Human Reproduction Update, Vol.7, No.1 pp. 38–46, 2001

Review: parent–child relationships and child development in donor insemination families

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The present article reviews the empirical research regarding the parent–child relationships and the development of children in donor insemination (DI) families. Over the years, follow-up studies have appeared sporadically and, despite the varying quality of the research methods, preliminary findings have emerged. Heterosexual DI parents were psychologically well adjusted and had stable marital relationships. DI parents showed a similar or higher quality of parent–child interaction and a greater emotional involvement with their children compared with naturally conceived families. The majority of studies which investigated several aspects of child development found that, overall, DI children were doing well. Findings with regard to emotional/behavioural development, however, were divergent in that some studies identified an increase of such problems while others did not. A steadily growing group within the DI population is lesbian mother families. More recently, follow-up studies have been carried out among DI children who were raised from birth by two mothers. Despite many concerns about the well-being of these children, no adverse effects of this alternative family structure on child development could be identified. As the DI children in all investigations were still young, our knowledge about the long-term effects of DI remains incomplete.

Key words: assisted reproduction/child development/donor insemination/parent–child relationships

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Introduction

Donor insemination (DI), until recently the only available treatment for couples in whom the man appeared to be infertile, is one of the oldest techniques in reproductive medicine. In the past, DI was practised within a strictly confidential doctor-patient context, in which the doctor guaranteed the anonymity of the donor and advised the patients to keep the matter a closely guarded secret. DI practice became more widely accepted during the 1970s, leading to the births of thousands of DI children in Western countries. In the course of the 1980s, DI also attracted the attention of a number of social scientists who considered the long-term psychological consequences of DI on family functioning and child development. It was argued that the stigma associated with male infertility may entail serious distress even after the birth of a child (e.g. Berger, 1980; Clamar, 1989; Connolly *et al*., 1992). By regarding DI as a strict medical treatment in which the use of anonymous donor spermatozoa should be disregarded as soon as possible, doctors collaborated in their patients' desire to become a 'normal' family as quickly as possible. The fact that DI bypassed rather than treated the infertility of the male partner, could therefore easily be denied by the couples involved. Several authors have stressed that in DI practice there is never a medical indication in the strict sense of the word. It allows couples to create a family in a way that differs from the traditional nuclear family in that the DI father and his child are not genetically linked. The lack of such a link may put attachment relationships between parent and child at risk (Brewaeys *et al*., 1993; Englert, 1994). Criticism was also directed at the practice of keeping the DI origin of the child a secret. DI parents were opting to provide their children with incorrect information about their genetic origins. Secrecy about such essential items may affect family relationships negatively and undermine the relationship of trust between parents and children (e.g. Haimes, 1988; Clamar, 1989; Baran and Pannor,

1993; Daniels and Taylor, 1993; Imber-Black, 1993; Adair and Purdie, 1996). Moreover, some authors have regarded access to knowledge about one's genetic origins as a human right (e.g. McWhinnie, 1986; Bruce, 1990; Snowdon, 1993; Landau, 1998). More recently it also became clear that, as a result of the increased knowledge about genetic disorders, secrecy might have negative effects for the donor offspring's physical health. Should the donor child have inherited a genetic defect, secrecy and anonymity make it almost impossible to obtain information that can sometimes be life-saving (Landau, 1998).

The pleas for less secrecy in DI practice became gradually accompanied by doubts about the use of anonymous donors (Daniels, 1988; Mahlstedt and Greenfield, 1989; Daniels and Taylor, 1993; Adair and Purdie, 1996; Landau, 1998). Children who were aware of their DI origin would be at risk of developing psychological problems if the donor's identity was not revealed. Over the years the issues of confidentiality and donor anonymity remained the subjects of a lively debate. The variety of views was also reflected in the legislation of several West European countries. In Austria, Sweden, Germany and Switzerland the child has the legal right to know its origins. In Britain a central register was set up of non-identifying donor information. In The Netherlands it will soon become compulsory by law to register the donor's identity. The different attitudes apparent in national legislation governing DI practice are partly a reflection of the great lack of empirical data on the long-term consequences of this technique. In comparison with other, more recent, techniques such as IVF or ICSI, follow-up studies investigating the effects of DI on family relationships and child development remain scarce. The present article reviews what empirical research there is into DI families and their children.

Family relationships in DI families

Characteristics of DI parents and their marital relationships

A number of early studies used anonymously written questionnaires to establish how parents continued to feel about having opted for DI, after the birth of their child (Levie, 1967; Rosenkvist, 1981; Leeton and Blackwell, 1982; Milson and Bergman, 1982; Kremer *et al*., 1984). In the vast majority of cases DI was felt to be a positive choice that was preferable to adoption. Fulfilling their desire for children in this way was felt by parents to be a source of great happiness and many went on to have a second DI child. With a few exceptions fathers reported that DI did not influence their relationship with their children and that they felt themselves to be 'real fathers'. The response rate in these studies was ~90% and the numbers of parents questioned were quite large. Children's ages varied greatly, from a few months to 15 years old. The questionnaires themselves, however, were quite brief and no control groups were used. The rosy picture described above has been criticized by a number of researchers who reported the stress on the part of DI couples after interviewing them. Stress was associated with problems arising from coping with infertility and the DI treatment itself. More particularly, patients cited as causes of distress the uncertainty and isolation resulting from the secrecy involved (Manuel *et al*., 1980; Meyer *et al*., 1980; Berger *et al*., 1986). Similarly, other research has pointed to an increased vulnerability among infertile men since only this group continued to reveal increased anxiety levels after follow-up (Connolly *et al*., 1992).

Findings with regard to the stability of the partner relationship among DI couples were consistent: the satisfaction with the relationship appeared to be average to high (Humphrey and Humprey, 1987; Schover *et al*., 1992; Kloch and Maier, 1991; Kloch *et al*., 1994; Golombok *et al*., 1995, 1996) and the number of divorces remained low or average (Levie, 1967; Rosenkvist, 1981; Kremer *et al*., 1984; Humphrey and Humphrey, 1987; Amuzu *et al*., 1990; Owens *et al*., 1993; Nielsen *et al*., 1995).

Parent–child interaction and child development

In the early years, a number of small and uncontrolled follow-up studies have been published, investigating several variables such as parent–child relationships, intellectual/psychomotor/language and emotional development of the DI child (Iizuka *et al*., 1968; Clayton and Kovacs, 1982; Leeton and Blackwell, 1982; Milson and Bergman, 1982; Amuzu *et al*., 1990) (Table I). Intellectual, psychomotor and language development among DI children appeared to be faster than among other children of their age. Two causes have been put forward for this more rapid development: DI parents were more closely involved with their children (Clayton and Kovacs, 1982; Amuzu *et al*., 1990) giving them more encouragement, and they belonged to higher socio-economic segments of society (Iizuka *et al*., 1968). None of these studies could identify an adverse effect of DI on the emotional development of the child. One study, however, reported that 14 of the 53 young DI children showed 'hyperactive behaviour'. Unfortunately it was not reported how this type of behaviour was measured (Clayton and Kovacs, 1982).

More recently a number of controlled follow-up studies of DI children and their families have appeared.

A first French study investigated 94 DI families with children between 3 months and 3 years of age and compared them with two controls: children born after fertility treatment not involving the use of a donor, and children of parents with no fertility problems (Manuel *et al*., 1990). Self-developed questionnaires for the parents were used to assess the children's emotional development and the parent–child relationship. A response rate of 76% was achieved. The main conclusions were that both groups of infertile patients presented an 'anxious over-investment' in their children and that among the children themselves there were signs of increased emotional vulnerability such as more psychosomatic complaints and disturbed eating and sleeping patterns. A methodological weakness was, however, the lack of information about validity and reliability of the measures used.

A small Australian study of 22 DI children between 6 and 8 years old was published in 1993. The emotional/behavioural development of the children was investigated by means of a standardized questionnaire filled in by the parents (response rate 88%). No significant differences could be identified between the DI families, adoptive and naturally conceived families (Kovacs *et al*., 1993). Limiting factors here were the small sample size and the use of just one self-report questionnaire.

A European follow-up study of 111 DI families in the UK, Italy, Spain and The Netherlands has been published (Cook *et al*., 1995; Golombok *et al*., 1995, 1996). The DI families with

Table I. Development of children raised in heterosexual donor insemination (DI) families

Authors	Year	Response rate (%)	Sample size	Method	Age of children (years)	Control groups	Issues under investigation	Main results
Iizuka *et al.*	1968	?	54	IQ test of child	0–11	None	Intellectual development	Above population norms
Leeton and Blackwell	1982	100	43	Self-developed questionnaire for parents	1–7	None	1. Marital relationship 2. Psychomotor development of child 3. Emotional development of child	1. 60% better after treatment, 40% unchanged 2. Above average 3. Normal
Milson and Bergman	1982	97	92	Self-developed questionnaire for parents	?	None	1. Marital relationship 2. Father-child relationship 3. Psychomotor development of child	1. 49% better after treatment, 51% unchanged 2. DI fathers spent more time with child 3. Average or above
Clayton and Kovacs	1982	100	50	Self-developed interview for parents	1–3	None	1. Psychomotor development of child 2. Emotional development of child	1. Above average 2. No major emotional problems/14 children showed hyperactive behaviour
Manuel *et al.*	1990	76	94	Self-developed interview for parents	3 months–3 years	Fertility treatment Naturally conceived	1. Psychomotor/language development of child 2. Emotional development of child 3. Parent–child relationships	1. Faster in DI children 2. More problems in DI group 3. Anxious overinvestment DI parents
Kovacs *et al.*	1993	88	22	Standardized questionnaire	6–8	Naturally conceived Adoption	Behavioural problems	No significant differences
Golombok *et al.*[a]	1996	47	111	Standardized questionnaires for parents and teacher Interview with parents Tests for children	4–8	Naturally conceived Adoption IVF	1. Psychological functioning of parents 2. Marital relationship 3. Parent–child interaction 4. Behavioural adjustment of child	1. DI mothers, not fathers, scored lower for depression/anxiety 2. No significant differences 3. DI mothers and fathers had greater parent–child interaction 4. No significant differences
Cook *et al.*	1997	53	19	Standardized questionnaires for parents Tests for children	4–8	Naturally conceived Adoption IVF	1. Parents' marital and psychiatric state 2. Behavioural adjustment of child	1. DI fathers had more marital problems. DI mothers had higher levels of depression and anxiety
Brewaeys *et al.* [a]	1997	53	39	Standardized/self-developed questionnaires for parents	4–8	Naturally conceived IVF	1. Disclosure/anonymity issues 2. Behavioural adjustment of child	1. 74% of DI parents opted for secrecy; 1/3 of DI mothers, ¼ of DI fathers needed more donor information. 2. DI children had more problems
Nachtigall *et al.*	1997	55	94	Standardized questionnaires	2–5 years	None	Disclosure issues Quality of parent–child relationship	Parents who disclosed were younger and had more DI children than parents who kept DI a secret. No differences between non-disclosing and disclosing parents. The father's perception of stigma (of being infertile) influenced the bonding with his child negatively

[a]Samples are inter-related. sign. = significant.

children between 4 and 8 years old were compared with IVF, adoption families and a control group of families with a naturally conceived child. The response rate in the DI families was 47%. Family functioning was assessed using a variety of psychological techniques. Self-report standardized questionnaires were used to measure the psychological well-being and the marital satisfaction of the parents. DI mothers, not fathers, showed lower levels of depression and anxiety and the quality of DI parents' marital relationship did not differ from that of parents with a naturally conceived child. A standardized interview with the parents was used to assess parent–child relationships. The overall results revealed that DI mothers showed greater warmth and emotional involvement towards their child than mothers with a naturally conceived child. Interpretation of this finding is somewhat difficult, however, because both over-concern and over-protectiveness were included in the emotional involvement scale. The overall quality of the parent–child interaction appeared to be higher for both DI mothers and fathers compared with naturally conceived controls. A standardized questionnaire was used to assess the level of parental stress. The results revealed less parental stress among DI mothers and no differences were found between DI fathers and naturally conceived controls. Thus, if differences were found between DI families and families with a naturally conceived child, they all pointed towards a better relationship between parents and children in the DI group. Furthermore their greater parental involvement was something that DI families had in common with IVF and adoption families. It was also striking that DI fathers did not differ from IVF fathers in all the variables measured here, while the former group had children who were not genetically their own and the latter had children who were. The authors concluded therefore that 'Going through a process in which having children is no longer self-evident exerted a positive influence on the parent–child relationship. The presence or absence of a genetic link between father and child was less important to family relationships than a strong desire to have children'.

This study also assessed the psychological development of the children by using standardized questionnaires for the parents and the child's teacher and psychological tests for the children (Golombok *et al*., 1995, 1996). No overall differences were found between children conceived by DI and the naturally conceived control group with regard to their emotional/behavioural development, attachment relationships, self-esteem and family concept. Surprisingly, the Dutch group of 38 DI children (response rate 53%) showed an increased incidence of emotional and behavioural problems as compared with the control group of naturally conceived children and with a large Dutch population sample (Brewaeys *et al*., 1997b). Although the reasons for the divergent results between the Dutch sample and those in the other European countries remained unclear, it is conceivable that these differences were associated with the lower socio-economic status of the DI families compared with the other groups of families. The same European study has also been extended to a small Bulgarian sample including 19 DI families with a response rate of 53%. These findings revealed that both IVF and DI children showed more behavioural/emotional problems compared with the naturally conceived control group (Cook *et al*., 1997). Although not explicitly measured in this study, it was suggested that cultural and economic differences between Eastern and Western countries have at least, to some extent, influenced these results. However, one of the remaining weaknesses of many follow-up studies of DI families is the low response rate, resulting in the risk of studying unrepresentative samples. The divergent results between countries with regard to the emotional/behavioural development of DI children were therefore probably due to random error sampling and have imposed limits on generalizations from the findings.

Donor insemination and lesbian mothers

As a result of the increased tolerance towards homosexuality during the 20 twenty years, lesbian motherhood has come to the attention of society. Fertility centres have been visited by women applying for DI, not because of the infertility of their male partner, but because of the absence of such a partner. Within reproductive medicine, however, DI for lesbian women remains a controversial issue (Englert, 1994; Golombok and Tasker, 1994; Shenfield, 1994). Despite the increased acceptance of same-sex relationships, there is still reluctance to accept lesbian motherhood. It has often been argued that a child needs a father for healthy psychological development, that lesbian mothers are less maternal and that their children would be at risk for disturbances in emotional, gender and social development.

Studies have been carried out in lesbian families where the mother had lived in a heterosexual marriage before adopting a lesbian identity, and no empirical evidence was found for the presuppositions mentioned above (for review see Brewaeys and van Hall, 1997).

Studies of children raised from birth by lesbian mothers have started to emerge (Patterson, 1994, 1995; Flaks *et al*., 1995; Brewaeys *et al*., 1995, 1997a; Golombok *et al*., 1997; Chan *et al*., 1998; Gartrell *et al*., 1999) (Table II). Although some of these mothers prefer the technique of self-insemination in order to become pregnant by a known donor, there is also an important group applying to fertility centres with the request for DI. Studies investigating the profile of the latter group revealed that, in contrast with the heterosexual infertile DI couples, these lesbian mothers intended to inform their children about the use of a donor at an early developmental stage. Furthermore, the majority were highly educated, lived openly as a lesbian, were accepted by the family of origin and had stable and long-lasting relationships (Brewaeys *et al*., 1995; Gartrell *et al*., 1995; Leiblum *et al*., 1995; Wendland *et al*., 1996; Jacob *et al*., 1999).

The study of children born into lesbian mother families provides a challenge for existing psychological theories. The psychological development of children is generally believed to be influenced by the home environment. Lesbian households differ in a number of important characteristics from the traditional heterosexual family: these children will grow up without a father-figure in their immediate surroundings and their mother(s) have a homosexual orientation. Results of controlled studies investigating family relationships and child development in this new family type are remarkably unanimous. Overall, lesbian mothers appear to show a higher quality of parent-child interaction compared with two-parent heterosexual families (Flaks *et al*., 1995; Brewaeys *et al*., 1997a; Golombok *et al*., 1997). One study investigating parental attachment found that

Table II. Development of children raised in lesbian families

Authors	Year	Sample size	Method	Age of children (years)	Control groups: heterosexual families	Issues under investigation	Main results
Patterson	1994[a]	37	Structured parent interview Structured child interview Standardized questionnaires	4–9	None	1. Social competence of child 2. Behavioural adjustment of child 3. Self-concept of child	1-3. Scores within normal range
Flacks *et al.*	1995	15	Standardized questionnaires Parents and teachers	3–9	15	1. Parental skills 2. Social competence of child 3. Behavioural adjustment of child	1. Lesbian mothers more parental skills 2 and 3. No significant differences
Patterson	1995[a]	26	Sandardized questionnaires	4–9	none	1. Division of labour for mothers 2. Relationship satisfaction for mothers	1. Biological mother more involved in childcare than social mothers 2. Relationship satisfaction high
Golombok *et al.*	1997	30	Standardized interview Standardized questionnaires Parents and teachers Tests for child	6	41 single 42 couples	1. Parent-child interaction 2. Attachment to child 3. Behavioural adjustment of child 4. Self-concept of child	1. Greater mother-child interaction in lesbian families 2. Children of lesbian mothers more securely attached 3. No significant differences 4. Lower self-concept in children of lesbian mothers
Brewaeys *et al.*	1997	30	Standardized interview Standardized questionnaires Mothers Tests for child	4–8 (30 naturally conceived couples)	39 DI couples	1. Relationship satisfaction 2. Parent-child interaction 3. Behavioural adjustment of child 4. Gender role behaviour of child	1. No significant differences 2. Greater mother-child interaction in lesbian families 3 and 4. No significant differences
Chan *et al.*	1998	55	Standardized questionnaires	7	25 couples	1. Relationship satisfaction 2. Parental stress 3. Parental self-esteem 4. Behavioural adjustment of child	1-4. No significant differences

[a]Samples are inter-related.

children in lesbian families experienced greater warmth and were more securely attached than children in the heterosexual control group (Golombok *et al*., 1997). In two-parent lesbian families, child care and professional activities were more equally divided between both mothers than in two-parent heterosexual families (Brewaeys *et al*., 1997a). The psychological development of the children themselves was very similar to that of children raised in a two-parent heterosexual family. No differences were found in their emotional/behavioural development (Flaks *et al*., 1995; Brewaeys *et al*., 1997a; Golombok *et al*., 1997; Chan *et al*., 1998) and their gender role development (Brewaeys *et al*., 1997a). One study investigating self-esteem found that children of lesbian mothers perceived themselves to be less cognitively and physically competent than their peers from two-parent heterosexual families. In interpreting these results, the authors suggested that the presence of a father might be important for the development of the child's self-esteem (Golombok *et al*., 1997).

Thus, despite the general concerns about lesbian motherhood, these mothers and their children were doing well. However, one must keep in mind that the majority of lesbian mothers involved in these studies lived in relatively privileged positions socially and economically, a condition that might have influenced their parental skills positively.

Disclosure of the use of a donor

Parent–child relationships in heterosexual DI families have often been discussed in relation to the issue of 'confidentiality'.

The matter of whether to tell children about their DI origin is the most important subject in the literature concerning DI. It has been argued that secrecy about the child's genetic origin would undermine family relationships, whereas some authors have maintained that the results of secrecy or disclosure are not necessarily good or bad (Golombok, 1997, 1998; Shenfield and Steele, 1997). General guidelines fail to take into account the specific family features of each individual parent confronted with this choice. The most evident solution is therefore to discuss with the parties all possible pros and cons and let them decide for themselves (Klock, 1997).

The opinions of DI parents have been investigated in several studies. Brewaeys reviewed 23 studies between 1980 and 1995 and concluded that the vast majority of parents had not informed the child (range: 70–100%) and did not intend to do so in future (range 47–92%) (Brewaeys, 1996). The reasons for secrecy most frequently mentioned were parental worries about the well-being of the child, uncertainty about when and how to tell, and fear that knowing would disturb the father-child relationship. Despite maintaining secrecy towards the child, approximately half of all DI parents had taken at least one other person into their confidence at the time of the treatment. Women tended to do this more than men. A considerable number of parents reported regret over their earlier openness once the child had been born (Brewaeys, 1996). Since the age of the children in these studies varied from 3 months to 15 years, it is likely that their parents' choice was made at a time when secrecy was still to a large extent being advised by the medical practitioners. The question, is then, whether the actual trend towards openness had any influence on the opinions of DI candidates themselves. Interesting in this regard is a Dutch study in which attitudes of DI parents were compared between 1980 and 1996 (van Berkel *et al*., 1999). The findings revealed that the number of couples adhering to absolute anonymity of the donor and secrecy towards the child remained the same over the years. Other, more recent, studies investigating the confidentiality issue reported similar findings; the great majority of DI parents continued to keep the DI treatment secret from the child (Brewaeys *et al*., 1997b; Golombok *et al*., 1996; Leiblum and Aviv, 1997; Nachtigall *et al*., 1998). Exceptional in this regard were the results of a study from New Zealand in which 30% of the parents had informed their children at a young age. Of the remaining parents, 77% had the intention to do so at a later stage. It is important to know, however, that 94% of this study population received counselling in which they were encouraged to disclose to children their conception circumstances, a condition which will have undoubtedly influenced their responses (Rumball and Adair, 1999).

A consequence of this non-disclosure among DI parents has been that the number of children who know about their DI origin remains very small. Until now, it is virtually impossible to examine the long-term influence of such knowledge on the child's psychological development. Only one study compared family characteristics between parents who had informed the child (30%) and parents who had not (Nachtigall *et al*., 1997). Ninety-four families with adolescent DI children were involved; the response rate was 55% for women and 46% for men. Family functioning was assessed by a variety of standardized questionnaires, including parental attitudes (warmth, strictness, aggravation, fostering of independence), parental involvement, marital satisfaction and marital intimacy. No difference was found between parents who had told their children and those who had not, for the above-mentioned variables. The only two differences between groups were the age of the parents and the number of DI children. Parents who had informed the child were younger and had had more than one DI child. Thus these findings did not support the view that secrecy influenced family functioning negatively. However, a negative relationship was found between the father's experienced stigma associated with infertility and his parental warmth and fostering of independence towards his child. Interestingly, these findings supported the supposition that unresolved feelings about being infertile may affect the father child-relationship adversely.

Donor anonymity

A few studies solicited DI parents' opinions about donor anonymity and found that <10% of the parents would have opted for a donor whose identity was known (Leeton and Blackwell, 1982; Daniels, 1988). Despite their choice for anonymity, one-third of the women and one-quarter of the men would have liked to know more about the donor; information such as the donor's appearance, his character traits or his educational level were most frequently mentioned (Brewaeys *et al*., 1997b; van Berkel *et al*., 1999). Heterosexual DI parents who intended to inform their children were more in favour of donor information than those who did not (Brewaeys *et al*., 1997b). The existence of a relationship between openness towards the child and the need for donor information was also supported in two other studies. Purdie and colleagues reported that 57% of the heterosexual DI candidates involved in their study had the

intention to inform their children, and consequently, 42% of the mothers and 28% of the fathers opted for an identifiable donor (Purdie *et al*., 1992). A study investigating lesbian mothers' attitudes towards DI revealed that they had all informed their children at an early developmental stage about their DI origins (Brewaeys *et al*., 1995). Of these, 56% would have opted for a donor whose identity was registered had this service been available. By doing so they anticipated their child's potential questions about the donor.

Discussion

Over the years, follow-up studies of DI children and their families have appeared sporadically. In this review we have been looking successively at studies investigating the psychological profile of the parents, the family relationships and the psychological development of the child, the parental attitudes towards confidentiality and donor anonymity.

DI parents appeared to be psychologically healthy and their marital satisfaction was at least as high as compared with control groups of naturally conceived families (Humphrey and Humphrey, 1987; Schover *et al*., 1992; Kloch *et al*., 1991, 1994; Golombok *et al*., 1995, 1996). Several aspects of family functioning have been investigated and, overall, DI parents showed a similar or higher quality of parent–child interaction, compared with the control groups of naturally conceived families (Kovacs *et al*., 1993; Golombok *et al*., 1995, 1996). Furthermore, DI mothers showed more emotional involvement towards their children than did mothers with a naturally conceived child, and DI fathers did not differ in this respect from fathers who were genetically linked to their children (Golombok *et al*., 1995, 1996). One study reported an 'anxious overinvestment' of both DI parents in their children (Manuel *et al*., 1990).

The majority of studies investigating several aspects of the psychological development of DI children (intelligence, psychomotor and language development, self-esteem and attachment) found that, overall, they were doing well (Iizuka *et al*., 1968; Milson and Bergman, 1982; Clayton and Kovacs, 1982; Leeton and Blackwell, 1982; Milson and Amuzu *et al*., 1990; Kovacs *et al*., 1993; Golombok *et al*., 1995, 1996). Findings with regard to the emotional/behavioural development were divergent. Some studies revealed no differences between the DI group and the naturally conceived control group (Kovacs *et al*., 1993; Golombok *et al*., 1995, 1996). Others reported an increase of such problems (Manuel *et al*., 1990; Brewaeys *et al*., 1997b; Cook *et al*., 1997). The reasons for these divergent results remain unclear but important characteristics such as socio-economic background or cultural and religious differences between DI parents were not fully taken into account. It is well known that such features might influence the couples' initial motivation for parenthood, their coping strategies in dealing with their infertility and their parental aspirations | all factors with a potential impact on child development. In this regard it is important that future research will also focus on differences within the DI population itself.

None of these follow-up studies identified a difference between assisted reproduction families with children who were genetically related to their parents (DI) and families who were not (IVF or other fertility treatments). These results seem to indicate that the missing genetic link between father and DI child had not yet affected the father-child relationship. All assisted reproduction families went through a process in which having children was no longer self-evident, apparently leading to a greater involvement from the parents in the child's upbringing. This greater parental commitment appeared to be more important for healthy child development than the presence or absence of a genetic link between father and child, at least at this stage of development.

However, the findings of the studies described above remain preliminary for a number of reasons. First of all, the children in these investigations were young and did not yet possess the capacity of abstract thinking by which they would be able to decode subtle signals with regard to their own origins. Whereas secrecy did not appear to have negative effects on families with young children, it remains to be seen whether this will lead to difficulties during adolescence and adulthood. On the other hand, there is general agreement that the child's basic trust and self-esteem, necessary for healthy identity development, is largely determined by the quality of the parent-child relationship in its early years. The fact that DI families were doing well in this regard may function as a buffer in future stressful circumstances.

Second, a number of methodological limitations have to be taken into account when interpreting the findings of these studies. A major concern is that response rates remained low in the majority of investigations, resulting in study samples which cannot be considered as representative for the general population of DI parents. One cannot therefore rule out that those families who were experiencing problems may have been less likely to participate in the study (Golombok *et al*., 1995, 1996; Brewaeys *et al*., 1997b; Cook *et al*., 1997; Nachtigall *et al*., 1998). Furthermore, a number of studies used unknown measures or relied on only one questionnaire filled in by the mother (Milson and Bergman, 1982; Clayton and Kovacs, 1982; Leeton and Blackwell, 1982; Manuel *et al*., 1990; Kovacs *et al*., 1993). This over-reliance on self-report questionnaires increased the risk that parents have been trying to present their family relationships in the best possible light. Only a few studies used a multi-method design in which information was gathered from several informants (parents, children and teachers) by means of a variety of techniques (standardized questionnaires, interviews and psychological tests) (Golombok *et al*., 1995, 1996; Brewaeys *et al*., 1997b; Cook *et al*., 1997).

Lesbian mother families comprise a particular group within the DI population. Despite many concerns about the well-being of children growing up with two lesbian mothers, follow-up studies failed to find adverse effects on child development. The quality of family relationships appeared to be at least as good as in heterosexual controls, and the child variables such as the emotional/behavioural development and gender role development revealed no differences between children of lesbian mothers and children who grew up in a two-parent heterosexual family (Flaks *et al*., 1995; Brewaeys *et al*., 1997a; Golombok *et al*., 1997; Chan *et al*., 1998). Results, however, should be interpreted with care since the study samples remained small and the children involved in the investigations were young. Moreover, as most of these mothers were socio-economically privileged, they cannot be regarded as a representative sample of the total lesbian population.

Furthermore, when discussing the issue of lesbian motherhood, one has to keep in mind that there is a great variety in the way these women have conceived their family. Some have chosen a known donor who may or may not be involved in the upbringing of the child. Others have applied to a fertility centre where they may choose between an anonymous or identity-registered donor. Research findings indicate that, in contrast with the heterosexual DI candidates, half or more of the lesbian couples prefer an identifiable donor to an anonymous one (De Bruyn *et al*., 1996; Jacob *et al*., 1999). Differences within these lesbian households have not been studied yet. They may, however, reveal important information with regard to the impact of the donor on child development.

Results of studies that investigated the issue of confidentiality showed that the great majority of DI parents did not intend to tell their children about their donor offspring. Findings were consistent over the years, showing that the changing public climate, where pleas towards more openness in DI practice are becoming more apparent, did not influence the DI parents themselves (Brewaeys, 1996; Golombok *et al*., 1996; Leiblum and Aviv, 1997; Nachtigall *et al*., 1998; van Berkel *et al*., 1999). The only study investigating family characteristics in DI families who had, or had not, informed the child, did not identify an adverse effect of secrecy on the relationship between the fathers and their adolescent children (Nachtigall *et al*., 1997). However, the finding that half of the DI parents opting for secrecy had told at least one other person about the use of a donor means that there will always be a potential for disclosure from someone other than the parents themselves. Taking adoption research into account, from which it appears that adopted children find it traumatic to be told by a third person that they are in fact adopted, it would be better to avoid this discrepancy in the future (Triseliotis, 1973).

Research concerning donor anonymity confirms that as long as most DI parents continue to opt for secrecy, the demand for identifiable donors remains small (Leeton *et al*., 1982; Daniels, 1988, Brewaeys *et al*., 1997b; van Berkel *et al*., 1999). However, in those groups wishing to be open about DI, there was an increase in the desire for identifiable donors (Purdie *et al*., 1992; Brewaeys *et al*., 1995). Children's reactions to the knowledge that they were conceived by means of an anonymous donor are still unknown. As the majority of heterosexual DI parents will never tell their child, it remains very difficult to examine the effect of the use of an anonymous donor in this family type. Lesbian mothers who had informed their children about the use of a donor at an early developmental stage therefore provide an opportunity to study the effect of being separated from half of one's genetic background. A limitation of studying only lesbian DI families is that findings cannot automatically be generalized to heterosexual DI families, as there is an important difference between both family types with regard to the presence of a father figure. The social father in the heterosexual DI families might play an important role in the child's process of identity formation.

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Received on May 12, 2000; accepted on October 13, 2000