

# Timing of contraceptive initiation and association with future sexual and reproductive outcomes

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**STUDY QUESTION:** Who initiates contraception before, at the time or after first sexual intercourse and how does timing of initiation affect future sexual and reproductive health (SRH) outcomes?

**SUMMARY ANSWER:** Earlier initiation was associated with current utilization of more effective contraception, but had no impact on future unintended pregnancy, abortion or sexually transmitted infection rates, while later initiation was linked to higher rates of unintended pregnancies and abortions.

**WHAT IS KNOWN ALREADY:** Contraceptive behaviour at first intercourse is associated with later SRH outcomes.

**STUDY DESIGN, SIZE, DURATION:** Data were drawn from the FECOND study, the last national SRH study in France, conducted in 2010–2011 by phone among 8645 individuals aged 15–49 years.

**PARTICIPANTS/MATERIALS, SETTING, METHODS:** Analysis was performed among 1552 women under the age of 30 years who were sexually experienced and had used contraception at some point. We used logistic regression models to identify factors associated with timing of contraception initiation relative to first intercourse (earlier, at the time and later) and its predictive value on future sexual and reproductive outcomes.

**MAIN RESULTS AND THE ROLE OF CHANCE:** Timing of contraceptive initiation across all three categories (earlier, at the time and later initiators) was dependent on women's age at the time of the survey, country of birth, education level, ease of discussing sex with mother and age of first sex. Using at the time initiators as a reference, later initiators had higher odds of unintended pregnancy [odds ratio (OR) = 1.8] and abortion (OR = 1.9), while earlier initiators were more likely to be using more effective contraception at the time of the survey (OR = 1.8).

**LIMITATIONS, REASONS FOR CAUTION:** The exclusion of sexually inexperienced women, a quarter of which had ever used the pill, may have reduced the scope of our analysis on the relevance of contraceptive initiation for non-contraceptive benefits.

**WIDER IMPLICATIONS OF THE FINDINGS:** The promotion of early initiation of contraception may contribute to long-term use of more effective methods of contraception.

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**Key words:** adolescents / contraceptive behaviour / unintended pregnancy / abortion / national survey

## Introduction

Despite high contraception coverage in developed countries, unintended pregnancies remain a public health concern. Half of pregnancies in the USA are unintended (Finer and Henshaw, 2006), and about a third in France (Bajos *et al.*, 2003). Most unintended pregnancies are due to contraceptive non-use, inconsistent use or use of less effective methods, such as condom, withdrawal or fertility awareness methods (Gold *et al.*, 2009). In France, 36% of pregnancies ending in abortion occurred as a result of non-use of contraception, while 33.5% were related to the use of barrier or natural methods (condoms, withdrawal or fertility awareness methods) (Moreau *et al.*, 2010). These figures also pertained to adolescents undergoing an abortion (Moreau *et al.*, 2012).

Data on contraceptive use are key to understanding unintended pregnancy rates. Contraceptive behaviours vary widely between and within countries, contributing to significant disparities in sexual and reproductive health (SRH) among young women even in the context of developed countries (Darroch *et al.*, 2001a,b). Such disparities seem to establish early on, as research has repeatedly shown that sexual initiation and preventive behaviours at sexual debut are socially determined and strong markers of later SRH outcomes (Manlove *et al.*, 2004; Brauner-Otto *et al.*, 2010; Bajos *et al.*, 2012). Current studies, however, have limited their focus on first intercourse, ignoring the potential relevance of earlier contraceptive initiation (before sexual debut) and its protective benefits on future SRH indicators, including contraceptive practices and unintended pregnancy.

Pre-sexual initiation of contraception may contribute to better SRH outcomes in several ways. Early initiation of hormonal methods is likely to increase the use of more effective methods (including dual use) at first sexual intercourse, which is often spontaneous and unplanned (Bozon, 2003; Abma *et al.*, 1998). Initiation independent of sexual intercourse may also instill better contraceptive practices and higher rates of contraception continuation due to the recognition of non-contraceptive benefits of hormonal methods. On the other hand, early initiation of hormonal methods may deter women from using condoms and thus increase their risks of sexually transmitted infections (STIs).

Based upon a sample of sexually experienced young women who had ever used a method of contraception in France, we aimed to identify the factors associated with timing of contraceptive initiation and its implications on future SRH behaviours and outcomes.

## Methods

Data were drawn from the FECOND study, a national SRH survey conducted in France in 2010–2011. Data were collected following a two-stage random probability sampling method. An initial sample of households was drawn from random digit dialing, and a second subsample of cell phone users (also drawn from random digit dialing) was included to account for individuals who did not own a landline (14% of the 15–49-year-age group in France). One individual per phone number was randomly selected for participation, and a total of 5272 women and 3373 men aged between 15 and 49 years were included in the study. The overall refusal rate was 20%. After oral consent was given, data were collected via anonymous telephone interviews, which lasted an average of 41 min.

For the purpose of this analysis, we focused on women below the age of 30 years who were sexually experienced and had ever used contraception (only four had never used contraception while sexually experienced). Women who had never had sexual intercourse ( $n = 383$ ) and those who reported

homosexual intercourse only ( $n = 8$ ) were excluded from the analysis, because timing of first contraception relative to first heterosexual intercourse could not be established. Likewise, women who provided no information on the timing of first contraception ( $n = 25$ ) were not considered. Our final sample consisted of 1552 women.

The Commission Nationale de l'Informatique et des Libertés, the relevant French government oversight agency, approved the FECOND survey and the Institutional Review Board of Johns Hopkins School of Public Health approved the current study.

## Socio-demographic and reproductive characteristics

Topics explored in the FECOND study included socio-demographic status and reproductive histories. Women reported on their age, education, country of birth, employment status, religious beliefs, healthcare insurance, parity, partnership status and family background, such as maternal and paternal education. Women were also asked to recall the ease of discussing sex with their mothers, fathers and friends at the age of 15 years.

Participants were asked detailed information on their sexual and reproductive histories, including age of first menarche, age at first heterosexual intercourse, pregnancy history and lifetime number of sexual partners. Measures of abortions and unintended pregnancies were constructed based on pregnancy histories, where women described the outcome of each of their pregnancy, as well as their pregnancy intentions at the time they became pregnant. Women also reported on their history of STIs, including the frequency of events and the timing of last infection.

## Contraceptive behaviours and characteristics

All participants were asked about ever using the pill, but only sexually experienced women were asked about the timing of initiation and their current use of contraception. In this analysis, sexually experienced women who initiated contraception before first sex are referred to as, 'earlier initiators' ( $n = 469$ ), while women who initiated after first sex are referred to as, 'later initiators' ( $n = 211$ ). Women who used the pill as their first method ( $n = 668$ ) were also asked about their reasons for starting their first pill (contraceptive and non-contraceptive reasons, such as treatment of acne, menstrual regulation, alleviation of painful periods and treatment of ovarian problems).

## Statistics

We first describe women's socio-demographic characteristics by timing of contraceptive initiation relative to first intercourse (before, at the time or after first sex). Factors considered relevant in this analysis were restricted to characteristics that remain fairly constant over time, such as country of birth, religious beliefs, parental education, ease of discussing sex with mother, father and friends. Although the education level reported at the time of survey may have changed over time, it is perceived as a marker of the women's social trajectory. We used a multinomial regression model to identify factors associated with earlier and later contraceptive initiation relative to initiation at the time of first sex (56% of the sample). We also present the results of the same analysis restricted to pill users ( $n = 668$ ).

In the second part of the analysis, we used multivariate logistic regression models to investigate the contribution of timing of contraceptive initiation to four future SRH indicators: history of unintended pregnancy, abortion, STIs and contraception practice at the time of survey. In this part of the analysis, we included all social factors linked to timing of first contraception, as well as socio-demographic factors that were relevant at the time of survey. We also present the results of the same analysis restricted to pill users and examine the role of reasons for pill initiation on later SRH indicators.

All analyses were weighted to account for the complex survey design. Specifically weights were created to account for the probability of being selected

in the sample. In addition, post-stratification techniques were applied to account for non-response, using data on male population living in France from the census as a reference. All analyses were performed with Stata software version 12.0. A  $P$  of  $<0.05$  was considered statistically significant.

## Results

The mean age of the sample at the time of survey was 23 years (22.8–23.2), with 26% adolescents (15–19 years) and 32% young adults (20–24 years). A total of 40% of women in the sample had not graduated from high school, 28% had a high school diploma, 17% had completed 3 years of college and 14% had completed a higher education degree. More than one in three young women were still in school (36%). At the time of the survey, 12% were unemployed, 9% qualified for universal health insurance for low-income population and more than half perceived their financial status as 'tight' (48%) or 'very difficult' (19%). Less than half of women were cohabitating (46%).

The mean age of first sexual intercourse was 17 years (16.9–17.7) (Table I). Overall, 18% of women reported any history of unintended pregnancy, 9% had ever had an abortion and 7% had contracted an STI in the last 5 years. Three-quarters of young women were in need of contraception at the time of the survey (sexually active in the last 3 months, not sterile, not pregnant or trying to get pregnant), with 80% using very effective methods (hormonal methods or intrauterine device), while 1% was not using contraception while at potential risk of an unintended pregnancy.

Half of women first used contraception at the time of first sex (56%), 29% initiated contraception before first sex and 16% after first sex (Table II). A significant proportion of later initiators started contraception within the first month after first sex (43%). Male condom was the most common first method used (52%), followed by the pill (44%). A total of 84% of early initiators reported using a condom at first sex, this proportion rising to 96% among those who initiated at the time of first intercourse ( $P < 0.001$ ), while only 55% of later initiators reported using a condom at first intercourse (data not shown). There was no difference in dual method use at first intercourse between women who started their pill before first intercourse and those who started the pill at the time of first intercourse (82.7 versus 84.3%,  $P = 0.72$ ). Among pill initiators, 37% started on the pill for non-contraceptive benefits only, 26% started the pill for contraceptive benefits and 37% started the pill for both reasons (Table II). Reasons for starting the pill varied substantially by timing of initiation (Table II)

Earlier contraceptive initiators were more likely to be in the older age group at the time of the survey, more likely to have experienced first intercourse at an older age and more likely to report ease of discussing sex with mother at the age of 15 years when compared with those who initiated contraception at the time of first sex (Table III). Later initiators were also more likely to be in the older age group at the time of the survey, and less likely to have a higher education degree when compared with those who initiated at first sex (Table III). Results restricted to women who used the pill as their first method of contraception show a different pattern, with no significant difference between early initiators and those who started at the time of first intercourse, while later pill initiators were more likely to be foreign born [odds ratio (OR) = 16.6 95% confidence interval (20–134)] and to report difficulty talking about sexuality with their mothers [OR = 3.3 (1.1–10.1)] (data not shown).

**Table I Sexual and reproductive characteristics of sexually experienced young women in France who had ever used a method of contraception.**

Participant characteristics	n	%
Age of first sexual intercourse (years)		
< 15	99	7.0
15–17 years	908	59.2
18–19 years	379	24.5
20 years and older	147	9.4
Total births		
None	1225	78.8
1 birth	198	12.0
> 1 births	129	9.3
Ever used the pill		
No	139	10.3
Yes	1413	89.7
History of unintended pregnancy		
No	1296	81.6
Yes	256	18.4
History of abortion		
No	1424	90.8
Yes	128	9.2
History of STI in the last 5 years		
No	1443	93.4
Yes	109	6.6
Current contraception method among women at risk		
Not in need of contraception	369	25.3
Not using contraception, although at risk	15	1.0
Implant	33	1.9
Intrauterine device	50	3.0
Patch/injectables	27	1.7
Pill	847	52.8
Male condom	154	10.6
Other barrier/natural methods	54	3.7
Sex talk with mother at the age of 15 years		
Easy	817	52.4
Difficult	198	12.8
Did not want to talk with mother	517	33.8
Inapplicable (no contact with mother at the age of 15)	13	1.0
Sex talk with father at the age of 15 years		
Easy	233	14.5
Difficult	206	13.4
Did not want to talk with father	1052	68.5
Inapplicable (no contact with father at age 15 years)	55	3.6
Sex talk with friends at the age of 15 years		
Easy	1191	75.7
Difficult	121	8.9
Did not want to talk with friends	234	15.3
Inapplicable (no contact with friends at the age of 15 years)	1	0.1

STI, sexually transmitted infection.

**Table II** Characteristics of first contraception method as a function of timing of initiation relative to first sexual intercourse.

Time between contraceptive initiation and first sex	Earlier initiators (initiated before first sex)		Later initiators (initiated after first sex)	
	n = 469	%	n = 211	%
< 1 month	62	12.4	96	42.8
1 to < 3 months	75	16.0	38	20.5
3 to < 6 months	79	16.7	25	12.1
6 months to < 1 year	91	19.7	20	9.5
1 to < 2 years	67	14.8	12	6.0
2 years or more	95	20.4	16	9.1
Type of first contraception (%)	Before first sex n = 469	At the time of sex n = 872	After first sex n = 211	Total n = 1552
Pill	100	9.8	59.4	43.7
Intrauterine device	0.0	0.0	1.6	0.3
Implant	0.0	0.0	1.4	0.2
Male condom	0.0	88.4	19.8	52.1
Withdrawal	0.0	0.7	1.7	0.6
Periodic abstinence	0.0	0.8	1.0	0.6
Patch	0.0	0.1	0.0	0.1
Emergency contraceptive pill	0.0	0.3	15.1	2.5
Total	100	100	100	100
Reasons for initiation among those who experienced the pill as the first contraception method (%)	Before first sex n = 455	At the time of sex n = 88	After first sex n = 125	Total n = 668
To avoid pregnancy if had sex	53.0	86.5	79.0	62.7
Acne	21.2	13.1	9.6	17.8
To regulate menstrual cycles	66.8	46.2	48.4	60.3
To avoid painful periods	47.5	25.9	26.1	40.2
Ovary problems	9.5	2.1	5.8	7.8
Other reasons	4.3	0.0	6.9	4.3

Timing of contraceptive initiation was associated with several later SRH outcomes (Table IV). After adjusting for other relevant factors, earlier initiators were more likely to be currently using more effective contraceptive methods (hormonal methods or IUD) [OR = 1.8 (1.1–2.9)] when compared with those who initiated at the time of first sex. Later contraceptive initiators were more likely to report having had an unintended pregnancy [OR = 1.8(1.1–3.0)] and to report more abortions [OR = 1.9 (1.1–3.4)] when compared with those who initiated at the time of first sex. We found no difference in reported STI rates by timing of contraception initiation. When restricting the analysis to pill initiators, results indicated greater odds of reporting an unintended pregnancy [OR = 3.7 (1.3–10.5)] and a tendency to report more abortion among later initiators [OR = 3.3 (0.9–13.4)] relative to those who initiated at the time of first intercourse, while we found no effect of early initiation on subsequent SRH indicators. These associations remained after controlling for reasons for pill initiation (Table IV). None of these reasons were significantly related to later SRH outcomes, with the exception of starting the pill for skin problems found to be associated with lower odds of abortion

and initiation for ovarian problems associated with lower use of very effective methods of contraception at the time of the survey (Table IV).

## Discussion

Previous studies have shown that contraceptive and condom use at first sexual intercourse are important markers of future sexual and reproductive behaviours (Darroch et al., 2001a,b; Manlove et al., 2004; Brauner-Otto et al., 2010; Bajos et al., 2012). Our results appear consistent with this literature indicating increased odds of poor SRH outcomes among late contraceptive initiators, including late initiators of the pill. While negative SRH outcomes were relatively frequent in the study population overall, with 18% reporting past experiences of unintended pregnancy and 9% a history of abortion, these estimates rose to 34 and 19%, respectively, among later initiators. These negative outcomes remained more prevalent among later initiators, even after controlling for women's socio-demographic background, suggesting that the disparities at sexual initiation previously reported (Bentley et al., 2009) and

**Table III** Factors associated with timing of contraceptive initiation relative to first intercourse: results from univariate analysis and multivariate logistic regressions.

	Before first sex	At-time of first sex	After first sex	P	Earlier versus at the time of first sex			Later versus at the time of first sex		
	%	%	%		OR	95% CI	P	OR	95% CI	P
Age (years)										
15–19	15.8	32.6	23.3	<0.001	1		0.001	1		0.001
20–24	33.8	32.1	29.0		2.1	1.3–3.2		2.1	1.2–3.6	
25–29	50.4	35.3	47.7		2.5	1.6–4.0		2.9	1.7–5.0	
Country of birth										
France	92.1	93.6	79.6	<0.001	1		0.67	1		
Foreign country	7.9	6.4	20.5		0.9	0.4–1.8		4.9	2.7–8.6	<0.001
Education level <sup>a</sup>										
<High school	36.4	38.1	53.8	<0.001	1		0.08	1		<0.001
Professional high school	12.9	12.9	12.7		0.7	0.4–1.1		0.6	0.3–1.1	
General high school	13.4	18.3	10.3		0.7	0.4–1.0		0.4	0.2–0.6	
3-year college	20.7	15.8	16.0		0.8	0.5–1.2		0.5	0.3–0.9	
Graduate school	16.6	14.9	7.2		0.5	0.3–0.9		0.2	0.1–0.4	
Importance of religion <sup>a</sup>										
Very/important	22.8	19.6	30.4	0.002						
Not very or not at all	52.1	49.5	36.2							
No religion	25.1	30.9	33.4							
Mother's education										
No diploma	22.1	16.4	24.6	0.04						
High school diploma	34.8	34.3	39.4							
3-year college	17.6	20.1	16.0							
Graduate school	25.6	29.1	20.0							
Sex talk with mother at the age of 15 years										
Easy	58.7	51.0	45.7	0.03	1		0.005	1		0.42
Difficult	10.8	12.5	17.6		0.6	0.4–1.0		1.3	0.8–2.2	
Did not want to talk	29.2	35.5	36.5		0.6	0.4–0.8		1.0	0.7–1.5	
Inapplicable	1.3	1.0	0.2		1.1	0.3–3.6		0.2	0.0–2.3	
Sex talk with father at the age of 15 years										
Easy	16.5	14.4	11.3	0.42						
Difficult	12.5	13.7	14.3							
Did not want to talk	68.9	67.5	70.9							
Inapplicable	2.2	4.3	3.5							
Sex talk with friends at the age of 15 years										
Easy	70.5	79.4	72.7	0.08	1		0.09	1		
Difficult	10.6	8.0	8.9		1.4	0.8–2.4		1.1	0.6–2.1	
Did not want to talk	18.9	12.6	18.5		1.5	1.0–2.1		1.6	1.0–2.5	
Mean age (years) of first sexual intercourse										
	17.7 [17.5–17.9]	16.7 [16.6–16.9]	16.6 [16.3–17.0]	<0.001	1.3	1.2–1.4	<0.001	0.9	0.8–1.0	0.20

OR, odds ratio; CI, confidence interval.

<sup>a</sup>Level of education and importance of religion represent the respondent's situation at the time of the survey.

evidenced in our study (later initiators were more likely to be from a disadvantaged socio-demographic background) have long-term consequences on women's SRH trajectories, even in the French context of universal health care.

In line with our initial hypothesis, we found that earlier contraceptive initiation was associated with greater utilization of more effective methods at the time of the survey (even compared with those who initiated at the time of first intercourse). This association was not

**Table IV Association between timing of contraceptive initiation and sexual reproductive health outcomes: results from the most parsimonious multivariate logistic regression models.**

			Unadjusted			Adjusted		
			OR	95% CI	P	OR	95% CI	P
Unintended pregnancy								
*Adjusted for age, country of birth, education level, employment, financial status, paternal education, parity, age at first sex and number of lifetime male sex partners								
All women	Timing of initiation	At first intercourse	1		<0.001			0.08
		Earlier	1.6	1.2–2.3		1.2	0.7–2.0	
		Later	3.4	2.3–5.1		1.8	1.1–3.0	
Pill users	Timing of initiation	At first intercourse	1		0.002			0.04
		Earlier	1.9	0.9–4.1		2.1	0.8–5.4	
		Later	4.4	1.9–10.2		3.7	1.3–10.5	
	Reasons for initiation (y/n)	Contraception	1.4	0.9–2.2	0.15	1.0	0.5–1.9	0.97
		Skin problems	0.4	0.2–0.7	0.004	0.5	0.2–1.3	0.17
		Menstrual regulation	0.9	0.6–1.3	0.47	0.9	0.4–2.0	0.78
		Painful period	1.0	0.7–1.6	0.83	1.5	0.7–3.3	0.30
Ovarian problems	1.2	0.6–2.6	0.56	2.1	0.8–5.9	0.14		
Abortion								
*Adjusted ORs for age, education, financial status, paternal education, religious affiliation, talk with mother about sex at the age of 15 years, age at first sex and lifetime number of male sexual partners.								
All women	Timing of initiation	At first intercourse	1		<0.001			0.03
		Earlier	1.0	0.6–1.6		0.7	0.4–1.4	
		Later	3.0	1.8–5.0		1.9	1.1–3.4	
Pill users	Timing of initiation	At first intercourse	1		<0.001			0.05
		Earlier	1.2	0.4–3.6		1.4	0.3–3.2	
		Later	3.9	1.3–12.0		3.3	0.9–11.6	
	Reasons for initiation (y/n)	Contraception	2.8	1.5–5.3	0.002	2.2	1.0–5.0	0.05
		Skin problems	0.3	0.1–0.9	0.03	0.4	0.1–1.3	0.11
		Menstrual regulation	1.0	0.6–1.8	0.92	0.9	0.4–2.0	0.80
		Painful period	1.1	0.6–1.9	0.79	1.7	0.8–3.5	0.18
Ovarian problems	0.6	0.2–1.8	0.34	0.7	0.2–2.5	0.53		
Sexually transmitted infections								
*Adjusted ORs for duration of sexual activity (continuous), cohabitation status and number of lifetime sexual partners.								
All women	Timing of initiation	At first intercourse	1		0.51	1		0.99
		Earlier	0.8	0.5–1.5		1.0	0.5–1.8	
		Later	1.3	0.7–2.5		1.0	0.5–1.9	
Pill users	Timing of initiation	At first intercourse	1		0.52	1		0.72
		Earlier	0.6	0.3–1.6		0.8	0.3–2.0	
		Later	0.9	0.3–2.6		1.1	0.3–3.2	
	Reasons for initiation (y/n)	Contraception	1.4	0.6–3.3	0.45	1.6	0.6–3.8	0.33
		Skin problems	1.8	0.8–3.8	0.13	1.7	0.8–3.9	0.19
		Menstrual regulation	0.9	0.4–1.9	0.82	0.8	0.4–1.8	0.61
		Painful period	1.3	0.6–2.8	0.44	1.6	0.7–3.5	0.22
Ovarian problems	2.1	0.8–5.2	0.12	3.1	0.8–11.2	0.09		
Use of less effective contraceptive practices or non-use of contraception <sup>a</sup> (when compared with use of very effective methods) among women at risk of an unintended pregnancy								
*Adjusted ORs for age, cohabitation status, education level, paternal education and age at first sex.								
All women	Timing of initiation	At first intercourse	1		0.023	1		0.01
		Earlier	0.6	0.4–0.9		0.6	0.4–0.9	
		Later	1.2	0.7–2.0		1.4	0.8–2.3	
Pill users	Timing of initiation	At first intercourse	1		0.92	1		0.42
		Earlier	1.1	0.4–2.6		1.3	0.4–4.0	
		Later	1.2	0.4–3.3		2.1	0.6–7.0	
	Reasons for initiation (y/n)	Contraception	0.8	0.4–1.5	0.55	1.2	0.6–2.4	0.66
		Skin problems	0.8	0.3–1.7	0.52	1.3	0.5–3.1	0.58
		Menstrual regulation	1.2	0.6–2.2	0.62	0.9	0.4–2.0	0.73
		Painful period	1.1	0.6–2.1	0.73	0.8	0.3–1.7	0.54
Ovarian problems	3.0	1.3–7.0	0.01	4.7	1.8–12.3	0.002		

<sup>a</sup>Use of less effective contraceptive methods includes condoms, withdrawal, spermicides, fertility awareness methods.



found when restricting the analysis to women who started on the pill, suggesting that early initiation mostly relates to the choice of hormonal methods, which ultimately remains associated with later use of more effective methods. Beyond timing of initiation, we found no significant difference in use of effective methods by reasons for pill use, questioning the impact of non-contraceptive benefits alone on later use of effective methods of contraception. While early initiation of contraception increased the odds of using more effective methods, it did not seem to deter women from using condoms to prevent STIs. Thus, our results reveal high rates of dual method use among women who chose the pill as their first contraception, with no negative impact on STI prevention. The absence of an effect of timing of contraception on subsequent STIs (in the 5 years preceding the survey) also supports the notion that early initiation does not increase the risk of STIs.

While initiation before first intercourse is associated with later increases in use of effective methods, this positive association does not seem to translate to further sexual health benefits compared with initiation at the time of first course, as the frequencies of unintended pregnancy and abortion were no different between those who started contraception before first sex and those who started at the time of first sex. Unintended pregnancies and abortions are based on self-reports, which are subject to bias due to abortion underreporting (Rossier, 2003; Moreau *et al.*, 2004). Differential reporting of abortion by timing of contraceptive initiation cannot be tested, however, the increased odds of abortion and unintended pregnancy among later initiators is consistent with the literature (Zabin *et al.*, 1979).

Earlier initiators reported more discussions with their mothers with regard to sexuality (although this association was not significant among first pill users). Factors of openness and informal discussion with mothers were found in past studies to be associated with contraceptive initiation and usage (Manlove *et al.*, 2006; Brauner-Otto *et al.*, 2010; De Graaf *et al.*, 2010; Hall *et al.*, 2012). Contrary to popular beliefs, our results do not support the notion that talking with teenagers about sexuality and earlier use of contraception promotes early sexual debut, as earlier initiators reported an older age at sexual initiation.

There are several limitations of this study, which was a secondary analysis of national cross-sectional survey data that will now be discussed. Because our analysis focused on timing of contraceptive initiation relative to first intercourse, we excluded 381 women who had never had sexual intercourse, despite 85 of them who reported ever using the pill. The mean age of these 85 earlier initiators was 20 years (18.9–20.8) when compared with 24 years (23.6–24.4) among earlier initiators in our analysis. Half of earlier initiators in our analysis started the pill for contraceptive benefits, but only 9% did so among the 85 earlier initiators who were not included. Thus, the exclusion of sexually inexperienced women may have reduced the scope of our analysis on the relevance of initiation for non-contraceptive benefits.

The cross-sectional nature of the study is another methodological consideration. In particular, the direction of the association observed between timing of contraceptive initiation and relationship with mother is unclear. The lack of prospective data also limits our ability to comprehensively include contextual and sequential information around the time of first contraception and subsequently explore other factors associated with timing of contraceptive initiation, such as family and social background (Bentley *et al.*, 2009), access to care and relationship characteristics (Manning *et al.*, 2000; Stone *et al.*, 2002) at the time of initiation.

Timing of contraceptive initiation was selected as our primary indicator in order to maintain sufficient sample size in each group to allow for comparisons. However, earlier initiators comprised a heterogeneous group with regard to reasons for initiation and time to first intercourse. The absence of a significant association between the reasons for pill initiation and current contraceptive use questions our initial hypotheses of higher continuation rates associated with non-contraceptive benefits. However, by omitting early initiators who were sexually inexperienced, we may not have fully captured the effect of non-contraceptive benefits on future reproductive outcomes.

Overall, our results suggest that earlier initiation is associated with current utilization of more effective contraception. However, earlier initiation alone, relative to initiation at the time of first intercourse has no impact on future unintended pregnancy rates, abortion or STIs. Future research, using longitudinal designs, is needed to investigate these 'inconsistent' results and improve our understanding of potential benefits of early initiation.

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## Authors' roles

K.T. and C.M. designed the study, conducted the analysis and wrote the paper. N.B., co-PI of the FECOND survey and A.B. coordinator of the FECOND were both involved in the study design and revised the manuscript.

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## Conflict of interest

The authors have no conflict of interest.

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