Long-term outcomes of children conceived through egg donation and their parents: a review of the literature

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This review examines the literature on the long-term outcomes for children and parents in families created through egg donation, focusing on child psychological adjustment, parental psychological health, and parent-child relationship quality. Where possible, outcomes were examined according to family disclosure status (i.e., whether or not the parents intended to tell/had told the child about their method of conception). The small body of empirical literature indicates that children and parents function well throughout childhood and into early adolescence, although there appear to be subtle differences in mother-child relationship quality. None of the differences found in relationship quality indicate problems in the mother-child relationship and instead reflect differences within the normal range. (Fertil Steril® 2018;110:1187–93. ©2018 by American Society for Reproductive Medicine.)

Key Words: Assisted reproductive technologies, egg donation, gamete donation, parent-child relationship, child adjustment

Treatment with donor eggs is becoming an increasingly widely used method of family building for women who are unable to conceive using their own eggs (1, 2). Empirical research on families created using egg donation has focused largely on parents' disclosure decisions (3, 4) and choices about the type of donation to use (i.e., anonymous, known, or identity-release) (5–7). With the exception of two longitudinal investigations, few studies have examined family functioning in families created in this way, and far less is known about family functioning in egg donation families in comparison with those created through sperm donation.

This review will examine the existing literature on the long-term outcomes for children and parents in families created through egg donation, focusing on child psychological adjustment, parental psychological health, and parent-child relationship quality. Due to the limited number of studies, a systematic review was not possible.

CONCERNS ABOUT LONG-TERM OUTCOMES FOR FAMILIES CREATED USING EGG DONATION

Concerns about long-term outcomes for children and parents in egg donation families have typically focused on the lack of genetic connection between mothers and their children. These concerns have arisen partly from studies of adoptive and step-parent families, in which children lack a genetic connection with both or one parent, respectively. Large bodies of empirical evidence demonstrate that children in both family types show elevated rates of behavioral and emotional problems (8, 9). However, in both cases, these difficulties appear to be related to associated factors, such as preadoption experiences, family breakdown, or parental psychopathology, rather than the absence of a genetic connection per se (8–10).

Nevertheless, survey and interview data have consistently found that Euro-American heterosexual couples cite a preference for genetically related families (11, 12), with egg donation viewed by younger women as a last resort (13). Similarly, experiences of stigma related to nongenetic parenthood are common among new adoptive parents (14, 15) and may also be a concern for donor conception parents (16). Women have been found to perceive higher levels of stigma than men, suggesting that they may be more sensitive to assumptions and norms about the nuclear family (15). Parents raising egg donation children, and children

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themselves to some extent, thus often navigate family life in cultures dominated by family narratives of genetically related children and parents (17).

As egg donation parents are likely to have experienced an extended period of infertility and fertility treatment by the time they become parents, they are likely to be older when they have their first child than their naturally conceiving peers (18). Concerns have thus also been raised about the effect of advanced parental age, although the extent to which parental age affects family functioning remains unclear. While older parenthood does not appear to be a risk factor for poorer parental psychological health (19, 20) or early mother-child interaction quality (21), some studies cite concerns about reduced physical energy, experiences of stigma related to older parenthood, and lower social support (22–24).

EXISTING RESEARCH ON FAMILIES CREATED THROUGH EGG DONATION

Most empirical evidence on children's and parents' outcomes in egg donation families comes from two longitudinal studies, both of which used a multimethod, multi-informant approach. The European Study of Assisted Reproduction Families (in which children were born in the 1980s) assessed family functioning in a UK sample of families created through egg donation in comparison with sperm donation, IVF, and adoptive families when children were ages 3–8 and again at age 12 (25, 26). The study examined child adjustment, parental psychological health, and parent-child relationship quality using standardized questionnaires, interviews, and a child report measure of socioemotional development. The UK Longitudinal Study of Reproductive Donation Families examined family functioning in a UK cohort of gamete donation families with children born approximately 15 years later than those in the European Study. Children in the study were born in 2000, and family functioning was examined in a sample of egg donation families in comparison with sperm donation, surrogacy, and natural conception families when children were ages 1, 2, 3, 7, 10, and 14 years old (16, 27–31). Mothers, fathers, and (in the three later phases) children were administered standardized interview, questionnaire, and observational measures intended to assess child adjustment, parental psychological health, and parent-child relationship quality. Teacher report data of child adjustment were also collected. Studies with smaller samples using a range of methods have explored parental psychological health (32), parent-child relationship quality (33, 34), and child adjustment (35).

All of the above studies included samples of families who used anonymous or known donation. To date, only one study has examined parent-child relationship quality in families formed through identity-release egg donation (36), and thus less is known about outcomes for families formed through this type of egg donation.

A related issue is the extent to which children's and parents' outcomes are associated with parents' decisions about whether to disclose the use of egg donation to their child. The UK Longitudinal Study of Reproductive Donation Families examined this question across the study phases (e.g., 30, 37, 38), underpinned by the assumption that children's and parents' feelings about donor conception, and subsequently the consequences for family functioning, may change as children grow older and gain increasingly sophisticated understandings of genetic inheritance (39, 40).

EGG DONATION AND PARENTAL PSYCHOLOGICAL HEALTH

Both the European Study of Assisted Reproduction Families and the UK Longitudinal Study of Reproductive Donation Families found that egg donation parents were psychologically well-adjusted in terms of their levels of depression, anxiety, parenting stress, and couple relationship quality (16, 25–27).

Egg donation parents in the European Study of Assisted Reproduction Families reported lower levels of parenting stress compared with IVF and sperm donation parents when children were ages 3–8 years (25). Egg donation mothers reported greater relationship satisfaction than IVF and sperm donation mothers, but no group differences were found for mothers' depression or anxiety scores. Similarly, fathers' depression scores did not differ between family types, but egg donation fathers reported lower levels of anxiety than comparison groups (25). At age 12, no differences were found between family types in mothers' levels of depression, anxiety, or relationship satisfaction (26). However, egg donation mothers reported that their partners took significantly less of the parenting load than sperm donation or IVF mothers did and that they were less reliable in parenting support than sperm donation fathers. Data from fathers were not collected at this phase of the study.

The UK Longitudinal Study of Reproductive Donation Families found no differences between egg donation, sperm donation, and natural conception mothers or fathers in levels of parenting stress, depression, anxiety, or relationship satisfaction when children were age 1. At ages 2 and 3, no differences were found between family types for mothers or fathers on any of the psychological health measures (27, 28). When children were age 7, egg donation fathers reported higher levels of parenting distress than sperm donation fathers, but a similar level to natural conception fathers (41). No differences were found between groups for fathers' levels of depression or anxiety (41) or marital quality (42). When children were age 10, egg donation mothers did not differ in their scores for maternal distress (a factor score comprising depression, anxiety, and marital quality) compared with sperm donation or natural conception mothers (30), and fathers did not differ in their marital relationship quality (42).

A US-based study of 31 egg donation families with a child age 6 months to 5 years found that the sample scored lower than norms on conflict scores, and higher than norms on cohesion scores, on a measure of perceived family interactions (32), suggesting that egg donation parents had better perceptions of interpersonal relationships within the family than a normative sample.

PARENTAL PSYCHOLOGICAL HEALTH BY DISCLOSURE INTENTION/STATUS

Data from the first five phases of the UK Longitudinal Study of Reproductive Donation Families have been used to examine whether egg donation parents' psychological health differs according to their disclosure intentions/status. When the child was age 1, parenting stress was significantly lower among mothers who planned to tell their children about their donor conception, but no difference was found for fathers according to disclosure intention (37). Conversely, when the child was age 2, no differences were found in mothers' depression, anxiety, or parenting stress scores according to disclosure intentions, but fathers in nondisclosing families showed lower anxiety than those in disclosing families. When the child was age 3, there was no effect of disclosure intention on mothers' or fathers' psychological health outcomes.

By the time the child was 7, 39% of mothers had started telling their child about the use of egg donation. Mothers who had started the disclosure process had lower depression scores than those in nondisclosing families, and fathers in disclosing families had lower parenting stress levels than fathers in nondisclosing families. Similar patterns were found for anxiety when the child reached age10, with anxiety lowest in mothers in disclosing families and levels of depression lowest in fathers who had disclosed (37). Taken together, the findings suggest that, with the exception of the toddlerhood period, disclosure in egg donation families was associated with better psychological health outcomes for parents. It should be noted, however, that the researchers emphasized the exploratory nature of these findings due to the small sample size in later phases of the study and that the results do not speak to causation.

EGG DONATION AND CHILD ADJUSTMENT

The European Study of Assisted Reproduction Families found children conceived through egg donation to be well-adjusted in terms of their socioemotional development at ages 3–8 years (25) and at age 12 (26). Similarly, the UK Longitudinal Study of Reproductive Donation Families found egg donation children to be psychologically well-adjusted at all phases of the study (27–31). At age 2, child psychological adjustment was assessed using the Brief Infant-Toddler Social and Emotional Assessment (43, 44) and at subsequent phases by the Strengths and Difficulties Questionnaire (45), completed by mothers when the child was 3, and then by mothers and teachers at later phases. Regarding disclosure, children's adjustment scores did not differ at ages 3, 7, or 10 according to whether they had been told about the nature of their conception (30). The most recent phase of the study found no differences between family types in adolescents' positive psychological functioning or self-esteem (31).

A survey of 769 British parents with children ages 5–9 years conceived through egg donation, sperm donation, IVF, embryo donation, and surrogacy found that egg donation fathers rated their children as higher in conduct problems than sperm donation and IVF fathers, although the same was not found for mothers' reports, and scores were not elevated in comparison with norms (35). No group differences were found for parents' reports of child depression, anxiety, prosocial behavior, or peer problems (35).

PARENT-CHILD RELATIONSHIP QUALITY

The first longitudinal study of parent-child relationship quality in egg donation families focused on 14 French mother-infant pairs with infants born in 1988–90 and classified all mother-child relationships as excellent at 36 months (33, 34), although no details were provided as to how excellence was defined (16). Researcher-evaluated observations of the mother's body language, vocal dialogue, and intention to breastfeed were used as indications of relationship quality, although these observations were not analyzed using a standardized coding scheme (34).

A study with a larger sample of 85 egg donation families with infants assessed parent-infant relationship quality using an observational measure and a measure of parents' representations of the relationship (the Parent Development Interview; [46]) (36). In comparison with IVF families, egg donation mothers and infants were found to have less optimal scores on several of the scales assessing mother-infant interaction quality, although this difference was not found when mothers with twins were excluded from the sample, and scores in both groups indicated good interaction quality. No differences were found between family types in father-infant interaction quality. Mothers and fathers in both family types were found to be more similar than different in their representations of the parent-infant relationship. Mothers only differed on one variable, with egg donation mothers scoring lower on confidence in parenting than IVF mothers. This difference was no longer significant once maternal age was controlled for, suggesting that egg donation mothers' lower confidence was attributed to their older age rather than egg donation per se (36).

Using a standardized interview measure of parenting quality (47), the European Study of Assisted Reproduction Families found that egg donation mothers showed higher expressed warmth toward their 4- to 8-year-olds than sperm donation and adoptive mothers but also reported more severe mother-child disputes than adoptive mothers (25). The study found no differences between groups in mother-child interaction quality, mothers' emotional involvement with the child, father-child interaction quality, or fathers' contribution to parenting. When the child was age 12, egg donation mothers responded equally sensitively to their child's needs as IVF mothers, but less sensitively than sperm donation mothers, although all groups showed between average and above average sensitivity (26). Egg donation mothers were less likely to be emotionally overinvolved with their child compared with sperm donation mothers, and no differences were found between groups for mothers' expressed warmth toward their child (26).

Likewise, a consistently high quality of parenting has been found in egg donation families in the UK Longitudinal Study of Reproductive Donation Families across a range of measures (16, 27–31). At age 1, when quality of parenting was assessed using the standardized parenting interview,

differences that were found between egg donation, sperm donation, and natural conception families suggested more positive relationships in the two gamete donation family types (16). Egg donation mothers expressed greater enjoyment in motherhood and greater warmth toward their infant than natural conception mothers, and greater pleasure in proximity to the infant. Greater emotional involvement with the infant was found among gamete donation parents compared with natural conception parents, with egg donation fathers describing higher levels of emotional involvement than sperm donation fathers (16).

When children were age 2 (27), parent-child relationship quality was assessed using the Parent Development Interview (46). Gamete donation mothers showed a tendency toward more positive maternal feelings toward the child and a perception of the child as more vulnerable, and egg donation mothers were found to experience more joy in the relationship compared with sperm donation and natural conception mothers and lower levels of overprotectiveness than sperm donation mothers (27). With regard to fathers, no differences were found between family types (27). Similar patterns were found at the third phase of the study. Gamete donation mothers showed more expressed warmth than natural conception mothers, and egg donation mothers showed higher levels of mother-child interaction than both sperm donation and natural conception mothers (28).

Observational assessments of parent-child relationship quality were introduced at the fourth phase of the study (when children were age 7). No differences were found between family types for maternal negativity, although mother-child relationships were found to be less positive in gamete donation families than in natural conception families (29). Gamete donation mothers showed less optimal interaction quality, assessed using variables from the observational and interview measures. Similarly, comparisons between egg donation and sperm donation mothers and children found less positive mother-child interactions in egg donation families (48).

With regard to father-child relationships when the child was age 7, egg donation fathers did not differ from sperm donation or natural conception fathers in their warmth and involvement with the child or discipline or control of the child (41). The observational assessment of interaction quality found no differences between family types for all but one variable, with egg donation children showing lower levels of negativity (i.e., behaviors that negatively influenced the interaction) than sperm donation children (41).

At ages 7 and 10, children's perspectives on parent-child relationship quality were collected using the MacArthur Story Stem Battery (49) and a modification of the Child and Adolescent Functioning and Environment Schedule (50), a semi-structured interview designed to obtain children's perspectives on family relationships. Results from the MacArthur Story Stem Battery indicated that children in egg donation, sperm donation, and natural conception families viewed their parents similarly in terms of their affection, harshness, and anger, although representations of maternal caretaking were less common in egg donation children than in the other family types (51). No differences were found between groups at either age in children's interview ratings of maternal or paternal warmth and affection, availability, or amount of interests/activities shared with parents. Unlike in natural conception families, egg donation children did not report a decline in shared activities with their mothers and fathers between the two timepoints (51).

In adolescence, egg donation mothers and children were found to have poorer relationship quality than mothers and adolescents in sperm donation families when assessed using questionnaire measures of parental acceptance/rejection and family relationship problems (31). These differences were found in both mother and adolescent-completed questionnaires. However, no differences were found between egg donation and sperm donation families in the observational assessment of adolescent-mother interaction quality or mothers' interview assessment of quality of parenting. However, within the disclosing families, more positive family relationships were found for adolescents who had been told about their biological origins before age 7 (38).

CONCLUSIONS

The existing literature on long-term outcomes indicates that families created through egg donation function well in terms of child adjustment, parental psychological health, and parent-child relationship quality. There were some suggestions of subtle differences in mother-child relationship quality between egg donation families and other family types, although these were not found consistently across studies and measures and merit further investigation.

Longitudinal research shows that egg donation children do not differ in their psychological adjustment from children born either through other forms of assisted reproduction or through natural conception. At all timepoints egg donation children functioned as well as comparison groups when assessed on a range of measures of behavioral and socioemotional adjustment and in adolescence showed similar scores for self-esteem and positive psychological functioning. These findings were consistent across informants.

Egg donation parents were also consistently found to have good long-term psychological health and in most cases had similar scores to comparison groups. That egg donation parents showed few difficulties in psychological health is consistent with longitudinal studies of IVF parents (52, 53). It may be that egg donation parents are largely psychologically resilient as a group, and it has been suggested that this may be a characteristic of parents conceiving after fertility treatment (53). The limited number of analyses that looked at the relationship between parents' psychological health outcomes and disclosure intentions/status suggest that disclosure may be related to more positive psychological health outcomes for parents, although this finding remains tentative at present.

Very few differences were found in egg donation parents' levels of parenting stress in comparison with other family types. It has been suggested that couples who persist with fertility treatment despite failures may make up a group of self-selected individuals with strong coping skills (54, 55), who, as a consequence, may be less affected by the

everyday hassles of parenthood. That egg donation parents also showed a high quality of couple relationship quality is consistent with research into IVF couples' adaptation to parenthood (56).

With regard to the quality of parent-child relationships in egg donation families, researchers have consistently found a high quality of parenting and relationship quality across studies. Egg donation families have been found to be functioning well in comparison with sperm donation, natural conception, and IVF families when assessed using a range of interview, questionnaire, and observational assessments of relationship quality. There are, however, some suggestions of a pattern of subtle differences indicating less optimal relationship quality between egg donation mothers and their children when compared with genetically related dyads, as found during infancy (36), at age 7 (48), and in middle adolescence (31). The pattern was not found across all measures, and in some cases may be explained by the disclosure status of the family (29, 48).

Only one study in the review included families with twins, despite multiple births being a common outcome of egg donation treatment, particularly in the United States (1). The negative effects of parenting twins on maternal psychological health in early parenthood has been well documented (57), and this also merits further investigation.

The multimethod, multi-informant approach taken by the longitudinal studies is a particular strength. It has been suggested that some parents who found it difficult to conceive may feel that they have no right to complain about their role as parents, so a certain degree of positive self-reporting or idealization of parenthood may be present (54, 58). Thus, studies that include children and teachers as informants and observational assessments of relationship quality are particularly informative as it is more difficult for parents to present themselves in a socially desirable manner (59). Likewise, the inclusion of fathers in almost all of the studies provides a more thorough understanding of the family system. This is particularly important as fathers continue to be underrepresented in family-based research (60). All of the studies recruited their samples through fertility clinics or hospitals and as such are likely to be more representative of assisted reproduction families than studies recruiting through support groups or online registries (61).

In examining the empirical data on long-term outcomes for egg donation families it is worth noting that assisted reproduction families are considered a hard-to-reach sample due to the sensitive nature of the subject material and the existence of stigma related to infertility and nongenetic parenthood (12, 15). As a result, the sample sizes may be considered small in comparison with those found in developmental psychology with more "traditional" samples. On a related note, it is also possible that egg donation families who choose to take part in research may be those who are more prone to disclosure (4, 62), which may introduce an element of bias into the samples.

It is also worth noting that the way in which egg donation is practiced varies greatly between countries (63). For example, some countries only allow the use of identity-release egg donation (e.g., the UK, Finland), others only allow anonymous donation (e.g., Spain, Denmark), and in some countries both types of donation are practiced (e.g., the United States). Most of the findings included in this review came from UK samples where children had been conceived through anonymous donation, and to date no studies have compared outcomes for families created through anonymous donation versus known or identity-release donation. As a result, it is not known whether outcomes for parents and children differ according to the type of donation practiced. Furthermore, countries also vary in whether they have national donor registries, and it is not known the extent to which having access to centrally held egg donor information (or lack thereof) may affect children's outcomes in the future.

The samples included in the review are relatively homogenous in terms of their age, ethnicity, education, and socioeconomic status, and all were made up of two-parent heterosexual couple families. As such, the findings are limited in their generalizability to other sociocultural groups and family forms (e.g., families created through surrogacy with egg donation or lesbian women using eggs from their partner). With regard to the socioeconomic status of participants, the majority of patients using egg donation in the United States and UK have to fund their own treatment (2, 64), meaning that treatments are less accessible to patients with lower incomes. The samples included in this review could thus be considered reflective of consumers of assisted reproductive technologies (65).

Given the ongoing presence of stigma toward both nongenetic parenthood and older motherhood (14, 15, 23, 24), individuals considering egg donation treatment may raise concerns with their clinicians about forming their families in this way. Clinicians and mental health professionals may thus wish to use the current findings to provide reassurance to such individuals that long-term outcomes for children created through egg donation are largely positive and do not differ from those of children created through other means.

Taken together, this small body of empirical literature indicates that both children and parents in families created through egg donation function well throughout childhood and into early adolescence, although there appear to be subtle differences in mother-child relationship quality. It should be noted, however, that none of the group differences found in relationship quality indicated problems in the mother-child relationship. Instead, they reflected differences within the normal range.

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