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The experiences of adolescents and adults conceived by sperm donation: comparisons by age of disclosure and family type

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BACKGROUND: This study presents findings from a large sample of donor offspring who are aware of the nature of their conception. Importantly, this is one of the first studies to compare the views of offspring told of their origins during childhood to those who found out during adulthood.

METHODS: Online questionnaires were completed anonymously by donor offspring who were members of the Donor Sibling Registry, a US-based worldwide registry that helps donor-conceived individuals search for and contact their donor and donor siblings (i.e. half-siblings). Data were obtained on offspring's feelings about being donor conceived and their feelings towards their parents.

RESULTS: Offspring of single mothers and lesbian couples learnt of their donor origins earlier than offspring of heterosexual couples. Those told later in life reported more negative feelings regarding their donor conception than those told earlier. Offspring's feelings towards their parents were less clear, with some of those told later reporting more positive feelings and others reporting more negative feelings. Offspring from heterosexual-couple families were more likely to feel angry at being lied to by their mothers than by their

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Reasons given by parents for non-disclosure include wanting to protect the child from the distress of not being able to gain any information about their donor. Other concerns include the impact that disclosure may have on family relationships, in particular with the father, and wanting to protect the father from either potential rejection by the child or the social stigma associated with male infertility. Parents can also be unsure about how to tell their child (Cook *et al.*, 1995; Nachtigall *et al.*, 1998; Lindblad *et al.*, 2000). The decision to disclose has also been found to differ between family types, with lesbian couples and single mothers more likely to disclose compared with heterosexual couples (Brewaeys, 2001). This is not surprising given that lesbian couples and single mothers have to explain the absence of a father to their child. Those parents who do decide to tell their child tend to do so because they want to be honest and open with their child (Rumball and Adair, 1999; Golombok *et al.*, 2004, 2006). For heterosexual couples, reaching a decision on whether they will tell their child or not can be complex (Shehab *et al.*, 2008). Parents who do decide to tell may use strategies defined as either 'seed planting' used by parents who believe that a child should be told from as early as possible, or 'right time' used by parents who believe that disclosure should occur when children are of an age where they can understand the information (Mac Dougall *et al.*, 2007).

Studies that have examined the views of donor-conceived offspring have shown that some adult donor offspring experience negative feelings about being donor conceived. Such feelings can include anger about being lied to or frustration about not having access to medical or genetic information (e.g. Turner and Coyle, 2000; Kirkman, 2004). However, a more recent study reported better experiences for adolescent offspring. Scheib *et al.* (2005) studied 29 adolescents and found that the large majority were comfortable about the way they were conceived. The adolescents in the study had found out about their conception at a young age (all had found out before age 10), which may well explain their more positive response. Furthermore, they all had open-identity donors which may have alleviated the feelings of anger and frustration reported by offspring unable to find out the identity of their donor (Scheib *et al.*, 2005). Some parents, particularly single mothers, of offspring born using open-identity donors, have shown interest in contacting other families conceived using the same donor. These parents report wanting to create a sense of family for their child, and when such contact has been made it has generally led to positive relationships (Scheib and Ruby, 2008). Similar positive relationships have been reported by parents who used anonymous sperm donation to have their child, but later searched for and contacted parents of their child's half-siblings (Freeman *et al.*, 2009).

Age of disclosure could thus be a critical factor in determining donor offspring's feelings about their donor conception. Telling children from a young age enables the information to be incorporated into the child's sense of identity (Rumball and Adair, 1999). Those told during late adolescence or adulthood often report being shocked and sometimes feel that their life has been a lie (Turner and Coyle, 2000). Family secrets may be detected by children. A study of donor offspring's recollections revealed that parents, particularly fathers, avoided discussing issues relating to resemblances, traits, genealogy and medical history (Paul and Berger, 2007).

Furthermore, if parents have discussed the child's conception with other family members or friends, there is always a possibility that offspring will find out about their conception by accident which could be far more detrimental (McWhinnie, 1995). Studies have found that around half of parents of donor-conceived children tell either a friend or a family member about their child's donor conception (Golombok *et al.*, 1999; Gottlieb *et al.*, 2000), and thus disclosure by someone other than parents is a real concern. Finally, with improvements in genetic technology and genetic understanding, there is an increasing possibility that offspring may discover their donor conception on their own (McGee *et al.*, 2001).

Little research has been conducted with families who disclose and who do not disclose, therefore it is not known if disclosure is beneficial. In a comparison between families who had told their child about their donor origins and those who had not, Lycett *et al.* (2005) found more positive parent–child relationships in disclosing families. Interim results from a study of families with a 7-year-old child found that assisted conception children (born using oocyte donation, sperm donation or surrogacy), who had been told of their origins, were rated by teachers as showing fewer emotional problems than those who had not (Casey *et al.*, 2008). However, it is not known whether this finding is due to telling *per se* or to other factors such as more open communication by these parents generally.

Although in the past, only anonymous sperm donors had been available to prospective parents, it is now possible for parents to access open-identity donors (i.e. donors whose identity is available to donor offspring when the child reaches a specific age) in some countries including the US, Sweden, Austria, Switzerland, the Australian State of Victoria, the Netherlands, New Zealand and the UK (Daniels and Lewis, 1996; Pennings, 1997; Scheib *et al.*, 2003; Lycett *et al.*, 2005; Janssens *et al.*, 2006; Lalos *et al.*, 2007). However, although open-identity donors are now an option (or in some countries, the only option) available to parents wishing to use donated sperm to start a family, it is important to bear in mind that it is only those offspring who are aware of their conception who can request the identity of their donor; although parents can be encouraged to tell their child about their conception, many parents still choose not to do so. Although it is thought that using open-identity donors will increase disclosure among parents, it is not yet known what the impact will be. It is possible that knowing that the child will be able to contact and meet their donor may actually make parents less likely to disclose. However, Greenfeld and Klock (2004) failed to find any differences regarding disclosure when they compared the views of women who had conceived a child using an anonymous oocyte donor with those who had used a known donor.

The present study

This study explores the views and experiences of a large number of individuals who are aware of their conception by sperm donation and is the first investigation to include adult as well as adolescent offspring. The participants were recruited via the Donor Sibling Registry (DSR), a worldwide internet registry that enables donor offspring to search for and contact their donor and/or their donor siblings (see Freeman *et al.*, 2009 for further details). Although the study may not be representative of all donor-conceived individuals, the large sample size allows for meaningful comparisons to be carried out between offspring of different ages and from different family types.

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Materials and Methods

All participants were either members of the DSR or children of parents who were members of the DSR. E-mails were sent to all members of the DSR, inviting them to take part in an online survey. For parents of donor-conceived offspring, the e-mail asked whether they were willing to allow their 13–17-year-old child to take part. The survey was also advertised on the front page of the DSR website. Ethical approval for this study was obtained from the Cambridge University Psychology Research Ethics Committee. Appropriate procedures were put in place to ensure that children were unable to participate without their parents' consent.

Data for the current study were obtained over two phases. The first phase was open to offspring aged 18 and over and was online for 11 weeks between April and June 2007. The second phase was open to offspring aged 13 and over and was online for 11 weeks between December and February 2008. Sixty-three offspring took part in the first phase, and 102 offspring took part in the second phase.

The response rate for the first phase was calculated using the total number of offspring who were active members at the beginning of the study. There were 336 adult donor offspring members, thus yielding a response rate of 19%. For the second phase, 456 e-mails were successfully sent to parents of 13–17-year-old donor children and to adult donor offspring who had not already taken part giving a response rate of 22%. Although the response rates are relatively low, they are consistent with studies that use online survey methods (Cook *et al.*, 2000; Couper, 2000; Kaplowitz *et al.*, 2004). These low response rates need to be considered alongside the advantages of carrying out online surveys, such as the ability to target large samples or samples that are difficult to reach (Couper, 2000; Wright, 2005; Freeman *et al.*, 2009).

Measures

The questionnaire had two main sections. The first asked offspring about their experiences of donor conception and the second asked them about searching for their donor and donor siblings. This paper reports findings from this first section only. The findings on searching are presented elsewhere (Jadva *et al.*, 2008).

The questions included multiple choice and open-ended items. For the multiple choice questions, respondents had to tick boxes with different response options including an option for 'other, please specify'. Respondents were also given an opportunity to elaborate on their answers. The questionnaire design, including the questions and response options, was based on interview questions from research carried out with donor conception families (e.g. Casey *et al.*, 2008; Lycett *et al.*, 2004, 2005). The questionnaire was piloted with DSR members to ensure that questions were clear and had face and content validity. Quantitative data were analysed using χ^2 tests, and qualitative data were used to illustrate findings from the quantitative analysis.

Two key areas were examined.

(i) *Feelings about being donor conceived.* Offspring were asked about (a) the age at which they had found out about their conception, (b) how they had found out about their conception, (c) how they felt at the time they had found out, and (d) how they feel now (at the time of completing the questionnaire). In order to gain more insight into offspring's feelings of being donor conceived, qualitative data analysis was carried out to identify any additional themes.

(ii) *Feelings towards parents.* Information was obtained on (e) how offspring felt towards their mother, and (f) father (for heterosexual-couple families only), at the time they found out. Again, qualitative data analysis was carried out to uncover any additional themes about offspring's relationships with their parents.

Participants

A total of 165 offspring conceived by sperm donation completed the survey. They were aged 13–61 years (mean 22 years, SD 10). Approximately half (82) were aged between 13 and 17 and the other half (81) were aged 18 or over. Seventy-five percent (123) were female and 25% (42) were male. Fifty-eight percent (96) of the offspring reported their parents to be a heterosexual couple, 23% (38) a single mother and 15% (25) a lesbian couple. The majority (89%, 148) of respondents were currently living in the US, with the remainder living in Canada (4%, 7), the UK (2%, 4), Australia (1%, 2) and South Korea (0.5%, 1). With regard to ethnicity, the vast majority (95%, 157) classified themselves as 'white', 5 (4%) as mixed race, 1 (0.6%) as 'American Indian/Alaska Native', and 1 (0.6%) did not respond.

Thirty-one percent (51) had yet to complete high school education, 21% (35) had been, or were currently being, educated to community college level, 8% (14) to undergraduate level and 17% (28) had a postgraduate (Masters or PhD) degree. Twenty-two percent (37) did not specify their educational background. Twenty-five percent (42) of the offspring currently had a partner and 12% (19) had children of their own.

Results

It should be noted that not all offspring answered every question; therefore, the numbers do not always add up to 100%. Also, for some of the questions, respondents could tick multiple responses.

Feelings about being donor conceived

Age of disclosure

Thirty percent (50) of offspring had found out about their conception before the age of 3 years, and 19% (32) had found out after the age of 18 (Table I). When asked to state their exact age at finding out, the mean age was 14 years (SD 9.5), reaching a maximum of 50 years. However, over one-third of offspring (38%, 62) did not give an exact age largely because they were too young to recall (80% of offspring told before age 3, and 40% of offspring told between ages 4 and 11 did not give an exact age). Taking this into account, the mean age of disclosure would be much lower.

Comparisons were carried out to determine whether age of disclosure differed between family types. As can be seen in Table I, only 9% (9) of offspring from heterosexual-couple families were told about their conception before the age of 3, compared with 63 and 56% of offspring from single mother and lesbian-couple families, respectively. Thirty-three percent of offspring from heterosexual-couple families were told of their conception after the age of 18, compared with none of the offspring from the other two family types.

Who told offspring about their conception?

Twenty-four percent (40) of offspring stated that they had always known about their conception, 55% (90) had been told by their mother, 1% (2) by their father, 14% (23) by both parents and 4% (7) by someone else. Looking at the breakdown by family type (Table I), it can be seen that almost half the offspring in single-mother families (45%, 17) and over half (56%, 14) in lesbian-couple families reported always knowing about their conception.

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Table I Age of disclosure and who told offspring about their conception, by family type

	Heterosexual-couple family		Single-mother family		Lesbian-couple family	
	n	%	*n*	%	*n*	%
Age of disclosure						
0–3	9	9	24	63	14	56
4–7	15	16	9	24	8	32
8–11	14	15	3	8	1	4
12–15	18	19	2	5	2	8
16–18	8	8	0	0	0	0
Over 18	32	33	0	0	0	0
Total	96	100	38	100	25	100
Who told offspring about their conception						
Always known	8	8	17	45	14	56
Mother	61	64	19	50	6	24
Father/co-parent	2	2	n/a	n/a	0	0
Both parents	18	19	n/a	n/a	5	20
Someone else	6	6	1	3	0	0
Total	95	99	37	97	25	100

Of the offspring who had been told by someone else, one had been told by her step-father and one had found out by overhearing a conversation between her parents. One (from a single-mother family) was told by her sister when aged 1. Four reported being told by a family friend or a member of their extended family.

Although information was not collected on the manner in which people were told, the large majority had been told intentionally by someone. However, in a few exceptions, offspring had found out unintentionally, e.g. during an argument with their parents or during a genetics class at school.

Response to disclosure

Those offspring who had found out about their conception before the age of 3 were not included in this analysis, as they were considered too young to recall their feelings. Thus, the final data analysed were from 87 offspring of heterosexual-couple families, 14 offspring of single mothers and 11 offspring of lesbian couples. When asked to select their feelings at the time of finding out from a list of different emotions, the most common feeling reported was curiosity (72%, 82). χ^2 Tests were computed to determine whether there were any relationships between feelings at the time of finding out and offspring having been told during childhood (aged 4–11), adolescence (aged 12–18) and adulthood (aged over 18). A number of significant associations were found according to age of disclosure, with those told during adulthood more likely to report feeling confused [χ^2 (2, $n = 114$) = 7.846, $P \leq 0.05$], shocked [χ^2 (2, $n = 114$) = 719.15, $P \leq 0.001$], upset [χ^2 (2, $n = 114$) = 8.348, $P \leq 0.05$], relieved [χ^2 (2, $n = 114$) = 13.043, $P \leq 0.01$], numb [χ^2 (2, $n = 114$) = 13.043, $P \leq 0.01$] and angry [χ^2 (2, $n = 114$) = 9.48, $P \leq 0.01$] (Table II). Offspring were also given the opportunity to elaborate further on their experiences of finding out that they were donor conceived. Examples taken from these open-ended responses are shown in Table II to illustrate the feelings expressed.

Current feelings about being donor conceived

All offspring (96 from heterosexual-couple families, 25 from lesbian-couple families and 38 from single-mother families) were asked how they feel currently (at the time of completing the questionnaire) about their conception. Again, they were asked to select their feelings from a list of possible emotions. The most common response was curiosity, reported by 113 (69%) offspring. Fisher's exact tests were conducted to compare the feelings of those told before the age of 18 and those told after the age of 18. Significant associations were found between age of disclosure and feeling angry (Fisher's exact, $P = 0.017$), relieved (Fisher's exact, $P = 0.018$) and shocked (Fisher's exact, $P = 0.005$), with those told after the age of 18 more likely to report these feelings (Table III). A non-significant trend was found for feeling ashamed, with those told after the age of 18 more likely to feel this way (Fisher's exact, $P = 0.051$). Again, offspring were given the opportunity to elaborate further on how they currently feel about being donor conceived, and, in Table III, examples taken from these open-ended responses illustrate some of the feelings expressed.

Definitions of donor

Offspring's qualitative responses were examined to determine the terminology used when talking about their donor. Table IV shows the terminology used and also the breakdown by family type.

The frequencies shown in Table IV suggest that offspring from single-mother families were more likely than offspring from two-parent families (heterosexual-couple families and lesbian-couple families) to

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Table II Feelings at time of finding out by age of disclosure

Feelings	Age of disclosure								*P*-value	Example (taken from open-ended responses)
	Childhood *n* = 51		Adolescence *n* = 31		Adulthood *n* = 32		All offspring *n* = 114			
	n	%	*n*	%	*n*	%	*n*	%		
Curious	36	71	20	65	26	81	82	72	n.s.	'I was so young I don't remember feeling much more than interested and curious.' 13-year-old female, found out during childhood
Confused	19	37	16	52	22	69	57	50	<0.05	'At first when told I did not really understand...' 17-year-old male, found out during childhood
Shocked	14	27	18	58	24	75	56	49	<0.001	'It was a big shock when my parents first told me.' 25-year-old female, found out during adolescence
Accepting	16	31	11	35	6	19	33	29	n.s.	'I've always been accepting to it because I never knew any different.' 15-year-old female, found out during childhood
Upset	8	16	7	23	14	44	29	25	<0.05	'Either tell your kid from the beginning or don't tell them at all, it was one of the most shocking and upsetting moments of my life.' 19-year-old female, found out during adolescence
Isolated	6	12	9	29	10	31	25	22	n.s.	'I felt alone.' 19-year-old female, found out during adolescence
Excited	10	20	8	26	6	19	24	21	n.s.	'I also felt excited, because it meant I might have a living "father" (my social father died when I was quite young), and half-siblings as well.' 36-year-old female, found out during adulthood
Relieved	3	6	8	26	12	38	23	20	<0.01	'I was relieved that the man my mom was married to was not my biological father.' 30-year-old female, found out during childhood
Numb	3	6	8	26	12	38	23	20	<0.01	'strange and numb.' 13-year-old female, found out during adolescence
Angry	6	12	4	13	12	38	22	19	<0.01	'I am angry because I asked about being "adopted" several times throughout my childhood and adolescence and told that I was being foolish. I knew.' 52-year-old female, found out during adulthood
Happy	7	14	8	26	5	16	20	18	n.s.	'When I found out, I was not heartbroken or devastated (unlike the popular belief), but I was more curious than anything else. 10 minutes after I found out, a dozen questions flowed out of my mouth in less than a minute. This was the best day of my life.' 13-year-old male, found out during adolescence
Indifferent	6	12	4	13	3	9	13	11	n.s.	'I am no different than any other person. How we are born doesn't make us who we are. I do not define myself by that trait. It is more of just how I came to be.' 17-year-old female, found out during childhood
Ashamed	6	12	2	6	5	16	13	11	n.s.	
Content	5	10	6	19	0	0	11	10	—	
Wish had not found out	2	4	1	3	1	3	4	4	—	
Other	5	10	3	10	3	9	11	10	—	'Annoyed to have to deal with it.' 31-year-old female, found out during adulthood

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Table III Current feelings by age of disclosure

Feelings	Under 18 $n = 132$		Over 18 $n = 32$		All offspring $n = 164$		*P*-value	Example (taken from open-ended responses)
	n	%	*n*	%	*n*	%		
Curious	89	67	24	75	113	69	n.s.	'I'm curious about the half of me that is blank.' 19-year-old female, found out during childhood
Accepting	60	46	14	44	74	45	n.s.	'I've always been accepting to it because I never knew any different.' 15-year-old female, found out during childhood
Content	36	27	4	13	40	24	n.s.	'Though I am content with my life, I would still love to meet the rest of my family.' 13-year-old female, found out during childhood
Happy	30	23	6	19	36	22	n.s.	'I am very happy with being donor conceived. I have no problems at all.' 14-year-old female, found out during childhood
Indifferent	31	24	3	9	34	21	n.s.	
Confused	19	14	7	22	26	16	n.s	'Trying to grasp my situation completely is impossible and I often get confused, frustrated, or stoic.' 19-year-old female, found out during childhood
Excited	18	14	5	16	23	14	n.s.	
Angry	13	10	9	28	22	13	0.017	'It makes me feel physically sick to think that I have a Father/Grandparents/Half Siblings out there that I can never ever meet!' 32-year-old female, found out at during adulthood.
Upset	12	9	7	22	19	12	n.s.	'The fact that my mother wanted a genetic connection with a child but didn't mind that she was denying me my connection to my father makes me very upset.' 17-year-old male, found out during childhood
Isolated	13	10	5	16	18	11	n.s.	
Relieved	9	7	7	22	16	10	0.018	'Relieved and happy now...' 17-year-old female, found out during adolescence
Shocked	1	1	4	13	5	3	0.005	
Ashamed	2	2	3	9	5	3	0.051	
Numb	2	2	2	6	4	2	n.s.	
Wish had not found out	1	1	1	3	2	1	n.s.	
Other	13	10	5	16	18	11	–	'like half of my heritage and identity are missing'. 37-year-old female, found out during adulthood

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Table IV Terminology used to describe donor by family type

	Heterosexual-couple family		Single-mother family		Lesbian-couple family		All offspring	
	n	%	*n*	%	*n*	%	*n*	%
Definitions of donor								
donor	39	41	10	26	10	40	60	36
father	6	6	5	13	0	0	13	8
biological father	6	6	2	5	0	0	8	5
dad	1	1	1	3	2	8	4	2
donor father	2	2	0	0	0	0	2	1
none used	42	44	20	53	13	52	78	47
Total	96	100	38	100	25	100	165	100

use terminology referring to 'dad' or 'father'. However, a Fisher's exact test did not find this difference to be significant.

The open-ended responses shed further light on terminology relating to parentage. As one offspring from a single-mother family stated 'I dislike the word donor. He is my father. I have no other man as father' (17-year-old male, found out during childhood, from single mother family).

Other offspring referred to their donor as their dad or father, even though they did not want to form a relationship with him.

> 'It is completely unnatural, my Father was likely to be a 20-ish year old Med Student, My Mother was a 36 year old Woman very unlikely to have met this type of person. It makes me feel like some kind of Hybrid or Cuckoo!'

32-year-old female, found out during adulthood, from heterosexual-couple family.

> 'He IS my father in the most basic sense, but I don't expect a "familial" relationship with him, except in the "long lost relatives" sense.'

37-year-old female, found out during adulthood, from heterosexual-couple family.

> 'I'd like to know my dad, but since I've grown up without him, it's really no biggie.'

16-year-old male, found out during childhood, from single-mother family.

Feelings towards parents

Feelings towards mother at the time of disclosure

Offspring were asked how they felt towards their mother at the time of finding out and they responded by selecting their feelings from a list of possible emotions. Overall, 40% said they felt no different towards their mother, and 30% said they appreciated their mother's honesty. χ^2 Tests were computed to determine whether age of disclosure was related to offspring's feelings towards their mother at the time of finding out. Significant associations were found between age of disclosure and offspring feeling angry about being lied to [χ^2 (2, $n = 114$) = 12.66, $P \leq 0.001$] and feeling a sense of betrayal [χ^2 (2, $n = 114$) = 6.11, $P = <0.05$], with offspring told during childhood less likely to report these feelings. Offspring told during adolescence and adulthood also reported feeling sympathetic towards their mother [χ^2 (2, $n = 114$) = 15.68, $P \leq 0.001$] and were more likely to state that they appreciated their mother's honesty [χ^2 (2, $n = 114$) = 6.57, $P \leq 0.05$]. Those told as children were more likely to state that it made no difference to how they felt towards their mother compared with those told later in life [χ^2 (2, $n = 114$) = 6.57, $P \leq 0.05$] (Table V).

Feelings towards mother and father (for heterosexual-couple families) at the time of disclosure

For offspring from heterosexual-couple families, χ^2 tests were carried out to examine the relationship between age of disclosure and offspring's feelings towards their mother and father separately (Table VI). The most common feeling reported by offspring towards their mother was 'angry at being lied to', whereas the most common feeling towards their father was 'sympathetic'. Offspring told during childhood were more likely to report feeling that disclosure made no difference to how they felt towards their mother [χ^2 (2, $n = 87$) = 8.949, $P = <0.05$]. Offspring told during adolescence and adulthood were more likely to report feeling sympathetic towards their mother compared with those told during childhood [χ^2 (2, $n = 87$) = 8.973, $P = <0.05$]. No association was found between feelings towards father and age of disclosure, although offspring who were older at the time of disclosure showed a non-significant trend towards feeling betrayed [χ^2 (2, $n = 87$) = 5.847, $P = 0.054$].

Looking at how all offspring (irrespective of age of disclosure) felt towards their parents at the time of disclosure (Table VI), it can be seen that 34% (30) felt 'angry at being lied to' by their mother in comparison with only one offspring reporting this feeling towards their father. The most common feeling towards fathers at the time of disclosure was sympathetic (37%, 32).

An additional theme that was highlighted by offspring of heterosexual-couple families was how their conception was kept a secret because their father did not wish them to know. Often these offspring were only told once their parents had separated or following their father's death.

> 'My father had made my mother promise to never tell me about this, and still does not know that I know about my biological origins. So my parents are the only people who ever knew. I have not told my father that I know, and have not told anyone else.'

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Table V Offspring's feelings to their mother at the time of disclosure by age of disclosure

	4–11 $n = 51$		12–18 $n = 31$		Over 18 $n = 32$		All offspring $n = 114$		P-value
	n	%	n	%	n	%			
Feelings to mother									
No different	28	55	13	42	5	16	46	40	<0.01
Appreciated honesty	9	18	12	24	13	41	34	30	<0.05
Angry at being lied to	6	12	9	29	15	47	30	26	<0.01
Betrayal	6	12	7	23	11	34	24	21	<0.05
Sympathetic	1	2	10	32	9	28	20	18	<0.001
Loved them more	5	10	8	26	4	13	17	15	n.s.
Estranged	6	12	4	13	6	19	16	14	n.s.

Table VI Offspring's feelings to their mother and father (heterosexual-couple families) at the time of disclosure by age of disclosure

	4–11 $n = 29$		12–18 $n = 26$		Over 18 $n = 32$		All offspring $n = 87$		P-value
	n	%	n	%	n	%			
Feelings to mother									
Angry at being lied to	6	21	9	35	15	47	30	34	n.s.
No difference	15	52	9	35	5	16	29	33	<0.05
Appreciated honesty	5	17	10	38	13	41	28	32	n.s.
Betrayal	4	14	7	27	11	34	22	25	n.s.
Sympathetic	1	3	9	35	9	28	19	22	<0.05
Estranged	5	17	4	15	6	19	15	17	—
Loved them more	2	7	7	27	4	13	13	15	n.s.
Feelings to father									
Angry at being lied to	0	0	0	0	1	3	1	1	—
No difference	6	21	7	27	8	25	21	24	n.s.
Appreciated honesty	0	0	2	7	3	9	5	6	—
Betrayal	2	7	7	27	10	31	19	22	0.054
Sympathetic	12	41	9	35	11	34	32	37	n.s.
Estranged	3	10	8	31	7	22	18	21	n.s.
Loved them more	5	17	4	15	9	28	18	21	n.s.

18-year-old female, found out during adolescence, from heterosexual-couple family.

> 'Although generally I do not agree with telling children something like this so late, my mother was keeping a secret that she promised my father she would keep and also following the specific recommendation of the doctor who did the insemination.'

39-year-old female, found out during adulthood, from heterosexual-couple family.

> 'It was a secret my mother had wished to reveal for a long time but felt compelled to be silent by her infertile husband.'

24-year-old male, found out during adulthood, from heterosexual-couple family.

Others commented that they had a good relationship with their father, but they were concerned about upsetting him.

> 'My father has never said anything negative—I just think it makes him feel a bit uncomfortable.'

13-year-old male, found out during childhood, from heterosexual-couple family.

> 'For a long time it was something the family just didn't talk about, now we're a little more open with it, but I still have never really discussed it

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angry at being lied to by their father. The most common feeling offspring from heterosexual-couple families felt towards their mother was 'angry at being lied to' compared with just one offspring feeling this towards their father. In comparison, the most common feeling towards their father was 'sympathetic'. It is unclear from the present data why offspring display greater levels of anger to their mother than their father at the time of disclosure. One possible explanation is that mothers had lied to conceal the truth or had missed opportunities to reveal their child's donor conception. Also, children are more likely to talk about relationship issues with their mothers than their fathers.

The open-ended responses provided greater insight into issues affecting offspring in heterosexual-couple families. For example, some reported that donor conception was kept secret because their mother had promised their father that they would never disclose. This ties in with findings from studies of parents' reasons for non-disclosure, which have shown parents to be concerned about the impact that disclosure may have on the father–child relationship (Cook *et al.*, 1995).

Limitations of the study

One major limitation of this study was sample bias. Participants were members of a website that facilitates contact between individuals conceived by donor and their half-siblings or donor. Thus, the sample was not representative of all donor-conceived offspring, specifically those who are not aware of their donor conception or who are not curious about their donor relations. Nevertheless, by recruiting the sample through the DSR, we have been able to access large numbers of donor-conceived individuals who are aware of their donor origins, the focus of interest in the present study. To date, very little research has been conducted on individuals who know about their donor conception, and thus the study provides valuable insight into the outcomes of donor conception from the perspective of offspring themselves.

A further limitation relates to the methodology of the study. Although an online survey enables researchers to access large numbers of participants, they also have relatively low response rates. In addition to this, the survey methodology, in comparison with face-to-face interviews, does not allow for the researcher to explore emerging themes in the participant's narrative. This survey gave rise to a wealth of issues that we did not ask offspring about directly. Future studies would benefit from using in-depth interviews to gain more insights into many of the issues that are so pertinent to offspring created using donor sperm. However, it is important to bear in mind that online surveys may offer a sense of privacy not possible during face-to-face interviews, which could lead to more honest and open responses.

In the current study, age of disclosure was confounded with family type and current age. Offspring from single-mother and lesbian-couple families were more likely to have been told of their conception at an early age compared with offspring from heterosexual-couple families. Age of the offspring at the time of taking part in the study was also highly associated with age of disclosure, so that older people in the sample were more likely to report negative feelings about their donor conception compared with younger individuals.

Future studies would benefit from the use of psychological measures to assess the psychological impact on individuals aware of being donor conceived. Although this study showed that age of disclosure was related to offspring's feelings about being donor conceived, examining whether age of disclosure is related to offspring's psychological well-being was beyond the scope of the investigation. Assessing the psychological consequences of donor conception is of paramount importance for ensuring the well-being of individuals conceived in this way.

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