Pathways from parenthood history to later life health: Results from analyses of the English Longitudinal Study of Ageing

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Abstract
We analysed the extent to which associations between parenthood histories and later life health are mediated by wealth, health-related behaviours, social support and strain. A sample of men and women aged 50+ who participated in the English Longitudinal Study of Ageing waves 1-3 was used (n = 6,207). Parenthood history included number of natural children, having adopted or step children and timing of first and last birth. Mediators were wealth, social support and strain, smoking and physical activity. Health outcomes were allostatic load and limiting long-term illness. The path models were adjusted for age, education, marital history, childhood health and intergenerational contacts. The association between a higher number of children and health was mediated by wealth in men and women, and by smoking and social strain in women. The association between having an adopted or step child and health was mediated through wealth. In addition to mediation through wealth, physical activity and smoking, mothers had a direct association between early childbirth and allostatic load. Among fathers, the direct paths from early and late childbirth to health remained, although some of the effects were mediated through wealth and physical activity.
Extended abstract

Introduction

Recognition of the importance of life course influences on health and mortality at older ages has led to growing interest in the long-term consequences of particular reproductive pathways, particularly in the context of changing fertility patterns. Most studies of contemporary populations have found a U- or J-shaped association between number of children born (parity) and later life mortality and morbidity among women, and in a few studies men, with nulliparity or having only one child and having four or five or more children, being associated with increased risks relative to having two children (Doblhammar 2000; Grundy & Tomassini 2005, 2006; Hank 2010; Hurt, Ronsmans & Thomas 2006; Read, Grundy & Wolf 2011; Spence 2008). However in Scandinavian populations, which have generous social supports for parents, there seems to be no, or a reduced, ‘penalty’ for high parity. Early entry to motherhood is associated with poorer later health (Read et al. 2011; Mirowsky 2005; Spence 2008). Later health disadvantages of early fatherhood have also been reported. Results on possible later life health effects of having children at relatively old ages are less consistent.

The hypothesised causal pathways that underlie these associations are complex. Pregnancy, childbearing and lactation protect against some types of hormonally related cancers. High parity, however, is associated with higher risks of diabetes and circulatory diseases, although underlying mechanisms are not clearly established. Similarities in findings for women and men reported in studies which consider both point also to underlying biosocial pathways relevant to both genders. On the positive side, childrearing may lead to avoidance of health damaging behaviours. A Norwegian data, for example, show an inverse association between parity and risks of death from alcohol related causes (Grundy & Kravdal 2010). Parenthood also often involves greater social participation in the community and social support from children is associated with health benefits at older ages (Furstenberg 2005). Less positively, parenting may involve stress, with associated higher risks of depression, and substantial economic costs (Evenson & Simon 2005; Joshi 2002). These disadvantages may offset or outweigh potential benefits for those following particular parenting pathways (such as early entry to parenthood) or parenthood in particular circumstances (such as lone parenthood, having adopted or step children, or socio-economic disadvantage).

Research questions

Our aim in this paper is to elucidate the pathways through which fertility histories may influence later life health. We investigate whether associations between fertility histories and later life health operate through (i.e. are mediated by) certain important dimensions of life known to be associated with health – namely health related behaviours; indicators of social support and strain; and wealth. First of our two health outcomes is allostatic load – an index based on multisystem physical dysregulation resulting from long-term exposure to stress. We expect allostatic load to be an early indicator of health problems and a predictor of later health and disability. Our second health outcome is limiting-long-term illness.

Data

We use data from the waves 1-3 of the English Longitudinal Study of Ageing (ELSA), a nationally representative longitudinal study of the older population of England. The first wave of ELSA conducted in 2002-2003 included men and women then aged 50 years or more from households which had participated in any one of the 1998, 1999 or 2001 rounds of the cross sectional Health Survey for England (HSE). Response rates for the HSE were 69% in 1998, 70% in 1999 and 67% in
2001. This process led to the recruitment of 11,392 core members to the first wave of the ELSA study (response rate 67%). Comparisons with other sources, including the national census, showed that the baseline ELSA survey was nationally representative. 10,770 of Wave 1 respondents were eligible for re-interview at Wave 2 in 2004-5 (excluding those who had died or had moved out of the country) of whom 8,780 (82%) participated. 7,535 participated in Wave 3. Of the wave 3 respondents, 6,207 provided full parenthood history as part of the life course interview.

**Measures**

*Life history and demographic characteristics.* Socio-demographic variables were age (in single years); marital history, and education. Marital history was measured using dichotomized items of being currently married (measured in each wave), and ever divorced and ever widowed (derived from the life history interview in wave 3). Education was dichotomised distinguishing respondents with any formal qualification from those with no qualifications. Three binary variables for intergenerational contacts were created to measure co-residence with one or more child, weekly contact with children among those who were not coresident with child and neither coresident nor weekly contact with children. Contact variables were derived at each waves and used as a time-varying variable in analyses for the parents. The retrospective data collected in wave 3 was used to derive an indicator of poor health in childhood. Those reporting missing school, being in hospital or confined to bed for more than a month due to illness or that poor health had restricted physical activities for more than three months in childhood were coded as having had a childhood health problem. Parenthood history variables were also derived from the life history interview. We derived five binary variables indicating 0, 1, 2, 3, or 4+ natural living children and a further dichotomous variables indicating whether the respondent had any adopted children, or any step children. For parents additional dichotomous variables were derived indicating whether or not respondents had had a child before the age of 20 (women) or 23 (men) or after age 35 (women) or 39 (men).

*Intermediate variables from wave 1.* Wealth quintiles were calculated using non-pension wealth indicating financial, physical and housing wealth net of debts. Smoking was used as a dichotomous variables, indicating whether the participant was currently smoking. Self-reported physical activity was used to create four categories: Sedentary (no physical activity and if working in sedentary job), low (mild physical activity at least once a week or if working in a job that was mostly standing), moderate (moderate physical activity at least once a week or if working in a job that involved physical work), and high (vigorous physical activity at least once a week or if working in a job that involved heavy manual labour). Because the distribution of physical activity was approximately normal and the association with outcomes linear, this measure was treated as continuous in the analysis. A mean score of perceived social support and social strain from partner, children, relatives and friends was calculated. Support support included three questions: How much do they really understand the way you feel about things? How much can you rely on them if you have a serious problem? How much can you open up to them if you need to talk about your worries? Social strain included three questions: How much do they criticise you? How much do they let you down when you are counting on them? How much do they get on your nerves? The mean was calculated using the items that were available. People reporting having no partner, children, relatives or friends (n = 10 in wave 1) were given a missing value.

*Health outcomes from wave 2 and 3.* Limiting long-term illness was a dichotomous measure (1=one or more, 0=none) measured in wave 3. Allostatic load was measured using nine biomarkers obtained during the nurse visit in wave 2. Five of the biomarkers were derived from blood samples: HDL/ total cholesterol ratio (mg/dL) (index of risk for cardiovascular disease), triglycerides (index of lipid metabolism), glycosylated haemoglobin (HbA1c, %) (index of glucose metabolism over the previous
30-90 days), fibrinogen (index of inflammation and cardiovascular disease, mg/dL) and C-reactive protein (index of inflammation and cardiovascular disease, mg/dL). Three of the biomarkers were obtained from anthropometric measures (waist to hip ratio), blood pressure measures (systolic and diastolic blood pressure) and lung function (peak expiratory flow rate). For all nine measures, individuals belonging to the highest 25 percentile indicating the health risk were identified from the sample distribution. The count of belonging to the risk quartiles was calculated. Allostatic load score was adjusted for medication, fasting and inhaler use.

Analysis

The associations between fertility history, intermediate measures and health outcomes were studied using path models within the structural equation modeling framework using MPlus software. Because of differences in variable distributions and life trajectories, men and women were analysed separately. All intermediate factors and covariates were entered simultaneously in the analysis to adjust their potential influence in the full model. First, the direct association between fertility history and health limitation, and fertility history and allostatic load was assessed. The direct associations of intermediate factors with fertility history and health outcomes were also assessed. In the next step, intermediate factors were added to the model and allostatic load was used as a secondary mediator and health limitation as a tertiary outcome. Maximum likelihood estimation with robust standard errors (MLR) was used to take into account any non-normality in the sample. The estimation of the model was carried out under missing data theory using all available data.

Results

The direct associations between fertility history and allostatic load indicated that having an adopted child among women and having a higher number of children and early entry to parenthood for both men and women were associated with higher (worse) allostatic load scores. A higher number of children and early parenthood were associated with limiting long-term illness in both men and women. Late fatherhood was associated with a higher risk and late motherhood with lower risk of limiting long-term illness. Moreover in men, having step child was associated with a higher risk of limiting long-term illness. There were significant associations between all intermediate factors (net wealth, physical activity, smoking, social support and social strain) and allostatic load and limiting long-term illness. A higher number of children (4 vs. 2) was associated with net wealth, physical activity and smoking in men and women, and with social strain in women. In men, late fatherhood was associated with lower wealth quintile and social strain. The associations suggested that there was possible mediation through a number of intermediate factors.

When all intermediate factors were entered in the model, the direct association between having a high number of children and allostatic load and limiting long-term illness disappeared. In both men and women this association was mediated through wealth and in women through smoking and social strain. Moreover, in women the association between having an adopted child and health and in men the association between having a step child and health was mediated through wealth. In mothers, there was a direct association between early childbirth and allostatic load, but otherwise the associations were mediated through wealth, physical activity and smoking. Among fathers, the direct paths from early and late child birth to health remain to some extent. However, some of the effects were mediated through wealth and physical activity.
Discussion

Path models highlights wealth as an important mediator in the pathway from parenthood history to later life health. This finding was similar for men and women suggesting the importance of socio-economic mechanisms in both genders. Most of the mediation also operated through allostatic load, which points to usefulness of recognising pre-clinical physiological changes related to parenthood characteristics in predicting health outcomes. The findings supported the idea that health-related behaviours and social strain play an important role in the association between parenthood histories and later life health. However, the mediation through health-related behaviours and social strain was considerably weaker than the mediation through wealth. We did not find any significant mediation through social support. It is possible that some of the factors, especially the ones with positive health effects, such as social support and physical activity, may be more likely to act as buffers between adverse life histories and later life health. Hence, testing the interactions in these factors would be helpful. The health consequences of timings of births were only partially mediated by these factors, leaving a considerable amount of covariance between timing of births and later health unexplained. In the future studies, it is important to find potential factors that could mediate the associations. Although the present study included a number of background factors, some of which were from very early life, and death with incomplete data over time, it is important to study the role of initial selection mechanisms and attrition in detail.

In summary, the findings suggest that economic strain and its later physiological stress consequences (allostatic load) play very important role in explaining the poorer health outcomes among those having a higher number of children, and having adopted and step children. Less advantageous health-related behaviors and social strain also mediate the association to some extent. The intermediate factors also played a role in the association between timing of births and later poorer health, but only partially.

References