Father absence and age at first birth in a Western sample.

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Abstract

Objectives: Although a large literature has shown links between 'father absence' during early childhood, and earlier puberty and sexual behaviour in girls in Western populations, there are only a few studies which have looked at timing of reproduction, and only one of these fully incorporated childless respondents to investigate whether father absence is associated with increased hazard of becoming a parent at one time point (early) more than another. Here we sought to clarify exactly when, if at all, father absence increased the likelihood of first birth in a Western sample. **Methods:** An online sample of 954 women reported on their childhood living circumstances, their age of menarche, first coitus, first pregnancy and first birth. **Results:** Cox regression and Kaplan Meier plots showed an increased risk of becoming a parent for father absent women in their twenties, but no overall greater likelihood of parenthood. **Conclusion:** These data support the suggestion that father absence is associated with an acceleration of reproductive behaviour in Western samples, rather than a simple increase in likelihood of reproduction.

Keywords: father absence, life history, menarche, first birth, cox regression, proportional hazards.

Introduction

In Western populations, a large literature has focused on the potential for facultative life history adjustment to the psychosocial environment, including the presence or absence of a biological father in the child's home. Evidence from across Europe, North America, Australia and New Zealand suggests father absence can be associated with an accelerated life history including earlier puberty and earlier onset of sexual activity in daughters, and the association with puberty at least persists when controlling for socioeconomic status and genetic factors (Tither & Ellis, 2008). Most theories suggest that father absence either directly, or as a facet of general environmental stress, stimulates earlier reproductive readiness in daughters as a response to the instability/riskiness of the environment (Chisholm, 1993) or the instability/scarcity of pair bonds in the local culture (Draper & Harpending, 1982; Belsky, Steinberg & Draper, 1991; Hoier, 2003).

Less well established, however, is whether this earlier readiness for reproduction actually translates into early reproduction itself, which is critical to these adaptationist understandings of the phenomena. Although contraceptives have partially severed the link between coitus and reproduction, several of the theories discussed above would predict that this earlier readiness may yet translate into earlier reproduction, either actively or passively (e.g. through poor contraceptive use and subsequently not terminating the pregnancy) and indeed some evidence suggests father absent girls have greater interest in cues to infants (Maestripireri et al, 2004).

Most relevant research into reproductive timing has specifically addressed teenage pregnancy, with most studies finding that teen pregnancies/teen motherhood is significantly more likely amongst those who experience father absence (e.g. Ellis et al, 2003, 2009; see also Sear & Coall, 2011, for a review). However, given that teen mothers may represent a very particular and small set of individuals (e.g. likely to be of low socioeconomic status, living apart from the father and constituted less than 7% of c. 700 000 live births in the UK in 2008: Office of National Statistics, 2009) and that age of first birth in the West tends to be very late (UK: 27.5 years, ONS, 2009) teen motherhood is now very much an anomaly. It may thus be more useful to consider age at first birth which can be used to determine whether, within culturally typical ranges, those who have experienced early father absence still show significantly earlier reproduction. Currently only three studies appear to have addressed this question with specific reference to father absence. While Nettle, Coall & Dickens (2011) found that low paternal involvement in rearing (amongst other risk factors) related to earlier age of first pregnancy in a UK cohort sample, this is not synonymous with father absence from the home which may be a distinct phenomenon from general paternal investment. Chisholm et al (2005) on the other hand found that father absence was associated with earlier first birth in a group of primiparous pregnant women (aged up to 36) recruited through an Australian hospital (mother absence showed a trend in the same direction), but the analyses of both Nettle et al and Chisholm et al excluded women who have not yet had a first birth and thus could have missed out some important data points (especially given Chisholm et al's small sample of 100 women)

In contrast, both Quinlan (2003) and Waynforth (2012) used cox regression survival analysis to control for this problem. While Waynforth (2012) reported a significant association between father absence and hazard of first birth by age 30, he did not test whether the time-dependant patterns in parenthood were different between groups –i.e. were father absent girls more likely to reproduce at all, or merely to have done so early? In contrast, Quinlan (2003), who did test the proportional hazards assumption, found that although changes in living arrangements and living with father-only were associated with earlier pregnancy, living with mother only (i.e. being father absent) did not appear to increase the hazard of early pregnancy.

The current study sought to provide further evidence regarding whether father absence prior to puberty is associated with not only earlier readiness for reproduction (menarche and first coitus) but with earlier reproduction itself.

Method

Participants

954 women, including 193 mothers, aged 16 to 70 years (mean 27.6) were recruited from visitors to the website of the University of St Andrews Perception Laboratory (www.perceptionlab.com) between January and August 2003 for a battery of online tests covering 'Background and Facial Attraction'. 90.5% of participants were European or North American and 84.6% were Caucasian (neither race nor region of origin related to age of first birth or interacted with parental absence, all $F<1.5$, all $p>0.19$, so were not analysed further). Results on facial preferences for a subset of these participants (aged 16 to 29) have been published, including links between parental divorce, coitus and menarche in those participants (Boothroyd & Perrett, 2008, Study 1).

Questionnaire

Participants completed a 'family background' questionnaire and a 'sex and relationships' questionnaire, including the following variables:

Parental separation – participants reported the ages between which they lived with each parent. Based on the age they reported that they had ceased living with their biological father, women were coded as becoming father absent <12 years of age (for whom it is possible father absence may have accelerated puberty), between 12 and 18 years (where puberty was already well underway or complete prior to absence), or father present until 18. Importantly, only 9 women reported a first birth prior to 18 years, meaning only a very small minority of women could have ceased cohabiting with their parents due to their childbearing.

Childhood socioeconomic status – participants reported whether they perceived their parents' income as falling into the lowest, lower middle, upper middle or top income bracket.

Life history variables - Age of first menstruation (menarche), first coitus, first pregnancy and first birth were all reported in years. All life history variables are summarised in Table 1. Importantly, although some teenage pregnancies did occur in our data, the average age of first birth was close to the current UK population mean. Additionally a further variable 'miscarriage/abortion' was constructed, with a value of 1 given to those who reported a discrepancy between first pregnancy and first birth of more than 1 year, or who reported a first pregnancy but no first birth (N=74).

Results and discussion

Preliminary results

As shown in Table 2, aside from age at menarche and first pregnancy, all variables were significantly (or borderline significantly) positively correlated with each other and age was correlated with all life history outcomes except age of menarche such that older women tended to report later age of coitus, pregnancy and first birth. As age at first pregnancy was highly correlated with age at first birth ($r_{192}=0.897$, $p<0.001$) it was not utilised in further analyses.

In common with the narrower sample of 16-29 year olds (Boothroyd & Perrett, 2008), preliminary analyses including age as a covariate showed that in this full sample father absence was not associated with age of menarche ($F_{2,792}=0.732$), but that those who lived with their fathers until 18 years reported later first coitus (mean age=18.02 years; $F_{2,668}=10.021$, $p<0.001$) than those who had experienced father absence during either age bracket (both post-hoc ps≤0.001). There was also a trend for those experiencing father absence prior to 12 to report earlier coitus than those experiencing later father absence (16.75 vs 17.30 years, post-hoc p=0.076).

Amongst those women who had experienced a first pregnancy, there was no association between father absence and whether or not that pregnancy was apparently miscarried/aborted ($x^2=2.412$).

Parental absence as a predictor of age at first birth

Cox regression survival analysis was used to control for variance in participants' opportunities for reproduction. Of 799 usable cases, 644 were censored as they had not yet had a first birth while 155 reported having a first child. Father absence was entered into the regression as a categorical variable with those 'father absent pre-12 years' acting as the indicator group. In order to test the principal of proportional hazards (i.e. to determine whether likelihood of transitioning to parenthood showed different temporal patterns in the different groups), an interaction term between group and Log(age) was entered in a second block. Although the first block did not produce a significant model ($x^2=1.701$, df=2, p=0.427) and father absence did not predict overall likelihood of transitioning to parenthood, introduction of the group by time interaction term yielded a significant improvement on the model ($x^2=20.918$, df=1, $p<0.001$) and furthermore, father absence group did now significantly effect hazard of transition to parenthood such that those reporting father absence prior to age 12 significantly differed from those reporting father absence between 12 and 18, who in turn differed from those reporting father presence (see Table 3). The Kaplan Meier survival curves were produced for each group independently and are shown on the same axes in Figure 1. Here we can see an early surge in transition to parenthood amongst the 'father absent before 12 years' women in their twenties, with other women catching up around 30 years of age (in contrast to Waynforth's findings where father absent women were more likely to have had a child at 30 years of age). During their twenties, women who experienced father absence between 12 to 18 years of age showed faster transition to parenthood than women who had been father present but still slower than those experiencing early father absence. Only women who had been father present until 18 years of age experienced their first birth after c. 35 years and by this stage were more likely to have had a child than any other group. Importantly, although adding income, and time-dependant income as variables significantly improved the model ($x^2=17.587$, df=1, $p<0.001$), father absence did not cease to significantly predict childbearing on a non-proportional basis.

The apparent surge in early parenthood amongst women reporting early father absence supports Chisholm et al and Waynforth's results and suggests that including late (or possibly late) reproducing women does not prevent finding an association between father absence and earlier reproduction and furthermore, that such differences cannot be due simply to father absent women reproducing more in general. Indeed, we found tentative evidence in the Kaplan Meier plots that by their 30s father absent women may be less likely to have reproduced at all, despite doing so earlier when they do reproduce. This latter finding does not straightforwardly fit the adaptationist approaches above (although we did not measure overall reproductive success of the groups, so neither are our data directly inconsistent with such approaches), but would perhaps be more consistent with evidence from non-Western cultures in which (grand)parental support seems to be an important contributory factor to reproduction (Sear & Coall, 2011).

The results contrast, however, with those of Quinlan (2003) who used similar methods and found no effect of father absence itself, although he did find an association between number of household changes and age at first birth. An important caveat of the current data is that it is drawn from a sample of volunteers, recruited from those who visited a website concerning scientific research into facial attraction, rather than a cohort sample such as Waynforth or Quinlan's data sets. More detailed examination of how women from different family backgrounds transition to parenthood should therefore be carried out with more controlled and representative community samples. This is particularly important as recent evidence from the US has suggested that father absence 'effects' may be restricted to upper socioeconomic groups (Deardoff et al, 2010) and thus cultural context is critically important.

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Table 1. Summary statistics for life history variables.

	N	Min	Max	Mean	Std. Dev
Age of menarche	954	8.00	18.00	12.6600	1.44433
Age of first sex	793	9.00	33.00	17.5183	2.65955
Age of first pregnancy	245	14.00	41.00	23.6061	5.18993
Age of first child	193	15.00	42.00	25.4663	5.19617

Table 2. Inter-correlations of all life history variables. * p<0.01, ** p<0.001 (2 tailed)

		Age of menarche	Age of first sex	Age of first pregnancy	Age of first birth
Age	r	.009	.173**	.359**	.291**
	p	.775	.000	.000	. 000
	N	943	787	240	189
Age of menarche	r		0.125*	0.105	0.142
	p		0.000	0.106	0.052
	N		788	239	188
Age of first sex	r			0.378*	0.316*
	p			0.000	0.000
	N			234	185
Age of first pregnancy	r				0.897*
	p				0.000
	N				192

Table 3. Cox regressions for transition to parenthood.

		Exp(B)	Wald	df	p
Block 1					
	Father absent >12 years		4.691	2	.429
	Father absent 12-18 years	.819	.651	1	.420
	Father present	.802	1.568	1	.210
Block 2					
	Father absent >12 years		20.116	2	.000
	Father absent 12-18 years	.062	19.716	1	.000
	Father present	.012	19.037	1	.000
	Time x Father absence	1.119	17.498	1	.000
Block 3					
	Father absent >12 years		15.514	2	.000
	Father absent 12-18 years	.090	14.699	1	.000
	Father present	.019	15.180	1	.000
	Time x Father absence	1.107	14.155	1	.000
	Income	9.040	15.952	1	.000
	Time x Income	.924	13.901	1	.000

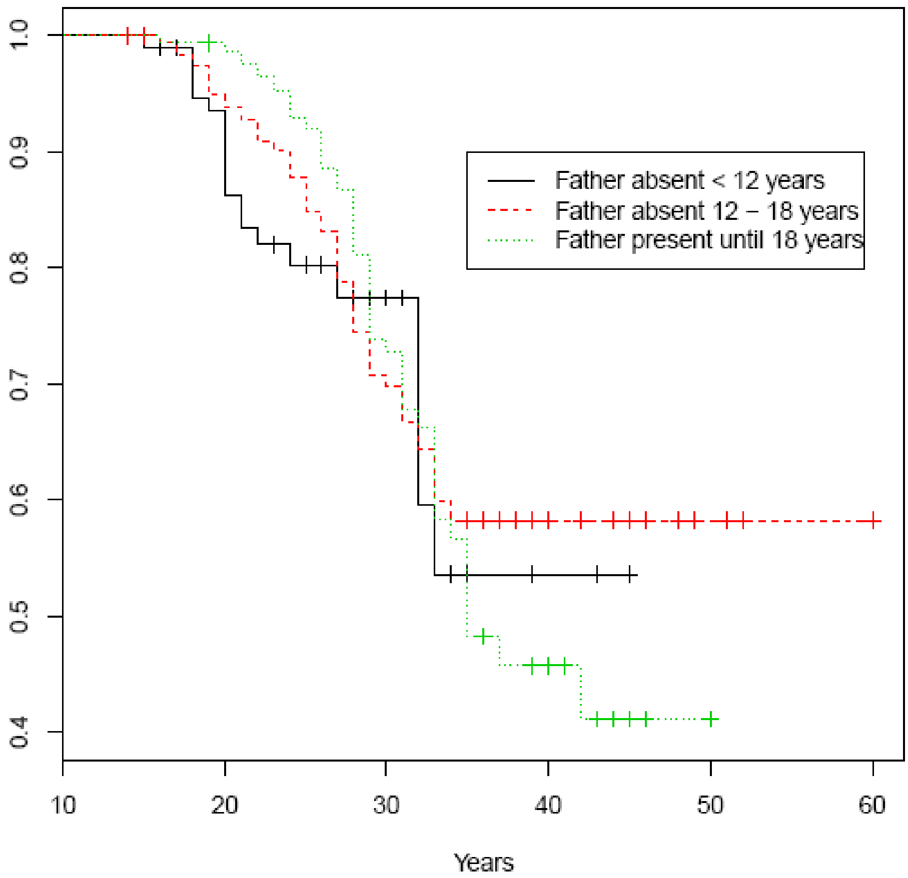

Figure 1. Survival curves showing the proportion of women in each group remaining childless by age.