

ARTICLE

Long-term follow-up of mental health and satisfaction in a Swedish sample of sperm and egg donors after open-identity donation



BIOGRAPHY

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KEY MESSAGE

Gamete donors are, generally, satisfied individuals with good mental health who do not regret their decision to donate gametes. Eighty-seven percent of gamete donors remained engaged, with responses received 14–17 years after donation. This is reassuring for all parties involved.

ABSTRACT

Research question: How is the mental health of open-identity gamete donors and their satisfaction with their contributions 14–17 years after acceptance as a donor?

Design: The Swedish Study on Gamete Donation is a longitudinal study comprising women and men who were accepted as donors at seven Swedish university clinics between 2005 and 2008. The latest (fifth) follow-up included 215 open-identity donors (response rate 87%): 123 oocyte donors and 92 sperm donors. The donors answered a questionnaire regarding their perceptions, experiences and expectations after gamete donation 14–17 years previously.

Results: The donors were satisfied with the experience of donating, and no differences were detected between sperm and oocyte donors. Oocyte donors were more than twice as likely to feel that family and friends were proud of their donation compared with sperm donors (51% versus 23%, $P < 0.001$). In total, six donors regretted their donation: four oocyte donors and two sperm donors. Sperm donors were more frequently satisfied with the financial compensation compared with oocyte donors ($P = 0.005$). No difference in the development of symptoms of anxiety or depression was detected 14–17 years post-donation.

Conclusion: Long-term follow-up studies on donors are important for recruiting donors, and for recipients and the children who will be conceived with donated gametes. The results from the current study indicate that donors, generally, have good mental health and do not regret their decision to donate gametes. These findings are reassuring for all parties involved.

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KEY WORDS

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INTRODUCTION

After an emotional custody case in Sweden where a father declined his paternal rights to a child conceived by sperm donation, Sweden became the first country worldwide to introduce legislation in 1985 that gave children conceived after donation the right to obtain identifying information about their donor [*The Genetic Integrity Act (2006:351) including changes up to SFS 2021:916, 2021*]. Since then, open-identity gamete donation has become available, and is mandatory in many countries (*Indekeu and Lampic, 2021*).

Sperm donation has been in practice for at least 100 years worldwide. Oocyte donation was first practised in the early 1980s, and has been available in Sweden since 2003 [*The Genetic Integrity Act (2006:351) including changes up to SFS 2021:916, 2021*].

Swedish law stipulates that identifying information can be released to the donor-conceived individual after reaching 18 years of age, or at a mature age. Donors are able to retrieve information from the clinic regarding the number of children born after their donation. However, no further information is given to donors regarding the families that received the donation.

Currently, 14 jurisdictions worldwide permit open-identity gamete donation alone, and programmes in many countries offer treatment with gametes from both non-identified and open-identity donors (*Indekeu and Lampic, 2021*).

Donation is, by definition, a gift; you give away something not for your own benefit. There is compensation for donors in most settings, and the variations in payment are vast. Usually, oocyte donors receive higher financial compensation compared with sperm donors. The compensation is also dependent on whether the clinic is private and the recipients are paying for treatment themselves, or if the donation and treatment are publicly funded by taxes (*Ethics Committee of the American Society for Reproductive Medicine, 2021; Samorinha et al., 2020*).

In an earlier follow-up on Swedish donors, the vast majority of donors believed that the financial compensation was satisfactory [i.e. around \$1000 for oocyte donation

and around \$60 for sperm donation (each time the donor donated sperm)] (*Sydsjö, unpublished data*).

The personality of gamete donors and their motivation for donating is of interest to the recipients, the child(ren) to be, and also the clinics recruiting gamete donors. Most donors state that they become donors purely for altruistic reasons (*Bracewell-Milnes et al., 2016; Bujan et al., 2022; Svanberg et al., 2012; Van den Broeck et al., 2013*). There is also evidence that some donors have other reasons, such as passing on good genes, financial motivations, and that it may be their only chance to have a child (*Skoog Svanberg et al., 2013; Svanberg et al., 2012; Van den Broeck et al., 2013; Wheatley, 2018*), despite the fact that, although they will have a biological parental link to the child, they will have no legal rights or duties as a parent [*The Genetic Integrity Act (2006:351) including changes up to SFS 2021:916, 2021*]. The motive of passing on one's genes has been found to be more important to men than women (*Svanberg et al., 2012*). Previous studies have found that open-identity oocyte and sperm donors, accepted for donation in Sweden, are mature, generous and have a clinically stable personality/character (*Sydsjö et al., 2011, 2012*).

While studies have shown that the psychosocial well-being of non-identified oocyte and sperm donors is good, research on open-identity donors is limited (*Söderström-Anttila et al., 2016*), particularly regarding the long-term experiences and health of oocyte donors. The mental and physical health of gamete donors is of importance for the donor, the recipients and the donor-conceived offspring from both short- and long-term perspectives. The physical and mental health statuses of open-identity oocyte and sperm donors have not been well investigated. In earlier follow-ups, the research group investigated anxiety and depressive symptoms among the donors, and found them to be in the normal range, with no signs of mental instability (*Skoog Svanberg et al., 2013; Svanberg et al., 2012; Sydsjö et al., 2011, 2012*).

In the Swedish Study on Gamete Donation (SSGD), a national sample of 181 oocyte donors and 118 sperm donors has been followed since they were accepted as donors between 2005 and 2008. The long-term impact of donation on the donor's life and the donor's situation after the donation are sparsely investigated in a national unselected sample of gamete donors.

Thus, as the donor-conceived children from this cohort of gamete donors approach maturity, and will soon be able to retrieve identifying information about the donors, the aim of this follow-up study was to continue to gain knowledge on oocyte and sperm donors' demographics, self-assessed mental health, and thoughts about their donation 14–17 years after acceptance as a donor.

More specifically, the following research questions were investigated:

- 1) Are there any differences between oocyte and sperm donors regarding their satisfaction and perceptions of having donated gametes? Is donor satisfaction related to knowledge of the result of their donation?
- 2) Is there a difference in what is considered reasonable compensation between identifiable oocyte and sperm donors?
- 3) Do identifiable oocyte and sperm donors have the same prevalence of symptoms of anxiety and depression 14–17 years after acceptance as a donor?

MATERIALS AND METHODS

Study population

The SSGD is a longitudinal study that comprises women and men who were accepted as either donors or recipients of donated gametes at any of the seven Swedish university clinics performing gamete donation between 2005 and 2008. A detailed description of the study design and participants has been reported previously (*Isaksson et al., 2014; Lampic et al., 2014; Skoog Svanberg et al., 2013; Svanberg et al., 2012; Sydsjö et al., 2011, 2012*). Donors completed a survey on acceptance (T1) and were followed up with postal surveys after 2 months (T2), 1 year (T3) and 5–8 years (T4). In the current follow-up (T5), donors were approached and asked to participate in a fifth follow-up regarding their perceptions, experiences and expectations after donating gametes 14–17 years previously. The rationale for this time point is to assess the donors' situation close to when the donor-conceived children reach 18 years of age, and will be able to contact the donors or retrieve identifying information about the donors. The donors were sent a letter including information about the follow-up, and a consent form where they were invited to participate in the current follow-

up by responding to a questionnaire. Non-responders were sent up to two reminders.

In total, 181 oocyte donors and 118 sperm donors constituted the original study population that completed the first survey (T1). Of these, eight dropped out at previous data collection occasions (T2–T4), three were deceased, and no postal address could be found via the Swedish Population Register for 15. In total, 169 oocyte donors and 104 sperm donors were approached for the current follow-up (T5). Among these donors, one woman and two men actively declined to participate, and 27 women and six men did not return the questionnaire, resulting in a response rate of 83% (141/169) for oocyte donors and 92% (96/104) for sperm donors. A subsample of the donors (18 oocyte donors and four sperm donors) had donated to someone they knew, most often a sibling. As directed donation entails other circumstances and challenges, the perspectives of these donors will be presented in a separate article, and this group was excluded from the present study. This resulted in a final study population of 215 open-identity donors: 123 oocyte donors and 92 sperm donors. Data were anonymized prior to data analyses and manuscript preparation.

Data collection

Donors were asked for information on their sociodemographic background (educational level, having children, desire to have children) and the donation (whether they had donated at more than one clinic, whether they had donated abroad, whether the donation had resulted in a child, compensation) in a study-specific questionnaire.

Donors' satisfaction with their donation (six items) and perceptions of their situation as a donor (five items) were assessed with items that had been used in a previous follow-up of the SSGD (Skoog Svanberg et al., 2013). Responses were made on a five-point Likert scale and were categorized into agree, disagree and neutral.

The mental status of the donors was assessed with the Hospital Anxiety and Depression Scale (HADS) (Zigmond and Snaith, 1983), a 14-item scale with seven items for the anxiety subscale and seven items for the depression subscale. The HADS has demonstrated good internal

consistency and concurrent validity, and a subscale score of ≥ 8 is considered to indicate anxiety disorder and depression (Bjelland et al., 2002). The HADS was also used in previous follow-ups (Skoog Svanberg et al., 2013), and data from T1 are included for comparison in the present study.

Ethical considerations

Due to the longitudinal design, ethical approval was obtained from the Ethical Review Board of Linköping prior to each follow-up (M129-05, M29, T113-07 and 2012/356). The current follow-up was approved by the Ethical Review Board of Linköping, Sweden and the Swedish Ethical Review Authority (Dnr 2018/546-31, date of approval 12 December 2018). Participation in the study was voluntary and all participants provided written informed consent to participate. All methods were carried out in accordance with guidelines and regulations, and adhered to the principles outlined in the Declaration of Helsinki.

Statistics

Data are presented as number (n) and percentage. Pearson's Chi-squared test was used to analyse categorical variables, although Fisher's exact test was used where cell counts were <5 . There were very few cases with partially missing values. Therefore, these cases were excluded pairwise (i.e. excluded in analyses where they had not provided any information and no imputation of missing data was performed). All analyses were performed using SPSS Version 28 (IBM Corp., Armonk, NY, USA). Statistical significance was defined as $P < 0.05$ (two-sided).

Drop-out analyses

The overall response rate was 87%, and sperm donors participated to a greater extent compared with oocyte donors (92% versus 83%). Drop-out analyses were performed with respect to selected variables assessed at the time of acceptance as a donor (T1) and 2 months post-donation (T2). Assessing responses at T1, non-responders to the current follow-up (14–17 years post-donation) reported more biological children than those donors who participated in the current follow-up (74% versus 52%, $P = 0.001$). There were no other significant differences between non-responders and responders with regard to other sociodemographic background factors (e.g. educational level, marital status, desire to have children),

motivation for donating, or perception of the importance of the genetic child–parent bond (measured at T1), nor with respect to their opinion of the possibility of being approached by an offspring from their donation (measured at T2) (data not shown).

RESULTS

Participant characteristics

At the current follow-up, the mean age of sperm donors was 50 years (range 35–73 years) and the mean age of oocyte donors was 46 years (range 36–56 years).

Most sperm and oocyte donors had a college/university degree: 85% of sperm donors and 70% of oocyte donors ($P = 0.051$). Moreover, more oocyte donors reported having children compared with sperm donors (88% versus 66%, $P < 0.001$), including biological children and stepchildren. Sperm donors reported having adopted children, whereas this was not the case for any of the oocyte donors (TABLE 1). A larger proportion of sperm donors reported a desire to have more children in the future compared with oocyte donors (27% versus 9%, $P < 0.001$) (TABLE 1). Assessing data from all follow-ups for all donors, 181 donors reported that they had become a parent of a biological child since the start of the study, and 184 had either stepchildren, adopted children or biological children. Since the previous follow-up in 2013 (5–8 years post-donation), 17 oocyte donors and 22 sperm donors had become parents.

In addition to having donated at one of the seven reproductive medical clinics in Sweden, two sperm donors and no oocyte donors had also donated their gametes abroad (Nordic countries) (TABLE 2). Also, 11 donors (six sperm donors and five oocyte donors) had donated at more than one Swedish clinic (TABLE 2). More of these individuals stated that they wanted more children of their own ($P = 0.019$), and that it was important that their own child looked like them (25% versus 11%, $P = 0.021$), compared with individuals who had donated at a single clinic. Individuals who had donated at more than one clinic claimed that they regarded their donations as complete and were not considering further donations less often than individuals who had donated at a single clinic (17% versus 52%, $P = 0.023$).

TABLE 1 DEMOGRAPHIC DATA FOR SPERM AND OOCYTE DONORS AT FOLLOW-UP

	Sperm donor (n=92)	Oocyte donor (n=123)	P-value ^b
	n (%)	n (%)	
Level of education			0.051
Elementary	0 (0)	4 (3)	
Lower secondary	7 (8)	15 (13)	
Upper secondary	7 (8)	17 (14)	
College/university	78 (85)	84 (70)	
Same partner as when donating			0.012
Yes	24 (26)	53 (43)	
No, single	27 (29)	23 (19)	
No, new partner	28 (30)	40 (33)	
Did not have partner when donating	13 (14)	7 (6)	
Children ^a			<0.001
Yes	59 (66)	108 (88)	
No	30 (34)	15 (12)	
Pregnant/partner pregnant			1.000
No	87 (98)	120 (98)	
Yes	2 (2)	3 (2)	
Stepchildren			0.174
No	83 (93)	107 (87)	
Yes	6 (7)	16 (13)	
Adopted children			0.030
No	85 (96)	123 (100)	
Yes	4 (4)	0 (0)	
Biological children			<0.001
No	31 (35)	18 (15)	
Yes	58 (65)	105 (85)	
Do you want (to have more) children?			<0.001
Yes	25 (27)	11 (9)	
No	61 (66)	111 (90)	
Don't know	6 (7)	1 (1)	

^a Children is the presence of any of the different categories of children (i.e. if a donor has stepchildren and/or adopted children and/or biological children).

^b P-values were derived using Pearson's Chi-squared test, although Fisher's exact test was used where cell counts were <5.

Note: Numbers may not sum to population totals due to partially missing values. Some percentages may not sum to 100 due to rounding errors.

Approximately one-half of the sperm donors and one-third of the oocyte donors knew that their donation had resulted in at least one child (TABLE 2), and the number of children ranged between one and 12 for sperm donors and between one and four for oocyte donors.

Perceptions of financial compensation to donors

Sperm donors were significantly more satisfied with the financial compensation they had received for their donation compared with oocyte donors (91% versus 75%, $P = 0.005$) (TABLE 2). Two-thirds of

sperm donors felt that <\$100 was reasonable, while this was true for only 6% of oocyte donors. Among oocyte donors, the most commonly stated reasonable levels of compensation were \$100–499 (33%) and \$1000–1999 (20%).

Satisfaction with and perceptions of donation

Overall, the gamete donors were satisfied with the experience of having donated; for example, a large majority agreed that they felt that they had made a contribution to their fellow human beings (96% for both oocyte and sperm donors). No differences

between sperm and oocyte donors were detected, except for the item 'This is the highlight (a major event) in my life', where oocyte donors were significantly more likely to agree compared with sperm donors (34% versus 26%, $P = 0.047$) (TABLE 3). No difference in satisfaction was found between sperm and oocyte donors if the donors knew that the donation had resulted in a child or did not want to know if the donation had resulted in a child (data not shown).

In comparison with sperm donors, a significantly higher proportion of oocyte donors believed that family and friends

TABLE 2 OUTCOME OF DONATION AND VIEWS OF GAMETE DONORS ABOUT FINANCIAL COMPENSATION

Donation statistics and compensation view	Sperm donor (n=92)	Oocyte donor (n=123)	P-value ^a
	n (%)	n (%)	
Donated at more than one Swedish clinic?			0.535
No	86 (93)	118 (96)	
Yes	6 (7)	5 (4)	
Donated abroad?			0.182
No	90 (98)	123 (100)	
Yes	2 (2)	0 (0)	
Donation resulted in child(ren) that I know about?			<0.001
Don't know	39 (42)	60 (49)	
I don't want to know	3 (3)	1 (1)	
No	1 (1)	23 (19)	
Yes	49 (53)	39 (32)	
Satisfied with compensation for donation?			0.005
Yes	80 (91)	88 (75)	
No	8 (9)	29 (25)	
Reasonable amount of compensation (\$)			<0.001
<100	53 (69)	6 (6)	
100–499	17 (22)	36 (33)	
500–999	0 (0)	6 (6)	
1000–1999	3 (4)	22 (20)	
2000–5000	0 (0)	6 (6)	
Travelling expenses, compensation for loss of work	0 (0)	19 (17)	
No opinion	4 (5)	14 (13)	

^a P-values were derived using Pearson's Chi-squared test, although Fisher's exact test was used where cell counts were <5.

Note: Numbers may not sum to population totals due to partially missing values. Some percentages may not sum to 100 due to rounding errors.

were proud of their donation (23% versus 51%, $P < 0.001$), and considered their donation to be complete after the donation procedure (36% versus 59%, $P = 0.005$) (TABLE 4). In total, six donors stated that they regretted their donation: four oocyte donors and two sperm donors. The donors that regretted their donation felt that the parents should be open about using a donor, and that this should not affect the relationship between children and parents. However, four of the donors did not agree with the statement 'The child should receive some information regarding the donor during its upbringing', and five donors thought that this information should be provided at 'a mature age'. One oocyte donor stated that she was not provided with sufficient information regarding the future consequences of her donation. Also, two oocyte donors commented that they had hesitated to donate but found it difficult to stop the

process after having committed and being accepted as a donor.

Mental health status

Approximately 80% of the donors did not exhibit any symptoms of anxiety at either T1 or T5. However, during the 14–17 years since their acceptance as a donor, 11% of oocyte donors and 12% of sperm donors had developed symptoms of anxiety. Similarly, approximately 92–93% of the donors did not exhibit symptoms of depression at T1 or T5, but 7% of oocyte donors and 5% of sperm donors had developed symptoms of depression since their acceptance as a donor (TABLE 5).

DISCUSSION

The open-identity gamete donors that were assessed at T5, 14–17 years after acceptance as a donor, were found to be

dedicated to the study, and almost 87% of the donors chose to answer the questionnaire. This was interpreted to mean that the donors were willing to continue to share information about themselves, and showed responsibility and very well-intentioned compliance with the principle of sharing their perceptions, experiences and expectations after donating gametes 14–17 years previously. Since the rationale for executing this fifth round of follow-up was to gain knowledge about the donors' situations before their identity could be released, with the possibility of being contacted by their donor offspring, the present results are reassuring that donors are open to being contacted and having their identity revealed.

Despite the high response rate, some of the donors were lost to follow-up. These individuals may have had a negative

TABLE 3 SATISFACTION OF GAMETE DONORS 14–17 YEARS POST-DONATION

Satisfaction measure	Sperm donor (n=92)	Oocyte donor (n=123)	P-value ^a
	n (%)	n (%)	
I am happy to help couples unable to have children by other means			0.509
Agree	91 (100)	120 (98)	
Neutral	0 (0)	1 (1)	
Disagree	0 (0)	2 (2)	
I feel as though I have made a contribution to my fellow human beings			1.000
Agree	87 (96)	118 (96)	
Neutral	3 (3)	4 (3)	
Disagree	1 (1)	1 (1)	
My life is more content			0.784
Agree	44 (48)	54 (44)	
Neutral	38 (42)	54 (44)	
Disagree	9 (10)	15 (12)	
I feel that I gave something away without receiving anything back			0.238
Agree	7 (8)	19 (15)	
Neutral	8 (9)	11 (9)	
Disagree	76 (84)	93 (76)	
This is the highlight (a major event) of my life			0.047
Agree	24 (26)	42 (34)	
Neutral	32 (35)	52 (42)	
Disagree	35 (38)	29 (24)	
I think I will brood about it for the rest of my life			0.268
Agree	7 (8)	10 (8)	
Neutral	13 (14)	9 (7)	
Disagree	71 (78)	104 (85)	

^a P-values were derived using Pearson's Chi-squared test, although Fisher's exact test was used where cell counts were <5.

Note: Numbers may not sum to population totals due to partially missing values. Some percentages may not sum to 100 due to rounding errors.

donation experience and therefore did not wish to participate.

Although the Swedish population register identifies each individual uniquely using a personal identification number, it was not possible to locate 15 donors. This may have an impact on some donor-conceived offspring who will not be able to contact their donor if they wish to do so (*Lampic et al., 2022; Scheib et al., 2017*). These offspring will only be able to obtain limited information about their donor, such as their name and, potentially, their motivation for donating and occupation from the clinic records. Very few of the donors were deceased.

Based on this investigation of self-assessed symptoms of depression or anxiety, the mental health of the donors seems to be good. An earlier assessment of the donors

in the SSGD, using the same psychometric instrument, found similar results (*Skoog Svanberg et al., 2013*). In addition, the donors in this follow-up were investigated using a personality inventory – the Temperament and Character Inventory (*Brändström, 2008; Cloninger, 1994*) – at the first assessment after acceptance as a donor. The vast majority of the donors were considered to be stable and mature, and to have a generous personality/character (*Sydsjö et al., 2011, 2012*). These results, together with the results from the present assessment (i.e. donors were satisfied with their donations and were mentally healthy), indicate that the procedures involved in recruiting and accepting donors in a non-commercial donor programme function well. This is reassuring for recipient couples, children-to-be, lawmakers, medical professionals and, of course, the donors themselves.

To the authors' surprise, a few individuals had donated at more than one clinic in Sweden and at commercial clinics abroad. It is recommended that an individual's donations should not result in offspring in more than six families (*Sydsjö et al., 2015*); however, if a donor donates at more than one clinic, this number may be exceeded. Each clinic has the responsibility to keep account of their donors, but there is no national register or reports between clinics. The reason for donating at more than one clinic may be due to the desire to spread one's genes (*Svanberg et al., 2012*) and financial compensation, and also these donors claimed that they regarded their donations as complete less often than donors who donated at a single clinic.

Both sperm and oocyte donors were reasonably satisfied with the monetary compensation they had received. In

TABLE 4 PERCEPTIONS OF GAMETE DONORS ABOUT THEIR SITUATION AS A DONOR 14–17 YEARS POST-DONATION

Perception	Sperm donor (n=92)	Oocyte donor (n=123)	P-value ^a
	n (%)	n (%)	
I am concerned about my fertility			0.152
Agree	1 (1)	4 (3)	
Neutral	4 (4)	1 (1)	
Disagree	86 (95)	118 (96)	
I feel that my family and friends are proud of my donor contribution			<0.001
Agree	21 (23)	63 (51)	
Neutral	48 (53)	43 (35)	
Disagree	22 (24)	17 (14)	
It is hard for family and friends to understand all the aspects of my donation			0.481
Agree	9 (10)	9 (7)	
Neutral	31 (34)	52 (42)	
Disagree	50 (56)	62 (50)	
For me, the donation was totally completed after the donation procedure			0.005
Agree	33 (36)	72 (59)	
Neutral	26 (29)	24 (20)	
Disagree	32 (35)	27 (22)	
I regret my donation			0.656
Agree	2 (2)	4 (3)	
Neutral	2 (2)	1 (1)	
Disagree	87 (96)	118 (96)	

^a P-values were derived using Pearson's Chi-squared test, although Fisher's exact test was used where cell counts were <5.

Note: Numbers may not sum to population totals due to partially missing values. Some percentages may not sum to 100 due to rounding errors.

Sweden, gamete donation is, by definition, a donation. Oocyte donors get their medication from the clinic, and are given approximately \$1000 (2022) compensation, with the exact amount depending on whether it is a public or private clinic. For sperm donors, the compensation is around \$60 each time they give a sperm sample at the clinic. It appears that most donors are willing to donate for relatively low monetary compensation. However, oocyte donors were found to be less satisfied with their compensation than sperm donors. This was also reflected in the finding that oocyte donors considered a larger amount to be reasonable compensation for donating. The findings regarding compensation in the current study are supported by the findings of *Lee et al. (2017)* from a study investigating the public's opinion on appropriate compensation. Lee et al. found that, in general, the public considered that oocyte donors should receive higher compensation than sperm donors, which is in line with the donors' opinion in the current study. This could be

due to oocyte donation being a more invasive and complicated procedure (*Samorinha et al., 2020*). Thus, in order to obtain more, suitable oocyte donors, higher compensation could be of value.

A recent Danish interview study on 23 non-identified sperm donors from a commercial sperm bank showed that, 10 years post-donation, most men stated that they were donors for economic reasons, but that they also viewed themselves as unselfish in helping others. These men also expressed that they were glad to be non-identified, and did not want to know about any children conceived as they thought this might be damaging for them and create problems for them, their children and their families (*Lou et al., 2023*). In the present study, close to 50% of the donors had not requested information on the number of children born after their donation. These donors are particularly interesting as donor-conceived children from donations in 2005–2008 will reach maturity in the coming years, and will be

able to obtain information and potentially seek contact with their donor. *Lampic et al. (2022)* found that a small proportion of donor-conceived children had sought contact. It could be speculated that these donors are less prepared for being approached by their donor child(ren), which could have a negative effect on the child's reception when approaching the donor. There may be donors who are not aware of the possibility for their offspring to seek this information from clinics, despite the fact that this is discussed at the time of donation. These donors may consider their donation to be complete, and do not want information about any possible offspring as their own families find it difficult to understand why they donated.

Strengths of this study include the low drop-out rate, and that fact that it is a national cohort of open-identity donors from all seven clinics that provided gamete donation between 2005 and 2008. A limitation is the fact that it was not possible to locate all the donors. The results are

TABLE 5 SELF-ASSESSED ANXIETY AND DEPRESSION SYMPTOMS MEASURED USING HADS AT DONOR ACCEPTANCE AND AT 14–17-YEAR FOLLOW-UP

HADS score	Sperm donor (n=92)	Oocyte donor (n=123)	P-value ^a
	n (%)	n (%)	
Anxiety at T1			1.000
No, 0–7	85 (93)	113 (93)	
Yes, ≥8	6 (7)	8 (7)	
Depression at T1			1.000
No, 0–7	90 (99)	119 (98)	
Yes, ≥8	1 (1)	2 (2)	
Anxiety at T5			1.000
No, 0–7	79 (86)	103 (85)	
Yes, ≥8	13 (14)	18 (15)	
Depression at T5			0.593
No, 0–7	87 (95)	112 (93)	
Yes, ≥8	5 (5)	9 (7)	
HADS anxiety			0.739
Below cut-off on both occasions	74 (81)	98 (82)	
Above cut-off on first occasion alone	4 (4)	3 (3)	
Above cut-off on second occasion alone	11 (12)	13 (11)	
Above cut-off on both occasions	2 (2)	5 (4)	
HADS depression			0.938
Below cut-off on both occasions	85 (93)	109 (92)	
Above cut-off on first occasion alone	1 (1)	1 (1)	
Above cut-off on second occasion alone	5 (5)	8 (7)	
Above cut-off on both occasions	0 (0)	1 (1)	

^a All P-values were computed using Fisher's exact test. Numbers may not sum to population total. Note: Numbers may not sum to population totals due to partially missing values. Some percentages may not sum to 100 due to rounding errors.

HADS, Hospital and Anxiety Depression Scale; T1, when accepted as a donor; T5, 14–17 years post-donation.

generalizable in a non-commercial setting of open-identity donors.

Few donors regretted their donation, but this is, of course, distressing for those donors who feel this way, and in the future, it may be distressing for a child that approaches his/her donor. Clinics need to be very attentive to signs of ambivalence from donors to be, and be very careful during the process in order to minimize the number of donors that are not fully sure about, and prepared for, their donation and the procedures involved.

The vast majority of gamete donors found donation to be very satisfactory and rewarding, which is reassuring for donors in the near term and in the future. This finding is in accordance with other studies that have measured satisfaction in connection with the donation process (*Williams and Machin, 2018*).

CONCLUSION

Long-term follow-up studies on donors are important for recruiting donors, and for recipients and the children who will be conceived with donated gametes. The results from this study indicate that open-identity donors have, generally, good mental health and do not regret their decision to donate gametes. These findings are reassuring for all parties involved.

DATA AVAILABILITY

Data will be made available on request.

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AUTHOR CONTRIBUTIONS

C.L., A.S.S. and G.S. conceptualized, planned and designed the study. E.N. was responsible for recruiting participants and planning the study. M.B. was responsible for data collection and data analyses. G.S. was primarily responsible for writing the paper. All authors were involved in interpreting the results and revising the paper with respect to content. All authors approved the final version of the manuscript for submission.

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