

Child development and quality of parenting in lesbian families: no psychosocial indications for a-priori withholding of infertility treatment. A systematic review

J.A.M.Hunfeld¹, B.C.J.M.Fauser, I.D.de Beaufort and J.Passchier

Department of Medical Psychology and Psychotherapy, Netherlands Institute of Health Sciences (NIHES), Center of Reproductive Medicine, Department of Medical Ethics, Erasmus Medical Center, Rotterdam, The Netherlands

¹To whom correspondence should be addressed at: Department of Medical Psychology and Psychotherapy, Erasmus Medical Center, Postbox 1738, Room Cf 308, 3000 DR Rotterdam, The Netherlands; E-mail: hunfeld@mpp.fgg.eur.nl

Among fertility centres, much discussion focuses on whether to withhold infertility treatment from special patient groups (lesbians, prospective single parent(s), prospective parent(s) of relatively advanced age, or with severe diseases) because it is assumed that this is in the best interest of the child. The present study aimed to establish whether there is any empirical evidence for this assumption. A literature search was made in PubMed/Medline and PsycINFO to identify studies that had assessed psychological outcomes of children and quality of parenting after infertility treatment. Eight studies met the following inclusion criteria: published in an English-language peer-reviewed journal between 1978 and 2002, and focused on psychosocial child development and quality of parenting after infertility treatment in the above-mentioned special patient groups. All reviewed studies focused on lesbian or single-parent families. Overall, the methodological quality of studies as assessed by a standardized set of criteria was high. The evidence of the studies (assessed by the best evidence synthesis method) was strong for the conclusion that in lesbian families the psychosocial development of children (median age 6.1 years) and the quality of parenting are not different from those in healthy heterosexual two-parent families after infertility treatment or natural conception. Therefore, withholding infertility treatment from lesbian families on the assumption that such intervention may not be in the interest of the prospective child seems unjustified. For the other special patient groups, no conclusions could be drawn, because of a lack of relevant studies.

Keywords: child development/infertility treatment/lesbian families/quality of parenting/systematic review

TABLE OF CONTENTS

Introduction
Methodology
Results
Discussion and recommendations
References
Appendices

Introduction

Fertility centres are increasingly confronted with requests for infertility treatment from special patient groups. For example, the request of lesbian couples, prospective single parents, prospective parent(s) (male or female) of relatively advanced age (>55 years), or with disabilities or severe diseases due to familial congenital abnormalities.

In the year 2000, the Dutch government criticized the authorized Dutch fertility centres ($n=12$), because some withheld infertility treatment from lesbians (four centres) or from single females (eight centres). These policies may not be

in agreement with the general equality of treatment act (in force in the Netherlands since 1994) that prohibits direct or indirect discrimination on the grounds of religion, philosophy of life, ideology, political persuasion, race, sex, nationality, civilian status, and sexual orientation (Van Craaicamp and Oosting, 2000). In the Dutch centres, and in similar fertility centres abroad, the main reason for withholding infertility treatment is that such interventions may not be in the interest of the prospective child (Blyth, 1990; Blyth and Cameron, 1998). Often, the implicit assumption is that it is better for children to be born into a family with both father and mother of comparable, relatively young age and without (a predisposition for) disabilities or severe diseases. In the case of lesbians, the absence of the father is considered to increase the risk of gender identity confusion and less conventional gender role behaviour, which may be considered unfavourable (Falk, 1989; Green, 1992; Patterson, 1992). Moreover, it is sometimes assumed that lesbians are emotionally unstable or unable to assume a maternal role (Falk, 1989), which might also impair the child's development.

However, to date no study could identify any adverse effect of lesbian motherhood on child development or quality of parenting (Falk, 1989; Golombok, 1998; Brewaeys, 2001; Baetens and Brewaeys, 2001). Currently, no data are available to either refute or support the policy to provide infertility treatment to prospective parent(s) of relatively advanced age, or with disabilities or severe diseases due to familial congenital abnormalities. There are no or few (case report) studies concerning these groups. It has been reported (Collins, 1999) that women with disabilities are sometimes devalued as sources of reproduction. They are perceived as needing and requiring care and may, therefore, be unsuitable for the nurturant reproductive roles considered appropriate for females. In addition, a sick or disabled mother, sometimes with a compromised life expectancy, may be a burden for the child. However, there is no empirical evidence to support these statements.

Some gynaecologists refer to their medical autonomy and responsibility, stating that they make decisions regarding treatment of special patient groups after extensive evaluation. Their rationale for this attitude is that the outcome of such interventions is not well evaluated in the scientific literature.

The main problem with regard to past reviews is that they are narrative (Gibbs, 1988; Falk, 1989; Golombok and Tasker, 1994; Brewaeys, 1996; Fitzgerald, 1999; Baetens and Brewaeys, 2001); that is, no quantitative assessments have been made of the methodology and the strength of evidence according to a set of standardized criteria (as is used in systematic reviews). No firm conclusions could therefore be drawn. In addition, a systematic review enables the identification of topics which have sufficient and consistent evidence and those that need additional study. Moreover, such a review is of the utmost importance for a better understanding of the moral and legal issues central to the public debate with regard to reproductive technologies. It will help to distinguish between moral questions '*per se*', and the interpretation of facts related to moral questions (the weighing of facts).

In areas of research with expertise in performing systematic reviews (e.g. randomized controlled clinical trials in pain research), it is recommended that two evaluative dimensions of the reviewed studies be considered: (i) the strength of the evidence (strong, moderate, limited, inconclusive); and (ii) the outcome of the study (positive versus negative) (Mior and Nielson, 2001). Therefore, in this report procedures of systematic reviews were applied in order to evaluate the methodology, the outcome and the strength of the evidence of the selected studies to address the question: is there empirical evidence for the assumption that the psychosocial development of the child and quality of parenting after infertility treatment in a special patient group differ from that in a healthy heterosexual two-parent family, particularly with respect to behavioural problems?

Methodology

Selection of eligible studies

Studies were selected which met the following criteria:

1. Published in the English language between 1978 (the first IVF baby) and May 2002.
2. Published in a peer-reviewed journal. Reviews in journals and books were used only to discuss the findings of the current review.

3. Focused on psychosocial child development and quality of parenting in special patient groups (lesbians, single parents, parent(s) (male or female) of relatively advanced age, or with disabilities or severe diseases) after infertility treatment.

Child development was operationalized as psychological, social and sexual development, and quality of parenting as parent-child interaction, emotional involvement, warmth and disciplinary issues. Any study was added in which these concepts were used relative to either child development or quality of parenting. Both assessors therefore read the abstract or the methods section of candidate studies.

Electronic databases (PubMed/Medline, PsycINFO) and the snowball method (citations in articles reviewed) were used to identify candidate studies. The search terms 'child development' and 'quality of parenting' were successively combined with the search terms 'infertility treatment', 'reproductive technology', 'in-vitro fertilization', 'artificial insemination by donor', 'oocyte donation', 'frozen sperm donation' and 'frozen oocyte donation'.

Study quality assessment

Study quality was assessed according to a standardized and validated set of criteria based on the protocols of the Cochrane Database of Systematic Reviews as used in randomized controlled trials (Sackett *et al.*, 1991; Von Korff, 1994; Cole and Hudak, 1996; Jadad *et al.*, 1996; Borghouts, 1998; Ezzo *et al.*, 2000; Geurts *et al.*, 2001), and modified to cover the case-control design of the studies included in this review:

1. Comparison group(s). The presence of at least one comparison group, representative for the most prevalent family type (i.e. heterosexual two-parent family).
2. Sample size. Based on power analysis ($\alpha=0.05$, power=0.80, Cohen's $d=8$, i.e. a large difference between the groups), a sample size of more than 25 participants per comparison group was required.
3. Sample selection. A random selection strategy should be employed.
4. Design. The investigation should be case-controlled and based on quantitative information.
5. Outcome measures. These should be standardized, reliable and valid and cover the child's development and quality of parenting.
6. Statistical analyses. Hypothesis testing using appropriate statistical analyses should be performed on the most important outcome measures.

These six criteria were assessed and scored independently by two research psychologists (J.A.M.H. and J.P.). A score of 1 (criterion met) or 0 (criterion not met) was used, leading to a total maximum score of 6 points per study. Inter-reviewer disagreement was solved by discussion leading to a uniform score. Scores of 0 to 3 points were taken to indicate studies of low quality, and scores of 4 to 6 studies of high quality (Sackett *et al.*, 1991; Von Korff, 1994; Cole and Hudak, 1996; Jadad *et al.*, 1996; Borghouts, 1998; Ezzo *et al.*, 2000; Geurts *et al.*, 2001). This assessment was performed for each comparison group that was included in any of the reviewed studies.

Outcome assessment

Because only eight studies met the selection criteria, a meta-analysis (whereby statistical data of the studies are pooled and tested between groups), could not be performed. Instead, a best

evidence synthesis method (Slavin, 1995) as used in other systematic reviews (Ezzo *et al.*, 2000; Van Tulder *et al.*, 2000; Geurts *et al.*, 2001) was applied. This consists of four levels of scientific evidence:

1. Strong evidence: more than one relevant high-quality study with generally consistent outcomes.
2. Moderate evidence: one relevant high-quality study and one (or more) relevant low-quality study(ies) with generally consistent outcomes.
3. Limited evidence: one relevant high-quality study or more than one relevant low-quality studies with generally consistent outcomes.
4. Inconclusive evidence: one relevant low-quality study, no relevant studies, or studies with inconsistent outcomes.

Relevant is defined as using appropriate outcome measures for child development and quality of parenting. A 'generally consistent outcome' is defined as a situation in which 75% of the studies agree on the result that there are no differences between case and control (comparison) groups on child development or quality of parenting (Ezzo *et al.*, 2000; Van Tulder *et al.*, 2000; Geurts *et al.*, 2001).

The impact of the special patient group on the child's development and quality of parenting was considered separately and classified as having either a significant positive or negative effect or a significant effect but not in favour of or against the special patient group, or no significant effect.

Results

Child development

In the PubMed/Medline search, 21 records were found on 'child development' and 'infertility treatment', 76 records combined with 'reproductive technology', 45 records combined with 'in-vitro fertilization', 15 records combined with 'artificial insemination by donor', three records combined with 'oocyte donation', two records combined with 'frozen sperm donation', and no records combined with 'frozen oocyte donation.' Of these 162 records, eight studies met the criteria for inclusion. The excluded studies focused on medical, legal, or ethical issues of infertility treatment, the child's physical and motor development, heterosexual two-parent families after infertility treatment, the impact of different infertility treatments on child development, were published in a language other than English, or overlapped. In the PsycINFO search no records were found using our search terms. Table I summarizes the eight selected studies (Golombok *et al.*, 1983, 1997; McCandlish, 1987; Flaks *et al.*, 1995; Tasker and Golombok, 1995; Brewaeys *et al.*, 1997; Chan *et al.*, 1998; Gartrell *et al.*, 2000) dealing with the impact of special patient groups on psychosocial child development. The methodological details of these eight studies are presented in Appendix A. All reviewed studies focused on lesbian or single parents; no studies were carried out on parent(s) of relatively high age, or with severe diseases. At the time of assessment the median age of the children across all studies was 6.1 (range 1.5–23.5) years. Thus, most studies focused on prepubertal children, ranging in age from 1.5 to 9 years (McCandlish, 1987; Flaks *et al.*, 1995; Brewaeys *et al.*, 1997; Golombok *et al.*, 1997; Chan *et al.*, 1998; Gartrell *et al.*, 2000) and only three studies assessed the sexual orientation of

(post)pubertal children (Golombok *et al.*, 1983; Tasker and Golombok, 1995; Gartrell *et al.*, 2000).

The assessment of the six methodological aspects and the quality standard of each study are presented in Table II. Two studies used no comparison group(s) (McCandlish, 1987; Gartrell *et al.*, 2000). In the remaining studies, the comparison group(s) varied between heterosexual two-parent families, with only two studies using heterosexual two-parent families after infertility treatment (Brewaeys *et al.*, 1997; Chan *et al.*, 1998), heterosexual single parent families (Golombok *et al.*, 1983, 1997; Tasker and Golombok, 1995) and the general population norm, based on a questionnaire (Golombok *et al.*, 1983, 1997; Flaks *et al.*, 1995; Tasker and Golombok, 1995; Brewaeys *et al.*, 1997; Chan *et al.*, 1998). The sample size of four studies (including two studies with more than one comparison group and one study with three comparison groups, two of which were of sufficient sample size) was below the criterion of more than 25 participants (McCandlish, 1987; Flaks *et al.*, 1995; Tasker and Golombok, 1995; Chan *et al.*, 1998). All but one study (Brewaeys *et al.*, 1997) used selected, volunteer samples (friends, colleagues, advertisements and single or lesbian parent organizations). One study employed no quantitative research design (McCandlish, 1987). Except for two studies (McCandlish, 1987; Gartrell *et al.*, 2000), all studies used reliable and valid instruments to assess the outcomes, including multiple instruments (interviews and questionnaires or more than one questionnaire measuring the same concept) (Golombok *et al.*, 1983, 1997; Flaks *et al.*, 1995; Tasker and Golombok, 1995; Brewaeys *et al.*, 1997; Chan *et al.*, 1998). Behaviour problems, psychosocial development and peer relationships were most frequently reported as primary outcomes. To assess these variables, most studies used either the Child Behavior Checklist (CBCL; Achenbach *et al.*, 1987; Achenbach, 1991a,b) (Flaks *et al.*, 1995; Brewaeys *et al.*, 1997; Chan *et al.*, 1998) or a standardized interview (Golombok *et al.*, 1983, 1997). Six of the eight studies used statistical analysis on the most important outcomes (Golombok *et al.*, 1983, 1997; Flaks *et al.*, 1995; Tasker and Golombok, 1995; Brewaeys *et al.*, 1997; Chan *et al.*, 1998).

Based on the methodological assessment and the cut-off for quality assessment (sum score of ≤ 3) (Sackett *et al.*, 1991; Von Korff, 1994; Cole and Hudak, 1996; Jadad *et al.*, 1996; Borghouts, 1998; Ezzo *et al.*, 2000; Geurts *et al.*, 2001), three studies (including one study with two comparison groups) were of low quality (McCandlish, 1987; Tasker and Golombok, 1995; Gartrell *et al.*, 2000). The study by McCandlish did not meet any of the assessment criteria; Tasker and Golombok used a comparison group that did not meet our assessment criteria (i.e. not representative for the most prevalent family type), too small a sample size and a sample consisting of volunteers; and Gartrell *et al.* had no comparison group, a volunteer sample and used only descriptive statistics. The remaining studies were of high quality, based on the use of representative comparison groups, sufficient sample size, a quantitative design, appropriate, valid and reliable outcome measures, and adequate statistical analysis (Golombok *et al.*, 1983, 1997; Flaks *et al.*, 1995; Brewaeys *et al.*, 1997; Chan *et al.*, 1998) (see Table II). Although the methodological quality of the studies varied, the results across all studies are consistent in that they report that being born in a lesbian family after infertility treatment has no significant negative impact on the child's psychosocial development.

Table I. Overview of the studies ($n=8$) examining the psychosocial and sexual development of the child born after infertility treatment

Author	Groups	Selection	Results
Golombok <i>et al.</i> (1983)	(a) Lesbian families ($n=27$) Children ($n=37$: 13 m; 24 f); mean age: 9.3 yrs Conception mode: AID ¹ ($n=1$); Rest: not specified (b) Heterosexual single parent (mother) ($n=27$) Children ($n=38$: 24 m; 14 f); mean age: 10 yrs Conception mode: not specified (c) Norm group: general population, for the comparison with psychosexual development Conception mode: not specified	Advertisement, Single-parent organizations	Positive significance ² Children of (a) had no enuresis problems (assessed as part of psychiatric problems) versus 6 children of (b) No significance No differences between children of (a) and (b) in (interview): Psychosexual development; Quality of peer relationships; Emotional and conduct difficulties; Hyperactivity; Unsociability; Psychiatric referral No differences between children of (a), (b) and (c) in (interview): Psychosexual development (personal communication)
McCandlish (1987)	Lesbian families ($n=5$); children ($n=7$: 5 m; 2 f); Age range: 1.5–7 yrs Conception mode: AID ¹ No comparison group	Friends Acquaintances	All children who were able to talk evidenced healthy gender identity and knowledge of gender differences; no behavioural problems were reported by the parents or noted in the interview
Flaks <i>et al.</i> (1995)	Lesbian families ($n=15$); Children ($n=15$: 7 m; 8 f); mean age: 5.8 yrs Conception mode: AID ¹ (b) Heterosexual two-parent families ($n=15$) Children ($n=15$: 7 m; 8 f); mean age: 5.8 yrs Conception mode: not specified (c) Norm group: general population (normal and clinical sample) Conception mode: not specified	Lesbian mother support group; Advertisements; Women's Organizations Gay, lesbian parenting groups	Positive significance ³ Children of (a) and (b) had less behavioural problems and more social competence versus children of (c) (CBCL) ⁴ No significance No differences between children of (a) and (b) in (CBCL) ⁴ : Internalizing problems; Externalizing problems; Total Behaviour Problems; Social competence; Adaptive functioning; Cognitive functioning (WISC-R ⁵ , WPPSI-R ⁶)
Tasker and Golombok (1995)	(a) Children of lesbians: $n=15$: (8 m; 17 f) Mean age: 23.5 yrs Conception mode: AID ¹ ($n=1$); Rest: not specified (b) Children of heterosexual single mothers and stepfathers: ($n=21$: 12 m; 9 f) mean age: 23.5 yrs Conception mode: not specified (c) Norm group: general population Conception mode: not specified	Mothers by advertisements; children contacted via their mother	Significance ⁷ Young adults of (a) were more likely to have considered the possibility of becoming involved in a same gender sexual relationship and were involved in a same-gender sexual relationship more often versus young adults of (b) No significance No differences between young adults of (a) and (b) in (interview): Peer relationships; Sexual orientation; Seeking professional help No differences between young adults of (a) and (b) and working males and females (age 19–39 yrs) of (c) in: Anxiety (STAI) ⁸ and Depression (BDI) ⁹
Breweaeyns <i>et al.</i> (1997)	(a) Lesbian families ($n=30$) Children ($n=30$: 15 m; 15 f); mean age: 5 yrs Conception mode: AID ¹ (b) Heterosexual families ($n=38$) Children ($n=38$: 26 m; 12 f); mean age: 5 yrs Conception mode: AID ¹ (c) Heterosexual families ($n=30$) Children ($n=30$: 11 m; 19 f); mean age: 5 yrs Conception mode: natural conception (d) Norm group: general population Conception mode: not specified	Fertility depts Brussels/Leiden	No significance No differences in children of (a), (b) and (c) in preschool activities (feminine versus masculine behaviour) (PSAI) ¹⁰ No differences between (a), (b), (c) and (d) in: Total Behaviour Problems (CBCL) ⁴

Author	Groups	Selection	Results
Golombok <i>et al.</i> (1997)	(a) Lesbian mothers ($n=30$): Couples: $n=15$; singles: $n=15$ Children ($n=38$); sex: not specified Mean age: 6 yrs Conception mode: AID ¹ (b) Single heterosexual families ($n=42$) Children ($n=38$); sex: not specified Mean age: 6 yrs Conception mode: not specified (c) Heterosexual two-parent families ($n=41$) Children ($n=38$); sex: not specified Mean age: 6 yrs Conception mode: not specified	Advertisement Two-parent heterosexual families: maternity ward records	Negative significance ¹¹ Children of (a) and (b) perceived themselves as less cognitive and physically competent than children of (c) (PPCSAC) ¹² No significance No differences between children of (a), (b) and (c) in (interview): Psychiatric state; Perceived maternal acceptance; Perceived peer acceptance No differences between children of (a) and (b) in: Perceived cognitive competence (PPCSAC) ¹² ; Perceived physical competence (PPCSAC) ¹²
Chan <i>et al.</i> (1998)	Lesbian families: $n=55$: (ai) Couples: $n=34$; (aii) singles: $n=21$ Children ($n=55$: 37 m; 18 f); mean age: 7 yrs Conception mode: AID ¹ (b) Heterosexual families: $n=25$: (bi) Couples: $n=16$; (bii) singles: $n=9$ Children ($n=25$: 17 m; 8 f); mean age: 7 yrs Conception mode: AID ¹ (c) Norm group: general population Conception mode: not specified	Clients of the Sperm Bank of California	No significance No differences between children of (a), (b), and (c), (ai) versus (bi), and (aai) versus (bai) in (CBCL) ⁴ : Internalizing problems; Externalizing problems; Total Behaviour Problems; Social competence; Adaptive functioning
Gartrell <i>et al.</i> (2000)	Lesbian families ($n=84$): Couples: $n=70$; singles: $n=14$ Children ($n=85$): sex: not specified Mean age: 5 yrs Conception mode: AID ¹ No comparison group	Advertisements	83% ($n=150$) of the mothers: no concerns about their child's health or development 87% ($n=74$) of the children were described as relating well to their peers

m = male f = female

¹Artificial insemination by donor.

²Outcome in favour of the lesbian-parent family.

³Outcome in favour of the lesbian and single-parent family.

⁴The Child Behavior Checklist.

⁵The Wechsler Intelligence Scale for Children - Revised.

⁶The Wechsler Preschool and Primary Scale of Intelligence - Revised.

⁷Outcome neither in nor out of favour of lesbian- or single-parent family.

⁸The State Trait Anxiety Inventory (Spielberger, 1983).

⁹The Beck Depression Inventory (Beck and Steer, 1987).

¹⁰The Preschool Activity Inventory (Golombok and Rust, 1993).

¹¹Outcome not in favour of lesbian- or single-parent family.

¹²The Pictorial Scale of Perceived Competence and Social Acceptance for young Children (Harter and Pike, 1984).

Of the six studies using a comparison group, all (100%) reported no significant differences for the main outcome measures in child development in lesbian families compared with child development in single mother families (Golombok *et al.*, 1983, 1997; Tasker and Golombok, 1995), the norm group of the general population (Golombok *et al.*, 1983; Flaks *et al.*, 1995; Tasker and Golombok, 1995; Brewaeys *et al.*, 1997; Chan *et al.*, 1998), or heterosexual two-parent families (Flaks *et al.*, 1995; Brewaeys *et al.*, 1997; Golombok *et al.*, 1997; Chan *et al.*, 1998). Two of these six studies (33%) found that some variables (but not the primary outcome) had a positive significant difference, i.e. in favour of child development with lesbian couples (Golombok *et*

al., 1983; Flaks *et al.*, 1995). None of the children in these lesbian families had any problems with enuresis, compared with six children of the heterosexual single-parent families. One study (17%) found one negative significant difference, i.e. not in favour of child development in lesbian or single-parent families; the children of these father-absent families perceived themselves as less cognitive and less physically competent than children of father-present families (Golombok *et al.*, 1997). One study (17%) reported a significant difference neither in favour of nor against the lesbian families, i.e. young adults of lesbian families were more likely to have considered the possibility of becoming involved in a same-gender sexual relationship or were involved in

Table II. Assessment of the quality of studies on psychological development of children born after infertility treatment (0 = criterion not met; 1 = criterion met) per comparison group (see Methods for details of assessment)

Author, year of publication	Comparison group	Sample Size	Sample Selection	Design	Outcome measures	Statistical analysis	Sum score	Quality
Golombok <i>et al.</i> (1983)	L ¹ versus HSM ²	0	1	0	1	1	4	H ³
	L versus NGP ⁴	1	1	0	1	0	4	H
	HSM versus NGP	1	1	0	1	0	4	H
McCandlish (1987)	No comparison group	0	0	0	0	0	0	L ⁵
Flaks <i>et al.</i> (1995)	L versus HTF ⁶	1	0	0	1	1	4	H
	L versus NGP	1	0	0	1	1	4	H
Tasker and Golombok (1995)	L versus HSM ⁷	0	0	0	1	1	3	L
	L versus NGP	1	0	0	1	0	3	L
Brewaeys <i>et al.</i> (1997)	L versus HTF-NC ⁸	1	1	1	1	1	6	H
	L versus HTF-AID ⁹	1	1	1	1	1	6	H
	L versus NGP	1	1	1	1	1	6	H
Golombok <i>et al.</i> (1997)	HSM/L versus HTF	1	1	0	1	1	5	H
	L versus HSM	0	1	0	1	1	4	H
Chan <i>et al.</i> (1998)	L versus HF ¹⁰ -AID	1	0	0	1	1	4	H
Gartrell <i>et al.</i> (2000)	L versus NGP	1	1	0	1	1	5	H
	C versus S ¹¹	1	1	0	1	1	5	H
	No comparison group	0	1	0	1	0	3	L

¹Lesbians.

²Heterosexual single mothers.

³High-quality study (sum score >3).

⁴Norm group general population regarding sex role behaviour.

⁵Low-quality study (sum score ≤3).

⁶Heterosexual two-parent families.

⁷Most children of HSM families had lived with a stepfather.

⁸Naturally conceived.

⁹Artificial insemination by donor.

¹⁰Heterosexual families (couples and singles).

¹¹Couples versus singles.

a same-gender relationship more often (Tasker and Golombok, 1995).

According to the criteria of the best evidence synthesis method (Slavin 1995), there is strong evidence for the conclusion that the psychosocial and sexual development of the prepubertal child born after infertility treatment and raised by lesbian parents is not different from that of children of heterosexual two-parent families or the general population norm.

Regarding the other special patient groups, and the sexual orientation of the children of lesbian couples, too few studies or studies of insufficient quality according to the assessment criteria were available to draw conclusions from the evidence analysis with regard to our research question.

Quality of parenting

In the PubMed/Medline search four records were found on 'quality of parenting' and 'infertility treatment', 13 combined with 'reproductive technology', nine combined with 'in-vitro fertilization', four combined with 'artificial insemination by donor', two combined with 'oocyte donation', and no records combined with frozen sperm donation or frozen oocyte donation; of these 32 records, the same eight studies described in the previous section fulfilled the criteria of the current review on quality of parenting. The excluded studies focused on heterosexual two-parent families, the impact of (non-)disclosure (telling the child that it was conceived by infertility treatment) or twins

conceived by infertility treatment on family functioning, legal issues (child custody issues) or overlapped. In the PsycINFO search, no records were found on the search terms related to our topic. The data of the eight reviewed studies are summarized in Table III; methodological details of these studies are presented in Appendix B.

Table IV presents the assessment of the six methodological aspects and the quality standard of each study. Several outcome measures for quality of parenting were used (i.e. parent-child interaction, emotional involvement, warmth, parenting skills, family relationships), of which parent-child interaction was reported most frequently as primary outcome measure (McCandlish, 1987; Brewaeys *et al.*, 1997; Golombok *et al.*, 1997; Chan *et al.*, 1998). To assess parent-child interaction all but one study used (standardized) interviews and one study administered the Parenting Stress Index (Chan *et al.*, 1998). The majority of studies used statistical analysis on the most important outcome measures.

Based on the methodological assessment and the cut-off for quality assessment (sum score ≤3), three studies were of low quality (McCandlish, 1987; Tasker and Golombok, 1995; Gartrell *et al.*, 2000) and five were of high quality (Golombok *et al.*, 1983, 1997; Flaks *et al.*, 1995; Brewaeys *et al.*, 1997; Chan *et al.*, 1998) (see Table IV).

Although the methodological quality of the studies varied, the results across all studies were consistent. Of the six studies

Table III. Overview of the studies ($n=8$) examining the Quality of Parenting¹ of children born after infertility treatment (see Table I for sample selection)

Author	Groups	Results
Golombok <i>et al.</i> (1983)	(a) Lesbian mothers ($n=27$): Couples ($n=12$); singles ($n=9$); mean age mother: mid-30s Children ($n=37$); mean age: 9.3 yrs Conception mode: AID ³ ($n=1$) (b) Heterosexual single mothers ($n=27$); Mean age mother: mid-30s Children ($n=38$); mean age: 10 yrs Nearly all children had been born into a heterosexual household	Positive significance ² Most of (a) were in regular contact with the fathers versus few of (b) No significance (a) and (b) showed no differences in warmth
McCandlish (1987)	Lesbian families ($n=5$); age range mothers: 30–53 yrs Children ($n=7$); age range: 1.5–7 yrs Conception mode: AID ³	Both parents had healthy attachment to the infant. During the early symbiotic period, the birth mothers and child were a close unit; social mothers and child tended to become more strongly attached after early infancy (14–18 months); parents engaged in age-appropriate warm and comfortable contact with the child; both parents reported setting limits with the child (consistent with observed behaviour)
Flaks <i>et al.</i> (1995)	(a) Lesbian families ($n=15$); mean age birth mother: 39 yrs; social mother: 40.5 yrs; children ($n=15$); mean age: 5.8 yrs Conception mode: AID ³ (b) Heterosexual two-parent families ($n=15$); mean age mother: 36.9 yrs; father: 37.2 yrs; children ($n=15$); mean age: 5.8 yrs Conception mode: not specified	Positive significance ² (a) had higher awareness of child care problems and formulated more acceptable solutions than (b) (PASS) ⁴ No significance (a) and (b) showed no differences in awareness of the skills needed to successfully resolve problems (PASS) ⁴
Tasker and Golombok (1995)	(a) Children of lesbian mothers ($n=25$); Mean age: 23.5 yrs Conception mode: AID ³ ($n=1$) Rest: not specified (b) Children of single mothers and stepfather ($n=21$); mean age: 23.5 yrs Conception mode: nearly all children born into a heterosexual household	Positive significance ² (a) described their relationship with their mothers partner more positively; reported more contentment with family identity and were more positive about it over time versus (b) No significance (a) and (b) reported no differences in quality of their current relationship with their mother and father
Brewaeys <i>et al.</i> (1997)	(a) Lesbian families ($n=30$); mean age mother: 39 yrs; Children ($n=30$); mean age: 5 yrs Conception mode: AID ³ (b) Heterosexual two-parent families ($n=38$); mean age mother: 36 yrs; father: 40 yrs; children ($n=38$); mean age: 5 yrs Conception mode: AID ³ (c) Heterosexual two-parent families ($n=30$); mean age mother: 37 yrs; father: 40 yrs; children ($n=30$); mean age: 5 yrs Conception mode: NC ⁵	Positive significance ² (a) showed higher quality of parent–child interaction, greater help of the partner in child care activities, greater handling of the partner of disciplinary issues versus all heterosexual fathers (NC ⁵ and AID ³) No significance (a), (b) and (c) showed no differences in perception of positive and negative feelings about both parents
Golombok <i>et al.</i> (1997)	Lesbian families ($n=30$): couples: $n=15$; singles: $n=15$; mean age: 37 yrs (b) Heterosexual single mothers ($n=42$); mean age: 37 yrs (c) Heterosexual two-parent families ($n=42$); mean age: 40 yrs Conception mode of each group: not specified Each group: children ($n=38$); mean age: 6 yrs	Positive significance ² (a) and (b) showed more warmth and parent–child interaction than (c); (a) had more parent–child interaction than (b) Negative significance ⁶ (a) and (b) showed more severe disputes than (c) (PSI-SF) ⁷ No significance (a), (b) and (c) showed no differences in (PSI-SF) ⁷ : Parenting stress; Emotional involvement; Frequency of disciplinary issues (a) versus (b) showed no differences in (PSI-SF) ⁷ : Seriousness of disputes; Warmth
Chan <i>et al.</i> (1998)	(a) Lesbian families ($n=55$): Couples ($n=34$); singles ($n=21$); Children ($n=55$) Conception mode: AID ³ (b) Heterosexual families ($n=25$): couples ($n=16$); singles ($n=9$); children ($n=25$) Conception mode: AID ³ The groups did not differ in mean age mother: 42 yrs; child: 7 yrs	Significance None No significance Lesbian and heterosexual families showed no differences in (PSI-SF) ⁷ : Total Parenting stress; Parenting distress; Parent–child dysfunctional interactions
Gartrell <i>et al.</i> (2000)	Lesbian families ($n=84$): couples ($n=70$); singles ($n=14$); mean age birth mother: 39.4 yrs; social mother: 40.9 yrs. Children ($n=85$); mean age: 5 yrs Conception mode: AID ³	Mothers were uniformly enthusiastic about participating in their child's growth and reported loving the child deeply. 82% of the lesbian families showed a good or high level of functioning

¹Defined in the reviewed studies as parent–child interaction, emotional involvement, warmth, parenting skills, family relationships.²Outcome in favour of the lesbian or single-parent family.³Artificial insemination by donor.⁴The Parenting Awareness Scale.⁵Naturally conceived.⁶Outcome not in favour of the lesbian or single-parent family.⁷Parenting Stress Index – Short Form.

Table IV. Assessment of studies on quality of parenting of children born after infertility treatment

Author, year of publication	Comparison group	Sample Size	Sample Selection	Design	Outcome measures	Statistical analysis	Sum score	Quality
Golombok <i>et al.</i> (1983)	L ¹ versus HSM ²	0 1	0	1	1	1	4	H ³
McCandlish (1987)	–	0 0	0	0	0	0	0	L ⁴
Flaks <i>et al.</i> (1995)	L versus HTF ⁵	1 0	0	1	1	1	4	H
Tasker and Golombok (1995)	CL versus CHSM ⁶	0 0	0	1	1	1	3	L
Brewaeys <i>et al.</i> (1997)	L versus HTF-AID ⁷	1 1	1	1	1	1	6	H
	L versus HTF-NC ⁸	1 1	1	1	1	1	6	H
Golombok <i>et al.</i> (1997)	HSM/L versus HTF	1 1	0	1	1	1	5	H
	L versus HSM	0 1	0	1	1	1	4	H
Chan <i>et al.</i> (1998)	L versus HF ⁹	1 0	0	1	1	1	4	H
	C versus S ¹⁰	1 1	0	1	1	1	5	H
Gartrell <i>et al.</i> (2000)	–	0 1	0	1	1	0	3	L

¹Lesbians.

²Heterosexual single mothers.

³High-quality study (sum score >3).

⁴Low-quality study (sum score ≤3).

⁵Heterosexual two-parent families.

⁶Children of lesbians versus children of heterosexual single mothers and stepfather.

⁷After artificial insemination by donor.

⁸Naturally conceived.

⁹Heterosexual families (couples and singles).

¹⁰Couples versus singles.

using a comparison group on the main outcome variables, all (100%) showed no significant differences in quality of parenting compared with quality of parenting in single mother families (Golombok *et al.*, 1983, 1997; Tasker and Golombok, 1995) or heterosexual two-parent families (Flaks *et al.*, 1995; Brewaeys *et al.*, 1997; Golombok *et al.*, 1997; Chan *et al.*, 1998). Five of these studies (83%) found on some variables (not primary outcome) significant positive differences, i.e. in favour of quality of parenting in lesbian families; most of the lesbian mothers were in regular contact with the fathers versus few of the heterosexual single mothers (Golombok *et al.*, 1983). Flaks *et al.* (1995) observed greater parental awareness for child care problems in lesbian or single-parent families. In addition, these families showed higher quality of parent–child interactions (Brewaeys *et al.*, 1997; Golombok *et al.*, 1997) and warmth (Golombok *et al.*, 1997). Tasker and Golombok (1995) reported that the children of lesbian families were more positive about the family identity. One study (17%) found on some variables (not primary outcome) significant negative differences, i.e. not in favour of the lesbian families; Golombok *et al.* (1997) observed more severe disputes in father-absent than in father-present families.

According to the criteria of the best evidence synthesis method (Slavin, 1995), there is strong evidence for the conclusion that quality of parenting (i.e. parent–child interaction, emotional involvement, warmth, parenting skills, family relationships) of lesbian parents after infertility treatment is not different from that of heterosexual (two-parent) families.

For the other special patient groups, too few studies were available to draw conclusions from the evidence analysis regarding our research question.

Discussion and recommendations

This is the first systematic review investigating the impact of lesbian parenthood on the child’s development and quality of parenting. In contrast with previous reviews, in the present study the methodological quality and strength of evidence of the eight reviewed studies were assessed in a systematic manner using a standardized set of criteria.

The literature search showed no (or few) studies with respect to the other special patient groups after infertility treatment. Studies are needed to address these special patient groups with regard to their impact on the development of the child and quality of parenting.

Lesbian families are still considered as deviating from the perceived ideal (most prevalent) family type (i.e. the heterosexual two-parent family) and are assumed to result more frequently in a negative outcome for the child (Golombok, 2000). However, the reviewed studies demonstrate consistent results, with strong evidence that the psychosocial [and sexual] development of prepubertal children and quality of parenting in lesbian families do not differ from those in heterosexual two-parent families. This is in agreement with the conclusions of the narrative reviews of empirical studies related to our research question (Bozett, 1987; Gibbs, 1988; Brewaeys *et al.*, 1997; Hahn and DiPietro, 2001). Regarding the assumed negative impact of the father-absent family on the child’s development, previous studies concluded that both lesbian and single families pose a challenge for the meaning and definition of family (Fitzgerald, 1999). It is not the sexual orientation or family type, but the warmth and support that is predictive for the child’s development (Amato, 2001). In addition to these factors, emotional involvement was also found in

at least equal amounts in heterosexual two-parent and lesbian families.

Regarding single parents, only two of the reviewed studies (Golombok *et al.*, 1983; Tasker and Golombok, 1995) focused explicitly on single mothers by comparing them with the general population norm. However, because no statistical analysis was performed, no valid conclusions can be drawn regarding this group.

Although there is strong evidence supporting the results of the eight reviewed studies regarding lesbian families, the investigations reported here have some limitations and problems regarding generalizability of the findings. Thus, our classification of the studies into high- and low-quality studies should be interpreted with the following restrictions in mind:

1. A major difficulty with most studies is the highly biased sample selection with mainly fully adult, well-educated and relatively affluent volunteers, which may not be representative of lesbian mothers in general. The screening in fertility centres for psychological stability of potential patients of infertility treatment may also have contributed to the selection bias. On the other hand, the only study with the highest quality rating and a random selection of patients from a fertility clinic (Brewaeyns *et al.*, 1997) reported findings similar to the studies with a highly biased sample selection.

2. Another limitation concerns the comparison groups used in the reviewed studies. In many instances these were normative data of a comparable group obtained in earlier epidemiological studies (conception mode not specified), heterosexual single mothers or heterosexual two-parent families who had conceived their child naturally. We do not consider the single parent group as an appropriate comparison group, given the ideal of the heterosexual two-parent families. The most fair comparison group is probably the heterosexual two-parent family in the same situation as the lesbian couple (i.e. after conceiving by infertility treatment). However, our finding of no differences in child development and quality of parenting in comparison with a heterosexual two-parent family after natural conception, makes it even more plausible to conclude that the lesbian family after infertility treatment is not a risky environment for raising a child.

3. The studies also have a rather small sample size (median sample size 30, range 15–84), with four studies (including two with more than one comparison group) below our criterion of more than 25 participants. A further problem is the heterogeneity of the samples. Children born to heterosexual single or lesbian mothers following infertility treatment, differ in important ways from children who find themselves in a one-parent or lesbian family following divorce, in that they are raised by a single mother or lesbian parent family from the very start and have not experienced their parent's divorce and the departure of their father from the family home or their mother's disclosure of sexual orientation. Whereas the single most important factor leading to problems for children appears to be hostility between the parents before and around the time of the divorce (Amato, 2001). Few (lesbian) or no (single mother) studies have specifically examined the development of children of lesbian or single mothers who received infertility treatment from the outset.

Notwithstanding the mixed samples and comparison groups, the overall conclusion regarding child development and quality of parenting is still positive. When case and comparison groups were

used in which, in the comparison groups, no children were born by infertility treatment, strong evidence remains for a comparable child development and quality of parenting in lesbian families.

4. Although some of the reviewed studies used children's or teacher reports, most relied almost exclusively on the mothers' report, which may have been biased owing to self-presentation effects: lesbian mothers would wish to portray an overtly positive picture of family life. Future research should therefore also address the children themselves.

5. The strong evidence for a comparable child development and quality of parenting in lesbian and heterosexual two-parent families is mainly limited to the first 9 years of the child's life. Consequently, our evidence analysis excludes an important phase in the child's sexual development: the sexual orientation or becoming lesbian or gay themselves. Further research is needed to assess the children's development during and post puberty.

In conclusion, given our findings, the assumption of high risk for disturbed development of the child and reduced quality of parenting in lesbian families seems unjustified. More information is mandatory with regard to single and other special patient groups.

Acknowledgements

This study forms part of a research project funded by the Netherlands Organization for Scientific Research (Program: Bioethics, Grant No. EB-35-00/3).

References

- Abidin, R.R. (1995) *Parenting Stress Index: Professional manual*, 3rd edition. Psychological Assessment Resources, Odessa, FL.
- Achenbach, T.M. (1991a) *Manual for the Child Behavior Checklist/4-18 and 1991 Profile*. University of Vermont, Department of Psychiatry, Burlington.
- Achenbach, T.M. (1991b) *Manual for the Teacher's report Form and 1991 Profile*. University of Vermont, Department of Psychiatry, Burlington.
- Achenbach, T.M., Edelbrock, C. and Howell, C.T. (1987) Empirically based assessment of the behavioral/emotional problems of 2-3-year-old children. *J. Abnorm. Child Psychol.*, **15**, 629–650.
- Amato, P.R. (2001) Children of divorce in the 1990s: an update of the Amato and Keith (1991) meta-analysis. *J. Fam. Psychol.*, **15**, 626–638.
- Baetens, P. and Brewaeyns, A. (2001) Lesbian couples requesting donor insemination: an update of the knowledge with regard to lesbian mother families. *Hum. Reprod. Update*, **7**, 512–519.
- Beck, A. and Steer, R. (1987) *The Beck Depression Inventory Manual*. Psychological Corporation, San Antonio, CA.
- Blyth, E. (1990) Assisted reproduction: what's in it for children? *Child Soc.*, **4**, 167–182.
- Blyth, E. and Cameron, C. (1998) The welfare of the child. An emerging issue in the regulation of assisted reproduction. *Hum. Reprod.*, **13**, 2339–2342.
- Borghouts, J.A. (1998) The clinical course and prognostic factors of non-specific neck pain: a systematic review. *Pain*, **77**, 1–13.
- Bozett, F.W. (1987) Homosexuality and Family Relations. In: Bozett, F.W. (ed.) *Gay and lesbian parents – future perspectives*. Praeger, New York, pp. 231–236.
- Brewaeyns, A. (1996) Donor insemination, the impact on family and child development. *J. Psychosom. Obstet. Gynaecol.*, **17**, 1–13.
- Brewaeyns, A. (2001) Review: parent-child relationships and child development in donor insemination families. *Hum. Reprod. Update*, **7**, 38–46.
- Brewaeyns, A., Golombok, S., Naaktgeboren, N., de Bruyn, J.K. and Hall, E. (1997) Donor insemination: Dutch parents' opinions about confidentiality and donor anonymity and the emotional adjustment of their children. *Hum. Reprod.*, **12**, 1591–1597.
- Bricklin, B. (1990) *Parent Awareness Skills Survey Manual (PASS)*. Village Publishing, Doylestown, PA.

- Brown, G.W. and Rutter, M.L. (1966) The measurement of family activities and relationships: a methodological study. *Hum. Relat.*, **19**, 241–263.
- Chan, R.W., Raboy, B. and Patterson, C.J. (1998) Psychosocial adjustment among children conceived via donor insemination by lesbian and heterosexual mothers. *Child Dev.*, **69**, 443–457.
- Cole, D.C. and Hudak, P.L. (1996) Prognosis of non-specific work-related musculoskeletal disorders of the neck and upper extremity. *Am. J. Ind. Med.*, **29**, 657–668.
- Collins, C. (1999) Reproductive technologies for women with physical disabilities. *Sex. Disability*, **17**, 299–307.
- Ezzo, J., Berman, B., Hadhazy, V.A., Jahad, A.R., Lao, L. and Singh, B.B. (2000) Is acupuncture effective for the treatment of chronic pain? A systematic review. *Pain*, **86**, 217–225.
- Falk, P.J. (1989) Psychosocial assumptions in family law. *Am. Psychol.*, **44**, 941–947.
- Fitzgerald, B. (1999) Children of lesbian and gay parents: a review of the literature. *Marriage Fam. Rev.*, **29**, 57–75.
- Flaks, D.K., Ficher, I., Masterpasqua, F. and Joseph, G. (1995) Lesbians choosing motherhood: a comparative study of lesbian and heterosexual parents and their children. *Dev. Psychol.*, **31**, 105–114.
- Gartrell, N., Banks, A., Reed, N., Hamilton, J., Rodas, C. and Deck, A. (2000) The National Lesbian Family Study: 3. Interviews with mothers of five-year-olds. *Am. J. Orthopsychiatr.*, **70**, 542–548.
- Geurts, J.W., Van Wijk, R.M., Stolker, R.J. and Groen, G.J. (2001) Efficacy of radiofrequency procedures for the treatment of spinal pain: a systematic review of randomized clinical trials. *Reg. Anesth. Pain Med.*, **26**, 394–400.
- Gibbs, E.D. (1988) Psychosocial development of children raised by lesbian mothers: a review of the research. *Women Ther.*, **8**, 65–75.
- Golombok, S. (1998) New families, old values: considerations regarding the welfare of the child. *Hum. Reprod.*, **13**, 1146–1150.
- Golombok, S. (2000) *Parenting: What Really Counts?* Routledge, Taylor and Francis Group, London.
- Golombok, S. and Rust, J. (1993) The Preschool Activity Inventory, a standardized assessment of gender role in children. *Psychol. Assess.*, **5**, 131–136.
- Golombok, S. and Tasker, F. (1994) Donor insemination for single, heterosexual and lesbian women: issues concerning the welfare of the child. *Hum. Reprod.*, **9**, 1972–1975.
- Golombok, S., Spencer, A. and Rutter, M. (1983) Children in lesbian and single-parent households: psychosexual and psychiatric appraisal. *J. Child Psychol. Psychiatr.*, **24**, 551–572.
- Golombok, S., Tasker, F. and Murray, C. (1997) Children raised in fatherless families from infancy: family relationships and the socioemotional development of children of lesbian and heterosexual mothers. *J. Child Psychol. Psychiatr.*, **38**, 783–791.
- Graham, P. and Rutter, M. (1968) The reliability and validity of the psychiatric assessment of the child: II. Interview with the parent. *Br. J. Psychiatr.*, **114**, 581–592.
- Green, R. (1992) *Sexual Science and the Law*. Harvard University Press, Cambridge, MA.
- Hahn, C.S. and DiPietro, J.A. (2001) *In vitro* fertilization and the family: quality of parenting, family functioning, and child psychosocial adjustment. *Dev. Psychol.*, **37**, 37–48.
- Harter, S. and Pike, R. (1984) The pictorial scale of perceived competence and social acceptance for young children. *Child Dev.*, **55**, 1969–1982.
- Jadad, A.R., Moore, R.A., Carroll, D., Jenkinson, C., Reynolds, D.J.M., Gavaghan, D.J. and McQuay, H.J. (1996) Assessing the quality of randomized clinical trials: is blinding necessary? *Controlled Clinical Trials*, **17**, 1–12.
- McCandlish, B. (1987) Against all odds: lesbian mother family dynamics. In: Bozett, F.W. (ed.), *Gay and Lesbian Parents—future perspectives*. Praeger, New York, pp. 23–38.
- Mior, S. and Nielson, W.R. (2001) Preface: prevention, treatment, and disability management. *Clin. J. Pain*, **17**, S65–S67.
- Patterson, C.J. (1992) Children of lesbian and gay parents. *Child Dev.*, **63**, 1025–1042.
- Quinton, D. and Rutter, M. (1988) *Parenting Breakdown: The Making and Breaking of Intergenerational Links*. Avebury Gower Publishing, Aldershot, UK.
- Quinton, D., Rutter, M. and Rowlands, O. (1976) An evaluation of an interview assessment of marriage. *Psychol. Med.*, **6**, 577–586.
- Rutter, M. and Brown, G.W. (1966) The reliability and validity of measures of family life and relationships in families containing a psychiatric patient. *Soc. Psychiatr.*, **1**, 38–53.
- Rutter, M., Cox, A., Tupling, C., Berger, M. and Yule, W. (1975) Attainment and adjustment in two geographic areas. The prevalence of psychiatric disorder. *Br. J. Psychiatr.*, **126**, 493–509.
- Sackett, D.L., Haynes, R.B. and Tugwell, P. (1991) *Clinical Epidemiology*. Little, Brown and Co., Boston.
- Slavin, R.E. (1995) Best evidence synthesis: an intelligent alternative to meta-analysis. *J. Clin. Epidemiol.*, **48**, 9–18.
- Spielberger, C. (1983) *The Handbook of the State-Trait Anxiety Inventory*. Consulting Psychologists Press, Palo Alto, CA.
- Tasker, F. and Golombok, S. (1995) Adults raised as children in lesbian families. *Am. J. Orthopsychiatr.*, **65**, 203–215.
- Van Craaicaamp, J.C. and Oosting, M.E. (2000) Netherlands: IVF for unmarried women, euthanasia. *Lancet*, **356**, 1512–1513.
- Van Tulder, M.W., Ostelo, R., Vlaeyen, J.W., Linton, S.J., Morley, S.J. and Assendelft, J.W. (2000) Behavioral treatment for chronic low back pain: a systematic review within the framework of the Cochrane Back Review Group. *Spine*, **25**, 2688–2699.
- Von Korff, M. (1994) Studying the natural history of back pain. *Spine*, **19**, 2041S–2046S.
- Wechsler, D. (1974) *Manual for the Wechsler Intelligence Scale for Children - Revised*. Psychological Corporation, New York.
- Wechsler, D. (1989) *Wechsler Preschool and Primary Scale of Intelligence - Revised*. Psychological Corporation, New York.

Appendix A. Outcome, instruments and statistical analysis used to assess child development in the eight reviewed studies

Author	Outcome	Instruments	Statistical analysis
Golombok <i>et al.</i> (1983)	Psychiatric state: peer relationships; emotions; behaviour Sexual orientation ¹	Standardized interview: Parent and teacher questionnaires from the Isle of Wight epidemiology study. Reliability, validity: good (Rutter <i>et al.</i> , 1975) Sexual orientation scale: developed for the study. Reliability, validity: good	<i>t</i> -tests
McCandlish (1987)	Developmental appropriateness: gender development	Structured interview, including open-ended questions. Reliability, validity: not mentioned	None
Flaks <i>et al.</i> (1995)	Cognitive functioning children <6 yrs Cognitive functioning children >6 yrs	Wechsler Preschool and Primary Scale of Intelligence – Revised (WPPSI-R). Reliability, validity: good (Wechsler, 1989) Wechsler Intelligence Scale for Children – Revised (WISC-R). Reliability, validity: good (Wechsler, 1974)	MANOVAS Post hoc <i>t</i> -tests
Tasker and Golombok (1995)	Behavioural adjustment: Internalizing (overcontrolled) problems; Externalizing (undercontrolled) problems; Social competencies Family relationships; Peer relationships (i.e. teased or bullied); Sexual orientation ¹ ; sexual relationship history Professional health care use (for psychological problems) Psychological adjustment: Anxiety Depression	Child Behaviour Checklist (CBCL). Reliability, validity: good (Achenbach, 1987, 1991a,b) Semi-structured interview, child report (14 yrs after the 1st assessment). Reliability, validity: not mentioned The State Trait Anxiety Inventory (STAI). Reliability, validity: good (Spielberger, 1983) The Beck Depression Inventory (BDI). Reliability, validity: good (Beck and Steer, 1987)	Fisher exact tests No statistical analysis on STAI and BDI
Brewaeys <i>et al.</i> (1997)	Behavioural adjustment: Emotions; Behaviour; Social competencies Gender Role Behaviour	Child Behaviour Checklist (CBCL). Reliability, validity: good (Achenbach, 1987, 1991a,b) Preschool Activities Inventory (PSAI). Reliability, validity: satisfactory (Golombok <i>et al.</i> , 1983)	ANOVAS; Pearson χ^2 -test Post hoc <i>t</i> -tests
Golombok <i>et al.</i> (1997)	Emotions; Behaviour; Relationships; Psychiatric state Cognitive competencies; Physical competencies; Acceptance by mother; Acceptance by peers	Standardized interview, mother, teacher reports. Reliability, validity: good (Graham and Rutter, 1968) The standardized Pictorial Scale of Perceived Competence and Social Acceptance for young children (PPCSAC). Reliability, validity: satisfactory (Harter and Pike, 1984)	Fisher's LSD; MANOVAS
Chan <i>et al.</i> (1998)	Behavioural adjustment; Behaviour; Social competence	Child Behaviour Checklist (CBCL), mother, teacher reports. Reliability, validity: good (Achenbach, 1991a,b)	<i>t</i> -tests; ANOVAS; Post hoc <i>t</i> -tests; Pearson correlations; Regression analyses
Gartrell <i>et al.</i> (2000)	Health; Psychological development	Semi-structured interview, mother report. Reliability, validity: not mentioned	Cohen's kappa (agreement in interview rating)

¹Same gender and opposite gender attraction.

Appendix B. Outcome, instruments and statistical analysis to assess quality of parenting in the eight reviewed studies

Author	Outcome	Instruments	Statistical analysis
Golombok <i>et al.</i> (1983)	Father contact Warm feelings towards children	Standardized interviews. Reliability, validity: good (Brown and Rutter, 1966; Rutter and Brown, 1966) Systematic rating of warmth. Reliability, validity: good (Quinton <i>et al.</i> , 1976)	<i>t</i> -tests, χ^2 - tests
McCandlish (1987)	Parent-child relationship Family interactions	Structured interview, including open-ended questions. Reliability, validity: not mentioned	None
Flaks <i>et al.</i> (1995)	Awareness of child care problems	The Parent Awareness Skills Survey (PASS). Reliability, validity: good (Bricklin, 1990)	MANOVAS, post hoc <i>t</i> -tests
Tasker and Golombok (1995)	Family relationships Contentment over family identity. Change over time in contentment	Semi-structured interviews, child report. Reliability, validity: not mentioned	Paired <i>t</i> -tests
Brewaeys <i>et al.</i> (1997)	Parent-child relationship (i.e. discipline, interaction, help in child care activities)	Standardized interview, adaptation of the technique developed by Quinton and Rutter (1988), mother report. Reliability, validity: good	χ^2 - tests, MANOVASs, post hoc <i>t</i> -tests
Golombok <i>et al.</i> (1997)	Parent-child interaction (i.e. discipline, the child's fears and anxieties, warmth, emotional involvement)	Standardized interview, adaptation of the technique developed by Quinton and Rutter, 1988. Reliability, validity: good	MANOVAS
Chan <i>et al.</i> (1998)	Parenting stress Parent-child dysfunctional interactions	The Parenting Stress Index Short Form (PSI-SF). Reliability, validity: good (Abidin, 1995)	<i>t</i> -tests, post hoc tests, multiple regression analyses, co-variates
Gartrell <i>et al.</i> (2000)	Parenting experiences Quality of family life assessment	Semi-structured interview. Reliability, validity: not mentioned	Descriptive statistics