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ARTICLE

Psychological adjustment in disclosing and non-disclosing heterosexual-couple families following conception with oocytes or spermatozoa from identity-release donors

BIOGRAPHY

Andreas Widbom is a clinical psychologist working within the field of reproductive medicine. The main area of his research relates to the psychosocial aspects of treatments with donated sperm and oocytes.

Andreas Widbom[1,*], Gunilla Sydsjö[2], Claudia Lampic[1,3]

KEY MESSAGE

Disclosure of the donor conception to young children does not appear to be associated with negative outcomes for parents or children. Heterosexual couples using oocyte or sperm donation should be informed that disclosure when the child is 7–8 years old is not detrimental to the psychological adjustment of families.

ABSTRACT

Research question: Is there a relationship between disclosure and psychological adjustment in heterosexual-couple families following oocyte donation and sperm donation when the child is 7 years old?

Design: This was a cross-sectional study of heterosexual couples with 7- to 8-year-old children conceived with identity-release oocyte donation (n = 83, response rate 56%) or sperm donation (n = 113, response rate 65%). Participants individually completed instruments for the assessment of parents' emotional distress (HADS), parenting stress (SPSQ) and relationship quality (ENRICH), and their child's psychological adjustment (SDQ-Swe) and reported whether they had talked with their child about their donor conception.

Results: About half of parents had talked with their child about their donor conception (oocyte donation 61%, sperm donation 58%). Separate analyses for mothers and fathers showed no main effects of disclosure or type of donation on the outcomes, nor were there any interaction effects. Overall, mothers and fathers in oocyte donation and sperm donation families were found to be well adjusted, reporting within-normal range levels of anxiety, depression and parental stress, and a high relationship quality. The children were well adjusted, with low levels of emotional and behavioural problems.

Conclusions: Overall, the present results confirm previous research indicating that early disclosure of the donor conception to children is not associated with negative outcomes for parents or children. Heterosexual couples using oocyte or sperm donation should be informed that disclosure when the child is 7–8 years old is not detrimental to the psychological adjustment of families.

[1] Department of Women's and Children's Health, Karolinska Institutet Stockholm, Sweden
[2] Division of Children's and Women's Health, Department of Biomedical and Clinical Sciences, Linköping University, Linköping, Sweden
[3] Department of Psychology, Umeå University, Umeå, Sweden

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*Corresponding author. E-mail address: andreas.widbom@ki.se (A. Widbom). https://doi.org/10.1016/j.rbmo.2022.06.011
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INTRODUCTION

The potential benefits and harms of disclosure to donor-conceived individuals is a contentiously debated issue hampered by inconclusive evidence. Parental disclosure of the donor conception is argued to be in the child's best interest, and starting disclosure from an early age is increasingly being recommended (*Ethics Committee of the ASRM, 2018*; *Human Fertility and Embryology Authority, 2019*; *Kirkman-Brown et al., 2022*; *The National Board of Health and Welfare, 2004*). However, the extent to which parents disclose the mode of conception to their donor-conceived child varies, and parents' decision making on disclosure has been found to be influenced by multiple factors (*Indekeu et al., 2013*).

Heterosexual couples have been shown to be less likely to disclose their use of sperm donation to their children (*Beeson et al., 2011*; *Freeman et al., 2016*) and to express concerns about the impact of disclosure (*Blake et al., 2010*; *Readings et al., 2011*; *Widbom et al., 2021*). In comparison, single women and same-sex female couples tend to be open with their children about their conception with donor spermatozoa as they need to explain the absence of a father in the family (*Appleby et al., 2012*). In line with this, heterosexual-couple parents have expressed worry about the potential negative impact on the parent–child relationship, particularly concerning the relationship with the non-genetic father (*Golombok et al., 2002*; *Scheib et al., 2003*; *Widbom et al., 2021*). In view of the apparent challenges for heterosexual donor-conceiving couples and the ongoing debate about the benefits and risks of disclosure, it is important to consider the consequences of these parents' disclosure for family well-being and functioning.

Previous research comparing disclosing and non-disclosing heterosexual-couple families on a large number of outcome measures indicates more similarities than differences in terms of psychological functioning and relationship quality when the donor-conceived child is between pre-school age and early adolescence (i.e. 4–14 years) (*Blake et al., 2014*; *Freeman and Golombok, 2012*; *Golombok et al., 2002*; *Golombok et al., 2011*; *Golombok et al., 2013*; *Ilioi et al., 2017*; *Kovacs et al., 2015*; *Lycett et al., 2004*). However, several of these studies have shown significant group differences on certain outcome measures, most often indicating an association between disclosure and more positive adjustment.

Concerning the parents' psychological state, one study did not find any significant differences in mothers' psychological distress between disclosing and non-disclosing sperm donation families (*Kovacs et al., 2015*), while two studies showed a tendency towards disclosure having more positive outcomes for mothers (*Blake et al., 2014*; *Golombok et al., 2013*). Interestingly, disclosure had different effects on the parenting stress of sperm donation and oocyte donation fathers when the child was age 7 years, and on depression symptoms when the child was 10, with sperm donation fathers in disclosing families reporting higher levels and oocyte donation fathers reporting lower levels of psychological distress compared with non-disclosing families (*Blake et al., 2014*).

In regard to parents' satisfaction with the partner relationship, three studies of sperm donation families found no significant differences between disclosing and non-disclosing couples (*Freeman and Golombok, 2012*; *Kovacs et al., 2015*; *Lycett et al., 2004*). No study to date has investigated the impact of disclosure on couple relationships in oocyte donation families.

Concerning the impact of disclosure on parent–child interaction and family functioning, the majority of the reported results indicate no statistically significant differences between disclosing and non-disclosing families. However, several studies report positive outcomes of disclosure on some outcome measures. For example, mothers in disclosing families were found to report less frequent and less severe disputes with their child (*Golombok et al., 2002*; *Lycett et al., 2004*), less strict discipline (*Golombok et al., 2002*), their child being less of a strain and themselves feeling more competent as a mother (*Lycett et al., 2004*), and lower levels of conflict with their sons (*Freeman and Golombok, 2012*), compared with mothers in non-disclosing families. Among fathers, the only significant result indicates that disclosure is associated with sperm donation fathers feeling more competent as a parent (*Lycett et al., 2004*). In contrast, adolescents in disclosing sperm donation families reported less warm father–child relationships (*Freeman and Golombok, 2012*).

In terms of the children's psychological adjustment, studies have compared disclosing and non-disclosing sperm donation families or combined families that have used different types of treatment, and samples are typically represented by few disclosing families. Most studies have found no statistically significant differences between disclosing and non-disclosing families regarding child adjustment (*Freeman & Golombok, 2012*; *Golombok et al., 2002*; *Golombok et al., 2013*; *Ilioi et al., 2017*; *Kovacs et al., 2015*; *Lycett et al., 2004*). However, one study found that mothers in disclosing families considered their children to have lower levels of conduct problems (*Lycett et al., 2004*).

In summary, the literature on the associations between disclosure and psychological adjustment among heterosexual-couple families is inconclusive. While most results show no statistically significant differences between disclosing and non-disclosing families, there is an indication that disclosure is associated with positive aspects of family functioning, and a few findings suggest that disclosure in sperm donation families may have more negative outcomes for fathers. However, the majority of studies concern only sperm donation or do not differentiate between donation types, relate to treatment with anonymous donors and predominantly include the mothers' perspectives. Furthermore, several studies have been hampered by selection bias, small sample sizes, and high attrition in longitudinal studies.

The aim of the present study was to investigate the relationship between disclosure and psychological adjustment in heterosexual-couple families following oocyte and sperm donation.

MATERIALS AND METHODS

The present study was performed within the context of the Swedish legislation on identity-release donation, which mandates that the donor-conceived child has the right to obtain identifying information about their donor when they are sufficiently mature (i.e. around

TABLE 1 CHARACTERISTICS OF THE PARTICIPATING PARENTS FOLLOWING OOCYTE OR SPERM DONATION

Parameter	Oocyte recipients		Sperm recipients	
	Women (*n* = 43)	Men (*n* = 40)	Women (*n* = 61)	Men (*n* = 52)
Age, mean (SD)	43 (3.5)	45 (4.6)	41 (3.8)	45 (5.2)
Education[a,b]				
Elementary	2 (5)	1 (3)	1 (2)	3 (6)
Upper secondary	13 (31)	18 (45)	23 (38)	31 (60)
University	27 (64)	21 (53)	37 (61)	18 (35)
Main occupation				
Full-time work	25 (58)	38 (95)	32 (52)	49 (94)
Part-time work	15 (35)	2 (5)	23 (38)	2 (4)
Unemployed	1 (2)	0 (0)	1 (2)	0 (0)
Studying	1 (2)	0 (0)	3 (5)	0 (0)
Other	1 (2)	0 (0)	2 (3)	1 (2)
Same partner[c]				
Yes	40 (93)	36 (90)	53 (87)	44 (85)
No	3 (7)	4 (10)	8 (13)	8 (15)

Data are reported as *n* (%) unless otherwise indicated.

Participants' demographics have previously been reported (*Lampic et al., 2021*).

[a] Highest accomplished level.

[b] Missing data for one female oocyte recipient.

[c] Living with the same partner at the time of the study (child age 7 years) as at the donation treatment (i.e. a co-parent of the donor-conceived child).

the age of 18 years; see the Genetic Integrity Act SFS 2006:351 as described in *Stoll, 2008*). All recipients undergo a psychosocial evaluation with a counsellor and a physician to ensure that they understand the practical, psychosocial and legal aspects of the treatment and intend to share information about the donor conception with the resulting child. Initially, the legislation on identity-release donation applied only to heterosexual couples using donor insemination (1985) but this was later extended to include other recipient groups and types of donor conception: IVF treatment with donor oocytes and spermatozoa for heterosexual couples (2003), sperm donation for same-sex female couples (2005) and single women (2016), as well as embryo donation for heterosexual and same-sex female couples and single women (2019).

Participants

The present study is part of the prospective longitudinal Swedish Study on Gamete Donation (SSGD), where donors and recipients of donated gametes were recruited between 2005 and 2008 from all seven university hospitals providing gamete donation in Sweden. Eligibility criteria were being able to read Swedish and undergoing at least one round of treatment. A total of 309 (72%) recipients of donor oocytes and 255 (81%) heterosexual recipients of donor sperm were included in the SSGD.

The present study concerns a cohort from the fourth wave of data collection of the SSGD, when parents were approached in the year following the child's seventh birthday. Inclusion criteria were being part of a heterosexual couple and having given birth to a child following treatment with donor spermatozoa or oocytes. Couples who had conceived with gametes from a donor they knew were excluded. Questionnaires were distributed via mail together with a cover letter informing them of the purpose of the study, and a pre-stamped return envelope. Non-responders were sent two reminders, and responders received a gift voucher (approximately €10).

The study included a total of 196 participants: 83 parents following oocyte donation (response rate 56%), and 113 parents following sperm donation (response rate 65%). The 196 participants represented a total of 110 couples, where 86 couples were represented by both parents, and 24 couples were represented by one parent. The large majority of participants were living with the co-parent of the donor-conceived child. Participants' demographics have previously been reported (*Lampic et al., 2021*) and are presented in TABLE 1. Responders and non-responders at the fourth wave were compared with regard to disclosure intentions and behaviour assessment when the children were 1–4 years of age (*Isaksson et al., 2012*), and no significant group differences were found (data not shown).

Measures

Participants individually completed a questionnaire including sociodemographic characteristics, as well as validated instruments covering aspects of the parents' relationship quality and the psychological adjustment of the parents and their children.

Parents' psychological state

This was assessed using the Hospital Anxiety and Depression Scale (HADS) (*Zigmond and Snaith, 1983*) with two subscales assessing symptoms of depression and anxiety, respectively. Subscale scores range from 0 to 21, with higher scores indicating more severe symptoms. A subscale score of ≥8 was defined as indicating anxiety disorder and depression, respectively (*Bjelland et al., 2002*). The HADS is a reliable and

valid instrument for assessing symptom severity of depression and anxiety and has demonstrated good internal consistency and concurrent validity (*Bjelland et al., 2002*). In the present study, internal consistency was good for both depression (α = 0.77) and anxiety (α = 0.81).

Parents' relationship satisfaction

This was assessed using the ENRICH (Evaluating and Nurturing Relationship Issues, Communication, Happiness) marital inventory (*Fournier et al., 1983*; *Fowers & Olson, 1989*) including 10 subscales: Personality issues, Communication, Conflict resolution, Financial management, Leisure activities, Sexual relationship, Children and parenting, Family and friends, Egalitarian roles, and Conception of life. Each subscale yields a score ranging from 10 to 50, adding up to a total score varying between 100 and 500, with higher scores representing greater relationship satisfaction.

ENRICH is a reliable and valid instrument for assessing marital satisfaction and has demonstrated acceptable to excellent internal consistency (α = 0.69–0.97) and test–retest reliability (0.65–0.94) (*Fournier et al., 1983*). The Swedish version of the inventory has demonstrated acceptable reliability and validity (*Wadsby, 1998*). In the present study, internal consistency for the total score was excellent (α = 0.94).

Stress associated with parenting

This aspect was assessed using the Swedish Parenthood Stress Questionnaire (SPSQ) (*Östberg et al., 1997*), which is the Swedish version of the Parenting Stress Index, Form 6, Parent Domain (*Loyd and Abidin, 1985*). The SPSQ includes five subscales: Incompetence, Role restrictions, Social isolation, Spouse relationship problems and Health problems. A total score is computed as the mean of the five subscales, ranging from 1 to 5, with higher scores indicating more stress (*Östberg et al., 1997*). The SPSQ is a reliable and valid instrument and has demonstrated good internal consistency (α = 0.89) and test–retest reliability (0.89) (*Östberg and Hagekull, 2000*), as well as concurrent, construct, predictive and discriminant validity (*Östberg, 1998*; *Östberg et al., 1997*; *Östberg et al., 2007*). In the present study, internal consistency for the total score was good (α = 0.72).

Child's psychological adjustment

This was assessed using the Swedish version of the Strengths and Difficulties Questionnaire (SDQ-Swe) (*Goodman, 1997*; *Smedje et al., 1999*). It includes the subscales Emotional symptoms, Conduct problems, Hyperactivity/inattention, Peer relationship problems and Prosocial behaviour. A Total Difficulties score is computed as the sum of four of the subscales (omitting Prosocial behaviour), yielding a total score ranging from 0 to 40, with higher scores indicating greater difficulties. A score of ≥14 was defined as indicating a borderline or abnormal range of psychological problems (*Malmberg et al., 2003*; *Smedje et al., 1999*). The SDQ-Swe is a reliable and valid instrument for assessing emotional and behavioural problems among children aged 4–16 and has demonstrated an acceptable to good internal consistency (α = 0.84 and 0.76) (*Malmberg et al., 2003*; *Smedje et al., 1999*). In the present study, internal consistency was good (α = 0.80).

Parents' disclosure intention/ behaviour

Disclosure at the child's age of 7–8 years was assessed by asking parents if they had started talking with their child about being conceived with oocyte/sperm donation. Five response alternatives were provided and participants were categorized into 'Disclosers' (Yes, I have started talking about it) or 'Non-disclosers' (No, I intend to do it later on; No, I intend to do it if/when the child raises the question; No, I am uncertain/ hesitant; No, I will not tell the child about the donor conception).

Statistical analysis

A factorial analysis of variance (ANOVA) was conducted to compare the means of the outcome measures (ENRICH, HADS, SPSQ, SDQ-Swe) by the main effects of disclosure status (disclosing versus non-disclosing) and family type (sperm donation versus oocyte donation), as well as the interaction effect of disclosure status and family type, for mothers and fathers, separately. All analyses were performed using IBM SPSS, version 25 (IBM, USA). A *P*-value <0.05 was considered statistically significant.

Ethical approval

The Regional Ethical Review Board in Linköping, Sweden approved the study (M29/05, 2005-02-23; M29/05/1-06, 2006-02-14; 2013/299-31, 2013-08-07).

RESULTS

More than half of the participants following oocyte donation (61%, *n* = 50/82) and sperm donation (58%, *n* = 64/110) reported that they had talked with their child about their donor conception (data were missing for four participants). In terms of the outcome measures, a majority of the participants' scores were within the normal range on symptoms of anxiety (mothers 83%, fathers 89%) and depression (mothers 93%, fathers 92%). Similarly, most parents' assessments of their child's psychological adjustment were below the cut-off indicating emotional and behavioural problems (mothers 95%, fathers 91%).

Participants' scores on the HADS, ENRICH, SPSQ and SDQ-Swe were entered into a factorial ANOVA and are presented in TABLE 2. Separate analyses for mothers and fathers showed no main effect of disclosure or type of donation, i.e. there were no statistically significant differences between disclosers and non-disclosers and between families following oocyte and sperm donation with regard to parents' and children's psychological adjustment and parents' relationship quality. In addition, there were no statistically significant interaction effects of disclosure status and donation type.

DISCUSSION

The present study examined the relationship between disclosure and psychological outcomes in heterosexual-couple families with 7-year-old children following identity-release gamete donation. Overall, mothers and fathers in oocyte donation and sperm donation families were found to be well adjusted, reporting within-normal range levels of anxiety, depression and parental stress, and a high relationship quality. The children were well adjusted, with low levels of emotional and behavioural problems. Disclosing families did not differ from non-disclosing families in terms of the parents' relationship quality or the psychological adjustment among mothers, fathers or children. This indicates that early disclosure has neither detrimental nor beneficial consequences for the psychological well-being of families when the children are young.

The present results showing no significant group differences between disclosing and

TABLE 2 MOTHERS' AND FATHERS' PSYCHOLOGICAL ADJUSTMENT AND RELATIONSHIP QUALITY, AND CHILD'S PSYCHOLOGICAL ADJUSTMENT IN DISCLOSING COMPARED WITH NON-DISCLOSING FAMILIES

Outcome measure and donation type	Disclosing			Non-disclosing			Disclosure		Donation type	
	n	Mean	SD	*n*	Mean	SD	*F*[a]	*P*-value	*F*[a]	*P*-value
Mothers										
Parenting stress (SPSQ)[b]							2.83	0.096	0.674	0.414
Sperm donation	35	20.30	0.48	23	2.19	0.39				
Oocyte donation	27	2.28	0.50	13	2.05	0.46				
Anxiety (HADS-A)[c]							0.663	0.418	1.95	0.166
Sperm donation	35	5.37	3.81	24	4.92	2.84				
Oocyte donation	28	4.50	2.90	14	3.79	4.12				
Depression (HADS-D)[d]							1.03	0.314	0.016	0.899
Sperm donation	35	2.77	1.94	24	3.08	2.62				
Oocyte donation	28	3.57	3.38	14	2.14	2.32				
Relationship quality (ENRICH)[e]							0.015	0.902	0.228	0.634
Sperm donation	33	394	52.3	23	403	51.1				
Oocyte donation	25	403	47.5	13	395	69.0				
Child adjustment (SDQ-Swe)[f]							0.404	0.527	0.183	0.670
Sperm donation	35	6.57	4.88	24	5.33	4.43				
Oocyte donation	28	6.43	4.60	14	6.36	6.16				
Fathers										
Parenting stress (SPSQ)[b]							1.67	0.199	0.686	0.410
Sperm donation	27	2.25	0.47	22	2.06	0.42				
Oocyte donation	22	2.27	0.43	18	2.20	0.54				
Anxiety (HADS-A)[c]							2.50	0.118	0.992	0.322
Sperm donation	29	3.69	2.78	22	2.59	2.30				
Oocyte donation	21	4.33	3.32	17	3.29	4.22				
Depression (HADS-D)[d]							0.367	0.546	0.004	0.948
Sperm donation	29	3.62	3.75	22	2.50	2.48				
Oocyte donation	21	2.86	2.56	17	3.18	3.01				
Relationship quality (ENRICH)[e]							0.053	0.818	1.32	0.254
Sperm donation	23	395	48.4	21	416	44.3				
Oocyte donation	19	401	38.9	17	385	57.5				
Child adjustment (SDQ-Swe)[f]							0.003	0.957	1.22	0.272
Sperm donation	29	5.34	4.69	22	5.18	3.19				
Oocyte donation	22	6.27	4.92	18	6.33	4.65				

[a] The *F*-value (analysis of variance) is for the main effect of the factor, i.e. disclosure/non-disclosure, and donation type (oocyte donation/sperm donation).

[b] SPSQ (Swedish Parenthood Stress Questionnaire): scale from 1 to 5. Higher scores indicate higher stress.

[c,d] HADS-A; HADS-D (Hospital Anxiety and Depression Scale): scale from 0 to21. Scores ≥8 indicate anxiety disorders (A) and depression (D).

[e] ENRICH (Evaluating and Nurturing Relationship Issues, Communication, Happiness): scale from 100 to 500. Highers score indicate greater relationship satisfaction.

[f] SDQ-Swe (Strengths and Difficulties Questionnaire, Swedish version): scale from 0 to 40. Scores of 14–16 are borderline, and scores ≥17 indicate psychological disorder.

non-disclosing families are in line with the overall picture from previous findings showing no significant effect of disclosure on the well-being and functioning of sperm donation families (*Blake et al., 2014*; *Freeman and Golombok, 2012*; *Golombok et al., 2002*; *Golombok et al., 2011*; *Golombok et al., 2013*; *Ilioi et al., 2017*; *Kovacs et al., 2015*; *Lycett et al., 2004*). The current findings also add to the scarce research on disclosure in oocyte donation families, and confirm previous results that there are no significant differences between disclosing and non-disclosing families in terms of parents' psychological state (*Blake et al., 2014*), parent–child relationships and child adjustment (*Golombok et al., 2011*; *Golombok et al., 2013*; *Ilioi et al., 2017*); in addition, they contribute new knowledge indicating that disclosure is not related to the relationship satisfaction oocyte donation couples.

While previously reported results indicate more similarities than differences between disclosing and non-disclosing families, several studies have shown significant group differences in certain outcomes, most often indicating an

association between disclosure and more positive adjustment. One possible explanation for why the present study did not show any group differences in parents' psychological well-being is that non-disclosing parents in the present study differed from those in some previous studies regarding their stance on future disclosure. It is known from a previous wave of the SSGD (when the children were 1–4 years old) that almost all parents intended to talk with their child about the donor conception during their upbringing (*Isaksson et al., 2012*). Thus, it is conceivable that the parents in the present study who had not yet disclosed felt confident about their decision to delay disclosure until the child was older, reflected by a psychological well-being similar to that of disclosing parents.

In contrast, non-disclosing parents in other studies may have had more conflicted views of disclosure. Many of the previous studies comparing disclosing and non-disclosing families are based on couples who underwent donor conception more than 20 years ago, which may have impacted both on their disclosure decisions and on their psychological adjustment to (non) disclosure. Studies from Sweden and Finland have shown higher disclosure rates among heterosexual couples who were treated in the past two decades than during earlier periods (*Gottlieb et al., 2000*; *Isaksson et al., 2012*; *Sälevaara et al., 2013*; *Söderström-Anttila et al., 2010*). This coincides with the introduction of Swedish guidelines (*The National Board of Health and Welfare, 2004*) instructing clinicians to encourage their patients to share information of the donor conception with their children from an early age.

In addition, Swedish studies have reported support for disclosure and openness to the donor-conceived child regarding their genetic origin in the general population (*Svanberg et al., 2003*) and among child healthcare professionals (*Armuand et al., 2019*; *Armuand et al., 2020*), which may also reflect a change of societal attitudes towards greater openness about donor conception. As disclosure takes place in a social context, disclosure can be perceived as threatening if societal attitudes are unsupportive towards new family forms (*Macmillan, 2022*). Consequently, the present results may reflect that those parents who had not yet disclosed the donor conception to their child were not driven by threat.

Based on the present results, early disclosure has neither harmful nor beneficial consequences for the psychological well-being of heterosexual-couple families with donor-conceived children between 7 and 8 years of age. In addition, most participants were within the normal ranges on the psychological outcome measures, which is in line with previous research showing that families from gamete donation overall function well (*Golombok, 2020*). The lack of evidence for non-disclosure being harmful to the child has been used as an argument against the notion that disclosure is in the child's best interest (*Pennings, 2017*). While it is true that non-disclosure has not been associated with negative outcomes in families with relatively young children, this must be weighed against the potential negative consequences of delayed or accidental disclosure.

Delayed disclosure has been found to be challenging for parents (*Hargreaves and Daniels, 2007*) and was found to be associated with significantly less positive family functioning and psychological well-being in families with 14-year-old donor-conceived children (*Ilioi et al., 2017*). In line with this, a recent study found that donor-conceived individuals whose parents had told them about their donor conception in adolescence or young adulthood reported significantly more negative emotions associated with disclosure and lower satisfaction with the timing of disclosure compared with those who had known about their conception from an early age (*Lampic et al., 2022*).

Delaying disclosure may also lead to individuals finding out about their donor conception accidentally, which can have detrimental effects on their well-being (*Jadva et al., 2009*; *Turner and Coyle, 2000*). Considering the risks of accidental disclosure, increasing with the popularity of direct-to-consumer DNA tests (*Crawshaw, 2018*; *Harper et al., 2016*), parents should be informed that disclosing the nature of conception to offspring early on does not appear to be detrimental to the psychological wellbeing of either parents or their children.

The present results should be interpreted taking into account the methodological strengths and limitations of the study. The SSGD includes a population-based sample with high initial response rates, which reduces the risk of selection bias. In the present study, it should be taken into consideration that the response rate for oocyte donation couples and sperm donation couples was 56% and 65%, respectively, which limits the external validity. However, the prospective design of the SSGD allowed for an investigation of attrition bias, showing no significant differences between responders and non-responders in terms of disclosure intentions and behaviour assessed when the child was aged 1–4 years. Thus, it is unlikely that a drop-out of participants would have caused any systematic error, for example from a higher drop-out rate among participants who were less positive to disclosure. However, it is possible that completing repeated surveys as part of the SSGD made parents increasingly aware about disclosure issues.

While it is a strength that all outcomes were assessed using validated instruments, the parents' disclosure status was based on a study-specific item related to whether they had started to talk with their child about being conceived with oocyte/sperm donation. Previous research indicates that parents disclose in 'layers' (*Readings et al., 2011*), for example informing their child about the treatment but not about the donor gametes. Thus, it is possible that some participants were categorized as 'disclosers' despite not having informed their child about the specifics of having used gametes from a donor. Finally, the small sample sizes of the investigated subgroups (disclosing and non-disclosing mothers and fathers) limit the generalizability of the present findings.

CONCLUSIONS

The present results are in line with previous research indicating that the early disclosure of the donor conception to children is not associated with negative outcomes for the well-being of the parents or children. Therefore, heterosexual couples using oocyte or sperm donation should be informed that disclosure when the child is 7–8 years old is not detrimental to the psychological adjustment of families. In view of the increasing popularity of direct-to-consumer DNA testing, it is

important that parents with donor-conceived children are made aware of the potential risks of delayed or accidental disclosure.

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REFERENCES

Appleby, J.B., Blake, L., Freeman, T. **Is disclosure in the best interests of children conceived by donation? In Richards, M., Pennings, G. and Appleby, J.B. (eds) Reproductive donation: Practice, policy and bioethics.** Cambridge University Press, New York, NY 2012: 231–249. doi:10.1017/CBO9781139026390.013

Armuand, G., Skoog Svanberg, A., Lampic, C., Elenis, E., Sydsjö, G. **Attitudes among paediatric healthcare professionals in Sweden towards sperm donation to single women: a survey study.** Fertil. Res. Pract. 2020; 6: 9. doi:10.1186/s40738-020-00078-z

Armuand, G., Sydsjö, G., Skoog Svanberg, A., Lampic, C. **Attitudes towards embryo donation among healthcare professionals working in child healthcare: a survey study.** BMC Pediatr. 2019; 19: 209. doi:10.1186/s12887-019-1578-4

Beeson, D.R., Jennings, P.K., Kramer, W. **Offspring searching for their sperm donors: how family type shapes the process.** Human Reproduction 2011; 26: 2415–2424. doi:10.1093/humrep/der202

Bjelland, I., Dahl, A.A., Haug, T.T., Neckelmann, D. **The validity of the Hospital Anxiety and Depression Scale: An updated literature review.** Journal of Psychosomatic Research 2002; 52: 69–77. doi:10.1016/S0022-3999(01)00296-3

Blake, L., Casey, P., Readings, J., Jadva, V., Golombok, S. **Daddy ran out of tadpoles': how parents tell their children that they are donor conceived, and what their 7-year-olds understand.** Human Reproduction 2010; 25: 2527–2534. doi:10.1093/humrep/deq208

Blake, L., Jadva, V., Golombok, S. **Parent psychological adjustment, donor conception and disclosure: a follow-up over 10 years.** Human Reproduction 2014; 29: 2487–2496. doi:10.1093/humrep/deu231

Crawshaw, M. **Direct-to-consumer DNA testing: the fallout for individuals and their families unexpectedly learning of their donor conception origins.** Hum. Fertil. (Camb.) 2018; 21: 225–228. doi:10.1080/14647273.2017.1339127

Ethics Committee of the American Society for Reproductive Medicine. **Informing offspring of their conception by gamete or embryo donation: an Ethics Committee opinion.** Fertil. Steril. 2018; 109: 601–605. doi:10.1016/j.fertnstert.2018.01.001

Fournier, D.G., Olson, D.H., Druckman, J.M. **Assessing marital and premarital relationships: The PREPARE-ENRICH inventories.** Marriage and family assessment 1983; 54: 229–250

Fowers, B.J., Olson, D.H. **ENRICH marital inventory: A discriminant validity and cross-validation assessment [Empirical Study].** Journal of Marital and Family Therapy 1989; 15: 65–79. doi:10.1111/j.1752-0606.1989.tb00777.x

Freeman, T., Golombok, S. **Donor insemination: a follow-up study of disclosure decisions, family relationships and child adjustment at adolescence.** Reproductive Biomedicine Online 2012; 25: 193–203. doi:10.1016/j.rbmo.2012.03.009

Freeman, T., Zadeh, S., Smith, V., Golombok, S. **Disclosure of sperm donation: a comparison between solo mother and two-parent families with identifiable donors.** Reproductive Biomedicine Online 2016; 33: 592–600. doi:10.1016/j.rbmo.2016.08.004

Golombok, S. 2020 **We are family: The modern transformation of parents and children.** 1 ed. Scribe Publications

Golombok, S., Blake, L., Casey, P., Roman, G., Jadva, V. **Children born through reproductive donation: a longitudinal study of psychological adjustment.** Journal of Child Psychology and Psychiatry 2013; 54: 653–660. doi:10.1111/jcpp.12015

Golombok, S., Brewaeys, A., Giavazzi, M.T., Guerra, D., MacCallum, F., Rust, J. **The European study of assisted reproduction families: the transition to adolescence.** Human Reproduction 2002; 17: 830–840. doi:10.1093/humrep/17.3.830

Golombok, S., Readings, J., Blake, L., Casey, P., Mellish, L., Marks, A., Jadva, V. **Children Conceived by Gamete Donation: Psychological Adjustment and Mother-Child Relationships at Age 7.** Journal of Family Psychology 2011; 25: 230–239. doi:10.1037/a0022769

Goodman, R. **The Strengths and Difficulties Questionnaire: A Research Note.** Journal of child psychology and psychiatry 1997; 38: 581–586. doi:10.1111/j.1469-7610.1997.tb01545.x

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 https://www.ncbi.nlm.nih.gov/pubmed/10967013

Hargreaves, K., Daniels, K. **Parents dilemmas in sharing donor insemination conception stories with their children.** Children & Society 2007; 21: 420–431

Harper, J.C., Kennett, D., Reisel, D. **The end of donor anonymity: how genetic testing is likely to drive anonymous gamete donation out of business.** Hum. Reprod. 2016; 31: 1135–1140. doi:10.1093/humrep/dew065

Human Fertility and Embryology Authority. ***Code of Practice.*** London, 2019. https://portal.hfea.gov.uk/knowledge-base/read-the-code-of-practice/

Ilioi, E., Blake, L., Jadva, V., Roman, G., Golombok, S. **The role of age of disclosure of biological origins in the psychological wellbeing of adolescents conceived by reproductive donation: a longitudinal study from age 1 to age 14.** Journal of Child Psychology and Psychiatry 2017; 58: 315–324. doi:10.1111/jcpp.12667

Indekeu, A., Dierickx, K., Schotsmans, P., Daniels, K.R., 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. doi:10.1093/humupd/dmt018

Isaksson, S., Sydsjö, G., Skoog Svanberg, A., Lampic, C. **Disclosure behaviour and intentions among 111 couples following treatment with oocytes or sperm from identity-release donors: follow-up at offspring age 1–4 years.** Human reproduction (Oxford) 2012; 27: 2998–3007. doi:10.1093/humrep/des285

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. doi:10.1093/humrep/dep110

Kirkman-Brown, J., Calhaz-Jorge, C., Dancet, E.A.F., Lundin, K., Martins, M., Tilleman, K., Thorn, P., Vermeulen, N., Frith, L., Donation,

E.W.G.o.R. **Good practice recommendations for information provision for those involved in reproductive donation.** Hum. Reprod. Open 2022; 2022: hoac001. doi:10.1093/hropen/hoac001

Kovacs, G.T., Wise, S., Finch, S. **Keeping a child's donor sperm conception secret is not linked to family and child functioning during middle childhood: An Australian comparative study.** Australian & New Zealand journal of obstetrics & gynaecology 2015; 55: 390–396. doi:10.1111/ajo.12349

Lampic, C., Skoog Svanberg, A., Gudmundsson, J., Leandersson, P., Solensten, N.G., Thurin-Kjellberg, A., Wånggren, K., Sydsjö, G. **National survey of donor-conceived individuals who requested information about their sperm donor-experiences from 17 years of identity releases in Sweden.** Hum. Reprod. 2022; 37: 510–521. doi:10.1093/humrep/deab275

Lampic, C., Skoog Svanberg, A., Sorjonen, K., Sydsjö, G. **Understanding parents' intention to disclose the donor conception to their child by application of the theory of planned behaviour.** Human reproduction (Oxford) 2021; 36: 395–404. doi:10.1093/humrep/deaa299

Loyd, B.H., Abidin, R.R. **Revision of the parenting stress index.** Journal of Pediatric Psychology 1985; 10: 169–177. doi:10.1093/jpepsy/10.2.169

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.** Fertility and Sterility 2004; 82: 172–179. doi:10.1016/j.fertnstert.2003.11.039

Macmillan, C. **Openness in donor conception families.** BioSocieties 2022. doi:10.1057/s41292-021-00265-1

Malmberg, M., Rydell, A.-M., Smedje, H. **Validity of the Swedish version of the Strengths and Difficulties Questionnaire (SDQ-Swe).** Nordic Journal of Psychiatry 2003; 57: 357–363. doi:10.1080/08039480310002697

Pennings, G. **Disclosure of donor conception, age of disclosure and the well-being of donor offspring.** Human reproduction (Oxford) 2017; 32: 969–973. doi:10.1093/humrep/dex056

Readings, J., Blake, L., Casey, P., Jadva, V., Golombok, S. **Secrecy, disclosure and everything in-between: decisions of parents of children conceived by donor insemination, egg donation and surrogacy.** Reproductive Biomedicine Online 2011; 22: 485–495. doi:10.1016/j.rbmo.2011.01.014

Scheib, J.E., Riordan, M., Rubin, S. **Choosing identity-release sperm donors: the parents' perspective 13-18 years later.** Hum. Reprod. 2003; 18: 1115–1127 https://www.ncbi.nlm.nih.gov/pubmed/12721193

Smedje, H., Broman, J.E., Hetta, J., von Knorring, A.L. **Psychometric properties of a Swedish version of the "Strengths and Difficulties Questionnaire.** European child & adolescent psychiatry 1999; 8: 63–70. doi:10.1007/s007870050086

Stoll, J. 2008 **Swedish donor offspring and their legal right to information.** Uppsala universitet Uppsala: 2008

Svanberg, A.S., Lampic, C., Bergh, T., Lundkvist, O. **Public opinion regarding oocyte donation in Sweden.** Hum. Reprod. 2003; 18: 1107–1114 http://www.ncbi.nlm.nih.gov/pubmed/12721192

Sälevaara, M., Suikkari, A.M., Söderström-Anttila, V. **Attitudes and disclosure decisions of Finnish parents with children conceived using donor sperm.** Hum. Reprod. 2013; 28: 2746–2754. doi:10.1093/humrep/det313

Söderström-Anttila, V., Sälevaara, M., Suikkari, A.M. **Increasing openness in oocyte donation families regarding disclosure over 15 years.** Hum. Reprod. 2010; 25: 2535–2542. doi:10.1093/humrep/deq194

The National Board of Health and Welfare. Barnets rätt att få kännedom om sitt ursprung efter en assisterad befruktning med donerade ägg eller spermier. 2004. https://www.socialstyrelsen.se/globalassets/sharepoint-dokument/artikelkatalog/meddelandeblad/2004-1-1_200411.pdf (25 May 2022, date last accessed).

Turner, A.J., Coyle, A. **The identity experiences of adults conceived by donor insemination and the implications for counselling and therapy.** Human reproduction (Oxford) 2000; 15: 2041–2051. doi:10.1093/humrep/15.9.2041

Wadsby, M. **Evaluation of the Swedish version of the ENRICH Marital Inventory [Empirical Study].** Nordic Journal of Psychiatry 1998; 52: 379–387. doi:10.1080/08039489850139409

Widbom, A., Isaksson, S., Sydsjö, G., Skoog Svanberg, A., Lampic, C. **Positioning the donor in a new landscape-mothers' and fathers' experiences as their adult children obtained information about the identity-release sperm donor.** Hum. Reprod. 2021; 36: 2181–2188. doi:10.1093/humrep/deab146

Zigmond, A.S., Snaith, R.P. **The Hospital Anxiety and Depression Scale.** Acta psychiatrica Scandinavica 1983; 67: 361–370. doi:10.1111/j.1600-0447.1983.tb09716.x

Östberg, M. **Parental stress, psychosocial problems and responsiveness in help-seeking parents with small (2–45 months old) children.** Acta Pædiatrica 1998; 87: 69–76. doi:10.1111/j.1651-2227.1998.tb01389.x

Östberg, M., Hagekull, B. **A Structural Modeling Approach to the Understanding of Parenting Stress.** J. Clin. Child. Psychol. 2000; 29: 615–625. doi:10.1207/S15374424JCCP2904_13

Östberg, M., Hagekull, B., Hagelin, E. **Stability and prediction of parenting stress.** Infant and Child Development 2007; 16: 207–223. doi:10.1002/icd.516

Östberg, M., Hagekull, B., Wettergren, S. **A measure of parental stress in mothers with small children: dimensionality, stability and validity.** Scandinavian Journal of Psychology 1997; 38: 199–208. doi:10.1111/1467-9450.00028

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