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ABSTRACT

In this paper we examine associations between the fertility histories of older British women and men and their quality of life using data on a sample of 6,374 men and women born between 1923 and 1949 drawn from the British Household Panel Survey (BHPS). Quality of life in 2001 was measured using scores from the four subscales of the CASP-19 questionnaire: control, autonomy, pleasure and self-realisation. Fertility histories were derived using information on the births of children collected in all waves of the BHPS. The aspects of fertility history investigated were number of children born and parents' ages at birth of first and last child. Age, education, marital status, tenure status, smoking, co-residence with one or more children, perceived social support and health limitations were included as covariates. The results suggested that early entry to parenthood and to some extent high parity were related to poorer quality of life. These associations were mostly mediated by socio-economic, social support and health factors. Compared to women with two children, nulliparous women expressed a higher level of autonomy, and both nulliparous women and those with four or more children a higher level of self-realisation. Low parity was related to a lower level of pleasure, especially among men, but this relationship appeared weaker and among women was not significant when background factors were controlled.

KEY WORDS – fertility history, quality of life, older women and men.

Fertility history and quality of life

Increases in longevity and in the representation of older people in most populations have led to an increasing recognition of the importance of the *quality* as well as the quantity or duration of later life. Although an under-theorised and ill-defined topic (Dijkers 2005; Higgs *et al.* 2003; Hyde *et al.* 2003), quality of life is clearly a multi-dimensional concept that covers both subjective and objective circumstances that can affect the individual's evaluation of his or her life (Bowling *et al.* 2003; Lawton *et al.* 1999). Previous research on quality of life at older ages has identified the

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importance of material, health-related and social influences, including having trusting relationships and interactions with family and friends (Netuveli and Blane 2008). Studies in which older people have been asked what things they consider important in their life similarly have shown that own health, the health of those that people are close to, and relationships with family and friends are the most frequently reported topics (Bowling *et al.* 2003; Krause 2007; Salmela-Aro *et al.* 2009). These domains of later life are closely associated with family life and family building patterns throughout the life course, which suggests that fertility histories may be associated with quality of later life. In this paper, we analyse associations between the fertility histories of older women and men in Britain and four dimensions of quality of life.

Previous research

Most previous studies of the relationship between fertility histories and outcomes in later life have focused on mortality, physical health, depression or receipt of help. Associations between fertility histories and positive outcomes, including quality of life in older age, have received much less attention, however, and results have been mixed, possibly because of the multi-dimensionality of wellbeing. Differences in the age groups investigated may also be important as the short- and long-term implications of various fertility histories may differ (*see* Kohler, Behrman and Skytthe 2005). In this paper, we investigate the association between fertility history and four different dimensions of later life quality of life measured using the CASP-19 quality of life questionnaire (Hyde *et al.* 2003). These dimensions are: *control* over one's life; freedom to carry out plans (*autonomy*); feeling life to be pleasurable and meaningful (*pleasure*) and having opportunities for *self-realisation.* Of these dimensions, 'Control' and 'Autonomy' may be regarded as prerequisites of free participation in society. 'Pleasure' and 'Self-realisation' focus on the agency of older people, and measure the more active aspects of old age. These dimensions of quality of life are not new, were considered in early gerontological theories (*see* Netuveli and Blane 2008), and show good validity when correlated with satisfaction with life scales (Hyde *et al.* 2003). Broadening the scope from morbidity and health to study quality of life makes it possible to look at wellbeing outcomes that are not restricted by normative assumptions of 'good health' but reflect the subjective wellbeing of older people.

Earlier findings on parity and later life health

There have been only a few studies on the effects of fertility histories on different dimensions of quality of life but, as already noted, several that

have analysed associations between fertility histories and various indicators of health in later life. Research on associations between fertility histories and later life mortality has often found a U-shaped (or J-shaped) pattern with higher mortality among low and high parity groups compared to those of medium parity (for a review *see* Hurt, Ronsmans and Thomas 2006), although results from recent Scandinavian studies have tended not to find a high parity 'penalty' (Grundy 2009; Grundy and Kravdal 2008; Hinkula *et al.* 2006). Associations between high parity and poorer self-reported health among women (Grundy and Tomassini 2005), men (Guralnik *et al.* 2009) and both women and men (Grundy and Holt 2000) have been reported in some United Kingdom (UK) studies. Some studies among women in the United States of America (USA), however, have found no association between parity and limitations in functioning (Moen, Dempster-McClain and Williams 1992; Spence 2008), while one study (Kington, Lillard and Rogowski 1997) reported that high parity was related to poorer health but not to functional limitations.

In terms of mental health, the results of previous research have been mixed. Research on Chinese samples has found that older people with fewer children have more depressive symptoms (Chou and Chi 2004; Silverstein, Cong and Li 2006), and report more loneliness (Chou and Chi 2004). In another Chinese study, the association between childlessness and poorer wellbeing was found to be mediated by living arrangements and the availability of a pension and health services (Zhang and Liu 2007). A number of European studies suggest that gender modifies the association between number of children and mental health at older ages. Generally, childless men have more depressive symptoms than parous men, whereas the difference in the level of depressive symptoms among childless and parous women is smaller (Buber and Engelhardt 2008; Helbig *et al.* 2006; Plaisier *et al.* 2008). In two Scandinavian studies, parous women reported more happiness (Kohler, Behrman and Skytthe 2005) and higher satisfaction with life and self-esteem (Hansen, Slagsvold and Moum 2009) than childless women, while parous and childless men did not differ from each other in these dimensions of wellbeing. Some studies from the USA have found associations between high parity and depression in women (Spence 2008); others have found less depression among childless women compared to parous women (Evenson and Simon 2005; Sudha *et al.* 2006). Finally, Zhang and Hayward (2001) reported that older unmarried childless men had more depression and loneliness than women in a comparable situation.

The mechanisms linking fertility quantum and health may in part reflect the fact that the physiological consequences of multiple pregnancies and childbirths may lead to poorer health outcomes (*see* Hurt, Ronsmans

and Thomas 2006; Spence 2008). Poorer health related to a higher parity may in turn decrease quality of life by inhibiting opportunities for control, autonomy, sense of pleasure and self-realisation. On the other hand, parenthood may enhance social networks, provide a positive social role and a potential important source of social support (Buber and Engelhardt 2008; Furstenberg 2005; Grundy and Shelton 2001; Krause 2007; Offer and Schneider 2007; Silverstein, Cong and Li 2006; Zunzunegui, Béland and Otero 2001). Mental health may be enhanced by feelings of fulfilment through the parental role (Erikson 1950). Close relationships, most often including spouse and children, are frequently reported as a major source of satisfaction and purpose in life and an important component of personal goals in old age (Bowling *et al.* 2003; Krause 2007; Salmela-Aro *et al.* 2009). Children can, however, be regarded as constraints (Gallanger and Gerstel 2001), if there are several competing roles to be fulfilled. Poor timing and a high number of children may increase the stresses associated with rearing children and involve substantial economic costs (Evenson and Simon 2005; Joshi 2002; Spence 2008), and thus decrease the sense of autonomy and self-realisation both during child-bearing phases of life and, because of the importance of life course influences on wellbeing at older ages, also in later life.

Earlier findings on timing of birth and later life health

Early child bearing has been found to be a risk factor for poorer health and functioning in later life in a number of studies of women (Henretta 2007; Mirowsky 2005; Spence 2008) and in one study of both women and men (Grundy and Holt 2000). Young age at the birth of the first child is associated with poorer later life mental health in women (Henretta *et al.* 2008; Kalil and Kunz 2002; Koropeckyj-Cox, Pienta and Brown 2007; Spence 2008), men (Heath, McKenry and Jeigh 1995) and women and men (Mirowsky and Ross 2002). Some studies, however, have not found such associations. For instance, Taylor (2009) reported from the Wisconsin Longitudinal Study that though early child birth was related to poorer health, it was not associated with psychological wellbeing at age 53 years. In the British cohorts born in 1946 and 1958, teenage motherhood was associated with increased risk for psychiatric morbidity in the later but not in the earlier cohort (Maughan and Lindelow 1997).

Research on the relationship between late child birth and mental health is scarcer and has had contradictory findings. Late first birth was related to depression in women, but not in men in a study from the USA (Mirowsky and Ross 2002), but another of women from the USA found no association between late child bearing and depression (Spence 2008). Similarly, a

recent Dutch study found no relationship between symptoms of depression and anxiety and age at first birth or age of the youngest child among either men or women (Plaisier *et al.* 2008). Mechanisms linking early child birth and health outcomes may be related to physiological and especially to social and psychological stresses (*see* Spence 2008), but the causal mechanisms are hard to identify, especially as adverse childhood circumstances may lead to early child bearing and also cause worse health and wellbeing (Chase-Lansdale and Kiernan 2004). Additionally, early child bearing may alter the pathways to education, employment and income that can be critical to later health and wellbeing. Young mothers may have increased risks of partnership disruption which itself may have negative consequences (Kalil and Kunz 2002). They may also receive less social support than older mothers, and be more likely to experience family estrangement (Moffitt *et al.* 2002). These numerous negative factors can accumulate through the lifecourse and decrease quality of life in older age. Koropeckyj-Cox, Pienta and Brown (2007) concluded that childlessness and off-time child bearing (particularly early child bearing) were related to poorer mental health in midlife among women through their link to marital status, health and socio-economic status.

Having the first child late makes it possible to attain desired education and higher occupational status, which may provide more financial resources when starting a family. Older parents may also benefit from the social support and companionship of children who are relatively young (Yi and Vaupel 2004). In these ways late parenthood may potentially increase the quality of life, especially the domains of pleasure and self-realisation, but as parental responsibilities and economic costs related to dependent children extend to parents' later life, older parenthood may also postpone achievement of a sense of autonomy. Mirowsky and Ross (2002) suggested there is an optimal age of parenthood in terms of mental health that is determined by both biological and cultural factors, including gender-related expectations. Thus while 'too early' and 'too late' child bearing in their US study was related to depression among women, for men there was a more or less linear mental health advantage of later paternity. However, most of the previous research on timing of child bearing and mental health has focused almost exclusively on women, and there are very few studies of men.

Research questions

In this study, we investigated the relationship between fertility histories (number of children and timing of child bearing) and quality of life in women and men in two age groups (51–69 and 70–79 years). Quality of life

was measured using four subscales, control, autonomy, pleasure and self-realisation, of the CASP-19 questionnaire (Hyde *et al.* 2003). We hypothesised that low parity (nulliparity and one child) might mean more opportunities for autonomy and thus be positively associated with this dimension of quality of life at older age, especially among women. Conversely, we expected that high parity would be negatively associated with autonomy and control. As children can also be an important source of positive feelings, we expected a negative association between nulliparity and feelings of pleasure and satisfaction with life. Early child bearing, by having an extensive influence on work and family life trajectories, was expected to be associated with a lower quality of life on all dimensions. Late child birth may increase family constraints in mid and later life and restrict the freedom to plan and choose activities, and so be negatively associated with feelings of autonomy, but may potentially increase feelings of life satisfaction, meaning and self-realisation. We expected that all these associations would be at least partly mediated by socio-economic, social support and health factors.

Method

The sample

The sample used here was drawn from the British Household Panel Survey (BHPS), an annual nationally-representative sample of private households in the UK (Taylor *et al.* 2006). The total sample size in the earlier waves of BHPS was about 10,000 adults. The later waves had larger samples (between 15,000 and 18,000 adults) through the inclusion of additional sub-samples in 1997 (European Community Household Panel), in 1999 (Scottish and Welsh extension samples), and in 2001 (Northern Ireland extension sample). At Wave 1, interviews with all eligible adults occurred in 69 per cent of households (including proxies). In the later waves, the response rate varied between 88 and 97 per cent. A sample of 7,228 women and men born between 1923 and 1949 was drawn that answered the quality of life questionnaire in 2001; of these, 6,374 had available the information on fertility history. At this time, the average age of the participants was 63 years, with a range from 51 to 79 years.

Dependent variables

Quality of life was assessed with the CASP-19 questionnaire (Hyde *et al.* 2003). It has 19 items measuring four dimensions: control in life,

autonomy, pleasure and self-realisation. *Control in life* is measured by four items: 'My age prevents me from doing the things I would like to', 'I feel that what happens to me is out of my control', 'I feel free to plan for the future', and 'I feel left out of things'. *Autonomy* is measured by five items: 'I can do the things I want to do', 'Family responsibilities prevent me from doing what I want to do', 'I feel that I can please myself with what I do', 'My health stops me from doing things I want to do', and 'Shortage of money stops me from doing things I want to do'. *Pleasure* is measured by five items: 'I look forward to each day', 'I feel that my life has meaning', 'I enjoy the things I do', 'I enjoy being in the company of others', and 'On balance, I look back on my life with a sense of happiness'. *Self-realisation* is measured by five items: 'I feel full of energy these days', 'I choose to do things that I have never done before', 'I feel satisfied with the way my life has turned out', 'I feel that life is full of opportunities', and 'I feel that the future looks good to me'. Each item is rated on a four-point scale that ranges from 'often' to 'never'. Items were reverse coded so that a higher score indicated a higher quality of life. Mean scores for the four subscales were calculated and used in the analysis. The internal consistency measured with Cronbach's alpha was 0.65 for Control, 0.57 for Autonomy, 0.76 for Pleasure, and 0.81 for Self-realisation. The correlations between the subscales varied between +0.41 and +0.63. The distributions of the subscales were approximately normal but with a slight skewness towards the positive end of the scale. This was dealt with using a maximum likelihood estimator in the models for robust estimation of standard errors that takes into account non-normality of outcomes.

The CASP-19 scale has often been used as a sum score of all items to measure the general level of quality of life. However, the four subscales can be separately identified and used as measures of four dimensions of quality of life. We used the subscales instead of the total sum score in the present study, because theoretically their associations with fertility history may vary. Previous methodological analyses of the CASP-19 questionnaire suggest that though a second-order factor model with four subscales fitted slightly better than a first-order factor model with four subscales, the difference between the models was small (Wiggins *et al.* 2008). There was some missing data in the quality of life subscales (*see* Table 1). Missing values were related to older age, and poorer socio-economic and heath status. In order to check for any bias arising from the missing data, we repeated all the analyses using multiple imputation of missing values, but found this had no effect on the results. Given also the low frequency of missing values, we present here the results from analyses not including imputed values.

TABLE 1. *Profiles of the two British Household Panel Survey cohort samples*

Variables and categories	Missing (%)	Gender and birth years			
		Women		Men	
		1923–39	1940–49	1923–39	1940–49
Background factors:					
Age (years), mean (SD)	0	69.4 (4.84)	55.8 (2.86)	69.1 (4.84)	56.0 (2.85)
Not married (%)	<1	45.7	23.8	24.0	16.5
No qualification (%)	4	55.5	40.3	46.6	31.5
Not home owner (%)	2	29.7	21.4	25.6	19.4
Smoking (%)	4				
Never smoked		61.8	54.7	44.1	47.1
Ex-smoker		20.3	16.6	37.4	27.0
Currently smoking		17.9	28.6	18.5	25.9
Co-residence with child (%)	<1	12.6	45.7	16.1	51.7
Emotional support (%)	<1	78.1	79.0	68.8	66.1
Health limitations (%)	<1	33.4	28.3	31.8	21.6
Fertility history					
Number of children (%)	3				
0		15.6	10.6	17.6	15.1
1		15.3	12.8	13.7	12.9
2		27.2	38.9	30.0	39.1
3		21.6	24.4	20.9	20.5
4+		20.3	13.3	17.8	12.3
Birth before age 20/23[1] (%)	2[2]	7.0	14.4	10.6	17.2
Birth after age 35 (%)	2[2]	12.7	7.5	21.1	14.5
Dependent variables:					
Quality of life, mean (SD)[3]	5				
Control		2.80 (0.65)	2.89 (0.62)	2.83 (0.62)	2.91 (0.61)
Autonomy		3.00 (0.54)	2.91 (0.58)	2.97 (0.55)	2.90 (0.57)
Pleasure		3.66 (0.40)	3.59 (0.45)	3.63 (0.41)	3.55 (0.45)
Self-realisation		2.93 (0.60)	3.00 (0.58)	2.96 (0.59)	2.97 (0.58)
Sample sizes		1,842	1,596	1,524	1,412

Notes: 1. Cut-offs: for women at age 20 years, and for men at age 23 years. 2. Calculated for those who have children. 3. CASP-19.
Significance levels: * $p<0.05$, ** $p<0.01$, *** $p<0.001$.

Independent variables

The number of natural children (0, 1, 2, 3 and 4+) was derived using information on births of children collected in 1992 and 1998–2003. Having two children, the modal frequency, was chosen as the reference category. Ages of parents at the birth of the first and last child were derived from the children's dates of birth reported by parents and information on the parents' month and year of birth. Day of birth was not available for parents and imputed as the 15th of the declared month of birth. On the basis of previous studies (Grundy and Tomassini 2005), early births were categorised as births before age 20 years for women, and before age 23 years for men, and late births as those after age 35 years. Those with a

missing number of children or missing dates of birth for children (7% of men and 3% of women) had to be excluded from the analyses of the timing of births. People with missing fertility history items were on average a year older than people with completed fertility histories and were more likely to report health limitation, not to own their home, have no qualifications and report a lack of emotional support.

Background factors

Age was a continuous variable measured in 2001. Education was derived from a variable for the highest attained educational qualification (12 categories). Because of the low educational level in these age cohorts, a dichotomous variable for education was created by distinguishing those with any recognised qualification from those with none ('1' no qualification, '0' has qualification). Marital status was dichotomised into married or cohabiting, and not married, the latter including the divorced and separated, widowed and never-married (the small sample numbers precluded separate examination of these groups). Housing tenure was also dichotomised into '0' for owned, including shared ownership, and '1' for rented, rent free or other. Three dummy variables relating to smoking status were created: 'never smoked', 'ex-smoker' and 'currently smoking'. These were derived from information on current smoking in various rounds of the survey and retrospective questions about ever a smoker and age when last stopped smoking.

Information on current co-residence with children was derived from 2001 household roster information and coded '1' if the parent had any natural, adopted or step children living in the household, and otherwise '0'. Emotional support was measured by five questions: 'Is there anyone who: (1) you can really count on to listen to you when you need to talk; (2) you can really count on to help you out in a crisis; (3) you can totally be yourself with; (4) you feel really appreciates you as a person; and (5) you can really count on to comfort you when you are very upset?' ('1' yes, '2' no, '3' not sure). A dichotomous measure was constructed so that '1' indicated support (answer 'yes') on all five items and '0' indicated that at least in one of the items the respondent has answered 'no' or 'not sure'. Health limitation was assessed by a dichotomous question: 'Does your health in any way limit your daily activities compared to most people of your age?' ('1' yes, '2' no). The scale was reversed so that 'no' was coded 0.

Analysis

Analysis was carried out using Mplus software (Muthén and Muthén 2007). To study the relationship between fertility histories, the four

dimensions of quality of life and the role of the covariates, multivariate path analysis was used. The four dimensions of quality of life and age were treated as continuous variables in the model. The fertility history items and other covariates were treated as dummy variables. A maximum likelihood estimator with robust estimation of standard errors was used. In the first set of analyses, parous and non-parous respondents were included. In the second set of the analyses, only parous people were analysed. Age, number of children, and early and late child birth (only among parents) were included in the first block. In the second block, qualification, marital status, tenure status, smoking, co-residence with children (only among parents) and social support were added. Where there was a change in odds ratios after adding all the covariates in one block, we then added covariates separately in order to study the individual impact of each covariate. The significant results are reported in the text, but in the tables we present only the results from the three main models. Preliminary analyses distinguished the two cohorts included in the present study: those born respectively in 1923–39 and 1940–49, because the fertility patterns of these cohorts are rather different, with women and men born in the 1940s having higher fertility and an earlier age at parenthood than those born during the 1920s and 1930s (*see* Tomassini *et al.* 2004). The results of models applied to the two cohorts gave very similar results, however, and formal testing showed no significant differences. We therefore provide descriptive results on the two cohorts separately but combined them in the multivariate analyses. Because there were significant differences between the genders and the data were collected from households, resulting in the inclusion of a number of couples for whom data was not fully independent, men and women were analysed separately.

Results

The descriptive results

Frequencies and means for the quality of life, fertility history and background variables are presented in Table 1. There were few differences between women and men or the older and younger age group in scores on the quality of life subscales. There were, however, gender and age group differences in the distribution by fertility history and background factors. Compared with the older respondents, those in the younger age group were more often married, with educational qualifications, home owners, smokers and co-resident with a child. Compared to women, men were more often married, had educational qualifications and were co-resident with a child. Women were more likely than men to have a health

TABLE 2. *The association between fertility history and the 'control' dimension in older women's and men's quality of life*

	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Control	All women			All men		
Number of children[1]						
0	0.002	0.039	0.047	−0.054	0.044	0.049
1	−0.025	−0.002	0.024	−0.059	−0.013	−0.020
3	−0.017	0.014	0.010	−0.058	−0.037	−0.026
4+	−0.102**	−0.050	−0.015	−0.095**	−0.032	−0.019
Sample size		3,438			2,936	
	Parous women			Parous men		
Number of children[1]						
1	−0.026	−0.003	0.022	−0.063	−0.025	−0.023
3	−0.010	0.017	0.011	−0.054	−0.036	−0.023
4+	−0.081*	−0.037	−0.012	−0.078*	−0.042	−0.031
Birth before age 20/23[2]	−0.087*	−0.043	0.001	−0.102**	−0.076*	−0.066*
Birth after age 35	−0.066	−0.057				0.045
Sample size		2,740			2,285	

Notes: Model 1: adjusted for age; Model 2: Model 1 plus qualification, marital status, tenure status, smoking, emotional support and co-residence with children; Model 3: Model 2 plus health limitations.
1. Reference case – two children. 2. Cut-off for women at age 20 and for men at age 23.
Significance levels: * $p<0.05$, ** $p<0.01$, *** $p<0.001$.

limitation, but also more likely to have good emotional support. Differences in the fertility patterns of the cohorts are clearly evident in Table 1. In the younger cohort, experience of early parenthood and having four or more children was more usual, and nulliparity or low parity less usual than in the older cohort. This is consistent with well-known differences in the fertility patterns of these cohorts (Grundy and Tomassini 2005). More men than women reported having no children. It is possible that this arises partly from under-reporting of births by men estranged from their children (Greene and Biddlecom 2000).

Associations between fertility history and quality of life

Control. Among both women and men, having had four or more children compared to two children related to a poorer sense of control in the base model adjusted only for age (Table 2). This relationship disappeared when other covariates were added to the model. Of the covariates, the largest reduction in the relationship between fertility history and control came with including health limitations for women and emotional support for men in the model. Qualification, tenure status, and to some extent smoking, also reduced the association in women and men. Among parous women and men, early child birth was related to a poorer sense of control.

TABLE 3. *The association between fertility history and the dimension 'autonomy' in older women's and men's quality of life*

	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Autonomy	All women			All men		
Number of children[1]						
0	0.089**	0.093**	0.102***	0.025	0.037	0.042
1	−0.038	−0.023	0.002	−0.026	0.000	−0.008
3	−0.089**	−0.064*	−0.068**	−0.129***	−0.110***	−0.097***
4+	−0.156***	−0.113***	−0.079**	−0.222***	−0.168***	−0.153***
Sample size		3,438			2,936	
	Parous women			Parous men		
Number of children[1]						
1	−0.038	−0.029	−0.002	−0.039	−0.021	−0.018
3	−0.081**	−0.056*	−0.062**	−0.115***	−0.097***	−0.083**
4+	−0.129***	−0.084**	−0.057*	−0.194***	−0.151***	−0.139***
Birth before age 20/23[2]	−0.109**	−0.081*	−0.036	−0.065*	−0.042	−0.030
Birth after age 35	−0.127*	−0.104	−0.107*	−0.056	−0.034	−0.045
Sample size		2,740			2,285	

Notes: Model 1: adjusted for age; Model 2: Model 1 + qualification, marital status, tenure status, smoking, emotional support and co-residence with children; Model 3: Model 2 + health limitations.
1. Reference case – two children. 2. Cut-off for women at age 20 and for men at age 23.
Significance levels: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

In parous women, this association ceased to be significant after controlling for the background factors. All the covariates in the model reduced the association in women, although to a lesser extent in the case of co-residence with a child and emotional support. In men, the relationship was somewhat reduced but remained significant after controlling for the background factors. The reduction was mainly due to adding qualification, tenure status and health limitations in the model.

Autonomy. In both women and men, having three or more children compared to two was related to a poorer sense of autonomy (Table 3). In women, nulliparity was related to a stronger sense of autonomy. After controlling for the background factors, the relationships remained significant, though the magnitude of the relationship was somewhat reduced. All the covariates except marital status contributed to the reductions in the relationships between number of children and autonomy. Among parous women, early and late child birth related to a poorer sense of autonomy. This association was reduced by controlling the background factors, especially educational qualification, tenure status, smoking, emotional support and health limitations in the case of early child bearing, and co-residence with a child in the case of late child bearing. Among parous men, early child birth was related to a poorer sense of autonomy. This

TABLE 4. *The association between fertility history and the dimension 'pleasure' in older women's and men's quality of life*

	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Pleasure	All women			All men		
Number of children[1]						
0	−0.031	0.002	0.005	−0.091***	−0.029	−0.028
1	−0.054*	−0.034	−0.024	−0.073**	−0.038	−0.040
3	−0.015	0.012	0.011	−0.027	−0.012	−0.008
4+	−0.032	0.014	0.026	−0.066**	−0.028	−0.023
Sample size		3,438			2,936	
	Parous women			Parous men		
Number of children[1]						
1	−0.057*	−0.035	−0.026	−0.091**	−0.025	−0.052*
3	−0.008	0.014	0.012	−0.025	−0.036	−0.013
4+	−0.011	0.023	0.032	−0.039	−0.042	−0.019
Birth before age 20/23[2]	−0.111***	−0.059*	−0.043	−0.065*	−0.076*	−0.038
Birth after age 35	0.012	0.013	0.012	−0.021	0.055	−0.010
Sample size		2,740			2,285	

Notes: Model 1: adjusted for age; Model 2: Model 1 + qualification, marital status, tenure status, smoking, emotional support and co-residence with children; Model 3: Model 2 + health limitations. 1. Reference case – two children. 2. Cut-off for women at age 20 and for men at age 23.
Significance levels: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

relationship was not significant after controlling for the background factors.

Pleasure. In women, having one child compared to two children was related to feeling less pleasure in life (Table 4). In men, nulliparity, and having one or four or more children compared to having two children, were related to a poorer sense of pleasure in life. After controlling for the background factors, these relationships ceased to be statistically significant. In women, all covariates except marital status attenuated the relationship between the number of children and pleasure. In men, the reduction was mostly due to controlling for qualification, emotional support and health limitations. In addition, the relationship between low parity and pleasure was reduced by adding marital status and tenure status in the model. The relationship between high parity and pleasure was also reduced by controlling for smoking. Among parous women and men, early child birth was related to a poorer sense of pleasure. Among women, the relationship between early birth and pleasure was attenuated by all the covariates, except marital status and co-residence with a child. In men, only tenure status and health limitations had a major mediating effect.

Self-realisation. In women, self-realisation was weaker among women with one child compared with those with two children, but the relationship

TABLE 5. *The association between fertility history and the dimension 'self-realisation' in older women's and men's quality of life*

	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Self-realisation	All women			All men		
Number of children[1]						
0	0.010	0.056	0.065*	−0.076*	0.027	0.032
1	−0.084**	0.052	−0.027	−0.058	−0.006	−0.013
3	−0.026	0.016	0.011	−0.057	−0.030	−0.018
4+	−0.059	0.019	0.052	−0.111**	−0.036	−0.023
Sample size	3,438			2,936		
	Parous women			Parous men		
Number of children[1]						
1	−0.088**	−0.055	−0.030	−0.076*	−0.030	−0.028
3	−0.014	0.023	0.016	−0.052	−0.038	−0.026
4+	−0.022	0.043	0.069*	−0.088**	−0.041	−0.030
Birth before age 20/23[2]	−0.194***	−0.112**	−0.068*	−0.111**	−0.071*	−0.061*
Birth after age 35	−0.016	−0.011	−0.014	−0.023	−0.005	−0.015
Sample size	2,740			2,285		

Notes: Model 1: adjusted for age; Model 2: Model 1 + qualification, marital status, tenure status, smoking, emotional support and co-residence with children; Model 3: Model 2 + health limitations.
1. Reference case – two children. 2. Cut-off for women at age 20 and for men at age 23.
Significance levels: * $p<0.05$, ** $p<0.01$, *** $p<0.001$.

disappeared after controlling for the background factors (Table 5). Interestingly, in the base model, nulliparous women and women who had had four or more children did not differ from women with two children, but after controlling for the background factors, the sense of self-realisation appeared to be stronger for nulliparous and high parity women than women with two children. The relationship became stronger mostly by adding health limitations to the model, but also taking into account qualification, tenure status and timing of birth for women with four or more children and marital status and emotional support for nulliparous women. In men, nulliparity and high parity were associated with a poorer sense of self-realisation but these associations disappeared after controlling for the background factors. As found in the analysis of the pleasure scores, the reduction was mostly associated with having qualifications, emotional support and health limitations, and to some extent smoking. In addition, marital status and tenure status mediated the relationship between nulliparity and self-realisation. Among parous women and men, early child birth was related to a poorer sense of self-realisation. This association somewhat reduced but remained significant after controlling for the background factors. All the covariates except co-residence with a child contributed to the reduction in women. Smoking and health limitations

reduced the relationship between early child birth and self-realisation in men.

Discussion

This study has investigated the relationship between fertility histories and different dimensions of quality of life using nationally-representative data on British women and men aged 51–79 years. We found that early child birth and to some extent high parity, compared to medium parity, generally related to a poorer quality of life. These relationships were mostly explained by socio-economic, social support and health factors, although some associations appeared to persist after taking these factors into account. Compared to women with two children, nulliparous women expressed a higher level of autonomy and self-realisation. Women with four or more children also expressed higher levels of self-realisation but lower levels of autonomy than women with two children. Low parity was related to a lower level of pleasure, especially among men, but this relationship was mostly explained by the background factors. Late child birth was related to a reduced sense of autonomy among women.

High parity was related to poorer sense of autonomy in women and men. The three other dimensions, control, pleasure and self-realisation, were related to parity in men but the associations were mediated or moderated by socio-economic, social support and health factors. The strong association between parity and autonomy may be related to the content of the items measuring this dimension. These include, for example, responses to the statement, 'Family responsibilities prevent me from doing what I want to do'. Interestingly, in women one of the dimensions of quality of life, self-realisation, turned out to be positively associated with high parity. This finding may reflect an enhanced sense of fulfilment among those whose values and goals have been centred around raising a family and who have had many children (*see* Bowling *et al.* 2003; Krause 2007; Salmela-Aro *et al.* 2009).

As expected, low parity was associated with both positive and negative quality of life outcomes. Nulliparous women expressed a higher level of autonomy and self-realisation. This relationship was stronger when the background factors were added to the model. This suggests that childlessness facilitated the sense of autonomy among women who did not experience health limitations and who received emotional support. Similarly, childlessness contributed to the sense of self-realisation among women who were married and did not experience health limitations. Among men, nulliparity compared to having two children was related to a

lower level of pleasure and self-realisation but after taking into account marital status, tenure status, educational level, and smoking, the negative association between childlessness and self-realisation disappeared. The results suggest that childlessness can enhance some elements of quality of life in women, but that in men there are either no or negative associations with quality of life domains after controlling for background factors. Previous research suggests that nulliparous women are on average well adjusted (*see* Dykstra 2006), and often better off in this regard than their male counterparts (Cwikel, Gramotnev and Lee 2006). Zhang and Hayward (2001), for example, reported that unmarried childless men had higher rates of loneliness and depression than women in comparable circumstances. The health consequences of childlessness may also depend on whether an individual is childless because of choice or circumstances. For the present study we lacked data on the reasons for childlessness or the meaning of parenthood, and so could not investigate this in the analysis.

Early child birth was related to a lower sense of control in men and self-realisation in men and women. There were associations with the other dimensions of quality of life, too, but they were mediated, or moderated, by the background factors, suggesting that poorer outcomes in quality of later life mostly arise from the disadvantages in socio-economic and health status associated with early parenthood. In women, most of the background factors had some influence. In men, marital status, tenure status and health limitations were the main mediators. In addition, the experience of early parenthood itself may have long-lasting effects on quality of life, especially a lower sense of self-realisation (*i.e.* satisfaction with past life and the level of future optimism) that is independent of socio-economic and health status. Previous findings have shown that early child birth in general has more detrimental health effects than parity (*see* Spence 2008). The present finding suggests a similar pattern for dimensions of quality of life, suggesting both direct and indirect routes. It is important to note, however, that some factors which may influence both timing of parenthood and later quality of life, such as personality and early environmental factors, were not controlled in this study.

Late child birth was associated with a lower level of autonomy among women but not men, possibly because children are a greater constraint on the activities of mothers than of fathers. This association was mediated by educational qualifications, health limitations and, in particular, co-residence with a child. No positive quality of life outcomes were related to late child birth in the present study. In the more recent cohorts, among whom postponed parenthood has been a frequent and conscious choice, the associations may be different. We considered associations with any

birth after age 35 years. Focusing however only on the first births after age 35 may yield different results.

The results included some interesting gender differences. Fertility histories have mostly been studied among women, based on the assumption that child bearing and parenthood has more physical and psychological effects on women's than men's health and wellbeing. Congruent with some previous findings (Buber and Engelhart 2008; Helbig *et al.* 2006; Plaisier *et al.* 2008; Zhang and Hayward 2001), the present study showed that men are affected too, and in some cases even more than women. The most striking gender differences were in associations between dimensions of quality of life and both nulliparity and high parity. The mediating factors were also in some cases different for men and women. Women may use different coping strategies or have different expectations related to quality of life than men. Gender differences may also reflect the different life trajectories of women and men in these generations. Further research is needed on the mechanisms underlying these gender differences, and whether they are related to individual characteristics, or cohort or larger macro environments (*see* Evenson and Simon 2005; Hansen, Slagsvold and Moum 2009). Although the results for the genders were quite different, the two cohorts were very similar. As quality of life was measured at only one time point, it is not possible to separate cohort and age effects or examine individual change over time (or ageing effects). The results, however, indicate that the associations were very similar in the two cohorts even though their fertility patterns were different (*see* Tomassini *et al.* 2004). Analyses of other birth cohorts may give different results.

One limitation of the present study was that using more detailed categories for the covariates was not possible because of sample size limitations. Since non-response was associated with older age and disadvantaged socio-economic and heath status, this may distort the results, most probably by under-estimating the strength of associations. Even though the multi-dimensional characteristics of quality of life were taken into account, there may be other aspects of quality of life that the measure used in this study did not capture. Importantly too, it is difficult to disentangle the direction of the identified associations as the mediating factors investigated may have been a cause or an effect of particular fertility pathways. Further research using longitudinal data are needed to address this issue.

This study suggests that having children *per se* does not raise the quality of life in old age and that childlessness does not necessarily lead to a poorer or better quality of life. Associations with parity depend on gender, health and social networks, and the dimension of quality of life considered. Disadvantages are mostly related to early parenthood, especially among

men. Fertility history is only one factor among others that may influence later life quality and socio-economic, social support and health-related factors often mediate the relationship between fertility history and quality of life.

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