

# A child of “hers”: older single mothers and their children conceived through IVF with both egg and sperm donation

Ruth Landau, Ph.D.,<sup>a</sup> Ruth Weissenberg, Ph.D.,<sup>b</sup> and Igaël Madgar, M.D.<sup>b</sup>

<sup>a</sup> Paul Baerwald School of Social Work and Social Welfare, Hebrew University of Jerusalem, Jerusalem; and <sup>b</sup> Andrology Unit, Sheba Medical Center, Tel Hashomer, Israel

**Objective:** To study the decision to have a child alone, the experience of gamete donation, the issue of disclosure of the donor link to the child, conception-related health and sociodemographic characteristics of the mothers, children's socioemotional development, and mother-child relationships.

**Design:** Qualitative study.

**Setting:** Prior clients of a sperm bank.

**Participant(s):** Eleven single women in their late forties who gave birth to children aided by IVF involving both egg and sperm donation, i.e., the children are not genetically related to the mothers.

**Result(s):** Not only were there differences among the participants, but they also differed from the only previous study focusing on single women becoming mothers by choice and using advanced reproductive technologies.

**Conclusion(s):** Similarly to previous studies, we generally found that the impact of assisted conception on parenting and child development gives no undue cause for concern while the children are still young. However, the young age of the children in our sample prevented us from answering many questions about the children's socioemotional development and about disclosure of donor conception to children born to older single women using double gamete donation and IVF. (*Fertil Steril*® 2008;90:576–83. ©2008 by American Society for Reproductive Medicine.)

**Key Words:** Egg donation, sperm donation, IVF, single mothers, Israel

Four reviews of research on assisted conception, concentrating on parenthood and the cognitive and socioemotional development of the children in these families, have been published in recent years (1–4). Susan Golombok and her colleagues at the Family and Child Psychological Research Center, City University of London, have contributed massively to the knowledge base in this area (5–11). In their comprehensive review, Golombok and MacCallum (3) distinguish among the various types of assisted conception families: in vitro fertilization (IVF) families, intracytoplasmic sperm injection (ICSI) families, donor insemination (DI) families, egg donation families, lesbian and single mother DI families, and surrogacy families. Although the difference between IVF and natural conception lies in the conception itself, Golombok and MacCallum (3) suggest that the stress of the IVF treatments makes having a child by IVF a different experience for parents. A further difference is the higher likelihood of multiple births, frequently accompanied by preterm births and low birth weight.

Research on DI families, mostly on younger children, so far does not suggest particular problems in parenting nor in psychologic problems in the children (3, 7), even though

there are some differences between IVF families and those where children conceived naturally. Only the Israeli study of Levy-Schiff et al. (12) explicitly found that children born through assisted conception have more emotional difficulties than naturally conceived children. However, they did not distinguish between IVF children with and without gamete donations and did not study single women who became mothers by choice.

Two major concerns in DI families are crystallizing (3). First, there is growing unease about the secrecy surrounding DI, because the families do not wish to disclose that the father is not genetically related to the child. Adoption research suggests that not knowing one's genetic origin or discovering under unfavorable circumstances that one's father is not one's genetic father may adversely affect the offspring later in life (3). Second, parents may feel or behave less positively toward a nongenetically related child, and this may have an undermining effect on the child's identity.

The concerns expressed about egg donation are similar to those raised by DI: lack of a genetic bond between mother and child and the secrecy surrounding this fact. However, the few studies on egg donation families (5, 7, 13) do not allow conclusions to be drawn about how this type of conception affects parent-child relationships and child development.

Golombok and MacCallum (3) point out that no comprehensive study has yet been carried out on the psychologic well-being of children born to single heterosexual mothers who used sperm donation and either artificial insemination

Received February 15, 2007; revised and accepted July 3, 2007.  
Supported by a grant from the Warburg Foundation, Hebrew University of Jerusalem.  
Reprint requests: Ruth Landau, Ph.D., Paul Baerwald School of Social Work and Social Welfare, Hebrew University of Jerusalem, Mount Scopus, Jerusalem, 91905, Israel (FAX: 972-3-6415918; E-mail: [mslanda@mscc.huji.ac.il](mailto:mslanda@mscc.huji.ac.il)).

or IVF. Golombok and MacCallum call such mothers “solo mothers,” possibly to distinguish them from single parent families following parental separation and divorce.

Solo mother families form a special group; the mothers do not necessarily experience infertility problems but use assisted conception technologies and raise their children from birth without a partner. Golombok and MacCallum report that the concerns with these families involve the effects of the children growing up fatherless and are based on research showing negative outcomes in cognitive, social, and emotional development for children raised by single mothers as a consequence of family separation. Golombok and MacCallum argue that the outcomes for single mother families due to divorce, where economic hardship and parental conflict can account for the unfavorable findings, cannot be generalized to children born to solo mother families (3). These children have not experienced parental separation and are generally raised without financial hardship.

In three studies with very small samples of solo mother DI families, the mothers’ main reason for choosing DI was the sense that time was running out for fulfilling their lifelong dream of having a child. They felt there was no choice but to have a child in this way due to the lack of a partner (3). In a more recent study, Murray and Golombok focused on solo DI mothers (14), on their psychologic well-being, and the quality of parent-child relationships. That study also examined the issue of disclosure of the DI to the child. Twenty-seven solo mother DI families were compared with 50 married DI families. Solo mothers showed lower levels of sensitivity toward their infant than married mothers. They were more open toward disclosing the donor conception to the child than were married DI mothers (14).

In the follow-up to that study, when the children were age 2, and using somewhat smaller samples, children of solo mothers exhibited fewer emotional and behavioral difficulties than those of married DI mothers (15). Because the children were still infants, Murray and Golombok noted that it would be some time before the children’s feelings can be examined about never knowing the man who was their sperm donor.

The solo mothers were a group of college-educated women in their late thirties, all financially secure professionals. They did not resemble the poorer working-class single mothers in previous studies who became mothers as a result of sexual intercourse. Similar characteristics were shown by single mothers in another qualitative study of ten women who chose to become single mothers in their late thirties and early forties; six participants had their child by natural childbirth, and four adopted children (16).

The research on parenting and mother-child relationships in solo mother DI families is hampered by the small samples (14). Moreover, Buck et al. (17) have noted that various research hurdles complicate the analysis of assisted conception treatments and consequent outcomes. Although Buck and his colleagues focused more on issues arising from the medical

treatments, their assertions also apply to other aspects of assisted conception. For example, Murray and Golombok (14, 15) focus on solo mothers with singletons, probably for reasons of clarity. However, children born with the aid of donor sperm may be the result of both insemination and IVF. According to a world collaborative report on IVF in 2000 by Adamson et al. (18), the chance to give birth to twins in IVF-aided pregnancies was 27%. Although in countries where single embryo transfer is encouraged the IVF twin rate is much lower, the representation of the reality may become complicated because there can be solo mothers who have to face the situation of raising twins alone.

No studies have examined single women in their forties who bore children conceived through both sperm and egg donation and IVF. Nor is there any research on the effect of egg and sperm donation among married couples. At least in Israel, the case of egg and sperm donation for a woman using sperm from a sperm bank is unique in that both donations must be anonymous. That is, the two gamete donors are unknown to each other, to the recipient, and to the resulting offspring.

As with embryo donation, which is legally prohibited in Israel, the resulting offspring is genetically unrelated to the birthing mother. This lack of genetic relationship between mother and child in egg and sperm donation resembles adoption. Indeed, Bartholet (19) views offspring created by egg and sperm donation as a technologic form of adoption. Adopted children and those conceived through egg and sperm donation are both wanted by the parents who raise them. However, in egg and sperm donation the experience of pregnancy and birth by the woman creates a ‘natural’ looking situation, enabling secrecy about the child’s genetic parents. A further difference is that in adoption the rights and responsibilities of becoming a parent come through legal rather than biologic channels.

The present analysis is part of a larger study on the health and psychologic well-being of children born to formally single DI mothers. Our questionnaire included the question of whether the responding women had also been aided by egg donation. Eleven women shared with us that they bore a child following both sperm and egg donation and IVF. For the sake of precision, because our sample comprises ten solo mothers and one respondent with a female partner, we use the term “single mother.” We present results from eleven families in which formally single women in their late forties gave birth to and are raising children who are not genetically related to them.

## METHODS

### Participants and Procedure

The eleven single mothers with children conceived through both sperm and egg donation and IVF were recruited through one sperm bank in Israel. In Israel, single women have access to both donor insemination and IVF. The Health Funds are required to fund fertility treatments of all types to all women up to 51 up to the birth of two living children. Despite the growth in the number of births resulting from various forms of

medically assisted conception, neither the Israeli Ministry of Health nor any other Israeli institution tracks data on births assisted by new biotechnologies. Some information regarding Israeli single women seeking gamete donation can be found in Weissenberg et al. (21).

In the present study, single women using the services of the sperm bank in the last 9 years were contacted by telephone by one of the researchers, told about the research and asked whether they would agree to receive a letter asking for their written consent to participate in the research. We were able to contact about 100 single mother families. A large majority of these were willing to participate in the research. After signed written consents were returned, we made appointments for personal meetings. The study was approved by the Institutional Review Board of the medical center in which the sperm bank is located.

The sperm bank records show that, since its inception 9 years before, frozen sperm was provided to 109 single women who were also in need of egg donation. The average age of these women was 45.88 (range 33–53) years. Thirty-six of them achieved pregnancy, 14 finally bore living children, and six produced twins. The present analysis presents data from 11 of the 14 women who became single mothers with sperm and egg donation and IVF.

Most women were interviewed in their homes, the interviews lasting between 1 and 3 hours. The mothers were asked to answer a structured questionnaire that contained both open-ended questions and closed-ended scales. All information generated in the encounter between the mother and interviewer was documented, and an interpretive summary of each interview that included the interviewer's personal impressions was produced within 1 day. The interviews were conducted by the two principal researchers and by one psychology and one social work graduate student who were carefully instructed on how to collect the data and debriefed after the interviews.

## MEASURES

### Demographic and Social Variables

Demographic and social questions about mother and child were: current family status (1-single, 2-married, 3-divorced, 4-widowed); age at giving birth; religion (1-secular, 2-traditional, 3-orthodox, 4-ultraorthodox); type of community (1-city; 2-village; 3-kibbutz); current living arrangement (1-alone with the child/children, 2-with a partner, 3-other); education (1-partial high school; 2-high school; 3-bachelor's degree; 4-master's degree or doctorate); type of work/employment; and the number of hours working per week.

### Conception-Related and Health Variables

These variables included: types of fertility treatments (1-sperm insemination, 2-IVF); type of birth (1-spontaneous, 2-cesarean, 3-other); number of children born after first birth with assisted conception (1-one, 2-two, 3-three or more);

child's/children's current age; child's/children's sex (1-male; 2-female); child's/children's birth weight (1-less than 1500 g, 2-1501–1999 g; 3- $\geq$ 2000 g); mother's physical health (1-poor to 10-excellent); child/children's physical health (1-poor to 10-excellent); and description of child's handicap and developmental problems, if any. Interviews with mothers of twins were conducted separately for each child.

### Children's Socioemotional Development and Mother-Child Relationships

Following Golombok et al. (22), children's socioemotional development and mother-child relationships were assessed by an interview with the mother using the Child and Adolescent Functioning and Environment Schedule (23). The child's adjustment in kindergarten or school and with peers was assessed using the following ratings: 1) interest/effort in school/kindergarten on a 4-point scale from 1-no interest/effort to 4-above average interest/effort and the extent to which the child maintained effort and interest in the educational setting; 2) worries/difficulties with teachers on a 4-point scale from 1-none to 4-major difficulties; e) the child's relationships with peers on the same scale as worries/difficulties with teachers: from 1-none to 4-major difficulties. The latter question assesses issues of not having friends or of being bullied. After Golombok et al. (6), the measures also included the Conflict Tactics Scale (24). This questionnaire showed high internal consistency (0.64–0.99). We also asked our respondents to assess the satisfaction they gained from parenthood (1-very low to 10-very high).

### Disclosure of Donor Conception

Current regulations in Israel require full anonymity of the gamete donor. We therefore used semistructured open questions on the mother's attitude to revealing the truth to the child about his/her conception. Based on research in the field (25–30), we asked a series of questions about the disclosure of donor conception. In this paper we focus on the following: 1) Do the sperm and egg donation cause the mother concern; 2) would she like to know the identity of the sperm donor; 3) would she like her child or children to know the identity of the sperm donor; 4) did she share with her child or children the circumstances of conception with the aid of sperm and egg donation; and 5) does she intend to share this information with the child or children in the future?

## FINDINGS

Considering the small size of the sample of single mothers here who gave birth after egg and sperm donation and IVF, the data are purely descriptive.

### Sociodemographic Data

Eleven single women gave birth to 14 children with the aid of both sperm and egg donations and IVF. For ten of the eleven

women this was their first birth. Seven of the women gave birth to one child, three women bore twins, and one woman gave birth to a singleton after a natural birth 10 years before. Ten of the women were never married, and one of them was divorced for many years without children. Their average age at the birth of the children was 46 (range 36–50) years. Seven of the single mothers were secular, three traditional, and one religious. All lived in cities, seven alone with their singletons, one woman with her child and female partner, one alone with her twins, one with her twins and their grandmother, and one with her twins and an au pair. Two of the women had only a high school education, six had bachelors' degrees, and three had masters' degrees. All but one of the mothers worked; only one of them worked part time, and the other nine worked over 40 hours per week. Seven of the women were professionals, and three fulfilled secretarial functions. The children of all ten working mothers were in day care, kindergarten, or school.

### **Conception-Related and Health Variables**

The IVF needed with both sperm and egg donation was not in all cases the mother's first choice of assisted conception. Some of the women first tried to become mothers using artificial insemination of a sperm donation. The number of assisted conception treatment cycles varied, with one woman reporting nine cycles of donor insemination followed by nine cycles of IVF. The range of IVF cycles varied from 1 to 17 cycles. Nine of the women had a cesarian birth. Eight of the newborns were female and six were male. At the time of the interview, eight children were younger than 2 years, three children were between 2 and 4 years, and only three were older than 4 years. Two pairs of twins were younger than 2, and one pair was between 2 and 4 years. One child in each of two pairs of twins was born with a weight of less than 2000 g. Assessing their children's current physical health on a scale of 1 to 10, mothers rated eleven of the children as having excellent health (10). One mother of twins rated the health of both children as 5, bringing the average down to 9. Note that at the time of the study none of the mothers reported any handicaps or developmental issues. The average reported physical health of the mothers was 8.

### **Children's Socioemotional Development and Mother-Child Relationship**

According to the mothers' reports, all of the children showed high interest in day care, kindergarten, or school and functioned according to their age. Only three of the eleven mothers reported minor emotional or behavioral difficulties: three children who were born as twins (one pair and one twin child) had minor attention-related difficulties, and one singleton child had minor emotional difficulties that somewhat affected the family's leisure time. The responses to the Conflict Tactics Scale revealed that the mothers of twins found it more difficult to cope with conflict situations. The mothers of singletons reported relatively calm discussions with the child as a way to resolve conflict situations. All mothers reported the

highest level of satisfaction with parenthood (10 on a scale of 1 to 10).

### **The Decision to Have a Child Alone and the Experience of Gamete Donation**

In contrast to the women studied by Murray and Golombok (14), for the present sample of women time had already run out and DI only was not enough. Owing to their age, it was necessary to use egg donation as well as sperm donation and IVF to fulfill their desire for motherhood. The reasons for having children with gamete donations were: the wish not to have a child from casual sex or to deceive a man, a wish to avoid potential health risks, and the desire to have a child without the involvement of a male partner. One of the women justified her choice of using donor sperm as follows:

Since I was unable to find the right partner to share my life with, I preferred to be aided by a sperm donor. I knew that the sperm bank provides full information about the donor's looks, character, and health, and this is important for me.

Nine of the women reached their decision after they realized that, being single, this was the only way for them to become mothers. One mother shared with us:

I reached the age when I did not have anybody and I felt very sad that I was unable to raise a family. Then I made the decision to use gamete donation. At the beginning it seemed to me that the use of gamete donation is a very cold way to bring a child to this world, but during the years in which I underwent the fertility treatments it ceased to bother me. My parents did not support my decision to become a mother at my age, but now they are in favor of it and have helped me a lot through the pregnancy and after the birth.

One woman mentioned that since she is religious this was the only legitimate way for her to become pregnant. She was hinting that as a single observant woman she could not have sexual relationships with a man to become pregnant. The only woman who gave birth to a second child using egg and sperm donation with IVF reported that her decision arose from her wish to "be a family." Considering that the father of her first naturally born child did not acknowledge his fatherhood and is not in contact with the child, and that she comes from a large family, she felt that she had to give a sibling to her only child. Some of the women also said that they felt that it would be better for their children to have no father at all than to have a "partial" father, as when the relationship between the father and mother is compromised. One of the women expressed herself as follows:

Since I did not find (unfortunately for me) someone with whom I can share my life and I still wanted to raise a family, I thought it would be right to give birth to children alone. This way, I will be the only person responsible for them and can raise them according to my best judgment. There is nobody in the background with whom it is necessary to negotiate the way the children should be raised, despite the fact that

we do not want to live together. I had a few offers for joint parenthood but I decided to turn them down. I decided to do it by myself.

Another 49-year-old woman, the mother of a 1-year-old child, said:

The important decisions in my life did not take me a lot of time to make. I always wanted to have at least one child. I love children very much. When my uncle died 3 years ago and I inherited some money, I decided to use this money for fertility treatments and to live on it for as long as it lasts.

This mother was the only one to express her feelings that perhaps she should have adopted. She felt that adoption was probably a more moral solution, but then she added that being an older single woman meant that she had to opt for international adoption, costing her at least US\$30,000, whereas the purchase of egg and sperm donation had cost her only one-tenth of that sum.

One of the single mothers in the sample made her choice as a result of having a female partner. She was the only woman in the sample to have a partner to share her parental duties with. All of the other ten women, despite their wishes for a partner, had not found one, and at the time of the data collection the family status of all respondents had remained the same.

### **Disclosure of Donor Conception**

Some of the women told us that before giving birth they had not really thought about the significance of the child being conceived using gamete donation; all they wanted was to get pregnant. But eight of the women were now concerned. Only three women did not find this issue central. Those who were worried listed the following concerns: 1) Is the sperm donor physically and mentally healthy? What is his family's health history? 2) How many unknown living siblings have been conceived with the aid of the same sperm donor? What is the chance of incest due to lack of knowledge of the child's genetic origin? And 3) What will be the child's emotional reaction to the revelation that s/he was conceived using an anonymous sperm donation? Will the child blame the mother for the circumstances of its conception as it grows older? One mother said:

I am very much concerned that my daughter is being raised in a small family with only a mother. I am worried she will be angry at me that I don't know the identity of her father. My relationship with my own family was not good; I was angry at my parents for many reasons. Now I am afraid my daughter will be cross with me, despite the fact that I am a different mother than my mother was.

Five of the single mothers would prefer to know the donor's identity whereas five others preferred not to know it. Arguments for having access to information about the sperm donor's identity were: sheer curiosity, the wish to provide the child with more information about his or her father,

the wish that there would be no secrets in the child's life, and access to genetic information for health reasons only. A mother of a child older than 4 years said:

I am concerned about the health of the sperm donor. This could be significant for the future of my child. I hope that the sperm bank keeps this information, particularly information regarding genetic diseases.

None of the three women who gave birth to twins wanted to know the sperm donor's identity. A mother of twins elaborated:

A while ago one of the twins called me: "Mother-Father." It is my impression that my children enjoy what exists [a mother] and not what is lacking in their lives [a father].

When asked whether they would like the child to have access to information about the sperm donor's identity at age 18, three mothers favored their children having access to the information, three were against it, and five said they are not sure. Those in favor of access thought it would give their child some peace of mind, particularly regarding the fear of possible marriage between siblings. The mothers who did not want their children to have access to information about their fathers said, among other things, that the information at the age of 18 would just confuse the child and that it is preferable for the child not to have any fantasies regarding the identity of his or her father. One of the mothers said:

Since he has no contact with my children and does not have any part in their lives, and as he leads his own life apart from them, I see no reason why they should meet him at the age of 18 and even develop any expectations in this context.

Of the mothers who were ambivalent as to whether their children should know their father's identity, one said that she is afraid that the children would suffer if the father were to reject them. This mother added that she does not see the sperm donor as a father and in her view the sperm donation does not make him one. None of the mothers had shared with their children that they were conceived using donor sperm at the time of data collection, the majority claiming that the child or children are still too young. However, all respondents intend to eventually share this fact with their children.

We asked the mothers whether the fact that they also needed egg donation concerned them. Six women raised concerns similar to those voiced about sperm donation. These mothers were primarily concerned about potential genetic/health problems of the donor and issues stemming from the possibility that the child has many unknown siblings, thus increasing the chance of incest. One of the mothers said:

Nowadays there are many children born following egg donation. I don't know how many half-brothers and half-sisters my daughter has. Perhaps she will accidentally meet them? It would be good to know whether there are diseases in the family [of the donors] that I have to take into account, and perhaps to run some medical tests ...

None of the mothers had shared the information about the egg donation with their child/children.

## DISCUSSION

This study provides a glimpse into the lives of eleven single Israeli women who gave birth, at the average age of 46 years, after both egg and sperm donation and IVF. All women interviewed here invested considerable energy, time, and money to achieve pregnancy, birth, and motherhood. While all of them expressed great pleasure in their role as mothers, the data reveal many differences both among the women themselves and compared with U.K. single mothers who chose to use DI (14, 15). In those studies, the offspring were the genetic children of their mothers. Here, the children are genetically unrelated to their mothers.

The legal situation in Israel prevents these children from ever knowing who their genetic mother and father are. Nor will the birth mothers have access to this information, even though they may wish it for their children. Similarly, the gamete donors will never know the identity of the other genetic parent of the child nor the identity of the birth mother raising the child.

Another significant difference between the single mothers in the Murray and Golombok (14) sample and the present study is the average age of mothers at childbirth: The mothers here are on average 8 years older. This appears to affect the social support available for these single mothers from their parents, siblings, and friends. The much greater age gap between these mothers and their children raises the question of whether they can continue fulfilling their maternal role as the years pass. This question becomes even more critical when considering that these older single parents may eventually have to care for their young children and frail parents at the same time.

This double burden may be even more problematic, not only because of age-related chronic diseases but also because combinations of relatively minor conditions may make these older mothers themselves dependent while their children are still dependent on them (31). Other significant disadvantages of being an older parent are that older parents are less energetic and may forget what it is like to be young and lose the ability to empathize with their children (32). They are also less likely to live to see their children to achieve adulthood. Early loss of the only parent a child has and knows is a psychologic risk for the child's future (33). Although the mothers' fear of morbidity and mortality was not explicitly raised in the interviews, the mothers' need to move closer to their family of origin and extended family seems to reflect their way of coping with these concerns.

A third marked difference from the U.K. sample is that in the Israeli sample all except one of the single mothers worked full time; only 22% of the single mothers were working full time in the U.K. sample. The Israeli mothers must meet the requirements of both their role as a single mother and as a full-time worker. These mothers therefore depended quite

extensively on both their extended families and paid help, in addition to day care, kindergarten, or school. Except for one lesbian mother, none of these single mothers had partners to share with the chores of raising their children.

No differences were found in the education and occupations of women in the study here and in the U.K. sample.

We were somewhat surprised that one woman among our sample already was a mother and yet still chose to undergo the complicated assisted conception procedures to have a second child genetically unrelated to her and her first child. She did this purely to create a family for her first child. This case reflects the individual variation in the uses and significance of gamete donation and of motherhood for women (27).

Most studies on the sociopsychologic outcomes of children born through assisted conception have examined singletons. In the present study, despite the complexity of their conception, all the singletons were in excellent health and their everyday functioning was good, according to the mothers' reports (15). Note, though, that with most of the children in this sample being less than 4 years old, we can draw only limited conclusions about the children's physical health and development.

In the present sample, three of the eleven mothers gave birth to twins. Two experienced difficulties in coping alone with raising two children. One of these mothers moved to live with her elderly mother, and the other was assisted by an au pair. Two of the children were born prematurely and with low birth weight, and the health of one pair of twins was rated as 5 (out of 1–10). The latter results recall similar findings on neonatal outcomes of pregnancies conceived by IVF (34).

Our data are consistent with studies finding a difference between raising singletons or twins. Olivennes et al. (9) found that the mothers of twins showed significantly higher levels of parenting stress, but the twins did not appear to have more emotional problems than singletons. The data in the present study indicate that twins born to single women with the aid of gamete donation are more prone to have emotional difficulties and that it is more difficult for their mothers to cope with situations where conflicts occur. Accordingly, it seems that the challenge of having to raise twins is even greater for older working single women, who alone must assume all the tasks and responsibilities of parenthood.

The women in the present study were determined to achieve motherhood at all costs, as van den Akker also found (20). When they had to make a choice, pragmatic factors played a role in their decision-making process. They went from donor insemination to IVF to egg donation, frequently one cycle of treatment after the other, with all the physical, emotional, and economic difficulties involved, including cesarian childbirth. Despite their pragmatic approach toward the conception of their children, these mothers are not indifferent to the lack of genetic relationship with them. Although none of them had told the children about the sperm donation,

all of them planned to do this eventually. As Murray and Golombok (14) argue, the absence of a father increases the likelihood of the child asking questions about its conception. However, although the mothers thought and were concerned about the donors and their families, about their identity and health, it is quite unclear whether they will be willing to tell their children about the egg donation.

In the Golombok, Lycett, et al. (7) study, married mothers whose children were conceived by anonymous egg donation were more likely to think about the donation than DI mothers. However, they were no more likely to talk about the donor to their partner, possibly because the subject is perceived as a taboo. In a follow-up study 1 year later, the research team concluded that egg donation mothers were generally happier and DI mothers were more concerned (35). Considering that the mothers participating in the U.K. study were married, it is possible that the egg donation mothers were glad that they could give birth to the genetic child of their husband. In contrast, the DI mothers, who bore their own genetic child but needed sperm donation, were concerned about the emotional well-being of their partner raising a child not genetically related to him.

Can gamete donations be compared with adoption? Comparing criteria for embryo donation and adoption, Widdows and MacCallum (36) found what they regard as an unjustified disparity in selecting parents for the two processes. Social factors dominate in selecting parents for adoption, although medical criteria dominate in embryo donation. The criteria for mothers to receive double gamete donation discussed in that study are similar to those used in the U.K. for embryo donation. That is, before adoption the social and emotional suitability of the future parents is carefully examined; whereas women opting for motherhood by assisted conception must only be medically fit to become pregnant. As one of the mothers in the present sample noted, cost also plays a role in women's choices whether to adopt or to use assisted conception. The cost of adopting a child in Israel can be ten times higher than that of assisted conception.

However, the principal difference between double gamete donation and adoption is the gestational relationship of the mother to the child. The gestational link is emotionally significant for the woman, allowing her to feel that the child is "hers" and that she is a "normal" mother who conceived "naturally." The women in the sample here went to extreme lengths with the aid of technologic advances to create a family resembling a "normal" genetically related family. The child also benefits from the additional bond of being gestated in its future mother's womb (36).

Bearing the child herself also allows a mother to keep the donation secret. Mothers receiving double gamete donation hide the lack of genetic relationship from the offspring and also from friends and family (20). Double gamete donation and IVF is unusual in Israel, even though the pronatalist approach in this country encourages women of any family status and age to become mothers. It probably would take a lot of courage for such a single mother to share with her offspring

all that she did to become a mother and it is unclear what narrative of the conception would be told to the offspring.

The psychologic implications for offspring of DI single mothers of growing up fatherless and without access to genetic information about their fathers remain unclear (14). The implications are similarly unclear for the children of older single mothers, who show no resemblance to anybody in their families and who will never have access to information about their genetic mothers and fathers. Given the current young age of the children, we cannot yet determine whether these families will encounter difficulties in the future. We do not know how the children will feel about growing up in a small family, mostly consisting of the mother and the child, or sometimes of a mother and twins, with a very large age gap between the mother and child and with the mother aging.

As with other studies, our findings suggest that the impact of assisted reproduction on parenting and child development does not give undue cause for concern. However, in the case of children born to older single women through egg and sperm donation and IVF, the complexity and the number of means used to achieve parenthood raise a number of as yet unanswered questions. Although it will not be easy to conduct studies on these children, because consent of their mothers is necessary, such studies are important to shed light on the actual outcomes for children growing up with their older mothers who are not genetically related to them. Carefully designed studies on this population are particularly important to minimize socially desirable responses by the mothers who may have high expectations of themselves as parents (7).

## REFERENCES

1. Brewaeys A. Review: parent-child relationships and child development in donor insemination families. *Hum Reprod Update* 2001;7:38–46.
2. Colpin H. Parenting and psychosocial development of IVF children: review of the research literature. *Dev Rev* 2002;22:644–73.
3. Golombok S, MacCallum F. Practitioner review: outcomes for parents and children following nontraditional conception: what do clinicians need to know? *J Child Psychol Psychiatry* 2003;44:303–15.
4. Hahn CS. Review: psychosocial well-being of parents and their children born after assisted reproduction. *J Pediatr Psychol* 2002;26:525–38.
5. Golombok S, Murray C, Brinsden P, Abdalla H. Social versus biological parenting: family functioning and the socioemotional development of children conceived by egg and sperm donation. *J Child Psychol Psychiatry* 1999;40:519–27.
6. Golombok S, Brewaeys A, Glavazzi MT, Guerra D, MacCallum F, Rust J. The European study of assisted reproduction families; the transition to adolescence. *Hum Reprod* 2002;17:830–40.
7. Golombok S, Lycett E, MacCallum F, Jadva V, Murray C, Rust J, et al. Parenting infants conceived by gamete donation. *J Fam Psychol* 2004;18:443–52.
8. MacCallum F, Golombok S. Children raised in fatherless families from infancy: a follow up of children of lesbian and single heterosexual mothers at early adolescence. *J Child Psychol Psychiatry* 2004;45:1407–19.
9. Olivennes F, Golombok S, Ramogida C, Rust J. Behavioral and cognitive as well as family functioning of twins conceived by assisted reproduction: findings from a large population study. *Fertil Steril* 2005;84:725–33.

10. Golombok S, MacCallum F, Murray C, Lycett E, Jadva V. Surrogacy families: parental functioning, parent-child relationships and children's psychological development at age 2. *J Child Psychol Psychiatry* 2006;47:213–22.
11. Murray C, MacCallum F, Golombok S. Egg donation parents and their children: follow up at age 12 years. *Fertil Steril* 2006;85:610–8.
12. Levy-Schiff R, Vakil E, Dimitrovsky L, Abramovitz M, Shahar N, Har-Even D, et al. Medical, cognitive, emotional and behavioral outcomes in school-age children conceived by in-vitro fertilization. *J Clin Child Psychol* 1998;27:193–203.
13. Raoul-Duval A, Bertrand-Servais M, Letur-Konirsch H, Frydman R. Psychological follow-up of children born after in-vitro fertilization. *Hum Reprod* 1994;4:1097–101.
14. Murray C, Golombok S. Single mothers and their infants conceived by donor insemination. *Am J Orthopsychiatry* 2005;75:242–53.
15. Murray C, Golombok S. Single mothers and their donor insemination infants: follow-up at age 2 years. *Hum Reprod* 2005;20:1655–60.
16. Mannis VS. Single mothers by choice. *Fam Relations* 1999;48:121–8.
17. Buck LGM, Schisterman EF, Dukic VM, Schieve LA. Research hurdles complicating the analysis of infertility treatment and child health. *Hum Reprod* 2005;20:12–8.
18. Adamson GD, de Mouzon J, Lancaster P, Nygren KG, Sullivan E, Zegers-Hochschild F. World collaborative report on IVF, 2000. *Fertil Steril* 2005;85:1586–622.
19. Bartholet E. *Family bonds: adoption and the politics of parenting*. Boston & New York: Houghton Mifflin Company, 1993.
20. van den Akker O. A review of family donor constructs. Current research and future directions. *Hum Reprod Update* 2005;12:91–101.
21. Weissenberg R, Menashe Y, Madgar I. Inception and five-year run of a semen cryobank: clinical and behavioral aspects. *Cell Tissue Banking* 2001;2:235–9.
22. Golombok S, MacCallum F, Goodman E, Rutter M. Families with children conceived by donor insemination: a follow-up at age 12. *Child Dev* 2002;73:952–68.
23. John K, Quinton D. *Child and Adolescent Functioning and Environment Schedule (Revised)*. London: MCR Child Psychiatry Unit, 1991.
24. Strauss M. Measuring intra-family conflict and violence: the Conflict Tactics (CT) Scales. *J Marriage Fam* 1979;41:75–88.
25. Gottlieb C, Lalos O, Lindblad F. Disclosure of donor insemination to the child: the impact of Swedish legislation on couples' attitudes. *Hum Reprod* 2000;15:2052–6.
26. Lindblad F, Gottlieb C, Lalos O. To tell or not to tell: What parents think about telling their children that they were born following donor insemination. *J Psychosom Obstet Gynecol* 2000;21:193–203.
27. Kirkman M. Egg and embryo donation and the meaning of motherhood. *Womens Health* 2003;38:1–18.
28. Nachtigall RD, Pitcher L, Tschann JM, Becker G, Szkupinski Quiroga S. Stigma, disclosure and family functioning among parents of children conceived through DI. *Fertil Steril* 1997;68:83–9.
29. Rumball A, Adair V. Telling the story: parents' script for donor offspring. *Hum Reprod* 1999;14:1392–9.
30. Scheib JE, Riordan M, Rubin S. Choosing identity-release sperm donors: the parents' perspective. *Hum Reprod* 2003;18:1115–27.
31. Fisher F, Sommerville A. To everything there is a season? Are there medical grounds for refusing fertility treatments to older women? In: Harris J, Holm S, eds. *The future of human reproduction: ethics, choice, and regulation*. Oxford: Clarendon Press, 1998.
32. Morris HB. *Last chance children: growing up with older parents*. New York: Columbia University Press, 1988.
33. Landau R. The promise of post-menopausal pregnancy. *Soc Work Health Care* 2004;40:53–69.
34. Hourvitz A, Pri-paz S, Dor J, Seidman DS. Neonatal and obstetric outcome of pregnancies conceived by ICSI or IVF. *Reprod Biomed Online* 2005;11:469–75.
35. Golombok S, Jadva V, Lycett E, Murray C, MacCallum F. Families created by gamete donation: follow up-at age 2. *Hum Reprod* 2005;20:286–93.
36. Widdows H, MacCallum F. Disparities in parenting criteria: an exploration of the issues, focusing on donation. *J Med Ethics* 2002;28:139–44.