Marital status and female and male contraceptive sterilization in the United States

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Objective: To examine female and male sterilization patterns in the United States based on marital status, and to determine if sociodemographic characteristics explain these patterns.
Design: Survival analysis of cross-sectional data from the female and male samples from the 2006–2010 National Survey of Family Growth.
Setting: Not applicable.
Patient(s): The survey is designed to be representative of the US civilian noninstitutionalized population, ages 15–44 years.
Intervention(s): None.
Main Outcome Measure(s): Vasectomy and tubal sterilization.
Result(s): In the United States, vasectomy is the near-exclusive domain of married men. Never-married and ever-married single men, and never-married cohabiting men, had a low relative risk (RR) of vasectomy (RR = 0.1, 0.3, and 0.0, respectively), compared with men in first marriages. Tubal sterilization was not limited to currently married, or even to ever-married women, although it was less common among never-married single women (RR = 0.2) and more common among women in higher-order marriages (RR = 1.8), compared with women in first marriages. In contrast to vasectomy, differential use of tubal sterilization by marital status was driven in large part by differences in parity.
Conclusion(s): This study shows that being unmarried at the time of sterilization—an important risk factor for poststerilization regret—was much more common among women than men. In addition to contributing to the predominance of female, vs. male, sterilization, this pattern highlights the importance of educating women on the permanency of sterilization, and the opportunity to increase reliance on long-acting reversible contraceptive methods. (Fertil Steril® 2015;103:1509–15. ©2015 by American Society for Reproductive Medicine.)
Key Words: Tubal sterilization, vasectomy, marital status, contraception, National Survey of Family Growth

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Sterilization has been the most prevalent method of contraception in the United States for decades (1). It is a cost-effective, highly effective, "forgettable" method of contraception (2). Its main drawback is that the procedures are not necessarily reversible, meaning that it is appropriate for only those who wish to end childbearing. Accordingly, most studies have examined its use among married men and women (3–6), often treating tubal sterilization and vasectomy as competing strategies. Yet, research suggests that contraceptive sterilization is prevalent among unmarried individuals as well (1, 7).

Studies that have included unmarried individuals have generally documented marital status at the time of the study interview, rather than at the time of sterilization. Thus, they are unable to determine whether ever-married individuals were sterilized before, during, or after marriage, and whether never-married individuals were sterilized while single or while cohabiting. With the exception of practice-based studies (8), which are often limited in scope and generalizability, no study, since the careful survival analyses

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of tubal ligations performed in 1990–1995 (9, 10), has considered female sterilization within union histories. These analyses showed that nearly 1 in 3 operations were on unmarried women, with more than half of these being on never-married women.

Knowledge of the union context of male sterilization is even more limited, as the single survival analysis of vasectomies performed in the 1980s (9) reported that only 7% of operations were on unmarried men, but did not evaluate risk by cohabitation status or marital history. More-recent studies that have included union context at the time of the study interview show that contraceptive sterilization has increased among never-married, noncohabiting women in recent decades (1, 7). However, the procedure seems to remain relatively uncommon among never-married, noncohabiting men (11). The union context of childbearing has also continued to transform (12, 13), with unmarried individuals being increasingly likely to reach their targeted number of children, and therefore to consider sterilization for fertility control. These trends are important, as prospective US research on poststerilization regret has identified being unmarried at the time of sterilization (14) and having a change in marital status after sterilization (15) as important risk factors. Updating our knowledge of the union context of female and male sterilization could thus advance understanding of persistently high levels of poststerilization regret in the United States. More than 1 in 4 women with unreversed tubal ligations express a desire for sterilization reversal (16), and nearly 1 in 5 men with unreversed vasectomies express a desire for future children (17).

In addition, Increased use of sterilization by unmarried women has been proposed (9, 10) as an explanation for the predominance of female, vs. male, sterilization since the 1970s (18). Yet no study has examined male sterilization within union histories, let alone compared the union context of male, vs. female, sterilization within a single time period. Some researchers (10) have linked increased use of sterilization by unmarried women to the changing context of childbearing decisions. But no study has examined the role of parity in explaining differential use of vasectomy by marital status.

This study uses survival analysis techniques to describe the timing and level of female and male sterilization in the United States, and examine female and male sterilization patterns based on marital status. In addition, the analysis explores the question of whether sociodemographic and reproductive characteristics explain these patterns. This will provide the most-recent information to date on the union context of contemporary sterilization, detail the prevalence of an important risk factor for poststerilization regret (14, 15), and contribute to the literature on the longstanding predominance of female, vs. male, sterilization (18)—which persists despite the fact that male sterilization is safer and less invasive (19, 20).

METHODS

Subject Data

Data for this study were drawn from the 2006–2010 National Survey of Family Growth (NSFG). The NSFG is designed and administered by the National Center for Health Statistics and has been conducted periodically since 1973. The survey was approved by the University of Michigan Institutional Review Board (21), and my institution does not require institutional review board approval for analysis of deidentified public-use data.

The NSFG data are representative of the US civilian noninstitutionalized population, ages 15–44 years, when properly weighted, and include oversamples of both black and Hispanic respondents. For the 2006–2010 survey, in-home interviews were conducted by women trained as interviewers, with 12,279 women and 10,403 men using computer-assisted personal interviewing. Response rates were 78% for women and 75% for men (22). All analyses and descriptive statistics were adjusted for the NSFG's complex sample design using the *svy* command in Stata 12 (StataCorp).

Respondent Characteristics and Inclusion Criteria

Sterilized respondents were identified as those women and men who reported ever having had a tubal sterilization or a vasectomy, respectively. These procedures may include operations that occurred for noncontraceptive reasons. However, sensitivity analyses were conducted for the female sample—which does allow for a distinction based on respondents' retrospective reports. These analyses suggest that limiting the analysis to operations that occurred for mainly contraceptive purposes, while censoring respondents who had a sterilization operation for noncontraceptive reasons at the date of the operation, does not affect the substantive conclusions (data not shown). Marital status was based on retrospective reports of the beginning and ending dates of all previous and current cohabitations and marriages, and consisted of 6 categories: never-married single, ever-married single, never-married cohabiting, ever-married cohabiting, first-order marriage, and higher-order marriage.

Other sociodemographic and reproductive characteristics included in the analysis were: parity (based on retrospective reports of the month and year of birth of each biologic child; categories were: 0, 1, 2, $\geq$3); early childbearing (had a first birth before age 18 years, had no early birth); education (less than high school, completed high school, completed college); race and ethnicity (non-Hispanic white, non-Hispanic black, Hispanic, other); and nativity (native born, foreign born).

The analytic samples were limited to respondents aged 18–44 years, because of the upper age limit of the NSFG, and the fact that sterilization is rare at younger ages. I omitted respondents who indicated that it is not physically possible for them to have a baby for reasons other than surgical sterilization, or who had missing information on any covariate in the analysis. An exception was made for the relatively large number of male respondents with missing information on the start or end date of any previous cohabitation (8%, compared with 1% in the female sample). Furthermore, reports on cohabitations in the male sample were limited to current and first cohabitations, meaning that it was impossible to determine the timing of all previous cohabitations