

Social age deadlines for the childbearing of women and men

F.C. Billari^{1,*}, A. Goisis^{1,2}, A.C. Liefbroer^{3,4}, R.A. Settersten⁵,
A. Aassve¹, G. Hagestad⁶, and Z. Spéder⁷

¹Department of Decision Sciences, Carlo F. Dondeona Centre for Research on Social Dynamics and IGIER, Bocconi University, Roentgen 1, 20136 Milan, Italy ²Department of Social Policy, The London School of Economics and Political Science, Houghton Street, London WC2A 2AE, UK ³Netherlands Interdisciplinary Demographic Institute, PO Box 11650, 2502 AR The Hague, The Netherlands ⁴Department of Social Research Methodology, VU University Amsterdam, De Boelelaan 1081, 1081 HV Amsterdam, The Netherlands ⁵Department of Human Development and Family Sciences, Oregon State University, Corvallis, OR 97331, USA ⁶NOVA/ Norwegian Social Research, PO Box 3223 Elisenberg, 0208 Oslo, Norway ⁷Demographic Research Institute HCSO, Buday László 1-3, H-1024 Budapest, Hungary

*Correspondence address. E-mail: billari@unibocconi.it

Submitted on August 2, 2010; resubmitted on November 9, 2010; accepted on November 24, 2010

BACKGROUND: This study examines whether social age deadlines exist for childbearing in women and men, how they vary across countries, whether they are lower than actual biological deadlines and whether they are associated with childbearing at later ages and the availability of assisted reproduction techniques (ARTs).

METHODS: This study is based on the European Social Survey, Round 3 (2006–2007), which covers 25 countries. Data were gathered on social age deadlines for childbearing in women (21 909 cases) and men (21 239 cases) from samples of representative community-dwelling populations aged 15 and older.

RESULTS: Social age deadlines for childbearing were perceived more frequently for women than men. These deadlines are often lower than actual biological limits, and for women and men alike: 57.2% of respondents perceived a maternal social age deadline ≤ 40 years of age; 46.2% of the respondents perceived a paternal social age deadline ≤ 45 years of age. There is also considerable variability in deadlines across countries, as well as within them. At the country level, the presence of social age deadlines for the childbearing of women was negatively associated with birth rates at advanced ages and the prevalence of ART, and later deadlines were positively associated with these factors.

CONCLUSIONS: It is important to understand the factors that increase and limit late fertility. While biological factors condition fertility, so do social expectations. These findings provide widespread evidence across Europe that social limits exist alongside biological ones, though both sets of factors are more binding for women.

Key words: maternal age / paternal age / life course / fertility / assisted reproductive technology

Introduction

One of the most important changes in reproductive behaviour in recent decades has been the rising proportion of births among mothers at advanced ages (Prioux, 2005; Billari *et al.*, 2007). In the EU, the share of births to mothers aged 40 and over has increased from 1.6% in the late 1980s to 3.0% in 2006 (Sobotka *et al.*, 2010). Nevertheless, contemporary levels of fertility at later ages remain substantially below women's biological potential. Leridon (2008) estimates that only 16.6% of 40-year-old women are definitively sterile (compared with 54.6% at the age of 45 and 91.9% at the age of 50), and that, in the absence of contraception and 'proceptive' behaviour, an average of 1.1 children could be born to women between the ages of 40 and 44.

One explanation for the discrepancy between potential and achieved childbearing after age 40 that is put forward within the 'life course' literature in the behavioural and social sciences is that childbearing is influenced by social age deadlines, i.e. proscriptions against engaging in certain behaviours too early or too late (Settersten, 2003). Social age deadlines wield the greatest power when there is widespread consensus about them within a population. Social age deadlines for childbearing may be related to, but not necessarily equal to, biological or physiological deadlines, and they are most likely to influence actual reproductive behaviour if they are lower than these biological limits. Earlier studies in a range of countries revealed the existence of age deadlines related to both starting childbearing and completing childbearing for women and, interestingly, for men, albeit looser than the one for women (Settersten and Hagestad,

1996a,b; Billari and Micheli, 1999; Toulemon and Léridon, 1999; Liefbroer and Billari, 2010).

Age deadlines sometimes become *de facto* legal age deadlines. Adoption is an example. Several countries impose a maximum age difference between prospective adoptive parents and the adopted child. The maximum legal age difference is usually 40, 45 or 50 years (ISS/IRC International Reference Centre for the Rights of Children Deprived of their Family, 2005). IVF is another example. Legal age limits that indirectly affect childbearing relate to sperm donation (e.g. 45 years of age in France or the UK). These facts are consistent with prior research on social age deadlines in that limits are readily given and expressed with 'round' decade or mid-decade points (that is, ages ending with zero or five). Similarly, the ubiquitous presence of age categories (e.g. 5-year age categories) can be found throughout studies of human reproduction. The medical literature often refers to 35 as a threshold age for pregnancy outcomes, and much research on fertility is carried out according to discrete age categories for both men and women (see, for example, Bianco *et al.*, 1996; Bray *et al.*, 2006; de La Rochebrochard *et al.*, 2006; Lampinen *et al.*, 2009).

Social age deadlines for childbearing among women are likely to be driven, in part, by concerns about the health risks for both mother and child. Risks at advanced maternal age include chromosome abnormalities (Hassold and Chiu, 1985), foetal death, stillbirth and loss (Fretts *et al.*, 1995; Andersen *et al.*, 2000; Reddy *et al.*, 2006) and other pregnancy complications (Luke and Brown, 2007; Cerdá *et al.*, 2008; Smith *et al.*, 2008). Interestingly, there is evidence that for obstetric outcomes, increasing age is a continuum rather than a threshold effect (Cleary-Goldman *et al.*, 2005). While advanced maternal age has been a longstanding topic of research (van Katwijk and Peeters, 1998), advanced paternal age has only recently captured the interest of researchers (ESHRE Capri Workshop Group, 2005). It has been shown that men's biological clocks affect hormone levels, fertility and sperm quality (Lambert *et al.*, 2006; Lewis *et al.*, 2006). Both advanced maternal and paternal age are associated with the risk of autism spectrum disorders (Croen *et al.*, 2007) and miscarriage (de La Rochebrochard and Thonneau, 2002). Advanced paternal age is associated with lower success for IVF (de La Rochebrochard *et al.*, 2006), higher occurrence of malformations (Thacker, 2004; Zhu *et al.*, 2005), schizophrenia (Sipos *et al.*, 2004) and higher risk for infertility (de La Rochebrochard and Thonneau, 2003). For these and other conditions, the literature seems to suggest that the age of 45 is generally a turning point for men (Hassan and Killick, 2003). At the same time, there are those who have argued that advanced paternal age is not an independent risk factor for adverse birth outcomes (Chen *et al.*, 2008) or negligible (Yang *et al.*, 2007).

Materials and Methods

Though shed light on social age deadlines on childbearing, we analyse data from a module of the ongoing European Social Survey (ESS), representative of the population aged 15 and over in each of the 25 participating countries. The ESS is a bi-annual survey conducted using face-to-face interviews. To enhance comparability, the same sampling plan is applied in each country and the questionnaires are carefully translated with sensitivity to country contexts. The ESS Round 3 (ESS-3) in 2006–2007 contained a module on 'The timing of life: the organization of the life course in Europe', designed by members of our team and led by Billari, Hagestad,

Liefbroer and Spéder (European Social Survey, 2008). Twenty-five countries participated in ESS-3: Austria, Belgium, Bulgaria, Cyprus, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Latvia, Netherlands, Norway, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine and the UK. Response rates varied between 46% (France) and 73% (Portugal and Slovakia). Final sample sizes varied from as low as 1505 individuals (Denmark) to a maximum of 2916 individuals (Germany). Design-related sampling weights are provided for all countries, except Latvia and Romania. We present un-weighted estimates for Latvia and Romania, and these countries are excluded from our general estimates. Our analyses mainly use one survey item that was specifically designed to ascertain social age deadlines for childbearing. After extensive pilot testing, the final version of the question was: 'After what age would you say a woman [or man] is generally too old to consider having any more children?' Possible answers included a specific age (in integer numbers), 'never too old' (although not explicitly mentioned by interviewers to respondents) and 'don't know'. Interviewers were instructed to explain that 'having any more children' referred to either the first or any additional children a person may have. Interviewers were also instructed to probe for a specific age if respondents first mentioned a broader range of ages. If respondents could not provide a specific age, answers were coded as 'don't know'.

Given our interest in comparing maternal and paternal age deadlines, a split ballot design was implemented in which a random sample of about half of the respondents was asked to answer the question about women and the other half about men (the word 'woman' was substituted with 'man'). In some countries, this split ballot was performed with pre-determined randomization or software-based randomization, while in other countries, randomization was based on the day of interview.

We compare data across countries, looking separately at maternal and paternal age deadlines and at variability across different birth cohorts. Our measures include the share of respondents reporting a specific age deadline, the mean and standard deviations (SDs) of these deadlines and the share of respondents who provide an age limit at or below a specific threshold (40 for women and 45 for men). For analyses that pool data across countries, sampling weights are combined with population-size weights to ensure that each country in the sample is represented in proportion to its population aged 15 and older. We also correlate the ESS data on age deadlines for childbearing with the data on the prevalence of assisted reproduction techniques (ARTs) in European countries (Andersen *et al.*, 2008) and data on birth rates published as part of the European Commission's Eurostat database.

In order to measure the availability of ART across countries, we use the 2004 data generated from the European register by ESHRE (Andersen *et al.*, 2008). Andersen *et al.* (2009) released 2005 data and we performed correlation analyses between the two ESHRE register data, i.e. number of clinics by countries in 2004 and 2005. The correlation coefficient between the two waves of data is equal to 0.99 and, with the exception of Austria and Latvia, all countries are included in both reports.

Results

A total of 21 909 responses were available on social age deadlines for the childbearing of women. The vast majority (96.4%) of the respondents readily cited a maternal age deadline, with a mean of 41.7 years (SD = 5.2), and 57.2% of respondents perceived a maternal age deadline of 40 or earlier. A total of 21 239 responses were available on social age deadlines for the childbearing of men. Most (90.2%) of the respondents readily cited a paternal age deadline, with a mean of 47.3 years (SD = 7.6) and 46.2% of the respondents indicated that men should not have children after age 45. In order to reveal

Table I Social age deadlines for the childbearing of women and men, by country.

Country	Women					Men				
	No. observed	% acknowledging the existence of a limit	% perceiving a deadline ≤ 40	Mean	SD	No. observed	% acknowledging the existence of a limit	% perceiving a deadline ≤ 45	Mean	SD
Austria	1147	96.8	37.1	43.8	5.2	987	91.0	25.1	51.1	7.8
Belgium	859	99.2	67.5	40.7	4.9	920	97.3	60.2	45.4	7.2
Bulgaria	555	89.6	57.6	41.2	4.7	582	79.0	48.2	45.4	6.3
Cyprus	475	97.7	52.7	42.7	5.3	458	93.9	38.8	48.2	7.3
Denmark	703	98.4	68.6	40.5	4.1	743	97.7	60.2	45.3	6.0
Estonia	736	93.3	43.5	43.4	5.2	672	85.7	25.9	51.2	7.9
Finland	938	95.3	49.7	42.6	4.7	887	92.3	31.2	50.5	8.1
France	979	100.0	54.5	42.1	4.5	949	100.0	50.3	47.7	7.3
Germany	1383	97.5	57.2	41.6	4.6	1362	93.1	45.2	47.4	7.2
Hungary	708	97.3	77.3	39.3	4.7	721	89.2	49.9	46.0	7.4
Ireland	754	95.0	51.3	42.2	4.9	768	86.1	44.4	47.0	7.1
Netherlands	900	98.6	66.9	40.8	4.3	930	96.1	58.9	45.7	6.9
Norway	847	98.6	56.7	41.7	4.3	856	96.8	47.4	47.3	6.7
Poland	775	97.1	66.7	40.8	5.1	776	90.9	46.6	46.7	7.6
Portugal	1056	97.3	48.4	42.8	5.2	951	87.0	35.4	48.3	8.2
Russia	1034	93.8	60.6	41.1	5.7	972	80.6	39.8	47.7	8.3
Slovakia	811	95.1	62.5	40.9	5.7	812	87.8	41.7	46.8	7.7
Slovenia	653	94.6	53.0	42.4	5.0	684	86.7	34.5	48.7	7.6
Spain	910	96.7	49.9	42.9	5.4	843	91.8	57.4	46.0	7.1
Sweden	899	95.7	48.5	42.6	5.1	926	96.0	44.7	47.8	6.9
Switzerland	894	97.4	56.1	41.7	4.5	819	96.3	50.6	47.2	6.6
UK	1139	96.9	49.6	42.6	5.3	1126	91.7	43.2	48.1	7.7
Ukraine	960	95.4	58.1	42.1	5.2	775	88.0	50.1	46.4	7.5
Latvia ^a	818	77.5	31.7	44.5	6.8	812	68.2	23.2	49.9	8.4
Romania ^a	976	94.1	49.4	42.8	6.7	908	88.2	42.1	47.4	8.6
Countries average ^a	21 909	96.4	57.2	41.7	5.2	21 239	90.2	46.2	47.3	7.6

Authors' computations, ESS, 2006–2007. Values below 26 and above 80 were dropped from analyses. In order to obtain accurate estimates, data were weighted by design weights. See text and ESS website (<http://www.europeansocialsurvey.org/>) for additional information.

^aLatvia and Romania were not included in average country values because the appropriate design weights are not available.

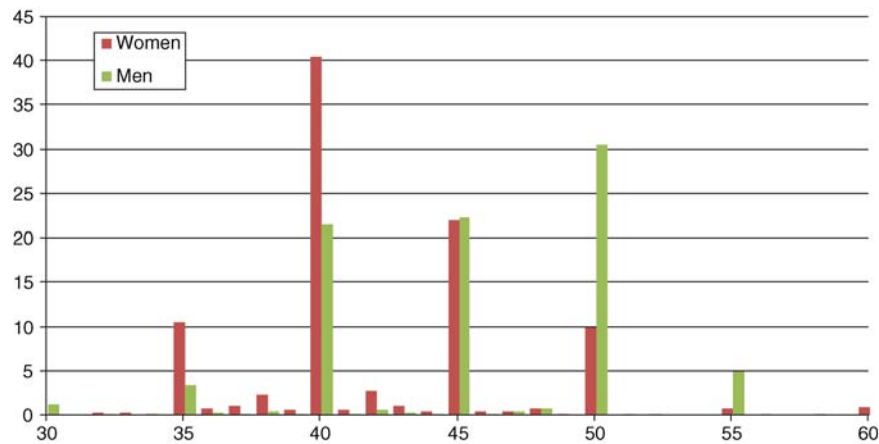


Figure 1 Frequency distribution of social age deadlines for women and men. Source: Authors' computations, ESS, 2006–2007. The percentages are computed based on those respondents who perceive an age deadline. Values below 26 and above 80 were dropped from the analyses and the percentage of respondents perceiving a deadline below 30 and above 60 is not reported in the figure. In order to obtain accurate estimates, data were weighted by design weights. See text and ESS website (<http://www.europeansocialsurvey.org/>) for additional information.

whether men and women differ in their likelihood of prescribing an age deadline, the analyses for each split ballot (i.e. gender of the target) were also broken down by the gender of the respondent. Since the differences in the perception of deadlines across genders were negligible and statistically insignificant, these analyses were not included in the results section.

We report the results on maternal and paternal social age deadlines by country in Table I. With the single exception of Bulgaria, in all countries, maternal age deadlines are perceived by >90% of the respondents. The mean maternal age deadline varies from 39.3 years (Hungary) to 43.8 years (Austria). In all countries, there is also substantial variation within the population (the SD is always higher than 4 years). In 16 of the 23 countries included in these analyses, the majority of people mention an age deadline of 40 or lower (the highest percentage was Hungary, at 77.3%, and the lowest percentage was Austria, at 37.1%).

Relative to women, a smaller proportion of respondents mention social age deadlines for the childbearing of men. Once again, Bulgaria has the lowest share, with 79.0% of the respondents mentioning a paternal age deadline, followed closely by Russia, at 80.6%. As expected, mean age deadlines for men are significantly higher than those for women, varying from 45.3 (Denmark) to 51.2 (Estonia). There is a substantial variation within each country (the SD is always larger than 6 years, except for Denmark), and variation is greater for men than for women. The average difference between paternal and maternal age deadline ranges between 3.1 years (Spain) and 7.9 years (Finland). In only 7 of the 23 countries do most (over-half) of the respondents perceive a paternal age deadline of 45 or earlier. The highest percentages of respondents who think that a man should not have a child after the age of 45 are observed in Belgium and Denmark (60.2%), while the lowest percentage is observed in Austria (25.1%).

Within countries, both the share of respondents who mention an age deadline for childbearing and the variation in mean age deadlines are indicators of how much normative consensus exists. Because the

proportions who perceive an age deadline for women are higher than for men in almost all countries (with the exception of France), and because the SDs are uniformly larger for men than for women, the evidence for normative consensus around childbearing deadlines is stronger for women than it is for men.

Figure 1 provides additional information on the pooled (across countries) distribution characteristics of maternal and paternal age deadlines. The modal age deadline, among those respondents who declare to perceive a limit, for women is 40 (mentioned by 40.5% of respondents) and for men 50 (30.6%). It is noteworthy that these modes—and indeed most of specific ages given—are highly concentrated on 'round' ages (35, 40, 45 and 50).

Table II shows how social age deadlines for childbearing vary by age. Norms related to childbearing deadlines for women seem to be slightly weaker among younger respondents than older ones. For example, the percentage of respondents who feel that women should not have children after age 40 is higher among older than among younger respondents. Among men, the youngest age group is actually more likely to oppose men having children after age 45 (47.9 versus 44.7 and 40.3%) and to mention lower mean age deadlines (46.7 versus 47.7 and 48.1 years) than the oldest age group.

Country-level correlation analyses were performed in which variation in age deadlines across countries is linked to differences in the availability of ART and in actual childbearing behaviours at advanced ages. Correlation analyses linking age deadlines (ESS, 2006–2007) to the availability of ART were computed for 17 countries and those linking to childbearing behaviours at advanced ages were computed for 22 countries. This is because the analyses were performed only for those countries on which we hold information on the availability of ART (the number of clinics per thousand women in reproductive age, based on Andersen *et al.*, 2008) and a comparable measure of ASFR at ages 40+ (Eurostat, accessed March 2008).

Both the availability of ART and the prevalence of childbearing at age 40 and older are positively correlated with maternal age deadlines

Table II Social age deadlines for the childbearing of women and men (by age group).

Age class	Women				Men			
	No. observed ^a	% acknowledging the existence of a limit	% perceiving a deadline ≤40	Mean SD	No. observed ^a	% acknowledging the existence of a limit	% perceiving a deadline ≤45	Mean SD
15–24	2636	93.9	55.9	41.9 5.8	2666	91.8	47.9	46.7 7.8
25–34	3034	96.7	54.8	42.2 5.4	3002	88.4	45.9	47.3 7.5
35–44	3568	96.7	50.5	42.2 5.0	3462	90.0	45.3	47.7 7.4
45–54	3488	97.3	58.0	41.6 4.9	3376	89.2	45.6	47.1 7.5
55–64	3192	96.8	63.3	41.1 4.7	3021	91.5	47.4	47.4 7.8
65–74	2441	96.2	60.9	41.3 5.2	2315	90.6	46.2	47.3 7.5
75–84	1379	98.0	60.6	41.7 4.9	1310	90.5	44.7	47.7 7.9
>85	377	97.9	64.2	41.2 5.3	367	88.7	40.3	48.1 7.8

Own computations based on the ESS. Values below 26 and above 80 have been dropped. In order to obtain accurate estimates, the data have been weighted by design weights. See text and ESS website (<http://www.europeansocialsurvey.org/>) for additional information.

^aThe number of observations does not include respondents from Latvia and Romania since these countries are excluded from the computation of the estimates.

(with correlation coefficients of +0.41 and +0.40, respectively). In addition, the prevalence of late-childbearing behaviours is negatively correlated with the percentage of respondents in a country who oppose women having a child after age 40 (with a correlation coefficient of -0.40).

Discussion

In light of the recent increase in fertility at advanced ages, it is important to understand both the factors that drive this increase and the factors that limit it. Biology and reproductive technology set ultimate limits on fertility, especially for women. In this study, we documented the existence of social age deadlines for childbearing using data from 25 European countries. One key finding is that the large majority of Europeans perceive social age deadlines for childbearing, for both women and men. At the same time, a considerable amount of variation across and within countries in these deadlines exists. Moreover, the cross-national variation in social age deadlines is related to differences in the availability of ART and in the actual prevalence of late fertility.

Social age deadlines for childbearing of women and men are considerably below biological deadlines. Notwithstanding the fact that deadlines are stricter for women than for men, the gap in deadlines between women and men is surprisingly small, especially among younger respondents. One reason for this may be that young people in Europe are more aware of recent medical insights into the biological limits to childbearing for both women and men. Another reason may be that, for young people, notions of gender equality in the life course may be of greater importance and so they apply similar expectations to women and men alike, or that for them, it is late parenthood rather than late motherhood that should be avoided for reasons physical or otherwise.

We found little variation across countries in terms of mean upper age limits, but considerable heterogeneity in both the percentage of people who perceive a deadline and in the percentage of people who feel that women should not have children after age 40 and men after age 45. These differences across Europe underscore the fact that social ideas about the ages at or after which it is inappropriate to have children are intimately conditioned by the cultural context. In fact, the appropriateness of late childbearing for women is positively and significantly correlated with the actual rate of late fertility. Of course, we must be cautious in making a causal argument, for social age deadlines are just one of many factors at play in constraining reproductive behaviour. Still, work on fertility intentions suggest that people adapt their fertility intentions downward even before they reach the biological deadline, which would suggest that social age deadlines for childbearing are important influences on individuals' late-childbearing behaviour (Schoen et al., 1997; Liefbroer, 2009).

The relationship between social and biological or medical developments is also surely reciprocal. For instance, social deadlines for childbearing might well reflect the development of new technologies. This is suggested in our country-level correlational analyses that show a negative relationship between accessibility to ART and whether deadlines for childbearing are perceived, and a positive relationship between accessibility to ART and later childbearing deadlines.

Beyond biological reasons, social age deadlines for childbearing for both men and women may also be related to concerns about the abilities of older fathers and mothers to raise their children responsibly, though the evidence for these concerns is mainly anecdotal. Finley (1998), however, reported that adolescents born to fathers who were aged 40 or over evaluate the parental quality of their father as being lower than that of fathers who were aged 30–39 at birth. On the other side, older mothers (parents) may have certain socio-economic characteristics which could, at least up to a certain extent, make up for the biological disadvantage of later ages (Stein and Susser, 2000). On average, older mothers tend to be in stable relationships, highly educated and more settled in their careers (Hansen *et al.*, 2005; Kalmijn and Kraaykamp, 2005; Benzie *et al.*, 2006; Lampinen *et al.*, 2009): these socio-demographic characteristics could potentially have a positive effect on children's developmental and cognitive outcomes.

One limitation of the study is that its design does not allow making causal inferences. In addition, multiple indicators for assessing age deadlines would have been preferable, although the survey question used has been extensively tested and used. Another limitation of the study is that country-level correlational analyses were carried out for a restricted sub-sample of countries, because of limited availability of ART measures. Future research should aim at gaining a deeper understanding of social age deadlines, and of their interaction with reproductive behaviour, within a larger data-collection design, including both quantitative and qualitative evidence.

Authors' roles

F.C.B. has contributed to the conception and design of the life-course module of the ESS (3rd round, 2006), to the interpretation of the data and to drafting the paper. A.G. has carried out the analyses, contributed to the interpretation of the data and to drafting the paper. A.C.L. has contributed to the conception and design of the study, to the interpretation of the data and to drafting of the paper. R.A.S., A.A., G.H. and Z.S. have all contributed to the interpretation of the data and to drafting the paper.

Funding

This study was funded by the European Commission [Framework Programme 7, project REPRO ('Reproductive Decision-Making in a Macro-Micro Perspective', Grant Agreement: SSH-2007-3.1.2-217173)] and the European Science Foundation [Programme HumVIB, project LIFETIMING ('The Timing of Life: Understanding Cross-National Differences in the Organization of the Life Course in Europe')]. Funding to pay the Open Access publication charges for this article was provided by the Carlo F. Dondeña Centre for Research on Social Dynamics, Bocconi University.

References

- Andersen AN, Wohlfahrt J, Christens P, Olsen J, Melbye M. Maternal age and fetal loss: population-based register linkage study. *BMJ* 2000; **320**:1708–1712.
- Andersen AN, Goossens V, Ferraretti AP, Bhattacharya S, Felberbaum R, de Mouzon J, Nygren KG. Assisted reproductive technology in Europe, 2004: results generated from European registers by ESHRE. *Hum Reprod* 2008; **23**:756–771.
- Andersen AN, Goossens V, Bhattacharya S, Ferraretti AP, Kupka MS, de Mouzon J, Nygren KG, The European IVF-monitoring Consortium for the European Society of Human Reproduction Embryology (ESHRE). Assisted reproductive technology and intrauterine inseminations in Europe, 2005: results generated from European registers by ESHRE. *Hum Reprod* 2009; **24**:1267–1287.
- Benzie K, Tough S, Tofflemire K, Frick C, Faber A, Newburn-Cook C. Factors influencing women's decisions about timing of motherhood. *J Obstetric Gynecologic Neonatal Nursing* 2006; **35**:625–633.
- Bianco A, Stone J, Lynch L, Lapinski R, Berkowitz G, Berkowitz RL. Pregnancy outcome at age 40 and older. *Obstet Gynecol* 1996; **87**:917–922.
- Billari FC, Micheli GA. Le scelte demografiche. La percezione dei costi e delle norme sociali. In: Mauri L, Billari FC (eds). *Generazioni di donne a confronto Indagine sociodemografica*. Milan: Franco Angeli, 1999.
- Billari FC, Kohler H-P, Andersson G, Lundström H. Approaching the limit: long-term trends in late and very late fertility. *Popul Dev Rev* 2007; **33**:149–170.
- Bray I, Gunnell D, Smith GD. Advanced paternal age: how old is too old? *J Epidemiol Community Health* 2006; **60**:851–853.
- Cerdá M, Buka SL, Rich-Edwards JW. Neighborhood influences on the association between maternal age and birthweight: a multilevel investigation of age-related disparities in health. *Soc Sci Med* 2008; **66**:2048–2060.
- Chen X-K, Wen SW, Krewski D, Fleming N, Yang Q, Walker MC. Paternal age and adverse birth outcomes: teenager or 40+, who is at risk? *Hum Reprod* 2008; **23**:1290–1296.
- Cleary-Goldman J, Malone FD, Vidaver J, Ball RH, Nyberg DA, Comstock CH, Saade GR, Eddleman KA, Klugman S, Dugoff L. *et al.* Impact of maternal age on obstetric outcome. *Obstet Gynecol* 2005; **105**:983–990.
- Croen LA, Najjar DV, Fireman B, Grether JK. Maternal and paternal age and risk of autism spectrum disorders. *Arch Pediatr Adolesc Med* 2007; **161**:334–340.
- de La Rochebrochard E, Thonneau P. Paternal age and maternal age are risk factors for miscarriage; results of a multicentre European study. *Hum Reprod* 2002; **17**:1649–1656.
- de La Rochebrochard E, Thonneau P. Paternal age \geq 40 years: An important risk factor for infertility. *Am J Obstet Gynecol* 2003; **189**:901–905.
- de La Rochebrochard E, de Mouzon J, Thépot F, Thonneau P. Fathers over 40 and increased failure to conceive: the lessons of *in vitro* fertilization in France. *Fertil Steril* 2006; **85**:1420–1424.
- European Society of Human Reproduction and Embryology (ESHRE), Capri Workshop Group Fertility and ageing. *Hum Reprod Update* 2005; **11**:261–276.
- European Social Survey. *ESS-3 2006 Documentation Report*. Edn 3.2. Bergen: European Social Survey Data Archive, Norwegian Social Science Data Services, 2008.
- Finley GE. Parental age and parenting quality as perceived by late adolescents. *J Genet Psychol* 1998; **159**:505.
- Fretts RC, Schmittiel J, McLean FH, Usher RH, Goldman MB. Increased maternal age and the risk of fetal death. *N Engl J Med* 1995; **333**:953–957.
- Hansen M, Bower C, Milne E, de Klerk N, Kurinczuk J. Assisted reproductive technologies and the risk of birth defects—a systematic review. *Hum Reprod* 2005; **20**:328–338.
- Hassan MAM, Killick SR. Effect of male age on fertility: evidence for the decline in male fertility with increasing age. *Fertil Steril* 2003; **79**:1520–1527.

- Hassold T, Chiu D. Maternal age-specific rates of numerical chromosome abnormalities with special reference to trisomy. *Hum Genet* 1985; **70**:11–17.
- ISS/IRC. *The Age Prescriptions for the Prospective Adoptive Parents*. Geneva: International Social Service, 2005.
- Kalmijn M, Kraaykamp G. Late or later? A sibling analysis of the effect of maternal age on children's schooling. *Soc Sci Res* 2005;**34**: 634–650.
- Lambert SM, Masson P, Fisch H. The male biological clock. *World J Urol* 2006;**24**:611–617.
- Lampinen R, Vehvilainen-Julkunen K, Kankkunen P. A review of pregnancy in women over 35 years of age. *Open Nurs J* 2009;**3**:33–38.
- Leridon H. A new estimate of permanent sterility by age: sterility defined as the inability to conceive. *Popul Stud* 2008;**62**:15–24.
- Lewis BH, Legato M, Fisch H. Medical implications of the male biological clock. *JAMA* 2006;**296**:2369–2371.
- Liefbroer AC. Changes in family size intentions across young adulthood: a life-course perspective. *Eur J Popul/Revue européenne de Démographie* 2009;**25**:363–386.
- Liefbroer AC, Billari FC. Bringing norms back in: a theoretical and empirical discussion of their importance for understanding demographic behaviour. *Popul Space Place* 2010;**16**:287–305.
- Luke B, Brown MB. Elevated risks of pregnancy complications and adverse outcomes with increasing maternal age. *Hum Reprod* 2007; **22**:1264–1272.
- Prioux F. Late fertility in Europe: some comparative and historical data. *Rev Épidemiol Santé Publique* 2005;**53**:2S3–2S11.
- Reddy UM, Ko C-W, Willinger M. Maternal age and the risk of stillbirth throughout pregnancy in the United States. *Am J Obstet Gynecol* 2006; **195**:764–770.
- Schoen R, Kim YJ, Nathanson CA, Jason F, Astone NM. Why do Americans want children? *Popul Dev Rev* 1997;**23**:333–358.
- Settersten RA Jr. Age structuring and the rhythm of the life course. In: Mortimer JT, Shanahan MJ (eds). *Handbook of the Life Course*. New York: Kluwer Academic/Plenum Publishers, 2003.
- Settersten RA Jr, Hagestad GO. What's the latest? Cultural age deadlines for family transitions. *Gerontologist* 1996a;**36**:178–188.
- Settersten RA Jr, Hagestad GO. What's the latest? II. Cultural age deadlines for educational and work transitions. *Gerontologist* 1996b; **36**:602–613.
- Sipos A, Rasmussen F, Harrison G, Tynelius P, Lewis G, Leon DA, Gunnell D. Paternal age and schizophrenia: a population based cohort study. *BMJ* 2004;**329**:1070.
- Smith GCS, Cordeaux Y, White IR, Pasupathy D, Missfelder-Lobos H, Pell JP, Charnock-Jones DS, Fleming M. The effect of delaying childbirth on primary Cesarean Section rates. *PLoS Med* 2008;**5**:e144.
- Sobotka T, Billari FC, Kohler H-P. *The Return of Late Childbearing in Developed Countries: Causes, Trends and Implications*. Vienna: Vienna Institute of Demography, 2010.
- Stein Z, Susser M. The risks of having children in later life. *BMJ* 2000; **320**:1681–1682.
- Thacker PD. Biological clock ticks for men, too: genetic defects linked to sperm of older fathers. *JAMA* 2004;**291**:1683–1685.
- Toulemon L, Léridon H. *La famille idéale: combien d'enfants, à quel âge?* No. 652, Juin 1999. Paris: Institut National de la Statistique et des Études Économiques.
- van Katwijk C, Peeters L. Clinical aspects of pregnancy after the age of 35 years: a review of the literature. *Hum Reprod Update* 1998;**4**:185–194.
- Yang Q, Wen SW, Leader A, Chen XK, Lipson J, Walker M. Paternal age and birth defects: how strong is the association? *Hum Reprod* 2007; **22**:696–701.
- Zhu JL, Madsen KM, Vestergaard M, Olesen AV, Basso O, Olsen J. Paternal age and congenital malformations. *Hum Reprod* 2005; **20**:3173–3177.