

# Social, Demographic and Situational Characteristics Associated with Inconsistent Use of Oral Contraceptives: Evidence from France

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**CONTEXT:** Oral contraceptives are the most popular form of reversible contraception used in developed countries. Their efficacy depends on how consistently and correctly they are used.

**METHODS:** The incidence of inconsistent pill use was estimated from data from a random sample of 1,234 pill users who participated in a French population-based survey in 2000. Multivariate logistic regressions were used to identify the social, demographic and situational characteristics associated with inconsistent use.

**RESULTS:** Twenty percent of women missed at least one pill during the four weeks prior to the interview, 7% missed two or more pills, and 10% missed at least one pill without using contraceptive backup during subsequent sexual intercourse. Inconsistent pill use was related to situational characteristics that are likely to change over time. The odds of having missed pills were elevated among women whose last intercourse had been with an occasional partner or who had small children. Women who did not have a daily pill-taking routine also had elevated odds of inconsistent use. The likelihood of having missed a pill and not used contraceptive backup was elevated among women who felt they had not been involved in the choice of contraceptive method prescribed by their physician.

**CONCLUSIONS:** Service providers may need to better address women's preferences and needs, to help them choose the contraceptive method that best fits their sexual, emotional and social lifestyles, and thus improve contraceptive effectiveness during typical use.

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In France, as in most developed countries, oral contraceptives are the most popular form of reversible contraception; in 2000, 45% of French women aged 18–44 were current users.<sup>1</sup> When used perfectly, the pill has a failure rate of less than 1%; during typical use, however, the rate is 8%.<sup>2</sup> This difference reveals the consequences of imperfect use.

Only a few studies (most of them based on nonrepresentative samples of the population) have attempted to measure consistency of pill use and identify characteristics associated with inconsistent use. These studies indicate that an average of 15–47% of women miss at least one pill per cycle,<sup>3</sup> but because they are based on women's reports, they may underestimate the incidence of inconsistent use. Indeed, comparing self-reported data on pill-taking with data from an electronic device measuring compliance with the oral contraceptive regimen, Potter et al. observed a significant gap between women's reporting and their practice: The proportion of women reporting no missed pills each month was 53–59%; the proportion recorded electronically, 19–33%.<sup>4</sup>

Furthermore, the incidence of inconsistent pill use varies across countries. Rosenberg et al. found the level of inconsistent pill use to be higher in France (24%) and the United Kingdom (22%) than in Denmark (17%) or Italy (15%).<sup>5</sup> In the United States, 25–47% of women miss at least one pill during a cycle of use.<sup>6</sup>

Reflecting the classic approach to medical compliance, which implicitly measures patients' "deviance" from a pre-

scribed medical rule, most studies have defined inconsistent use of the pill as missing at least one pill during a cycle. However, a public health point of view would seek to capture the level of exposure to the risk of pregnancy resulting from inconsistent use; that level depends on numerous factors, including the frequency and timing of sexual intercourse, the number and timing of missed pills, and the use of contraceptive backup after a missed pill.

A majority of characteristics that have been examined with regard to inconsistent pill use are individual-level ones—women's age, ethnicity, social background and history of induced abortion.<sup>7</sup> However, as Ingham and Van Zessen argue, individual characteristics become significant only in particular situational or interactional contexts.<sup>8</sup> Consequently, a number of researchers have emphasized the need for models to highlight the contextual and dynamic nature of contraceptive behavior.<sup>9</sup> Beckman and Harvey's review of the literature supports this approach, showing that condom use depends on a couple's sexual experience (e.g., relationship characteristics) as well as equality within the relationship.<sup>10</sup> In a qualitative study among women who had had unintended pregnancies, Bajos and colleagues found that the likelihood of contraceptive failure was elevated when the method used did not fit with a woman's sexual, emotional and social lifestyle.<sup>11</sup> For example, some women who were at risk for unintended pregnancy had unprotected sex because they did not have the social resources to per-

suade an unwilling partner to use a condom.\*

The importance of the context also raises the issue of patient-physician interaction, because in most countries, the use of highly effective contraceptive methods (such as oral contraceptives) is conditional on a medical prescription. Research on medical compliance suggests that interactions with patients should not be seen as the “opportunity to reinforce instructions around treatment but rather [as] a space of exchange where expertise of both patients and health care professionals should be shared to achieve a [mutually] agreed goal.”<sup>12</sup> In light of this reframed model, known as concordance, research on patient-physician interaction emphasizes the need to identify characteristics of that interaction that foster adherence to a therapeutic protocol tailored to patients’ life situations.<sup>13</sup>

In this study, we have sought to build on previous research by using data from a nationally representative sample of French women to estimate the incidence of inconsistent pill use during the last cycle of use, taking into account the frequency of missed pills and the use of contraceptive backup after a missed pill, and to identify individual and situational characteristics that are associated with inconsistent use.

## METHODS

### Data

The Cohorte Contraception (COCON) survey, a population-based cohort survey exploring contraceptive practice and abortion in France, was conducted between 2000 and 2004. The methodology has been described in detail elsewhere.<sup>14</sup> Here we present only the main features.

A two-stage probability sampling method was used to identify a representative sample of French-speaking women aged 18–44. An initial sample of 14,704 households including at least one eligible woman was randomly selected from the telephone directory, which had been stratified by region. If more than one eligible woman lived in a household, one was randomly selected. The response rate among eligible women was 75%. The second stage was designed to oversample women who had had an abortion or an unintended pregnancy in the five years prior to the survey. All women who met these criteria (1,034) were included in the sample, and 19% of other women (1,829) were randomly selected.

To take the sampling design into account, each respondent was given a sampling weight, equal to the product of the number of eligible women in the household and the inverse of the sampling fraction. The weighted sample was further adjusted to reflect the main social and demographic characteristics of women in the 1999 French census (i.e., age, marital status, occupational status and level of education).

The survey questionnaire was designed to collect information on women’s social and demographic characteristics, contraceptive and reproductive histories, last sexual intercourse, opinions and knowledge about contraception, and receipt of gynecologic care in the year prior to the survey. It also included a set of questions exploring contraceptive practice at the time of the interview, specifically addressing

pill compliance, which was one of the objectives of the survey.<sup>15</sup> Other questions in this module related to the context in which the contraceptive prescription was made and reasons for satisfaction or dissatisfaction with the method used. Data were collected via computer-assisted telephone interviews, which lasted an average of 40 minutes.

The study received the approval of Commission Nationale de l’Informatique et des Libertés.

### Indicators of Inconsistent Pill Use

Four survey questions related to women’s use of the pill in the four weeks before the interview. Women were asked, “Since you have been using this pill, did you happen to forget to take it or [did you take] the pill with an important delay?” (French medical guidelines recommend contraceptive backup if a woman has missed a combined pill by more than 12 hours or a progestin-only pill by more than three hours;<sup>16</sup> interviewers used those cutoffs to describe “an important delay.”) If women answered yes to this question, they were asked “How many times in the last four weeks?” and “The last time you missed one or several pills, what did you do?” Potential responses to the latter question were “nothing,” “I continued the tablet, skipping the missed pill,” “I took the missed pill as soon as I realized,” “I used emergency contraception,” “I used condoms,” “I didn’t have sexual intercourse until the next menstrual period” and “other or I don’t know.” Finally, if women answered “I took the missed pill as soon as I realized,” they were asked “How many hours after you missed the pill did you take it?”

We employed responses to these questions to construct three indicators of inconsistent use during the four weeks before interview. The first assessed the number of missed pills; responses were categorized as none, one or more than one. The second assessed use of contraceptive backup after the last missed pill; responses were categorized as no missed pill, missed pill and used backup, or missed pill and did not use backup. These two indicators were combined to construct the third one, aimed at characterizing the subgroup of women who were most at risk of contraceptive failure: those who missed more than one pill and did not use contraceptive backup after the last missed pill.

### Independent Variables

To identify subgroups of women who were at greatest risk of use-failure, we examined associations between each indicator of inconsistent use and a wide range of social, demographic and situational variables.

Information on women’s age, marital status (married, cohabiting, single), level of education, employment status and nationality came directly from survey responses. Income per capita, defined as the total household income divided by the number of individuals per household, was di-

\*Bajos and colleagues’ study contributed to the development of the questionnaire for the Cohorte Contraception (COCON) survey, on which this article is based. In particular, the qualitative analysis led to the inclusion of questions on sexual behavior, on relationship type and on life circumstances that may influence women’s day-to-day contraceptive practice.

**TABLE 1. Odds ratios (and 95% confidence intervals) from logistic regression analyses examining the likelihood that sexually active pill users participating in the COCON survey missed a pill during the four weeks prior to interview, and the likelihood that they missed more than one, by selected characteristics, France, 2000**

Characteristic	1 missed pill (N=170)	>1 missed pill (N=96)
<b>Age</b>		
18–24	2.1 (1.1–4.0)†	0.9 (0.4–2.1)
25–34	1.0	1.0
35–44	1.3 (0.6–2.7)	0.5 (0.2–1.1)
<b>Level of education</b>		
<H.S.	1.0	1.0*
≥H.S.	1.6 (0.9–2.7)	2.5 (1.1–5.6)
<b>Unemployed</b>		
No	1.0	1.0
Yes	1.5 (0.7–3.3)	1.2 (0.5–3.2)
<b>Income per capita</b>		
Low or medium	1.0	1.0***
High	0.7 (0.4–1.4)	0.3 (0.1–0.9)
Unknown	1.3 (0.4–4.5)	na
<b>Nationality</b>		
French	1.0	1.0
Other	1.2 (0.2–9.0)	1.9 (0.7–4.9)
<b>Age of the last child</b>		
No children	1.0**	1.0*
<2 years	2.9 (1.5–6.0)	3.0 (1.2–7.6)
≥2 years	1.8 (0.8–4.0)	2.7 (1.1–6.8)
<b>History of unintended pregnancy</b>		
Yes	1.0 (0.6–1.7)	1.9 (0.9–3.7)†
No	1.0	1.0
<b>Partner at last intercourse</b>		
Regular	1.0**	1.0
Occasional	5.3 (1.4–20.4)	0.9 (0.1–8.9)
<b>Involved in the choice of the pill</b>		
Yes	1.0	1.0***
No	0.4 (0.1–1.7)	8.3 (2.3–29.1)
<b>Established pill-taking routine</b>		
Yes	1.0*	1.0***
No	1.9 (1.1–3.3)	5.5 (2.7–11.3)
<b>Health side effects</b>		
Yes	1.0 (0.6–1.9)	2.0 (1.0–4.1)*
No	1.0	1.0
<b>Negative effect of the pill on sexual desire</b>		
Yes	1.6 (0.5–5.2)	1.0 (0.3–3.2)
No	1.0	1.0
<b>Type of pill</b>		
Combined	1.0	1.0
Progestin-only	1.9 (0.8–4.7)	1.2 (0.5–2.9)
<b>Duration of use</b>		
≤1 year	1.3 (0.6–2.5)	1.9 (0.8–4.2)
>1 year	1.0	1.0

\*p<.05. \*\*p<.01. \*\*\*p<.001. †p<.10. Notes: Significance levels refer to the results for the likelihood ratio test for all the categories of a variable. na=not applicable because no women were in this category.

vided into two categories: Women whose income was at or above the 67th percentile were classified as having a high income; the rest, as having a low or middle income. The presence of a child younger than two in the household and

a history of unintended pregnancy were determined from women’s detailed obstetric history.

Women were asked whether their last sexual partner was a regular or an occasional sexual partner. As we examined inconsistent pill use among women who had had intercourse in the four weeks prior to the interview, the type of last partner was explored in the context of that period.

Involvement in the choice of the contraceptive method was measured by first asking pill users “Who has advised you on using the pill?” If the answer was a physician, women were further asked if they had “agreed to use the contraceptive method.” Women were considered not to have been involved in the choice of their method if they answered both that they had been advised to use the pill by a physician and that they had not agreed to use this method.

Daily pill-taking routine was explored by asking women if they took the pill “always at the same time.” If they answered “no, not always” they were considered not to have a daily pill-taking routine.

Experience of side effects was assessed through the question “Do you think that the contraceptive method you are using has an effect, whether positive or negative, on your health?” Possible answers were “no, certainly not”; “no, I don’t think so”; “yes, maybe”; “yes, certainly”; and “don’t know.” Answers were coded as no, yes or don’t know.

Adverse effect of the pill on sexual desire was assessed by asking women “Do you have the impression [that the pill] has a positive or negative effect on your desire to have sexual intercourse?” Women who answered “yes, a negative effect” were categorized as considering the pill to have an adverse effect, while those who answered “no” or “yes, a positive effect” were categorized as considering it to have no adverse effect on sexual desire. (Since the “pill scare” phenomenon was only marginally covered by the French media and had no impact on the prevalence of use, which has constantly risen over the past four decades in France,<sup>17</sup> fear of the pill’s adverse effects was not explored in the survey.)

Childbearing intentions were examined using the question “Today, do you wish to have a child?” Possible responses were “yes, now,” “yes, within the next year,” “yes, in a few years,” “yes, but don’t know when” and “no.” Women giving either of the first two responses were considered to be intending to have a child in the near future; all others were considered not to be intending to do so.

Finally, knowledge of failure due to inconsistent use of the pill was measured using the question “In your opinion, when a woman forgets the pill once, is she at risk of getting pregnant?” Women who responded “no” or “don’t know” were categorized as having no knowledge; those who responded “yes” or “it depends on the day of the cycle” were considered to have some knowledge.

**Analysis**

Our analyses are based on data from the first interview, conducted in 2000. Of the 2,863 women in the sample, 1,234 were using oral contraceptives at the time of the interview and reported having had sexual intercourse at least once

during the previous year; these women made up the analytic sample.

We used polytomous and simple logistic regression models<sup>18</sup> to examine each indicator of inconsistent pill use, including all variables for which p values were 0.2 or less in univariate analysis. The regressions for all three indicators included the same characteristics to facilitate comparisons of the results across indicators. We excluded from the multivariate analyses the 6% of women who had not been sexually active during the four weeks prior to the interview, as they could not appear in the group of women who had not used contraceptives during sexual intercourse after having missed a pill. Statistical analyses were performed using Stata version SE7. The total numbers reported in the tables are unweighted; the percentages are weighted.

## RESULTS

### Patterns of Pill Use

During the four weeks prior to the interview, 20% of women had missed at least one pill, and 7% had missed two or more pills. Overall, 10% had missed at least one pill and had not used contraceptive backup during subsequent sexual intercourse; this group represents 50% of women who had missed at least one pill. Three percent of women had missed more than one pill and used no contraceptive backup after the last missed pill.

The absence of sexual activity during the four weeks prior to the interview was highly predictive of missing a pill: Forty-three percent of women who had not had intercourse had missed at least one pill, compared with 19% of women who had had intercourse ( $p < 0.001$ ).

Among the 1,165 women who had been sexually active in the four weeks prior to the survey, 19% had missed at least one pill during that period, and 6% had missed two or more pills. Eleven percent had missed at least one pill without using contraceptive backup during subsequent sexual intercourse after the last missed pill, and 4% had missed more than one pill and used no backup after the last missed pill.

### Characteristics Associated with Inconsistent Use

Results of the first multivariate analysis show that the predictors of inconsistent use among sexually active pill users largely differ according to the number of pills missed (Table 1). Women whose last partner was an occasional partner were more likely than those whose last partner was a regular partner to have missed one pill (odds ratio, 5.3), but this characteristic was not associated with having missed more than one pill. Additionally, age was marginally associated only with having missed one pill. The likelihood of having missed more than one pill (but not of having missed one) was elevated among women with at least a high school education (2.5), those who had not felt involved in the choice of their contraceptive method (8.3) and those who reported side effects (2.0); it was reduced among high-income women (0.3). A history of unintended pregnancy was marginally associated with having missed multiple pills. Women reporting the presence of a young child in the household

**TABLE 2. Odds ratios (and 95% confidence intervals) from logistic regression analyses examining the likelihood that sexually active pill users missed a pill during the four weeks prior to interview, by use of contraceptive backup for intercourse subsequent to the last missed pill, according to selected characteristics**

Characteristic	Used backup (N=133)	Used no backup (N=133)
<b>Age</b>		
18–24	2.3 (1.0–5.4)	1.3 (0.7–2.5)
25–34	1.0	1.0
35–44	0.8 (0.4–1.7)	1.1 (0.5–2.3)
<b>Level of education</b>		
<H.S.	1.0*	1.0
≥H.S.	2.8 (1.2–6.4)	1.3 (0.7–2.2)
<b>Unemployed</b>		
No	1.0	1.0
Yes	1.5 (0.6–4.0)	1.3 (0.6–2.9)
<b>Income per capita</b>		
Low or medium	1.0	1.0*
High	0.9 (0.4–2.1)	0.4 (0.2–0.8)
Unknown	1.9 (0.5–7.5)	0.3 (0.1–1.7)
<b>Nationality</b>		
French	1.0	1.0
Other	0.3 (0.1–2.0)	2.3 (0.5–10.1)
<b>Age of the last child</b>		
No children	1.0**	1.0
<2 years	4.4 (1.8–10.8)	2.1 (1.0–4.2)
≥2 years	3.2 (1.3–8.2)	1.4 (0.7–3.2)
<b>History of unintended pregnancy</b>		
Yes	1.4 (0.7–2.8)	1.1 (0.6–1.9)
No	1.0	1.0
<b>Partner at last intercourse</b>		
Regular	‡	1.0**
Occasional	‡	6.8 (1.8–26.6)
<b>Involved in the choice of the pill</b>		
Yes	1.0	1.0**
No	0.4 (0.1–1.8)	4.0 (1.4–11.6)
<b>Established pill-taking routine</b>		
Yes	1.0***	1.0**
No	3.0 (1.6–5.9)	2.4 (1.3–4.3)
<b>Health side effects</b>		
Yes	1.2 (0.7–2.3)	1.2 (0.6–2.3)
No	1.0	1.0
<b>Negative effect of the pill on sexual desire</b>		
Yes	2.7 (0.6–12.2)	0.8 (0.3–2.1)
No	1.0	1.0
<b>Type of pill</b>		
Combined	1.0	1.0
Progestin-only	1.1 (0.2–6.3)	2.2 (1.1–4.3)*
<b>Duration of use</b>		
≤1 year	1.6 (0.8–3.6)	1.3 (0.6–2.6)
>1 year	1.0	1.0

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ . †Variable was not estimated in this model because an insufficient number of women with an occasional partner reported using backup after the last missed pill. Note: Significance levels refer to the results for the likelihood ratio test for all the categories of a variable.

or the lack of an established pill-taking routine had elevated odds of having missed one pill (2.9 and 1.9, respectively) and of having missed more than one (3.0 and 5.5).

The same analysis performed among all pill users shows

**TABLE 3. Odds ratios (and 95% confidence intervals) from logistic regression analyses examining the likelihood that sexually active pill users missed more than one pill and used no contraceptive backup for intercourse subsequent to the last missed pill during the four weeks prior to interview, by selected characteristics**

Characteristic	Missed >1 pill and used no backup (N=54)
<b>Age</b>	
18–24	0.9 (0.3–3.1)
25–34	1.0
35–44	0.5 (0.2–1.3)
<b>Level of education</b>	
<H.S.	1.0
≥H.S.	1.0 (0.4–2.7)
<b>Unemployed</b>	
No	1.0
Yes	1.2 (0.5–3.2)
<b>Nationality</b>	
French	1.0
Other	2.6 (0.9–7.3)†
<b>Age of the last child</b>	
No children	1.0
<2 years	3.0 (1.0–9.3)
≥2 years	1.9 (0.7–5.4)
<b>History of unintended pregnancy</b>	
Yes	2.7 (1.2–6.1)*
No	1.0
<b>Partner at last intercourse</b>	
Regular	1.0
Occasional	4.8 (0.5–49.1)
<b>Involved in the choice of the pill</b>	
Yes	1.0***
No	11.7 (3.2–42.4)
<b>Established pill-taking routine</b>	
Yes	1.0**
No	4.3 (1.7–10.6)
<b>Health side effects</b>	
Yes	1.5 (0.6–4.1)
No	1.0
<b>Negative effect of the pill on sexual desire</b>	
Yes	0.8 (0.2–3.1)
No	1.0
<b>Type of pill</b>	
Combined	1.0*
Progestin-only	2.5 (1.0–6.2)
<b>Duration of use</b>	
≤1 year	0.8 (0.3–2.1)
>1 year	1.0

\*p<.05. \*\*p<.01. \*\*\*p<.001. †p<.10. Note: Significance levels refer to the results for the likelihood ratio test for all the categories of a variable.

that women who had not had intercourse during the four weeks prior to the survey had elevated odds of having missed more than one pill (not shown). The other associations described above remain unchanged except that a history of unintended pregnancy was no longer associated with the likelihood of having missed more than one pill.

The second set of multivariate results (Table 2, page 193) shows that in the event of inconsistent use, women with a

high school or higher level of education were significantly more likely than other women to have used contraceptive backup during subsequent intercourse (odds ratio, 2.8), thus reducing the risk for contraceptive failure. The presence of young children and the absence of an established pill-taking routine were associated with an increased likelihood of inconsistent use, regardless of the use of contraceptive backup after a missed pill. Additionally, women who reported that their last partner was an occasional partner had elevated odds of using no contraceptive backup after a missed pill.

Women who reported that they had not been involved in the choice of their contraceptive method, who had elevated odds of having missed more than one pill, also had elevated odds of having used no contraceptive backup after having missed a pill (4.0). Additionally, the use of progestin-only pills, which leave limited time for recovery (three hours), was associated with an increased risk of missed pills with no contraceptive backup (2.2). In contrast, a high income level was associated with a reduced risk of having had unprotected intercourse after a missed pill (0.4). Notably, women’s knowledge of contraceptive failure due to inconsistent pill use and their intent to have a child in the near future were not associated with use of contraceptive backup after a missed pill in univariate analyses (not shown).

In the third regression (Table 3), we found that foreign-born women tended to be more likely than French women to have missed more than one pill and used no contraceptive backup. The odds of inconsistent use according to this definition were significantly elevated among women who reported a history of unintended pregnancy (2.7) and those who felt they had not been involved in the choice of their contraceptive method (11.7). They also were raised among women who had not established a daily pill-taking routine (4.3) and among progestin-only pill users (2.5).

## DISCUSSION

Twenty percent of women in our survey (including those who had not had sexual intercourse during the observation period) had missed at least one pill during the four weeks prior to the interview. This result is consistent with an earlier finding that 24% of French women missed at least one pill during a cycle of use.<sup>19</sup> Under the most commonly used definition, these women were inconsistent pill users.

By characterizing inconsistent pill use according to the potential risk of contraceptive failure (as determined by the number of missed pills and later contraceptive use), our study shows that the characteristics associated with inconsistent use differ according to the definition used. On the whole, 7% of women in this study forgot more than one pill during the four weeks prior to the interview. This proportion is similar to the 10% in earlier work among European women,<sup>20</sup> but it is noticeably lower than the 22% seen in a prospective study conducted among a national sample of U.S. women who were followed for two months.<sup>21</sup>

Our results also show that 10% of women missed at least one pill without using contraceptive backup after the last missed pill. To our knowledge, this indicator has been used

only once before, by Oakley et al., in a prospective study of 103 women followed for three months.<sup>22</sup> The previous study was very different from the COCON survey in terms of population selection and data collection, but produced similar findings: Forty-three percent of women in that survey who forgot their pill were exposed to the risk of pregnancy during the first month of follow-up, as compared with 50% in our survey.

Our indicators of inconsistent pill use, while attempting to identify those women at increased physiological risk of failure, do not capture the true level of risk of unintended pregnancy, because they do not take into account the day of the cycle on which a pill is missed. Forgetting a pill at the beginning, middle or end of a cycle does not generate the same level of risk. Thus, women's attitudes toward using contraceptives during subsequent intercourse may differ on the basis of the specific situation. Furthermore, the questionnaire did not ask about the intervals between missed pills. Consequently, we were unable to distinguish between women who had missed several pills in a row (who would be at fairly high physiological risk of failure) and those who had missed one pill during one week and another in a different week (who would be at lower risk).

Despite these limitations, our indicators are more likely to identify those women at relatively high risk of contraceptive failure than the classic indicator "missing at least one pill per cycle." This is particularly true of women who reported having missed more than one pill and used no contraceptive backup; although the statistical power of the analysis is limited because this group comprises only 3% of pill users, data on these women provide insight into the most important characteristics associated with pill failure. Focusing on this group, we found that inconsistent pill use was related to the context in which the contraceptive prescription was made. Women who were most at risk of use-failure were relatively likely to report that they had not agreed with the choice of the contraceptive method they were using, suggesting a lack of participation in medical decision making. In addition, women who reported having experienced pill side effects (a predictor of nonadherence to the regimen or discontinuation of the method<sup>23</sup>) were at increased risk of having missed more than one pill. This finding illustrates the importance of adjusting the contraceptive prescription to women's needs. Several authors have focused on this issue, arguing that the quality of the patient-physician relationship and the degree to which the patient takes part in medical decisions greatly influence contraceptive practice and outcomes.<sup>24</sup>

Our study has only touched upon patient-physician interactions, but our results call for further research on this topic. Furthermore, several authors emphasize the need for recommendations to improve women's consistent and long-term use of their contraceptive method.<sup>25</sup> These recommendations include creating time and opportunities for women to obtain adequate and personalized counseling, and taking into account their sexual, emotional and social lifestyles and method preferences. Our results support these

recommendations, suggesting that physicians should help patients place their contraceptive decisions within the context of their lives, which, consistent with findings from a qualitative study on contraceptive failure in France,<sup>26</sup> we found to be associated with inconsistent use of the pill. Thus, women who had not had sexual intercourse during the study period or whose last partner had not been a regular partner were more likely than others to miss their pill. These findings are consistent with the conclusions of Rosenberg et al. in the European study<sup>27</sup> and of Oakley et al., using qualitative data from a survey conducted in China.<sup>28</sup>

The context in which a relationship takes place can also be assessed in terms of intention to have a child in the near future (within one year). However, in univariate analyses, this characteristic was not associated with any of the indicators of inconsistent pill use in our study. This finding is consistent with the conclusions of Toulemon et al., who consider inconsistent pill use not to reflect "ambiguous" contraceptive motivations, but rather to result from difficulties in complying with a daily regimen.<sup>29</sup> Indeed, this interpretation is borne out in the associations we found with other lifestyle characteristics—raising small children or failing to establish a daily pill-taking routine. This last correlation is consistent with early findings from large retrospective surveys conducted in the United States and Europe showing that the strongest characteristic related to inconsistent use was whether women had a regular routine for taking their pills.<sup>30</sup>

Beyond these situational characteristics, our results emphasize the complex role of certain social and demographic characteristics, particularly education. Knowledge of the risk of contraceptive failure in case of missed pills was not associated with inconsistent pill use in univariate analyses, thus illustrating the gap between knowledge and behavior well described in the public health literature;<sup>31</sup> however, we found an association between inconsistent pill use and level of education. The distinction among the different missed pill categories, in particular according to the later use of contraceptive backup, allows a better understanding of the unexpected result showing an increase in the odds of missing more than one pill among higher educated women, as these women are also more likely to use contraceptive backup during subsequent intercourse, thus reducing the risk of contraceptive failure. Results also suggest that more focused care is needed when providing contraceptive counseling for women with specific social and reproductive characteristics—for example, women with a history of unintended pregnancies, who had an increased likelihood of having missed more than one pill and used no contraceptive backup, and low-income women, who had elevated odds of having missed multiple pills in our study. Finally, providers may also consider offering special counseling and prescribing advance supplies of contraceptive backup methods (condoms or emergency contraception) when prescribing pills, especially progestin-only pills, which leave little time for recovery in case of missed pills. In our study, progestin-only pill users were, indeed, more likely

***More focused care is needed when providing contraceptive counseling for women with specific social and reproductive characteristics.***

than users of combined pills to report having repeatedly missed pills and used no contraceptive backup.

Our study shows the importance of addressing inconsistent pill use not only in terms of groups of individuals at risk but also in terms of sexual and emotional contexts and living conditions that interact and can lead to difficulties in the management of daily contraceptive practice. Situations that carry an elevated risk of contraceptive failure appear to be related to the woman's lack of involvement in the choice of her method. Beyond prescribing the form of contraception that is most effective during perfect use, service providers may need to better address women's preferences and concerns regarding contraceptive methods, in order to help them choose a method that best fits their sexual, emotional and social lifestyle. By doing so, they will contribute to the improved effectiveness of contraceptive methods during typical use.

## REFERENCES

1. Bajos N et al., Contraception: from accessibility to efficiency, *Human Reproduction*, 2003, 18(5):994-999.
2. Trussell J, Contraceptive failure in the United States, *Contraception*, 2004, 70(2):89-96.
3. Rosenberg M and Waugh MS, Causes and consequences of oral contraceptive noncompliance, *American Journal of Obstetrics and Gynecology*, 1999, 180(2, pt. 2):276-279; Rosenberg MJ, Waugh MS and Meehan TE, Use and misuse of oral contraceptives: risk indicators for poor pill taking and discontinuation, *Contraception*, 1995, 51(5):283-288; Peterson LS et al., Women's efforts to prevent pregnancy: consistency of oral contraceptive use, *Family Planning Perspectives*, 1998, 30(1):19-23; and Rosenberg MJ, Waugh MS and Burnhill MS, Compliance, counseling and satisfaction with oral contraceptives: a prospective evaluation, *Family Planning Perspectives*, 1998, 30(2):89-92 & 104.
4. Potter L et al., Measuring compliance among oral contraceptive users, *Family Planning Perspectives*, 1996, 28(4):154-158.
5. Rosenberg MJ, Waugh MS and Meehan TE, 1995, op. cit. (see reference 3).
6. Rosenberg M and Waugh MS, 1999, op. cit. (see reference 3); Peterson LS et al., 1998, op. cit. (see reference 3); and Rosenberg MJ, Waugh MS and Burnhill MS, 1998, op. cit. (see reference 3).
7. Hillard PJ, Oral contraception noncompliance: the extent of the problem, *Advances in Contraception*, 1992, 8(Suppl. 1):13-20; Burkman RT, Oral contraceptives: current status, *Clinical Obstetrics & Gynecology*, 2001, 44(1):62-72; and Peterson LS et al., 1998, op. cit. (see reference 3).
8. Ingham R and Van Zessen G, Towards an alternative model of sexual behaviour: from individual properties to interactional processes, in: Van Campenhout L et al., eds., *Sexual Interactions and HIV Risk: New Conceptual Perspectives in European Research*, London: Taylor and Francis, 1997, pp. 83-89.
9. Free C, Ogden J and Lee R, Young women's contraception use as a contextual and dynamic behaviour: a qualitative study, *Psychology and Health*, 2005, 20(5):673-690; Gold RS et al., Situational factors and thought processes associated with unprotected intercourse in heterosexual students, *AIDS Care*, 1992, 4(3):305-323; and Hardon A and Ogden J, Condom use and contraception non use amongst 16-19 year olds: a within subjects comparison, *Psychology and Health*, 1999, 14(4): 697-709.
10. Beckman LJ and Harvey SM, Factors affecting the consistent use of barrier methods of contraception, *Obstetrics & Gynecology*, 1996, 88(3 Suppl.):655-715.
11. Bajos N, Ferrand M and Équipe GINE, *De la Contraception à l'Avortement: Sociologie des Grossesses non Prévues*, Paris: Institut National de la Santé et de la Recherche Médicale, 2002.
12. Bissell P, May CR and Noyce PR, From compliance to concordance: barriers to accomplishing a re-framed model of health care interactions, *Social Science and Medicine*, 2004, 58(4):851-862.
13. Moatti JP, Spire B and Duran S, Un bilan des recherches socio-comportementales sur l'observance des traitements dans l'infection à VIH: au delà des modèles biomédicaux? *Revue d'Epidémiologie et de Santé Publique*, 2000, 48(2):182-197.
14. Bajos N, Leridon H and Job-Spira N, Contraception and abortion in France in the 2000s: the COCON survey, *Population*, 2004, 59 (3/4):347-356.
15. Ibid.
16. Haute Autorité de Santé (HAS), *Stratégies de Choix des Méthodes Contraceptives chez la Femme*, Paris: HAS, 2004, p. 234.
17. Bajos N, Leridon H and Job-Spira N, 2004, op. cit. (see reference 14).
18. Hosmer DW and Lemeshow S, *Applied Logistic Regression*, New York: Wiley, 1989.
19. Rosenberg MJ, Waugh MS and Meehan TE, 1995, op. cit. (see reference 3).
20. Ibid.
21. Rosenberg MJ, Waugh MS and Burnhill MS, 1998, op. cit. (see reference 3).
22. Oakley D et al., Oral contraceptive use and protective behavior after missed pills, *Family Planning Perspectives*, 1997, 29(6):277-279 & 287.
23. Rosenberg M and Waugh MS, 1999, op. cit. (see reference 3).
24. Rosenberg MJ et al., Compliance and oral contraceptives: a review, *Contraception*, 1995, 52(3):137-141; Delbanco SF, Improving the use of contraceptives: the challenge continues, *Obstetrics & Gynecology*, 1996, 88(3 Suppl.):1S-3S; Delbanco TL and Daley J, Through the patient's eyes: strategies toward more successful contraception, *Obstetrics & Gynecology*, 1996, 88(3 Suppl.):41S-47S; Branden PS, Contraceptive choice and patient compliance: the health care provider's challenge, *Journal of Nurse-Midwifery*, 1998, 43(6):471-482; Burkman RT, Compliance and other issues in contraception, *International Journal of Fertility and Women's Medicine*, 1999, 44(5):234-240; Isaacs JN and Creinin MD, Miscommunication between healthcare providers and patients may result in unplanned pregnancies, *Contraception*, 2003, 68(5):373-376; and Rosenberg M and Waugh MS, 1999, op. cit. (see reference 3).
25. Branden PS, 1998, op. cit. (see reference 24); and Burkman RT, 1999, op. cit. (see reference 24).
26. Bajos N, Ferrand M and Équipe GINE, 2002, op. cit. (see reference 11).
27. Rosenberg MJ, Waugh MS and Meehan TE, 1995, op. cit. (see reference 3).
28. Oakley D et al., Combining qualitative with quantitative approaches to study contraceptive pill use, *Journal of Women's Health*, 1999, 8(2): 249-257.
29. Toulemon L and Leridon H, Maitrise de la fécondité et appartenance sociale: contraception, grossesses accidentelles et avortements, *Population*, 1992, 47(1):1-46.
30. Rosenberg MJ, Waugh MS and Meehan TE, 1995, op. cit. (see reference 3); and Rosenberg MJ, Waugh MS and Burnhill MS, 1998, op. cit. (see reference 3).
31. Aggleton P et al., Risking everything, risk behavior, behavior change, and AIDS, *Science*, 1994, 265(5170):341-345.

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