

# Child Disability and Mothers' Tubal Sterilization

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**CONTEXT:** *The needs of children with disability can be substantial, leading some parents to consider contraceptive sterilization to prevent additional births.*

**METHODS:** *Matched records from the 1993 National Health Interview Survey and the 1995 National Survey of Family Growth were used to investigate the relationship between child disability and mothers' sterilization. Data included the birth records of 8,711 children, information on older children in the household, and the mothers' background and reproductive characteristics. Logistic and Cox regression models were used to estimate the effect of the birth of a child with a disability on the risk of mothers' sterilization.*

**RESULTS:** *The birth of a child with disability has no effect on the likelihood that a mother will undergo sterilization within the next month; however, women who have an older child with severe disability are more likely than those whose older children are nondisabled to undergo sterilization within a month after the birth of another child (odds ratio, 2.6). Severe disability in a newborn significantly increases the risk of sterilization 1–36 months after birth (risk ratio, 1.7); severe disability among older children also appears to increase the risk of sterilization 1–36 months after birth (1.5), although this result was only marginally significant.*

**CONCLUSIONS:** *Women often respond to the birth of children with disabilities by changing their fertility plans, although usually not immediately unless they have older children with severe disability. These findings are consistent with parents' desire to have a nondisabled child and with their need to care for an exceptional child by forgoing additional births.*

*Perspectives on Sexual and Reproductive Health, 2003, 35(3):138–143*

Sterilization is the most commonly used method of contraception in the United States, just surpassing oral contraceptives.<sup>1</sup> Its effectiveness (nearly 100%) and the fact that it is fully covered by most insurance plans<sup>2</sup> make it an attractive option for those who choose to have no additional births. Medical advances in sterilization procedures<sup>3</sup> and perhaps a greater willingness of unmarried women to adopt this method<sup>4</sup> have contributed to a rise in tubal sterilization compared with vasectomy: Among women relying on contraceptive sterilization, the proportion who were protected by tubal sterilization (rather than by their partner's vasectomy) increased steadily from 68% in 1982 to 72% in 1995.<sup>5</sup>

Previous research on contraceptive behavior demonstrates the importance of factors associated with resource constraints and cultural preferences in determining desired family size and contraceptive use. Women's age, parity, marital status, poverty, education, religious affiliation, race and ethnicity, immigration status and region of residence are strong correlates of fertility behavior.<sup>6</sup> The existing literature argues that women with limited resources (financial or otherwise) and a low preference for additional children are less likely than others to have additional births.<sup>7</sup>

Since women disproportionately are the caregivers for children, studies of fertility behavior tend to focus on their economic, social and demographic characteristics. When the

characteristics of other family members are included in studies of contraceptive behavior, these usually refer to the woman's spouse or partner (e.g., measured as differences in age or education level).<sup>8</sup> The characteristics of children (other than number of siblings and the age of the youngest child) are typically overlooked as potential influences on fertility and contraceptive behaviors. In this article, we investigate whether a specific child characteristic—the presence of disability—influences mothers' decisions to undergo tubal sterilization. We then examine the extent to which the effect differs for postpartum sterilization (procedures that occur within the first month after birth) and interval sterilization (procedures that occur between one and 36 months after birth).

## BACKGROUND

Children have considerable influence on family life. Caregiving needs—financial, emotional and supervisory—are substantial for any parent. However, the experience of raising a child with disability is likely to affect the family in more profound ways than is otherwise the case for a nondisabled child. Such a child can require more caregiving time,<sup>9</sup> which can lead to the mother's withdrawal from the labor force, worsened economic situation of the household, interruptions in parents' sleep and a greater chance of marital instability.<sup>10</sup>

One in eight children in the United States are born with

a disability or develop one by age 17, and one in 16 have a limited ability to participate in age-appropriate activities.<sup>11</sup> Although children with disability often can lead successful lives and eventually become independent adult members of society, to do so often requires more intensive parental and public investment than is needed for children with no limitations. Providing this special care is also associated with somewhat poorer outcomes for siblings. Nondisabled siblings of children with disability are at increased risk of poor health, unmet need for medical care and absence from school because of illness.<sup>12</sup> These additional stressors could reduce the likelihood of another birth for mothers of disabled children.

In families that include a child with a disability, parents may choose to concentrate resources on that child, rather than have additional children who may not have all the resources necessary for successful development. In other cases, mothers of children with a genetically based disability may review options discussed in genetic counseling to prevent subsequent births. As a consequence, these women may be more likely than others to elect sterilization to avoid subsequent births, particularly if the child's disability is severe.

In situations where the child with a disability is an only child, an alternative pattern may operate. While learning and social events are undoubtedly rewarding to parents of children with a disability (perhaps even more than to parents of nondisabled children), these parents may wish to also experience the normal parenting activities of their friends and siblings.<sup>13</sup> They may desire to have a child who will be more likely to give them grandchildren and perhaps be able to support them in their old age.

Sometimes, prenatal testing indicates that a child will be born with a genetic disorder. Regardless of the outcome of that pregnancy, some mothers may choose to forgo subsequent births for fear that future children, too, will be affected. However, in many cases subsequent children are unlikely to be born with the disorder, as most will be either noncarriers or unaffected carriers.<sup>14</sup> Thus, we would not expect the majority of such mothers to undergo sterilization.

We expect the effect of child disability to be quite different for postpartum and interval sterilization procedures. The postpartum period is most commonly chosen for cases in which serious perinatal complications have occurred or desired family size has been reached. We hypothesize that giving birth to a child who has a disability does not increase women's likelihood of undergoing postpartum sterilization. Instead, we hypothesize that it raises women's likelihood of choosing interval sterilization—as the child's disability and the extra caregiving needs take some time to become clear (the resource demand hypothesis). In cases where the mother bears her first child, sterilization may be delayed until after the birth of another child (the normative parenting hypothesis).

## METHODS

### Data

Information on mothers' fertility and contraceptive histories as well as the disability status of their children is not available in any one existing nationally representative data

set. To conduct our analyses, we matched health and disability information for children in the 1993 National Health Interview Survey (NHIS) with fertility and contraceptive histories of their mothers found in the 1995 National Survey of Family Growth (NSFG).

The NHIS, a continuing, nationwide interview survey designed and administered by the National Center for Health Statistics (NCHS), obtains information about the health, disability and other characteristics of each member of the household. Interviewers ask to speak to the person in the household who is most capable of giving accurate responses, which for children is usually the mother. The sample provides national estimates of the noninstitutionalized civilian population.

The NSFG, also designed and administered by NCHS, is a nationwide survey that examines marital, fertility, contraception and employment trajectories of women aged 15–44. Through in-person surveys and short self-administered surveys of noninstitutionalized civilian women, it collects detailed information regarding factors affecting pregnancy and health, as well as a variety of demographic and economic characteristics. This includes information about the birth dates of all children, regardless of residence, and the date of a tubal sterilization.

The 1993 NHIS provided the sampling frame for the 1995 NSFG. As a result, records of women interviewed in the 1993 NHIS can be linked to records of the same women interviewed in the 1995 NSFG. We merged these files, using mothers' original identifiers, so that the unit of analysis is a birth record that contains the disability status of the child (the focal child), the disability status of older children in the household (if any), and the mother's fertility and contraceptive histories. We restricted the sample to the 9,280 records referring to children who were biologically related to the mother, living at home in 1993 and aged 3–18 in 1995. Of these, 8,711 (94%) had birth dates that matched within three months and were selected as the basis of our analyses.\* Investigation of all 9,280 records indicates that selected and nonselected records did not differ significantly by the child's disability status.

### Measures

• *Tubal sterilization.* To investigate the effects of child disability on mothers' fertility decisions, we model the likelihood of mothers' tubal sterilization subsequent to each birth. Forty percent (3,511) of the birth records used in this study indicate mothers who subsequently had a tubal ster-

\*The original merged data set had 18,961 child records, and 46% of NHIS and NSFG birth dates matched within three months. In all, 3,254 NHIS records were missing data, generally because the children had not been born or were newborns in 1993. Additionally, 4,028 NSFG records were missing data; most referred to children aged 17 and older in 1993, who had likely left home by 1995. Older children and those born to women aged 40–44 were significantly more likely than others to be selected for inclusion in the analysis; black children and those born to women aged 14–19 or who had a high school education or less were less likely to be selected. However, because only 6% of records were excluded, we feel that the effect of this bias on our results is minimal. Contact the authors for further details.

ilization.\* (Mothers who had their fallopian tubes removed as part of a hysterectomy or for other purposes unrelated to fertility intentions subsequent to a birth are censored, as they no longer are at risk of tubal sterilization.)

Postpartum tubal sterilization usually refers to a procedure that occurs less than 48 hours after delivery.<sup>15</sup> Since NSFG sterilization dates comprise only the month and year of the event, we defined postpartum sterilization as a procedure occurring within the month of delivery. In cases where NHIS and NSFG birth dates differed by up to three months, we used the NSFG date of birth to calculate the time to sterilization. Birth information obtained from the mother in the NSFG is likely to be more accurate than birth date information from the NHIS, which could have been reported by any person in the household aged 18 or older.

Although tubal sterilization in the United States is evenly split between postpartum and interval procedures,<sup>16</sup> there are important differences between the women opting for each procedure. For example, women who have a postpartum sterilization are much more likely than women electing interval sterilization to be young, black and from the South.<sup>17</sup> And although payment for postpartum sterilization is about evenly split between private insurance and Medicaid, two-thirds of payment for interval sterilization is through private insurance.<sup>18</sup> These differences indicate that women electing interval tubal sterilization tend to be of higher socioeconomic status than those who undergo postpartum tubal sterilization.

• **Child disability.** Measuring child disability is very complex. Some methods take into account information on medical conditions, limitations in activities of daily living or ability to participate in age-appropriate social roles.<sup>19</sup> Activity limitation is a powerful measure of disability because it is easily reported by primary caregivers and proxy persons alike, and presents a clear understanding of difficulty in everyday situations. The NHIS gathered information on activity limitation for all children in the household, focusing on limitations in age-appropriate activities expected to last 12 months or longer because of a health condition. For children younger than five, activity limitation was measured by the child's ability to participate in play or other preschool activities; for those aged 5–17, activity limitation was indicated by a report that the child is limited or unable to attend school, or needs to attend a special school or special classes. Six percent of children were limited in activity and were classified as having moderate disability; fewer than 1% were unable to participate in activity and were classified as having severe disability.

Although child disability sometimes is evident at birth, some disabilities are diagnosed around two years of age or even as late as preschool or kindergarten, when peer group

comparisons first reveal behavioral or learning problems. While information regarding a child's medical condition and age at diagnosis would enhance our understanding of the complex relationship between child disability and mothers' subsequent fertility, this information is not available in the 1993 NHIS.

• **Other factors.** Known factors that increase women's likelihood of having a tubal sterilization include being older, higher-parity and currently married.<sup>20</sup> Women with a low level of education and those in poverty also have an elevated likelihood of undergoing contraceptive sterilization,<sup>21</sup> and there are differences by religion, race and ethnicity, and immigrant status.<sup>22</sup> Region of residence and urban residence act as proxies for a direct measure of availability of sterilization services and medical protocols.<sup>23</sup> Our analyses include measures of all these factors to provide an accurate estimate of the unique impact of a child's disability and sibling composition on tubal sterilization.

### Analysis

We organized the data to measure the extent to which a tubal sterilization following a given birth depended on the seriousness of the disability and on whether other children with disability were present in the household. Our analyses included all matching child records in sampled households; because family characteristics would be multiply represented in this sample, we corrected for estimating errors associated with nonindependent cases using SUDAAN statistical software. We weighted data using NSFG weights.

We focused on the effect of the birth of a child with a disability on the mother's likelihood of sterilization both at the time of the child's birth and in each subsequent month. As a first step, we evaluated the bivariate relationship between child disability and mothers' sterilization by comparing failure times (e.g., the time from a child's birth to the date of sterilization) by group status (e.g., the child's disability status). We used Kaplan-Meier analysis, as it gives a simple estimation of the hazard (or failure rate) for an otherwise homogeneous sample from censored data—where not all persons have experienced the failure event (in this case, mother's sterilization).<sup>24</sup> Of the birth records, 40% indicated that the mothers had had a tubal sterilization (at a median of 46.3 months after birth).

Multivariate regression models can be used to statistically control for the effects of related factors when estimating the effect of child disability on mothers' sterilization. In the second stage of analysis, we used a dichotomous logistic regression model to estimate the effect of the focal child's disability on the likelihood of the mother's tubal sterilization within one month of the child's birth, controlling for the effects of related factors. Nine percent of the 8,672<sup>†</sup> birth records containing sterilization dates indicated mothers' sterilization during the postpartum period. For the rest, we estimated the hazard, or rate, of tubal sterilization by the time since the child's birth using a Cox proportional hazard regression model.

Initially, we estimated both the logistic and the Cox mod-

\*Previous research found only minor differences between estimates from models that included censoring at partner's vasectomy and those that did not (source: reference 4).

†Thirty-nine birth records were missing sterilization dates, and were treated as missing cases.

els to include interactions between the disability status of the focal child and the disability status of older children in the household. However, as a result of small sample sizes there were severe problems of multicollinearity, with resultant instability in coefficients. Thus, we present models that specify the net, direct effects of disability status of the focal child and older children (if any).\*

## RESULTS

Overall, the majority of focal children were born to white mothers (74%), had no limitations (93%) and did not have any siblings with disabilities (93%); there were approximately the same proportion of males as females. Most had mothers who were aged 20–34 years, had had at least a high school education, were currently married, were Protestant or Catholic, lived in urban areas and were born in the United States.

### Postpartum Tubal Sterilization

Women who gave birth to children with disability—regardless of the severity—were no more likely than other mothers to have a postpartum tubal sterilization (Figure 1). This is true even for those with a nondisabled or moderately disabled older child. However, women who already had at least one child with a severe disability were significantly more likely than those who did not to undergo postpartum sterilization when they gave birth to another child: Twenty-three percent of women who had a severely disabled older child had a postpartum sterilization, compared with fewer than 10% of those whose older children were without disability or had only moderate limitations.<sup>†</sup>

Results of analyses controlling for other factors known to affect the likelihood of sterilization confirm that the presence and severity of disability in the focal child had no impact on the likelihood that a mother underwent postpartum sterilization (Table 1). However, women who had an older child with a severe disability had an increased likelihood of postpartum sterilization (odds ratio, 2.6). These results support the normative parenting hypothesis, and appear to suggest that resource constraints lead to birth limitation only after the birth of another (usually nondisabled) child.

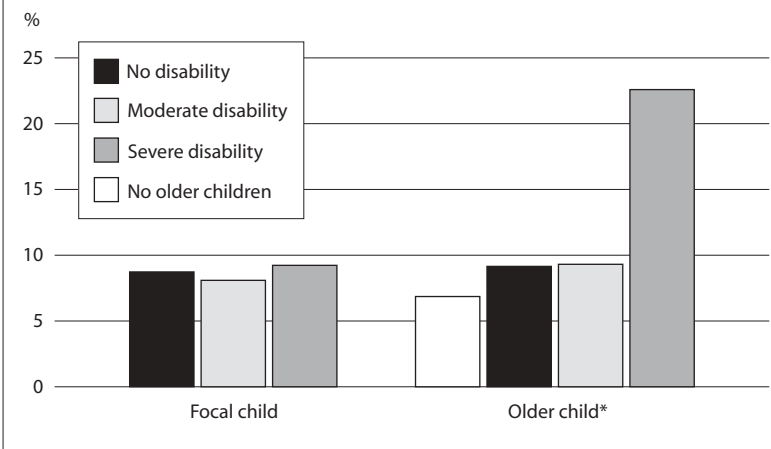
### Interval Tubal Sterilization

By 36 months after the birth of the focal child, the cumulative proportion of women who had been sterilized was significantly greater among those who had a child with severe disability (26%) than among women whose child was not limited (20%) or had moderate limitation (21%); these

\*Significant interaction terms in the model predicting postpartum sterilization improve the fit of the model; however, these interaction term categories contain fewer than 30 cases and evidence of high multicollinearity (tolerance estimates less than 0.40).

†Because of constraints in SAS (version 8.2) and SUDAAN software available at NCHS as of January 2003, our Kaplan-Meier estimates do not reflect sample weights or correction for errors due to complex sample design. Sample weights and correction for design effects were used in multivariate estimates generated using SUDAAN.

**FIGURE 1. Percentage of infants whose mothers underwent postpartum sterilization, by disability status of the infant (focal child) and of older children in the household**



\*Percentage with severe disability is significantly different from other percentages at  $p < .05$ . Note: Data are weighted and adjusted for clustering. Source: Matched data from the 1993 National Health Interview Survey and the 1995 National Survey of Family Growth.

differences emerged about 20 months after birth (Figure 2, page 142). There was no significant difference in the sterilization experiences of mothers of children with moderate limitation and mothers of children without disability.

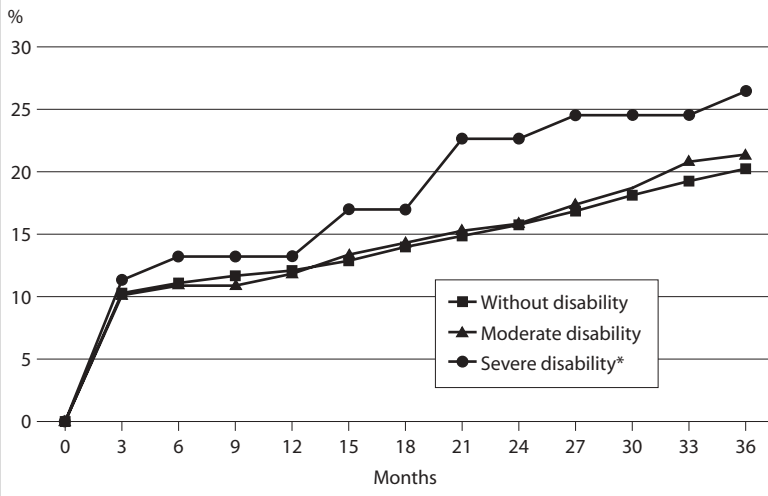
In analyses of the cumulative proportion sterilized by disability status of older children, only 14% of women with no older children underwent sterilization by 36 months after the birth of the focal child (Figure 3, page 142). This finding is consistent with the results for postpartum sterilization. The proportion was greater among women with older nondisabled children (22%), consistent with data suggesting that few American women consider their families complete with only one child.<sup>25</sup> However, the proportion sterilized following the focal birth was considerably greater when one or more older children with disability were present in the household, and particularly so in cases of severe disability:

**TABLE 1. Odds ratios from logistic regression analyses assessing the likelihood of postpartum sterilization, and risk ratios from Cox regression analyses assessing the likelihood of interval sterilization, by disability status of the focal child and of older children**

Disability status	Postpartum (N=8,672)	Interval (N=7,907)
<b>Focal child</b>		
None (ref)	1.00	1.00
Moderate	0.93	1.00
Severe	1.12	1.65*
<b>Older children</b>		
No older children	1.07	0.56
None (ref)	1.00	1.00
Moderate	0.81	1.10
Severe	2.57*	1.52†
-2 log likelihood (df=29)	4,640.29	85,729.03

\* $p < .05$ . † $p < .10$ . Notes: ref=reference group. Estimates are net of effects of the child's sex and the mother's parity at time of birth, race and ethnicity, poverty level, age at child's birth, educational level, marital status at child's birth, urban residence, immigrant status and region of residence. Data are weighted and adjusted for clustering. Source: Matched data from the 1993 NHIS and the 1995 NSFG.

**FIGURE 2. Estimated cumulative percentage of mothers undergoing tubal ligation, by months since birth of the focal child, according to child's disability status**



\*Among Kaplan-Meier strata, severe disability is significantly different from other categories at  $p < .05$ . Note: Data are unweighted. Source: Matched data from the 1993 NHIS and 1995 NSFG.

By 36 months after the birth of the focal child, 40% of mothers who had an older child with a severe disability had an interval sterilization, as did 25% of those who had older children with moderate disabilities.

We estimated the effects of the focal child's and older children's disability status on women's risk of undergoing interval tubal sterilization, controlling for known covariates (Table 1).<sup>\*</sup> In this analysis, the likelihood of interval sterilization did not differ between women who gave birth to a moderately limited child and those who gave birth to a child without disability. However, women who gave birth to a child with a severe disability were significantly more likely than those who gave birth to a nondisabled child to undergo interval sterilization (risk ratio, 1.7). In addition, women who had previously given birth to a child with a

severe disability were more likely than those who had borne only nondisabled children to have an interval sterilization (1.5). (Although this effect was not significant by conventional standards, it was significant at  $p < .10$ . We feel that the effects are meaningful, given the relatively small sample size of children with severe disability in the analysis.) Multiplying these risk ratios, we estimated that the rate of interval sterilization among women who gave birth to a child with a severe disability and have an older child with a severe disability is 2.5 times that of women whose focal child and older children do not have a disability (not shown). It is clear that both the disability status of the focal child and the disability status of older children are key determinants of interval sterilization.

**DISCUSSION**

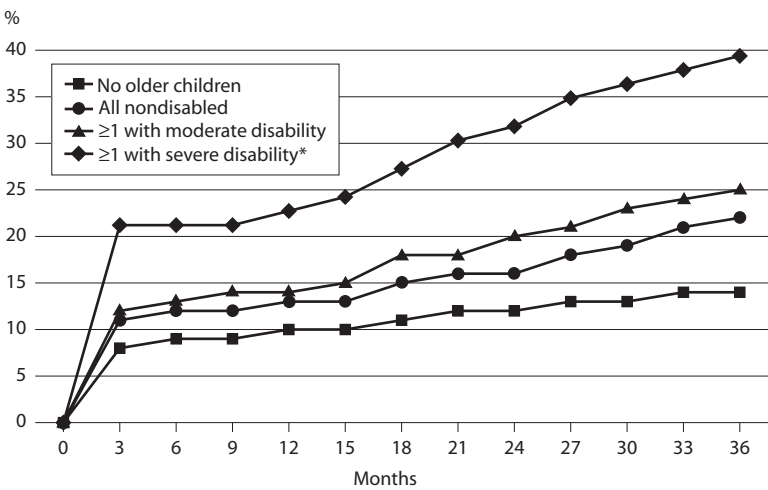
Our goal was to investigate how a mother's decision to undergo sterilization is influenced by having a child with disability. Fathers, too, may respond to child disability by choosing to undergo sterilization themselves. Yet, modeling vasectomy rates with our data is problematic, mainly because of the likely confounding of child disability and the presence of a father in the household. The NSFG contains vasectomy information only for men married to or cohabiting with sampled women at the time of the interview. In analyses not presented here, we found that the decision to divorce is associated with the birth of a child with disability in complex ways. Thus, we cannot adequately measure the likelihood of male sterilization among fathers of children with disability with these data.

While admittedly less than ideal, restricting our analysis to tubal sterilization likely captures most of the effect of child disability on couples' fertility decisions. Women are more likely to undergo sterilization than men: For example, in the 1995 NSFG, about 50% of currently married women with four or more children had been sterilized, compared with about 15% of their spouses. Furthermore, mothers are likely to bear most childrearing responsibilities, especially in the event of divorce,<sup>26</sup> and their fertility decisions are more likely than fathers to be influenced by any increase in caregiving associated with the birth of a child with disability.

Our results demonstrate that the birth of a child with a disability does not affect a mother's decision to become sterilized during the first month postpartum. At the time of the child's birth, the mother may not be aware of the child's disability and the unique and substantial caregiving that may be required, so the postpartum sterilization decisions of these women are similar to those of mothers of children born without disability.

The effect of child disability on sterilization is observed subsequently, as mothers become aware of the special needs of their children. We find that child disability strongly influences a mother's decision to undergo sterilization during the interval period, although only if the disability

**FIGURE 3. Estimated cumulative percentage of mothers undergoing tubal ligation, by months since birth of the focal child, according to older children's disability status**



\*Among Kaplan-Meier strata, severe disability is significantly different from other categories at  $p < .05$ . Note: Data are unweighted. Source: Matched data from the 1993 NHIS and 1995 NSFG.

\*The parallel lines and test statistics produced by the Kaplan-Meier estimates (not shown) demonstrate that the hazards of sterilization are proportional, thus meeting the assumption necessary for using the Cox model.



is severe; moderate disability has little or no effect. This suggests that while the caregiving needs of children with moderate limitation are undoubtedly greater than those of nondisabled children, parents manage these needs without altering their subsequent fertility plans. Parents of such children are satisfied with the normative parenting experiences they expect to have. Severe disability, however, does influence a mother's decision to become sterilized during the interval period. As these mothers become aware of their child's need for substantial and specialized care, they are more likely than other women to prevent subsequent births, perhaps to devote more resources to their existing children.

Our findings suggest that resource constraint is an important factor in mothers' fertility decisions subsequent to the birth of child with disability. Compared with mothers of a nondisabled child, mothers whose child has a severe disability are indeed more likely to choose interval tubal sterilization. Nonetheless, the desire for a normative parenting experience is strong. Even when caregiving needs are considerable, mothers who have just given birth to a child with severe disability are no more likely to choose postpartum sterilization than are women with nondisabled older children. Only after the birth of a subsequent child do mothers of a seriously disabled child have an elevated likelihood of choosing postpartum or interval sterilization. It appears that substantial resource constraints outweigh the desire for a normative motherhood experience only in situations where mothers care for two or more children with severe disability.

In future analyses, we plan to use the merged NHIS and NSFG data to explore the effect of child disability on a number of other family outcomes, such as maternal workforce participation and marital stability. These projects will enhance the existing literature by providing a more comprehensive and analytically sophisticated understanding of the many ways that the experience of child disability can affect families.

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## Acknowledgments

The authors wish to acknowledge Carrie Spearin for her help throughout the project. An earlier version of this article was presented as a poster at the annual meeting of the Population Association of America, Atlanta, May 9–11, 2002. The research on which this article is based was supported by grant 5U01 HD37614 from the National Institute of Child Health and Human Development.

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