

Preconception sex selection demand and preferences in the United States

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Objective: Preconception sex selection for nonmedical reasons raises important moral, legal, and social issues. The main concern is based upon the assumption that a widely available service for sex selection will lead to a socially disruptive imbalance of the sexes. For a severe sex ratio distortion to occur, however, at least two conditions have to be met. First, there must be a significant preference for children of a particular sex, and second, there must be a considerable interest in employing sex selection technology. Our objective was to ascertain such demand and preferences among the United States general population.

Design: Cross-sectional web-based survey.

Setting: United States general population.

Patient(s): One thousand one hundred ninety-seven men and women aged 18 to 45 years.

Intervention(s): None.

Main Outcome Measure(s): Web-based questionnaire assessing preferences for sex of children and demand for preconception sex selection for nonmedical reasons.

Result(s): Eight percent of respondents would use preconception sex selection technology, 74% were opposed, and 18% were undecided. If the sex selection process was simplified to taking a pill, 18% would be willing to use such a medication, 59% were opposed, and 22% were undecided. In terms of gender choices, 39% of respondents would like their first child to be a son, 19% would like their first child to be a daughter, and 42% had no preference. Overall, 50% wished to have a family with an equal number of boys and girls, 7% with more boys than girls, 6% with more girls than boys, 5% with only boys, 4% with only girls, and 27% had no preference.

Conclusion(s): Preconception sex selection technology via sperm separation is unlikely to be used by the majority of the United States population and is unlikely to have a significant impact on the natural sex ratio. (Fertil Steril® 2006;85:468–73. ©2006 by American Society for Reproductive Medicine.)

Key Words: Sex selection, sperm sorting, MicroSort, gender preferences, sex ratio, social survey, law, ethics, health policy

Preconception sex selection technology that separates X- and Y-bearing sperm is currently available in the United States as part of an FDA-approved clinical trial via the Genetics and IVF Institute (Fairfax, VA) and over 100 collaborating clinics in 30 states (1). The technology employs a flow cytometer that separates the 2.8% heavier X- from Y-bearing sperm to produce an X- or Y-enriched sperm sample for artificial insemination or in vitro fertilization (2–4). Upon successful completion of the clinical trial (which began in 1995), the potential exists for widespread dissemination

and marketing of this technology throughout the United States (5).

Because use of such technology poses important moral, legal, and social issues, it has become one of the most controversial topics in bioethics today (6–9). Some concerns include an inappropriate use of limited medical resources (10), the perpetuation of sexist attitudes that reinforce discrimination against women (11), the fear that children born as a result of sex selection may be expected to act in certain gender-specific ways (12), and the acceleration of trends toward selection of offspring characteristics and the creation of “designer babies” (13).

The main concern, however, is that a widely available service for preconception sex selection may distort the natural sex ratio and lead to a socially disruptive imbalance of the sexes, as has occurred in countries such as

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China and India (14–20). Even uncompromising advocates of procreative liberty concede that a severe distortion of the sex ratio would justify limits on reproductive freedom (21–26).

However, whether or not a sex ratio distortion poses a real threat to Western societies is an empirical question that cannot be answered by intuition, but only by evidence. For a severe sex ratio distortion to occur, at least two conditions must be met. First, there must be a marked preference for children of a particular sex, and, second, there must be a considerable demand for a reproductive service for preconception sex selection. Moreover, both conditions need to be met simultaneously. For example, if there was a marked preference for children of a particular sex but couples were unwilling to use sex selection technology (because it was thought to be too intrusive, too

expensive, or immoral), then a widely available service for sex selection would not have a significant demographic impact.

To determine whether or not these two conditions are met, we conducted a nationwide representative survey on gender preferences and demand for preconception sex selection in the United States.

MATERIALS AND METHODS

A self-administered, web-based survey was conducted using a previously validated questionnaire (Table 1) (27). Harris Interactive (Rochester, NY), a market-research firm specializing in internet-based research methods, was commissioned to conduct the nationwide survey, drawing upon its Harris Poll Online Panel to identify potential

TABLE 1

Questionnaire.

Suppose you did not have any children but would very much want to.

1. If given a choice, would you like your first born child to be
 - a boy
 - a girl
 - do not care
 - not sure
2. If you would like to have more than one child, would you prefer to have
 - only boys
 - only girls
 - more boys than girls
 - more girls than boys
 - an equal number of boys and girls
 - do not care
 - not sure
3. It may soon be possible for parents to choose the sex of their children. Couples interested in such a service would have to visit a Fertility Center, provide a sperm sample, undergo an average of three to five cycles of intrauterine insemination, and pay a fee of approximately \$2,500 per attempt. Would you take advantage of this technology?
 - yes
 - no
 - not sure
4. Suppose, the procedure would require just a single cycle of intrauterine insemination, could be performed in any doctor's office, and would be covered by your health insurance. Would you then consider taking advantage of it?
 - yes
 - no
 - not sure
5. Suppose, there was a medication enabling parents to choose the sex of their children. Couples simply had to ingest a blue pill to ensure the birth of a boy or a pink pill to ensure the birth of a girl. Would you take advantage of such a medication?
 - yes
 - no
 - not sure

Dahl. Sex selection. Fertil Steril 2006.

respondents (who were invited to participate in the survey via e-mail).

The five-question survey was conducted between September 1 and 3, 2004, of a sample of 1,197 men and women between the ages of 18 and 45 throughout the United States. Each respondent was issued a unique password to guard against multiple responses from any participants. A proprietary web-based technology that enables large numbers of respondents to simultaneously complete the survey was used.

The demographic characteristics (age, sex, ethnicity, education, income, marital status, and region of residence) of the population sampled were weighted where necessary to reflect United States census estimates of American adults aged 18 to 45. Propensity score weighting was also used to adjust for respondents' propensity to use the internet. In theory, with a probability sample of this size, one could say with 95% certainty that the results have a sampling error of ± 3 percentage points owing to the probability that a sample is not a perfect cross-section of the total population from which it was drawn). All Harris Interactive surveys are designed to comply with the code and standards of the Council of American Survey Organizations (CASRO) and the code of the National Council of Public Polls.

RESULTS

The demographic characteristics of the survey respondents are presented in Table 2. Both men and women responded equally to the survey (49% and 51%, respectively). Married respondents made up 53%, with most having some college or more (61%), and most working full or part time (58%). Some demographic questions were not answered by every respondent.

The computer-tabulated results for each survey question are as follows:

1. Participants were asked if, given a choice, they would want their first child to be male or female. Thirty-nine percent of respondents would like their first child to be a boy, 19% would like the first child to be a girl, and 42% stated that they have no preference about the sex of their first child (Fig. 1A). The divorced/separated group was less likely to have a sex preference (28% for a boy and 17% for a girl) than the married participants (38% for a boy and 21% for a girl) and the single/never-married participants (43% for a boy and 13% for a girl).
2. Provided they would like to have more than just one child, participants were asked, if, given a choice, they would want only boys, only girls, more boys than girls, more girls than boys, as many girls as boys, or whether the sex of their children would not matter to them at all. Five percent preferred only boys, 4% only girls, 7% more boys than girls, 6% more girls than boys, 50% as many girls as boys, and 27% had no preference (Fig. 1B).

TABLE 2

Demographics of survey respondents (n = 1,197).

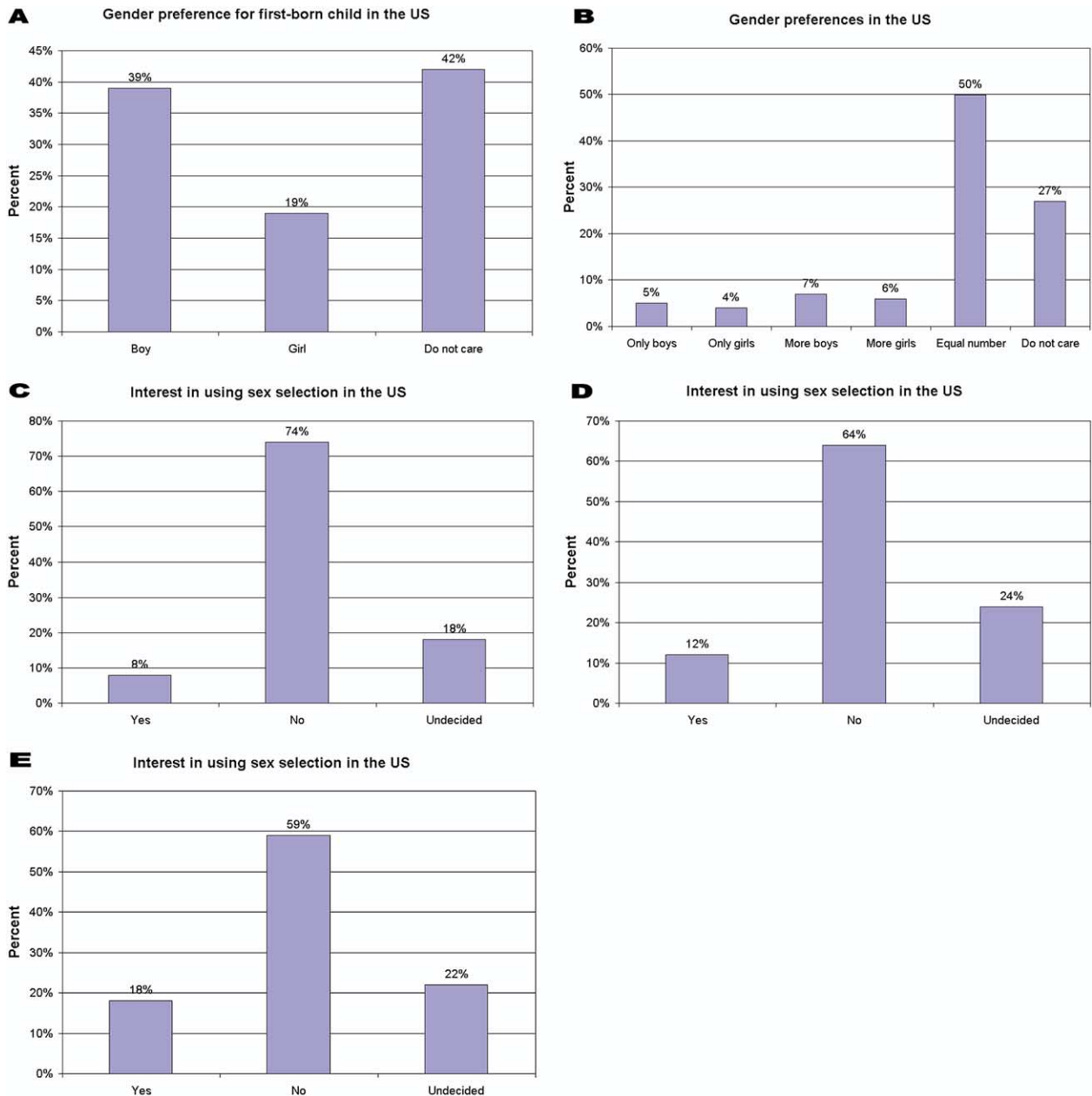
Gender	
Male	587 (49.0%)
Female	610 (51.0%)
Age (ys)	
18–34	692 (57.8%)
35–45	505 (42.2%)
Marital status	
Single/never married	406 (37.4%)
Married	576 (53.0%)
Divorced/separated	104 (9.6%)
Region of residence	
Northeast	214 (18.0%)
Midwest	243 (20.4%)
South	425 (35.7%)
West	310 (26.0%)
Education (highest level)	
High school or less	473 (39.5%)
Some college	396 (33.1%)
4-year college or more	328 (27.4%)
Household income	
<\$35,000	375 (35.2%)
\$35,000–\$49,999	158 (14.8%)
\$50,000–\$74,999	203 (19.1%)
>\$75,000	329 (30.9%)
Employment status	
Full-time/self-employed	674 (47.8%)
Part-time	144 (10.2%)
Student	186 (13.2%)
Unemployed	392 (27.8%)
Retired	15 (1.0%)

Dahl. Sex selection. Fertil Steril 2006.

3. Participants were then asked if they could imagine selecting the sex of their children via sperm separation technology. In order to make an informed decision, participants were given details on the procedure and its cost. Whereas 8% of respondents could imagine taking advantage of such technology, 74% were opposed, and 18% were undecided (Fig. 1C).
4. To establish whether the 92% (n = 1,103) who were either opposed or undecided toward using sperm separation technology for sex selection were in fact not interested in sex selection or simply found the procedure to be too demanding, we asked them if they could imagine using this technology if it could be performed in any doctor's office, required only a single cycle of intrauterine insemination, and was covered by their health insurance. Given these less demanding circumstances, 12% would use such technology, 64% were opposed, and 24% were undecided (Fig. 1D).

FIGURE 1

(A) Gender preferences for first child (n = 1,197). **(B)** Gender preferences for all children born (n = 1,197). **(C)** Interest in preconception sex selection when couples have to undergo three to five cycles of intrauterine insemination and have to pay for the treatment themselves (n = 1,197). **(D)** Among the 92% of couples not interested in sex selection with the conditions noted in Figure 1C, the interest in preconception sex selection if couples had to undergo just a single cycle of intrauterine insemination and treatment were covered by health insurance (n = 1,103). **(E)** Interest in preconception sex selection if there were a medication to select the sex of their children (n = 1,197).



Dahl. Sex selection. *Fertil Steril* 2006.

5. Finally, we asked the participants to imagine there was a medication to select the sex of their children. Rather than visiting a fertility center, they would simply have to take a “pink pill” to ensure the birth of a girl or a “blue pill” to ensure the birth of a boy. While 18% would be willing

to use such a medication, 59% were opposed, and 22% were undecided (Fig. 1E). Compared to the 8% of respondents in question 3 who were willing to use sex selection, the 18% of respondents who were willing to use “a pill” were more likely to have a household income less than

\$35,000 (22% versus 6%) and to have a high school education or less (19% versus 6%).

Individual answers to all five questions posed did not yield any significant differences by age, sex, ethnicity, education, or income.

DISCUSSION

To our knowledge, this is the first study in the medical literature that examines the demand and preferences for preconception sex selection technology among a representative general population of the United States. Our study shows that only 8% of Americans would consider using preconception sex selection technology for nonmedical reasons. If the process were simplified to taking a pill, only 18% would wish to choose the sex of their child. Furthermore, the majority of Americans (77%) either prefer to have an equal number of boys and girls or have no preference.

The results of our study are consistent with findings from prior social research. For example, based on a cross-cultural survey on parental gender preferences conducted in the 1970s, Nancy E. Williamson predicted that “if a reasonably practical, safe, and effective method of sex selection were to become available, it will probably be used by relatively few couples and mostly to have at least one child of each sex” (28, 29).

In an extensive social survey of 5,981 married women under 45 years of age residing in the United States, Westoff and Rindfuss (30) found striking evidence for the desire to have a balanced sex composition of their family: “Despite a strong preference for a first-born boy, the gender preferences for subsequent children were overwhelmingly determined by the sex of existing children: 85% of women with two boys indicated a preference for a girl, and 84% of women with two girls registered a preference for a boy. [. . .] Overall, 51.1% preferred the next child to be male, and 48.9% preferred the next child to be female, yielding a sex ratio of 104. In terms of sampling error, this is indistinguishable from the current sex ratio of 105. Thus, the implication is that, apart from the transitional period, sex control technology would have very little effect on the sex ratio at birth.”

According to a survey among 140 primiparous American women conducted by Steinbacher and Gilroy (31), 18% preferred to have a boy, 23% preferred to have a girl, and 59% expressed no preference at all. Asked, “If the means were available to you so that you could have selected the sex of your child, would you have done so?,” 18% answered yes, 53% no, and 29% were undecided. Of the 26 women who said they would have used sex selection, 13 would have done so to ensure the birth of a boy and 13 would have done so to ensure the birth of a girl.

In a recent survey conducted by Jain et al. (32), among 561 American infertility patients, 229 (40.8%) women stated that they would like to be able to choose the sex of their

children as part of their infertility treatment. Of these 229 women, 13 (5.7%) had children of both sexes, 111 (48.4%) had children of only one sex, and 105 (45.9%) had no children at all. Of the 13 women having children of both sexes, 5 (38.5%) preferred to have another boy, and 8 (61.5%) preferred to have another girl. Of the 105 women having no children, 36 (34.3%) desired to have a boy, and 69 (65.7%) desired to have a girl. Additionally, of the 111 women having children of only one sex, 37 (74.0%) mothers of girls wished for a boy, and 50 (82.0%) mothers of boys wished for a girl. In other words, “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” (32).

It is certainly interesting that in the study by Jain et al. (32), a larger proportion of infertility patients expressed a desire for sex selection (40.8%) compared to our findings in the general population (8%). There could be several potential reasons for this discrepancy. Infertility patients are more familiar with procedures such as intrauterine insemination, and thus may not see sex selection as a cumbersome process. Also, infertility patients may wish to choose the sex of their next child since they may perceive that their likelihood of having future children is limited. Data on these potential factors, however, are lacking.

There can sometimes be quite a difference between what people say and what they actually do. Thus, it is quite reassuring that other demographic research that has focused on examining when couples stop having more children does indeed confirm the stated preference for a gender-balanced family. In the United States, couples with two boys and couples with two girls are significantly more likely to have a third child than couples with one boy and one girl, suggesting that parents with children of both sexes are more content with their family composition (33–36).

Perhaps even more instructive than social surveys and demographic research are data collected by fertility clinics already offering preconception sex selection. According to a report of a fertility center in New York City, all of the 120 American couples seeking sex selection were doing so for the sole purpose of family balancing: “They selected girls when they had boys at home and boys when there were only girls” (37). Likewise, Gametrics Limited in Alzada, Montana, which detailed the collective experience of 65 fertility clinics, states, “The overwhelming majority had two or more children of the same sex and desired a child of the opposite sex” (38). Finally, the Genetics & IVF Institute in Fairfax, Virginia, reports, “The majority of couples (>90.5%) in our study were seeking gender pre-selection for family balancing purposes, were in their mid-thirties, had two or three children of the same sex, and desired only one more child” (39).

It is only a matter of time before preconception sex selection technology becomes widely available and marketed throughout the United States. With the numerous ethical issues posed by use of such technology, our study provides

some reassurance that preconception sex selection is unlikely to be used by the majority of the population and is unlikely to have a significant impact on the natural sex ratio.

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