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ASSISTED REPRODUCTION TECHNOLOGIES

Anonymous sperm donors' attitude towards donation and the release of identifying information

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Abstract

Introduction Belgian legislation allows only strictly anonymous gamete donation and known donation (donation to a recipient known by the donor). Recently, an amendment of the legislation was proposed to grant donor offspring, as of 18 years old, the right to claim identifying information about their donor.

Purpose The aim is to explore the attitude of actual sperm donors towards donation and the release of identifying information and to investigate which donors would be willing to donate when anonymity would be prohibited by law.

Methods All men who were accepted as sperm donors ($n = 242$) by AZ Jan Palfijn Hospital (Ghent, Belgium) were invited to complete an anonymous online survey. The response rate was 65.5%.

Results One in five (20.1%; $n = 30$) would continue sperm donation upon a legislation change towards identifiable donation. Three in four donors (75.2%) would agree to provide basic non-identifiable information about themselves and one in three (32.9%) would provide extra non-identifiable information such as a baby photo or a personal letter. Almost half of the donors (45.6%) would agree to donate in a system where the hospital can trace the donor at the child's request and contact the donor, leaving it to the donor to decide whether or not to have contact with the requesting donor child.

Conclusion These findings show that only one in five current donors would continue to donate when identifiable. The study also demonstrates that current donors think more positive about alternative options and that nearly half of them are willing to be contacted by the hospital at the donor child's request, providing the donor can decide at that time whether or not to release his identity.

Keywords Anonymity · Motivation · Disclosure · Attitude · Semen donor · Donor conception

Introduction

Over the past decades, the use of donor sperm for fertility treatment—typically referred to as third-party reproduction—has continued to expand. The use of donor gametes varies from country to country and can even differ between donor banking facilities in a single country [23].

Although anonymous gamete donation is still found in the majority of the European countries, Sweden was, in 1985, the first of several countries to abolish donor anonymity completely [5]. Consequently, Swedish children conceived with donor semen, when reaching the age of 18, have the right to claim identifying information of their donor. After the Swedish precedent, Switzerland (1992), The Netherlands (2000), and the UK (2005) followed [10]. Denmark and Iceland apply a double track system, where the donor can choose to be either an identifiable or an anonymous donor [10]. Other countries like Germany use anonymous donation as standard practice but lack satisfying legislation to help delineate the relationship between donors, recipients, and donor children [3].

In general, in countries with a double track policy, 20% to 50% of donors are willing to keep on donating when donor anonymity would be abolished [2, 9, 13, 17, 18, 22]. In countries with donor anonymity, 11% to 50% of donors would be willing to donate in case of a change from donor anonymity to non-anonymous donations [7, 8, 15, 16, 25]. In countries at the point of changing the law, half of the donors are willing to keep on donating [1, 11].

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Belgian legislation allows both strictly anonymous gamete donation and known gamete donation (donation to a recipient known by the donor). Recently, two political parties wanted to change the current anonymous donation law; one party suggested a non-anonymous donation system, the other party proposed the double track system where both anonymous and non-anonymous donations are allowed.

One of the major concerns about lifting anonymity is the impact this may have on donor recruitment. Some authors claim that scarcity of donor sperm in their country is directly related to the abolition of donor anonymity [14] while other authors state that a modest decline in donor numbers after anonymity removal is not unexpected but can be overcome by an adaptive recruitment strategy [4, 6].

This study's focus is to investigate the attitude of actual anonymous sperm donors in contrast to three previous Belgian studies where the attitude of non-donors [20], or of candidate donors [12], were examined or where a combination of candidate sperm donors and sperm donors were examined [24]. No other Belgian study investigated the attitude of actual donors; nevertheless, it is of great importance to know the attitude of actual donors since they are the providers of donor sperm.

The aim of this study is twofold: (1) to explore the attitude of actual sperm donors towards donation and the release of identifying information and (2) to investigate which donors would be willing to donate in a donation programme where anonymity is prohibited by law. The impact on the behaviour on actual donors is highly relevant in a setting where domestic (Belgian) donors provide only 36.7% of all donor sperm applied in Belgian fertility centres [23] and where import and export of donor sperm is the most important form of movement of human reproductive cells [19].

Material and method

Method

All men who were accepted as sperm donors ($n = 242$) by Jan Palfijn Hospital (Ghent, Belgium) between 2009 and 2017 were contacted by e-mail and invited to complete the anonymous online survey. The survey was online from October 27 until December 8, 2017. Questions ($n = 36$) were asked about motivation to donate, attitude towards anonymous donation, and social demographics. All accepted donors received an introductory e-mail, including information about the study and were kindly asked to complete the online survey. To motivate the donors, the importance of their opinion was emphasized. Three reminders were sent.

Validation of the survey

The survey was composed of questions derived from the literature. The electronic databases PubMed, Web of Science, and Embase were screened for publications using the following search strategy: ("tissue donor*" OR "unrelated donor*" OR "donor*" OR "donation*" OR "donor conception") AND ("semen" OR "spermatozoa" OR "sperm" OR "gamete*") AND ("disclosure" OR "self disclosure" OR" confidentiality" OR "confidentiality/psychology" OR "tissue donors/psychology" OR "personally identifiable information" OR "identifiable information" OR "anonymity" OR "identity-release legislation" OR "changing legislation" OR "abolishing anonymity"). The search strategy resulted in 1485 titles over the three electronic databases (492 in PubMed, 313 in WOS, and 680 in Embase). All titles were imported in Endnote and screened for relevant articles based on title selection, abstract selection, and full-text selection—in that order—after exclusion of duplicates. A total of 583 titles and 284 abstracts were excluded based on wrong study population or non-relevant data. A total of 532 duplicates were discarded resulting in 86 full-text analyses. Another 58 publications were excluded due to wrong study design or poor quality, which resulted in 28 included records.

The composed survey was validated via a Delphi procedure by an interdisciplinary team of 8 experts who thoroughly examined the survey. The team consisted of a medical secretary, a quality manager, an embryologist, two gynaecologists and two study nurses, and a professor of empirical research methods for moral science and ethics. The experts gave their opinion about the format, the content of the questions, and the use of wording and suggested extra questions or extra multiple choice answers. The feedback was incorporated in a new version of the survey. In addition, the survey was examined by two sperm donors to ensure clarity of wording. After a three-round Delphi procedure, a final version of the survey was compiled and transferred to Qualtrix, an online survey questionnaire software.

Statistical analysis

Data of the online survey were extracted from Qualtrix and imported into the Statistical Package of the Social Science (SPSS version 25; IBM). The statements about motivation and attitude were recoded into two categories, the donors that agreed with the statement ("Totally agree" and "Agree") and the others ("Neutral", "Disagree", and "Totally disagree"). A two-sided Fisher exact test was used to explore the significance of the association between the variables (continue, uncertain, and discontinue future sperm donation) and demographics, motivation, attitude, and levels of information. Fisher exact tests with a significant result were tested post hoc to compare pairwise the proportion of donors who agreed

with the statement ("Totally agree" and "Agree") and the others ("Neutral", "Disagree", and "Totally disagree") between those who would continue, those who were uncertain, and those who would discontinue to donate when anonymity would be abolished by law. Because of the multiple comparison, Bonferroni correction was used resulting in a significance level of $p < 0.016$.

For age (as a continuous variable), analysis of variance test (ANOVA test) was performed.

Ethics committee approval

The study was approved by the University Hospital Ghent Ethics Committee, with Belgian Registration Number (B0201733518), and received a positive advice from the local Jan Palfijn Ghent Hospital Ethics Committee. All respondents gave their informed consent at the start of the online survey.

Results

All sperm donors ($n = 242$) accepted by the donor bank between 2009 and 2017 were contacted by e-mail. Of those, 13 donors were not reachable, resulting in 229 donors who received the invitation to participate in the study. Of the 165 surveys received, one donor did not give consent to participate in the study and 15 were excluded after data cleaning due to incomplete answers. The sample number used for statistical analyses totalled 149 valid surveys.

The survey's central question investigated the sperm donor's willingness to continue his donations when anonymity would be abolished by law. One in five (20.1%; $n = 30$) indicated that they would continue to donate. One in four (26.2%; $n = 39$) was uncertain and little more than half of the donors (53.7%; $n = 80$) indicated they would discontinue their donations.

Socio-demographic characteristics and the willingness to continue to donate

The socio-demographic characteristics are presented in Table 1. At the time of the survey, the anonymous sperm donors had a mean age of 32.1 years (20–46; SD 5.97). No statistical difference in age was found between donors who would continue their donations, donors who were uncertain, and those who would no longer donate (32.2, SD 5.4 vs. 31.4, SD 6.1 vs. 32.3, SD 6.1; $p = 0.725$). Four out of five (82.6%; $n = 123$) of the respondents had a partner and one-third (33.5%; $n = 50$) had children of their own.

Half of the donors (51.7%; $n = 77$) were also blood donors and one in five (20.8; $n = 31$) was an active sperm donor. When asked to explain their status, 72.9% ($n = 86$) of the non-active donors said they thought that there was enough donor sperm in the sperm bank. The others (27.1%; $n = 32$) were non-active for personal reasons, mainly related to lack of time to donate (21.9%; $n = 7$), a non-supportive partner (18.8%; $n = 6$), or a move to a different city (12.5%; $n = 4$).

Most of the respondents were heterosexual (89.2%; $n = 132$), 9.5% ($n = 14$) were homosexual, and 1.4% ($n = 2$) were bisexual. The majority of the respondents (68.5%) were atheistic or not religious. Half of the sperm donors (50.3%; $n = 75$) successfully completed university studies, one in three (31.5%; $n = 47$) completed college, and for almost one in five (16.1%; $n = 24$), high school was their highest level of education. Three donors (2.0%) did not have a high school degree.

Table 1 shows that no significant relationship was observed between the willingness to continue to donate in a non-anonymous donation system and the donor's education, age, religion, fatherhood, blood donor status, sexual orientation, or relationship status.

Motivation and the willingness to continue to donate

In Table 2, an overview is provided of the association between the type of motivation to donate sperm and the willingness to continue to donate after a hypothetical abolishment of donor anonymity.

Most of the respondents (86.6%; $n = 129$) were motivated by altruism although also a majority (59.1%; $n = 88$) was motivated by the financial compensation and nearly half of them (45.0%; $n = 67$) by access to blood and fertility tests. One in four (24.2%; $n = 36$) was solely motivated by altruism without being motivated by access to test results or the financial compensation. A minority was solely motivated by their tests (0.7%; $n = 1$) or solely motivated by the financial compensation (4.0%; $n = 6$). Less than 5% (4.7%; $n = 7$) was motivated by self-interest alone (which was seen as either access to test results and/or the financial compensation without being motivated by altruism). For about one in three (27.5%; $n = 41$), their motivation was a combination of the three.

One in five (22.8%; $n = 34$) would continue to donate without a financial compensation. About one in three (29.5%; $n = 44$) was motivated to donate their sperm because they knew people who used donor sperm or donor oocytes. When asked about their motivation to donate sperm, one in five (20.1%; $n = 30$) said to be motivated because they had no children of their own. Global Fisher exact test showed a significant relationship ($p = 0.043$) in the willingness to donate; however, no significant relationship, at a significance level of < 0.016, was found after post hoc tests of pairwise comparison between those who would continue to donate compared with those who were uncertain or would discontinue their donations when anonymity would be prohibited by law ($p = 0.042$). Little more than one in four (28.9%; $n = 43$) was motivated

Table 1 Socio-demographic characteristics of the anonymous sperm donors according to those who would continue, those who were uncertain, and those who would discontinue their donations when anonymous sperm donations would be prohibited by law ($N = 149$)

	Continue ($n = 30$)		Uncertain ($n = 39$)		Discontinue ($n = 80$)		Total		p value
Characteristic	n[a]	%[a]	n[a]	%[a]	n[a]	%[a]	n[b]	%[b]	FE[c]
Active donor									0.417
Active donor	6	20.0	11	28.2	14	17.5	31	20.81	
Non-active donor	24	80.0	28	71.8	66	82.5	118	79.19	
Blood donor									0.860
Yes	17	56.7	20	51.3	40	50.0	77	51.68	
No	13	43.3	19	48.7	40	50.0	72	48.32	
Partner relationship									0.095
Yes	21	70.0	32	82.1	70	87.5	123	82.55	
No	9	30.0	7	17.9	10	12.5	26	17.45	
Sexual orientation[d]									0.077
Heterosexual	24	80.0	37	97.4	71	88.8	132	89.2	
Homosexual and bisexual	6	20.0	1	2.6	9	11.3	16	10.8	
Children									0.921
No	19	63.3	26	66.7	54	67.5	99	66.44	
Yes	11	36.7	13	33.3	26	32.5	50	33.6	
Biological parent of children[e]									0.045
Yes	9	81.8	13	100.0	26	100.0	48	96.0	
No	0	0.0	0	0.0	0	0.0	0	0.0	
Combination of own and partner's children	2	18.2	0	0.0	0	0.0	2	4.0	
Child(ren) conceived with ART[e]									0.116
Yes	0	0.0	0	0.0	5	19.2	5	10.0	
No	11	100.0	13	100.0	21	80.8	45	90.0	
Religion[f]									0.314
Religious	6	20.0	14	35.9	27	33.8	47	31.5	
Not religious	24	80.0	25	64.1	53	66.3	102	68.5	
Education									0.731
Elementary school or not finished elementary school	8	26.7	7	17.9	12	15.0	27	18.1	
College	9	30.0	12	30.8	26	32.5	47	31.5	
University	13	43.3	20	51.3	42	52.5	75	50.3	
Age	n	Mean age	n	Mean age	n	Mean age	n	Mean age	ANOVA[g] 0.725
Mean	30	32.2	39	31.4	80	32.3	149	32.07	
Standard deviation (SD)		5.4		6.1		6.1		5.97	
Maximum		44		42		46		46	
Minimum		22		20		20		20	

[a] Number (n) or percentage (%) of donors respectively willing to continue, being uncertain, or would discontinue their donations when donor anonymity would be prohibited by law

[b] Number (n) or percentage (%) of total sample

[c] FE, Fisher exact test: to compare the proportion of donors who agreed with the statements ("Agree" and "Totally agree") and the others ("Neutral", "Disagree", and Totally disagree") between those who want to continue, those who were uncertain, and those who would discontinue their donations when anonymity would be prohibited by law

[d] 1 donor did not answer the question and indicated the question as "Not important" ($n = 148$)

[e] Question only presented to respondents with children ($n = 50$)

[f] Religious, respondents who answered Catholic, Christian, Protestant, Islamic, Jewish, or "Religious, but no specific religion"; not religious, respondents who answered Atheist, Liberal, No religion, or Agnost

[g] ANOVA, analysis of variance: to compare age as a continuous variable between those who want to continue, those who were uncertain, and those who would discontinue their donations

by the prospect of passing on their genes. Markedly, this proportion was significantly higher in the group who would continue to donate compared with those who were uncertain or would not continue to donate ($p < 0.001$).

Table 2 Anonymous sperm donors' motivation to donate according to those who would continue, those who were uncertain, and those who would discontinue their donations when anonymous sperm donations would be prohibited by law ($N = 149$)

	Continue ($n = 30$)		Uncertain ($n = 39$)		Discontinue ($n = 80$)		Total		p value
	n^a	$\%^a$	n^a	$\%^a$	n^a	$\%^a$	n^b	$\%^b$	FE[c]
Motivation									
Because I want to help people with their child wish (altruism)	26	86.7	33	84.6	70	87.5	129	86.6	0.947
Because I want to know the results of my sperm/blood tests	9	30.0	19	48.7	39	48.8	67	45.0	0.186
Because, this way, I can receive a financial compensation	16	53.3	26	66.7	46	57.5	88	59.1	0.498
Because I needed a fertility treatment myself	0	0.0	0	0.0	3	3.8	3	2.0	0.423
Because I know people who used donor sperm or donor oocytes	8	26.7	13	33.3	23	28.7	44	29.5	0.836
Because I have no children of my own	11	36.7	5	12.8	14	17.5	30	20.1	*0.043*
Because I want to pass on my genes	20*	66.7*	9	23.1	14	17.5	43	28.9	*< 0.001*
Because I am a donor child myself	1	3.3	0	0.0	1	1.3	2	1.3	0.43
Willingness to donate without a financial compensation									
Yes, I would continue to donate	12	40.0	8	20.5	14	17.5	34	22.8	0.180
I am not sure if I would continue to donate	10	33.3	20	51.3	40	50.0	70	46.98	
No, I would no longer donate	8	26.7	11	28.2	26	32.5	45	30.2	

Significance level is <0.05

[a] Number (n) or percentage (%) of donors who agreed with the statement ("Agree" and "Totally agree") and respectively would continue, were uncertain, and would discontinue with their donations when donor anonymity would be prohibited by law

[b] Number (n) or percentage (%) of donors who agreed with the statement ("Agree" and "Totally agree") of total sample

[c] FE, Fisher exact test: to compare the proportion of donors who agreed with the statements ("Agree" and "Totally agree") and the others ("Neutral", "Disagree", and Totally disagree") between those who want to continue, those who were uncertain, and those who would discontinue their donations when anonymity would be prohibited by law

*$p < 0.016$ based on pairwise comparison by Fisher exact test to compare the proportion of donors between those who would continue to donate compared with those who were uncertain or would discontinue their donations when anonymity would be prohibited by law. Significance level of 0.016 is being used because of Bonferroni correction for multiple comparison

Attitude and the willingness to continue to donate

Attitude towards recipients

Table 3 presents the donors' attitude towards donation and the association with their willingness to donate in a non-anonymous system. One in four donors (26.2%; $n = 39$) was curious about the women who received their sperm. The proportion of curious donors was significantly larger in the group who would continue with their donation compared with the others who were uncertain or would discontinue their donations ($p < 0.001$). Less than 10% (9.4%; $n = 14$) of the donors preferred to take part in the decision about who would receive their donor sperm. Donors who thought that matching a donor to a recipient should be done solely by medical staff (70%; $n = 105$) showed a significant relationship in their future willingness to donate. However, no significant relationship was found after post hoc tests of pairwise comparison between those who would continue compared with those who were uncertain or would discontinue their donations ($p = 0.048$). A minority stated that they did not want to donate their sperm to single women (6.0%; $n = 9$) or to lesbian couples (4.0%; $n = 6$). Most of the donors (64.4%; $n = 96$) would rather not meet the recipients. The proportion of the donors who would rather not meet the recipients was significantly lower in the group who would continue their donations compared with those who were uncertain or would discontinue with their donations ($p < 0.001$). Almost half of the donors (47.0%; $n = 70$) would like to be informed when their donation leads to a pregnancy and of them, a significantly larger proportion would continue to donate when anonymity is no longer guaranteed compared with those who were uncertain or would stop their donations ($p < 0.001$).

Attitude towards anonymity

Table 3 shows that two-thirds of the donors (65.8%; $n = 98$) only wanted to donate their sperm when anonymity would be guaranteed. One in five (22.8%; $n = 34$) would accept that donor children would know their identity and less than one in five (17.4%; $n = 26$) would accept that donor children could contact them directly. More than half (57%; $n = 85$) of the donors would not want to meet the donor child. Interestingly, the majority of the donors (87.2%; $n = 130$) wanted to be able to decide whether or not to meet the child after a request from a donor child, meaning they were open to be contacted in light of the request

Table 3 Sperm donors' attitude towards donation and the release of identifying information according to those who would continue, those who were uncertain, and those who would discontinue their donations when anonymous sperm donations would be prohibited by law ($N = 149$)

	Continue ($n = 30$)		Uncertain ($n = 39$)		Discontinue ($n = 80$)		Total		p value
	n^a	$\%^a$	N^a	$\%^a$	n^a	$\%^a$	n^b	$\%^b$	FE[c]
Attitude towards recipients									
I am curious about the women who received my sperm	17*	56.7*	11	28.2	11	13.8	39	26.2	*< 0.001*
I would like to take part in the decision about who receives my donor sperm	6	20.0	3	7.7	5	6.3	14	9.4	0.090
Matching a donor to a recipient should be done solely to medical staff	18	60.0	23	59.0	64	80.0	105	70.5	*0.020*
I prefer not to donate my sperm to single women	0	0.0	2	5.1	7	8.8	9	6.0	0.265
I prefer not to donate my sperm to lesbian couples	0	0.0	1	2.6	5	6.3	6	4.0	0.471
I would rather not meet the recipient(s)	4*	13.3*	18	46.2	74	92.5	96	64.4	*< 0.001*
I would like to be informed when my sperm leads to a pregnancy	23*	76.7*	18	46.2	29	36.3	70	47.0	*0.001*
Attitude towards anonymity/openness									
I only want to donate my sperm when anonymity is guaranteed	1*	3.3*	20	51.3	77	96.3	98	65.8	*< 0.001*
I would be ok with it when the donor children would know my identity	25*	83.3*	8	20.5	1	1.3	34	22.8	*< 0.001*
I would be ok with it when the donor children could contact me directly (e.g. via e-mail)	19*	63.3*	7	17.9	0	0.0	26	17.4	*< 0.001*
I do not want to meet donor child that is conceived with my sperm	2*	6.7*	12	30.8	71	88.8	85	57.0	*< 0.001*
I want to be able to decide whether or not to meet the child after a request from a donor child. I should have the opportunity to decline.	28	93.3	35	89.7	67	83.8	130	87.2	0.387

Significance level is <0.05

[a] Number (n) or percentage (%) of donors who agreed with the statement ("Agree" and "Totally agree") and respectively would continue, were uncertain, and would discontinue with their donations when donor anonymity would be prohibited by law

[b] Number (n) or percentage (%) of donors who agreed with the statement ("Agree" and "Totally agree") of total sample

[c] FE, Fisher exact test: to compare the proportion of donors who agreed with the statements ("Agree" and "Totally agree") and the others ("Neutral", "Disagree", and Totally disagree") between those who want to continue, those who were uncertain, and those who would discontinue their donations when anonymity would be prohibited by law

*$p < 0.016$ based on pairwise comparison by Fisher Exact test to compare the proportion of donors between those who would continue to donate compared with those who were uncertain or would discontinue their donations when anonymity would be prohibited by law. Significance level of 0.016 is being used because of Bonferroni correction for multiple comparison

of a donor child on the condition that they had the opportunity to decline. There were no statistically significant trends in the group who would continue to donate compared with those who were uncertain or would discontinue their donations when anonymity would be abolished by law ($p = 0.387$).

Levels of information and the willingness to continue to donate

Table 4 presents the levels of information and the association with the donors' willingness to donate in a non-anonymous system.

What information does the donor want to give?

Almost four in five (78.5%; $n = 117$) wanted to donate in a strictly anonymous system where at no time information is passed on to the recipients or to donor children. The proportion of those donors was significantly lower in the group who would continue with their donations when anonymity is no longer guaranteed, compared with those who were uncertain or would discontinue ($p = 0.002$). Three out of four donors (75.2%; $n = 112$) would accept to donate when recipients or donor children would receive basic information with which the donor cannot be identified, namely eye colour, hair colour, blood type, weight, and height. One in three (32.9%; $n = 49$) would accept to donate when donor children would receive extra information with which the donor cannot be identified such as a baby photo and or a letter in which the donor describes his personality, his hobbies, and his motivation for donation. The proportion of the donors willing to give extra non-identifiable information was significantly larger in the group who would continue to donate after abolishment of donor anonymity compared with those who were uncertain or would discontinue their donations ($p < 0.001$). One in five (19.5%; $n = 29$) donors would still donate when donor children could trace them. The proportion of those donors was significantly larger in the group who would continue to donate when anonymity is no longer guaranteed compared with those who were uncertain or would stop their donations ($p < 0.001$). Almost half of the donors (45.6%; $n =$

68) would agree to donate in a system where the hospital can contact the donor at the child's request, leaving it to the donor to decide whether or not to have contact with the requesting donor child. Interestingly, from the donors who were uncertain whether they wanted to continue to donate in a non-anonymous donation system, 69.2% ($n = 27$) of them would accept to donate in a system where donors can decide to have contact after a donor child's request. The proportion of those donors was significantly larger in the group who would continue with their donations compared with those who were uncertain or would discontinue their donations ($p < 0.001$). One in three donors (33.6%; $n = 50$) would donate to someone they know, for instance a family member or a friend. Of all respondents, 14.1% would donate to someone with whom they later can make an agreement to see the child grow up and/or contribute to the upbringing of the child. Moreover, the proportion of those donors who would donate to someone they know and/or would contribute to the upbringing of the child was significantly larger in the group who would continue to donate when anonymity was to be abolished by law compared with those who were uncertain or would no longer donate ($p < 0.001$ and $p < 0.001$).

What information does the donor want to receive?

As shown in Table 4, little more than half of the donors (54.4%; $n = 81$) wanted to receive information about the donor children.

Table 4 Levels of information that anonymous sperm donors want to give about themselves to donor children or want to receive from donor children according to those who would continue, those who were uncertain, and those who would discontinue their donations when anonymous sperm donations would be prohibited by law ($N = 149$)

	Continue ($n = 30$)		Uncertain ($n = 39$)		Discontinue ($n = 80$)		Total		p value
	n^a	%[a]	n^a	%[a]	n^a	%[a]	n^b	%[b]	FE[c]
What information does the donor want to give									
Strictly anonymous donation where at no time information is passed on to the recipients or donor children	18*	60.0*	28	71.8	71	88.8	117	78.5	*0.002*
Donation whereby recipients or donor children receive only basic information with which the donor cannot be identified: e.g. eye colour, hair colour, blood type, weight, height	20	66.7	32	82.1	60	75.0	112	75.2	0.351
Donation whereby donor children receive extra information with which the donor cannot be identified: e.g. a baby photo of the donor and / or a letter in which the donor describes his personality, his hobbies and his motivation for the donation.	17*	56.7*	21	53.8	11	13.8	49	32.9	*< 0.001*
Donation whereby the donor children can, at their request, receive information to trace me	23*	76.7*	6	15.4	0	0.0	29	19.5	*< 0.001*
Donation whereby the hospital can trace me at the request of the child. I then decide whether or not I want to have contact with the requesting donor child.	28*	93.3*	27	69.2	13	16.3	68	45.6	*< 0.001*
Donation to someone I know myself (e.g. family or friend of me)	21*	70.0*	13	33.3	16	20.0	50	33.6	*< 0.001*
Targeted donation to someone with whom I later make an agreement so I can see the child grow up and / or can contribute to the education	13*	43.3*	4	10.3	4	5.0	21	14.1	*< 0.001*
What information does the donor want to receive									
No information	4*	13.3*	11	28.2	53	66.3	68	45.6	*< 0.001*
The number of children conceived	22*	73.3*	22	56.4	31	38.8	75	50.3	*0.003*
The phenotype of the children conceived	13*	43.3*	8	20.5	3	3.8	24	16.1	*< 0.001*
The children's development (how well they do in life)	20*	66.7*	13	33.3	7	8.8	40	26.8	*< 0.001*
Health	17*	56.7*	17	43.6	11	13.8	45	30.2	*< 0.001*
Personality	14*	46.7*	10	25.6	5	6.3	29	19.5	*< 0.001*

Significance level is <0.05

[a] Number (n) or percentage (%) of donors who agreed with the statement ("Agree" and "Totally agree") and respectively would continue, were uncertain, and would discontinue with their donations when donor anonymity would be prohibited by law

[b] Number (n) or percentage (%) of donors who agreed with the statement ("Agree" and "Totally agree") of total sample

[c] FE, Fisher exact test: to compare the proportion of donors who agreed with the statements ("Agree" and "Totally agree") and the others ("Neutral", "Disagree", and Totally disagree") between those who want to continue, those who were uncertain, and those who would discontinue their donations when anonymity would be prohibited by law

*$p < 0.016$ based on pairwise comparison by Fisher exact test to compare the proportion of donors between those who would continue to donate compared with those who were uncertain or would discontinue their donations when anonymity would be prohibited by law. Significance level of 0.016 is being used because of Bonferroni correction for multiple comparison

Half of the donors (50.3%; $n = 75$) would like to know the number of children conceived with their donor sperm. The proportion of those donors was significantly larger in the group who would continue to donate when anonymity is no longer guaranteed in comparison with those who were uncertain or would discontinue to donate ($p = 0.001$) when anonymity is no longer guaranteed. A minority of the donors (16.1%; $n = 24$) was interested in the child's phenotype. The proportion of those donors was significantly larger in the group who would continue to donate compared with those who were uncertain or would stop with their donations ($p < 0.001$). One in four (26.8%; $n = 40$) was interested in the children's development and almost one in three (30.2; $n = 45$) was interested in the child's health. One in five (19.5%; $n = 29$) was interested in the personality of the donor children. The proportion of the donors interested in the children's development, health, and personality was significantly higher in the group who would continue to donate compared with those who were uncertain or would discontinue their donations when donor anonymity is no longer guaranteed (respectively $p < 0.001$, $p < 0.001$, and $p < 0.001$).

Discussion

In our study, 20.1% of the anonymous donors were willing to continue to donate when donor anonymity would be abolished by law. This result is in line with general findings in countries with a strictly anonymous donation system, where 11% to 50% of the anonymous donors would continue to donate [7, 8, 15, 16, 25], but is lower than two previous Belgian studies on candidate donors. Ide et al. [12] and Thijssen et al. [24] found that respectively 28.8% and 26% of the candidate donors would be willing to continue to donate in a non-anonymous system. The lower percentage observed in our study can potentially be explained by the difference in study population: actual donors in contrast to candidate donors in the previous Belgian studies. Candidate donors did not yet donate their sperm and are hence still only theoretically affected by a change in the law, whereas an actual sperm donor who already donated would be directly affected in case this law would change. Although most donors favour strictly anonymous donations, the majority (75.2%) would also consider to release non-identifiable information about themselves and little less than half of the donors (45.6%) would donate in case the hospital could trace donors at a donor child's request—provided the donor can decide whether or not to have contact with the requesting donor child. A previous study concluded similar findings: candidate donors felt positive towards releasing non-anonymous information and may well agree with a neutral institute that collects and stores the donor's data and contacts the donors with a specific question to which the donor can respond positively or negatively [12]. These findings show that donors think more positive about alternative options.

In response to the large number of blood donors amongst the sperm donors in comparison with the general Belgian population where only 3% donates blood [24], an interesting donor recruitment strategy may be to organize targeted campaigns in blood donor centres. Although private campaigns (to the advantage of one centre) are prohibited by law, the government could organize public campaigns and promote sperm donation in blood donor centres.

Donors who are curious or donors who would give or receive extra information are more willing to donate than the others. In contrast, donors who do not want to share information would no longer donate when anonymity would be abolished. Provoost et al. [20] described similar results in Belgian potential donors who did not want to exchange information (in both directions) with donor children and recipients.

When questioning donors who were non-active because of personal reasons, the three most important reasons were lack of time to donate, a non-supportive partner, and a move to a different city. Provoost et al. [20] found that almost 40% of Belgian non-donors feared that sperm donation might have a negative impact on their current or future relationship. Although it has been described that older donors, donors in a relationship, or donors with children of their own are more willing to donate in a non-anonymous setting [6, 26], our results did not show an association between current donors' age or their fatherhood and their willingness to continue to donate in a non-anonymous system. Riggs and Russell [21] reported that homosexual men were significantly more inclined to donate in an open-identity donation system. Contrasting with these findings, we did not record an association between sexual orientation and the willingness to donate in a non-anonymous system.

What this study shows is that a considerable percentage of current Belgian sperm donors favour anonymous donation and these donors would consider abolition of donor anonymity a reason to discontinue their donations. Blyth and Frith [4] claimed that the impact of abolishment of donor anonymity does not need to be disastrous when there is an adaptive policy for donor recruitment. In Belgium, however, active recruitment is prohibited by law. Recently, a draft law was proposed to change this law but it remains unclear to what extent this could impact the supply of donated sperm. Currently, only 37% of donor sperm used in Belgian assisted reproductive technology is of indigenous origin [23]. Consequently, the tendency that only one in five of the current Belgian anonymous sperm donors would continue to donate in an identifiable system could be detrimental for the future availability of donor sperm in Belgium and the balance between endogenous and imported sperm, used in Belgian fertility centres.

A limitation of this study is that the data originate from a single centre and may not represent the opinion of all Belgian sperm donors. Future research based on a multi-centre follow-up design would be ideal to collect more data on the Belgian

sperm donors. A second limitation is that these results are difficult to extrapolate to other countries with an anonymous donation system due to cultural or policy differences (e.g., relating to advertising). Because the sperm donors were recruited in an anonymous system, it can be expected that most of them prefer anonymity, whereas non-anonymous donation systems may attract donors with different demographic characteristics and different types of motivation.

Conclusions

One in five of the current donors would continue to donate when anonymity would be abolished by law, whereas half of them would no longer donate and one in four was undecided. Overall, donors seem to be positive towards a system whereby the hospital can contact the donor at a child's request, provided that the donor can decide at that time whether or not to have contact with the requesting donor child.

Donors who are willing to donate in a non-anonymous donation system may also have some personal interest in the donation: they were more often curious about the children, wanted to be contacted by them, and were more often interested in spreading their genes. This is in line with the belief that a different profile of donors would be recruited. However, it remains unclear what role these donors' personal interests will play in future contact with their donor offspring.

This study showed that socio-demographic characteristics do not seem to influence the donor's willingness to continue to donate, making it difficult to develop targeted recruitment strategies to attract new donors. However, the recent abolishment of the ban on advertising and the finding that half of the sperm donors are also blood donors open new opportunities for national campaigns to promote sperm donation in blood donor centres.

Compliance with ethical standards The study was approved by the University Hospital Ghent Ethics Committee, with Belgian Registration Number (B0201733518), and received a positive advice from the local Jan Palfijn Ghent Hospital Ethics Committee. All respondents gave their informed consent at the start of the online survey.

Conflict of interest The authors declare that they have no conflict of interest.

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