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Childhood social hardships and fertility: A prospective cohort study

Emily W. Harville, PhD and

Department of Epidemiology, Tulane School of Public Health and Tropical Medicine, New Orleans, LA, 70112, USA

Renée Boynton-Jarrett, MD, ScD

Division of General Pediatrics, Boston University School of Medicine, Boston, MA, 02118, USA

Abstract

Purpose—To examine the effect of lifetime social hardships on fertility.

Methods—Using the British National Child Development Study, a longitudinal cohort study, the impact of exposure to childhood hardships on becoming pregnant, reported infertility, and time to pregnancy was investigated. 6477 women reported on whether they had become pregnant by age 41, and 5198 women had data on at least one pregnancy. Factor analysis was used to identify six types of childhood hardships (as reported by parent, child, social worker, or teacher); retrospective report of child abuse was also examined. Logistic regression and discrete failure-time analysis was used to adjust for potential confounders.

Results—Never-married women were more likely to have become pregnant at some point if they had experienced more childhood hardships. Retrospectively reported child abuse was associated with an increased likelihood of having been told one was unable to have children. Among ever-married women, childhood hardships were associated with reduced fecundability, but the association was weakened by adjustment for adult social class.

Conclusions—The relationship between childhood adversity and adult fertility is complex. Future research should investigate pathways between characteristics of adversities and fertility.

Keywords

adversity; fertility; pregnancy; socioeconomic status

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Address for correspondence: Emily Harville Department of Epidemiology Tulane University School of Public Health 1440 Canal St. SL-18 New Orleans, LA 70112-2715 harville@tulane.edu.

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INTRODUCTION

Infertility, the inability to achieve pregnancy, is a public health issue with a prevalence of 9 to 15% within the childbearing population [1]. Although socioeconomic [2, 3] and racial/ethnic [4] disparities in access to infertility treatments have been reported, the social determinants of infertility are largely unknown and have been understudied. In the 2002 U. S. National Survey of Family Growth, among married women, rates of infertility were highest for Black and Hispanic women, and those without a high school diploma [5]. A population-based study of Scotland found a somewhat higher risk of infertility in those with both high and low levels of education, but no relationship with social deprivation,[6] while a Norwegian study found higher levels of involuntary childlessness with higher education, and reduced levels among those were manual workers.[7] However, a study of the Danish population found no difference in lifetime prevalence of infertility by social class[3].

Stress and stressful life events may reduce the probability of conception and assisted reproduction success [8-11]. Chronic stressors were associated with diminished ovarian reserve [12]. Stress has also been associated with poorer ovarian functioning [13] and is thought to influence menstrual cycles [14]. A dose-response association between adverse childhood experiences and increased risk of fetal death has been documented [15]. However, certain social stressors in adulthood, such as job strain, have not been associated with reduced time to pregnancy [16], and prospective studies of psychosocial stress in adulthood and assisted reproductive technology success have yielded mixed findings [17].

Increasingly, research has documented the long-term effects of childhood adversities on health over the life course [18, 19]. Prolonged exposure to adverse social environments in childhood could influence fertility via several pathways. First, hardships could directly alter the hormonal, cardiovascular, or metabolic milieu in a way that influences fecundity. Child traumatic stress has been associated with neuroendocrine disruptions, including altered functioning of the hypothalamic-pituitary-adrenal (HPA) axis and raising cortisol levels [20], and menstrual function is regulated by hypothalamic gonadotropin-releasing hormone. Prior studies have also demonstrated an association between childhood abuse and earlier onset of menopause [21]. Childhood adversity could increase adiposity, raise the risk of hypertension, or increase the propensity to diabetes [22]. Second, social hardships may indirectly affect pregnancy through effects on health behaviors [23]; smoking, for instance, has been associated with both childhood abuse [24] and reduced fertility [25]. Finally, childhood adversities have also been associated with sexually transmitted disease risk [26], a major risk factor for infertility [27].

While several studies have investigated the association between childhood adversities and age of first pregnancy [28] or unplanned pregnancy [29], few studies have investigated fecundability (the probability of conception) or risk of clinical infertility. The purpose of this study was to investigate the relationship between adverse childhood experiences, measured prospectively, and fertility. A building empirical research literature has established an association between childhood adversity and a number of different adverse health outcomes [30-32]. Guided by a life course perspective and stress theory on ‘biological embedding,’ or

the process through which early experience influences biology [33], we hypothesized that greater exposure to early life adversity would be associated with reduced fertility.

MATERIALS

Sample

Study participants are enrolled in the National Child Development Study, a cohort study of 17,638 British children (8959 girls) born during one week in 1958 [34]. This is approximately 98% of the births registered that week [35]. Respondents were contacted at multiple time points in childhood (ages 7, 11, 16) and adulthood (ages 23, 33, and 41-42). Approximately 73% participated at either age 33 or 41 [36], with a small bias towards losses from the unskilled manual labor social class [37]. As children, cohort members were traced via schools, local health authorities, social services departments, last known address, media appeals, the National Health Service Central Register, and Family Practitioner Committees; as adults, housing department, national insurance, military, and drivers' license records were also used [35].

The current study is based on reports of pregnancies by female cohort members at these two points. 5123 answered questions at both the 33- and 41-year follow-up interviews, 663 at only the 41-year interview, and 691 at only the 33-year interview, for a total of 6477 women answering questions about pregnancy, including whether or not they had been pregnant, and 5198 women reporting at least one pregnancy. All women had answered at least one question about childhood adversity.

Assessment of the Outcomes

At the 33-year and 41-year follow-up, each cohort member was asked if they had ever been pregnant, and if so, the outcome of each pregnancy (miscarriage, abortion, stillbirth, livebirth). Our study event of interest was the first report of pregnancy on either follow-up questionnaire, regardless of pregnancy outcome. 4659 women reported at the first pregnancy at the 33-year interview (90%), while 539 (10%) reported the first pregnancy at the 41-year interview. There were 131 women who did not report a pregnancy by age 33 and did not participate at the 41-year interview, who could have had a pregnancy subsequent to the 33-year interview. A sensitivity analysis was run, assuming that all these women had a later pregnancy; the results of this analysis did not differ from those presented here. At both time points, women were asked about each pregnancy, including a question "Until this pregnancy was conceived, for how long had you been having sex without regularly using birth control?" Time-to-pregnancy (TTP) was characterized as the discrete cycle number (months of trying to conceive). In addition, at the 41-year interview, participants were asked if they had been told by a doctor they could not have children.

Assessment of the Exposure

Childhood hardships were measured several different ways during the study. A Local Authority Health visitor interviewed the parents (usually the mothers) at ages 7, 11, and 16. The health visitor completed an assessment of the social environment, which included a list of questions about social services the family had required, as well as a question "under

which categories would you list the difficulties of this family”, which included a list of responses such as “alcoholism”, “mental illness or neurosis”, “housing”, and “financial”. The Educational Questionnaire was completed by the head teacher and class teacher at the child's school, and provided information about the child's eligibility for services, adjustment, and appearance of neglect. A Local Authority Medical Officer carried out the medical examination and consulted records. Generally, the greatest number of participants were able to be followed up for the educational questionnaire (for instance, 14,205 at the age 11 sweep [35]), and slightly fewer for the medical and health visitor interviews (13,207 and 13,879, respectively).

Data from all these sources were used to examine adversity. We performed an exploratory factor analysis in order to categorize the types of hardships, as previously described [38]. Principal components analysis was used to categorize the childhood hardships. Maximum likelihood method followed by the oblique (promax) rotation was used. Items with factor loadings > 0.45 were assigned to the factor for which they had the greatest loading. A six factor solution was chosen due to parsimony and consistency with theoretically pre-determined latent constructs of types of hardships. A six factor solution yielded the following factors (details in Table I): (1) financial (unemployment, free lunch eligibility, bed sharing, contact with criminal), (2) caregiver low interest in education, (3) family dysfunction (family tension, alcoholism), (4) lack of supportive caregiving (parents don't read to child, father doesn't take active role), (5) violence/mental health issues (physical neglect, maladjustment, bullying, contact with social services, mental subnormality [intellectual or developmental disability] in family), (6) family structure disruption (foster care, divorced parents, single mother). We summed the number of hardships within each factor in order to create the score for each factor. An indicator of the number of cumulative hardships was created by summing the total number of hardships across factors. For items measured more than once, participants were categorized as having experienced the hardship if it was reported at any time point. The final category was created by collapsing the upper categories to maintain a reasonable sample size (table II).

At the 41-year interview, participants were also interviewed about experience of abuse during childhood. These included reports of physical, sexual, and verbal abuse, a strict or neglectful upbringing, and parental alcoholism or mental health issues. 4656 women (3800 with pregnancy data) had information on at least one of these variables.

Covariates

Known predictors of fecundability (probability of conception) and time to pregnancy (TTP) were examined as covariates. Age at menarche was assessed at the age 16 follow-up. The remaining covariates were calculated at age 33. Body mass index (BMI) was calculated from measured height and weight. Education was highest completed level. Social class was based on respondent's occupational status; if this was missing, it was based on partner's occupational status. Smoking was categorized as current/former/never.

Statistical Analysis

Multivariable logistic regression models were computed to estimate odds ratios (OR) while controlling for covariates associated with fertility. TTP was also analyzed using a discrete proportional hazards model to estimate the fecundability ratio, a measure of fertility representing the ratio of the cycle-specific probabilities of conception among the exposed compared to unexposed [39], with TTP truncated at 13 months. Two sensitivity analyses were performed: one, omitting all accidental pregnancies and all women reporting $TTP \leq 1$, and two, replacing all pregnancies reported as accidental with a 0 month TTP [40].

Known predictors of fecundability and TTP were included in models *a priori*, including age at menarche, BMI, smoking during pregnancy, social class, education level, and partnership status at age 33. Because of the potential relationship between partnership status and fertility intentions (unmarried births are more likely to be unplanned), interaction with marital status (never married/married/lived with partner or previously married at age 33) was assessed. Multiple imputation, using SAS's PROC MI and PROC MIANALYZE (version 9.2) was used to impute missing values for confounders; most often missing were BMI or social class (table II).

The 41 year survey was approved by the North Thames Multi-Centre Research Ethics Committee and the current analysis was approved by the Institutional Review Boards of Tulane University and Boston University School of Medicine.

RESULTS

Characteristics of the study population are presented in Table II. 79% (5198) of women reported becoming pregnant at least once. Hardship experience was common, with 31% of the population experiencing 4 or more hardships over childhood. Retrospectively reported abuse ranged from 2-3% for sexual abuse to 33% for unaffectionate father (table SI). The number of women who had never been married and were not living with a partner at age 33 was fairly small (244 women with pregnancies, 4.9%; 195 with TTP data, 4.3%). Childhood adversity was generally associated with a increased likelihood of becoming pregnant among those who were never-married at age 33, but was not associated with becoming pregnant among those who were partnered (were married or lived with a partner) or had been married (table III).

Overall, 4677 women (90%) had information on time to pregnancy of their first pregnancy. Among women reporting a time to pregnancy, 541 (12%) reported at least 12 months before becoming pregnant, and 1046 (22%) reported at least 6 months. Compared to women without TTP data, women with TTP data were more likely to be married, less likely to smoke, and were less likely to have experienced most hardships, although the absolute differences in proportions were small (Table II).

A fecundability ratio (FR) below 1 indicates reduced fecundability (or increased time to pregnancy). In unadjusted analysis, childhood adversity was generally not associated with fecundability in women who had never been married (table IV). In ever-married or partnered women there was reduced fecundability with higher financial hardship, lack of parental

interest in education, violence/mental health issues, and overall, but these associations generally disappeared after adjustment for adult education and social class. The first sensitivity analysis (all TTP less than or equal to 1 set to missing) found similar patterns, with some associations remaining even after adjustment for adult education and social class (for instance, lack of parental interest in education, FR 0.84, 0.73-0.95). The second sensitivity analysis (where all accidental pregnancies are set to TTP=0) found similar patterns to the initial analysis (results available on request).

Nearly 3% (N=157) of women reported being told by a doctor that they could not have children, but there were no associations between reported infertility and prospectively assessed childhood social hardships and the interaction with partnership status was not present (results not presented). Retrospective reports of witnessing abuse (aOR 1.89, 95% CI 1.10-3.26), conflict in the home (aOR 1.76, 1.15-2.70), and maternal alcoholism during childhood (aOR 2.31, 1.30-4.11) were each independently associated with an increased likelihood of having been told one was unable to have children, in models adjusted for social class, education, and partnership status. Retrospective report of child abuse was not associated with never having been pregnant (results not presented).

DISCUSSION

In this cohort study of British women we found an association between several early-life hardships, becoming pregnant, and time-to-pregnancy. Socio-demographic factors in adulthood had a large modifying effect, which suggests that childhood hardships are related to fertility largely indirectly through their relation with adult social status. Unmarried women were more likely to have become pregnant if they experienced more hardships; however, no associations were seen with TTP among this group. Although there was no association with overall likelihood of pregnancy for married women, there was some evidence for reduced TTP. To our knowledge, this is the first study to investigate the association between social adversities in early life and infertility. Our findings are consistent with existing studies that have demonstrated an association between early life adversities and reproductive aging [41] and fetal nonviability [15], two potential causes of infertility.

There are several possible reasons for an association between childhood hardship and infertility; unfortunately, we have little ability to assess them within the dataset. Those who experience more adversity are more likely to have adverse health behaviors, such as smoking [42, 43] (which we did adjust for), which can affect fertility. Sexually transmitted infections are associated with tubal scarring and infertility risk, as well as childhood adversities [26]. We do not have information on whether the woman wanted children or not: a woman might decide not to have children in order to avoid repeating patterns of her childhood. Generally, however, disadvantaged women are at increased risk for unplanned pregnancy [44]. Hardships may be associated with limited access to contraception. Childhood adversities may increase vulnerability to exploitative or abusive relationships [45]. The comparison between the married and unmarried women as well as the consequences of adjustment for adult social class and education suggest that the social effects are large compared to any biological effects.

Women who experience abuse or hardship are more likely to become pregnant as adolescents or young women [15], and thus will have less opportunity to experience age-related infertility (at least for first pregnancies) than other women. Childhood adversities are also associated with risk for depression in adulthood [23], and depressed women are more likely to report unintended pregnancies[46]. Therefore, more fertile women in the group exposed to hardships may have been differentially removed from the TTP analysis. The sensitivity analyses suggest that the effect of the differential pregnancy planning was to bring the association closer to the null.

All measures of infertility are limited, especially in studies not designed to have this as a focus. Self-report of pregnancy is likely to under-report pregnancies ending in abortion or miscarriage. We do not have information on whether those who did not have a child wished to have one, and none of the analyses can take into account the reasons behind not becoming pregnant. We also do not have information on use of assisted reproductive technology, though most women in the study were pregnant during 1980s, when use of such therapies was less common. Our subanalysis of infertility is limited by a single, self-report question, and also limited to a selected group who seek medical care for infertility or a condition with fertility-related outcomes. We have no information on partner infertility. The limited ethnic diversity makes the study less generalizable to other groups.

Some retrospectively reported abuse was associated with an increased likelihood of having been told one was unable to have children. The most direct explanation for this is that women who had been abused were more likely to have medically-diagnosed infertility, but there are other possible reasons; for instance, women who are more open to reporting abuse may also be more likely to report infertility.

Time to pregnancy can only be assessed in planned pregnancies, and estimates can lead to bias if more fertile couples are more likely to get pregnant accidentally, or if groups have differential access to contraception and abortion [40]. Our results indicate that women who experienced adversity were less likely to plan their pregnancy. The sensitivity analysis suggested that the relationship between TTP and hardship might be somewhat underestimated. Self-report of TTP has generally been shown to have acceptable validity for epidemiologic studies [47, 48].

Finally, there are limitations in the measures of childhood adversity. We lack prospective measures of several forms of child maltreatment, including child physical and sexual abuse. There is a chance that we could misattribute findings to other unmeasured, but correlated factors. Also, many of the hardships were indirectly measured, for instance, by the report of the teacher or the parent. A study designed directly to measure some hardships would perhaps find a stronger association. However, triangulation of assessment of these hardships by multiple informants is a more robust assessment of adversity, and if there were inconsistencies our results would be more likely biased toward the null. Our analysis is also strengthened by the prospective assessment of childhood hardships, which is rare.

In summary, we find an association between exposure to social hardships or abuse in early life and self-reported infertility and longer time to pregnancy. Those who experienced

hardship and were not married were more likely to become pregnant than those who experienced fewer hardships, largely independent of education and social class as an adult. The research topic is a difficult one due to the strong social influences on reproductive choices. Further research might include studies of diagnosed infertile couples; assessment of biological responses to childhood adversity and fertility; or demographic follow-up of cohorts of disadvantaged children. Such more specific research will be needed to specify mechanisms through which social stressors in early life may influence fertility.

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ABBREVIATIONS

TTP	Time to pregnancy
BMI	Body mass index
OR	odds ratio
FR	fecundability ratio
CI	confidence interval

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Table I

Description of Childhood Social Hardship Factors

Factor	Items	Reported by	Time period assessed
Financial hardship	Unemployment	Parent	Birth, age 7, 11, 16
	Eligible for free school lunches	Parent, school	Age 11, 16
	Sharing a bed	Parent	Age 11, 16
	Contact with the criminal justice system	Parent, school	Age 11, 16
Caregiver low interest in education	Lack of interest in child's education	School	Age 7, 11, 16
	Hope child would leave school at the minimum age	Parent	Age 11, 16
Indicators of family dysfunction	Family problems with tension	Health visitor	Age 7
	Alcoholism or other problems	Health visitor	Age 7
Lack of supportive caregiving	Parents' not reading to the child	Parent	Age 7
	Father not taking an active role in the child's upbringing.	Parent	Age 7 and 11
Violence/mental health issues	Physical neglect	Teacher	Age 7 and 11
	Maladjustment	Teacher	Age 7 and 11
	Mental subnormality in family	Health visitor	Age 7
	Experienced bullying	Parent	Age 7 and 11
	Contact with social services	School, Parent	Age 7 and 11
Family structure disruption	Foster care	Parent	Age 7, 11 and 16
	Divorced parents as child	Parent, child	Age 7, 11, adult report
	Single mother at birth	Parent	Birth
	Parent dead	Parent, child, health visitor	Age 7, 11, 16, adult report

Table II

Characteristics of Women Participating in the British National Child Development Study, 1958-2001.

	All women included in analysis (n=6477)		Women with at least one pregnancy (n=5198)		Women with TTP data (n=4677)	
	N*	%	N	%	N	%
Cohort member's mother's age at cohort member's birth						
0-<20	342	5.6	277	5.6	244	5.5
20-<28	2998	48.9	2472	50.2	2246	50.7
28-<35	2011	32.8	1568	31.9	1407	31.7
>=35	785	12.8	605	12.3	536	12.1
Cohort member's mother's education						
left school at minimum age	4562	74.5	3683	75.0	3316	74.9
schooling beyond minimum age	1560	25.5	1229	25.0	1109	25.1
Marital status at age 33						
married	4062	70.7	3794	76.2	3507	77.3**
living with partner	659	11.5	536	10.8	483	10.7
single, divorced, widowed	1027	17.9	651	13.1	547	12.1
BMI at age 33						
<20	585	10.5	491	10.1	434	9.8
20-<25	3020	54.0	2610	53.9	2389	54.1
25-<30	1325	23.7	1178	24.3	1085	24.6
>=30	660	11.8	563	11.6	506	11.5
Smoking at age 33						
never	2861	49.5	2399	48.0	2199	48.4**
former	1017	17.6	913	18.3	850	18.7
current	1898	32.9	1683	33.7	1497	32.9
Education at age 33						
primary or less	855	14.3	678	14.2	574	13.3**
secondary school	1272	21.3	1037	21.7	929	21.6
O-levels or equivalent	1888	31.7	1554	32.5	1419	33.0
A-levels or equivalent	780	13.1	614	12.9	571	13.3
university or higher	1166	19.6	894	18.7	812	18.9
Childhood adversity and fertility						
Social class (occupational) at age 33						
I (managerial/professional)	201	3.7	154	3.3	142	3.3
II	1547	28.2	1242	26.2	1148	26.5
III (manual/non-manual)	2371	43.2	2068	43.7	1887	43.6
IV	1115	20.3	1030	21.8	934	21.6
V	250	4.6	241	5.1	219	5.1
Age at 1 st pregnancy						

	All women included in analysis (n=6477)		Women with at least one pregnancy (n=5198)		Women with TTP data (n=4677)	
	N*	%	N	%	N	%
<20			827	16.1	717	15.3**
20-<25			1769	34.3	1637	35.0
25-<30			1500	29.1	1404	30.0
30-<35			749	14.5	688	14.7
>=35			307	6.0	231	4.9

TTP, time-to-pregnancy

* May not sum to total due to missing data

** Statistical difference ($p < 0.05$) between those with TTP and without

Table III

Childhood Adversities and never having become pregnant in British Women, 1958-2001.

		OR (unadjusted)					
		marital status=never married at age 33			marital status=married or had been married at age 33		
		OR	95% CI	p	OR	95% CI	p
Financial hardship	0			<0.01			0.56
	1	0.83	(0.54, 1.26)		0.92	(0.77, 1.10)	
	2+	0.26	(0.13, 0.51)		0.98	(0.78, 1.23)	
No interest in education	0			<0.01			0.42
	1	0.57	(0.36, 0.90)		1.06	(0.89, 1.27)	
	2+	0.48	(0.31, 0.74)		0.92	(0.77, 1.09)	
Family dysfunction	0			0.30			0.37
	1+	0.78	(0.49, 1.25)		1.09	(0.90, 1.33)	
Lack of supportive caregiving	0			0.36			0.81
	1	0.97	(0.64, 1.49)		0.96	(0.80, 1.14)	
	2+	0.79	(0.49, 1.26)		0.99	(0.80, 1.23)	
Violence/mental health issues	0			0.02			1.00
	1	0.63	(0.44, 0.91)		0.85	(0.72, 1.00)	
	2+	0.63	(0.38, 1.05)		1.12	(0.90, 1.39)	
Issues of family structure	0			<0.01			0.47
	1+	0.48	(0.32, 0.73)		0.94	(0.79, 1.11)	
Overall	0			<0.01			0.34
	1	1.23	(0.72, 2.09)		1.06	(0.85, 1.32)	
	2	0.87	(0.51, 1.47)		1.06	(0.84, 1.33)	
	3	0.94	(0.53, 1.68)		0.87	(0.67, 1.12)	
	4+	0.48	(0.30, 0.77)		0.95	(0.78, 1.17)	

		OR (adjusted for age at 1st menstruation, BMI and smoking at age 33)				
		marital status=never married at age 33			marital status=married or had been married at age 33	
		OR		p	OR	p
Financial hardship	0			0.01		0.68
	1	0.87	(0.56, 1.34)		0.93	(0.78, 1.11)
	2+	0.32	(0.15, 0.66)		0.99	(0.78, 1.26)
No interest in education	0			<0.01		0.56
	1	0.73	(0.45, 1.18)		1.07	(0.90, 1.29)
	2+	0.52	(0.33, 0.81)		0.93	(0.78, 1.11)
Family dysfunction	0			0.65		0.34
	1+	0.89	(0.55, 1.45)		1.10	(0.90, 1.35)
Lack of supportive caregiving	0			0.25		0.85
	1	1.02	(0.65, 1.59)		0.96	(0.80, 1.15)
	2+	0.72	(0.44, 1.17)		1.00	(0.80, 1.23)

OR (adjusted for age at 1st menstruation, BMI and smoking at age 33)					
marital status=never married at age 33			marital status=married or had been married at age 33		
	OR	p		OR	p
Violence/mental health issues					
0		0.06			0.82
1	0.68	(0.46, 1.00)		0.86	(0.73, 1.02)
2+	0.69	(0.40, 1.18)		1.15	(0.92, 1.43)
Issues of family structure					
0		<0.01			0.54
1+	0.54	(0.35, 0.82)		0.95	(0.80, 1.13)
Overall					
0		<0.01			0.50
1	1.29	(0.75, 2.24)		1.06	(0.85, 1.33)
2	0.93	(0.54, 1.62)		1.06	(0.85, 1.33)
3	0.98	(0.53, 1.79)		0.88	(0.67, 1.14)
4+	0.55	(0.33, 0.90)		0.98	(0.79, 1.20)

OR (adjusted for previous + social class, education at age 33)					
marital status=never married at age 33			marital status=married or had been married at age 33		interaction by marital status (fully adjusted model)
	OR	p	OR	p	
Financial hardship					
0		0.05		0.77	0.01
1	0.94	(0.60, 1.46)	0.94	(0.78, 1.13)	
2+	0.37	(0.18, 0.78)	1.00	(0.78, 1.28)	
No interest in education					
0		0.05		0.68	<0.01
1	0.82	(0.49, 1.36)	1.08	(0.89, 1.30)	
2+	0.61	(0.37, 0.99)	0.94	(0.78, 1.15)	
Family dysfunction					
0		0.91		0.35	0.23
1+	0.97	(0.59, 1.60)	1.10	(0.90, 1.34)	
Lack of supportive caregiving					
0		0.50		0.83	0.46
1	1.06	(0.68, 1.66)	0.96	(0.80, 1.16)	
2+	0.80	(0.49, 1.32)	0.99	(0.80, 1.23)	
Violence/mental health issues					
0		0.37		0.63	0.03
1	0.76	(0.50, 1.15)	0.88	(0.74, 1.04)	
2+	0.85	(0.48, 1.52)	1.18	(0.94, 1.48)	
Issues of family structure					
0		<0.01		0.62	<0.01
1+	0.56	(0.37, 0.86)	0.96	(0.80, 1.14)	

		OR (adjusted for previous + social class, education at age 33)				interaction by marital status (fully adjusted model)
		marital status=never married at age 33		marital status=married or had been married at age 33		
	OR		p	OR	p	
Overall						
	0		0.06		0.62	<0.01
	1	1.35	(0.78, 2.35)	1.06	(0.85, 1.33)	
	2	1.00	(0.57, 1.75)	1.07	(0.85, 1.35)	
	3	1.09	(0.58, 2.02)	0.90	(0.69, 1.18)	
	4+	0.65	(0.37, 1.15)	0.99	(0.79, 1.24)	

OR, odds ratio; BMI, body mass index

OR, odds ratio; BMI, body mass index

OR, odds ratio; BMI, body mass index

Table IV

Childhood Adversities and Time to Pregnancy in 4677 British Women

	fecundability ratio (unadjusted)						marital status=never married at age 33						fecundability ratio (adjusted for previous + social class, education, partnership status at age 33)					
	FR			95% CI			P			FR			95% CI			P		
	fecundability ratio (adjusted for age at 1st menstruation, BMI and smoking at age 33)			95% CI			P			FR			95% CI			P		
Financial hardship	0						0.11									0.14		
	1	1.05	(0.68, 1.61)					1.06	(0.68, 1.64)							1.07	(0.68, 1.68)	
	2+	0.60	(0.36, 1.01)					0.60	(0.35, 1.04)							0.62	(0.34, 1.15)	
No interest in education	0						0.06									0.03		
	1	1.03	(0.65, 1.63)					0.99	(0.60, 1.62)							1.15	(0.66, 1.99)	
	2+	0.66	(0.44, 1.00)					0.61	(0.39, 0.95)							0.75	(0.44, 1.28)	
Family dysfunction	0						0.29									0.31		
	1+	0.78	(0.49, 1.23)					0.77	(0.47, 1.27)							0.90	(0.53, 1.54)	
Lack of supportive caregiving	0						0.73									0.81		
	1	0.94	(0.61, 1.47)					0.95	(0.61, 1.48)							1.16	(0.71, 1.90)	
	2+	1.12	(0.71, 1.79)					1.09	(0.68, 1.76)							1.21	(0.72, 2.01)	
Violence/mental health issues	0						0.44									0.32		
	1	1.01	(0.69, 1.47)					0.98	(0.66, 1.46)							1.13	(0.73, 1.75)	
	2+	0.78	(0.47, 1.30)					0.73	(0.42, 1.25)							0.90	(0.49, 1.64)	
Issues of family structure	0						0.89									0.94		
	1+	1.03	(0.70, 1.50)					0.99	(0.67, 1.45)							1.01	(0.67, 1.51)	
Overall	0						0.44									0.36		
	1	1.34	(0.76, 2.34)					1.24	(0.70, 2.20)							1.36	(0.75, 2.47)	

marital status=never married at age 33									
fecundability ratio (unadjusted)				fecundability ratio (adjusted for age at 1st menstruation, BMI and smoking at age 33)			fecundability ratio (adjusted for previous + social class, education, partnership status at age 33)		
	FR	95% CI	P	FR	95% CI	P	FR	95% CI	P
2	1.51	(0.87, 2.62)		1.41	(0.80, 2.51)		1.67	(0.92, 3.01)	
3	1.57	(0.80, 3.07)		1.54	(0.79, 3.01)		1.92	(0.92, 3.97)	
4+	0.93	(0.59, 1.48)		0.85	(0.51, 1.42)		1.13	(0.62, 2.06)	
marital status=married or had been married at age 33									
fecundability ratio (unadjusted)				fecundability ratio (adjusted for age at 1st menstruation, BMI and smoking at age 33)			fecundability ratio (adjusted for previous + social class, education)		
	FR	95% CI	P	FR	95% CI	P	FR	95% CI	P
Financial hardship									
0			0.04			0.02			0.31
1	0.91	(0.83, 0.99)		0.89	(0.82, 0.98)		0.94	(0.86, 1.03)	
2+	0.94	(0.83, 1.06)		0.92	(0.81, 1.04)		0.98	(0.86, 1.12)	
No interest in education			<0.01			<0.01			0.01
0									
1	0.89	(0.81, 0.98)		0.86	(0.78, 0.94)		0.94	(0.85, 1.04)	
2+	0.86	(0.79, 0.94)		0.82	(0.75, 0.90)		0.93	(0.84, 1.03)	
Family dysfunction									
0			0.95			1.00			<0.01
1+	1.00	(0.91, 1.11)		1.00	(0.90, 1.11)		1.00	(0.90, 1.11)	
Lack of supportive caregiving									
0			0.35			0.39			0.29
1	1.02	(0.93, 1.11)		1.02	(0.93, 1.11)		1.07	(0.98, 1.17)	
2+	1.05	(0.95, 1.17)		1.05	(0.94, 1.16)		1.09	(0.98, 1.21)	
Violence/mental health issues									
0			0.07			0.05			<0.01
1	0.93	(0.86, 1.01)		0.92	(0.85, 1.00)		0.97	(0.89, 1.05)	
2+	0.93	(0.83, 1.04)		0.92	(0.82, 1.04)		0.98	(0.87, 1.11)	
Issues of family structure									

marital status=married or had been married at age 33									
fecundability ratio (unadjusted)					fecundability ratio (adjusted for age at 1st menstruation, BMI and smoking at age 33)			fecundability ratio (adjusted for previous + social class, education)	
	FR	95% CI	P		FR	95% CI	P	FR	95% CI
Overall	0		0.13				0.22		
	1+	1.07	(0.98, 1.16)		1.06	(0.97, 1.15)		1.07	(0.98, 1.17)
	0		0.01				<0.01		
	1	1.03	(0.92, 1.15)		1.02	(0.91, 1.13)		1.05	(0.93, 1.17)
	2	0.90	(0.81, 1.01)		0.89	(0.79, 1.00)		0.96	(0.85, 1.08)
	3	0.88	(0.77, 0.99)		0.86	(0.76, 0.97)		0.93	(0.82, 1.06)
	4+	0.91	(0.82, 1.00)		0.87	(0.78, 0.97)		0.99	(0.88, 1.10)

OR, odds ratio; CI, confidence interval; BMI, body mass index

OR, odds ratio; CI, confidence interval; BMI, body mass index