Preimplantation sex selection demand and preferences among infertility patients in Midwestern United States

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Abstract

Purpose To determine the demand and preferences of infertility patients for sex selection for nonmedical reasons, and to investigate the relation between these choices and their demographic and socioeconomic characteristics.

Methods A cross-sectional, self-administered survey by mail was conducted at a University hospital-based fertility

center of 1,350 consecutive women who presented for infertility care, to assess patient demand and preferences for sex selection.

Results Of respondents, 49% wanted to select the sex of their next child for no added cost. Of these patients, 56% had no living children and 37% had children all of one sex. After adjustment for observed predictors of gender preference, we found a significant preference for a female child among women who had only sons, had more living children, or were single. Nulliparous women did not significantly prefer one sex over the other. Among parous women, those with only daughters significantly desired to select a male child, whereas those with sons significantly desired to select a female child.

Conclusion There is significant demand among infertility patients for preimplantation sex selection, with a significant portion of this demand coming from patients who do not have any children or have children all of one sex.

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Introduction

The desire for couples to choose the sex of their offspring has been present for centuries. Effective options for acting on their desires became available in the 1970s with the advent of technologies such as ultrasonography, chorionic villus sampling, and amniocentesis. Such options, however, were invasive and would lead women to undergo an abortion if a particular sex of the fetus was not desired.

Newer technologies, however, have given women the option of selecting the sex of offspring before embryo creation or implantation (preimplantation sex selection). The two methods currently commercially available are sperm separation and preimplantation genetic diagnosis (PGD) [1–6]. Even though the intended use of such technologies was to prevent the birth of children with sex-linked genetic disorders, these technologies are being increasingly used for preimplantation sex selection for nonmedical reasons (<http://www.microsort.net/index.php>, accessed March 1, 2007) [7, 8].

Use of preimplantation sex selection for nonmedical reasons is, of course, one of the most controversial topics in bioethics today. The main concern is that widespread use of such technology may alter the natural sex ratio and lead to a socially disruptive imbalance of the sexes [9–12].

The American College of Obstetricians and Gynecologists (ACOG) and the International Federation of Gynecology and Obstetrics (FIGO) already state their opposition to sex selection for nonmedical reasons [13, 14]. After an extensive 2-year analysis, the President's Council on Bioethics has detailed its concerns on this issue, and continues to list sex selection under its 'Topics of Council Concern' [15, 16]. The United Kingdom recently outlawed any technique used for sex selection for nonmedical reasons, after public opinion polls found the majority of respondents not in favor of such technology [17].

In contrast, the Ethics Committee of the American Society of Reproductive Medicine (ASRM) in 2001 stated that preconception sex selection for nonmedical reasons was ethically acceptable for the purpose of providing a family with a child of a different sex than an existing child (gender variety), provided the sex selection methods were safe and effective [18]. In 2002, they refined their position, stating that any nonmedical use of PGD should be discouraged (although sperm separation may still be acceptable) [19].

Despite such controversies, infertile couples are likely to be exposed to such technologies since they often undergo intrauterine insemination (IUI) and/or in vitro fertilization (IVF), which are necessary components of using sperm separation or PGD, respectively. As recently reported, based on a national survey, the general public in the United States is unlikely to make use of such technologies [20]. Infertile couples, however, may feel differently.

We previously reported results of a cross-sectional study of patients presenting for infertility treatment at a University hospital-based fertility center in Massachusetts [21]. Briefly, there was significant demand among infertility patients for preimplantation sex selection (41% of respondents), with a significant portion of this demand coming from patients who do not have any children or have children all of one sex. Nulliparous women did not

significantly prefer one sex over the other. Among parous women, those with only daughters significantly desired to select a male child, whereas those with only sons significantly desired to select a female child. It is unclear, however, if the opinions of this study population are similar to those of patients in other parts of the United States.

We therefore conducted a survey study of women presenting to an infertility clinic (that does not offer sex selection for nonmedical reasons) in Illinois. Our objectives were to compare and contrast our previous observations of patients' preferences for sex selection for nonmedical reasons, the method and sex they would choose, and to quantify the relations between these choices and their demographic and socioeconomic characteristics.

Materials and methods

Collection of data

Institutional review board (IRB) approval was obtained from the University of Illinois at Chicago (UIC) before conducting the study. We mailed a brief questionnaire (consisting of 24 questions) to 1,350 consecutive women who presented to the UIC Fertility Center for infertility care, determined by their primary ICD-9 diagnosis code for infertility (628.x or 606.x), between March 2004 and April 2005. The survey instrument was similar to our previous study [21] and collected information on patient demographics, obstetric and infertility history, preferences for sex selection, and whether their significant other was consulted when responding to the questionnaire.

The questionnaire was pilot tested to ensure face validity with the assistance of three infertility physicians, three non-infertility physicians, four infertility patients, and a sociologist. Based on their feedback, the questionnaire was amended to ensure future subjects' understanding of the questions. The questionnaire (along with a cover letter and postage paid return envelope) was mailed in June 2005, and responses were collected during the next 3 months. One month after the initial mailing, a second mailing was sent to non-respondents in order to improve the response rate. Survey results were entered into a database (Microsoft Access 2000, Microsoft Corp., Redmond, WA), and reverified for accuracy.

Statistical analysis

We compared the distribution of reproductive history and demographic characteristics between women who did and did not desire sex selection. Among women who would select the sex of their next child, we compared the

Table 1 Desire for sex selection among women presenting for fertility treatment ($n=741$)

Characteristic	Would you use sex selection (if no added cost)? ^a		Adjusted odds ratio (95% CI) ^b
	Yes (<i>n</i> =363)	No (<i>n</i> =378)	
<i>Demographic</i>			
Age (years)	35.2±5.83 ^c	34.8±5.53 ^c	1.01 (0.99–1.04) <i>p</i> value, test for trend=0.33
<30 years of age	61 (16.8)	68 (18.0)	1.00 (referent)
30–34 years of age	107 (29.5)	111 (29.4)	1.17 (0.75–1.84)
35–39 years of age	100 (27.6)	121 (32.0)	0.95 (0.60–1.50)
>39 years of age	95 (26.2)	78 (20.6)	1.48 (0.91–2.38)
Ethnicity			
African American	104 (28.7)	104 (27.5)	2.05 (1.29–3.27)
Caucasian	96 (26.5)	209 (55.3)	1.00 (referent)
Hispanic/Latino	95 (26.2)	39 (10.3)	11.6 (6.58–20.4)
Chinese	15 (4.1)	4 (1.1)	3.74 (0.98–14.3)
East Indian	24 (6.6)	10 (2.7)	2.32 (0.61–8.84)
Other Asian or Pacific Islander	29 (8.0)	12 (3.2)	2.86 (1.14–7.17)
Highest education level completed			
High school	165 (45.5)	138 (36.5)	1.00 (referent)
College	83 (22.9)	140 (37.0)	0.40 (0.27–0.58)
Graduate degree	115 (31.2)	100 (26.5)	0.59 (0.39–0.89)
Religious preference			
Buddhist	2 (0.6)	2 (0.5)	1.17 (0.16–8.50)
Catholic	124 (34.4)	164 (43.5)	0.99 (0.70–1.39)
Chinese-traditionalist	12 (3.3)	1 (0.3)	14.6 (1.87–114)
Hindu	22 (6.1)	5 (1.3)	5.37 (1.97–14.7)
Jewish	18 (5.0)	14 (3.7)	1.68 (0.79–3.56)
Muslim	12 (3.3)	9 (2.4)	1.54 (0.62–3.79)
Protestant	116 (32.1)	143 (37.9)	1.00 (referent)
Secular/agnosticism/non-religious	55 (15.2)	39 (10.3)	1.75 (1.08–2.83)
Marital status			
Married	313 (86.2)	319 (84.4)	1.00 (referent)
Same sex couple	0 (0.0)	2 (0.5)	–no ‘yes’ responses–
Divorced/separated	7 (1.9)	4 (1.1)	
Single	43 (11.9)	53 (14.0)	
Gross annual household income			
<\$50,000	92 (25.5)	88 (23.3)	1.00 (referent)
\$50,000–\$100,000	96 (26.6)	86 (22.8)	1.01 (0.65–1.53)
\$100,001–\$150,000	43 (11.9)	99 (26.3)	0.34 (0.21–0.55)
\$150,001–\$200,000	64 (17.7)	80 (21.2)	0.51 (0.31–0.84)
\$200,001–\$250,000	47 (13.0)	24 (6.4)	0.99 (0.52–1.91)
>\$250,000	18 (5.0)	0 (0.0)	–no ‘no’ responses– <i>p</i> value, test for trend=0.51
<i>Reproductive history</i>			
Gravidity	1.31±1.23 ^c	1.58±1.32 ^c	0.86 (0.76–0.98) <i>p</i> value, test for trend=0.03
Never pregnant	104 (28.7)	74 (19.6)	1.64 (1.12–2.40)
Ever pregnant	259 (71.4)	304 (80.4)	1.00 (referent)
Parity			
Nulliparous	204 (56.2)	175 (46.3)	1.39 (0.79–2.44)
Parous			
Only boy(s)	77 (48.4)	98 (48.5)	0.94 (0.52–1.72)
Only girl(s)	56 (35.2)	71 (35.2)	0.96 (0.51–1.79)
At least one boy and one girl	26 (16.4)	33 (16.3)	1.00 (referent)

Table 1 (continued)

Characteristic	Would you use sex selection (if no added cost)? ^a		Adjusted odds ratio (95% CI) ^b
	Yes (<i>n</i> =363)	No (<i>n</i> =378)	
Number of live births if parous	1.30±0.63 ^c	1.18±0.41 ^c	1.70 (1.10–2.64) <i>p</i> value, test for trend=0.02
Current number of living children if parous	1.34±0.72 ^c	1.24±0.46 ^c	1.54 (1.04–2.28) <i>p</i> value, test for trend=0.03
<i>Infertility history</i>			
Duration of time trying to conceive (months)	41.5±25.0 ^c	40.4±29.4 ^c	1.00 (1.00–1.01) <i>p</i> value, test for trend=0.27
≤2 years	97 (26.7)	125 (33.1)	1.00 (referent)
>2–3 years	68 (18.7)	74 (19.6)	1.23 (0.79–1.92)
>3–4 years	62 (17.1)	55 (14.6)	1.64 (1.06–2.64)
>4 years	136 (37.5)	124 (32.8)	1.85 (1.22–2.79)
Primary infertility diagnosis			
Age/poor ovarian reserve	30 (8.3)	27 (7.2)	1.66 (0.86–3.20)
Ovulation	80 (22.1)	56 (14.9)	2.24 (1.40–3.58)
Blocked tubes	75 (20.7)	80 (21.2)	1.80 (1.13–2.87)
Uterine factor	18 (5.0)	11 (2.9)	2.76 (1.20–6.35)
Endometriosis	28 (7.7)	26 (6.9)	2.01 (1.06–3.83)
Male factor	59 (16.3)	65 (17.2)	1.50 (0.92–2.43)
Unexplained	72 (19.9)	112 (29.7)	1.00 (referent)
Current or past form(s) of assisted reproduction			
None	129 (35.5)	130 (34.4)	1.00 (referent)
Intra-uterine Insemination (IUI)	111 (30.6)	79 (20.9)	1.15 (0.75–1.67)
In vitro fertilization (IVF)	80 (22.0)	93 (24.6)	0.82 (0.55–1.24)
Both IUI and IVF	43 (11.9)	76 (20.1)	0.42 (0.26–0.68)

^a Table values in parentheses are percentages.

^b Adjusted for age (continuous in years), nulliparity religion (Christianity, Judaism, Agnosticism, other), and if the woman has at least one daughter. Unadjusted ORs were very similar to the adjusted values.

^c Mean±standard deviation.

distribution of these same variables by preference for a male or female child. Logistic regression was used to calculate the crude (unadjusted) and multivariate (adjusted) odds ratios (ORs) and 95% confidence intervals (CIs) that are presented as estimates of the relative risk [22].

A multivariate OR for each main effect was calculated after adjustment for variables that confounded these crude relations. We considered all variables as potential confounders of the association of the exposure of interest with sex preference if addition of that variable to the model changed the OR by 10% or more [23]. If a factor was identified as a confounder of any estimated main effect, it was kept in all models. We conducted tests for trend in ordinal categorical exposures by creating an ordinal variable in which the median value or midpoint of each category was assigned to all participants in that group and then calculating a Wald statistic [24]. All *p* values are based on two-sided tests. The SAS statistical software (version 8.2, SAS Institute Inc., Cary, NC) was used for all analyses.

Results

Out of 1,350 questionnaires that were mailed, 129 were returned by the postal service due to the lack of a correct mailing or forwarding address. From the remaining 1,221 mailings, we received a total of 743 completed questionnaires (61% response rate). Respondents ranged in age from 21–56 (median=35), with 41% self-identifying as Caucasian, 28% African-American, and 18% Hispanic.

Two respondents did not answer the question regarding sex selection preference and therefore were excluded from these analyses. Of the 741 members of the analytic population, 363 respondents (49%) wanted to select the sex of their next child for no added cost (Table 1). Of the 363 patients, 204 (56%) had no living children and 133 (37%) had children all of one sex. A significant preference for sex selection was observed among women of any ethnicity other than Caucasian, who had never been pregnant, or who had been attempting to conceive for a longer duration. Those with any education greater than a

Table 2 Preference for a male or female child if woman would select sex (at no added cost; $n=363$)

Characteristic	Male ($n=131$)	Female ($n=232$)	Unadjusted odds ratio (95% CI)	Adjusted odds ratio (95% CI) ^a
<i>Demographic</i>				
Age (years)	34.5±5.67 ^b	35.6±5.89 ^b	1.03 (0.99–1.07) <i>p</i> value, test for trend=0.11	1.04 (0.99–1.09) <i>p</i> value, test for trend=0.09
<30 years of age	27 (20.6)	34 (14.7)	1.00 (referent)	1.00 (referent)
30–34 years of age	37 (28.2)	70 (30.2)	1.50 (0.79–2.86)	1.55 (0.74–3.26)
35–39 years of age	34 (26.0)	66 (28.5)	1.54 (0.80–2.96)	2.44 (1.08–5.51)
>39 years of age	33 (25.2)	62 (26.7)	1.49 (0.77–2.88)	1.67 (0.73–3.79)
Ethnicity				
African American	26 (19.9)	78 (33.6)	1.72 (0.94–3.16)	1.42 (0.62–3.27)
Caucasian	35 (26.7)	61 (26.3)	1.00 (referent)	1.00 (referent)
Hispanic/Latino	38 (73.0)	57 (24.6)	0.86 (0.48–1.54)	0.44 (0.15–1.30)
Chinese	9 (6.9)	6 (2.3)	0.38 (0.13–1.90)	0.77 (0.10–5.77)
East Indian	11 (8.4)	13 (5.6)	0.68 (0.28–1.17)	6.69 (0.78–57.3)
Other Asian or Pacific Islander	12 (9.2)	17 (7.3)	0.81 (0.35–1.68)	1.87 (0.44–7.86)
Highest education level completed				
High school	54 (41.2)	111 (47.8)	1.00 (referent)	1.00 (referent)
College	33 (25.2)	50 (21.6)	0.74 (0.43–1.27)	0.80 (0.39–1.65)
Graduate degree	44 (33.6)	71 (30.6)	0.79 (0.48–1.29)	0.97 (0.43–2.15)
Religious preference				
Buddhist	2 (1.5)	0 (0.0)	–both chose male–	–both chose male–
Catholic	47 (35.9)	77 (33.5)	0.60 (0.35–1.03)	0.53 (0.28–1.00)
Chinese-traditionalist	8 (6.1)	4 (1.7)	0.18 (0.05–0.65)	0.03 (0.00–0.22)
Hindu	10 (7.6)	12 (5.2)	0.44 (0.17–1.11)	0.21 (0.21–0.67)
Jewish	10 (7.6)	8 (3.5)	0.29 (0.11–0.81)	0.66 (0.22–1.99)
Muslim	7 (5.3)	5 (2.2)	0.26 (0.08–0.88)	0.11 (0.02–0.49)
Protestant	31 (23.7)	85 (37.0)	1.00 (referent)	1.00 (referent)
Secular/Agnosticism/non-religious	16 (12.2)	39 (17.0)	0.89 (0.44–1.81)	0.57 (0.25–1.30)
Marital status				
Married	121 (92.4)	192 (82.8)	1.00 (referent)	1.00 (referent)
Same sex couple	0 (0.0)	0 (0.0)	-- none would select --	-- none would select --
Divorced/separated	0 (0.0)	7 (3.0)	-- all chose female --	-- all chose female --
Single	10 (7.6)	33 (14.2)	2.52 (1.22–5.23)	2.41 (1.00–5.82)
Gross annual household income				
<\$50,000	25 (19.1)	67 (29.3)	1.00 (referent)	1.00 (referent)
\$50,000–\$100,000	40 (30.5)	56 (24.5)	0.50 (0.27–0.92)	0.39 (0.19–0.80)
\$100,001–\$150,000	12 (9.2)	31 (13.5)	0.92 (0.41–2.07)	0.71 (0.25–2.04)
\$150,001–\$200,000	30 (22.9)	34 (14.9)	0.41 (0.21–0.79)	0.55 (0.22–1.41)
\$200,001–\$250,000	15 (11.5)	32 (14.0)	0.76 (0.36–1.64)	0.81 (0.26–2.52)
>\$250,000	9 (6.9)	9 (3.9)	0.36 (0.13–1.00) <i>p</i> value, test for trend=0.15	0.37 (0.08–0.17) <i>p</i> value, test for trend=0.63
<i>Reproductive history</i>				
Gravidity	1.28±1.20 ^b	1.32±1.24 ^b	1.03 (0.86–1.23) <i>p</i> value, test for trend=0.76	1.39 (1.09–1.79) <i>p</i> value, test for trend=0.01
Never pregnant	39 (29.8)	65 (28.0)	0.92 (0.57–1.47)	0.50 (0.27–0.91)
Ever pregnant	92 (70.2)	167 (72.0)	1.00 (referent)	1.00 (referent)
Parity				
Nulliparous	71 (54.2)	133 (57.3)	0.56 (0.21–1.46)	0.83 (0.30–2.27)
Parous				
Only boy(s)	2 (3.3)	75 (75.8)	11.2 (2.11–60.0)	21.0 (3.64–121)
Only girl(s)	52 (86.7)	4 (4.0)	0.02 (0.01–0.09)	0.02 (0.01–0.09)
At least one boy and one girl	6 (10.0)	20 (20.2)	1.00 (referent)	1.00 (referent)
Number of live births if parous	1.23±0.59 ^b	1.33±0.65 ^b	1.31 (0.76–2.27) <i>p</i> value, test for trend=0.34	4.01 (1.75–9.21) <i>p</i> value, test for trend=0.001
Current no. of living children if parous	1.28 ± 0.72 ^b	1.37 ± 0.72 ^b	1.21 (0.74–1.94) <i>p</i> value, test for trend=0.44	3.61 (1.66–7.82) <i>p</i> value, test for trend=0.001

Table 2 (continued)

Characteristic	Male (<i>n</i> =131)	Female (<i>n</i> =232)	Unadjusted odds ratio (95% CI)	Adjusted odds ratio (95% CI) ^a
<i>Infertility history</i>				
Duration of time trying to conceive (months)	36.8±21.1 ^b	44.0±26.6 ^b	1.01 (1.00–1.02) <i>p</i> value, test for trend=0.01	1.01 (0.99–1.02) <i>p</i> value, test for trend=0.35
≤2 years	42 (32.1)	55 (23.7)	1.00 (referent)	1.00 (referent)
>2–3 years	26 (19.9)	42 (18.1)	1.23 (0.66–2.32)	1.13 (0.52–2.49)
>3–4 years	25 (19.1)	37 (16.0)	1.13 (0.59–2.16)	0.94 (0.41–2.16)
>4 years	38 (29.0)	98 (42.2)	1.97 (1.13–3.41)	1.06 (0.48–2.33)
<i>Primary infertility diagnosis</i>				
Age/poor ovarian reserve	8 (6.1)	22 (9.5)	1.75 (0.69–4.47)	1.54 (0.45–5.34)
Ovulation	33 (25.2)	47 (20.4)	0.91 (0.47–1.74)	0.82 (0.37–1.85)
Blocked tubes	18 (13.7)	57 (24.5)	2.02 (0.99–4.10)	1.64 (0.70–3.89)
Uterine factor	6 (4.6)	12 (5.2)	1.27 (0.43–1.27)	1.42 (0.38–5.33)
Endometriosis	13 (9.9)	15 (6.5)	0.73 (0.30–1.77)	0.41 (0.13–1.29)
Male factor	25 (19.1)	34 (14.7)	0.87 (0.43–1.75)	0.64 (0.27–1.51)
Unexplained	28 (21.4)	44 (19.1)	1.00 (referent)	1.00 (referent)
<i>Current or past form(s) of assisted reproduction</i>				
None	44 (19.1)	85 (36.6)	1.00 (referent)	1.00 (referent)
Intra-uterine Insemination (IUI)	43 (32.8)	68 (29.3)	0.82 (0.48–1.39)	0.93 (0.48–1.82)
In vitro fertilization (IVF)	31 (23.7)	49 (21.1)	0.82 (0.46–1.46)	1.09 (0.53–2.26)
Both IUI and IVF	13 (9.9)	30 (12.9)	1.20 (0.57–2.52)	2.25 (0.86–5.94)

Odds ratios greater than 1.0 reflect preference for a female child.

^a Adjusted for age (continuous in years), nulliparity, religion (Christianity, Judaism, Agnosticism, other), and if the woman has at least one daughter.

^b Mean±standard deviation.

high school diploma were significantly less likely to desire sex selection. With respect to religion, Catholic women were least likely to desire sex selection.

Table 2 provides details of patient preference for male and female offspring. Of the 363 patients wanting to select the sex of their next child, 131 (36%) wanted a male and 232 (64%) wanted a female child. After adjustment for observed predictors of gender preference, we found a significant preference for a female child among women who had only sons, had more living children, or were single (although the number single women were small). Compared with parous women, nulliparous women did not significantly prefer one sex over the other. Among parous women, those with only daughters significantly desired to select a male child, whereas those with sons significantly desired to select a female child.

Discussion

Our study shows that there is a significant demand for pre-implantation sex selection for non-medical reasons, with a significant portion of this demand coming from patients who do not have any children or have children all of one sex. Furthermore, there is a significant preference for a female child among women who are single, have only sons, or have more living children.

The major findings of this study are similar to the findings of our prior study on infertile women conducted in Massachusetts [21]. In terms of overall demand for sex selection, 49% of women in this study and 41% in the Massachusetts study expressed an interest to choose the sex of their next child. Of these women, 56% had no living children in this study compared to 46% in the Massachusetts study. Furthermore, 37% in this study and 48% in the Massachusetts study had children all of one sex.

With regard to preferences for a particular sex, both studies demonstrated similar overall preferences. In this study compared to the Massachusetts study, 36% versus 39% wanted boys and 64% versus 61% wanted girls, respectively. After controlling for observed predictors of gender preference, both studies found a significant preference for a female child among women who had only sons or had more living children. Both studies also found that among parous women, those with only daughters significantly desired to select a male child, whereas those with sons significantly desired to select a female child.

This study also found that patients who are Catholic and Protestant are least likely to opt for sex selection for non-medical reasons. This finding is certainly congruent with the Vatican's long-standing view that artificial insemination and fertilization are morally unacceptable [25, 26]. Although some Protestant denominations have liberal attitudes towards infertility treatment, there may be others that

are less permissive, particularly with regard to sex selection and disposition of unwanted embryos [26, 27]. In contrast to the Massachusetts study, however, this study did not find any significant gender preferences based on patient ethnicity or education level. This may be in part due to the Illinois study population being relatively more ethnically diverse and having a lower level of education.

As this study confirms, the large proportion of demand for sex selection from patients without any children may create an ethical dilemma. The ASRM Ethics Committee has deemed the “desire for gender variety in a family” to be a prerequisite for any families wanting to use sex selection for non-medical reasons. However, with an anticipated high demand coming from nulliparous women, clinics offering sex selection will have to decide how to selectively handle such requests.

It is interesting that a significant proportion of infertility patients would be interested in using sex selection. This is in contrast to the data collected from our recent web-based survey of 1,197 men and women aged 18–45 within the United States general population, where only 8% of respondents would use preconception sex selection technology for nonmedical reasons [20]. One possible explanation may be that infertile couples may see their next pregnancy as their last chance to have a child and would therefore like to have an option of choosing the sex. They may also be in a position where they would be undergoing an IUI or IVF procedure as part of their treatment anyway, making preimplantation sex selection an easy ‘add-on’ option.

Conclusion

There is little doubt that as preimplantation sex selection technology becomes more widespread, there will be many infertile couples ready to make use of such services. Our study further confirms that a significant portion of this demand will come from patients who do not have any children or have children all of one sex. Medical societies, fertility clinics, ethicists, and policy makers may need to reassess how to deal with use of such technology.

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