled themes to be highlighted, the trajectories and time or career dependent elements were less evident. The quantitative analysis was able to bring out these more hidden nuances – in particular those that related to changes over time or were time dependent over employment histories that spanned up to 5 decades. The mixed method approach, given the individual participants were of different ages and each followed a unique employment path/trajectory, provided a systematic method which enabled patterns and trends to be identified and allowed us to explore the interrelationships between time in paid work, family commitments and other aspects of individuals' lives that underpinned their different career histories. In particular, the mix of methodologies facilitated an examination of the individual occupational histories over time, how they had evolved and how they had continued to shape the lives of the participants.

Discussion

The focus of this article is on the application of a mixed methods research approach rather than study findings. The intention is to illustrate the utility of embedding an OHC into a semi-structured interview, to effectively capture data on the long working lives of older people in a systematic manner and in doing so, to address the dearth in research reporting on mixed methods studies using time-line techniques as well as contribute to the burgeoning evidence base on mixed methods in gerontological research (Happ, 2009).

Given the effect of ageing on memory recall and the lengthy, complex and often transient nature of contemporary employment, accurately documenting occupational biographies can be difficult for older people. To enhance the accuracy of self-reporting, it is imperative to use tools which optimise recall via visual and verbal cues. There is a substantive body of evidence that demonstrates the effectiveness of calendar based tools in systematically capturing high quality, time-based data, retrospectively (Freedman et al., 1988; Axinn et al., 1999; Caspi et al., 1996; Belli & Callegaro, 2009). OHCs in particular have been used successfully to elicit complex work histories from farm workers (Hoppin et al., 1998; Engel et al., 2001; Zahm et al., 2001) and the general working population (Lilley et al., 2011) but have yet to be used exclusively with an elder population. Traditional OHCs use empirical analysis of data to statistically explore patterns in data across the lifecourse. However, this quantitative approach does not allow for individual explanations of behaviour and decision-making (Harris & Parisi, 2007). Moreover, the highly structured nature of the OHC limits the type of data collected (timing and sequence of jobs). Although easier to analyse, the data lacks the depth and breadth needed for in-depth understanding of complex social phenomenon and cannot provide meaningful explanations of emergent patterns; in essence the 'whys' behind participants' trajectories.

There is an emerging body of work that has adopted a more interpretative stance and used life history calendar methods qualitatively which has greater scope for

capturing explanatory data; allowing for greater insights and shedding light on patterns and employment transitions over the lifecourse. According to Harris and Parisi (2007), a qualitative approach contributes to explaining differences in work histories across people, places and time, illuminating interactions between history, biography and context. This ability to capture individual heterogeneity is vital, given that older workers form a very heterogeneous group in terms of health, skills, types of jobs, and the local labour market (OECD, 2006). Some researchers have used life history calendar techniques in conjunction with interviews (e.g. Martyn & Martin, 2003; Harris & Parisi, 2007; Nelson, 2010; Scott-Ricks & Harrison, 2011). In these studies, priority was given to the qualitative data with basic descriptive statistics used to demonstrate trends in calendar data. But as far as we are aware no studies give equal priority to each paradigm, as is done in our study, where the integration of data enables a far richer analysis of the data collected than would be possible individually.

Advantages of mixed-method OHCs

Adopting a mixed methods design to obtain full work histories on a sample of older people and as part of this process to identify different career pathways and the factors shaping them, proved to be a sound methodological strategy. Taking this 'pragmatic' approach enabled the older participants to map out their work lives in a systematic and comprehensive fashion whilst at the same time enabled the research team to capture the participants' whole labour market career and explore the factors motivating occupational transitions and changes in employment status. In particular, we could explore the factors underlying individual occupational histories and how different pathways had impacted on the lives of the participants in older age including their perspectives on ageing, their wellbeing and transitions into retirement. The quantitative clustering of the sample according to their different work histories additionally lends itself to consideration of how perspectives on age and experiences of ageing are shaped by individual life courses. This fostered new insights and lines of enquiry that would not have been possible using a single method. Overall, the integration of mixed methodologies enabled an in-depth examination of the complex interplay between work, family and personal circumstances that shapes employment histories.

In practical terms, the integrated approach was implemented by combining the typologies resulting from the sequence analysis with the qualitative methods by grouping sample members and comparing their experiences and observations. As an illustration, the use of the OHC nested within an interview facilitated the exploration of the multi-causal factors and underlying reasons for the identified transitions between employment states, including transitions into retirement, and career changes that were in themselves too disparate to model in a formal way. For example, the reasons for the changes in employment status and occupational transitions recorded in the calendars were scrutinised in the qualitative component of the interviews. In this way we were able to identify five main reasons for the transitions between employment states and occupations identified in the quantitative component. The significance of these influences varied between the clusters but there were also differences between them as well as commonalities across the clusters notably by gender and at different stages in people's lives. Moreover, it was possible to unpack the impact of decisions made earlier in an individual's working life on transitions made

in later life. For example, for one interviewee (F1, age 54, self-employed part-time (cluster 2)) her decisions to work for an academic publisher and set up a training business were related to her earlier career as a teacher; for another (M43, age 59, unemployed (cluster 4)) his decision to take voluntary redundancy and go into full-time education in his 40s was linked to an unsettled period in his life due to divorce and the death of a close relative.

Using a mixed methodology enabled us to capture the underlying structure of the long life histories of older people and derive typologies of those histories over an extended period of time. This is an important advantage in ageing research given that panel data at the national level are not widely available for the length of time necessary to assess the employment histories of people in their 50s and 60s in a comparable way. For example, full data for the original British Household Panel Survey/Understanding Society sample are currently only available for 20 years. The shortest sequence used in our analysis is 33 years. However, some purpose specific, retrospectively constructed datasets are available over longer time-frames e.g. the British Household Panel Survey Combined Work-Life History files (Halpin, 2000).

The research also suggest that OHCs used within an interview are aptly suited to the needs of older respondents. The OHCs provided a useful focal point for the interview, giving it structure. This made it easier for the respondents to construct their narrative and enabled the researchers to gather a coherent and comprehensive mix of data. The physical and visual nature of the OHCs highlighted patterns and trends at a glance and where information gaps were evident or additional further understanding was needed, probe further. Consistent with other studies (e.g. Engel et al., 2001) participants were keen to ensure their timelines were as complete as possible which enhanced the quality of the data in terms the validity and reliability.

A particular attraction of using the OHC in a mixed methods design with older people is the reflective nature of the tool. The opportunity to ‘*walk down memory lane*’ was appreciated and often acted as a catalyst for further reflection. The process of ‘thinking back’ on significant life events is known to have significant therapeutic value for older people. Recalling past experiences can enhance self-esteem and heighten sense of identity (Yen-Chun Lin, Yu-Tzu Dai, & Shiow-Li Hwang, 2003). In relation to occupational histories, the OHCs and the follow on interviews provided an opportunity for older people to visualise their working lives on paper, to reminisce about past accomplishments and provide explanations and justification for actions taken and decisions made. The reflective nature of the tool, the cathartic benefit of telling their life story, of being listened to and feeling valued engendered a positive and enjoyable research experience for many of the participants. This satisfaction in the research process, as evidenced below can have a positive impact on the data, enhancing both accuracy and reliability of the data (Glasner & van der Vaart, 2009).

I think it’s given me an opportunity to really think about how I do feel about it all. And I guess that what attracted me about it, about being interviewed was how I feel now, this sort of transition period and it’s sort of very frightening going into retirement (F13, female age 59, employed full-time)

It is, it is interesting isn’t it, it is, and yes you know, it’s given me food for thought too (M26, male age 54, employed full-time)

The participatory nature of the chosen methods provided an opportunity for older people to be engaged in co-producing meaningful data for research. Not only is this empowering, active engagement promotes shared responsibility of the research

process which creates a desire to produce high quality data and gives the message that their contribution is valued. This is important for a population who tend to hold a minority status in society today. In our opinion, it was this collaborative component, the working together to populate the OHC that also enhanced the research experience for our participants. Co-constructing their work biographies ensured that the difficulty and frustration encountered by Feldman and Howie's (2009) older sample when self-completing their life history review tool would not be experienced by our participants.

A further point is that the interactive format makes for pleasant data collection conditions not only for the interviewees but the researchers as well. Similar to Harris and Parisi (2007), our researchers enjoyed listening to the respondents narratives and working collaboratively with them to co-construct the OHC.

Limitations of mixed-method OHCs

Adopting a mixed methods approach to collecting and analysing the long working lives of older people poses several methodological challenges. Consideration must be given to aspects of the tools used and the population with which they are being administered. One such consideration is paper size. According to Nelson (2010) paper size is important and has implications on where interviews can be conducted and what data can be analysed. She used blank A0 easel paper rather than a pre-printed matrix but this unstructured format meant that the calendar data could not be formally analysed. Our choice of paper size (A3) proved suitable for use with older people. The size was large enough to record data that was legible to the respondents and easily accommodated the stickers earmarking key life events. The use of the stickers to record personal events helped to personalise the data collection: 'Was that after your son George was born?' which in turn maintained the interest and focus of the participants. This cross-referencing of personal information with job histories additionally helped to reduce discrepancies; for example, by clarifying dates that might otherwise simply be guessed or only roughly estimated.

Pragmatically, the OHC can be cumbersome and complicated to complete. The number of sheets required (up to seven in some cases) to obtain full work histories made management of the OHCs somewhat unwieldy during the interviews. Equally, co-ordination of the various pens and multiple stickers needed for coding was burdensome and could detract interviewers from other tasks such as following up on important details and correcting inconsistencies. The unwieldiness of the traditional pen and paper method could potentially be circumvented by using a tablet or laptop computer but this format may not be best suited to all older people as some may be more comfortable using pen and paper methods rather than technological interfaces. The use of a computer in the interviews could also inhibit rapport building.¹

Some inconsistencies in how different researchers recorded the data were also noted although these did not surface until the analysis stage. For example, different colour codes used, and multiple jobs were recorded in different ways. The value of using a mixed methods design became apparent here as interview transcripts were then used to help clarify any resulting inconsistencies in the data. Further inconsistencies emerged in how interviewers moved through the OHC. One interviewer began interviews with the participant's first job rather than last. This was not deemed an issue of particular concern as Belli and Callegaro (2009) are of the opinion that priority should be given to the respondent's preferences for moving through

the calendar, but it does highlight the need for training of researchers using OHCs, to ensure consistency in approach. Further research is needed to assess the impact of different approaches to recording data on the OHC to maximise methodological benefits (Roberts & Horney, 2010, chapter 15).

Collecting data on an older population also poses challenges. Despite efforts to maximise recall by using OHCs, there were still some difficulties in remembering periods of employment, especially when the participants had only been in a particular job for a short time or had held multiple jobs simultaneously (this was also difficult to code in the calendars). Gaps in work histories were inevitable given respondents' age but we found that discussion during the follow-on interviews could jog their memory and gaps in the time line were subsequently filled as part of the interview process further highlighting the benefit of using a mixed methods design.

Time is another factor that merits consideration when collecting data from an elderly cohort. An OHC administered within a semi-structured interview increases the amount of time needed to complete the data collection process. Duration ranged between one and two and half hours with most lasting longer than an hour and a half. Although not particularly excessive time-wise, recalling and reflecting on significant events sequentially across a long life span can be difficult for older participants (Feldman & Howie, 2009). Researchers need to be cognisant of the emotional demands that timeline tools can bring to bear on participants.

Additional limitations relate to the analysis of the OHC data as sequences which requires the application of optimal matching. This method has been criticised because of concerns about how researchers determine the substitution and indel costs that are used to calculate the dissimilarity matrix (Halpin, 2003, 2010; Piccarreta, 2012). Ideally these costs should be determined by theory but this is not usually practical (Davia & Legazpe, 2014). Using a transition based substitution cost structure as here treats non-frequent transitions as more costly and setting indel costs equal to one (the Levenshtein IOM parameterization, see Potârcă et al., 2013) attaches importance to preserving the timing of sequences but does not restrict the procedure to using only substitution operations. While sequence analysis has been more commonly used to find patterns in large data sets, the non-parametric Needleman-Wunsch alignment algorithm used in the optimal matching procedure makes no distributional assumptions. In addition, embedding the OHC in a qualitative interview has the advantage of allowing for detailed inspection of the patterns identified and their relevance. Future research could nevertheless benefit from using large national data sets to perform parallel sequence analysis and using the findings to inform new qualitative research.²

Summary

This paper provides procedural knowledge on the adapted use of an OHC nested within a semi-structured interview, to analyse the employment histories of a sample of older people. Given the age of the participants, their life histories were predictably long and complex. Adopting a mixed methods research design to capture both qualitative and quantitative data not only enabled us to explore patterns but helped us develop a more holistic understanding of the data and uncover some new insights about the interrelationships between age and employment over the lifecourse. The use of the mixed method OHC was central to this study and allowed us to collate data over relatively long periods of time. Further, by integrating semi-structured interview

questions within the OHC format in this study, we were able to contextualise the employment experiences of the sample members and better understand how older people themselves perceive the relationship between age and work, the barriers to employment they face and their perceptions of the changing work environment. In particular, the complexities of individual decisions, both at a moment in time and over the lifecourse could be explored. This is an important consideration in research on ageing and employment where snapshots of individual lives can potentially give misleading information. The research reported here can be viewed as a first step in the application of this particular mix of methodologies to research the employment histories of older workers. In this paper we have tried to illustrate some of the gains from adopting this approach and how it may be used by others.

Acknowledgements

We are grateful to the anonymous reviewers who provided constructive comments that helped us to improve the paper significantly.

Funding

This research was part-funded through two European Social Fund projects: Institutional Discrimination against older workers (2005–6) and Institutional discrimination against older male workers (2006–7).

Notes

1. Our thanks to one of the anonymous reviewers for this point.
2. See note 1.

References

- Anyadike-Danes, M., & McVicar, D. (2010). My brilliant career: Characterizing the early labor market trajectories of British women from generation X. *Sociological Methods Research*, 38, 482–512. doi:10.1177/0049124110362968
- Axinn, W., Pearce, L., & Ghimire, D. (1999). Innovations in life history calendar applications. *Social Science Research*, 28, 243–264. doi:10.1006/ssre.1998.0641
- Bell, A. J. (2005). “Oh yes, I remember it well!” reflections on using the life-grid in qualitative interviews with couples. *Qualitative Sociological Review*, 1(1). Retrieved February 2013, from http://www.qualitativesociologyreview.org/ENG/archive_eng.php
- Belli, R., & Callegaro, M. (2009). The Emergence of calendar interviewing: A theoretical and empirical rationale. In R. Belli, F. Stafford, & D. Alwin (Eds.), *Calendar and time diary methods in life course research* (pp. 31–52). London: Sage.
- Berney, L., & Blane, D. (2003). The Lifegrid method of collecting retrospective information from people at older ages. *Research Policy and Planning*, 21, 13–22.
- Blossfeld, H., Buchholz, S., & Kurz, K. (2011). *Ageing populations, globalization and the labor market: Comparing late working life and retirement in modern societies*. Cheltenham: Edward Elgar.
- Bradburn, N. M., Rips, L. J., & Shevel, S. K. (1987). Answering autobiographical questions: The impact of memory and inference on surveys. *Science*, 236, 157–162. doi:10.1126/science.3563494
- Brzinsky-Fay, C., Kohler, U., & Luniak, M. (2006). Sequence analysis with stata. *The Stata Journal*, 6, 435–460.
- Burnard, P. (1991). A method of analysing interview transcripts in qualitative research. *Nurse Education Today*, 11, 461–466. doi:10.1016/0260-6917(91)90009-Y

- Burnard, P., Gill, P., Stewart, K., Treasure, E., & Chadwick, B. (2008). Analysing and presenting qualitative data. *British Dental Journal*, 204, 429–432. doi:10.1038/sj.bdj.2008.292
- Carmichael, F., Hulme, C., & Porcellato, L. (2013). Older age and ill health: Links to work and worklessness. *International Journal of Workplace Health Management*, 6, 54–65. doi:10.1108/17538351311312330
- Carmichael, F., Hulme, C., Porcellato, L., Ingham, B., & Prashar, A. (2011). Ageism and age discrimination: The experiences and perceptions of older employees. In E. Parry & S. Tyson (Eds.), *Managing age diversity* (Chap. 8, pp. 115–128). London: Palgrave Macmillan.
- Caspi, A., Moffitt, T., Thornton, A., Freedman, D., Amell, J., Harrington, H., ... Silva, P. (1996). The life history calendar: A research and clinical assessment method for collecting retrospective event-history calendar. *International Journal of Methods in Psychology*, 6, 101–114. doi:10.1002/(SICI)1234-988X(199607)6:23.3.CO;2-E
- Creswell, J., & Plano Clark, V. (2007). *Designing and conducting mixed methods research*. London: Sage.
- Davia, M. A., & Legazpe, N. (2014). Female employment and fertility trajectories in Spain: An optimal matching analysis. *Work, Employment & Society*, 28, 633–650. doi:10.1177/0950017013500117
- DeLisle, J. (2011). The benefits and challenges of mixing methods and methodologies. *Caribbean Curriculum*, 18, 87–120.
- Eerola, M., & Helske, S. (2012). Statistical analysis of life history calendar data. *Statistical Methods Medical Research*, 1–27. doi:10.1177/0962280212461205
- Engel, L., Keifer, M., & Zahm, S. (2001). Comparison of a traditional questionnaire with an icon/calendar-based questionnaire to assess occupational history. *American Journal of Industrial Medicine*, 40, 502–511. doi:10.1002/ajim.1118.abs
- Feldman, S., & Howie, L. (2009). Looking back, looking forward: Reflections on using a life history review tool with older people. *Journal of Applied Gerontology*, 28, 621–637. doi:10.1177/0733464808330081
- Freedman, D., Thornton, A., Camburn, D., Alwin, D., & Young-DeMarco, L. (1988). The life history calendar: A technique for collecting retrospective data. *Social Methodology*, 18, 37–68.
- Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory: strategies for qualitative research*. Chicago, IL: Aldine Publishing.
- Glasner, T., & van der Vaart, W. (2009). Applications of calendar instruments in social surveys: A review. *Quality & Quantity*, 43, 333–349. doi:10.1007/s11135-007-9129-8
- Green, A. (2009). Older people and transitions from employment to nonemployment: International perspectives and policy issues. *The Professional Geographer*, 61, 46–58. doi:10.1080/00330120802577699
- Halpin, B. (2000). BHPS work-life history files, version 2, ESRC research centre on micro-social change, University of Essex. June 2014 Retrieved from <http://www.esds.ac.uk/doc/3954/mrdoc/pdf/newman.pdf>
- Halpin, B. (2003) *Tracks through time and continuous processes: Transitions, sequences, and social structure* (Working paper 2003-01). Dept of Sociology, University of Limerick. Retrieved April 2014, from [http://www3.ul.ie/sociology/docstore/workingpapers/wp2003-01.pdf\(13/08/14\)](http://www3.ul.ie/sociology/docstore/workingpapers/wp2003-01.pdf(13/08/14))
- Halpin, B. (2010). Optimal matching analysis and life-course data: The importance of duration. *Sociological Methods & Research*, 38, 365–388. doi:10.1177/0049124110363590
- Happ, M. B. (2009). Mixed methods in gerontological research: Do the qualitative and quantitative data “touch”? *Research in Gerontological Nursing*, 2, 122–127. doi:10.3928/19404921-20090401-06
- Harris, D., & Parisi, D. M. (2007). Adapting life history calendars for qualitative research on welfare transitions. *Field Methods*, 19, 40–58. doi:10.1177/1525822X06292707
- Holland, P., Berney, L., Blane, D., Davey Smith, G., Gunnell, D. J., & Montgomery, S. M. (2000). Life course accumulation of disadvantage: Childhood health and hazard exposure during adulthood. *Social Science and Medicine*, 50, 1285–1295. doi:10.1016/S0277-9536(99)00375-5

- Hoppin, J., Tolbert, P., Flagg, E. W., Blair, A., & Zahm, S. (1998). Use of a life events calendar approach to elicit occupational history from farmers. *American Journal of Industrial Medicine*, 34, 470–476. doi:10.1002/(SICI)1097-0274(199811)34:53.0.CO;2-U
- Khan, K. (2009). Employment of the older generation. *Economic and Labour Market Review*, 3, 30–36. doi:10.1057/elmr.2009.57
- Kim, J., & Moen, P. (2002). Retirement transitions, gender and psychological well-being – A life course ecological model. *Journal of Gerontology: Psychological Sciences*, 57B, 212–222.
- Lilley, R. C., Cryer, P. C., Firth, H. M., Herbison, G. P., & Feyer, A. M. (2011). Ascertainment of occupational histories in the working population: The occupational history calendar approach. *American Journal of Industrial Medicine*, 54, 21–31. doi:10.1002/ajim.20903
- Martyn, K., & Martin, R. (2003). Adolescent sexual risk assessment. *Journal of Midwifery and Women's Health*, 48, 213–219. doi:10.1016/S1526-9523(03)00064-3
- Meltzer, P. (2001). Using the self-discovery tapestry to explore occupational careers. *Journal of Occupational Sciences*, 8, 16–24. doi:10.1080/14427591.2001.9686485
- Nelson, I. (2010). From quantitative to qualitative: Adapting the life history calendar method. *Field Methods*, 22, 413–428. doi:10.1177/1525822X10379793
- OECD (2004). *Ageing and employment practices – UK*. Paris: Author.
- OECD (2005). *Promoting adult learning*. Paris: Author.
- OECD (2006). *Live longer, work longer* (Ageing and Employment Policies Project). Paris: Author.
- Parry, O., Thomson, C., & Fowkes, G. (1999). Life course data collection: Qualitative interviewing using the life grid. *Sociological Research Online*. Retrieved December 1, 2011, from <http://www.socresonline.org.uk/4/2/parry.html>
- Piccarreta, R. (2012). Graphical and smoothing techniques for sequence analysis. *Sociological Methods & Research*, 41, 362–380. doi:10.1177/0049124112452394
- Pollock, G., Antcliff, V., & Ralphs, R. (2002). Work orders: Analysing employment histories using sequence data. *International Journal of Social Research Methodology*, 5, 91–105. doi:10.1080/13645570110062432
- Porcellato, L., Carmichael, F., Hulme, C., Ingham, B., & Prashar, A. (2010). Giving older workers a voice; constraints on employment. *Work, Employment & Society*, 24, 85–103. doi:10.1177/0950017009353659
- Potârcă, G., Mills, M., & Lesnard, L. (2013). Family formation trajectories in Romania, the Russia federation and France: Towards the second demographic transition?. *European Journal of Population*, 29, 69–111. doi:10.1007/s10680-012-9279-9
- Roberts, J., & Horney, J. (2010). The life event calendar method in criminological research. In A. R. Piquero & D. Weisburd (Eds.), *Handbook of quantitative criminology* (pp. 289–312). Springer Science + Business Media. doi:10.1007/978-0-387-77650-7-15
- Schmelzer, P. (2011). Income development of older people: Consequences of pension reforms and unstable careers in the UK. In H. Blossfeld, S. Buchholz, & K. Kurz (Eds.), *Ageing populations, globalization and the labor market: Comparing late working life and retirement in modern societies* (pp. 259–282). Cheltenham: Edward Elgar.
- Scott-Ricks, T. N., & Harrison, T. (2011). Issues using the life history calendar in disability research. *Disability and Health Journal*, 4, 262–270. doi:10.1016/j.dhjo.2011.05.004
- Sutton, J. E. (2010). A review of the life-events calendar method for criminology research. *Journal of Criminal Justice*, 38, 1038–1044. doi:10.1016/j.jcrimjus.2010.07.006
- Tams, S., & Arthur, M. B. (2010). New directions for boundaryless career: Agency and interdependence in a changing world. *Journal of Organisational Behaviour*, 31, 629–646. doi:10.1002/job.712
- Verd, J. M., & Lopez, M. (2011). The Rewards of a qualitative approach to Life-course research. The example of the effects of social protection on career paths Forum: Qualitative Social Research, 12, 1–15. Retrieved February 18, 2013, from <http://www.qualitative-research.net/index.php/fqs/rt/printerFriendly/1753/3259>
- Wiggins, R., Erzberger, C., Hyde, M., Higgs, P., & Blane, D. (2007). Optimal matching analysis using ideal types to describe the lifecourse: An illustration of how histories of work, partnerships and housing relate to quality of life in early old age. *International Journal of Social Research Methodology*, 10, 250–278. doi:10.1080/13645570701542025

- Wiseman, L., & Whiteford, G. (2009). Understanding occupational transitions: A study of older rural men's retirement experiences. *Journal of Occupational Science, 16*, 104–109. doi:[10.1080/14427591.2009.9686649](https://doi.org/10.1080/14427591.2009.9686649)
- Yen-Chun, Lin R., Yu-Tzu Dai, R. N., & Shiow-Li Hwang, R. N. (2003). The effect of reminiscence on the elderly population: A systematic review. *Public Health Nursing, 20*, 297–306. doi:[10.1046/j.1525-1446.2003.20407.x](https://doi.org/10.1046/j.1525-1446.2003.20407.x)
- Zahm, S., Colt, J., Engel, L., Keifer, M., Alvarado, A., Burau, K., & Blair, A. (2001). Development of a life events/icon calendar questionnaire to ascertain occupational histories and other characteristics of migrant farmworkers. *American Journal of Industrial Medicine, 40*, 490–501. doi:[10.1002/ajim.1117](https://doi.org/10.1002/ajim.1117)