Reproductive Technology and Its Impact on Child Psychosocial and Emotional Development

SUSAN E. GOLOMBOK, PhD

Family and Child Psychology Research Centre,
Family and Children School of Social Human Science
City University, UNITED KINGDOM

(Published online June 27, 2003)

Topic
Reproductive technologies

Introduction
Since the birth of the first baby was produced using *in vitro* fertilization in 1978,[1] advances in assisted reproduction procedures have had a fundamental impact on the ways in which families may be created. It is now possible for a child to have 5 parents: an egg donor, a sperm donor, a birth mother who hosts the pregnancy, and the two social parents, whom the child knows as "Mum and Dad."[2]

Subject
Research on the psychological development of children in assisted reproduction families has focused on two major types of assisted reproduction:

1. **"High-tech" procedures** include *in vitro* fertilization (IVF) and intracytoplasmic sperm injection (ICSI). IVF involves the fertilization of an egg with sperm in the laboratory and the transfer of the resulting embryo to the mother's womb. With ICSI, a single sperm is injected directly into the egg to create an embryo.

2. **Gamete donation** includes donor insemination and egg donation. Donor insemination involves the insemination of a woman with the sperm of a man who is not her husband or partner. The child produced is genetically related to the mother but not the father. Egg donation is like donor insemination in that the child is genetically related to only one parent, but in this case the mother is the parent with whom the child shares no genetic link. Egg donation is a much more complex and intrusive procedure than donor insemination and involves IVF techniques.

Problems
The key problems in this area of investigation are as follows:

a) The higher incidence of multiple births, preterm births, and low birthweight infants following IVF and ICSI.[3,4] The impact of these factors on child development must be considered separately from the impact of IVF and ICSI *per se*. Many of the

empirical investigations have focused on families with a singleton (only) child to avoid the confounding effect of a multiple birth.

b) Mothers of IVF children are generally older than mothers who give birth without medical intervention, and attempts to match natural conception mothers for maternal age have presented difficulties, as has matching for birth order of the target child and number of children in the family, although some researchers have attempted to statistically control for these variables.

Research Context

Studies in this area tend to be cross-sectional, although longitudinal investigations are beginning to appear. As the majority of parents whose children have been conceived by gamete donation do not tell their children about the nature of their conception, it is not possible to establish how children's psychological development may be affected when their parents do or do not divulge details regarding their genetic origins.

Key Research Questions

The key research question in this area is as follows: What are the consequences of assisted reproduction for children's cognitive, social, and emotional development?

Recent Research Results

1. **"High-tech" procedures.** The early, uncontrolled studies of the cognitive development of IVF children found no evidence of impaired cognitive ability.[5,6,7,8] Controlled studies of IVF infants reported similar findings using the Bayley Scales,[9,10,11] the Brunet-Lezine test,[12] and the General Cognitive Index.[13] No evidence of delayed mental development was found among ICSI children in studies in Belgium[14] and the United Kingdom.[15,16] Although one study in Australia found evidence of cognitive impairment,[17] there were no differences between the ICSI children and the control groups when the children were followed up at age 5, at which point the sample size had increased.[18]

   With respect to socio-emotional development, IVF mothers in a prospective study rated their babies as more temperamentally difficult than did natural conception mothers, and their babies showed more negative behaviours in response to stress.[19] At 1 year of age, no differences between the two groups of children were found for either social development or test-taking behaviour. However, the IVF mothers rated their children as having more behavioural difficulties, and more difficult temperaments, than the control group.[20] The authors suggested that these findings may be related to the greater anxiety of IVF mothers about their children's well-being. The security of the infant's attachment to the mother was also assessed at 12 months of age using the Strange Situation procedure.[21] IVF children showed predominantly secure attachment relationships, and there was no difference between groups in the proportion classified as "insecurely attached." No differences in the behaviour of IVF and naturally conceived children have been identified in studies conducted in Belgium,[22] Taiwan,[23] Sweden,[5] and the Netherlands.[24] In addition, the European Study of Assisted Reproduction Families[25,26] found that IVF children did not differ from natural-

conception children with respect to the presence of psychological disorder. An investigation of the psychological well-being of ICSI children found no evidence of raised levels of emotional or behavioural problems compared with IVF and naturally conceived children.[27]

2. **Gamete Donation.** With respect to cognitive development, two studies in Australia,[28,29] and one study in Sweden[30] found donor-insemination (DI) children were above average in terms of intellectual and psychomotor development. In the only controlled study, donor insemination children were found to be more advanced than natural conception children with respect to psychomotor and language development.[31] An investigation of the cognitive development of egg-donation children showed no evidence of psychomotor retardation.[32]

   The early, uncontrolled studies of the socio-emotional development of donor-insemination children found no evidence of emotional or behavioural problems.[28,29] Although one study reported a higher incidence of psychological problems among donor insemination children than among naturally conceived children,[31] controlled studies that used standardized measures found donor insemination children to be functioning well.[25,26] In an investigation in Finland, egg donation parents were less likely than IVF parents to express concern about their child's behaviour,[33] and no evidence of psychological difficulties among egg-donation children was found in a study conducted in the United Kingdom.[34]

Conclusions

Creating families by means of assisted reproduction has raised a number of concerns about potentially adverse consequences for child development. It seems, however, from the evidence available so far, that such concerns are unfounded. There is no evidence of cognitive impairment in singleton children born as a result of IVF procedures, although the findings regarding ICSI children remain inconclusive. The reports of superior cognitive functioning among donor-insemination children have not been supported by large-scale, controlled studies could conceivably result from the use of highly educated donors. In relation to socioemotional development, assisted-reproduction children appear to be functioning well. The greater difficulties of IVF infants are based on maternal reports and probably result from the higher anxiety levels of IVF mothers. Studies of children during the pre-school years do not indicate a higher incidence of emotional or behavioural problems among assisted-reproduction children.

Implications for Policy and Services

a) One of the most problematic issues associated with the practice of assisted reproduction is the high incidence of multiple births. The risks associated with multiple births in terms of perinatal mortality, neonatal problems, physical disability, and cognitive impairment have been well documented. The World Health Organization has recommended that fewer embryos be transferred in IVF procedures.[3]
b) The majority of children conceived by gamete donation grow up unaware that they lack a genetic relationship with one or both parents. Although the absence of psychological problems in children conceived by gamete donation suggests that

secrecy does not have an adverse effect, this does not mean that it is better for children not to be told about the nature of their conception. There is growing concern among professionals in the fields of adoption and family therapy, and from some DI adults about the secrecy that surrounds gamete donation. In addition, the widespread use of anonymous donors prevents children who are told about their donor conception, or who find out about it, from obtaining information regarding their genetic parent(s).

REFERENCES

1. Steptoe PC, Edwards RG. Birth after reimplantation of a human embryo. *Lancet* 1978;2(8085):366.
2. Einwohner J. Who becomes a surrogate: Personality characteristics. In: Offerman-Zuckerberg J, ed. *Gender in transition: A new frontier*. New York, NY: Plenum Medical Book Co; 1989:123-132.
3. Olivennes F, Fanchin R, Ledee N, Righini C, Kadoch IJ, Frydman R. Perinatal outcome and developmental studies on children born after IVF. *Human Reproduction Update* 2002;8(2):117-128.
4. Vayena E, Rowe PJ, Griffin PD, eds. *Current practices and controversies in assisted reproduction.* Report of a meeting on "Medical, Ethical and Social Aspects of Assisted Reproduction" held at WHO Headquarters in Geneva, Switzerland, 17-21 September 2001. Geneva: World Health Organization; 2002. Available at: http://www.who.int/reproductive-health/infertility/report_content.htm. Accessed September 02, 2003.
5. Cederblad M, Friberg B, Ploman F, Sjoberg NO, Stjernqvist K, Zackrisson E. Intelligence and behaviour in children born after in-vitro fertilization treatment. *Human Reproduction* 1996;11(9):2052-2057.
6. Mushin D, Spensley J, Barreda-Hanson M. Children of IVF. *Clinical Obstetrics & Gynaecology* 1985;12(4):865-876.
7. Mushin DN, Barreda-Hanson MC, Spensley JC. In vitro fertilization children: early psychosocial development. *Journal of in Vitro Fertilization & Embryo Transfer* 1986;3(4):247-252.
8. Yovich JL, Parry TS, French NP, Grauaug AA. Developmental assessment of twenty in vitro fertilization (IVF) infants at their first birthday. *Journal of in Vitro Fertilization & Embryo Transfer* 1986;3(4):253-257.
9. Gibson FL, Ungerer JA, Leslie GI, Saunders DM, Tennant CC. Development, behaviour and temperament: A prospective study of infants conceived through in-vitro fertilization. *Human Reproduction* 1998;13(6):1727-1732.
10. Brandes JM, Scher A, Itzkovits J, Thaler I, Sarid M, Gershoni-Baruch R. Growth and development of children conceived by in vitro fertilization. *Pediatrics* 1992;90(3):424-429.
11. Morin NC, Wirth FH, Johnson DH, Frank LM, Presburg HJ, Van de Water VL, Chee EM, Mills JL. Congenital malformations and psychosocial development in children conceived by in vitro fertilization. *Journal of Pediatrics* 1989;115(2): 222-227.
12. Raoul-Duval A, Bertrand-Servais M, Frydman R. Comparative prospective study of the psychological development of children born by in vitro fertilization and their mothers. *Journal of Psychosomatic Obstetrics & Gynecology* 1993;14(2):117-126.
13. Ron-El R, Lahat E, Golan A, Lerman M, Bukovsky I, Herman A. Development of children born after ovarian superovulation induced by long-acting gonadotrophin-releasing hormone agonist and menotropins, and by in vitro fertilization. *Journal of Pediatrics* 1994;125(5 Pt 1):734-737.

14. Bonduelle M, Joris H, Hofmans K, Liebaers I, Van Steirteghem A. Mental development of 201 ICSI children at 2 years of age. *Lancet* 1998;351(9115): 1553.
15. Sutcliffe AG, Taylor B, Li J, Thornton S, Grudzinskas JG, Lieberman BA. Children born after intracytoplasmic sperm injection population control study. *British Medical Journal* 1999;318(7185):704-705.
16. Sutcliffe AG, Taylor B, Saunders K, Thornton S, Lieberman BA, Grudzinskas JG. Outcome in the second year of life after in-vitro fertilisation by intracytoplasmic sperm injection: A UK case-control study. *Lancet* 2001;357(9274):2080-2084.
17. Bowen JR, Gibson FL, Leslie GI, Saunders DM. Medical and developmental outcome at 1 year for children conceived by intracytoplasmic sperm injection. *Lancet* 1998;351(9115):1529-1534.
18. Leslie GI, Cohen J, Gibson FL, McMahon C, Maddison V, Saunders D, Tennant C. ICSI children have normal development at school age. Paper presented at: 18th Annual Meeting of the European Society for Human Reproduction and Embryology; 2002; Vienna, Austria.
19. McMahon CA, Ungerer JA, Tennant C, Saunders D. Psychosocial adjustment and the quality of the mother-child relationship at four months postpartum after conception by in vitro fertilization. *Fertility and Sterility* 1997;68(3):492-500.
20. Gibson FL, Ungerer JA, Leslie GI, Saunders DM, Tennant CC. Maternal attitudes to parenting and mother-child relationship and interaction in IVF families: a prospective study. *Human Reproduction* 1999;14(O238 Suppl 1):131-132.
21. Gibson FL, Ungerer JA, McMahon CA, Leslie GT, Saunders DM. The mother-child relationship following in vitro fertilisation (IVF): Infant attachment, responsivity, and maternal sensitivity. *Journal of Child Psychology and Psychiatry and Allied Disciplines* 2000;41(8):1015-1023.
22. Colpin H, Demyttenaere K, Vandemeulebroecke L. New reproductive technology and the family: The parent-child relationship following in vitro fertilization. *Journal of Child Psychology and Psychiatry and Allied Disciplines* 1995;36(8):1429-1441.
23. Hahn CS, DiPietro JA. In vitro fertilization and the family: Quality of parenting, family functioning, and child psychosocial adjustment. *Developmental Psychology* 2001;37(1):37-48.
24. van Balen F. Child-rearing following in vitro fertilization. *Journal of Child Psychology and Psychiatry and Allied Disciplines* 1996;37(6):687-693.
25. Golombok S, Cook R, Bish A, Murray C. Families created by the new reproductive technologies: Quality of parenting and social and emotional development of the children. *Child Development* 1995;66(2):285-298.
26. Golombok S, Brewaeys A, Cook R, Giavazzi MT, Guerra D, Mantovanni A, Van Hall E, Crosignani PG, Dexeus S. The European Study of Assisted Reproduction Families: Family funtioning and child development. *Human Reproduction* 1996;11(10):2324-2331.
27. Place I, Englert Y. The emotional and behavioural development of ICSI children. How are ICSI families coping in comparison with IVF and run-of-the-mill families? Paper presented at: 18th Annual Meeting of the European Society for Human Reproduction and Embryology; 2002; Vienna, Austria.

28. Leeton J, Backwell J. A preliminary psychosocial follow-up of parents and their children conceived by artificial insemination by donor (AID). *Clinical Reproduction & Fertility* 1982;1(4):307-310.
29. Clayton CE, Kovacs GT. AID offspring: initial follow-up study of 50 couples. *Medical Journal of Australia* 1982;1(8):338-339.
30. Milsom I, Bergman P. A study of parental attitudes after donor insemination (AID). *Acta Obstetricia et Gynecologica Scandinavica* 1982;61(2):125-128.
31. Manuel C, Facy F, Choquet M, Grandjean H, Czyba JC. Les risques psychologiques de la conception par IAD pour l'enfant. *Neuropsychiatrie de l'enfance et de l'adolescence* 1990;38:642-658.
32. Raoul-Duval A, Bertrand-Servais M, Letur-Konirsch H, Frydman R. Psychological follow-up of children born after in-vitro fertilization. *Human Reproduction* 1994;9(6):1097-1101.
33. Soderstrom-Antilla V, Sajaniemi N, Tiitinen A, Hovatta O. Health and development of children born after oocyte donation compared with that of those born after in-vitro fertilization, and parents' attitudes regarding secrecy. *Human Reproduction* 1998;13(7):2009-2015.
34. Golombok S, Murray C, Brinsden P, Abdalla H. Social versus biological parenting: Family functioning and the socioemotional development of children conceived by egg or sperm donation. *Journal of Child Psychology and Psychiatry and Allied Disciplines* 1999;40(4):519-527.

To cite this document:

Golombok SE. Reproductive technology and its impact on child psychosocial and emotional development.. In: Tremblay RE, Barr RG, Peters RDeV, eds. *Encyclopedia on Early Childhood Development* [online]. Montreal, Quebec: Centre of Excellence for Early Childhood Development; 2003:1-7. Available at: http://www.child-encyclopedia.com/documents/GolombokANGxp.pdf. Accessed [insert date].