

A systematic review of sperm donors: demographic characteristics, attitudes, motives and experiences of the process of sperm donation

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BACKGROUND: This systematic review aimed first to integrate the current body of knowledge on the demographic, institutional and psychosocial information on sperm donors, and second to provide insight into the actual experiences of men who donate and the attitudes towards potential donation.

METHODS: Electronic databases (PUBMED, CINAHL, PsycINFO, Embase and Web of Science) were searched with no date restriction using a specific search strategy followed by a snowball strategy. English language peer-reviewed abstracts and full texts were screened for eligibility and the risk of bias was assessed with 15 criteria. Eligibility, quality assessments and data extraction were performed by two independent researchers, resolving disagreement by discussion.

RESULTS: The initial search retrieved 857 studies and after quality assessment, 29 studies were retained for data extraction. Data from nine countries were obtained. The review synthesis revealed differences and similarities between actual and potential sperm donors on

demographic characteristics, financial compensation and attitudes towards anonymity, disclosure and providing information to potential offspring. A number of methodological shortcomings have been identified in the studies investigating sperm donors.

CONCLUSIONS: Institutional factors (such as recruitment procedures, altruism versus compensation of sperm donors, anonymity versus open-identity donation) and the impact of changing legislation have largely dominated the studies on sperm donation. Furthermore, studies from countries with a bias towards white Western ideology and interpretation were over-represented. This has resulted in a profile of potential and actual sperm donors in terms of demographics, recruitment strategies, motivation for donation and attitudes regarding anonymity, disclosure, recipients and offspring. However, the psychosocial needs and experiences of the donor, and their follow-up and counselling are largely neglected. This review has identified key issues to inform current practice and the development of pathways of care for sperm donors that reflect the multidimensional nature of sperm donation.

Key words: assisted reproduction / psychology / sperm donation / third-party reproduction / systematic review

Introduction

Although the early medical involvement in human reproduction and the use of insemination with donor sperm dates back to the nineteenth century (Hard, 1909), the use of artificial insemination by donor (AID) has expanded since the late 1960s and has become a therapeutic option for male infertility in many countries (Meirow and Schenker, 1997). In addition to heterosexual couples suffering from male infertility, nowadays lesbian couples and single women are also primary recipients of donor sperm.

The issue of sperm donation still raises a lot of debate well over a century after its first use. There are certainly a number of legal and institutional difficulties that are still the subjects of discussion in many countries: donor recruitment and screening, donor payment, donor anonymity, the number of offspring resulting from sperm donation, the rights and responsibilities of the donor, etc. Laws and regulations vary greatly from country to country and even within a country, from jurisdiction to jurisdiction. Psychological and social concerns centre around the questions of family structure and the welfare of the child. Mental health professionals are still debating and researching disclosure (telling the child) practices, donor-offspring contact, families that have conceived via AID as well as some research and practice guidelines concerning the counselling and attitudes of the sperm donor (Boivin et al., 2001; American Society for Reproductive Medicine, 2004, 2008). Religious considerations are varied and complex, and some of the ethical concerns are fears about the application of technology for eugenic ends, anonymity and donor registries as well as the rise in reproductive tourism and international markets in sperm. For example, even in anonymous donation systems, donor-conceived offspring may trace and try to identify their donor and genetic half-siblings by using (online) registries.

Worldwide the demand for sperm donors seems much higher than the availability of men willing to donate sperm. In some countries, such as the UK, authors reported an acute shortage of gamete donors (Murray and Golombok, 2000; Blyth and Frith, 2008; Human Fertilisation and Embryology Authority, 2008). Pennings (2005) links the scarcity of sperm donors with the changing legislation regarding the removal of donor anonymity; however, this remains a controversial issue as others (Daniels, 2007; Blyth and Frith, 2008) assert that recruitment of identifiable gamete donors is still possible following changes in recruitment strategies.

Over the years, the medical screening of semen donors has received a lot of attention and this has resulted in national and

international guidelines for the medical evaluation of sperm donors (American Society for Reproductive Medicine, 2004, 2008; ESHRE). In addition, institutional factors (such as recruitment procedures, altruism versus compensation of sperm donors, anonymity versus open-identity donation) have been investigated often coinciding with changes in legislation in various countries.

This systematic review aimed first to integrate the current body of knowledge on the demographic, institutional and psychosocial information regarding sperm donors. Second, it aimed to provide insight into men's actual experiences of donation and their attitudes towards potential donation. The results of this review provide useful information for medical and psychosocial professionals, clinics and policy makers on sperm donors' demographic characteristics, attitudes, motives and experiences of the process of sperm donation.

Methods

Search strategy

English language publications in electronic databases (PUBMED, CINAHL, PsycINFO, Embase, Cochrane and Web of Science) were searched with the following search keywords in all possible combinations: (sperm* or semen*) AND (donor* or donation*) AND (attitudes* or motivation* or experiences*) OR (screening* or recruiting* or counselling*). No restrictions were set for time of publication. The search was followed by a snowball strategy, examining the references of selected publications.

Study selection

Inclusion criteria: only English language peer-reviewed studies that examined demographic characteristics, attitudes, motivations and experiences of actual donors, [known (known to recipients) or anonymous (unknown to recipients) donors, commercial donors (donation with monetary compensation) and volunteer donors (donation without financial reward)] potential donors and non-donors. Studies with potential donors were included in the systematic review as these data can provide information concerning the social and psychological process, which can have an influence on the decision to donate sperm. Together with the data from actual donors, this provides a broad overview of the available research literature.

Exclusion criteria: studies focusing on egg or embryo donation, recipients of donation, donor offspring and attitudes of clinic staff concerning sperm donation were excluded from the systematic review. Studies had to contain original data. Therefore, reviews, opinion papers and debate papers were not included. Publications focusing on the medical, ethical or legal aspects of sperm donation were not included as the focus of

the review is on the attitudes and experiences of the sperm donor. Publications using the same study populations were also excluded.

Study characteristics

All study methodologies (quantitative, qualitative or case studies) and outcomes were included. The study population consisted of actual donors and potential donors as well as non-donors.

Screening and quality assessment

Titles, abstracts and full texts of all collected publications were screened by a first investigator (M.V.) and then this process was repeated independently by a second investigator (U.V.). Disagreement was resolved by discussion until consensus could be reached.

Quality assessment was based on an integration of the 'Criteria of the Cochrane database of Systematic Review', criteria designed by *Shepherd et al.* (2006) and a check-list by *Downs and Black* (1998). This resulted in a 15-item check-list to assess the risk of bias that fitted the remit of this review. The criteria covered in the check-list included descriptions of database, rationale of the study, study population, research methodology (quantitative and qualitative) and outcome variables (quantitative and qualitative). Each quantitative study received a score between 0 and 15 and each qualitative study between 0 and 16. A cut-off score of 8/15 (or 8/16) was set to ensure high quality of the included studies. Quality assessment was performed by M.V. and cross-checked by U.V. Disagreement between the reviewers was resolved by discussion until consensus was reached.

Data abstraction

A standardized data extraction sheet was developed and used by two reviewers to extract data. Studies that met the inclusion criteria and quality assessment criteria were examined comprehensively. The necessary information was extracted from each paper and put into a table. This process was performed independently by the two reviewers (M.V. and U.V.). Initially, data were extracted into categories after a careful examination of the published literature and using the professional experience with similar study populations of the first author (U.V.). The initial data extraction categories were: demographic data, recruitment, motivation to donate, attitudes regarding payment, decision-making process, attitudes towards anonymity, attitudes towards disclosure, attitudes towards recipients and/or offspring, attitudes towards counselling, interest in donation outcome, donor's idea of or feelings regarding being a sperm donor. To obtain a critical assessment of the homogeneity of the data, the following variables were extracted: information concerning the authors, publication date, study and population characteristics, sample size, assessment procedure and outcome variables (Table I).

Results

Search strategy and study selection

The titles of 857 records were screened after the initial search. The search contained publications dating from 1985 until May 2011. Of these 857 titles, 369 abstracts were retained and examined. This led to the exclusion of 290 abstracts that were not relevant to the research questions (e.g. ethical aspects of sperm donation, legislation concerning sperm donation, review articles, embryological or medical papers, different research populations, e.g. donor offspring, egg donors or embryo donors, or no full text). Twelve papers were included after snowball strategy and a hand search of specialized journals. Of the 91 full text publications that were examined, only 29 met

the inclusion criteria. Of the 62 articles that were excluded, 42 were duplicates and 16 were reviews or debates, and 4 did not meet with the quality criteria. An overview of the search results and screening process is summarized in the study flowchart (Fig. 1).

Study characteristics

Data from the retained 29 studies were examined. Considerable variation was found in research questions, methodology, study design, quality, sample size and outcome measurements. Therefore, central issues which emerged will be discussed below in the synthesis of the findings.

To understand the literature, it is important to distinguish between different groups of sperm donors: 'potential sperm donors' are candidates for sperm donation currently in the recruiting process, but who have not yet been approved, 'actual sperm donors' are those who have contacted a centre and have been approved and are currently donating sperm, 'non-donors' are those people in the general population, often students, whose attitudes are of interest to researchers and organizations. Within the group of actual donors, a sub-division can be made into anonymous donors (i.e. donors whose identity is not known to recipients) and non-anonymous donors (donors whose identity is, or can be, known by recipients) and donors who are paid (either reimbursed, compensated or paid) versus those who are not. Finally, non-identifying information refers to characteristics of the donors, such as age, physical characteristics and background information, that does not provide information on the actual identity (name, address, etc.) of the donor, whereas identifying information refers to specifically providing recipients with a name and contact information of the donor.

The findings are divided into studies on potential donors, actual donors and non-donors (Table I). Thirteen of the 29 studies look at potential donors and 7 of these 13 are exclusively about potential donors, while the other 6 include samples of potential, actual and non-donors. Twenty of the 29 studies look at actual donors and 13 of these contain information exclusively on actual donors. Five studies included both potential and actual donors and one compared actual donors with non-donors. Only 3 studies of the 29 report on non-donors.

The characteristics of the 29 included studies are shown in Table I. Table I is organized according to donor type (potential donors, actual donors and non-donors) and includes information on authors, date of publication, country of origin, sample size, methodology or type of assessment, outcome variables and/or main research questions.

Country of study origin

Sperm donation practices and legislation vary between countries and this is reflected in the studies that were examined. Divergence in the literature as a result of differences between countries is to be expected. Authors from nine different countries have contributed to the scientific knowledge concerning the demographic and psychosocial aspects of sperm donation: the UK ($N = 9$), Australia ($N = 6$), the USA ($N = 4$), Denmark ($N = 3$), Sweden ($N = 2$), New Zealand ($N = 2$), Canada ($N = 1$), Germany ($N = 1$) and Nigeria ($N = 1$). The majority of the studies come from the UK ($N = 9$) and Australia ($N = 6$). Legislation in the UK has changed since April 2005, from an anonymous to an open donation system, and this change has led to a

Table I Data extracted from the 29 studies retained after a systematic review of the literature on sperm donors.

Authors, year of publication	Sample	Method (qualitative/quantitative/mixed) and time of assessment (pre- or post-donation)	Research aim	Research setting (study recruitment), country and/or country of analysis (if different)
(Ia) Potential donors				
Del Valle et al. (2008)	246 potential donors	Questionnaire ^a and semi-structured interview ^b /pre-donation <i>Mixed study design</i>	To collect demographic data and information assessing donor eligibility and willingness to donate without reimbursement	Toronto Institute for Reproductive Medicine, Repromed; Private Clinic, Canada
Ekerhovd et al. (2008)	30 potential donors	Questionnaire ^a and semi-structured interview ^b /pre-donation <i>Mixed study design</i>	To examine in a non-anonymous system the socio-demographic backgrounds, motivations and attitudes of Swedish sperm donors	Centre for Reproductive Medicine, Sahlgrenska University Hospital, Göteborg, Sweden
Godmand et al. (2006)	45 potential donors, 33 intended mothers, 12 partners	Questionnaire ^a /pre-donation <i>Quantitative design</i>	To explore opinions towards the release of identifying information amongst Western Australian potential sperm donors and recipients, and recipients' intentions to disclose	University of Western Australia; Concept Fertility Centre, King Edward memorial hospital, Australia
Hammarberg et al. (2008)	152 potential donors (pre-counselling); 72 potential donors (post-counselling)	Questionnaire ^a /pre-donation <i>Quantitative design</i>	To evaluate gamete donors' and recipients' views about donor counselling and beliefs about disclosure of the use of donor gametes to conceive, before and after attending counselling	University of Melbourne; Monash IVF, Australia
Lui et al. (1995)	55 potential donors	Questionnaire ^a /pre-donation <i>Quantitative design</i>	To investigate attitudes of potential semen donors with regards to motives, detachment and involvement on a personal level, concerning recipients and offspring	Collaboration between Hull IVF Unit, Hull University, Leeds University and York University and Oxford IVF unit, UK
Paul et al. (2006)	1101 potential donors	Retrospective analysis of patient files <i>Quantitative design</i>	To evaluate the recruitment process (demographic details, recruitment rate and reasons of rejection) of anonymous sperm donors in light of impending changes in donor anonymity laws	Newcastle Fertility Centre at Life, a tertiary referral centre in Reproductive Medicine, UK
Schover et al. (1992)	17 potential donors; 45 egg donors	Questionnaire ^{a,c} /pre-donation <i>Quantitative design</i>	To report on findings from psychological screening of semen donors and to compare with oocyte donors to examine gender differences	USA, Cleveland Clinic Foundation, Ohio, USA
(Ib) Potential and non-donors				
Cook and Golombok (1995)	144 potential donors; 136 non donors (medical students)	Questionnaire ^a /pre-donation <i>Quantitative design</i>	To ascertain the views of semen donors, to ascertain the views of a matched group of non-donors, to compare the views of donors and non-donors	20 centres licenced by HFEA; analysis at Clinical and Health Psychology Research Centre, London, UK
(Ic) Potential and actual donors				
Daniels et al. (1996a, b)	17 + 11 current and potential donors (two different centres)	Questionnaire ^{a,d} /pre- and post-donation <i>Quantitative design</i>	To compare two groups of donors at two different London clinics and the related recruitment methods and clinic policies	One National Health Service hospital and one non-profit making charity, UK; analysis University of Canterbury, New Zealand
Handelsman et al. (1985)	30 potential donors; 45 actual donors	Questionnaire ^{a,c} /pre- and post-donation <i>Quantitative design</i>	To characterize the psychological profiles and attitudes of sperm donors in a programme that has low student participation	Australia 1985, Royal Prince Alfred Hospital, AID programme from a wide range of the community, Australia

Mahlstedt and Probasco (1991)	36 potential donors; 43 actual donors	Questionnaire ^a /pre- and post-donation <i>Quantitative design</i>	To determine the willingness of donors to provide in-depth medical and psychosocial information on their application forms and to share this with recipient couples and their offspring	Two donor programmes Baylor College of Medicine Sperm Bank Programme, Scott Department of Urology, Houston Texas and Reproductive Resources, Metairie, Louisiana, USA
Riggs and Russell (2010)	1428 potential and actual donors (no distinction)	Coding of online profiles/not specified ^d <i>Quantitative design</i>	To explore characteristics that appear to indicate which men are most likely to respond to calls for sperm donation in the context of identity-release legislation via an examination of online profiles	Recruitment online (worldwide); analysis at University of Adelaide, Australia
Robinson <i>et al.</i> (1991)	52 actual and potential donors (no distinction), 5 egg donors and 71 intended parents	Questionnaire ^{a,d} /pre- and post-donation <i>Quantitative design</i>	A survey was carried out to establish the attitudes of both gamete donors and recipients to the potential effect of regulations governing gamete donation	John Radcliffe Hospital, Oxford; Bridge Fertility Centre, London, UK
(2a) Actual donors				
Daniels (1987)	37 actual donors	Questionnaire ^a /post-donation <i>Quantitative design</i>	To report on the characteristics and attitudes on a number of psychosocial issues of semen donors in New Zealand, to challenge the traditionally accepted views about the need for donor anonymity	Donors recruited at six New Zealand AID programmes, University of Canterbury, New Zealand
Daniels (1989)	23 actual donors	Questionnaire ^a /post-donation <i>Quantitative design</i>	To report on donor's characteristics, their motivations and their attitudes towards offspring	Recruited at Reproductive Medicine Clinic, Prince Henry's Hospital, Melbourne, Australia; analysis at University of Canterbury, New Zealand
Daniels <i>et al.</i> (2005)	32 actual donors	Questionnaire ^a /post-donation <i>Quantitative design</i>	To compare actual donor's responses regarding information sharing and views concerning offspring with their views recorded at the time of recruitment	Assisted Conception Unit of King's College Hospital, UK
Daniels <i>et al.</i> (1996a, b)	43 actual donors	Questionnaire ^a and semi-structured interview ^b /post-donation <i>Mixed design</i>	To examine attitudes of donors concerning social network, disclosure, involvement, decision making and attitudes towards offspring	Fertility Laboratory, Malmo University Hospital, Sweden
Ernst <i>et al.</i> (2007)	93 actual donors in 2002; 41 actual donors in 1992	Questionnaire ^a /post-donation <i>Quantitative design</i>	To investigate the likely consequence of abolishing anonymous sperm donation in Denmark	Denmark: Cryos International Sperm Bank in Copenhagen, Aarhus and Odense, 2007
Frith <i>et al.</i> (2007)	113 actual sperm donors and egg donors	Questionnaire ^{a,d} /post-donation <i>Quantitative design</i>	To examine the specific concerns expressed by donors about donating non-anonymously and to indicate strategies for recruiting donors within the context of non-anonymous and 'cost neutral' donation that now characterizes gamete donation in the UK	Recruited at licenced infertility treatment centres; analysis at University of Liverpool and Huddersfield, UK
Jadva <i>et al.</i> (2011)	63 actual sperm donors	Online questionnaire ^a /post-donation <i>Quantitative design</i>	To examine the motivations and experiences of anonymous donors who decide to make themselves open to contact with their donor offspring	Recruited via Donor Sibling Registry, USA; analysis at University of Cambridge, UK
Lalos <i>et al.</i> (2003)	29 actual sperm donors	Questionnaire ^{a,b} /post-donation <i>Quantitative design</i>	To examine initial awareness of semen providers for semen donation, the motivation and factors influencing the decision to become a semen provider, the views on advertising and recruitment, the perceived advantages and disadvantages of being a semen provider and the partner's participation in the decision	Sweden, two IVF units (Karolinska and Umea)

Continued

Table I *Continued*

Authors, year of publication	Sample	Method (qualitative/quantitative/mixed) and time of assessment (pre- or post-donation)	Research aim	Research setting (study recruitment), country and/or country of analysis (if different)
Pedersen <i>et al.</i> (1994)	26 actual sperm donors	Questionnaire ^a /post-donation <i>Quantitative design</i>	To examine sperm donors' motivations and emotional reactions to the role of donors and to measure their willingness to provide information about themselves to recipients and offspring	Fertility clinic in Aalborg Hospital, Denmark
Riggs (2008)	21 actual sperm donors (homosexual)	Interview ^b /post-donation <i>Qualitative design</i>	To investigate how gay men experience their donation. To describe the normative assumptions of lesbian parenting and procreation	Recruited in South Australia, New South Wales, Victoria and Tasmania; analysis at University of Adelaide, Australia
Riggs (2009)	21 actual sperm donors (homosexual)	Interview ^b /post-donation <i>Qualitative design</i>	The implications of donation for the health and well-being of gay men who donate sperm both in clinics and in private arrangements	Recruited in South Australia, New South Wales, Victoria and Tasmania; analysis at University of Adelaide, Australia
Thorn <i>et al.</i> (2008)	63 actual sperm donors	Questionnaire ^a /post-donation <i>Quantitative design</i>	To understand the views of current donors in Germany regarding their willingness to be identified to offspring	13 clinics in Germany
Walker <i>et al.</i> (1987)	91 actual sperm donors	Questionnaire ^a /post-donation <i>Quantitative design</i>	To investigate attitudes of patients, donors and health-care professionals towards current provision of AID services and proposed legislation in a multi-centred study	Collaborative study between AID clinics at the University Department of Obstetrics and Gynaecology, John Radcliffe Hospital, Oxford University, The Maternity Hospital, Bristol and seven clinics of the British Pregnancy Advisory Service, UK
(2b) Actual and non-donors				
Lui and Weaver (1996)	97 actual donors, 44 non-donors (fathers) and 56 non-donors (childless)	Questionnaire ^{a,d} /post-donation <i>Quantitative design</i>	To investigate the attitudes of semen donors, non-donor students and married non-donating fathers towards motivation, involvement with the donating process and with recipients and offspring	Licensed semen donor clinics in Hull, Leeds, Eastbourne and Oxford, UK
Sauer <i>et al.</i> (1989)	42 actual sperm donors	Questionnaire ^a /post-donation <i>Quantitative design</i>	To survey the attitudes of donors related to motivation, altruism, various uses for donated sperm, knowledge of insemination outcomes and confidentiality	Sperm clinic, Los Angeles, USA
(3) Non-donors				
Onah <i>et al.</i> (2008)	180 non-donors (medical students)	Questionnaire ^a /post-donation <i>Quantitative design</i>	To study the attitudes of medical students as potential sperm donors	University of Nigeria, Medical College, Nigeria

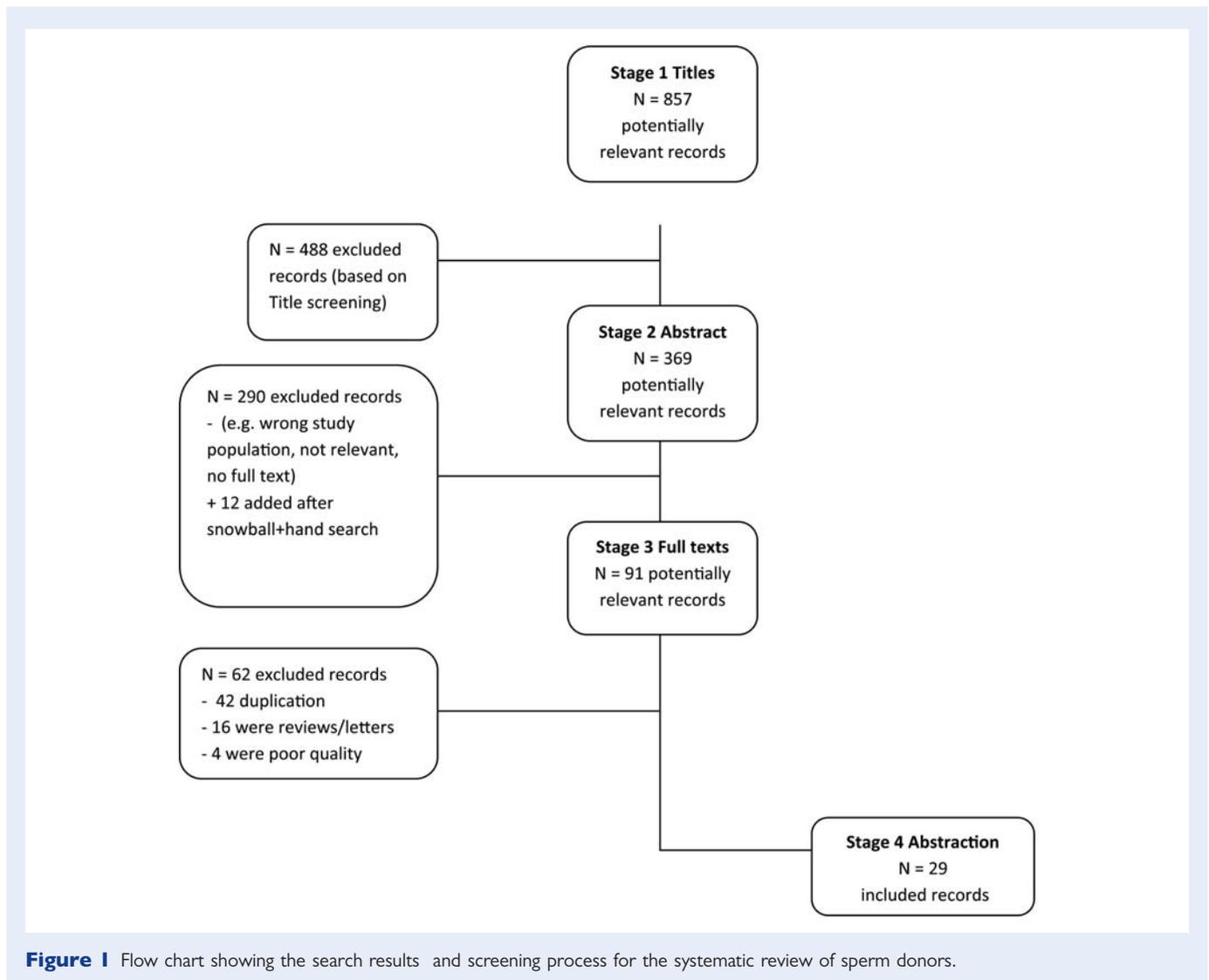
AID, artificial insemination by donor.

^aThe use of non-standardized questionnaires or no reported information on validity and reliability of the measurements.

^bQualitative research methodology used without a theoretical approach.

^cQuestionnaire modified/translated from existing questionnaire.

^dData analyses did not distinguish between donor groups.



number of studies being performed. Considering the list of countries of the included studies, a bias towards white Western ideology and interpretation is evident as these studies are clearly over-represented in the review sample. Though sperm donation is thought to be a worldwide practice, this is not reflected in the body of knowledge in research. Only one country (Nigeria) from the African continent was included, and this was a study on non-donors. Another bias can be found in the sperm donor population that is being studied. A number of studies (e.g. from the USA: [Sauer et al., 1989](#); from Denmark: [Ernst et al., 2007](#); from Canada: [Del Valle et al., 2008](#)) report on paid donors, whereas other (e.g. from the UK: [Daniels et al., 1996a, b, 2005](#); [Lui and Weaver, 1996](#); [Frith et al., 2007](#)) report on a more balanced group of donors, who are sometimes reimbursed, sometimes not reimbursed. Some studies (e.g. [Mahlstedt and Probasco, 1991](#)) do not clearly state whether or not the donor population under study is situated within a commercial or non-commercial system and this may lead to a bias in the interpretation of the results. An additional bias in many of the UK studies is found in the retrospective nature of the data (often preceding or following the change in gamete donation legislation), which is prone to recall

bias. All of these methodological elements should be taken into account when interpreting the research findings as they introduce constraints concerning the generalization to other donor populations.

Sample size

The mean sample size over all the studies is 147 respondents (range: 17–1428). The median sample size was 52, indicating that some of the sample sizes were relatively small (e.g. [Schover et al., 1992](#); [Daniels et al., 1996a, b](#); [Riggs, 2008](#)). For potential donors, the mean sample size was 257 (range: 17–1428), for actual donors 55 (range: 21–113) and for non-donors 138 (range: 44–180). Most studies ($n = 25$) questioned only sperm donors though 4 studies used a heterogeneous sample that included egg donors, recipient couples, partners of potential sperm donors and students. Only one author ([Riggs, 2008, 2009](#)) used qualitative interviews post-donation with a sample of 21 homosexual sperm donors. Semi-structured interviews were used in a sample size of 30 potential ([Ekerhovd et al., 2008](#)) and 246 potential ([Del Valle et al., 2008](#)) donors in addition to a questionnaire. Finally, in a sample of 43 actual donors a semi-structured

interview was used post-donation in addition to a questionnaire (Daniels et al., 1996a, b).

Research design

Different methodologies were used to examine the demographic characteristics, attitudes, motives and experiences of the process of sperm donation and included the use of a questionnaire ($n = 25$), purely qualitative interview data ($n = 2$) or a combination of both qualitative and quantitative data ($n = 3$) and analysis of patient medical files ($n = 2$) (for an overview of the study method, see Table 1, column 3). A single method was used for 26 studies, whereas 3 used mixed methods.

Examining the demographic characteristics, attitudes, motives and experiences of sperm donors was the primary aim of 25 studies, whereas 4 also investigated egg donors, recipient couples and views of staff and/or clinic.

Different types of outcome were registered and studies were categorized according to their primary aim or aims (multiple aims per study are possible): attitudes ($n = 20$), motives ($n = 8$), experiences of sperm donation ($n = 5$), demographic information ($n = 3$) and recruitment and screening ($n = 3$). As outcome measurements used differ between studies, it is possible that some of the differences found in the systematic review may be attributable to differences in the questions that were asked. Finally, not all studies have distinguished between donor groups (Robinson et al., 1991; Daniels et al., 1996a, b; Lui and Weaver, 1996; Frith et al., 2007; Riggs and Russell, 2010). The time of assessment of sperm donors differed between studies. Eight studies used pre-donation information, 16 used post-donation information and 4 combined pre-donation and post-donation information.

Questionnaire studies. Of the 25 studies that only used a questionnaire, two (Handelsman et al., 1985; Schover et al., 1992) used a psychometrically validated questionnaire. Handelsman and colleagues used the Cattell 16 personality profile and Schover and colleagues the Minnesota Multiphasic Personality Inventory test. The 23 remaining studies constructed a questionnaire specifically for sperm donors. Only two studies (Cook and Golombok, 1995; Lui et al., 1995) provided clear information on the construction of the questionnaire. The 23 other studies did not specify the construction process. The type of questions used (open ended, closed questions or a combination) was specified in 13 of 25 studies and the answer categories (multiple choice, single answer, Likert-type scale) were specified in 17 of 25 studies.

Interview. One group (Riggs, 2009; Riggs and Russell, 2010) used interviews in two studies as the sole methodology. The authors conducted the interviews on sperm donation for gay men, although they did not specify a specific theoretical framework for the study. The method of sampling and data collection was clearly described. In both studies, the authors provided an overview of the method of analysis. Three studies (Daniels et al., 2005; Del Valle et al., 2008; Ekerhovd et al., 2008) combined the use of a questionnaire with a semi-structured interview. None of these three studies specified a theoretical framework. Data analysis was described by Daniels et al. (2005) who used adequate qualitative analysis methods (thematic analysis). Ekerhovd et al. (2008) did not specify data analysis and Del Valle et al. (2008) used quantitative methods to analyse the qualitative data.

Meta-synthesis of the findings

Potential donors

There are 13 studies of 29 on potential donors, including 7 that exclusively examine potential donors and 6 that also look at other donor samples.

Recruitment. Five of 13 papers address recruiting potential donors and 4 report that media advertising is the most important way to reach new potential donors (Cook and Golombok, 1995; Daniels et al., 1996a, b; Paul et al., 2006; Ekerhovd et al., 2008). Potential donors also indicate that their social environment (e.g. real-life, directly experienced fertility/infertility issues pertaining to themselves and their networks) prompted them to consider sperm donation (Daniels et al., 1996a, b; Lalos et al., 2003). Cook and Golombok (1995) find 'mouth-to-mouth' advertising to be a good strategy.

Motivation. Nine of 13 studies looked at the motivation of potential donors to donate. In general, four different types of motivation could be distinguished: altruism, financial compensation, procreation or genetic fatherhood and finally questions about the donors own fertility. Cook and Golombok (1995) concluded, based on findings from 14 different centres licenced by the Human Fertilisation and Embryology Authority (HFEA) in the UK (prior to the change in legislation that proposed the removal of anonymity) that conducted donor insemination, that both altruistic and financial motives were important in the decision to donate sperm. Most of these potential donors would no longer donate if financial compensation was removed. However, the study population consisted of young, single men (mean age: 24 years old; 81% single), mostly students (65%). Other studies performed in anonymous systems in the UK and the USA confirmed the primary importance of a financial motive, often coinciding with more altruistic reasons to donate (Mahlstedt and Probasco, 1991; the USA: Schover et al., 1992; the UK: Lui et al., 1995). There were some conflicting results showing that some potential donors do not feel that financial compensation is necessary, or even wanted, for the process of donating sperm though differing laws and regulations of the countries where these studies were performed may account for the differences in findings (Handelsman et al., 1985; Daniels et al., 1996a, b; Ekerhovd et al., 2008). These potential donors underline that 'donating' means that no money is required and that it is a 'gift'. In some studies, ~27–43% of potential donors indicate that procreation and investigating one's own (in)fertility status are important aspects of donating (Handelsman et al., 1985; Daniels et al., 1996a, b) though to a lesser degree than altruistic and financial motivation.

There is some indication that country of residence (and regulations and laws that are country specific) may influence the type of motivation. Studies with potential donor populations from the USA often report higher percentages of men with a financial motivation, which is not surprising considering the number of commercial centres in the USA (Mahlstedt and Probasco, 1991; Schover et al., 1992). Studies performed in Sweden and Australia report higher percentages of altruistic motivation (Handelsman et al., 1985; Ekerhovd et al., 2008). Riggs and Russell (2010) investigated the motivation of sperm donors in four different countries and found that regardless of country, men were more likely to be motivated by a desire to

procreate than by empathy or perception of having valuable genes. A number of studies found a difference in motivation for donation based on age of the potential donors. Older potential donors (>25 years) seem more inclined to altruistic motives and are more likely to donate without financial compensation, whereas younger potential donors (<25 years) report more financial motives and would be less inclined to donate without financial compensation (Cook and Golombok, 1995; Daniels *et al.*, 1996a, b). Conflicting results were reported by Del Valle *et al.* (2008) who found younger Canadian potential donors (20–29 years) were more inclined to donate without financial compensation.

Anonymity. Seven of 13 studies report on attitudes towards anonymity. Four studies indicate that the majority of potential donors have a negative attitude towards the removal of anonymity (Schover *et al.*, 1992; Cook and Golombok, 1995; Lui *et al.*, 1995; Godmand *et al.*, 2006). Two of these studies (Cook and Golombok, 1995; Lui *et al.*, 1995) were performed in the UK and a possible explanation for the reported negative attitudes is the changing legislation towards more openness at the time of the studies. Three studies, two from the USA (Mahlstedt and Probasco, 1991; Schover *et al.*, 1992) and one from Australia (Godmand *et al.*, 2006) report more positive attitudes towards non-anonymity: if anonymity could not be guaranteed, 30–46% of potential donors would still be willing to donate.

It is important to distinguish between the potential donor's openness towards anonymity and the release of non-identifying information, and their openness towards providing the recipients and offspring with identifying information. In the study by Godmand *et al.* (2006) almost 40% of potential donors would not donate without a guarantee of anonymity, however, more than 75% of these potential donors felt positive towards releasing non-identifying information, such as physical characteristics and level of education, to offspring and half of the donors felt that offspring should be permitted access to identifying information at the age of 18 years. Other studies seem to confirm these findings (Mahlstedt and Probasco, 1991; Lui *et al.*, 1995; Ekerhovd *et al.*, 2008). Both Godmand *et al.* (2006) and Riggs and Russell (2010) report that single or homosexual men are significantly more inclined to release their identity than married, heterosexual men, indicating that psychosocial and demographic differences may influence attitudes towards anonymity and disclosure.

Attitudes towards donor offspring. Another important distinction that emerges from the reviewed literature is the difference between potential donor's openness towards identification (known donation) versus their willingness to have contact with offspring. A number of studies (Mahlstedt and Probasco, 1991; Cook and Golombok, 1995; Lui *et al.*, 1995; Godmand *et al.*, 2006) report that potential donors are not open to contact with offspring. In Godmand's study (2006) potential donors who would still be willing to donate without a guarantee of anonymity were not automatically more open to extended or intimate contact with offspring. Most potential donors would be willing to meet offspring in a single contact. In this study, demographic characteristics such as male age and having children of their own, had a significant impact on attitudes towards offspring: potential donors with children were much less inclined to want to meet offspring than potential donors without children (9 versus 30%); potential donors in a relationship were much less inclined to consider contact with offspring than

single potential donors (7 versus 28%). Riggs and Russell (2010) reported similar findings: in general, potential donors did not wish to be involved with offspring but those who were not opposed to active involvement were more likely to be single or homosexual men. Mahlstedt and Probasco (1991) reported that 10% of their USA donor population would like to meet offspring at the age of 18 years, 19% would actively want to know and meet offspring and 41% would not object if the child wished to meet but would not solicit a meeting themselves. In this study, 37% of potential donors would not like to meet offspring. In contrast, Ekerhovd *et al.* (2008) indicated that 87% of Swedish potential donors had a positive attitude towards future contact with offspring although, importantly, 80% of these potential donors did not feel that the donor had any moral responsibilities for the child later in life. Lui *et al.* (1995) also found that 80% of potential donors did not feel responsible for whatever happened with their sperm after the donation.

Attitudes towards disclosure. Conflicting results were found on the subject of disclosure to offspring. Some studies (Cook and Golombok, 1995; Godmand *et al.*, 2006) report that only one-third to half of potential donors believe parents should disclose information of their conception to the child. Others (Lui *et al.*, 1995) found that the majority of potential donors would prefer disclosure. Hammarberg *et al.* (2008) found that attitudes towards disclosure changed after a counselling session: before counselling 64% of potential donors felt that offspring had the right to information about their conception, whereas after counselling almost all donors felt offspring had the right to information.

Attitudes towards intended parents/recipients. Only 1 study (Ekerhovd *et al.*, 2008) of 13 mentions the attitude of potential donors towards intended parents/recipients of sperm donation. Most potential donors (94%) would donate to single women and 85% would donate to lesbian single women or lesbian couples. Reasons for not donating to these groups of sperm recipients were also mentioned in this study: some potential donors felt it was essential for a child to be raised by parents of both sexes and the birth of a child should be the 'result of love between a man and a woman'.

Interest in outcome. The interest of donors in the outcome of their donation—whether or not the donation resulted in offspring—is mentioned in 5 studies of 13. Overall, percentages of interest in the outcome of donation were 33% (Lui *et al.*, 1995), 41% (Mahlstedt and Probasco, 1991), 48% (Cook and Golombok, 1995), 83% (Handelsman *et al.*, 1985) and up to 94% (Ekerhovd *et al.*, 2008). Some of these potential donors merely wanted to know if a pregnancy had been achieved but did not want to know any specific information about the offspring (e.g. sex, date of birth). Other potential donors felt that knowing the outcome of the donation made the experience more meaningful.

Potential donors and attitudes towards counselling. Two of the 13 studies looked at the attitude of potential donors towards counselling. Lui *et al.* (1995) found that only a third of the potential donors in their study population felt that counselling was necessary. Possible explanations were offered: the counselling already provided by the clinic was adequate or the clinic does not stress the need for counselling enough. Hammarberg *et al.* (2008) looked at the attitudes of potential donors

pre- and post-counselling. Most potential donors felt that the topics discussed were very important. Potential donors seemed to find these topics even more relevant after counselling than before. These topics included disclosure and future interaction or contact with offspring.

Actual donors

In total, 20 studies of the 29 included in the review report on actual donors. Fourteen of these 20 studies report exclusively on actual donors, whereas 5 studies report on actual and potential donors, and 1 study reports on actual and non-donors. Two of the 20 studies (Riggs, 2008, 2009) used a qualitative approach and reported on the same study population, though with different research questions.

Recruitment

Six of the 20 studies have specified donor recruitment. Most studies (Handelsman et al., 1985; Daniels et al., 1996a, b, 2005; Lalos et al., 2003) indicate that the media and advertising are most efficient in attracting actual donors. Thorn et al. (2008) noted that the internet is becoming increasingly important in the recruitment of sperm donors. Recruitment via couples with infertility problems in the social environment of the sperm donor is mentioned in two studies but does not seem to be important in recruitment overall (Daniels et al., 2005; Thorn et al., 2008).

Motivation

There are contradictory findings concerning the motivation of actual donors. Some studies report that altruism and the will to help other couples is the most significant factor in donating sperm (Handelsman et al., 1985; Daniels, 1987, 1989, Daniels et al., 2005; Riggs and Russell, 2010). Financial compensation was indicated as the driving force for sperm donors by Sauer et al. (1989). In addition, this study revealed that half of the actual donors in the study population hoped that their donation would lead them to feel 'good about themselves'. In this sense, sperm donation may consolidate the donor's own identity. Most studies (Daniels 1987, 1989; Handelsman et al., 1985; Daniels et al., 2005; Ernst et al., 2007; Riggs and Russell, 2010; Jadva et al., 2011) do not report a single motivation for donation, but rather indicate that the motivation for sperm donation is multifaceted. Sperm donors also mention, besides altruism and financial compensation, procreation and investigating their own (in)fertility status. Some actual donors indicate that procreation is more important than empathy or even the value the donor places on his own genes (Riggs and Russell, 2010).

Anonymity

Fifteen of the 20 studies on actual donors have included attitudes regarding anonymity in the results. However, there are some methodological difficulties in interpreting the data. Eleven of 20 studies were conducted in an anonymous system, 4 in an open-identity system and for 5 studies no information on the anonymous or non-anonymous system could be found in the papers. Four of the 15 studies that did mention the anonymous or non-anonymous nature of the system of the donor population studies specified that the study was conducted as part of an ongoing shift in the legal system to remove anonymity of sperm donors. Usually these studies

asked actual donors if they would still be willing to donate if anonymity were removed and naturally this may result in a bias in the study results as these actual donors were recruited anonymously. In addition, not all studies specified whether or not donors were being paid or reimbursed for their donation or expenses. Of the 20 studies on actual donors, 12 reported that donors were being either paid or reimbursed. Two studies specifically mentioned that actual donors were recruited on a commercial system. The exact amount of money actual donors received for their donation varied from 10\$ to 70€. Some actual donors were paid or reimbursed per donated sample, whereas others were compensated per donation. Sometimes the centre had a maximum number of donations per donor, other centres allowed unlimited donation. Therefore, it becomes very difficult to compare the rates of payment for a sperm donation. Eight studies did not specify if actual donors were being paid or reimbursed.

The majority of actual donors felt that anonymity was important, with percentages of 68% (Daniels, 1987), 71% (Sauer et al., 1989) and 82% (Daniels, 1989). Interestingly, these are all studies from the late 1980s. As of the early 1990s, the preparation of legislative changes in some countries (e.g. UK, the Netherlands, Australia) prompted studies surveying current donors' attitudes on the change from an anonymous system to a more open-identity system. The proportion of current donors who would still donate if anonymity could no longer be guaranteed or was removed varied greatly: 20% (Pedersen et al., 1994; Lui and Weaver, 1996), 25% of donors asked in 2002 and 32% of donors in 1992 (Ernst et al., 2007), 36% (Mahlstedt and Probasco, 1991) and 50% (Daniels et al., 2005; Frith et al., 2007). In a study evaluating differences in attitude towards anonymity before and after donation, up to 37% of donors reported changes in their attitude (Daniels et al., 2005). Of these actual donors, one of four was prepared to be more open about themselves after the donation. Before donation, more than half felt unsure about anonymity (Daniels et al., 2005). A study performed in the UK by Robinson et al. (1991) confirmed the findings that potential donors (in the recruiting process) and actual donors have significant differences regarding certain attitudes, such as anonymity. Donors clearly differentiate between removing anonymity (releasing identifying information) and releasing non-identifying information. In a number of studies (Daniels, 1987; Mahlstedt and Probasco, 1991; Robinson et al., 1991; Pedersen et al., 1994; Daniels et al., 1996a, b; Thorn et al., 2008), high percentages, ranging from 40 to 97%, were found for actual donors agreeing to release non-identifying information, such as physical characteristics, level of education, etc. Furthermore, actual donors have been reported to differentiate between the type of non-identifying information they wish recipients and offspring to know. In a study by Daniels (1987), 68% of donors had given information to the clinical staff regarding physical characteristics and education but only 16% had provided additional information, such as hereditary aptitudes and temperament or character. Some actual donors feel a moral responsibility to provide offspring with either non-identifying or identifying information but clearly state only if the offspring (and not the recipients or intended parents) should so desire. Another condition that actual donors mention is that offspring should reach the age of 18 years before releasing the non-identifying information. Jadva et al., (2011) state that openness to releasing non-identifying information is not to be confused with openness to releasing identifying information.

Decision-making process

A number of studies (Sauer *et al.*, 1989; Daniels *et al.*, 1996a, b, 2005; Lalos *et al.*, 2003; Ernst *et al.*, 2007; Thorn *et al.*, 2008) evaluated the factors that influenced the decision-making process of donors to become a sperm donor. They looked at whether or not actual donors involved others in the decision-making process and if so, in whom they confided. With the exception of one (Lalos *et al.*, 2003), all studies report that a minority of actual donors involved their partner in the decision-making process. In one study (Thorn *et al.*, 2008), ~25% of donors felt they needed permission from their partner. In a Swedish study (Lalos *et al.*, 2003), the majority of donors felt that their partners had an important role in the decision to become a donor and reported either enthusiastic or neutral responses from their partners concerning sperm donation. However, this observation was not confirmed in another study (Daniels *et al.*, 1996a, b) where 37% of donors with a partner did not approve of a consent form for partners and felt that donors should make their own decisions, even though 39% of their partners were involved in the decision-making process. To sum up, although partners involvement in the decision-making process is welcomed (Daniels *et al.*, 1996a, b; reflected by the findings from Lalos *et al.*, 2003) donors do not feel that their partners need to provide consent for sperm donation.

Attitudes towards donor offspring

The proportion of actual donors wishing for contact with their offspring varied between 10 and 88% (Mahlstedt and Probasco, 1991; Jadva *et al.*, 2011). In part, these differences can be explained by looking at demographic differences in the donor population (e.g. marital status, sexual orientation, having children, country of residence). Riggs and Russell (2010) found that most actual donors are not open to contact with offspring, although more open attitudes are observed among single donors and homosexual donors. About half of the actual donors they studied felt that degree of involvement should be decided by the intended parents and only a minority of donors felt that offspring themselves should decide on the degree of involvement with the donor. In contrast, in an American sample of anonymous donors who later decided to make themselves open to contact with donor offspring and recruited via the Donor Sibling Registry, reported that 88% of actual donors were open to contact with offspring. They felt that the child/offspring should be the one to decide on future contact with the donor. Some of these actual donors preferred contact with offspring in a non-visible way: the child could ask questions but the donor would not reveal his identity. Ernst *et al.* (2007) note that the attitude of donors towards contact with offspring changed for one in five donors after their donation compared with the situation before the donation. Two studies highlight that donors often feel uncertain about having contact with offspring (Thorn *et al.*, 2008; Riggs and Russell, 2010), which may reflect, in part, societal and legal changes over the last two centuries.

Interestingly, 5 of the 20 studies explicitly asked actual donors whether they often thought about their donation or resulting offspring (Daniels, 1987, 1989; Daniels *et al.*, 1996a, b, 2005; Ernst *et al.*, 2007) and all report that the majority of actual donors often thought about their donation and/or resulting offspring. The study by Ernst *et al.* (2007) specified the type of thoughts: 40% of actual donors felt

happy thinking about possible offspring and 40% of actual donors sometimes worried about the future of resulting offspring. In another study (Jadva *et al.*, 2011), donors who wanted contact with offspring or who had already made contact with offspring were asked how they saw their relationship with resulting children. None of the donors said that there was 'no relationship'. A third of actual donors felt it was a special relationship, almost like a very good friend. A quarter felt it was merely a genetic bond and nothing more, while 15% of actual donors considered offspring to be 'their own children'.

Attitudes towards disclosure

Four of 20 studies specifically asked actual donors about their ideas on disclosure of the mode of conception to offspring. Studies report from 30 to 50% of donors who feel that parents should disclose information about the conception to children (Daniels *et al.*, 1996a, b, 2005).

Attitudes towards recipients

Only 2 studies of 20 looked at attitudes of actual donors towards the recipients of their donation. The proportion of actual donors that would donate for lesbian couples and for single women varied from 50 to 68% and 40 to 64%, respectively (Pedersen *et al.*, 1994; Ernst *et al.*, 2007).

Interest in outcome

Some studies report that actual donors are interested in the outcome of their donation, specifically whether or not the donation was successful and resulted in offspring (Handelsman *et al.*, 1985; Daniels, 1989; Jadva *et al.*, 2011). In contrast, Pedersen *et al.* (1994) reported that only 12% of donors in a Danish sample wanted to know the outcome. Thorn *et al.* (2008) found a differentiation in their study: more than half of the donors in their German sample were interested in the outcome of their donation but only 11% of donors asked about the outcome in the clinic where they donated. A number of studies also reported that actual donors felt unsure about wanting to know the outcome of the donation (Mahlstedt and Probasco, 1991; Jadva *et al.*, 2011).

Actual donors and counselling

Three studies of 20 mentioned attitudes towards counselling. Lui and Weaver (1996) reported that one in three actual donors would like counselling to address certain implications of their donation. They expected that counselling could help them to give their decision some thought and to look at all the involved parties in the donation. In another study (Jadva *et al.*, 2011), actual donors indicated that they did not contemplate the implications of donating sperm at the time of donation. Donors in the German study (Thorn *et al.*, 2008) felt that counselling for actual donors should be accessible in all clinics, and for all parties involved in the donation.

Non-donors

Four studies of 29 included in our review (Sauer *et al.*, 1989; Cook and Golombok, 1995; Lui and Weaver, 1996; Onah *et al.*, 2008) investigated non-donors in the general population. In the study by Cook and Golombok (1995), <15% of non-donors had seen an advertisement for sperm donors in the media. The authors concluded that this suggests that men who are interested in sperm donation were not

adequately reached by media and advertisements. One-third of the non-donors in the study had considered donating semen, and the majority (71%) of them had been attracted by the payment. The main reason these men had not yet gone ahead with sperm donation seemed to be a lack of motivation rather than concerns about the donation, as more than 40% of non-donors in the study said that they had not yet taken steps to donate. The study concluded that there may be a substantial untapped pool of potential donors. In contrast, in another study (Lui and Weaver, 1996), only a small number of non-donors felt that the donation should be paid for. In both studies (Cook and Golombok, 1995; Lui and Weaver, 1996), non-donors reported concerns about social, personal and practical aspects of sperm donation, but whether or not these impede the donation by non-donors remained unclear. Also, non-donors felt that counselling was so necessary as to not take the decision to become a donor lightly.

Discussion

Summary of research synthesis

The aims of this systematic review were to integrate the current body of knowledge on the demographic, institutional and psychosocial information on sperm donors, and to provide insight into men's actual experiences of donation and attitudes towards potential donation. A total of 29 studies were retained after quality assessment. These studies were arranged according to the donor population (potential donors, actual donors and non-donors). The literature reviewed demonstrates that there are striking similarities between these three donor groups concerning demographic characteristics, motivation for sperm donation as well as considerable differences concerning attitudes towards anonymity and disclosure. Donors (both potential and actual) are most often recruited through all types of media and their own social environment. The motivation to donate seems multifaceted and includes both altruistic and financial motives in addition to more secondary motives, such as their own fertility status and procreation. It appears that differences between actual and potential donors are mostly found on the subject of anonymity: some of the research points to changing (and more open) attitudes regarding anonymity and disclosure after, versus before, donation.

Recruitment and motivation

The media, advertisements and mouth-to-mouth advertising are good ways to inform and attract potential donors. Both potential and actual donors are influenced by their social environment or because they know infertile couples, but this seems to have less of an impact for sperm donors compared with egg donors (Schover et al., 1992, Sydjö et al., 2011).

In recent years, the internet has been on the rise as an efficient way to recruit donors both in commercial and non-commercial settings. The motivation to donate sperm appears to be a complex concept. For both potential and actual donors, a number of reasons for donating sperm can be found. Usually studies are mostly interested in either financial or altruistic motives and these are frequently portrayed as being diametrically opposed to one another. However, this is not always the case and may be largely influenced by legal and institutional factors (such as the system a country or centre uses to recruit donors) as well as the way in which the donor is asked about his motivation.

Donors mostly report that both altruism and financial compensation play a role in their decision to donate sperm. Though financial or altruistic motives may be seen as primary motives, a number of secondary motives may be just as, or even more, important to potential or actual donors as they are of a more intrinsic nature but perhaps not perceived by the donor as socially acceptable. Secondary motives frequently mentioned in the reviewed studies include procreation, passing on their own genes and investigating their own fertility status. Jadva et al. (2011) did not find significant differences in the primary motivation for egg- and sperm donors, though sperm donors seemed to indicate more secondary motivations (such as procreating and investigating their (in)fertility status) in their decision to donate sperm.

Anonymity and contact with offspring

Contradictory findings emerge from the systematic review concerning the donor's attitude towards anonymity and contact with offspring. Because of the methodological diversity in the reviewed papers, it is very difficult to get a clear and unanimous picture of the donor's attitude towards anonymity. There is some evidence to show that the demographic profile of recruited donors, in particular their marital status and age, can have a profound impact on their attitude towards anonymity and contact with offspring. Younger, single donors are often students largely motivated by financial gains and compensation and less likely to continue donating without the guarantee of anonymity and less likely to want or seek contact with offspring. They are, however, open to revealing non-identifying information to offspring. It has been suggested (both by researchers and actual donors) that this type of donor may benefit from implication counselling as they may not fully be aware of the future implications of their current sperm donation. On the other hand, older, married donors who often have children of their own are largely motivated by altruism and the positive experience of fathering a child. Most of them would continue donating even when anonymity could not be guaranteed. This type of donor feels comfortable disclosing non-identifying information, but the point of view on contact and disclosure to offspring varies: some of these donors are more open to contact with offspring because they take into account offspring's feeling and curiosity about their conception, others do not wish contact with offspring. Another, smaller subgroup emerges from the research: single men and/or homosexual men may be more strongly motivated by procreation and passing along ones genes. They are, compared with both single and married donors, more open to contact with offspring and feel comfortable providing identifying information to offspring and, furthermore, some of them would even like a 'father' role with offspring. Mostly, both types of donors are interested in the outcome of their donation, though this does not always have a clear association with their attitudes towards anonymity or disclosure towards offspring.

Studies that have been performed before, during or shortly after a legislative change often report a negative attitude towards the removal of anonymity. However, the way in which donors are recruited and the current societal legislation, practices or beliefs about anonymity or openness seem to play a very important role in donor's attitudes. As Daniels (2007) pointed out, anonymity, openness and donor recruitment are multi-faceted and cannot be reduced to a one-dimensional principle of cause and effect. He states that the dominant culture of a system (anonymous versus non-anonymous/open-

identity) will impact on the attitudes of the donor as well as demographic factors such as age and having children and finally also the clinic's policies regarding recruitment and information and preparation of both potential donors and attitudes of clinic staff. Unfortunately, not all included studies reported whether or not the studied donor population was in an anonymous, open-identity or mixed system. All types of donors make a clear differentiation between offspring's right to information (either identifying or non-identifying) about the donor versus their right to contact with the donor. Interestingly, these attitudes have been noted to shift during the donation process where potential donors are often more unclear about anonymity and disclosure to offspring compared with actual donors. Most donors, even in an anonymous system, feel comfortable revealing non-identifying information to offspring. In addition, donors make a distinction between types of 'contact with offspring', going from a one-time meeting to a close and family-type of relation. On the whole, donors feel that the first step towards contact should come from offspring (not parents or the donor himself). Some even say that it is the moral responsibility of the donor not to seek contact with offspring. Interestingly, a considerable number of donors feel very uncertain and undecided about both anonymity and future contact with offspring. This implies that counselling pre- and post-donation might be beneficial to donors, depending on the legal system applicable. In one study (Daniels *et al.*, 2005), donors were more inclined to and comfortable with, disclosure of information after counselling sessions, suggesting that counselling allows the provision of information, clarification and reassurance about these issues, which may affect donor's attitudes after donation.

Role of counselling

There is a scarcity of studies investigating the role of counselling with potential or actual sperm donors. The attitude towards counselling may depend on the country of origin, its legal framework regarding third-party reproduction, and on the type of counselling practices provided or offered in each country. Studies from the UK often report that a minority of donors feel the need for counselling. However, there is some evidence to suggest that not all donors are aware of their motivations for donation or the future implication of their donation. Counselling could then be of value in clarifying values and attitudes, providing information and support for donors, which may lead to a change in attitudes after counselling (Daniels *et al.*, 2005; Hammarberg *et al.*, 2008). In this way, psychosocial counselling cannot only be seen as a screening tool (to select fit and psychologically healthy donors is of interest to both sperm banks and recipient couples), but also as a quality assurance in the care of potential and actual donors.

Gaps in knowledge

Two major gaps in the knowledge about sperm donors emerge from this systematic review. First, it seems that the sperm donor as a person and as a stakeholder has been widely neglected in both medical and psychosocial research on this topic. There is almost no in-depth information about the experience of being a donor, as none of the reviewed studies included this topic as the primary aim of their investigation. The donor has not been studied as an actual stakeholder but rather as a means to an end in studies evaluating institutional factors pertaining to legislation, recruitment strategies and attitudes influencing donor recruitment and participation. Furthermore, the role and

status of the donor are often obscured because of the many other stakeholders involved in the practice of sperm donation. All these stakeholders have different interests: the donor in terms of his rights, responsibilities, motives and attitudes; the intended parents and their rights, responsibilities, opportunity for access to information, social fatherhood versus genetic fatherhood; the child and his/her right and access to information about his/her origin; the professionals in terms of their (legal and/or medical) responsibility in screening potential donors and parents, their responsibilities towards the resulting child. Finally, national legislation, ethical framework, as well as the leading social and cultural environment play a very important role in the practice of sperm donation, including the type of system (anonymous/open/...) in which potential donors are recruited and the type of counselling provided. Research that explicates and takes into account these multiple stakeholders and their resulting needs can have added value in this field and promote quality of care for donors, recipients and offspring.

A second gap in the knowledge that coincides with the lack of clarity on the role of the donor concerns the absence of follow-up research on sperm donors. In light of the growing societal changes surrounding anonymity and the increasing donor-offspring possibilities for contact in the future, it would appear that follow-up information on the sperm donor, both regarding his well-being and his attitudes about his donation, is crucial.

Methodological issues and current state of research

There were a number of methodological limitations in the studies included in the systematic review that may bias the results presented. However, these limitations are not unique to the studies on sperm donors but may also be applicable to oocyte donors, as reviewed previously (Purewal and van den Akker, 2009).

Many of the studies included in our review have a small sample size, even though most of the studies were quantitative. The median sample size was 52 with a very large range. The donor population under study was not always described properly, as already pointed out in the results section, leading to difficult interpretation of the results. The applicability and generalization of the findings need to be taken into account in relation to the publication date of the studies reviewed. Even though 15 of 29 studies were published after 2000, 14 studies were published before 2000 and 5 of those were published in the late 1980s, and these latter studies may not reflect the current climate and/or legislation and practices of third-party reproduction. Nevertheless, because the research findings are so scarce on this subject, these older studies were also included in the review. None of the studies included known donors (donation known to recipients), or in countries where known donation is practiced no specific mention of this population was made. Therefore, the results of this systematic review may not be applicable to known donors. It is difficult to find adequate control groups in comparative studies and there is no consensus in the literature on what constitutes an adequate control group for sperm donors. Furthermore, longitudinal studies providing information on the evolution of donor's experiences and attitudes are unavailable. With the shift towards more open systems of donating, this is indeed a limitation. As Purewal and van den Akker (2009) pointed out, it is possible that these types of studies are 'flawed' by a

'sampling bias'. It may be that only participants with certain attitudes, motivations and experiences took part in the research, resulting in high consensus and profiles of sperm donors that may lead to publication bias. We also cannot rule out the possibility of some overlap between papers in our review (i.e. different reports of the same study sample), however, apart from the Riggs studies (2008, 2009), as far as we could determine, this appears not to be the case. In addition there may be a country and language bias in this systematic review. The research findings presented here are a representation of mainly Western, and mainly UK/Scandinavian societies and culture: only one study (Onah et al., 2008) originated from an African country (Nigeria). While the findings may be representative and accurate for selected countries with Western ideologies such as the UK, Australia and Sweden, they may not extend to other European countries with a Latin heritage, to developing countries or countries with predominantly Eastern or African ideologies. Furthermore, despite the rise of 'reproductive tourism' no studies in this systematic review reported specifically on cross border reproductive care and this is a serious limitation in view of the current global trend in third-party reproduction (ESHRE, Task Force on Ethics and Law, 2008).

Recommendations for future research

Future research may benefit from incorporating the different stakeholders and points of view involved in third-party reproduction. Furthermore, the gaps in knowledge concerning known donors, follow-up of all types of donors and counselling the sperm donors may be of interest to researchers. Finally, an approach that focuses on more than institutional factors and incorporates the sperm donor as a man in his own right, instead of a means to an end, may help to diminish the invisibility of sperm donors and thereby increase their role as valuable stakeholders in the process of sperm donation.

Conclusion

Institutional factors and the impact of changing legislation have largely dominated the studies on sperm donation which resulted in a profile of potential and actual sperm donors in terms of demographics, recruitment strategies, motivation for donation, attitudes on anonymity, disclosure, recipients and offspring. However, the psychosocial needs and experiences of sperm donors, their follow-up and counselling are largely neglected. This review has identified key issues to inform current practice and the development of pathways of care for sperm donors that reflect the multidimensional nature of sperm donation.

Authors' roles

U.V. and M.V. contributed significantly to all stages of the preparation of this manuscript. D.V., P.E., K.D. and T.D. provided important intellectual content in the design and analysis and approval of the final version of this manuscript.

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Conflict of interest

None declared.

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