

Parental disclosure of assisted reproductive technology (ART) conception to their children: a systematic and meta-analytic review

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STUDY QUESTION: Does a genetic link and/or a child's age influence a parent's willingness to talk to a child about how they were conceived?

SUMMARY ANSWER: The presence/absence of a biological link and the child's age clearly influences the disclosure process.

WHAT IS KNOWN ALREADY: The research published to date has yielded diverse findings on autologous and donor assisted reproductive technology (ART) parents' disclosure of the conception method to their children and on the ages at which the children are informed, if told.

STUDY DESIGN, SIZE, DURATION: A systematic review and meta-analysis were carried out. A search of MEDLINE and PUBMED was run for English-language studies published from January 1996 through January 2015. A total of 26 studies were included in the systematic review, 19 of which were included in the meta-analysis.

PARTICIPANTS/MATERIALS, SETTING, METHODS: A total of 2814 parent responses were included in the systematic review. Two authors independently assessed the studies for review inclusion. Selection criteria were: peer-reviewed studies, quantitative studies only, research conducted after the birth of ART-conceived children, number of parent responses on disclosure status reported in terms of Told, Plan to tell, Uncertain, Plan to not tell. Thirty-two (32) study-level effect size statistics were included in the meta-analysis. Three authors independently assessed the risk of bias.

MAIN RESULTS AND THE ROLE OF CHANCE: Among parents who responded, 23% of the total number of parent responses indicated that they had already Told; 44% were Planning to tell; 13% were Uncertain and 20% were Planning to not tell their children about their ART conception. Meta-analysis gave no statistically significant differences between autologous and donor ART in the < 10 years age group, when comparing Told versus Planning to tell/Uncertain/Planning to not tell. In both cases, the probability of disclosure was < 50% ($P < 0.05$). Conversely, in the older age group (≥ 10 years old), a statistically significant difference was observed for autologous ART (Cohen's $h = 0.86$): Planning to tell showed a higher probability in the 10 years age group for the autologous ART subsample, than in the donor ART subsample (Cohen's $h = 0.89$).

LIMITATIONS, REASONS FOR CAUTION: All parents participated voluntarily in the studies and may have influenced the data in the direction of disclosure thereby. The reviewed studies, moreover, differed in terms of methodology, type of sample and data categorization method. The number of studies analyzing disclosure for children ≥ 10 years was quite limited; and lastly, most of the data examined were not collected longitudinally.

IMPLICATIONS OF THE FINDINGS: The high number of non-disclosing parents treated by donor ART points to an underestimation of the medical risks for the offspring (the presence of genetic illnesses, inadvertent consanguinity) and suggests that these children's rights may not be given due consideration. The decision to disclose may become more difficult over time, and ART parents need greater psychological support throughout the process.

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Key words: review / meta-analysis / disclosure / assisted reproductive technology / children / homologous ART / donor ART / parents / children's age

Introduction

After conception by assisted reproductive technology (ART), the crucial role of the disclosure process in parent–child relationships is generally acknowledged (McGee et al., 2001; Kirkman, 2003; Murray et al., 2006; Owen and Golombok, 2009; Rosholm et al., 2010; Indekeu et al., 2013; Blake et al., 2014). Yet, many parents feel uncertain about whether and when to disclose the lack of a biological link with their ART-conceived children.

Overall, ART can be subdivided into two main categories: donor ART, which involves the donation of male or female gametes, and Autologous ART, which uses the parents' gametes. Research has shown that the presence of a biological link with children, or lack thereof, strongly influences the disclosure process of ART parents (Golombok et al., 2002; Murray et al., 2006; Paul and Berger, 2007; Jadva et al., 2009; Rosholm et al., 2010; MacCallum and Keeley, 2012), as also observed in instances of adoption (Baran and Pannor, 1993; Daniels and Taylor, 1993; Brodzinsky et al., 1998; McWhinnie, 2001). Indeed, parents frequently fear that telling their children about their ART conception could undermine their relationship with them and could disturb the children's development; donor ART parents may experience a greater sense of unease in this regard (Golombok et al., 2002, 2006; Murray and Golombok, 2003; Lycett et al., 2004; MacCallum and Golombok, 2007; Soderstrom-Anttila et al., 2010; Readings et al., 2011; Salevaara et al., 2013). Other studies, however, have shown that the development of children who are informed early on about their biological origins does not differ from that of children who are not informed (Golombok et al., 2001, 2002; Murray et al., 2006; Colpin and Bossaert, 2008; Freeman and Golombok, 2012). Paul and Berger (2007) as well as Freeman and Golombok (2012) maintain that interactions in disclosing families are less conflictual than in families who do not discuss the topic, suggesting thereby that this type of 'secret' can result in tension in family interaction (Daniels et al., 2011; Golombok et al., 2011). It has also been found that disclosure during adolescence positively correlates with family stress, anxiety, and disorientation (Turner and Coyle, 2000; Hewitt, 2002), whereas disclosure at an earlier age is experienced positively or neutrally (Scheib et al., 2005; Beeson et al., 2011; Bos and Gartrell, 2011; Daniels et al., 2011; Golombok et al., 2011).

The aim of the present review was to summarize the current research data on parents' disclosure of ART, with the aim of organizing the findings obtained to date. It was thought that this knowledge would assist professionals and parents in the complex decision-making process that is inevitably involved in this conception choice. In fact, both autologous and donor ART as well as the different ART techniques available pose diverse issues to parents; for example, thanks to ART, children can now be conceived in non-traditional types of household (e.g. same sex couples, single mothers).

Although ART is widely used today (in Europe—there were 120 634 births in 2010, ESHRE, 2014)—and infertility-linked social stigma is on the decline (Daniels and Meadows, 2006), ART parents find it difficult to decide whether and when to tell their children about the procedure. Many parents consequently opt to not disclose the conception method to their ART children (Gottlieb et al., 2000; Golombok et al., 1996, 1997, 2002, 2005, 2006; Lycett et al., 2004, 2005), although a more recent tendency toward parental openness on the issue has been observed (Greenfeld, 2008; Soderstrom-Anttila et al., 2010; MacCallum and Keeley, 2012).

The present review therefore analyzes differences in ART parents' approach to disclosure, by specifically examining disclosure decisions observed, as a function of the type of ART method used (autologous/donor) and the role of a child's age in the process.

The first hypothesis examined in this review was that donor ART conception is much more difficult to disclose than is autologous ART conception (Golombok et al., 2002; Peters et al., 2005; Colpin and Bossaert, 2008; MacCallum and Keeley, 2012). This hypothesis reflects similar findings from adoption research, which shows that reluctance to disclose is closely associated with the lack of a biological link between parent and child (Golombok et al., 2002; Murray et al., 2006; Paul and Berger, 2007; Jadva et al., 2009). 'However, despite this similarity there are some important differences between adopting and ART parents. The latter, are involved from the beginning of the pregnancy process. In all cases, with the exception of SM, the woman carries the pregnancy and gives birth to the child, a situation which provides the parents with the opportunity to keep the presence of a donor secret.'

The second hypothesis referred to the parents' timing of disclosure, in relation to the child's age. The adoption literature highlights the importance of disclosing the child's biological origin at a very young age (Brodzinsky, 1990), to avoid it becoming a family secret over time, which can render disclosure even more difficult and conflict-ridden. The same caveats apply for children conceived through donor ART, because their parents must also cope with having to disclose the fact that at least one of them is not the biological parent (Rumball and Adair, 1999; Scheib et al., 2005; Mac Dougall et al., 2007; Blyth, 2012).

The present paper examined the following ART techniques: *in vitro* fertilization (IVF) and intracytoplasmic sperm injection (ICSI); donor insemination, which involves the donation of male gametes; egg donation (ED), which requires the donation of female gametes; embryo donation (DE), for instances of embryo donation; dIVF—an IVF technique using donor sperm; and surrogacy motherhood (SM), which involves uterus surrogacy (with either autologous or donor ART). All research reporting on IVF and ICSI techniques with no gamete donation including SM using the commissioning mother's egg and the commissioning father's sperm was classified as autologous ART. Conversely, donor insemination, ED, DE, dIVF, SM, with at least one external donor, were grouped as donor ART procedures.

Method

To test the above hypotheses, the following information was extracted from the selected papers:

- Telling status: Told (parents had already disclosed); Plan to tell (parents had decided to disclose, but were postponing the time to do so); Uncertain (parents who had not yet decided); Plan to not tell (parents who had decided to not disclose).
- Age of disclosure: the child's age when the parents disclosed.

Selection criteria and search strategy

Articles were then selected according to the following inclusion criteria:

- (1) Peer-reviewed studies written in English, with an abstract presented in an electronic database.
- (2) Quantitative studies only, with study methodology described in sufficient detail, including the participant recruitment process (age, gender, sample size, method and time of assessment, and outcome measures).
- (3) Research conducted after the birth of children conceived through ART techniques.

- (4) Outcome measures presenting the parents' (mother, father or both) number of responses or response percentages of their disclosure intentions, as per the telling status categories (Readings *et al.*, 2011) and the child's age when the parents disclosed.

A literature search was conducted to retrieve articles published since January 1996, the year in which the Centers for Disease Control and Prevention (CDC) began collecting data on all ART procedures performed in fertility clinics, and in which the first cross-cultural research on ART families was published in Europe (Golombok *et al.*, 1996). PRISMA guidelines were followed. The search engines used were PUBMED/MEDLINE. The search terms used were: assisted reproduction/OR donor insemination/OR IVF/OR ICSI/OR donor conception AND disclosure.

On the basis of the key words mentioned, a total of 525 records were found, 99 were duplicates and were removed, leaving 426 records, from which a further 287 were removed because, either the papers were published before 1996, or they were not in English, or they did not discuss ART disclosure, leaving 139 records.

Dissertations and conference presentations were not searched, because we considered that restricting our analyses to studies published in peer reviewed journals would increase the likelihood of finding studies of acceptable quality.

Data abstraction

Studies meeting the eligibility and quality criteria were examined; information was extracted and tabulated, in turn, by two authors (M.A.T. and L.Z.) and then cross-checked by each other. The two authors considered each article's year of publication, participant characteristics, sample size, assessment procedures, outcome measurements and summary of findings. Any disagreement on the articles (three articles) was resolved by consensus, after discussion between the authors.

Study selection

The 139 abstracts screened, were analyzed in terms of study design, type of disclosure and outcome. According to the *a priori* criteria described above, 63 of these were excluded because they were abstracts of qualitative studies or of conference presentations.

Seventy-six (76) full-text articles were assessed for eligibility of which only 43 contained percentage data on parents' disclosure intentions (Criterion 4). Moreover, 17 of the latter articles did not meet some other inclusion criteria; specifically: 4 studies on couples undergoing ART treatment (Criterion 3); 1 not specifying the child's age at the time of the study (Criterion 4); 1 not stating the number of parents recruited (Criterion 4); and 11 not subdividing parents' responses as a function of telling status (Criterion 4). Overall, only 26 studies, published between January 1996 and January 2015, met the review's selection criteria (Fig. 1).

Given the psychological importance of the topic discussed, the present study also reports the results of the papers that could not be used in the meta-analysis, but which met the initial selection criteria.

Study characteristics

Table I shows the characteristics of the 26 papers reviewed.

All articles had examined the issue of disclosure, but not all had considered the entire sample. Thirteen (13) of the studies (Caruso Klock and Greenfeld, 2004; Golombok *et al.*, 2004, 2006; Peters *et al.*, 2005; Lalos *et al.*, 2007; Mac Dougall *et al.*, 2007; Nekkebroeck *et al.*, 2008; MacCallum, 2009; Soderstrom-Anttila *et al.*, 2010; Readings *et al.*, 2011; Isaksson *et al.*, 2012; MacCallum and Keeley, 2012; Salevaara *et al.*, 2013) provided separate data for subsamples. These subsamples were treated as separate studies for the descriptive study (see Table II).

The articles surveyed 1358 mothers, 206 of whom had participated in longitudinal studies (Golombok *et al.*, 1996, 2002, 2004, 2006; Readings *et al.*, 2011; Freeman and Golombok, 2012). Twenty-one (21) mothers had participated in both the MacCallum and Golombok (2007) and MacCallum (2009) studies and were therefore counted only once. The reviewed articles also referred to 606 fathers. Moreover, 600 couples had responded to disclosure questions; 78 parents had responded individually (providing two different answers per couple thereby); and the telling status of 94 parents was not reported (Blyth *et al.*, 2013). Thus, the total sample for telling status consisted of 2814 responses.

The data had been collected in various nations: 11 studies had been conducted in the UK, 3 in the USA, 3 in Sweden, 2 in Belgium, 2 in Finland, 1 in New Zealand and 1 in Israel; a further 3 had involved more than one nation, 2 cross-cultural studies were conducted in the UK, the Netherlands, Spain and Italy; and 1 had surveyed English-speaking parents in the USA, UK, Australia and Canada.

Fifteen (15) studies out of 26 had been conducted when the ART children were less than 10 years old; only 5 had surveyed families with children older than 10 years. Six studies were based on a wide range of child's age (from 9 months to 22 years). Of the 26 studies examined, 14 had been published after 2007.

Most of the research had investigated donor ART: 9 had examined male gametes donation; 4 female gametes donation; 2 embryo donation; 3 had compared male and female gamete donation; 1 study presented a sample of parents who had used or IVF with sperm donation (Salevaara *et al.*, 2013); 4 studies had examined families using IVF/ICSI; 1 compared families with IVF/ICSI to those receiving embryo donation; and 2 studies compared SM, DI and ED families.

Only Blyth *et al.* (2013) had recruited their sample through the DSR (Donor Sibling Registry) website. The other studies had obtained the parents' names through fertility clinic databases. All parents had participated voluntarily in the studies.

Risk of bias in the included studies

Figure 2 shows all risk of bias ratings for the studies included in the quantitative analysis (see Supplementary data, Table SI for risk of bias specification). Whereas 18 studies were deemed to be at low risk of selection bias, six were considered as high risk. Two (2) studies did not properly describe their data collection methods and were deemed to be at risk of selection bias. Due to the nature of the research, blinding was considered non-viable for the mother/father/couples review. Performance and detection bias were low for 14 studies and high for 12. Six of the studies were considered to be at low risk of attrition bias and 20 at high risk of selective reporting bias. Selective reporting was low in 25 studies and high in one. Given the characteristics of the topic analyzed in the review the presence/absence of social-demographic variables reported in the studies was examined as a risk of bias component: 12 studies were found to be at low risk and 14 at high risk of bias.

Data analysis

The articles had analyzed highly diverse numerical samples. To render findings amenable to general assessment and synthesis in terms of telling status data, the number of responses per category was calculated. The percentage of the specific category responses with respect to the response total was then calculated (for instance, 634 responses were given for Told—i.e. 23% of the total number of the valid responses (2816) considered) (see Table II).

Ten (10) of the 44 study-level effect size statistics initially considered for meta-analysis (one per each subsample shown in Table II) were excluded, because they pertained to six papers not specifying age group division (Gottlieb *et al.*, 2000; Lalos *et al.*, 2007; Mac Dougall *et al.*, 2007; Soderstrom-Anttila *et al.*, 2010; Blyth *et al.*, 2013; Salevaara *et al.*, 2013). Moreover, one of the three Golombok *et al.* (2006) samples was excluded, as it did not distinguish

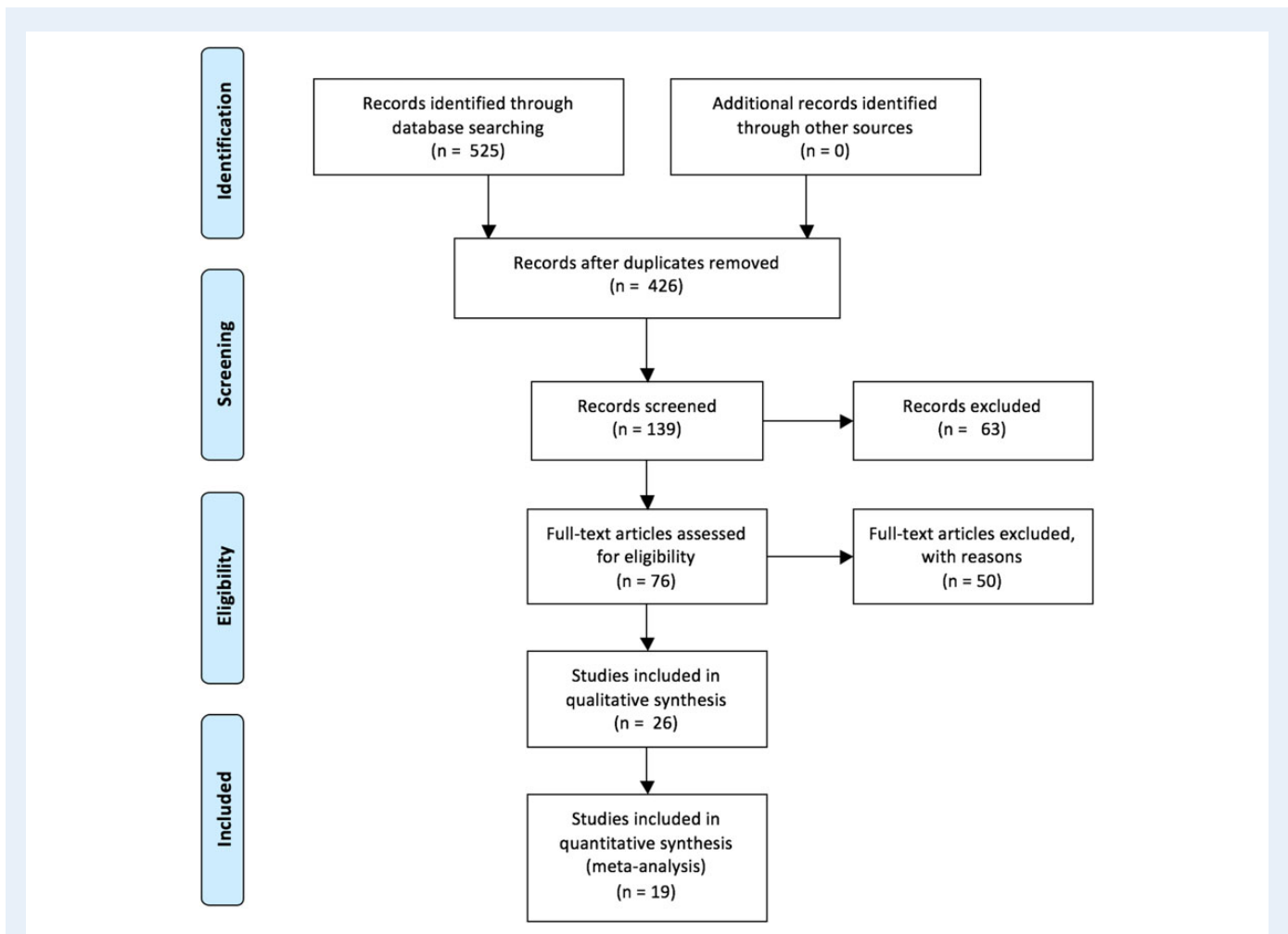


Figure 1 Flow chart of the systematic review.

between answers given by homologous versus heterologous SM parents. Lastly, the single MacCallum and Golombok (2007) sample was also excluded. The final analyses were therefore carried out on 32 study-level effect size statistics. Two different cases of statistical dependence were observed: the first concerned participants involved in longitudinal studies and responses subsequently published in different papers (Golombok et al., 1996, 2002, 2004, 2006; Lycett, 2004, 2005; Readings, 2011; Freeman and Golombok, 2012); the second pertained to papers considering mothers and fathers responding individually as separate samples, producing two answers per single couple thereby (Caruso Klock and Greenfeld, 2004; Peters et al., 2005; Isaksson et al., 2012). These two different dependence issues were addressed in terms of multiple outcomes within the same study, in the statistical model employed in the meta-analysis (Borenstein et al., 2009).

Each study-level effect size linked to longitudinal sample was coded in terms of multiple time-points within the same study.

Two statistical analyses were run by using the pre-established ART-type variables: autologous/donor and offspring age < 10 years/≥ 10 years as moderators. The first analysis compared the Told category with the Not-told responses (including the categories of Plan to tell, Uncertain and Plan to not tell). The second analysis examined parents' intentions about disclosure (i.e. the categories of Plan to tell/Plan to not tell) (see related telling status columns in Table II).

For each age group and typology of ART (autologous and donor), between brackets are reported the proportion of parents that had already told their

children the origins of their conception, the *P*-value that this proportion is different from 50% and the related 95% confidence interval. In the case of two groups with non-overlapping confidence intervals, we measured the effect size of the difference with Cohen's *h* (Cohen, 1988). A similar analysis was performed on the proportion of parents who are planning to disclose.

Meta-regression was used to evaluate the effect of publication year on the probability of Told/Not-told and on the probability of Plan to tell/Plan to not tell.

Results

Cumulative data results

The cumulative data revealed that only 23% of the 2814 responses of parents indicated that disclosure had already taken place; 44% of respondents expressed the intention to disclose in the future; 13% were undecided; and 20% expressed the intention to not tell their children how their conception had occurred. Only seven of the 26 studies investigated differences in disclosure intentions between mothers and fathers, involving a total of 1253 parents (649 mothers and 604 fathers).

Autologous/donor ART resulted in different telling status outcomes. In the 5 studies investigating IVF/ICSI, 25% of the parents had already Told; 57% were Planning to tell; 14% were Uncertain; and 4% were

Table 1 Papers in assisted reproductive technology literature examining disclosure, published Jan. 1996 through January 2015, which met the inclusion criteria for the study.

References	Child age	Sample	Conception method	Telling status	Methodology	Outcomes
1. Golombok <i>et al.</i> (1996) ^a UK, The Netherlands, Italy and Spain	4–8 years	116 couples 111 couples 115 couples 120 couples	IVF DI A NC	No Yes No No	Only mothers of DI-conceived children were interviewed about their openness toward disclosure	None of the parents participating in the research had told their children about their genetic origins. The outcomes of the parents opting for secrecy remain to be verified as the children grow.
2. Rumball and Adair (1999) ^a New Zealand	1–8 years	181 parents (78 couples, 23 mothers, 2 fathers)	DI	Yes	Self-report questionnaire	Couples chose to tell when 'it just seemed right' or when they believed their children would be able to understand. Some benefits were observed when children were given this information at a young age in a factual, non-emotional way. There were no significant differences between mothers' and fathers' responses.
3. Gottlieb <i>et al.</i> (2000) Sweden	1–15 years	122 couples	DI	Yes	Self-report questionnaire	Compliance with Swedish legislation: Only 52% of the parents involved had told or intended to tell their children.
4. Golombok <i>et al.</i> (2001) ^a UK	12 years	34 couples 49 couples 38 couples	IVF A NC	Yes No No	Standardized interview	The few parent–child relationship differences identified were associated with experiences of infertility, rather than with IVF <i>per se</i> .
5. Golombok <i>et al.</i> (2002) ^a UK, The Netherlands, Italy and Spain	11–12 years	102 couples 94 couples 102 couples 102 couples	IVF DI A NC	No Yes No No	Only mothers of DI-conceived children were interviewed about their openness to disclosure	ART families were similar to non-ART families in quality of parent–child relationships, with more positive functioning being observed among ART families. The exception was a small proportion of ART parents (19 mothers) in terms of over-involvement with their children. Overall, the ART children were functioning well and did not differ from adoptive or naturally conceived children.
6. Murray and Golombok (2003) ^a UK	3–8 years	17 families	ED	Yes	Standardized Interview	No parents had told their children at this stage, and 47% had no intention of telling them children in the future. ED parents with 3- to 8-year-old children showed similarity to DI parents in that they tended to favor non-disclosure.
7. Scheib <i>et al.</i> (2003) ^a USA	12–17 years	45 households	DI	Yes	Mail-back questionnaires	45 households (40% headed by lesbian couples, 38% by single women, 22% by heterosexual couples) reported their experience with open-identity donors and disclosure about it. Families were positive about DI and the fact that their children could obtain the donor's identity. Disclosure had no negative impact on families, regardless of parents' sexual orientation or relationship status.
8. Golombok <i>et al.</i> (2004) ^a UK	9–12 months	50 families 51 families 80 families	DI ED NC	No Yes	Standardized interview	More positive parent–child relationships were observed in gamete donation- than in naturally conceiving families, together with greater emotional involvement with children by both mothers and fathers. In contrast to the findings of earlier investigations, DI and ED parents were found to be more open to disclosure.
9. Caruso Klock and Greenfeld (2004) ^a USA	2 months to 8 years	62 mothers 62 fathers	ED ED	Yes Yes	Self-report questionnaire	Approximately half of the couples were planning to tell or had told their children about their oocyte donor conception, and a majority (82% of women and 67% of men) had told, although many (60% of women and 62% of men) regretted having done so.
10. Lycett <i>et al.</i> (2005) ^a UK	4–8 years	46 couples	DI	Yes	Semi-standardized interview	Parents who were intending to tell their children in the future had optimistic expectations of their children's reactions. Parents who had already told their children described the telling experience as a positive one.

Continued

Table I Continued

References	Child age	Sample	Conception method	Telling status	Methodology	Outcomes
11. Peters et al. (2005) ^a UK	5–6 years	181 mothers 181 fathers	IVF/ICSI-AUT-IVF/ ICSI-AUT	Yes Yes	Self-report questionnaire	Parents were planning to tell their children about their conception by IVF/ICSI at some point, but were unsure as to the most appropriate timing and disclosure method.
12. Golombok et al. (2006) ^a UK	3 years	20 couples 14 couples 41 couples 41 couples 67 couples	Partial DON-SM AUT-SM DI ED NC	Yes (AUT/DON not specified) Yes Yes No	Interview	The absence of a genetic and/or gestational link between parents and their children did not have a negative impact on parent–child relationships, nor on the psychological well-being of mothers, fathers, and 3-year-old children.
13. Lalos et al. (2007) Sweden	1–15 years	19 mothers 17 fathers	DI	Yes Yes	Semi-structured telephone interview	There was a discrepancy between parents' actions and the legislation on ART children's rights to receive information about their DI conception and donor identity, given that 61% of the parents had not yet told their children.
14. MacCallum and Golombok (2007) UK	2–5 years	21 mothers	DE	Yes	Semi-standardized interview	Embryo donation mothers were similar to DI or ED children's parents in their attitudes towards disclosure.
15. MacDougall et al. (2007) USA	1–19 years	62 couples 79 couples	DI ED	Yes Yes	Semi-standardized interview	Parents choosing early disclosure were more at ease with the disclosure process than parents choosing later disclosure, with the latter reporting greater uncertainty about how and when to disclose.
16. Colpin and Bossaert (2008) ^a Belgium	15–16 years	24 families	AUT-IVF NC	Yes No	Self-report questionnaire. Mothers of IVF-conceived children were interviewed about their openness to disclose.	Parents' and 15–16 years old adolescents' psychosocial adjustment did not differ significantly between IVF families and control families.
17. Nekkebroeck et al. (2008) ^a Belgium	5 years	69 mothers 109 mothers	AUT-IVF AUT-ICSI	Yes Yes	Self-report questionnaire	Disclosure practices and attitudes were very similar for both ICSI- and IVF conceiving mothers. No association was found between disclosure and child outcomes at age 5.
18. MacCallum (2009) ^a UK	2–5 years	21 mothers and 21 fathers 28 mothers and 28 fathers	DE A	Yes Yes	Systematic semi-structured interviews of mothers and fathers separately	Embryo donation parents' views on donors differed from adoptive parents' views, with donors having little significance in family life once treatment had been successful.
19. Landau and Weissenberg (2010) ^a Israel	4–7 years	62 single mothers	DI	Yes	Interview	These mothers tended to postpone disclosure, reporting difficulty in finding the most appropriate way to inform their children.
20. Soderstrom-Anttila et al. (2010) Finland	1–14 years	113 mothers 100 fathers	ED	Yes Yes	Questionnaire with separate material for each partner sent by mail	Parents with young ED children were more inclined to disclosure than were parents of older children.
21. Readings et al. (2011) ^a UK	7 years	36 couples 32 couples 21 couples 12 couples	DI ED SM-DON SM-AUT	Yes Yes Yes Yes	Interview	Approximately half of the children conceived via egg donation, and nearly three-quarters of those conceived via DI, remained unaware that the person they knew as mother or father was not their genetic parent. Nearly all the surrogacy parents had told their children how they were born. Parents used 'layers' of disclosure with both their children and family/friends.

22. Freeman and Golombok (2012) ^a UK	10–14 years	30 couples	DI	Yes	Semi-structured interviews: only mothers' answers were considered.	The differences between disclosing and non-disclosing families concerned quality of parent–child relationships. Disclosure was associated with lower levels of mother–son conflict. Adolescents who were aware of their donor origins reported less 'warm' relationships with their fathers than those who had not been told.
23. Isaksson <i>et al.</i> (2012) ^a Sweden	1–4 years	55 mothers 48 fathers 59 mothers 53 fathers	ED DI	Yes Yes Yes Yes	Self-report questionnaire	78% of participants were planning to tell their children; 16% had already started sharing information; and 6% planned not to tell or were undecided; 36% were unsure about a suitable time to start the disclosure process and desired more information on information-sharing strategies. Couple agreement on disclosure to offspring was related to quality of partner relationship.
24. MacCallum and Keeley (2012) ^a UK	5–9 years	17 mothers 28 mothers 24 mothers	ED AUT-IVF A	Yes Yes Yes	Interview	This study followed up a sample of embryo donation mothers by examining their current disclosure patterns and comparing them with those of adoptive and IVF mothers. Embryo donation mothers were far less likely to share information with their children: 43% were inclined towards disclosing, as compared with all adoptive mothers and 90% of IVF mothers.
25. Blyth <i>et al.</i> (2013) USA, UK, Australia and Canada	1–15 years	108 parents	ED	Yes	Donor Sibling Registry On-line survey	Parents of children conceived via oocyte donation: 70% had been advised to tell their children. A total of 87% of respondents showed interest in identifying and contacting their donors and other families with children sharing the same donor, with 19% having already made contact.
26. Salevaara <i>et al.</i> (2013) Finland	1–22 years	139 mothers 126 fathers	165 couples DI/87 couples dIVF	Yes Yes	Questionnaire sent separately to the mothers and the fathers	16.3% of the children aged 3–14 years had already received information about their conception. Parents of older children were significantly more unwilling to disclose than parents of younger children. No disclosure differences were observed between DI and dIVF families

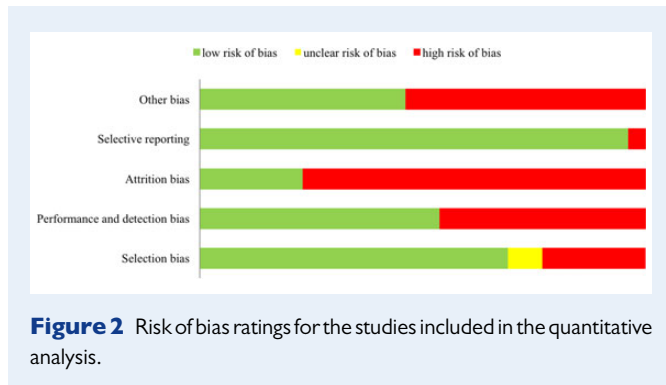
A, adoption; DE, embryo donation; DI, donor insemination; dIVF, IVF with donor sperm; ED, egg donation; AUT, autologous ART; DON, donor ART; NC, natural conception; SM, surrogacy motherhood.

^aThe articles used in the meta-analysis.

Table II Percentage of answers for the telling status: Told, Plan to tell, Uncertain and Plan to not tell in the 26 articles examined.

References	Sample	Conception Method	AUT/DON	Children's age (years)	Telling status (%)			
					Told	Plan to tell	Uncertain	Plan not to tell
Golombok et al. (1996)	111 mothers	DI	DON	4–8	0	12	13	75
Rumball and Adair (1999)	78 couples 23 mothers 2 fathers	DI DI DI	DON DON DON	1–8	30	54	4	12
Gottlieb et al. (2000)	122 couples	DI	DON	1–15	13	51	13	23
Golombok et al. (2001)	34 mothers	IVF	AUT	12	76	12	3	9
Golombok et al. (2002)	94 mothers	DI	DON	11–12	8	10	12	70
Murray and Golombok (2003)	17 couples	ED	DON	3–8	0	29	24	47
Scheib et al. (2003)	45 couples	DI	DON	12–17	93	4.5	2.5	0
Caruso Klock and Greenfeld (2004)	62 mothers 62 fathers	ED ED	DON DON	2 months to 8	11 8	48 45	7 6	34 41
Golombok et al. (2004)	50 couples 51 couples	DI ED	DON DON	9–12 months	0 0	46 56	24 22	30 22
Lycett et al. (2005)	46 couples	DI	DON	4–8	13	26	17	44
Peters et al. (2005)	181 mothers 181 fathers	IVF/ICSI IVF/ICSI	AUT AUT	5–6	26 17	58 57	16 21	0 4
Golombok et al. (2006)	20 mothers 14 mothers 41 mothers 41 mothers	SM/AUT SM/DON DI ED	AUT DON DON DON	3	44 5 7	53 39 61	3 10 10	0 46 22
Lalos et al. (2007)	19 mothers 17 fathers	DI DI	DON DON	1–15	58 64	26 18	0 0	16 18
MacCallum and Golombok (2007)	21 mothers	DE	DON	2–5	9	24	24	43
MacDougall et al. (2007)	62 couples 79 couples	DI ED	DON DON	1–19	32 23	45 58	6 9	16 10
Colpin and Bossaert (2008)	24 mothers	IVF	AUT	15–16	66	8	21	5
Nekkebroeck et al. (2008)	69 mothers 109 mothers	IVF ICSI	AUT AUT	5	11 14	71 75	12 5	6 6
MacCallum (2009)	21 mothers 16 fathers	DE DE	DON DON	2–5	9 6	24 19	24 19	43 56
Landau and Weissenberg (2010)	62 mothers single	DI	DON	4–7	23	64	10	3
Soderstrom-Anttila et al. (2010)	113 mothers 100 fathers	ED ED	DON DON	1–14	25 22	36 38	25 25	14 15
Readings et al. (2011)	36 couples 32 couples 21 couples 12 couples	DI ED SM/DON SM/AUT	DON DON DON AUT	7	28 41 95 75	19 31 5 25	14 12 0 0	39 16 0 0
Freeman and Golombok (2012)	30 mothers	DI	DON	10–14	33	10	13	44
Isaksson et al. (2012)	55 mothers 48 fathers 59 mothers 53 fathers	ED ED DI DI	DON DON DON DON	1–4	18 13 17 17	75 77 80 79	5 8 0 2	2 2 3 2
MacCallum and Keeley (2012)	17 mothers 28 mothers	DE IVF	DON AUT	5–9	18 46	24 43	12 7	47 4
Blyth et al. (2013)	94 parents	ED	DON	1–15	51	42	4	3
Salevaara et al. (2013)	139 mothers 127 fathers	DI DI	DON DON	1–22	16 15	25 21	31 30	28 34

DI, donor insemination; ED, egg donation; DE, embryo donation; SM/AUT, surrogacy motherhood with embryo from both intended parents; SM/DON, surrogacy motherhood with external donor; NC, natural conception; AUT, autologous ART; DON, donor ART.



Planning to not tell. Parents who had resorted to gamete donation had already Told in 21% of the DI cases and 23% of the ED cases. Telling had been postponed in 36% of the DI cases and in 48% of the ED cases; 13% were Undecided in both conditions, whereas 30% of the DI cases and 16% of the ED parents had opted to not disclose (Planning to not tell). In instances of surrogacy Told responses were 66% of the total; Planning to tell, 33%; Uncertain, 1%; and Planning to not tell, 0%. Lastly, in instances of embryo donation, 11% of respondents indicated that they had already disclosed; 22% had postponed telling; 19% were Undecided; and 48% had decided to not disclose. Overall, a limited percentage of parents disclosed (21% mothers, 17% fathers), and non-disclosing fathers had opted to not disclose almost as frequently as mothers did (17% of fathers, 14% of mothers). The percentage of mothers and fathers who had expressed the intention to inform their children in the future was the same (47%); similarly the percentage of Undecided was once again quite similar for mothers (17%) and fathers (19%) (see Table II).

Autologous/donor ART and the child's age

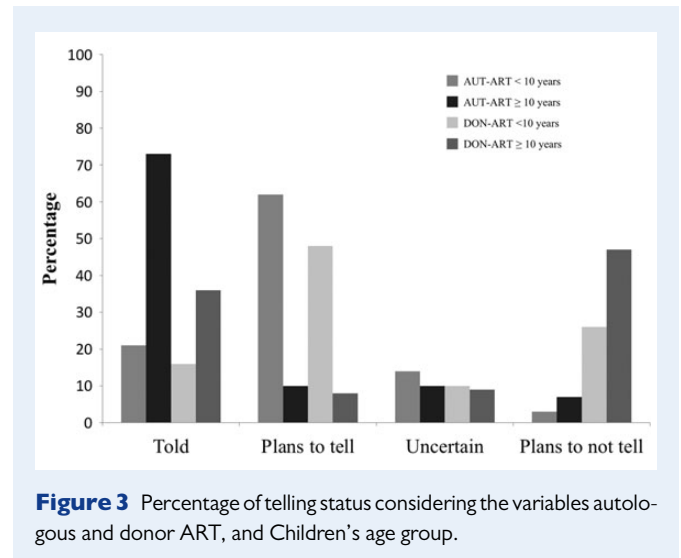
Children's age at the time of the research was divided into two main categories: less than 10 years and 10 years or older and therefore with a cutoff age corresponding to the start of preadolescence (Golombok *et al.*, 2002).

The following section refers to 14 papers involving both autologous and donor ART families with children aged less than 10 years and 5 with children aged 10 years or older. In the < 10 years subgroup, 19% of the responses were from parents who had already disclosed (Told); 52% of parents expressed the intention to do so in the future (Planning to tell); 11% were Uncertain; and 18% had decided to not disclose (Planning to not tell). Among families with children aged ≥ 10 years, 45% indicated that they had already disclosed (Told); 9% expressed the intention to disclose in the future (Planning to tell); 10% expressed indecision (Undecided) and 36% the intention to not disclose (Planning to not tell). In an effort to shed further light on these data, a further analysis was conducted by distinguishing between parent responses as a function of the type of ART used (autologous/donor).

As shown in Fig. 3, Telling percentages in instances of autologous ART and donor ART, in relation to the two age groups (< 10 and ≥ 10 years old) change considerably.

Meta-analysis

For the Told/Not Told and for the Planning to tell/Planning not to tell answers, considering each age-group and typology of ART (autologous



and donor), between brackets are reported: the proportion of parents that belong to the categories considered in the analyses, the *P*-value indicating that this proportion is different from 50% and the related 95% confidence interval. In the case of non-overlapping confidence intervals, we measured the effect size of the difference between the two groups considered with Cohen's *h* (Cohen, 1988).

The first analysis concerned the Told/Not Told answers. Parents who had already told their children the origins of their conception were compared with the other parents who had only indicated the intention to disclose (Plan to tell, Uncertain, Plan to not tell).

Two overlapping confidence intervals were observed in the < 10 years age group, between autologous (0.226, $P < 0.001$; 95% CI 0.184–0.275) and donor (0.265, $P < 0.001$; 95% CI 0.222–0.312) ART. In both cases, the disclosure probability was < 50%. Conversely, in the older age group (10–22 years old), a large effect size difference (Cohen's $h = 0.86$) was observed between autologous (0.716, $P < 0.01$; 95% CI 0.586–0.818) and donor (0.298, $P < 0.001$; 95% CI 0.208–0.406) ART parents, in that autologous ART disclosures were > 50% and donor ART disclosures were < 50%.

The second analysis examined data on parent intention to tell versus not to tell their children about their ART conception. In this case, the dichotomy examined was Plan to tell/Plan to not tell (parents who were Uncertain or had already disclosed (Told) were excluded). The number of parents of children < 10 who were Planning to tell about the child's conception circumstances both in autologous (0.929, $P < 0.001$; 95% CI 0.883–0.958) and donor (0.566, $P < 0.05$; 95% CI 0.510–0.620) ART was higher for the autologous ART subsample than it was for the donor ART subsample (Cohen's $h = 0.89$). Conversely, the data for the older age group in the autologous ART subsample (0.599, n.s., 95% CI 0.295–0.842) showed that Planning to tell did not differ statistically from Planning to not tell. Lastly, in the instance of donor ART (≥ 10 years), a percentage of parents < 50% were Planning to tell their children about their conception circumstances (0.150, $P < 0.001$; 95% CI 0.089–0.243).

A meta-regression including publication year as a moderator variable found no publication year effects on the probabilities for Told/Not Told ($\beta = 0.05$, $z = 0.72$, n.s.), nor for Plan to tell/Plan to not tell ($\beta = 0.13$, $z = 1.65$, n.s.).

Discussion

The present review summarizes the data available in the literature on parental disclosure of ART conception to their children. We specifically aimed to investigate differences as a function of genetic continuity, or lack thereof, with children conceived via autologous versus donor ART. Our hypothesis was that disclosure would be easier for autologous-ART parents than for donor parents (Golombok et al., 2002; Peters et al., 2005; Colpin and Bos-saert, 2008; MacCallum and Keeley, 2012). We also aimed to verify the ways in which a child's age might influence the disclosure process, given that many authors have highlighted how disclosure at an older rather than a younger age may be a more destabilizing event (Rumball and Adair, 1999; Scheib et al., 2005; Mac Dougall et al., 2007; Blyth, 2012).

Regrettably, we found that very few studies had examined the influence of family background characteristics. Recently Indekeu et al. (2013) conducted a review investigating factors that contribute to parental decision-making, but for donor ART only. Their analysis revealed that the cause of infertility most likely did not influence the disclosure process. Disclosure was more prevalent among younger than older couples; the results concerning the impact of social economic status were inconclusive.

Notably, ART research frequently compares the consequences of non-disclosure to the negative consequences observed in families with an adopted child (Golombok, 1997; McGee et al., 2001; Golombok et al., 2002; Murray et al., 2006; Paul and Berger, 2007; Jadva et al., 2009). In fact, over the last two decades, the ART conception field has shifted from favoring confidentiality to encouraging parents to tell their donor offspring how they were conceived (Gottlieb et al., 2000; Soderstrom-Antilla et al., 2010; Salevaara et al., 2013).

A number of ethics committees have expressed opinions in favor of disclosure, by considering it as a child right (e.g. ASRM—Ethics Committee of the American Society of Reproductive Medicine (2004); and HFEA—Human Fertilisation and Embryology Authority (2008)). A number of nations (Sweden, New Zealand, the State of Victoria in Australia, the Netherlands, the USA, Great Britain), moreover, have promulgated specific legislation acknowledging ART children's rights to know the method by which they were conceived (Rumball and Adair, 1999; Gottlieb et al., 2000; Scheib et al., 2003; Lycett et al., 2004, 2005; Soderstrom-Antilla et al., 2010). For instance, the European Convention on the Adoption of Children (Revised) (2008) states that ART-conceived children shall have access to information held by the competent authorities concerning their origins, under the condition that their parents of origin have a legal right to not disclose their identity. The matter is therefore legally contradictory, due to the differences with which it is dealt in different countries. Certainly, from a medical standpoint, biogenetic information ought to be made available to children to create awareness of unknown genetic illnesses.

The finding that many parents expressed little concern about their anonymous donors can be interpreted as trust in the clinic used and the donor screening process (Salevaara et al., 2013). Disclosure may benefit children by protecting their interests in knowing their genetic heritage and in securing accurate information about potential health problems. The possibility of accidental disclosure may rise with the growing frequency of genetic testing in contemporary medicine. Moreover, informing children of their genetic origins may protect them against later inadvertent consanguinity.

It was surprising that the total percentage of parents who had already disclosed was quite small. This finding shows that ART children's rights to access the details of their conception are still quite limited (van den

Akker, 2006). In this sense, mothers and fathers (Rumball and Adair, 1999; Hewitt, 2002; Scheib et al., 2003; Caruso Klock and Greenfeld, 2004; Mac Dougall et al., 2007; Blyth, 2012) did not differ in the number of intended or already achieved disclosures.

Autologous versus donor ART turned out to be the most influential disclosure variable. The data obtained in the present review confirmed that parents who are genetically related to their ART-conceived children show more openness about disclosure. Conversely, donor parents, although initially intending to disclose (see meta-analysis results above) show the most difficulty in informing their donor offspring. This finding points to the important psychological role of genetic continuity (or lack thereof) in the decision to disclose or not. The exception was shown by surrogate families, who were found to be the most open about conception disclosure. The relative ease of helping children understand the idea of surrogacy (for instance, by telling them they were in 'another lady's tummy' (Golombok et al., 2006) might be a facilitating factor for these parents in telling their children. It should also be noted that surrogate pregnancy is frequently entrusted to an acquaintance or family member—another factor that may work in favor of disclosure (Daniels, 1997; Caruso Klock and Greenfeld, 2004; Greenfeld, 2008; MacCallum, 2009; Rodino et al., 2011; Yee et al., 2011).

Conversely, the need to 'keep the secret' appears even stronger when the embryo is donated possibly because this involves the acknowledgement of a double lack of genetic link. However, it should be noted that all the research reporting embryo donation pertains to children from 2 to 9 years old, when the percentage of disclosure is also limited in other categories.

As in situations of adoption, maintaining secrecy about ART conception appears to differentially impact family and child relationships as a function of the child's age (Freeman and Golombok, 2012). The impact on offspring and family psychological well-being has been found to be more negative when children are told in preadolescence and in subsequent years (Freeman and Golombok, 2012; Salevaara et al., 2013).

As the child's age increases, the percentage of parents who disclose should also increase. Yet, our data show that although the total percentage of parents expressing the intention to tell before their children turned 10 was 52%, only 9% of parents surveyed in the research examined had actually managed to do so between age 10 and 22 years. Therefore, the number of parents who had decided to not disclose is higher in the second age range (from 18 to 36%). We can assume that parents who wait for 'the right moment' are unlikely to ever find such a time (Mac Dougall et al., 2007; Jadva et al., 2009; Rosholm et al., 2010). Not surprisingly, even when donor offspring are over ten years old, it is mostly autologous ART parents who comply with their expressed intent to disclose.

Age and process of disclosure of the adolescent's conception were identified as key mediators of parent–adolescent relationships. Understandably, the greater challenges of the onset of adolescence make it more difficult for parents to introduce a further element of complexity into the parent–child relationship (Turner and Coyle, 2000; Hewitt, 2002; Paul and Berger, 2007; Daniels et al., 2011; Ilioi and Golombok, 2015). Not surprisingly, fewer parents had disclosed when their children were over 10 years old, and again, these were mostly parents who had used autologous ART, as revealed by the meta-analysis.

The most frequent motivation cited by parents in favor of disclosure was the desire to create an atmosphere of honesty in the family (Rumball and Adair, 1999; Mac Dougall et al., 2007; Readings et al., 2011). Yet, the underestimation of medical issues—a factor requiring

close consideration, according, e.g. to the [ASRM \(2004\)](#) and to the [HFEA \(2008\)](#)—is quite striking.

Parents' justifications for not disclosing are mostly related to their desire to protect their children and/or to the view that conception is a private matter for the couple ([Readings et al., 2011](#)); or they claim to have difficulty finding the right words and the right time to do it ([MacCallum and Keeley, 2012](#)).

In general, ART research indicates that disclosure is not inherently problematic. The literature highlights how parents' decision to disclose is indicative of a more open and trusting family atmosphere and more harmonious relationships ([Paul and Berger, 2007](#)). Only [Freeman and Golombok's \(2012\)](#) and [Jadva et al. \(2015\)](#) findings showed that donor offspring may have a less affectionate relationship with their social fathers and that the latter, in turn (in instances of donor insemination) do not experience good parental psychological adjustment after disclosure occurs.

Limitations and future directions

The complexity of the decision-making process regarding ART disclosure to children is reflected in the heterogeneity of the studies investigating the topic. They differ in methodology, type of sample (recruitment and age range), sample size, and, partially, by categorization of analyzed data. Moreover, the studies reviewed all share the risk of having over-represented parents who tend to disclose; in fact, given that all the studies were based on voluntary participation, they may have ended up including fewer parents who wanted to keep their choice a secret, than occurs in the general ART parent population ([Caruso Klock and Greenfield, 2004](#); [Peters et al., 2005](#)).

The review inclusion criteria proved to be rather restrictive, especially due to the limit imposed by the telling status criteria, which were, however, essential to obtaining data that could be compared.

The present study did not investigate relevant themes such as background family characteristics, SES, previous treatment, parental age, cultural background—i.e. factors that are very rarely considered by research in this field. Recently [Indekeu et al. \(2013\)](#), in a review investigating factors contributing to parental decision-making in instances of donor ART only, concluded that the cause of infertility did not influence the disclosure process. Other results indicated that intention to disclose was more prevalent among younger couples than among older ones, and that findings on the impact of social economic status were inconclusive. The authors also underscored how the potential impact of demographic features, such as age, education and socioeconomic context, had been reported in only a few studies, usually as a side issue with mostly inconsistent results. Indeed, all these variables should be investigated by future research using a wide range of participants and always by comparing autologous and donor ART results. The information obtained therein could serve to highlight aspects influencing the disclosure process, which should be useful in structuring intervention to support parents confronting the need to tell their children how they were conceived.

The studies considered could not be examined in terms of differences in parental structure such as homosexual/heterosexual couples, or singles, due to the low number of the latter type of participants ([Scheib et al., 2003](#); [Blyth et al., 2013](#)). Equally limited was the number of studies (5 out of 19) dedicated to the analysis of disclosure for children ≥ 10 .

Lastly, most of the data examined were based on a single time point data collection, and this limit does not allow us to follow the trajectory

of different disclosure timings within the same participants. The disclosure process may undergo continuous modification as historical context, child development, family interaction and economic situations change over time. Moreover, a single time data point collection, even when conducted with a cross-sectional design, cannot account for differences that are observable only through longitudinal research.

Conclusions

The articles examined show that there are still few ART parents who opt to disclose to their children and that a crucial variable is the type of ART (autologous versus. donor) they had used to conceive.

The present review could be useful for specialists accompanying parents on the frequently long and demanding ART conception pathway. The difficulties parents experience in disclosing, as revealed by this review, point to a need to take the time to discuss with future parents the difficulties they have encountered in the procreative process and/or (in the instance of donor ART) any struggles they may have experienced when finding they are infertile. Indeed, the lack of a biological link and unprocessed feelings about this may strongly impinge on the relationship with their children.

Medical doctors, nurses and mental health professionals working in this sector can play a key role in guiding parents' decisions about if, when, and how to tell their children. From the beginning of the process, these experts should provide parents with information on the potential consequences of disclosure versus non-disclosure for their children. They should also dispel ART parents' concerns, to facilitate telling early on. Children's conception stories can be re-told and re-elaborated over time, as children grow in age and understanding. This approach is particularly critical in cases of donor ART, as their parents tend to keep the conception method secret: the decision to disclose grows more difficult over time and then may rarely be accomplished. ART parents could therefore benefit from some practical assistance, which may also be provided in an informative material format that explains why early disclosure is preferable and how to tell children as a function of a child's age ([MacCallum and Keeley, 2012](#)). Support groups for parents who have already experienced, or are experiencing the difficulty of disclosing, could be organized by professionals helping parents share and discuss their psychological, emotional and practical challenges together. Unfortunately, however, studies currently available on supporting strategies for parents coping with the challenges of disclosure have not yielded many practical suggestions. Even more crucially for these purposes, the papers do not present longitudinal data, which could yield reliable information on patterns followed by ART-conceiving parents and their children's responses.

Supplementary data

Supplementary data are available at <http://humrep.oxfordjournals.org/>.

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Authors' roles

M.A.T. conceived of the study, participated to the data research, drafted with L.Z., the initial manuscript, and corrected and organized the subsequent versions. L.Z. assisted in drafting the initial manuscript, and collected the data, carried out the initial analyses, with M.A.T., G.G. developed and carried out the statistical analyses. V.M. participated in the data collection and analyses. All authors approved the final manuscript as submitted.

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References

- Baran A, Pannor R. *Lethal Secrets*. New York: Amistad, 1993.
- Blake L, Jadva V, Golombok S. Parent psychological adjustment, donor conception and disclosure: a follow up over 10 years. *Hum Reprod* 2014; **11**:2487–2496.
- Blyth E. Discovering the 'facts of life' following anonymous donor insemination. *Int J Law Fam* 2012; **26**:143–161.
- Blyth E, Kramer W, Schneider J. Perspectives, experiences, and choices of parents of children conceived following oocyte donation. *Reprod Biomed Online* 2013; **26**:179–188.
- Borenstein M, Hedges LV, Higgins JPT, Rothstein HR. *Introduction to Meta-Analysis*. Chichester, UK: Wiley, 2009.
- Brodzinsky DM. A stress and coping model adoption adjustment. In: Brodzinsky DM, Schechter MD (eds). *The Psychology of Adoption*. Oxford, UK: Oxford University Press, 1990,3–125.
- Caruso Klock S, Greenfeld DA. Parents' knowledge about the donors and their attitudes toward disclosure in oocyte donation. *Hum Reprod* 2004; **19**:1575–1579.
- Cohen J. *Statistical Power Analysis for the Behavioral Sciences*, 2nd edn. Hillsdale, NJ: Lawrence Erlbaum, 1988.
- Colpin H, Bossaert G. Adolescent conceived by IVF: parenting and psychosocial adjustment. *Hum Reprod* 2008; **23**:2724–2730.
- Daniels K. *Guidelines for Embryo Donation for Reproductive Purposes in New Zealand: A Child/Family Approach. Ethics, law and society*. Aldershot, New Zealand: Ashgate Publishers, 1997.
- Daniels K, Meadows L. Sharing information with adults conceived as a result of donor insemination. *Hum Fertil* 2006; **9**:93–99.
- Daniels K, Taylor K. Secrecy and openness in donor insemination. *Polit Life Sci* 1993; **12**:155–170.
- Daniels KR, Grace VM, Gillett WR. Factors associated with parents' decisions to tell their adult offspring about the offspring's donor conception. *Hum Reprod* 2011; **26**:2783–2790.
- ESHRE. Assisted reproductive technology in Europe, 2010: results generated from European registers by ESHRE. *Hum Reprod* 2014; **29**:2099–2014.
- Ethics Committee of the American Society for Reproductive Medicine (ASRM). Informing offspring of their conception by gamete donation. *Fertil Steril* 2004; **82**:212–216.
- Freeman T, Golombok S. Donor insemination: A follow up study of disclosure decisions, child adjustment and family relationships at adolescence. *Reprod Biomed Online* 2012; **25**:193–203.
- Golombok S. Parenting and secrecy issues related to children of assisted reproduction. *J Assist Reprod Gen* 1997; **14**:375–378.
- Golombok S, Brewaeys A, Cook R, Giavazzi MT, Guerra D, Mantovani A, Van Hall E, Crosignani PG, Dexeus S. The European study of assisted reproduction families: family functioning and child development. *Hum Reprod* 1996; **11**:2324–2331.
- Golombok S, MacCallum F, Goodman E. The 'test-tube' generation: parent-child relationship and the psychological well-being of in vitro fertilization children at adolescence. *Child Dev* 2001; **72**:599–608.
- Golombok S, Brewaeys A, Giavazzi MT, Guerra D, MacCallum F, Rust J. The European Study of assisted reproduction families: the transition to adolescence. *Hum Reprod* 2002; **17**:830–840.
- Golombok S, Lycett E, MacCallum F, Jadva V, Murray C, Rust J, Abdalla H, Jenkins J, Margara R. Parenting children conceived by gamete donation. *J Fam Psychol* 2004; **18**:443–452.
- Golombok S, Jadva V, Lycett E, Murray C, MacCallum F. Families created by gamete donation: follow-up at age 2. *Hum Reprod* 2005; **20**:286–293.
- Golombok S, Jadva V, Lycett E, Murray C, MacCallum F, Rust J. Non-genetic and non-gestational parenthood: consequences for parent-child relationships and the psychological well-being of mothers, fathers and children at age 3. *Hum Reprod* 2006; **21**:1918–1924.
- Gottlieb C, Lalos O, Lindblad F. Disclosure of donor insemination to the child: the impact of Swedish legislation on couples attitudes. *Hum Reprod* 2000; **15**:2052–2056.
- Greenfeld DA. The impact of disclosure on donor gamete participants: donors, intended parents and offspring. *Curr Opin Obstet Gyn* 2008; **20**:265–268.
- Hewitt G. Missing Links: identity issues of donor-conceived people. *J Fert Counselling* 2002; **9**:14–20.
- Human Fertilisation and Embryology Authority (HFEA). 8th Draft Code of Practice. 2008.
- Ilioi EC, Golombok S. Psychological adjustment in adolescents conceived by assisted reproduction techniques: a systematic review. *Hum Reprod Update* 2015; **21**:84–96.
- Indekeu A, Dierickx K, Schotsmans P, Daniels KR, Rober P, D'Hooghe T. Factors contributing to parental decision-making in disclosing donor conception: a systematic review. *Hum Reprod Update* 2013; **19**:714–733.
- Isaksson S, Sydsjö G, Svanberg AS, Lampic C. Disclosure behaviour and intentions among III couples following treatment with oocytes or sperm from identity-release donors: follow-up at offspring age 1–4 years. *Hum Reprod* 2012; **27**:2998–3007.
- Jadva V, Freeman T, Kramer W, Golombok S. The experiences of adolescents and adults conceived by sperm donation: comparisons by age of disclosure and family type. *Hum Reprod* 2009; **24**:1909–1919.
- Jadva V, Imrie S, Golombok S. Surrogate mothers 10 years on: a longitudinal study of psychological well-being and relationships with the parents and child. *Hum Reprod* 2015; **30**:373–379.
- Kirkman M. Parents' contribution to narrative identity of offspring of donor-assisted conception. *Soc Sci Med* 2003; **57**:2229–2242.
- Lalos A, Gottlieb C, Lalos O. Legislated right for donor-insemination children to know their genetic origin: a study of parental thinking. *Hum Reprod* 2007; **22**:1759–1768.
- Landau R, Weissenberg R. Disclosure of donor conception in single-mother families: view and concerns. *Hum Reprod* 2010; **25**:942–948.
- Lycett E, Daniels K, Curson R, Golombok S. Offspring created as a result of donor insemination: a study of family relationships, child adjustment, and disclosure. *Fertil Steril* 2004; **82**:172–179.
- Lycett E, Daniels K, Curson R, Golombok S. School-aged children of donor insemination: a study of parents' disclosure patterns. *Hum Reprod* 2005; **20**:810–819.
- Mac Dougall K, Becker G, Scheib JE, Nachtigall RD. Strategies for disclosure: how parents approach telling their children that they were conceived with donor gametes. *Fertil Steril* 2007; **87**:524–533.

- MacCallum F. Embryo donation parents' attitudes towards donors: comparison with adoption. *Hum Reprod* 2009;**24**:517–523.
- MacCallum F, Golombok S. Embryo donation families: mothers' decisions regarding disclosure of donor conception. *Hum Reprod* 2007;**22**:2888–2895.
- MacCallum F, Keeley S. Disclosure patterns of embryo donation mothers compared with adoption and IVF. *Reprod Biomed Online* 2012;**24**:745–748.
- McGee G, Brakman SV, Gurmankin AD. Gamete donation and anonymity: disclosure to children conceived with donor gametes should not be optional. *Hum Reprod* 2001;**16**:2033–2036.
- McWhinnie A. Gamete donation and anonymity: should offspring from donated gametes continue to be denied knowledge of their origins and antecedents? *Hum Reprod* 2001;**16**:807–817.
- Murray C, Golombok S. To tell or not to tell: the decision-making process of egg-donation parents. *Hum Fertil* 2003;**6**:89–95.
- Murray C, MacCallum F, Golombok S. Egg donation parents and their children: follow-up at age 12 years. *Fertil and Steril* 2006;**85**:610–618.
- Nekkebroeck J, Bonduelle M, Ponjaert-Kristoffersen I. Maternal disclosure attitudes and practices of ICSI/IVF conception vis-à-vis a 5 year old child. *J Reprod Infant Psych* 2008;**26**:44–56.
- Owen L, Golombok S. Families created by assisted reproduction: parent-child relationships in late adolescence. *J Adolescence* 2009;**32**:835–848.
- Paul MS, Berger R. Topic avoidance and family functioning in families conceived with donor insemination. *Hum Reprod* 2007;**22**:2566–2571.
- Peters C, Kantaris X, Barnes J, Sutcliffe A. Parental attitudes toward disclosure of the mode of conception to their child conceived by in vitro fertilization. *Fertil Steril* 2005;**83**:914–919.
- Readings J, Blake L, Casey P, Jadva V, Golombok S. Disclosure and everything In-between: decisions of parents of children conceived by donor insemination, egg donation and surrogacy. *Reprod Biomed Online* 2011;**22**:485–495.
- Rodino IS, Burton PJ, Sanders KA. Donor information considered important to donors, recipients and offspring: an Australian perspective. *Reprod Biomed Online* 2011;**22**:303–311.
- Rosholm R, Lund R, Molbo D, Schmidt L. Disclosure patterns of mode of conception among mothers and fathers-5-year follow-up of the Copenhagen Multi-centre Psychosocial Infertile (COMPI) cohort. *Hum Reprod* 2010;**25**:2006–2017.
- Rumball A, Adair V. Telling the story: parents' scripts for donor offspring. *Hum Reprod* 1999;**14**:1392–1399.
- Sälevaara M, Suikkari AM, Söderström-Anttila V. Attitudes and disclosure decisions of Finnish parents with children conceived using donor sperm. *Hum Reprod* 2013;**28**:2746–2754.
- Scheib JE, Riordan M, Rubin S. Choosing identity-release sperm donors: the parents' prospective 13–18 years later. *Hum Reprod* 2003;**18**:1115–1127.
- Scheib JE, Riordan M, Rubin S. Adolescents with open-identity sperm donors: reports from 12–17 year olds. *Hum Reprod* 2005;**20**:239–252.
- Söderström-Anttila V, Sälevaara M, Suikkari AM. Increasing openness in oocyte donation families regarding disclosure over 15 years. *Hum Reprod* 2010;**25**:2535–2542.
- Turner AJ, Coyle A. What does it mean to be a donor offspring? The identity experiences of adults conceived by donor insemination and the implications for counselling and therapy. *Hum Reprod* 2000;**15**:2041–2051.
- van den Akker O. A review of family donor constructs: current research and future directions. *Hum Reprod Update* 2006;**12**:91–101.
- Yee S, Blyth E, Tsang AK. Views of donors and recipients regarding disclosure to children following altruistic known oocyte donation. *Reprod Biomed Online* 2011;**23**:851–859.