






Psychology and counselling

Donor sibling relations among adult offspring conceived via insemination by lesbian parents

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ABSTRACT

STUDY QUESTION: How do adult offspring in planned lesbian-parent families feel about and relate to their donor (half) sibling(s) (DS)?

SUMMARY ANSWER: A majority of offspring had found DS and maintained good ongoing relationships, and all offspring (regardless of whether a DS had been identified) were satisfied with their knowledge of and contact level with the DS.

WHAT IS KNOWN ALREADY: The first generation of donor insemination offspring of intended lesbian-parent families is now in their 30s. Coincident with this is an increased use of DNA testing and genetic ancestry websites, facilitating the discovery of donor siblings from a common sperm donor. Few studies of offspring and their DS include sexual minority parent (SMP) families, and only sparse data separately analyze the offspring of SMP families or extend the analyses to established adult offspring.

STUDY DESIGN, SIZE, DURATION: This cohort study included 75 adult offspring, longitudinally followed since conception in lesbian-parent families. Quantitative analyses were performed from online surveys of the offspring in the seventh wave of the 36-year study, with a 90% family retention rate. The data were collected from March 2021 to November 2022.

PARTICIPANTS/MATERIALS, SETTING, METHODS: Participants were 30- to 33-year-old donor insemination offspring whose lesbian parents enrolled in a US prospective longitudinal study when these offspring were conceived. Offspring who knew of a DS were asked about their numbers found, characteristics or motivations for meeting, DS terminology, relationship quality and maintenance, and impact of the DS contact on others. All offspring (with or without known DS) were asked about the importance of knowing if they have DS and their terminology, satisfaction with information about DS, and feelings about future contact.

MAIN RESULTS AND THE ROLE OF CHANCE: Of offspring, 53% (n = 40) had found DS in modest numbers, via a DS or sperm bank registry in 45% of cases, and most of these offspring had made contact. The offspring had their meeting motivations fulfilled, viewed the DS as acquaintances more often than siblings or friends, and maintained good relationships via meetings, social media, and cell phone communication. They disclosed their DS meetings to most relatives with neutral impact. The offspring, whether with known or unknown DS, felt neutral about the importance of knowing if they had DS, were satisfied with what they knew (or did not know) of the DS, and were satisfied with their current level of DS contact. This study is the largest, longest-running longitudinal study of intended lesbian-parent families and their offspring, and due to its prospective nature, is not biased by over-sampling offspring who were already satisfied with their DS.

LIMITATIONS, REASONS FOR CAUTION: The sample was from the USA, and mostly White, highly educated individuals, not representative of the diversity of donor insemination offspring of lesbian-parent families.

WIDER IMPLICATIONS OF THE FINDINGS: While about half of the offspring found out about DS, the other half did not. Regardless of knowing of a DS, these adult offspring of lesbian parents were satisfied with their level of DS contact. Early disclosure and identity formation about being donor-conceived in a lesbian-parent family may distinguish these study participants from donor insemination offspring and adoptees in the general population, who may be more compelled to seek genetic relatives. The study participants who sought DS mostly found a modest number of them, in contrast to reports in studies that have found large numbers of DS. This may be because one-third of study offspring had donors known to the families since conception, who may have been less likely to participate in commercial sperm banking or internet donation sites, where quotas are difficult to enforce or nonexistent. The study results have implications for anyone considering gamete donation, gamete donors, donor-conceived offspring, and/or gamete banks, as well as the medical and public policy professionals who advise them.

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Introduction

According to the latest available estimates, donor insemination (DI) was used by over 400 000 women for conception in US health facilities in 2015–2017, with 43% of users being sexual minority women. Actual usage is higher due to at-home insemination and likely underreporting (Arocho et al., 2019). DI is now permitted in the majority of surveyed countries worldwide (Horton et al., 2022). Insemination had previously only been available to heterosexual couples, but since the 1980s, sperm banks have offered DI to unmarried women and lesbian-identified parents (Hertz et al., 2017; Horton et al., 2022; The Sperm Bank of California, 2022b). A single sperm donor can contribute to multiple offspring in multiple families; these offspring are known as donor siblings (DS), donor half-siblings, or same-donor peers.

The first generation of DI offspring of intended lesbian-parent families is now in their 30s, coincident with several chronological changes, all contributing to the relatively new and burgeoning phenomenon of seeking DS. There are only limited data on adult DI offspring of sexual minority parent (SMP) families and their DS relationships, including whether DS were sought, as well as feelings about their DS even if not sought or found.

Evaluating these established adult DI offspring now is germane for several reasons: they are age-eligible (18 years or older) to seek their donor and/or DS; they may have experienced life events (e.g. marriage, parenthood or medical illness) that compel interest in their genetic origins (Crawshaw, 2002); and they may feel that seeking genetic relatives is now less threatening to their nonbiologic mother than when they were younger and/or residing with parents (Jadva et al., 2010). In addition, the increased availability of direct-to-consumer (DTC) DNA testing, ancestry databases, and social media sleuthing has facilitated finding DS (Jadva et al., 2010; Samplaski and Klipstein, 2020).

At the same time, information on adult DI offspring of SMPs and their possible DS is limited by several circumstances. First, offspring must identify their sperm donor before finding unknown DS, and DI has historically been shrouded in secrecy. DI anonymity was only lifted in 1983 when The Sperm Bank of California offered open-identity donations, so offspring could learn their donor's identity starting at age 18 (The Sperm Bank of California, 2022b). In 1997, this same facility started a mutual-consent registry for families who shared the same donor. Parents could join once their child was born, and DI offspring were eligible when they reached age 18 (The Sperm Bank of California, 2022a). Other fertility programs have been offering DS identification to offspring who are age-eligible for information (Indekeu et al., 2021). Second, concerns regarding losing child custody drove some SMPs toward anonymous (nonidentified) rather than known (directed) or open-identity donors (Gartrell et al., 2015). Finding DS is more difficult after nonidentified DI, which is still the only legal option in many jurisdictions (Calhaz-Jorge et al., 2020). Third, there is wide variation in reporting DI livebirths per donor (Calhaz-Jorge et al., 2020; Mroz, 2021; ESHRE Working Group on Reproductive Donation et al., 2022). Fourth, despite increased acknowledgment of a person's right to know their donor, there is no consensus guiding DS identification (Ethics Committee of the American Society for Reproductive Medicine, 2018; ESHRE Working Group on Reproductive Donation et al., 2022). Fifth, while some DI offspring hope to locate DS, others may be ambivalent about finding DS, with concerns about their own identity, sense of agency, and family cohesion, particularly when the timing and numbers of DS found can be uncontrollable. There have been reports of large numbers of additional DS appearing once a single DS match is made (We Are Donor

Conceived Survey, 2020; ESHRE Working Group on Reproductive Donation et al., 2022; Bolt et al., 2023). Finally, permanent anonymity was central to the contractual DI agreements of anonymous donors, partially for donor privacy and protection from responsibility for any offspring. Respect for the original anonymity guarantees that there is no potential harm to donors and their own families (Indekeu et al., 2021), and the possible decreased willingness of men to donate sperm in the future (Bay et al., 2014) leads some ethicists to question the right of offspring to supersede the donor's privacy, even in the service of finding their DS (Cohen et al., 2016; Ethics Committee of the American Society for Reproductive Medicine, 2019; Keshevan, 2019; Hodson et al., 2022).

Nevertheless, several developments have spurred contact between DI offspring and their donors and DS. First, open-identity DI is trending upward in jurisdictions worldwide and in some private fertility facilities (Indekeu et al., 2021). Second, since the 2000s, organizations led by DI offspring or their parents (e.g. Donor Sibling Registry) (Jadva et al., 2010), private fertility programs, and government agencies have launched registries for donor-conceived (DC) individuals (Indekeu et al., 2021). Third, the explosion of DTC DNA testing promoted by genealogy services, along with social media investigations and the use of facial-recognition software, has led to contact among DI offspring and their genetic relatives, even when unsought (Jadva et al., 2010; Ethics Committee of the American Society for Reproductive Medicine, 2019; Samplaski and Klipstein, 2020). Finally, scholarly and popular press reports on the current 'genome era', DS discoveries, and DS group formation may have spurred interest in gene matching generally, and in DS specifically (Naveed et al., 2015; Baden-Laser and Dominus, 2019; Ore, 2020; Mroz, 2021).

By July 2023, there were an estimated 45.7 million DNA profiles in the major DTC genetic databases (International Society of Genetic Genealogy, 2023), some associated with genetic relative-finder services. Among DTC DNA profilers, 82% had found any relative and 10% had discovered a full or half-sibling; more matches are expected as DTC DNA testing expands further (Guerrini et al., 2022). The internet group 'We Are Donor Conceived' reported that 78% of surveyed members had found their donor, and 72% had found DS, using DTC DNA testing (We Are Donor Conceived Survey, 2020).

Few studies of DI offspring and DS have included SMP families, and even fewer have included 30-year-old offspring. A study of membership in the Donor Sibling Registry or Single Mothers by Choice (web-based organization of single mothers) had 76% heterosexual parent offspring and 18% SMP offspring aged 13 to over 50 years (Hertz et al., 2017). DS contact was not separated by family type, and all participants had already sought their previously unknown sperm donor and/or DS via the studied organization(s). A qualitative report on different family types from The Sperm Bank of California's open-identity sperm donor program featured 47 offspring who had received their donor identification. All offspring (not separated by family type) had contacted DS to satisfy curiosity, seek a potential relationship, and/or connect with another DI person. Their mean age was 23.9 years, half had lesbian-couple parents, half had linked to DS at their parents' initiative (before the offspring were age-eligible), and only four offspring of lesbian-couple parents independently had contacted their DS after age 18 (Scheib et al., 2020). Currently, there is a paucity of information about those who independently seek their DS in adulthood, and a lack of data about DI offspring of SMP families who choose not to seek their DS.

Research on how DI offspring from planned lesbian-parent families feel about their DS is important, as the findings are relevant for SMPs, DC persons from any family type and gamete donors, as well as professionals and organizations working on their behalf (e.g. reproductive technology/gamete donation clinics, psychological and social service professionals, registries of DC individuals). The findings have implications for limiting the offspring allowable per donor and/or geographic area, uploading one's DNA profile online, timing of DI and DS disclosure to offspring, optimizing DS contact, and tensions between the DI offspring's desire for connection versus hesitancy regarding DS contact (Samplaski and Klipstein, 2020; Indekeu et al., 2021; ESHRE Working Group on Reproductive Donation et al., 2022).

Due to the importance of understanding more about how the adult DI offspring of SMP families find and relate to their DS, independently of their parent(s), and the lack of such information, the current study explores these DS relationships. The US National Longitudinal Lesbian Family Study (NLLFS) began in 1986 with the goal of providing prospective data on the first generation of planned lesbian-parent families (Gartrell et al., 1996). What distinguishes the NLLFS from other studied DI offspring is that all are 30–33 years old and have always known of their DI origins, a substantial proportion have always had a directed (always known) donor, a substantial proportion have always known they would be eligible to identify their donor once they reached age 18, and some have always known they had DS. All of these factors may have affected their views on DS. Based on the recent NLLFS seventh wave surveys, this unique cohort of DI adult (30- to 33-year-old) offspring with a diversity of sperm donor types provided a novel opportunity to examine the following key questions: How important is it for offspring to know if DS exist? How many DS have been found and contacted by the offspring, and what characterizes the contact? What terms are used for DS, and how do offspring feel about the level of contact?

Materials and methods

Study design

The US NLLFS has prospectively followed a cohort of lesbian-parent families from offspring conception, through childhood, and into adulthood (Gartrell et al., 1996). Participants in the current study were 30- to 33-year-old adults whose lesbian parents enrolled in the ongoing, community-based NLLFS from 1986 to 1992, while conceiving or pregnant with these index offspring. For Wave 1, prospective parents were garnered through announcements in lesbian/gay periodicals, women's bookstores and at lesbian events. There was a 5.5-year difference between the birth of the youngest and oldest index offspring, due to the extended recruitment (Gartrell et al., 1996). Since 1992, the parents have been surveyed in seven waves, while the offspring have been surveyed since age 10 (Gartrell et al., 2005, 2018; Gartrell and Bos, 2010). The NLLFS started with 84 planned lesbian-parent families. With 75 families at Wave 7, the retention rate is 90%.

After Sutter Health Institutional Review Board approval, each offspring was emailed upon reaching age 30. The purpose, procedure, and voluntary confidential nature of the study were explained. After obtaining informed consent, the survey was conducted via a protected online program. Data were collected from March 2021 to November 2022. Participants received a \$60 gift card.

Demographics

Demographic information on the total analytic sample of 75 NLLFS offspring is shown in Table 1. There were approximately equal numbers of female and male participants. Most offspring were White, college graduates, and in a significant relationship. The conventional donor types of anonymous, open-identity, and known since childhood were categorized more specifically, using updated terminology (Ethics and Practice Committees of the American Society for Reproductive Medicine, 2022), into currently identified and nonidentified donors. In this terminology, 53% (n = 40) had currently identified donors, including formerly anonymous donors contacted through the DI registry, open-identity donors contacted since age 18, and directed donors known since childhood. The remainder, 47% (n = 35), had currently nonidentified anonymous donors or nonidentified open-identity donors.

Measures

Donor sibling initial contact

Offspring were asked: 'How important is it for you to know if you have half-siblings in other families who were conceived through your donor?' (Not important, Neutral, Important); 'Have you found out if you have any DS?' (Yes, No); 'If yes, how many?'; 'Have you contacted or met any of them?' (Yes, No); 'How old were you when you contacted/met a DS for the first time?'

Table 1. Demographics of offspring (N = 75).

Variable		
Sex assigned at birth (n, %)		
Female	39	52.0
Male	36	48.0
Gender identity (n, %) ¹		
Cisgender	73	97.3
Gender nonbinary	2	2.7
Age, M (SD) ²	30.93	0.92
Race/Ethnicity (n, %)		
People of color ^{3,4}	7	9.3
White	68	90.7
Educational level (n, %)		
Some college	7	9.3
College degree	38	50.7
More than college	30	40.0
Sexual orientation (n, %) ⁵		
Straight/heterosexual	51	68.0
Gay/lesbian	3	4.0
Bisexual	7	9.3
Queer	13	17.3
Other	1	1.3
Ongoing committed relationship, yes (n, %)	59	78.7
Have children, yes (n, %)	8	10.7
Donor types (n, %)		
Anonymous		
Nonidentified	20	26.7
Contacted through DI registry ⁶	7	9.3
Open-identity		
Nonidentified	15	20.3
Contacted since age 18 ⁷	9	12.0
Known since childhood (Directed)	24	32.0

¹ The question on gender identity was: 'Do you currently describe yourself as man, woman, or transgender?' The two offspring who identified as transgender indicated on a follow-up question, 'How would you describe your gender identity in your own words?' that they were gender nonbinary. Cisgender offspring were those whose sex assigned at birth was the same as their gender identity when they completed the survey.

² Age range: 30–33.

³ Based on Wave 6 information.

⁴ African American/Black: n = 3, Latina/or Hispanic: n = 1, Other or mixed:

n = 3.

⁵ Due to rounding, the total percentage is 99.9%.

⁶ All but one offspring who contacted their donor also met him.

⁷ All who contacted their donor also met him.

(drop-down 18–38 years); ‘How many DS have you contacted or met?’; and ‘How did you contact or meet them?’ (multiple checklist answers allowed).

Relationships with donor siblings

Offspring who had contacted DS were asked: ‘Which of the following questions motivated you to contact or meet them?’ (multiple checklist answers allowed); ‘Thinking back to your main reasons for contacting/meeting them, do you feel that these have been fulfilled?’ (1 = No, definitely not, to 5 = Yes, very much so, and why or how?); ‘Do you consider this/these DS ...?’ (multiple checklist terminology answers allowed); ‘Overall, how well do you get along with your DS?’ was asked to assess the quality of the relationship (1 = Very badly, to 5 = Very well); ‘With how many DS do you have ongoing contact?’; ‘How do you maintain your contact?’ (multiple checklist answers allowed); ‘Is/are there DS with whom you have formed (a) close relationship(s)?’ (Yes, No). These offspring were further asked: ‘Have you told anyone about contacting/meeting them?’ (multiple checklist answers allowed); and ‘What impact has contacting/meeting them had on your relationship with your family member(s)?’ (1 = Negative, 2 = Mixed, neutral, not sure, not applicable, 3 = Positive).

Views on donor siblings, whether known or unknown

All offspring were asked: ‘Whether or not you have found, contacted or met any of these possible DS: Do you consider them...?’ (multiple checklist answers allowed); ‘How satisfied are you with the information you have or do not have about them?’ (1 = Very dissatisfied, to 5 = Very satisfied); and ‘What are your feelings about future contact with them?’ (1 = I do not want any or any more contact, 2 = Neutral, 3 = I am satisfied with the current level of contact, 4 = I would like contact or more contact).

Data analysis

The current study has a strong descriptive approach. Frequencies, percentages, means, and SDs were calculated for responses to the research questions. These analyses were done in SPSS (version 27).

Results

Donor sibling initial contact

As shown in Table 2, the offspring felt neutral ($M = 2.05$, $SD = 0.84$, on a scale of 1 to 3) about knowing if they had any DS. About half of offspring knew of having one or more DS, and of those, 75% had found five or fewer. Those who knew of DS made contact at a median offspring age of 19.0 years. Contact was typically initiated through DI or DS registries (45.2%), while others contacted their DS via the donor (29%) or via their parent(s) (29%).

Relationships with donor siblings

For the 31 offspring who had contacted or met DS, Table 3 details their contact motivations, terminology used, how well they got along, number of DS with whom ongoing contact had been maintained, way(s) in which their relationship had been maintained, and whether a special relationship(s) had formed. Seven of nine participants who listed contact motivation as ‘other’ explained that they did not actually have a motivation because they had known their DS since birth. Of offspring who had contacted their DS, the term ‘acquaintance’ was chosen by 49%, ‘brother/sister’ by 39%, ‘friend’ by 36%, and ‘relative’ by 26% of respondents, with multiple responses allowed, regardless of whether one or many

Table 2. Donor sibling initial contact.

Variable		
Importance of knowing if you have donor siblings in other families who were conceived through your donor (M, SD) ¹	2.05	0.84
Found out that you have any donor sibling, yes (n, %) ²	40	53.3
How many donor siblings (n, %) ^{3,4}		
1	9	22.5
2–5	21	52.5
6–10	4	10.0
11–20	0	0
20+	3	7.5
No number provided	3	7.5
Contacted or met donor siblings, yes (n, %) ³	31	77.5
Age at contact/meeting first donor sibling (median)	19.0	
How many donor siblings were contacted/met (n, %) ^{5,6}		
1	13	41.9
2–5	13	41.9
Over 5 ⁷	3	9.7
No number provided	2	6.5
How was contact initiated (multiple answers allowed) (n, %) ⁵		
Through donor sibling/sperm bank registry(ies)	14	45.2
Through the donor	9	29.0
Through the parent(s)	9	29.0
Other	2	6.5

¹ 1 = Not important, to 3 = Important. Observed minimal and maximal scores were 1.00 and 3.00, respectively.

² Percentages are based on total sample ($N = 75$).

³ Percentages are based on those who found they had (a) donor sibling(s) ($n = 40$).

⁴ Participants responded to an open-ended question regarding the number of donor siblings they knew of. The answers were recoded into four categories with a minimal number of 1 and a maximal number of over 50+.

⁵ Percentages are based on those who contacted or met (a) donor sibling(s) ($n = 31$).

⁶ Participants responded to an open-ended question regarding the number of donor siblings they contacted or met. The answers were recoded into four categories, with a minimal number of 1 and a maximal number of 20+.

⁷ One participant had contacted 8, 1 had ‘around 15’, and 1 had ‘around 20’ siblings.

DS had been contacted. Most chose only one term, but seven respondents chose two terms (three chose ‘friend’ and ‘relative’, two chose ‘brother/sister’ and ‘friend’, and two chose ‘acquaintance’ and ‘relative’). Offspring disclosure of their DS contact to others, and the impact of that contact on their relationship with their family members, is also presented in Table 3.

Views on donor siblings, whether known or unknown

All 75 offspring (even if no DS were sought or known) described their terminology for DS, their satisfaction with the amount of information available, and their wishes for future contact with their DS, as shown in Table 4.

Discussion

This is the first study to focus on the relationships between established adult DI offspring from SMPs and their DS. Wave 7 of the US NLLFS, at 36 years since inception, surveyed 30- to 33-year-old offspring, among the first generation conceived through DI using a diversity of sperm donor types, in planned lesbian-parent families. The adult offspring reported on characteristics of first contact with a DS and their relationships with DS,

Table 3. Relationships with the donor sibling(s).

Variable		
Motivation for contacts with donor sibling(s) (multiple answers allowed) ¹ (n, %)		
What they are like	19	61.3
To have a better understanding of why I am who I am	12	38.7
To form relationships	12	38.7
Do they want a relationship with me	10	32.3
What their families are like	9	29.0
Other ²	9	19.4
What do they think about being donor conceived	6	19.4
Health/Genetic questions	6	19.4
To have a better understanding of my ancestral history and family background	6	19.4
To incorporate them into my family	5	16.1
Meeting motivations fulfilled (M, SD) ^{1,3}	4.03	0.98
Terminology for contacted donor sibling(s) (multiple answers allowed) (n, %) ¹		
Acquaintance(s)	15	48.4
Brother(s)/Sister(s)	12	38.7
Friend(s)	11	35.5
Relative(s)	8	25.8
Other	1	3.2
Quality of donor sibling relationship (M, SD) ^{1,4}	4.03	0.84
With how many donor siblings is there ongoing contact (n, %) ^{1,5}		
0	11	35.5
1	11	35.5
2–5	8	25.8
Over 5	1	3.2
Ways in which contact is maintained (multiple answers allowed) (n, %) ⁶		
Meetings	12	60.0
Social media	11	55.0
Phone calls	8	40.0
Emails	7	35.0
Other ⁷	7	35.0
Gifts	3	15.0
Letters or cards	1	5.0
Disclosure of donor sibling contact to others (n, %) ¹	31	100.0
Disclosure of donor sibling contact to (multiple answers allowed) (n, %) ⁸		
I would tell anyone	27	87.1
Biological mother	25	80.6
Other (nonbiological) mother	25	80.6
Close friends	24	77.4
Partner/spouse	18	69.2
Grandparent(s)	10	32.3
Other family member(s)	10	32.3
Mother's current partner	6	19.4
Other nonfamily member(s)	5	16.1
I have not told anyone	0	0
Impact of donor sibling contact on relationship with others (M, SD) ^{9,10}		
Biological mother	2.13	0.34
Other (nonbiological) mother	2.17	0.38
Partner/spouse	2.30	0.47

¹ Percentages or means and SDs are based on participants who contacted their donor sibling(s) (n = 31).

² Seven 'other' written responses were that there was no motivation for contact because they had known their DS since birth.

³ 1 = No, definitely not, to 5 = Yes, very much so. Observed minimal and maximal scores were 2.00 and 5.00, respectively.

⁴ 1 = Very badly, to 5 = Very well. Observed minimal and maximal scores were 3.00 and 5.00, respectively.

⁵ Participants responded to an open-ended question about the number of donor siblings with whom they have ongoing contact. The answers were recoded into five categories, with a minimal score of 0 and maximal of over 5.

⁶ Percentages are based on n = 20 (excluding the participants who answered 0 on the previous question).

⁷ Six 'other' written responses were texting and/or videochatting.

⁸ With the exception of partner/spouse the percentages are based on the 31 participants who contacted their donor sibling(s). Percentages for partner/spouse are based on those who had a partner/spouse and contacted their donor sibling(s).

⁹ Means and SDs for biological mother were based on 23, nonbiological mother on 24, and partner/spouse on 17 participants (since one did not answer this question), respectively.

¹⁰ 1 = Negative impact, to 3 = Positive impact.

Table 4. Views on donor sibling, whether known or unknown, all NLLFS offspring (N = 75).

Variable		
Terminology for donor sibling by all NLLFS offspring (multiple answers allowed) (n, %)		
Only a genetic connection	38	50.7
A distant member of the family	18	24.0
Unrelated	13	17.3
A 'real' sibling	12	16.0
A special relationship, like a good friend	11	14.7
Any other person I know	6	8.0
Other	1	1.3
Satisfaction with information (or not) about donor sibling (M, SD) ¹	3.75	1.08
Feeling about future contact (M, SD) ²	2.68	1.08

¹ 1 = Very dissatisfied, to 5 = Very satisfied. Observed minimal and maximal scores were 1.00 and 5.00, respectively.

² 1 = I do not want any or any more contact, to 4 = I would like to have contact or more contact. Observed minimal and maximal scores were 1.00 and 4.00, respectively.

along with their quality and impact. Views on DS by all offspring, even those who had no known DS, were assessed.

Initial contact with donor siblings

All offspring, even if they had not sought or found any DS, felt neutral about the importance of knowing if they had DS. Early childhood discussions about donor conception with the lesbian-parent offspring of the NLLFS differ from the later-age of such discussions with, or even the lack of such disclosure to, DI offspring among heterosexual-couple families (Jadva et al., 2009; Hertz, 2022). NLLFS parents' efforts to mainstream their family structure by nurturing school and community education and support for their SMP families may have contributed to strong individual and family identity formation (Gartrell et al., 2019). The eminence of social and familial ties, which exist in some lesbian-couple families with a nongenetically related parent, and sensitivity to threatening the bond with the nongenetically related mother by seeking DS, may also be associated with offspring upholding their extant family structure (Blyth et al., 2012; Mamo and Alston-Stepnitz, 2015; Goldberg and Scheib, 2016; Andreassen, 2023). Many of these factors may be associated with the modest drive by NLLFS adult offspring to discover more genetic relatives, including DS, compared to other groups of DI offspring.

One-third of NLLFS offspring have known their donor since childhood. These donors were usually personal friends, relatives, or contacts of their parent(s), and possibly less likely to have also donated at commercial sperm banks (Hayman et al., 2015). Also, donor-to-recipient internet donation services did not exist at the time the NLLFS offspring were conceived (Harper et al., 2017). SMP offspring of directed donors from the 1980s were more likely to know that they have no or only a few DS.

Timing of DC disclosure varies by family type as reported in several studies. The NLLFS offspring were all told of their DC at an age-appropriate time in early childhood. These offspring were surveyed about their views on their donors at age 10 (Gartrell et al., 2005). In a Donor Sibling Registry study, DI discussions occurred before age 3 in more than half of single-mother and lesbian-couple families, but only in 9% of heterosexual-couple families (Jadva et al., 2009). In a study of recipients of open-identity DI at The Sperm Bank of California, 100% of single-mother and lesbian-couple parents, compared to 70% of heterosexual-couple parents, had discussed DI with their offspring by age 14 (Scheib et al., 2003). In a later study from the

same sperm bank of offspring who had received their open-identity donor information, their DC had been disclosed by age 11 in 100% of single-mother and lesbian-couple families and in 55% of heterosexual-couple families (Scheib et al., 2020). Early understanding by the offspring of their parent(s)' rationale for choosing DI, type of donor, and some sense of potential DS numbers may have contributed to consolidation of individual and family identity (Jadva et al., 2010; Goldberg and Scheib, 2016; Andreassen, 2023) and may have affected their feelings about knowing or seeking DS.

More than half of NLLFS offspring had found DS, and most had then made contact. A Donor Sibling Registry study of parents seeking their children's DS reported a median of 3, with a maximum of 55 DS found (Hertz et al., 2017). Most NLLFS offspring found fewer than five DS. One-third of NLLFS offspring had directed donors, with anticipated smaller numbers of potential DS. Two-thirds of the NLLFS offspring had nonidentified or open-identity sperm donors, vulnerable to the lack of enforced offspring limits per donor in the USA, and the wide variation in quotas outside of the USA. The American Society for Reproductive Medicine advises limiting pregnancies to 25 per sperm donor in a population of 800 000 due to consanguinity-risk calculations (Practice Committee of the American Society for Reproductive Medicine and the Practice Committee for the Society for Assisted Reproductive Technology, 2021). This advice is easily bypassed, as donors can donate at multiple sperm banks and can donate privately, including with unregulated donor-to-recipient DI websites (Harper et al., 2017; Taylor et al., 2022). Moreover, reporting of pregnancies is voluntary. There is no regulation of the gamete-banking industry in the USA, and no central reporting registry. Our findings mostly contrast with reports of large numbers of offspring from individual donors (Hertz et al., 2017; Baden-Laser and Dominus, 2019; Ore, 2020; Mroz, 2021).

Relationships with donor siblings

Most of the 31 NLLFS offspring who contacted DS were motivated to find out what the DS are like, but other frequent motives were gaining a better understanding of themselves, and forming (or wondering whether the DS wanted) a relationship. Their meeting motivations were largely fulfilled, comparable to other research (Hertz et al., 2017; Scheib et al., 2020). Although the study populations are somewhat dissimilar, the motivation of 'what are they like?' was chosen by 61% of NLLFS offspring and is most similar to 'curious about what qualities they share with me' cited by 80% in a Hertz et al. (2017) study of Donor Sibling Registry or Single Mothers by Choice offspring who contacted DS on their own, and 'curiosity/questions' cited by 90% in the Scheib et al. (2020) study of open-identity offspring who contacted DS. The motivation of 'forming relationships' was cited by 39% and 'incorporate them into my family' by 16%, compared to 'possibility of a larger extended family' by 43% and 'potential relationship/family' by 75%, among the NLLFS, Hertz et al. and Scheib et al. offspring, respectively. A motivation of 'What do they think about being donor conceived' was cited by 19% in the NLLFS, and 'find someone with the experience of being donor conceived' by 40% in the Scheib et al. study. The motivation of 'health/genetic questions' was cited by 19% in the NLLFS, 'medical information' by 54%, and 'genetic information' by 83% in the Hertz et al. (2017) study. Note that in all three studies, multiple choices were allowed, and the Hertz et al. and Scheib et al. studies included all family types but were not separately analyzed by type (heterosexual-couple, lesbian-couple, and single-mother families). Thus, in all three studies, the most common motivation was curiosity. Other

frequently cited motivations in the Hertz et al. (2017) and Scheib et al. (2020) studies were elected less commonly by NLLFS offspring.

Comparing DS terminology, 'acquaintance' was chosen by 49%, 'brother/sister' by 39%, and 'relative' by 26% of NLLFS offspring with contacted DS (with multiple responses allowed). In the Hertz et al. (2017) Donor Sibling Registry study of offspring (aged 13–50+ years) who had met DS, 42% chose 'part of nuclear family', and 71% chose 'part of extended family' terminology (with multiple responses allowed), thus more frequently affirming a close familial relationship in this population of 54% heterosexual-couple, 27% single-mother, and 18% lesbian-couple parents. In a different study of registry DI offspring (aged 14–28 years) and their DS, the offspring addressed the tension between an emotional tie due to shared genes and DI experience, yet without any shared household experiences, versus a collective nonfamilial network tie, associated with DS terminology that may change over time as more DS are discovered (Hertz, 2022). These varied and unstable DS relationships constitute a new type of 'kinship' (Blyth et al., 2012; Mamo and Alston-Stepnitz, 2015; Goldberg and Scheib, 2016; Hertz, 2022).

The NLLFS offspring judged the quality of their DS relationship as good, and 65% had maintained a continuing relationship. While it is difficult to compare the quality of the DS relationships between studies, the NLLFS offspring rated 'how well do you get along with your DS?' as mostly very well, $M = 4.06$, similar to the Scheib et al. (2020) interviews where 19 out of 22 (86%) described positive DS experiences and 4 out of 22 (18%) mentioned negative experiences. For NLLFS offspring, contact with DS came primarily through cell phone communication (calls, and six of seven 'other' responses were texts or videocalls), meetings, and social media. Most offspring would tell anyone about the DS contact, and they had told most of their relatives. The impact of this disclosure on the other relationships of offspring was mostly neutral.

Prior research on the general population of DI offspring reported some psycho-sociological benefits to DS contact, such as sharing common experiences of being DC (Scheib et al., 2020), and feeling new connectedness or collective identity, especially if raised as an only child and/or having an anonymous donor (Scheib et al., 2020; Hertz, 2022). These benefits are similar to many of the NLLFS offspring motivations for contact. More than one-third had ongoing contact with one or more DS.

In addition to benefits, the general population of DI offspring has reported some problems after DS contact, especially if discovering they are in a large and/or ever-enlarging DS group (Scheib et al., 2020; Indekeu et al., 2022). These include feeling overwhelmed by the number of DS (Scheib et al., 2020; Indekeu et al., 2022), and a loss of agency and individuality (Blyth et al., 2012; Bolt et al., 2023). Adjusting to a changing DS group can be difficult due to already having other well-established relationships, significant age or personal differences among the DS, and rivalries of bondedness within a large group (Hertz, 2022; Indekeu et al., 2022).

In contrast, the NLLFS offspring got along well with their DS. Seven offspring (22.6% of offspring who had met any DS) had known their DS since birth. The one-third of NLLFS offspring with directed donors were not as vulnerable to surprisingly high numbers of unknown DS (that can occur with nonidentified sperm donation). Since another approximately one-third of NLLFS offspring had open-identity donation in the USA, there was an easier route to assessing the potential number of DS via family contact or DS registries, before deciding to make contact.

These donor types may have contributed to the NLLFS offspring mostly finding a modest number of DS.

Views on donor siblings, whether known or unknown

Among all NLLFS offspring, half considered their DS to be just a minor genetic connection, 24% a distant member of the family, 17% unrelated, and 16% a sibling. Not surprisingly, when polling all offspring (those who did and did not have DS contact), the terminology was less family-focused (Table 4), compared to the terminology used by only the offspring with DS contact (Table 3). Regardless of whether offspring knew of their DS, satisfaction with the level of DS information was relatively high.

Strengths and limitations

Our study has several strengths. First, due to the NLLFS inception when DI was first offered to SMPs and recent advances in DNA-matching and DS discoverability, this study examined the vanguard of adult DI offspring of lesbian parents and their DS relationships. Second, several different donor types are represented, which are associated with varying levels of knowledge, interest, and access to potential DS. Third, the data come from the largest, longest-running longitudinal study of intended lesbian-parent families and their offspring. Due to its prospective nature and 90% family retention rate, the findings are not biased by over-representation of offspring who were already satisfied with their DS. It is also not skewed by presenting only offspring who are already seeking DS, as in ancestry registry studies, which are mainly comprised of offspring of nonidentified sperm donors.

Limitations of our study are its small and nonrepresentative participant pool, as this is the first generation of SMP offspring who have entered established adulthood. Access to DS is a recent phenomenon due to age-eligibility and newly expanding DNA-matching registries. The NLLFS started when there were smaller numbers of out SMPs with limited access to fertility services, such that recruiting a large or population-based SMP pool was not possible. Thus, the sample consists of US citizens, mostly White, highly educated individuals, not representative of DI offspring of SMPs from different nations, races, and socio-economic statuses.

Future longitudinal studies would benefit from larger, more diverse samples of SMPs and their offspring (Goldberg, 2023) and longitudinal follow-up of changing relations as more DS are discovered over time (Guerrini et al., 2022; Indekeu et al., 2022). Also understudied are offspring who are uninterested in DS contact or whose contact was initiated by their DS, rather than by themselves (Zhang, 2021; Indekeu et al., 2022).

These study results have implications for heterosexual or SMPs considering gamete donation, gamete (and potential) donors, DC offspring (including adult offspring starting parenthood themselves), gamete banks, and the medical, public health, and mental health professionals who advise them. With increasing usage of DI, DTC gene testing, and DNA-matching sites, the numbers of DS who find each other will continue to climb (Samplaski and Klipstein, 2020; Guerrini et al., 2022).

Consideration of more thorough counseling for all affected parties of gamete donation, and enforcement of sensible quotas on offspring produced per gamete donor may promote offspring identity strength, increase positive DS bonding (Indekeu et al., 2021; Taylor et al., 2022), and help avoid problems for offspring's and donor's own families from large, unwieldy DS groups (Hertz et al., 2017; ESHRE Working Group on Reproductive Donation, 2022; Bolt et al., 2023). Parents considering gamete donation

should try to limit the number of potential DS when making private gamete donation agreements, consider using open-identity or directed donors (because of easier contact with the donor and DS) when using fertility clinics, and demand industry quotas and monitoring of gamete banks regarding pregnancies produced.

Our data suggest that early discussions of DI origins and possible DS, careful consideration of DI sourcing and quotas, and a modest total numbers of DS contribute to offspring DS satisfaction, and support the practice of transparency within families using gamete donations. The abundance of gamete donation options and DNA-matching services are expanding the numbers and complexities of kinship networks into novel realms.

Data availability

The data underlying this article cannot be shared publicly to protect the privacy of the individuals who participated in the study. The data will be shared upon reasonable request to Dr Nanette K. Gartrell, the principal investigator of the NLLFS.

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Authors' roles

All authors have made substantial contributions to the conception and design of this study and revised the article critically for important intellectual content. In addition, N.K.G. collected the data, H.M.W.B. and N.C. conducted the statistical analyses, and A.S.K. wrote the initial draft of the article. All authors have approved this article and agree to be accountable for all aspects of the work.

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Conflict of interest

The authors have no conflict of interest to declare.

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