Families Created by Donor Insemination: Father–Child Relationships at Age 7

This study examined the psychological well-being of fathers and father–child relationships in families with a 7-year-old child conceived by donor insemination. Twenty-four donor insemination families and comparison groups of 25 egg donation and 32 unassisted-conception families were assessed using a standardized interview and questionnaires administered to the father, and father–child dyads participated in an observational assessment of father–child interaction. On the basis of perspectives from Parental Investment Theory and stress-related models, it was expected that donor insemination fathers would show raised levels of psychological problems and a poorer quality of parenting and have more conflictual relationships with their children than genetically related fathers in egg donation and unassisted-conception families. These hypotheses were not supported by the findings. Instead, it seems that commitment to parenthood may be more important than genetic relatedness for positive father–child relationships.

Fathers are generally viewed as integral to positive family functioning, with children of highly involved fathers found to perform better at school and to have higher levels of psychological adjustment, social competence, and empathy than children whose fathers are less involved (Fagan & Iglesias, 1999; Flouri & Buchanan, 2002; Lamb, 2010; Parke, 2002). Research on the mechanisms through which fathering influences child development has shown that fathers influence their children in ways similar to mothers, with sensitive yet authoritative parenting found to be positively associated with children’s socioemotional and cognitive development (Bronte-Tinkew, Moore, & Carrano, 2006; Lamb, 2012; Lamb & Lewis, 2010; Marsiglio, Day, & Lamb, 2000). Fathers in families created by donor insemination differ from fathers in unassisted-conception families in that they lack a genetic link with their children, raising concerns that this may interfere with the development of a positive relationship between them. It has been suggested that, in comparison to biological fathers in unassisted-conception families, donor insemination fathers may be more distant from and less warm toward their children (Baran & Pannor, 1993; Burns, 1987; Wärnock, 1984) and may lack a sense of entitlement in their role as fathers (Cordray, 1999; Turner & Cole, 2000) in a way similar to stepfathers, who tend to disengage themselves from disciplinarian roles (Amato & Sobolewski, 2004; Hetherington & Stanley-Hagan, 2002). With almost 500 children currently being born each year in the United Kingdom through donor insemination (Human Fertilization and Embryology Authority, 2010), and an estimated 30,000 to 60,000 children born each year through donor insemination in the United States (Evan, 2009), it is important that these concerns are addressed.

Evolutionary psychologists have framed these concerns in terms of Parental Investment Theory...
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(Fox & Bruce, 2001), which explains differential parental investment in offspring in terms of reproductive survival such that parents will be more inclined to allocate important resources (e.g., time, caregiving, financial aid) to offspring with whom they share a genetic connection (Daly & Wilson, 1996, 1998; Hamilton, Cheng, & Powell, 2007). This view is based in part on the finding that stepfathers offer less direct care, engagement, financial aid, and playtime to their stepchildren than do biological fathers (Anderson, Kaplan, Lam, & Lancaster, 1999; Hofferth, 2003; Zvöch, 1999). Thus, from an evolutionary psychology perspective, donor insemination fathers may similarly be expected to show less positive relationships with their children in comparison to genetically related fathers.

It has also been suggested that the stress associated with the experience of infertility and its treatment may have an adverse impact on parents’ psychological well-being and may interfere with adjustment to parenthood when a long-awaited child eventually arrives (Burns, 1990; Daniels, 2005). It is generally assumed that women experience the effects of infertility much more acutely than men. Although this may be the case, there is evidence that men experience infertility and its treatment as significantly stressful nonetheless (Mason, 1993; Wichman, Ehlers, Wichman, Weaver, & Coddington, 2011). As van den Akker (2001) pointed out, infertility does not occur in a vacuum but instead exists in a society wherein great value is placed on having children. It has been argued that blood ties and the traditional nuclear family are so deeply embedded within cultural notions of parenthood that deviations from this norm can trigger specific stressors for such families, including ambiguity for those in the parental role (Hamilton et al., 2007). In the case of donor insemination, this ambiguity may be heightened because of the increasing trend toward openness about the child’s genetic origins and the removal of donor anonymity in some countries, including the United Kingdom. Thus, donor insemination fathers may struggle to define and fully accept themselves as parents.

Indeed, in a study by Webb and Daniluk (1999), infertile men described feelings of powerlessness over their inability to become parents and, importantly, believed that fatherhood was a right and a tradition. It has been suggested that there may be a considerable subgroup of fathers for whom adjustment to parenthood after infertility presents a challenge (Fisher, Hammarberg, & Baker, 2005). For example, there have been reports of higher levels of anxiety and lower levels of self-esteem in relation to parenting in assisted-reproduction fathers, in comparison to unassisted-conception fathers (Cohen, MacMahon, Tennant, Saunders, & Leslie, 2001; Hjelmstedt, Widström, Wramby, & Collins, 2003). Given the association between paternal psychological difficulties and less positive fathering (Wanless, Rosenkoetter, & McClelland, 2008), it may be expected that fatherhood after donor insemination will be associated not only with raised levels of psychological problems but also with a less positive relationship between the father and his child.

Existing research on fathers in donor insemination families suggests some differences in the way that fathers interact with their children. Although in general the quality of parenting by donor insemination fathers of young children has been found to be as good as or superior to that of fathers in unassisted-conception families (Brewaeys, Ponjaert, van Hall, & Golombok, 1997; Flykt et al., 2009; Golombok et al., 1996; Golombok, Cook, Bish, & Murray, 1995; Holditch-Davis, Sandelowski, & Harris, 1999), the findings are not entirely straightforward. Nachtigall, Pitcher, Tchann, Becker, and Szkupinski Quiroga (1997) found that fathers in donor insemination families who were concerned about the stigma associated with the use of this procedure reported less warmth toward their 5-year-old child than fathers who were less concerned about stigma. Furthermore, Golombok, MacCallum, Goodman, and Rutter (2002) found that donor insemination fathers were found to be less involved in the control and discipline of their 12-year-old children than fathers from unassisted-conception families.

An additional concern for families conceived using donated gametes is that of secrecy. Although there appears to be a growing trend toward disclosure in some gamete donation families (Blyth, Langridge, & Harris; 2010; Golombok, Jadva, Lycett, Murray, & MacCallum, 2005; Lycett, Daniels, Curson, & Golombok, 2005), there is a considerable subgroup for whom disclosure rates remain low (Readings, Blake, Casey, Jadva, & Golombok, 2011). Secrecy is thought to be detrimental to family relationships (Finkenauer, Engels, Branje, & Meeus, 2004; Karpel, 1980; Landau, 1998; Schooler & Norris, 2002), with children picking
up on latent clues that information is being withheld from them, for example, through parents’ tone of voice, facial expressions, or avoidance of certain subjects (De Paulo, 1992; Ehrensaft, 2008; Paul & Berger, 2007). Publications from this study based on the mothers and children at age 7 have reported findings of lower mother–child mutuality (warm, well-synchronized, and cooperative interaction) and maternal positivity in donor insemination and egg donation families in which the child was unaware of his or her donor conception in comparison to naturally conceived families (Golombok et al., 2011; Golombok, Blake, Casey, Roman, & Jadva, 2013).

Finally, from the perspective of children in donor insemination families, recent research indicates that the lack of a genetic link with their father does not have serious deleterious effects in and of itself (Bos & van Balen, 2010; Brewaey, 2001; Golombok et al., 2004, 2005, 2006; Owen & Golombok, 2009) but that there may be an increased risk of psychosocial problems for children (Brewaey, Golombok, Naaktgeboren, de Bruyn, & van Hall, 1997; Cook, Vatev, Michova, & Golombok, 1997; Manuel, Facy, Choquet, Grandjean, & Czyba, 1990). In other words, the concerns about increased levels of psychological difficulties in donor insemination fathers and about secrecy, rather than being donor conceived per se, may place children at risk for psychological difficulties.

The present study aimed to address the extent to which donor insemination as a means of creating a family affects parenting and the quality of father–child relationships. The focus was on the influence (if any) of nonbiological fatherhood and the experience of assisted conception on the fathers’ psychological well-being, quality of fathering, and father–child interaction. Because of small sample sizes it was not possible to assess the impact of secrecy versus disclosure directly, although the influence of this factor is considered in the interpretation and discussion of the results.

An advantage of this study is the use of an objective observational measure, which provided an opportunity to examine the quality of interaction between donor insemination fathers and their children for the first time. Observational measures allow a detailed assessment of the quality of dynamic interactions between parents and children that cannot be captured by interview or questionnaire (Aspland & Gardner, 2003; Bakeman & Gottman, 1997; Hartman & Laird, 1990). Two further advantages are the inclusion of a comparison group of egg donation families in which the child is genetically related to the father but lacks a genetic link with the mother, thus controlling for the use of fertility treatment and third party involvement in the child’s conception, and a comparison group of unassisted-conception families in which both parents were genetically related to their children.

We examined the psychological well-being of fathers and the quality of father–child relationships in families with a donor insemination child aged 7 years. Earlier phases of the present study found that use of donor insemination did not appear to jeopardize fathers’ psychological well-being or quality of parenting when the children were aged 1 (Golombok et al., 2004), 2 (Golombok et al., 2005), or 3 (Golombok et al., 2006). Paternal influences on the development of children become more significant as children grow older (Allen, Hauser, O’Connor, & Bell, 2002; Grossman et al., 2002), however, with findings from studies of children in middle childhood showing strong associations between father–child relationships and child adjustment, whereas equivalent associations are not as frequently reported for mothers (Lamb & Lewis, 2010). Potential differences between the biological fathers in unassisted-conception and egg donation families and nonbiological fathers in donor insemination families may become apparent now that the children are age 7. In addition, it is possible that the detrimental effects of secrecy seen in mother–child interaction in this study (Golombok et al., 2011, 2013) will also be reflected in father–child interaction.

On the basis of predictions arising from parental investment and stress-related perspectives, together with the emerging findings relating to donor insemination families, the following three outcomes were hypothesized: (a) donor insemination fathers would show higher levels of psychological problems than unassisted-conception and egg donation fathers; (b) donor insemination fathers would display lower levels of warmth and involvement with their 7-year-old children, particularly in terms of discipline, in comparison to unassisted-conception and egg donation fathers; and (c) there would be more conflictual behavior between fathers and children during the observational task in comparison to unassisted-conception and egg donation fathers and children.
METHOD

Participants

In the first phase of the study, families with a 9- to 12-month-old child conceived through donor insemination and egg donation were recruited through nine fertility clinics throughout the United Kingdom. Parents with an unassisted-conception child (who are both genetically related to the child) were recruited through maternity wards according to the following criteria that maximized comparability with the assisted reproduction families: the child was between 9 and 12 months old, the child resulted from a singleton birth with a minimum of 30 weeks gestation and had no congenital abnormalities, the mother was at least 30 years of age, the child was the mother’s first or second child, the mother was married to or cohabiting with the child’s father, and the pregnancy had been planned. For a detailed description of the initial recruitment procedure, see Golombok et al. (2004). At the first stage of the study, when the children were age 1, 40 fathers with a child conceived by donor insemination, 37 fathers with a child conceived by egg donation, and 52 fathers with an unassisted-conception child participated in the investigation. At age 2, the participation rates were 85%, 76%, and 71%, respectively. At age 3, fathers were not interviewed, but they completed questionnaires. The current phase of the study included 24 donor insemination fathers, 25 egg donation fathers, and 32 fathers from unassisted-conception families when the children were 7 years old, representing 60%, 68%, and 62%, respectively, of the initial sample of fathers when the children were age 1. Using data collected during the first phase of the study, analyses comparing those fathers who are still participating and those who have been lost to follow-up showed no differences in terms of age, socioeconomic status, marital status, or number of children. In addition, no differences were found between participating and nonparticipating fathers in psychological well-being as measured by the Trait Anxiety Inventory (Spielberger, 1983), the Edinburgh Depression Scale (Thorpe, 1993), and the Parenting Stress Index (Abidin, 1990).

Demographic details by family type for the present phase of the study are shown in Table 1. All the children were age 7 years, and there was no difference in the proportion of boys and girls in each group. Unassisted-conception fathers were younger than donor insemination and egg donation fathers, $F(2, 80) = 4.20, p < .05$. The number of children in the family also differed between family types (Fisher’s exact $p = .01$), with unassisted-conception families being more likely than donor insemination

<table>
<thead>
<tr>
<th>Variable</th>
<th>Donor Insemination $(n = 24)$</th>
<th>Egg Donation $(n = 25)$</th>
<th>Unassisted Conception $(n = 32)$</th>
<th>$F$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of father (years)</td>
<td>47.50</td>
<td>47.84</td>
<td>43.06</td>
<td>4.20*</td>
<td>.02</td>
</tr>
<tr>
<td>Child’s gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Fisher’s exact $p$</td>
</tr>
<tr>
<td>Boy</td>
<td>12</td>
<td>16</td>
<td>19</td>
<td>.63</td>
<td></td>
</tr>
<tr>
<td>Girl</td>
<td>12</td>
<td>9</td>
<td>13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Socioeconomic status</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional</td>
<td>8</td>
<td>11</td>
<td>14</td>
<td>.01**</td>
<td></td>
</tr>
<tr>
<td>Managerial/technical</td>
<td>8</td>
<td>7</td>
<td>18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skilled/nonmanual</td>
<td>5</td>
<td>5</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skilled/manual</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of children</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One</td>
<td>8</td>
<td>11</td>
<td>2</td>
<td>.01**</td>
<td></td>
</tr>
<tr>
<td>Two</td>
<td>12</td>
<td>11</td>
<td>25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Three</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married/cohabiting with child’s mother</td>
<td>24</td>
<td>22</td>
<td>32</td>
<td>.051</td>
<td></td>
</tr>
<tr>
<td>Separated/divorced from child’s mother</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < .05.  **p < .01.
and egg donation families to have more than one child. A higher proportion of unassisted-conception families than donor insemination or egg donation families appeared in the top two socioeconomic status categories (Fisher’s exact \( p = .01 \), based on the occupation of the parent with the highest ranking position according to a modified version of the Registrar General’s classification (Office of Population and Census Statistics & Employment Department Group, 1991). This scale ranged from 1 (professional) to 4 (skilled manual), with donor insemination and egg donation families being more spread out among the four categories than unassisted-conception families. The difference between families in terms of marital status approached significance (Fisher’s exact \( p = .051 \)), with all divorced couples belonging to the egg donation group \(( n = 3 )\).

**Disclosure of Gamete Donation**

In the current sample, only 29% of the donor insemination children and 36% of the egg donation children had been told about their donor conception. These figures differ slightly from those reported in other publications from this study because the sample is slightly different (i.e., only data concerning fathers are presented here).

**Procedure**

Data were obtained from fathers by tape-recorded interview and standardized questionnaires and by a videotaped observational task with the child. Researchers trained in the study techniques visited the fathers at home and, in exceptional cases, at work. Not all fathers completed all three measures (i.e., the interview, questionnaires, and observational measure), either because they were interviewed at work and so could not participate in the observational assessment with their child or because the questionnaires were not returned. Thus, all fathers were interviewed \(( N = 81 )\), 68 (84%) completed questionnaires, and 59 (73%) took part in the observational assessment with their child.

**Measures**

*Fathers’ psychological state.* Fathers completed the Trait Anxiety Inventory (Spielberger, 1983) and the Edinburgh Depression Scale (Thorpe, 1993) to assess levels of anxiety and depression, respectively. Both of these measures, for which higher scores represent greater difficulties, have been shown to have good reliability and to discriminate between clinical and nonclinical groups. Fathers also completed the short form of the Parenting Stress Index (Abidin, 1990), a standardized assessment of stress associated with parenting. Subscale scores of Parental Distress, Parent–Child Dysfunctional Interaction, and Difficult Child were obtained, with higher scores indicating greater parenting stress. Test–retest reliability for the total score has been found to be .96 over a 1- to 3-month interval and .65 over 1 year. Concurrent and predictive validity have been demonstrated for the full-length questionnaire, and the short form has been reported to correlate highly with the full-length version.

*Quality of parenting.* Fathers were interviewed using an adaptation of a standardized interview designed to assess quality of parenting (Quinton & Rutter, 1988). This interview procedure has been validated against observational ratings of parent–child relationships in the home, demonstrating a high level of agreement between global ratings of the quality of parenting by interviewers and observers (Quinton & Rutter, 1988). The following ratings were made by the researcher according to standardized coding criteria, taking into account information obtained from both the interview and the researcher’s observations during the visit:

1. **Expressed warmth** was rated on a 6-point scale that ranged from 0 (none) to 5 (high) and was based on the father’s tone of voice, facial expression, and gestures when talking about the child; spontaneous expressions of warmth, sympathy, and concern about the child; and enthusiasm and interest in the child as a person.

2. **Emotional overinvolvement** was rated on a 4-point scale that ranged from 0 (little or none) to 3 (enmeshed) and measured the degree to which family life and the emotional functioning of the father were centered on the child and the degree to which the father was overly concerned about or overprotective toward the child.

3. **Emotional underinvolvement** was rated on a 4-point scale that ranged from 0 (little or none) to 3 (detached/dismissive) and measured the extent to which fathers were
disengaged with respect to the well-being of the child.

4. **Quality of interaction** was rated on a 5-point scale that ranged from 0 (very poor) to 4 (very high) and measured the amount of time that the child and father spent together and the extent to which they enjoyed each other’s company and showed affection to one another.

5. **Control** was rated on a 4-point scale that ranged from 0 (little or no control) to 3 (good control) and was based on the extent to which the father exercised flexible control and authority and set clear boundaries for the child’s behavior.

6. **Criticism** was rated on a 5-point scale that ranged from 0 (no criticism) to 4 (considerable criticism) and was based on the level of the father’s criticism of the child throughout the interview.

7. **Disciplinary indulgence** was rated on a 6-point scale that ranged from 0 (none) to 5 (indulgent) and measured the degree to which the father failed to show consistent attempts to guide the child’s behavior and tended to let the child get away with things.

8. **Disciplinary aggression** was rated on a 6-point scale that ranged from 0 (none) to 5 (abusive) and measured the extent to which the father’s disciplinary style was marked by irritability, loss of temper, and physical punishment.

On the basis of 47 randomly selected interviews that were coded by a second interviewer, interrater reliability for the above variables was found to range from .50 to .80 (Golombok et al., 2011).

**Father–child interaction.** Fathers and children were asked to complete a video-recorded interactive task together: the Co-Construction Task (Steele et al., 2007; Steele, D’Agostino, & Blom, 2005). During a visit to participants’ homes, fathers and children were given a set of wooden building blocks and instructed to build something together, the only stipulations being that they had 5 minutes in which to complete the task and that they should try to use as many of the blocks as possible. The video-recordings were then rated according to a standardized coding system adapted from that of Steele et al. (2005, 2007) by a team of two observers who were blind to family type. Father and child behaviors were rated separately, using both micro-analytic codes (the presence or absence of a target behavior in 10-second segments) and global codes (the level of a target behavior throughout the entire session). Although father–child dyads were given 5 minutes in which to complete the task, they often finished within the 5 minutes, and therefore, to ensure consistency, only the first 3 minutes of the interaction were coded for all father–child dyads. For the micro-analytic coding, in order to account for missing data incurred due to the naturalistic setting (e.g., participants facing away from the camera during a 10-second segment or inaudible speech), the ratings were converted into proportions (percentages) representing the frequency of occurrence of a behavior over the 3-minute period. The following three father nonverbal variables were coded micro-analytically: (a) “looking behavior,” whether the father tried to engage contact with the child by looking directly at him or her (b) “positive facial expression,” the presence of behaviors such as smiling, laughing, and animation; and (c) “negative facial expression,” the presence of behaviors such as frowning and sneering. The following three fathers’ verbal variables were also coded micro-analytically: (d) “response to questions,” verbal responses to comments and questions during the interaction; (e) “asks questions/makes suggestions,” whether the father is actively engaged in the task by making suggestions and asking questions about how to proceed; and (f) “positive verbal reinforcement,” positive words of encouragement or praise. The children’s nonverbal and verbal behavior was coded micro-analytically using the same variables as for fathers (a–e), excluding (f), positive verbal reinforcement. Instead, the children’s behavior was coded for the variable “makes suggestions/takes initiatives,” the extent to which the child attempted to lead the task.

For the global codes, fathers and children were individually rated on a 4-point scale that ranged from 0 (none) to 3 (almost always) on the following four variables, based on observations of the entire interaction: (a) “positive quality of demeanor,” the extent to which the father/child exhibited behaviors that positively influenced the interaction, such as warmth, enjoyment, and praise; (b) “neutral quality of demeanor,” the extent to which the father/child exhibited behaviors such as flatness, disinterest, and lack of reference to the other member of the dyad; (c) “negative quality of demeanor,” the extent
to which the father/child exhibited behaviors that negatively influenced the interaction, such as criticism, anger, and annoyance; and (d) "controlling behavior," the extent to which the father/child was controlling or imposing during the interaction without regard to the input from the other member of the dyad. In line with the procedure recommended by Steele et al. (2005, 2007), each father–child dyad was coded on both the micro-analytic and global coding scheme by two researchers simultaneously. To prevent bias in the coding of the observations, a team of four researchers coded the observations in pairs, working in a rotation to ensure each possible combination of pairs coded an equal proportion of observations; that is, two researchers coded an observation simultaneously. In addition, regular meetings were held to ensure that there was no "drift" in researchers’ interpretation of agreed coding criteria.

RESULTS

We conducted separate multivariate analyses of covariance (MANCOVAs) for the variables relating to fathers’ psychological state, quality of parenting, and father–child interaction. When a significant difference between groups was found, one-way analyses of covariance for each variable were carried out, along with the following two contrasts: (a) donor insemination versus egg donation and (b) donor insemination versus unassisted conception. Correlations were computed to determine whether any relationships existed between the demographic variables and the outcome variables. We used covariates only when there was a significant relationship between a demographic variable and an outcome variable that differed significantly between groups. Thus, age of the father and socioeconomic status were included in the analyses as covariates.

Fathers’ Psychological State

Fathers’ scores on the Trait Anxiety Inventory, the Edinburgh Depression Scale, and the Parenting Stress Index subscale scores of Parental Distress, Parent–Child Dysfunctional Interaction, and Difficult Child were entered into a MANCOVA. Wilks’s lambda was significant $F(10, 118) = 1.91, p < .05$. As shown in Table 2, there was a significant difference between groups for the Parental Distress subscale of the Parenting Stress Index, $F(2, 63) = 4.20, p < .05$. The contrasts showed that this reflected a difference between the donor insemination and egg donation fathers ($p < .01$), and a difference between the donor insemination fathers and unassisted-conception fathers ($p < .05$), with lower levels of parental distress reported by donor insemination fathers than both egg donation and unassisted-conception fathers. The differences between groups were of a medium effect size ($r = .32$ and $r = .38$, respectively; Cohen, 1992). There were no significant differences between family types for the Trait Anxiety Inventory or the Edinburgh Depression Scale.

Quality of Parenting

The interview variables relating to positive aspects of parenting (expressed warmth, emotional overinvolvement, emotional underinvolvement, and quality of interaction) were entered into a MANCOVA. There was no significant difference between family types. Variables relating to the control/discipline aspects of parenting (control, criticism, disciplinary indulgence, and disciplinary aggression) were entered

<table>
<thead>
<tr>
<th>Questionnaire</th>
<th>Donor Insemination</th>
<th>Egg Donation</th>
<th>Unassisted Conception</th>
<th>$F$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trait Anxiety Inventory</td>
<td>32.65&lt;sub&gt;a&lt;/sub&gt;</td>
<td>35.05&lt;sub&gt;a&lt;/sub&gt;</td>
<td>37.00&lt;sub&gt;a&lt;/sub&gt;</td>
<td>0.82</td>
<td>.44</td>
</tr>
<tr>
<td>Edinburgh Depression Scale</td>
<td>4.35&lt;sub&gt;a&lt;/sub&gt;</td>
<td>3.20&lt;sub&gt;a&lt;/sub&gt;</td>
<td>5.64&lt;sub&gt;a&lt;/sub&gt;</td>
<td>1.89</td>
<td>.16</td>
</tr>
<tr>
<td>PSI: Parental Distress</td>
<td>18.60&lt;sub&gt;a&lt;/sub&gt;</td>
<td>22.40&lt;sub&gt;b&lt;/sub&gt;</td>
<td>24.11&lt;sub&gt;b&lt;/sub&gt;</td>
<td>4.20*</td>
<td>.02</td>
</tr>
<tr>
<td>PSI: Parent–Child Dysfunctional Interaction</td>
<td>15.60&lt;sub&gt;a&lt;/sub&gt;</td>
<td>16.50&lt;sub&gt;b&lt;/sub&gt;</td>
<td>18.29&lt;sub&gt;b&lt;/sub&gt;</td>
<td>2.03</td>
<td>.14</td>
</tr>
<tr>
<td>PSI: Difficult Child</td>
<td>20.50&lt;sub&gt;a&lt;/sub&gt;</td>
<td>23.15&lt;sub&gt;a&lt;/sub&gt;</td>
<td>23.11&lt;sub&gt;a&lt;/sub&gt;</td>
<td>0.63</td>
<td>.54</td>
</tr>
</tbody>
</table>

*Note: Means in the same row that do not share subscripts differ at $p < .05$ in the contrasts. PSI = Parenting Stress Index.

*p < .05.*
into a separate MANCOVA. Again, no significant difference was found between family types.

**Father – Child Interaction**

The micro-analytic variables from the Co-Construction Task of fathers’ verbal variables (response to questions, asks questions/makes suggestions, and positive verbal reinforcement), fathers’ nonverbal variables (looking behavior, positive facial expression, negative facial expression), children’s verbal variables (response to questions, asks questions, and makes suggestions/takes initiatives), and children’s nonverbal variables (looking behavior, positive facial expression, negative facial expression) were entered into four separate MANCOVAs. No significant differences were found according to family type.

As shown in Table 3, the global variables from the Co-Construction Task of positive quality of demeanor, neutral quality of demeanor, negative quality of demeanor, and controlling behavior were entered into a MANCOVA for fathers and children separately. There were no significant differences between groups for fathers. For the children’s variables, Wilks’s lambda was significant, $F(8, 102) = 2.75, p < .01$. One-way analyses of covariance showed a significant difference between family types in negative quality of demeanor, $F(2, 54) = 4.23, p < .05$ (see Table 3). This reflects a difference between the donor insemination children and the egg donation children ($p < .05$) and between the donor insemination children and the unassisted-conception children ($p < .05$), with the donor insemination children displaying greater negativity than both the egg donation and the unassisted-conception children. The differences between groups were of a medium effect size ($r = -0.35$ and $r = -0.31$, respectively; Cohen, 1992); however, as shown in Table 3, all groups scored between 0 (none) and 1 (few), indicating that donor insemination children did not display particularly high levels of negativity. Instead, the children in egg donation and unassisted-conception families displayed particularly low levels. There were no differences between family types for positive quality of demeanor, neutral quality of demeanor, or controlling behavior.

**DISCUSSION**

Contrary to the hypothesized negative effects of nongenetic fatherhood in donor insemination families, fathers of 7-year-old children conceived by donor insemination did not differ from fathers of children conceived by egg donation or from fathers of unassisted-conception children with respect to the quality of their relationship with their child. Donor insemination fathers were found to display equally high levels of warmth and involvement with their children as genetically related fathers in egg donation and unassisted-conception families. It is important to note that donor insemination fathers did not differ from egg donation and unassisted-conception fathers in the control and discipline of their children, challenging claims that fathers with a genetically unrelated child may be less likely to engage in disciplinary aspects of parenting (Brewaey, Ponjaert, et al., 1997; Golombok, MacCallum, et al., 2002). The findings from the interview were supported by the results from the observational assessment of father–child interaction, in which no group differences were identified for any of the fathers’ variables. This finding is in line with earlier phases of the study that showed that donor insemination fathers did not differ from fathers in egg donation and unassisted-conception families with respect to warmth toward or control of their child (Golombok et al., 2004, 2005, 2006).

<table>
<thead>
<tr>
<th>Global variable</th>
<th>Donor Insemination (n = 21)</th>
<th>Egg Donation (n = 17)</th>
<th>Unassisted Conception (n = 21)</th>
<th>$F$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child positive quality of demeanor</td>
<td>$1.38_a$</td>
<td>$1.65_a$</td>
<td>$1.57_a$</td>
<td>1.34</td>
<td>.27</td>
</tr>
<tr>
<td>Child neutral quality of demeanor</td>
<td>$0.57_a$</td>
<td>$0.88_a$</td>
<td>$0.71_a$</td>
<td>0.47</td>
<td>.63</td>
</tr>
<tr>
<td>Child negative quality of demeanor</td>
<td>$0.71_a$</td>
<td>$0.29_b$</td>
<td>$0.14_b$</td>
<td>4.23</td>
<td>.02</td>
</tr>
<tr>
<td>Child controlling behavior</td>
<td>$1.00_a$</td>
<td>$0.82_a$</td>
<td>$0.43_a$</td>
<td>2.88</td>
<td>.07</td>
</tr>
</tbody>
</table>

*Note: Means in the same row that do not share subscripts differ at $p < .05$ in the contrasts.*

*p < .05*
These findings challenge the predictions, derived from both Parental Investment Theory and stress-related perspectives, that donor insemination fathers would show poorer relationships with their genetically unrelated children than would egg donation and unassisted-conception fathers with their genetically related children. Instead, the findings may be accounted for by Compensation Theory (Hamilton et al., 2007), which has been offered as an explanation for the similarly high levels of investment in children by adoptive and biological parents. Unlike adoptive fathers, donor insemination fathers do not need to counterbalance the effects of the child’s negative preplacement experiences (Hamilton et al., 2007); however, donor insemination fathers share with adoptive parents the experience of existing outside traditional notions of parenthood and thus may feel compelled to substantiate their role and competency as fathers by increasing their parenting efforts. This may mitigate the absence of a genetic connection with the child that might otherwise compromise the quality of fathering. Donor insemination fathers, like adoptive fathers, have pursued a long and arduous route to parenthood, which may intensify their commitment to creating a positive family environment when a child eventually arrives (Kirk, 1984). In contrast to stepfathers, who become members of a preexisting family in which children have been and may continue to be parented by their biological father, donor insemination fathers regard their children as their own (Golombok, MacCallum, et al., 2002).

With respect to fathers’ psychological well-being, the hypothesized findings of higher levels of anxiety and lower levels of self-esteem in assisted-conception fathers, which have been reported in other studies (Cohen et al., 2001; Hjelmstedt et al., 2003), were not found here. Indeed, the only difference in psychological well-being reflected lower levels of stress associated with parenting for donor insemination fathers than for fathers in both egg donation and unassisted-conception families. This finding may reflect the end result of a rigorous screening process; infertility treatment can be highly stressful, and those who sustain treatment are likely to be psychologically resilient in character (Hamilton et al., 2007; Repokari et al., 2005). In fact, Olivius, Friden, Borg, and Bergh (2004) noted that the most common reason given for discontinuing assisted-reproduction treatment was psychological distress. That donor insemination fathers scored lower in terms of parenting stress than fathers in egg donation families, who are also part of a couple who have experienced infertility, suggests that men who become fathers using donor insemination may be those who possess particular psychological strengths. Nevertheless, it is important to point out that the donor insemination fathers differed from fathers in the other family types on only one subscale of the Parenting Stress Index.

Of particular interest are the observations of the children during interaction with their father. Children who had been conceived using donor insemination were rated as displaying greater negativity toward their father than children in both egg donation and unassisted-conception families. It should be noted, however, that this difference reflects particularly low levels of negativity among the egg donation and unassisted-conception children rather than high levels of negativity among the donor insemination children. It is possible that the higher levels of negativity displayed by the donor insemination children when interacting with their father may be associated with the absence of a genetic connection between them. A more likely explanation, however, is that this finding may reflect a higher level of secrecy among the donor insemination families, which has been associated with less positive mother–child relationships in gamete donation families where the parents have not disclosed the donor conception to the child (Golombok et al., 2011; Golombok, Brewaeys, et al., 2002; Lycett, Daniels, Curson, & Golombok, 2004). Children are sensitive to information being withheld from them, picking up on clues such as parents’ tone of voice, facial expressions, or avoidance of certain subjects (Ehrensaft, 2008; Jadva, Freeman, Kramer, & Golombok, 2009; Paul & Berger, 2007). In the present sample, only 29% of the donor insemination children were aware of their donor conception. Family secrets have been shown to interfere with communication between family members, in particular between those who know the secret and those who do not (Papp, 1993). Thus, it is conceivable that secrecy about the child’s donor conception may have influenced father–child communication and had subtle effects on children’s interaction with their father.

This study was limited by the small sample size, which is characteristic of studies of gamete
donation families and due in part to the inevitable loss of participants in a longitudinal study design. This was particularly restrictive with regard to exploring the impact of secrecy versus disclosure about the child’s donor conception, although the impact of secrecy versus disclosure on mother–child interaction has been examined in previous publications (Golombok et al., 2011, 2013). Reasons were not given by all nonparticipating fathers as to why they had declined to take part; however, this was often due to fathers’ work commitments. The recruitment and retention of fathers in family studies and studies of assisted-reproduction families in particular is a common problem (Mitchell et al., 2007; Newton & Houle, 1993). Although those who remained in the study when the children were age 7 may differ in important ways from those who were lost to follow-up, no differences were found between participating and nonparticipating fathers with respect to demographic characteristics or questionnaire measures of psychological adjustment when the children were age 1.

An advantage of the present study was the use of an observational measure that produced a detailed, objective assessment of the dynamics of the father–child relationship. Assisted-reproduction parents may feel more inhibited than unassisted-conception parents in expressing regret and may feel a low sense of entitlement to complain (Hammarberg, Fisher, & Wynter, 2008). They may also tend to present themselves in a positive light in an effort to counter the negative attitudes toward nontraditional family forms (Golombok et al., 2004). Observational assessments are less influenced than other measures by socially desirable responding, because it is difficult to “fake good” with an observational measure.

The findings from the present study add to the comparatively small body of in-depth data on the dynamics of nongenetic fatherhood in terms of both the quality of parenting and father–child interaction. Despite predictions of poorer outcomes for fathers and children in donor insemination families (who lack a genetic connection) than for fathers in children in egg donation and unassisted-conception families (between whom the genetic link is intact), the results indicate that donor insemination fathers are just as involved and warm in their parental role. It would seem that the desire for and commitment to parenthood may be more important than genetic relatedness for positive fathering of donor insemination children of early school age. It will be important to follow up with these families as the children reach adolescence, particularly in light of the finding of greater negativity toward their father displayed by donor insemination than egg donation and unassisted-conception children. Adolescence represents a transitional point in child development at which stresses associated with family structure may be felt more acutely (Hetherington & Stanley-Hagan, 2002). Fathers’ roles may shift over time, too, with the effects of fathers’ behaviors and father–child relationships becoming stronger as children grow older (Cabrera, Fitzgerald, Bradley, & Roggman, 2007).

REFERENCES


