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Contraceptive use at first intercourse is associated with subsequent sexual behaviors☆,☆☆

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ABSTRACT

Objective: Women's contraceptive use at first sexual intercourse (FSI) may be associated with subsequent sexual behaviors. We examined associations between contraceptive methods used at FSI and subsequent number of lifetime partners, induced abortions and sexually transmitted infections (STIs).
Study design: During 2011–2012, we collected questionnaire data from a random sample of women aged 18–45 years from Denmark, Norway and Sweden. We used logistic regression and discrete-time proportional hazards models to estimate odds ratios (ORs) and hazard ratios (HRs) with 95% confidence intervals (CIs), comparing different contraceptive methods used at FSI in the whole study sample and in women with FSI in 2001 or later [when emergency contraceptive pills (ECPs) were available without prescription].
Results: Of 45,361 women in the study sample, those who did not use contraception at FSI (n=8155; 18.0%) were more likely than condom users to have ≥11 lifetime partners (OR=1.34; 95% CI 1.27–1.42), induced abortions (HR=1.62; 95% CI 1.53–1.71) and STIs (HR=1.15; 95% CI 1.10–1.20). ECP users (n=440, 1.0%) were more likely than condom users to have ≥11 lifetime partners (OR=1.76; 95% CI 1.40–2.22), induced abortions (HR=1.44; 95% CI 1.11–1.86) and STIs (HR=1.84; 95% CI 1.56–2.16). A similar pattern was seen in safe periods/withdrawal users. The associations did not change among women with FSI in 2001 or later (n=14,445).
Conclusions: Compared with condom use, contraceptive nonuse, safe periods/withdrawal use and ECP use at FSI were associated with subsequent number of sexual partners, induced abortions and STIs.
Implications: Contraceptive method used at first intercourse was associated with subsequent sexual behaviors in women. This study highlights the importance of early sexual behaviors and may help understand patterns of women's sexual behaviors.

1. Introduction

Experiences gained at first sexual intercourse (FSI) are suggested to influence subsequent sexual behaviors [1–5]. American studies have reported that individuals who used condoms at FSI were more likely to continue condom use in later sexual encounters [1–3]. Likewise, French and Danish studies have shown that women who did not use contraception at FSI had increased risk of subsequent contraceptive nonuse [4,5]. Approximately 10%–17% of 18–26-year-old women from Denmark, Norway and Sweden recently reported to have not used contraception at FSI [6].

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Emergency contraceptive pills (ECPs) have been available since 1980–1990 in Denmark, Norway and Sweden, and in 2000–2001, they were made available without prescription to all women in the three countries [7–9]. Consequently, ECP use increased markedly in all three countries [10,11]. In 2006, 24% of 16–46-year old Danish women reported to have ever used ECPs [12], and a study from 2015 found that 22% of 16–49-year old Swedish women had ever used ECPs [13]. In terms of ECP use at FSI, a recent study reported a prevalence of around 4% among 18–26-year-old Scandinavian women [6].

Women who do not use contraceptive methods at FSI may be less likely to use contraceptives regularly later in life and more likely to have outcomes of unprotected intercourse such as unintended pregnancies and sexually transmitted infections (STIs) [14]. ECPs may be an important option for women who did not use contraceptives before or during FSI; however, lack of contraceptive use at FSI or ECP use after FSI may indicate impulsivity or lack of forethought [15]. Therefore, a woman's behavior at FSI may be a marker of an underlying trait or personality dimension which could determine risk-taking in subsequent acts of sexual intercourse [1,16]. An improved understanding of the patterns of women's sexual behaviors throughout their life may be informative for interventions to prevent unintended pregnancies and STIs.

In this population-based questionnaire study of Scandinavian women, we investigated whether contraceptive methods used at FSI were associated with indicators of subsequent sexual behaviors, including number of lifetime sexual partners, induced abortions and STIs.

2. Materials and methods

2.1. Study sample

This study was based on data from a population-based cross-sectional questionnaire study which has previously been described in detail [17]. Briefly, in 2011, we randomly selected 83,720 women aged 18–45 years from nationwide population registers of Denmark, Norway and Sweden. We then sent a mailed invitation to the selected women to participate in the study. We considered women to be ineligible for the study if they were unable to answer the questionnaire because they did not speak the respective national language or because they were disabled, and if they had died or emigrated at the time of the study. We considered response to the questionnaire as indicative of consent to participate. The Data Protection Agencies and Research Ethics Committees in each country approved the study.

We collected information on demographics, lifestyles and sexual health. We asked the women "Which contraceptive method did you use at your first sexual intercourse?" The answer options were "no contraception," "condom," "oral contraceptive (OC) pill/mini pill," "safe periods," "withdrawal," "ECP" and "other (e.g., diaphragm, spermicide or intrauterine device)." We allowed women to give multiple responses.

2.2. Statistical analysis

We excluded women who reported not to have had sexual intercourse at the time of the study and women who did not provide information on contraceptive use or age at FSI (Fig. 1). We categorized the remaining women into mutually exclusive categories based on contraceptive method used at FSI as condom users, OC users, both OC and condom users, safe periods or withdrawal users, ECP users and nonusers. Women who used ECPs, safe periods or withdrawal in combination with condom were categorized as condom users. The nonusers included women who did not use any contraception at FSI. We excluded women who reported to have only used "other" contraceptive methods (diaphragm, spermicidal cream, intrauterine devices) from the analysis because this was a single-response category of heterogeneous contraceptive methods. Condom users were selected as the reference group because condom was the most commonly used contraceptive method at FSI.

We used the number of lifetime partners at the age of response and the occurrences of induced abortions and STIs before age at response as indicators of subsequent sexual behaviors. To assess the association between contraceptive method at FSI and lifetime number of partners, we initially used a generalized logit model. Based on percentile distribution, we categorized lifetime number of partners as 1–4, 5–10 and ≥11 partners. In the generalized model, the associations with contraceptive method at FSI did not differ markedly between the categories of 1–4 and 5–10 partners. Therefore, we combined these two categories and present binary logistic regression models estimating the odds ratio (OR) with corresponding 95% confidence intervals (CIs) of having ≥11 (75th percentile of distribution) vs. 1–10 lifetime partners. We adjusted this model for age at FSI and time since FSI.

For induced abortions and STIs, we used proportional hazards survival models to estimate hazard ratios (HRs) and corresponding 95%

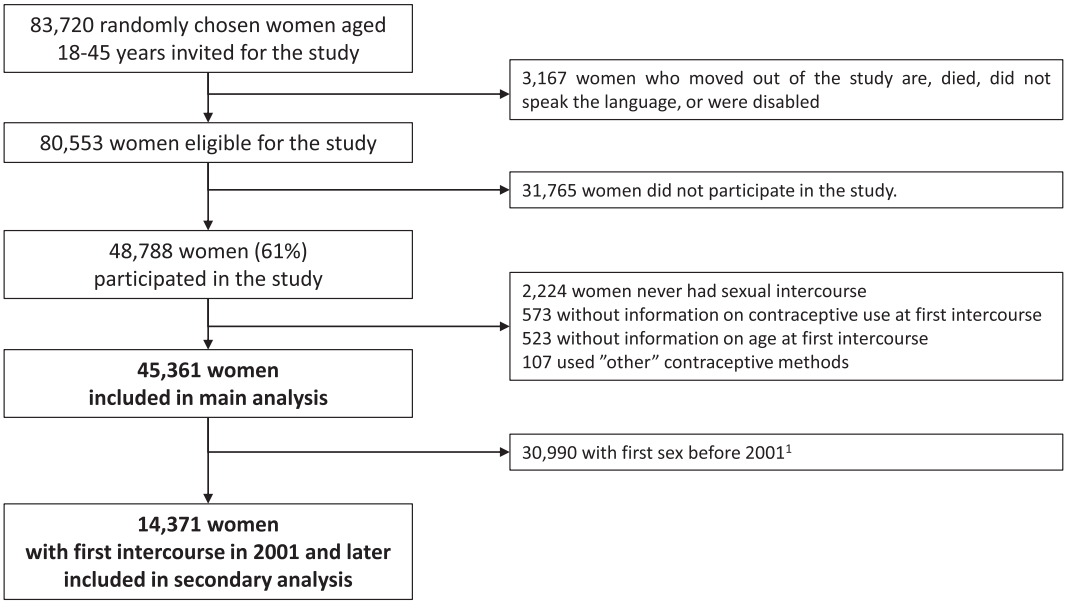

Fig. 1. Flowchart of the study population.

Table 1
Characteristics of 45,361 Scandinavian women aged 18–45 years according to contraceptive use at FSI

Characteristics		Contraceptive use at FSI											
		Condom users		OC users		Both OC and condom users		Safe periods or withdrawal users		ECP users		Nonusers	
		(*n*=26,428)		(*n*=5089)		(*n*=3337)		(*n*=1912)		(*n*=440)		(*n*=8155)	
Age at response (years; median, IQR)		33 (25–39)		35 (27–42)		30 (24–37)		36 (29–42)		23 (20–27)		35 (28–41)	
Country	Denmark	10,724	(40.6)	2230	(43.8)	1810	(54.2)	365	(19.1)	98	(22.3)	2296	(28.1)
	Norway	6956	(26.3)	1405	(27.6)	653	(19.6)	691	(36.1)	141	(32.1)	2829	(34.7)
	Sweden	8749	(33.1)	1454	(28.6)	874	(26.2)	856	(44.7)	201	(45.6)	3030	(37.2)
Education	≤High school	7386	(28.0)	1566	(30.8)	1070	(32.1)	508	(26.6)	171	(38.9)	3016	(37.0)
	>High school	18,915	(71.6)	3494	(68.7)	2245	(67.3)	1400	(73.2)	269	(61.1)	5088	(62.4)
	Missing	127	(0.4)	29	(0.6)	22	(0.6)	4	(0.2)	0	–	51	(0.6)
Type of response	Paper	16,701	(63.2)	3375	(66.3)	2038	(61.1)	1403	(73.4)	299	(68.0)	5498	(67.4)
	Web	4882	(18.5)	804	(15.8)	691	(20.7)	420	(22.0)	114	(25.9)	1291	(15.8)
	Telephone	4845	(18.3)	910	(17.9)	608	(18.2)	89	(4.7)	27	(6.1)	1366	(16.8)
Age at first intercourse	<15 years	3271	(12.4)	303	(6.0)	255	(7.6)	244	(12.8)	45	(10.2)	1382	(17.0)
	15–19 years	20,516	(77.6)	3981	(78.2)	2761	(82.7)	1366	(71.4)	346	(78.6)	5433	(66.6)
	≥20 years	2641	(10.0)	805	(15.8)	321	(9.6)	302	(15.8)	49	(11.1)	1340	(16.4)
≥11 lifetime partners	No	19,237	(72.8)	4110	(80.8)	2591	(77.6)	1339	(70.0)	307	(69.8)	5428	(66.6)
	Yes	6717	(25.4)	899	(17.6)	685	(20.5)	534	(27.9)	126	(28.6)	2497	(30.6)
	Missing	474	(1.8)	80	(1.6)	61	(1.8)	39	(2.0)	7	(1.6)	230	(2.8)
Induced abortions	No	21,835	(82.6)	4249	(83.5)	2915	(87.4)	1453	(76.0)	376	(85.5)	5808	(71.2)
	Yes	4085	(15.5)	694	(13.6)	360	(10.7)	416	(21.8)	59	(13.4)	2004	(24.6)
	Missing	508	(1.9)	146	(2.9)	62	(1.9)	43	(2.2)	5	(1.1)	343	(4.2)
STIs	No	18,409	(69.7)	3621	(71.2)	2323	(69.6)	1257	(65.7)	289	(65.6)	5269	(64.6)
	Yes	7716	(29.2)	1398	(27.5)	981	(29.4)	625	(32.7)	149	(33.9)	2714	(33.3)
	Missing	303	(1.1)	70	(1.3)	33	(1.0)	30	(1.6)	2	(0.5)	172	(2.1)

Data are presented as *n* (%) or median (IQR). IQR, interquartile range.

CIs. We defined STIs as having had chlamydia, gonorrhea, herpes, trichomonas or genital warts. We calculated follow-up time from the age at FSI to the age at first occurrence of each outcome. If a woman had experienced several STIs, we ended follow-up at the age of first STI. We censored women at the age of response if they had not experienced a given outcome. We employed discrete-time proportional hazards models since the ages at the response, outcomes, FSI and the follow-up time were grouped into 1-year intervals [18]. We checked the proportional hazards assumption by graphs and by likelihood ratio tests adding interaction terms to the models. No violations of proportionality were seen for the main exposure variable contraceptive use. And adding interaction terms with time since FSI for those confounders where the proportional hazards assumption was not met did not change the associations between contraceptive method and outcomes. Therefore, we present the HRs from models without interactions. We adjusted the associations in these models for women's age at FSI.

In a separate model, we additionally adjusted all associations for educational level at response, country and type of response (paper, Internet or telephone). The adjustment variables were selected a priori. Furthermore, we repeated all analyses among women in the study sample who had FSI in 2001 or later (i.e., when ECPs were available without prescription). This secondary analysis was done to examine whether the change in ECP availability affected the associations under study. All statistical analyses were performed using SAS version 9.4 (SAS Institute, Cary, NC, USA).

3. Results

Of the 83,720 invited women, we considered 3167 ineligible for the study (Fig. 1). Of the eligible women, 48,788 (60.6%) responded to the questionnaire. The majority answered via a paper-based version of the questionnaire (*n*=31,681; 64.9%), while others responded via Internet (*n*=8791; 18.0%) or telephone (*n*=8316; 17.0%). We excluded 3427 women who had not had sexual intercourse, who did not provide information on contraceptive method or age at FSI, or who used only "other" contraceptive methods at FSI, leaving 45,361 women for the main analysis.

In Table 1, we present characteristics of the women included in the main analysis. A total of 26,428 (58.3%) used condom, 5089 (11.2%) used OCs, 3337 (7.3%) used both OCs and condom, 1912 (4.2%) used safe periods or withdrawal, 440 (1.0%) used ECPs, and 8155 (18.0%) used no contraception at FSI. The ECP users were generally younger at response (median age 23 years) than women who used other contraceptive methods or no contraception at FSI (median ages 30–36 years). A higher proportion of nonusers (37.0%) and ECP users (38.9%) had low educational level (≤high school) than women using the other contraceptive

Table 2
Odds ratios of ≥11 lifetime partners and HRs of induced abortions and STIs according to contraceptive use at first intercourse among 45,361 Scandinavian women aged 18–45 years

Contraceptive use at first intercourse	≥11 Lifetime partners	Induced abortion	STIs[a]
	OR (95% CI)[b]	HR (95% CI)[c]	HR (95% CI)[c]
Condom users	1	1	1
OC users	0.71 (0.66–0.77)	0.90 (0.83–0.98)	0.99 (0.93–1.04)
Both OC and condom users	0.80 (0.73–0.88)	0.77 (0.69–0.86)	1.10 (1.02–1.17)
Safe periods/withdrawal users	1.18 (1.05–1.31)	1.38 (1.25–1.53)	1.13 (1.04–1.23)
ECP users	1.76 (1.40–2.22)	1.44 (1.11–1.86)	1.84 (1.56–2.16)
Nonusers	1.34 (1.27–1.42)	1.62 (1.53–1.71)	1.15 (1.10–1.20)

[a] Includes chlamydia, gonorrhea, trichomonas, herpes and genital warts.
[b] Adjusted for age at first intercourse and time since first intercourse.
[c] Adjusted for age at first intercourse. Time since first intercourse was the underlying time scale variable.

Table 3
Characteristics of 14,455 Scandinavian women aged 18–45 years with FSI in 2001 or later by contraceptive use at first intercourse.

Characteristics		Contraceptive use at FSI											
		Condom users		OC users		Both OC and condom users		Safe periods or withdrawal users		ECP users		Nonusers	
		(*n*=8596)		(*n*=1564)		(*n*=1423)		(*n*=427)		(*n*=342)		(*n*=2103)	
Age at response (years; median, IQR)		22 (20–25)		23 (21–26)		23 (20–25)		24 (21–27)		22 (20–24)		23 (21–27)	
Country	Denmark	3308	(38.5)	636	(40.7)	775	(54.5)	82	(19.2)	80	(23.4)	586	(27.9)
	Norway	2101	(24.4)	551	(35.2)	339	(23.8)	136	(31.8)	110	(32.2)	622	(29.6)
	Sweden	3187	(37.1)	377	(24.1)	309	(21.7)	209	(49.0)	152	(44.4)	895	(42.6)
Education	≤High school	3814	(44.4)	604	(38.6)	612	(43.0)	150	(35.1)	148	(43.3)	998	(47.5)
	>High school	4724	(55.0)	947	(60.6)	799	(56.2)	277	(64.9)	194	(56.7)	1088	(51.7)
	Missing	58	(0.6)	13	(0.8)	12	(0.8)	–	–	–	–	17	(0.8)
Type of response	Paper	5096	(59.3)	1011	(64.6)	846	(59.5)	288	(67.5)	235	(68.7)	1344	(63.9)
	Web	1824	(21.2)	276	(17.7)	341	(24.0)	121	(28.3)	87	(25.4)	409	(19.5)
	Telephone	1676	(19.5)	277	(17.7)	236	(16.5)	18	(4.2)	20	(5.9)	350	(16.6)
Age at first intercourse	<15 years	1240	(14.4)	76	(4.9)	117	(8.2)	55	(12.9)	36	(10.5)	308	(14.7)
	15–19 years	6348	(73.9)	1145	(73.2)	1145	(80.5)	258	(60.4)	273	(79.8)	1260	(59.9)
	≥20 years	1008	(11.7)	343	(21.9)	161	(11.3)	114	(26.7)	33	(9.7)	535	(25.4)
≥11 lifetime partners	No	6790	(79.0)	1338	(85.5)	1185	(83.3)	336	(78.7)	251	(73.4)	1576	(74.9)
	Yes	1705	(19.8)	212	(13.6)	220	(15.4)	84	(19.7)	87	(25.4)	494	(23.5)
	Missing	101	(1.2)	14	(0.9)	18	(1.3)	7	(1.6)	4	(1.2)	33	(1.6)
Induced abortions	No	7803	(90.8)	1447	(92.5)	1333	(93.6)	376	(88.1)	303	(88.6)	1754	(83.4)
	Yes	714	(8.3)	99	(6.3)	79	(5.6)	49	(11.5)	37	(10.8)	283	(13.5)
	Missing	79	(0.9)	18	(1.2)	11	(0.8)	2	(0.5)	2	(0.6)	66	(3.1)
STIs	No	6391	(74.4)	1182	(75.6)	1055	(74.1)	324	(75.9)	228	(66.7)	1495	(71.1)
	Yes	2114	(24.6)	361	(23.1)	354	(24.9)	102	(23.9)	112	(32.8)	571	(27.2)
	Missing	91	(1.0)	21	(1.3)	14	(1.0)	1	(0.2)	2	(0.5)	37	(1.7)

Data are presented as *n* (%) or median (IQR).

methods (26.6%–32.1%) (p<.0001). Furthermore, a higher proportion of nonusers had sexual debut before age 15 years (17.0%) than women using some form of contraception at FSI (6.0%–12.8%) (p<.0001).

In Table 2, we present the ORs of having ≥11 lifetime partners, and the HRs of induced abortion and STIs, according to contraceptive method used at FSI. The nonusers, ECP users and safe periods/withdrawal users were more likely than condom users to have ≥11 lifetime partners after adjusting for age at FSI and time since FSI. Similarly, nonusers, ECP users and safe periods/withdrawal users had higher hazards than condom users of induced abortions and STIs after adjusting for age at FSI. In contrast, women who used OCs or both OCs and condom at FSI were less likely than the condom users to subsequently have ≥11 lifetime partners and had lower hazard of induced abortions, whereas no clear pattern for STIs was seen. All associations were virtually unchanged after additional adjustments for education, country and type of response were made (data not shown).

In Table 3, we present the characteristics of women who had FSI in 2001 or later (when ECPs were available without prescriptions) (*n*= 14,455). In this subsample, 8596 (59.5%) used condom, 1564 (10.8%) used OCs, 1423 (9.8%) used both OCs and condom, 427 (3.0%) used safe periods or withdrawal, 342 (2.4%) used ECPs, and 2103 (14.5%) used no contraception at FSI. Low educational level (≤high school) was more common in nonusers (47.5%) than in women using some form of contraception at FSI (35.1%–44.4%) (p<.0001). Furthermore, late sexual debut (age 20 years or older) was more common in nonusers (25.4%), safe periods/withdrawal users (26.7%) and OC users (21.7%) than in women using condom (11.7%), both OC and condom (11.3%) or ECPs (9.7%) at FSI (p<.0001).

Table 4 presents the ORs and HRs of having ≥11 lifetime partners, induced abortion and STIs according to contraceptive method at FSI in the subsample of women with FSI in 2001 and later. Trends were generally similar to those seen in the main analysis: Nonusers and ECP users were more likely than condom users to have ≥11 lifetime partners. Furthermore, nonusers and ECP users had higher hazards than condom users of induced abortions and STIs. Women using safe periods/withdrawal at FSI had higher hazard than condom users of subsequently experiencing induced abortions. In contrast, women using OCs or both OCs and condoms at FSI were less likely than condom users to have ≥11 lifetime partners. Furthermore, the women using both OCs and condoms at FSI had lower hazard than condom users of induced abortions. Additional adjustments for education, country and type of response did not change the associations markedly (data not shown).

4. Discussion

In this large population-based study, we found that contraceptive use at first intercourse was associated with indicators of subsequent

Table 4
Odds ratios of ≥11 lifetime partners and HRs of induced abortions and STIs according to contraceptive use at FSI among 14,455 Scandinavian women aged 18–45 years with first intercourse in 2001 or later

Contraceptive use at first intercourse	≥11 Lifetime partners	Induced abortion	STIs[a]
	OR (95% CI)[b]	HR (95% CI)[c]	HR (95% CI)[c]
Condom users	1	1	1
OC users	0.78 (0.66–0.92)	0.87 (0.70–1.08)	1.07 (0.96–1.20)
Both OC and condom users	0.76 (0.65–0.89)	0.69 (0.55–0.87)	1.04 (0.92–1.16)
Safe periods/withdrawal users	1.15 (0.88–1.49)	1.49 (1.11–2.00)	1.06 (0.87–1.30)
ECP users	1.77 (1.35–2.32)	1.53 (1.10–2.13)	1.68 (1.38–2.03)
Nonusers	1.42 (1.26–1.61)	1.72 (1.49–1.98)	1.17 (1.07–1.29)

[a] Includes chlamydia, gonorrhea, trichomonas, herpes and genital warts.
[b] Adjusted for age at first intercourse and time since first intercourse.
[c] Adjusted for age at first intercourse. Time since first intercourse was the underlying time scale variable.

sexual behaviors — number of lifetime partners, induced abortions and STIs. Our findings suggest that compared with women who used condoms at FSI, women who did not use contraception or who used ECPs, safe periods or withdrawal methods at FSI were more likely to be inconsistent contraceptive users later in their life.

In line with our findings, previous studies also indicate that women have a tendency to maintain similar patterns of contraceptive use throughout their life. Therefore, women who do not use contraception at FSI are more likely to never use condoms [4], and women who used condoms at FSI are more likely to continue condom use in subsequent acts of sexual intercourse [1,2]. Furthermore, in previous studies, contraceptive nonuse has also been associated with induced abortions [4] and STIs [2]. Although the number of lifetime sexual partners may not directly impact a woman's health if she uses contraception during all acts of sexual intercourse, studies have reported women with multiple lifetime partners to be less likely to use contraception and more likely to have STIs [19,20].

The mechanisms behind the observed associations between contraceptive method used at FSI and subsequent sexual behaviors are not fully understood. However, it has been hypothesized that contraceptive behaviors adopted by women at early sexual experiences, such as FSI, may become an integral part of sex and lead to a tendency of contraceptive use in later life [1]. A woman's contraceptive choice at FSI could also be a marker of an underlying trait or risk-taking tendency [1]. Most women in our study had FSI at 15–19 years of age. Risk-taking tendencies can be higher during adolescence due to influences of biological, environmental and cultural factors [21], which may also influence adolescent women's decision to use contraceptives at FSI [21]. Additionally, the absence of an immediate adverse outcome, such as an unintended pregnancy or STI, among women who did not use contraception at FSI may lead women to believe that they are not at high risk for negative events, creating an optimistic bias for subsequent unprotected intercourse [22], and lead women to unrealistically minimize their own risk perception in future unprotected acts of intercourse. This optimistic bias may also prevent women from internalizing prevention messages focusing on safe sexual behaviors.

A further finding of our study was that women using OCs at FSI were less likely than condom users to subsequently have ≥11 lifetime partners and induced abortions. Previous studies found that hormonal contraceptive use, as compared with condom use, is more frequent in longer-lasting and stable relationships [23,24]. Therefore, it is possible that the women in our study who used OCs at FSI were more likely than the condom users to be in a committed and steady relationship at FSI. This may have made them less likely to subsequently acquire multiple sexual partners. Furthermore, OCs are known to be more effective than condoms at preventing unintended pregnancies based on typical-use failure rates [25]. Therefore, if the patterns of contraceptive use at FSI were maintained later in the women's sexual life, this may partly explain the lower risk of induced abortions in OC users compared with condom users at FSI.

A limitation of this study is that we could not directly assess contraceptive use subsequent to FSI. Self-reported behaviors may be prone to social desirability bias, and some women in our study may have misreported their contraceptive use or sexual behaviors. Additionally, some older women may not have correctly recalled their age and contraceptive use at FSI. Potential confounders such as the type of relationship at FSI and sexual behaviors of the women's partners were not assessed, including whether FSI was consensual, which may affect contraceptive use among women. We used information on induced abortion as an indicator of unintended pregnancy among women in our study, therefore, we may have missed some women with unintended pregnancies who either had spontaneous abortions or decided to continue the pregnancy to full-term. The strengths of the study include the large sample size and the assessment of associations between ECP use at FSI and subsequent sexual behaviors — a less well-studied topic. In our secondary analysis, ECP use was analyzed when the ECPs were available without prescription in all the three countries, thereby reducing potential differences in accessibility and awareness of ECPs. Finally, we had a high response rate (61%) despite the sensitive nature of the study questions. As previously reported [17], there were only modest differences in sociodemographic characteristics between participants and nonparticipants in the study.

In conclusion, contraceptive method used at FSI was associated with lifetime number of sexual partners and outcomes of unprotected sexual intercourse. This study highlights the importance of early sexual behaviors and provides insights into sexual trajectories of women. Future studies could evaluate the potential reasons underlying the associations between contraceptive use at FSI and subsequent sexual behaviors.

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