An integrative literature review of psychosocial factors in the transition to parenthood following non-donor assisted reproduction compared with spontaneously conceiving couples.

Running title: Parenthood after non-donor assisted reproduction

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Abstract

The paper reports an integrative literature review of research into the psychosocial factors which shape the transition to parenthood in couples following non-donor in vitro fertilisation in comparison with those conceiving spontaneously . Nineteen papers of non-donor IVF and SC mothers and fathers were included;. Differences between groups were reported for a range of psychosocial measures during the transition from pregnancy to parenthood including: the control couples feel they have over their lives (locus of control), parental adjustment and child behaviour, parental stress, parental investment in the child, self-esteem and self-efficacy, greater levels of protectiveness (separation anxiety) towards child, marital and family functioning, family alliance, marital satisfaction and communication, as well as anxiety, indirect aggression and lowered respect for the child. We have conceptualised these differences as three substantive themes which reflect psychosocial factors shaping transition to parenthood in parents after non-donor AR: namely, social support, relationships, and emotional well-being, which are in turn influenced by gender differences. These findings have implications for health care professionals' assessment of individual couples' support needs.

Key words:
Assisted reproductive technology
Non-donor
Parenthood
Psychosocial
Social support
Transition

Introduction

Worldwide, an estimated 2.4 million cycles of assisted reproduction (AR), predominantly in vitro fertilisation (IVF), are performed annually. The trend is increasing and the latest data from the UK (2016) showed over 20,000 babies were born following 68,000 cycles (HFEA, 2018).

This accounts for 2-3% of the estimated 775,000 babies born in the UK for the same year (ONS, 2017). Approximately 14% (2,781) of the babies born from IVF cycles in 2016 involved donor eggs, sperm or both, and while there were an additional 5,500 donor insemination cycles, this implies that the majority of AR cycles use couples' own gametes.

There has been continuing interest on whether previously infertile couples who conceive through AR find the transition to parenthood difficult (Colpin, Demyttenaere & Vandemeulebroecke, 1995; Olshansky, 2003; Sandelowski, 1995; van Balen, Naaktgeboren & Trimbos-Kemper, 1996). Studies into pregnancy and parenthood following successful donor AR show that couples who parent after donor AR adapt well to parenthood and may rise to the challenges of parenthood better than those who conceive spontaneously (Golombok, 2017). Less attention is given to the overwhelming majority of IVF parents who use their own gametes and give birth to singletons. Donor IVF transcends the boundaries of what is considered 'natural' procreation and third party assisted conception has been widely studied as particularly challenging for heterosexual couples (Torr, 2001; van den Akker, Postavaru & Purewal, 2016). Existing research utilises mixed samples of donor / non-donor and singleton /multiple births couples, meaning any differences in their experiences are unclear (Hammarberg, Fisher, & Wynter, 2008). There are consequently gaps in the non-donor AR parenthood literature which feed into/lead to an absence of inquiry into gendered relations in non-donor AR parenthood and non-donor fathers' needs following AR (Culley, Hudson, & Lohan, 2013).

Our review focuses exclusively on psychosocial factors shaping the transition to parenthood for non-donor AR parents. We understand 'psychosocial' as indicating psychological factors (social support, social relationships, emotional wellbeing) embedded in social structures such as gender. We draw on Sandelowski's (1995) conceptualisation of infertile couples' transition to parenthood as similar to, but different from fertile couples. Sandelowski (1995) conceptualises infertile couples' transition to parenthood as illness work where, during a prolonged period, couples withdraw into themselves as they form their new identity either as parents or as an infertile couple. Allan (2007) argues that this period of transition is partly helped by withdrawing into themselves into a space that is in-between infertility and parenthood – what she calls a liminal space before a new identity is taken on..

Although the phrase 'previously infertile parents who have conceived through non-donor assisted reproduction' is more accurate, the term 'AR parents or couples' is used in this paper for the sake of brevity and following Hammarberg et al. (2008).

Review question

What are the psychosocial factors shaping the transition to parenthood for non-donor AR parents compared to couples who conceive spontaneously?

Methods

An integrative or inclusive literature review was used to synthesize multiple sources of literature (Knafl & Whittemore, 2017; Whittemore & Knafl, 2005) as we wished to articulate our understanding of the psychosocial in an interdisciplinary sense as well as integrating qualitative and quantitative studies in the results and thematic analysis. Adapted PRISMA (define?) principles were adhered to in reporting results congruent with this type of review (Moher, Liberati, Tetzlaff & Altman, 2009).

Information sources and search strategy

A scoping review of the literature (Peterson, Pearce, Ferguson & Langford, 2017) was conducted in July 2017 by two authors, allowing a mapping of the literature before conducting a full search, and used a limited set of search terms: non-donor, IVF, ICSI, parent* transition and support* in the search engine Google Scholar and a cross search of databases (Medline, CINAHL, Psychinfo, PsychArticles, Web of Science) (see diagram 1). The scoping review showed that including the search word 'non-donor' was not effective since full articles would still need to be screened to establish non-donor or donor sampling. A focused search was conducted in August 2017 and re-run in January 2018 using an expanded set of search terms: IVF, in vitro fertilisation, assisted reproduction, assisted reproductive technology (ART), assisted conception, intracytoplasmic sperm injection, ICSI, pregn*, parent*, mother, father, transition, support*, need* and psych* via the EBSCO host interface using Medline, CINAHL, Psychinfo, Psycharticles, and Behavioral Sciences Collection. Boolean operators and truncation were used to search for peer reviewed research articles in English available as full text articles. This search resulted in 1,210 peer reviewed articles. Three articles were added through manual searching (see diagram 2).

[figure 1 at back]

[figure 2 at back]

Process for selecting papers

Eligibility criteria

Inclusion criteria: studies published in English between January 1990 - January 2018 reporting data on discrete samples of previously infertile parents who conceived using non-donor AR (IVF with or without ICSI) where the pregnancy resulted in a singleton birth; studies which focused on pregnancy as well as the transition through birth to parenthood of children ranging from six weeks to 10 years (pre-school) were included. Studies which focused exclusively on pregnancy, or which included donor AR pregnancy, parenthood in specific conditions such as HIV, preimplantation genetic diagnosis (PGD), or surrogacy were all excluded.

Screening

Papers were screened by title and abstract for relevance and duplicates were eliminated by AO and HA; full texts were screened by two authors independently based on inclusion and exclusion criteria; ineligible papers were removed. Discrepancies around inclusions and exclusions were resolved following discussion. Nine authors were contacted to clarify whether their samples were non-donor or included singleton or multiple births (see Table 1). Five of these papers were subsequently included in the review (Barnes et al., 2004; Flykt et al., 2009; Gameiro, Canavarro, Moura-Ramos, Boivin, & Soares, 2010; Gameiro, Canavarro, et al., 2011; Gameiro, Moura-Ramos, Canavarro, & Soares, 2011; Nekkebroeck et al., 2010; Walker, Mills & Gilchrist, 2017) and four were excluded from the review.

Quality appraisal

A quality assurance tool appropriate for both quantitative and qualitative studies (Shepherd et al., 2006) was applied to full text papers by OA and HA. Quality variables (Shepherd et al., 2006) (see Table 2) enabled the reviewers to appraise both types of study equally and avoid value judgments/biases (Culley, Law, et al., 2013). Table 2 gives each paper's quality assessment score; selected papers were required to achieve a score of at least four out of seven to be included (Culley, Law, et al., 2013). Scores were agreed if there were no differences in initial independent scores following discussion, ensuring a 100% agreement was achieved.

Data collection process

Selected papers were imported into NVivo (QSR International, 2017) in pdf format recording details of each paper: authors; publication date; research setting; research aims; research design; participants; sample size; recruitment method; data analysis methods; key findings; key themes; and methodological limitations including risk of bias.

Analysis

AO extracted data from each paper to create open codes in stage 1 which were checked by HA (Braun & Clarke, 2006; Dixon-Woods, Agarwal, Jones, Young & Sutton, 2005; Ward, House & Hamer, 2009). Open codes were then collapsed into themes, then higher order categories, or substantive themes (Braun & Clarke, 2006). For example, the codes 'maternal, 'mother, 'women', 'mother-child relationship' were grouped under the theme 'mothers' and the final substantive theme 'gendered experiences'. The resultant framework of substantive themes was discussed and refined by [HA, GM] and the final three substantive themes were agreed and checked subsequently by all co-authors. These themes describe psychosocial factors which shape transition to parenthood for non-donor AR parents. Extracted data were then reorganised according to these themes, which were employed as the framework for the narrative summary. In order to describe paper characteristics, quantitative data on the attributes of papers were collated and counted. These are reported in 'paper characteristics' below and in Table 1.

Results

Search, screening and selection results

1,736 papers were screened for relevance (titles, abstract), 1,502 and 26 duplicates were eliminated. 118 papers were screened against the inclusion/exclusion criteria; 55 full text papers were selected for further screening and three further articles were added through manual searching (n=58). Fifty-eight papers were read by [AO, HA]; 39 did not meet the conclusion criteria] and 19 papers were selected for review. 19 selected papers were screened by all authors prior to final inclusion in the review.

[table 1 at back]

Paper characteristics

Table 1 provides an overview of the heterogeneity of the data using the variables: authors, year, title, country, research design, methods; sample size; focus; findings; theme.

Participants

Sample sizes varied from eight to over 500 participants. McMahon, Ungerer, Tennant and Saunders (1997) and McMahon, Gibson, Leslie, Cohen, and Tennant (2003) used the same sample in a longitudinal study; Golombok, Cook, Bish, and Murray (1995) and Golombok et al. (1996) used a sample in a UK-only study and then included it in a separate international

study. Gameiro et al. (2010), Gameiro, Canavarro, et al. (2011) and Gameiro, Mouro-Ramos, et al. (2011) in three papers from one study used the same sample at different time points with different outcome measures; two other authors (Barnes et al., 2004; Nekkebroeck, et al., 2010) utilised the same sample as each other. Cook et al. (1997) combined an original sample with another from an existing study. Finally, Colpin et al. (1995) and Colpin and Seonen (2002) used the same sample for their pilot and main studies reported separately as two papers.

Design

The majority of the papers (14) recruited couples, four focused solely on mothers and one on fathers. Studies varied in relation to sampling method, size and outcome measures. All 18 quantitative papers used control or comparison groups (See Table 1). Six papers used questionnaires alone (Barnes et al., 2004; Flykt et al., 2009; Gameiro et al., 2010; Gameiro, Canavarro, et al., 2011; Gameiro, Mouro-Ramos, et al., 2011; Hjelmstedt & Collins, 2008; Nekkebroeck et al., 2010; Jongbloed-Pereboom et al., 2012). Ten used multiple methods: questionnaires and data from teacher reports (Colpin & Soenen, 2002; Hahn & DiPietro, 2001); questionnaires, and structured observations of mother-child interactions (Cairo et al., 2012; Colpin et al., 1995); questionnaires and semi-structured interviews with mothers/fathers (Cook, Vatev, Michova, & Golombok, 1997; Golombok et al., 1995, 1996; McMahon et al., 1997, 2003) and questionnaires, semi-structured interviews with mothers and observations of child behaviour (Gibson, Ungerer, McMahon, Leslie & Saunders, 2000). The qualitative study used semi-structured interviews in an interpretative phenomenological analysis study (Walker et al., 2017).

Quality assessment

Quality scores ranged from overall excellent (7/7) to satisfactory (4/7), with no study scoring below 4. The majority of the studies recruited AR and spontaneously conceived (SC) samples from fertility clinics/obstetric hospitals. While methods and instruments were clearly described by all the authors, there was no detail on methodology except in the qualitative paper (Walker et al., 2017), and few of the papers described which author(s) did the data collection and analysis.

[table 2 at back]

Thematic review: psychosocial factors affecting transition to parenthood

Differences were reported on/for a range of psychosocial measures which shape the transition from pregnancy to parenthood: locus of control, parental adjustment and child behaviour, parental stress, parental investment in the child, self-esteem and self-efficacy, greater levels of protectiveness (separation anxiety) towards child, marital and family functioning, family alliance, marital satisfaction and communication as well anxiety, indirect aggression and less respect for child (see Table 4). In addition, Walker et al. (2013) found that physical exercise gave IVF mothers a sense of control over their transition to motherhood.

These psychosocial differences at the individual and group level suggest three broader psychosocial themes, i) social support ii) family and marital relationships iii) parents' emotional wellbeing, shape the transition to parenthood for non-donor IVF couples.

[table 4 at back]

Social support

In three related papers, Gameiro et al. (2010), Gameiro, Canavarro, et al. (2011) and Gameiro, Mouro-Ramos, et al. (2011) reported on one study using the same non-donor sample of singleton birth AR parents and an SC control group in Portugal to investigate social support;. Gameiro et al. (2010) measured 'social nesting' (an inward movement socially and emotionally towards family members and away from friends) in AR couples and SC couples. Irrespective of how the children were conceived, the parents in the study turned to their immediate family post-partum, considering extended family and friends less important at this stage, although AR women perceived less support from friends than did SC women. In 2011 Gameiro, Canavarro, et al. examined parental investment in the child (PIC, a wish to protect and strengthen ties with children and to shape a parental identity) in couples who conceived through ART. AR or SC conception had no bearing on PIC and the association between PIC and satisfaction with marital relationship and network support was similar in both groups. If the marital relationship was under stress in either group, then PIC lessened/was reduced. In 2011 Gameiro, Mouro-Ramos, et al. studied emotional and instrumental support from social networks, parenting stress and PIC. No differences between AR and SC couples transition to parenthood or care for their children were found. However, for men in both groups, the emotional support offered by friends was most important as they became parents, and for women regardless of conception practical support from the nuclear family was perceived as the most important.

Family and marital relationships

A European study (Belgium, Denmark/Sweden (Nordic group), United Kingdom) compared the potential cultural impact of parenting styles between non-donor [IVF, ICSI] and SC of parents with five-year-old children (Barnes et al., 2004). The General Health Questionnaire (GHQ), short form Parental Stress Index (PSI) and Dyadic Adjustment Scale (DAS) were used. No differences were observed for well-being and family functioning. Mothers of ICSI conceived children were more committed to being a parent than the SC group and reported fewer hostile or aggressive feelings to their children. Between country differences showed that Belgian and British mothers were more committed to their work/parenting and/while fathers were less committed (?) than those in the Nordic group. Fathers' response rates were lower than mothers across all four countries and response rates for British and Belgian mothers were higher than the Nordic group.

As part of a larger study into the transition from infertility to parenthood, Cairo et al. (2012) assessed family dynamics among Swiss non-donor AR and SC parents using observation and self-report questionnaires during the fifth month of pregnancy and nine months post-partum. Family alliance (defined as a family's ability to work together as a team), marital satisfaction and parental attachment scores were similar or higher in the non-donor AR sample compared to the SC group during pregnancy. However, family alliance scores had decreased in the non-donor AR parents nine months post-partum**.** There was no evidence that family alliance could be predicted with prenatal factors (marital relationships and parents' attachment to the fetus).

Using the same methodology and measures as Golombok et al. (1995, 1996), Cook et al. (1997) compared the original samples from the UK, Netherlands, Spain and Italy (Golombok et al., 1995, 1996) with a sample of families recruited from Bulgaria. They found greater difficulties in parental adjustment, including greater secrecy and uncertainty, and in child behaviour in families from Bulgaria. The authors suggested that specific social contexts may affect outcomes of AR where countries with different traditions and cultural practices are compared.

Parent-child relationships and parents' psychosocial functioning were assessed using questionnaires and observations of mother-child interactions in Belgian families with a 24-30 monthold child (Colpin at al., 1995). No significant group effects for parent-child relationships, including behaviour of mother-child, or psychosocial functioning (personality, developmental history and marital relationship) between non-donor AR and SC mothers and fathers were

found. Employed non-donor AR mothers showed less acknowledgement of their child's autonomy compared to both unemployed AR mothers and employed SC mothers. No significant differences between AR and SC groups in terms of parenting or children's psychosocial development at follow up (children's ages 8-9) were reported by Colpin and Seonen (2002).

Flykt et al. (2009) used a later version of the PSI (McMahon et al., 2003) to examine how parental expectations predicted parenting stress in the first year after birth, using Finnish AR and SC couples during pregnancy and when the child was two months and 12 months old. In both groups the association between expectations and subsequent parental stress was similar. Like McMahon et al. (2003), Flykkt et al. (2009) found some variations in associations, such as SC mothers' reported expectations (measured in pregnancy) for their spouse's autonomy with their child as less good than predicted after the child was born, and there was a shorter duration of high parenting stress levels for a group of AR fathers.

Gibson et al. (2000) reported on mother-child interactions in AR and SC mothers in pregnancy and at 12 months postpartum. No significant between-group differences in infant attachment or mother-child interactions were found. Maternal reports of anxieties about adjustment to parenthood and infant difficulties by the AR group in pregnancy had not translated into negative attachment relationships.

Golombok et al. (1995) collected data on children, aged 4-8 years and their mothers and fathers, using standardized interviews with mothers to measure 'quality of parenting'. The quality of parenting and relationships was superior in families with children conceived by non-donor IVF compared to SC families. Levels of stress associated with parenting (marital state, anxiety and depression) were significantly higher in the SC group. In a larger, international study, Golombok et al. (1996) used the same methods as their 1995 UK study to compare quality of parenting, marital and psychiatric state, child behaviour and emotions between IVF and SC in four countries (UK, Spain, Italy and The Netherlands). Sample sizes varied but no significant cross-country differences relating to quality of parenting and psychosocial development of children between any groups were reported.

Hahn and DiPietro (2001) examined quality of parenting and family functioning using postal questionnaires in non-donor AR mothers of 3-7 year old children in Taiwan. Self-report data were compared with behavioural adjustment scores of the corresponding young children measured by postal questionnaire completed by their teachers, who were blinded to the method

of conception. While AR mothers reported greater levels of protectiveness towards their children, including maternal separation anxiety, the teachers did not perceive that maternal protective behaviours limited appropriate child development; these children were rated as showing fewer behavioural problems. However, AR mothers were significantly less satisfied with family functioning and marital communication than SC mothers.

A Swedish study of non-donor IVF and SC control group fathers were studied at 26 weeks gestation and 2 months post-partum (Hjelmstedt & Collins, 2008). Fathers' relationship with their children was tested using personality traits, anxiety, depressive symptoms, attachment and father-infant relationships. Non-donor AC fathers exhibited more anxiety and indirect aggression as well as less assertiveness during pregnancy in comparison with SC fathers. Both groups were equally attached to their children.

A study on parental well-being and anxiety using Dutch AR (IVF/ICSI) and control group SC couples, showed that non-donor AR couples did not experience increased anxiety or mental health issues one year after birth, although they did not report base line data (Jongbloed-Pereboom et al., 2012). There was an association between a higher number of treatment cycles and female cause for infertility (women) and longer wait for pregnancy (men) with lower anxiety and good mental health.

Using Barnes et al.'s original sample, with additional IVF couples, and the same measures for between-country comparison, Nekkebroeck et al. (2010) explored potential cultural impacts of different European countries on parenting styles following IVF/ICSI and SC conceptions. Response rates in the Nordic group were consistently good, while the lowest group of responders were Belgian fathers. Belgian ICSI mothers had on average higher anxiety and insomnia than ICSI mothers in the other two countries; British/UK? IVF mothers had less anxiety and insomnia than mothers in other countries; Belgian SC fathers had a lower score for social dysfunction than SC fathers in other countries. However, the total GHQ scores for all mothers (SC, IVF, ICSI) showed no significant differences. Total GHQ scores for IVF and ICSI fathers in the UK and Nordic groups had better/higher? scores than Belgian fathers. SC and IVF mothers in the UK reported more difficulties and stress with parent–child relationships, while SC and ICSI fathers in the UK described more parent–child dysfunctional interaction and less marital satisfaction. UK mothers across all groups reported higher stress levels than mothers in all groups in other countries. Mothers in the Nordic group expressed less negative feelings towards their children compared to mothers in other countries; although the

authors drew attention to the lower response rate in Belgian non-donor AR fathers. Nekkebreock et al. (2010) conclude that there are some cultural differences in parenting practices/styles both for AR and SC parents. Differences between countries were greater than differences between groups within countries.

Parents' emotional well-being

McMahon et al. (1997) investigated psychological adjustment to early motherhood during the first 4 months postpartum in Australian women. No differences were observed between non-donor IVF mothers and control SC mothers on anxiety, depression or marital satisfaction. Non-donor AR mothers reported lower self-esteem and maternal self-efficacy, although observations of maternal behaviours did not reveal differences in the quality of interactions with their infants, and early adjustment difficulties were mostly accounted for by mothers who underwent repeated IVF treatment cycles.

McMahon et al. (2003) used self-report measures of psychological adjustment (well-being, anxiety, emotional control and stress), in non-donor AR and SC parents of five year old children in Australia. Normative psychosocial adjustment between groups was confirmed even after the small numbers of twins in both groups were excluded from the analysis. AR mothers had a more external locus of control than other mothers, but not fathers. Mothers with higher numbers of IVF cycles reported more positive marital adjustment, lower parenting stress and lower scores on the Parental Distress and Difficult Child domains of the PSI. Finally, high numbers of IVF treatments also predicted lower (more defensive) scores on the PSI's Defensive Responding domain. These findings were repeated when the singleton data was analysed separately, although the sample size was small.

Walker et al. (2017) explored the experiences and decision-making processes related to physical activity in 8 British non-donor pregnant women or those who had given birth within two years of AR as they transitioned to motherhood. They described their experiences of transitioning from a childless woman to a non-donor AR mother as dangerous and unpredictable. All participants perceived infertility to be stigmatising and defining; they felt pressured to move on to a new non-stigmatised identity as mothers. Women worried about being viewed negatively by society and their families and discussed their perceptions of pregnancy and safety concerns in relation to physical activity, and how they consolidated their own needs with those of the child. Physical activity was seen as providing a sense of control, and as soothing although there were concerns around safety.

Discussion

This is the first review to report on research comparing the transition to parenthood following successful non-donor singleton AR and SC couples. Differences for the two groups were reported on a range of quantitative psychosocial measures during the transition from pregnancy to parenthood: locus of control, parental adjustment and child behaviour, parental stress, parental investment in the child, self-esteem and self-efficacy, greater levels of protectiveness (separation anxiety) towards child, marital and family functioning, family alliance, marital satisfaction and communication as well anxiety, indirect aggression and less respect for child (see Table 4); and qualitatively. ?new sentence? Walker et al., (2013) reported physical exercise gave IVF mothers a sense of control over their transition to motherhood. We have identified three broad themes reflecting the psychosocial differences in this transition: social support, relationships and emotional well-being.

Our review has also identified social structures which shape parents' transition: the cultural context of parenting (Nekkebroeck et al., 2010), employment status of women (Colpin et al., 1995) and gender differences. However by far the most significant finding was that men's experiences are under-reported. In their systematic review into psychological and social functioning in AR parents (non-donor and donor), Hammarberg et al. (2008) conclude that whilst many issues are shared with couples who conceive spontaneously, anxiety related to the survival of the fetus, early parenting problems and lower postnatal confidence seem more prevalent among AR parents and there is conflicting evidence around how AR parents adjust to pregnancy, childbirth and parenting. They considered that parenthood may be idealized by AR couples negatively affecting their adjustment to parenthood and 'the development of a confident parental identity' (Hammarberg et al., 2008: 395). This resonates with the findings of? Sandelowski (1995) and Olshansky (2003) who both describe a pervasive and lingering 'infertile identity' which affects AR parents beyond pregnancy into parenthood. Our review has shown that higher numbers of IVF cycles, cause of infertility and a longer wait for pregnancy may exacerbate this period of transition as shown in McMahon et al. (1997) and Jongbloed-Pereboom et al.'s (2012) studies.

Methodological issues

This is the first review to inform theoretically our understanding of the psychosocial factors which shape parenting after AR in non-donor couples. Our search shows there were few non-donor AR studies available for inclusion and a lack of clarity in identifying non-donor couples

in mixed samples. Our review also showed that few research studies specify non-donor AR samples, with several interconnecting research teams collaborating and frequently using the same sample over time -which could lead to socially desirable responding - or adding to the original sample. Apart from Walker et al. (2017), research included here focused on psychological functioning rather than the complexities of psychosocial support. In the 18 quantitative studies, the most commonly used questionnaires included GHQ, PSI, DAS and STAI. Multiple scales were used with measurements for attachment/bonding, emotional well-being, quality of parenting, parental investment in children and marital satisfaction. Questionnaires were delivered face to face except for one by post (Hahn & DiPietro, 2001). Relying heavily on self-report questionnaires is problematic because the individual respondent has a 'strong bias to present the most favourable impression of themselves to minimise indications of problems or stress in the parent–child relationship' (McMahon et al., 2003: 361). Our review suggests that greater focus on qualitative inquiry could help to off-set some of the inherent limitations of survey methodologies. Eight studies included either observations (Cairo et al., 2012; Colpin at al., 1995) or semi-structured interviews (Cook et al., 1997; Golombok et al., 1995, 1996; McMahon et al., 1997, 2003), or both (Gibson et al., 2000). Observation methods included: observation assessments of mother-child interactions (Gibson et al., 2000); observations of mother-child interactions using videos and ratings (Colpin et al., 1995), and observation using pre- or postnatal play scales (Cairo et al., 2012), and all focused exclusively on mother-child interactions- none on father-child.

The five interviews studies (Cook et al., 1997; Gibson et al., 2000; Golombok et al., 1995, 1996; McMahon et al., 2003) only interviewed women, relying on questionnaires to elicit data from men though not all male partners responded (Colpin & Seonen, 2002; McMahon et al., 2003). There was only one paper of non-donor fathers' experiences of the transition to AR parenthood.

Practice implications

Unlike previous work on AR parenting which has mixed donor and non-donor samples, our review focused on non-donor conception, and psychosocial factors which shape transition to non-donor parenthood. We have shown that the existing research on social support for parents following successful non-donor AR is limited, with only one study (Gameiro et al., 2010, Gameiro, Canavarro, et al., 2011; Gameiro, Mouro-Ramos, et al., 2011) focused directly on social support. This provides insufficient evidence for health professionals to base the assessment, planning and delivery of support needs for this group of new parents. Our results

have implications for health professionals in primary care including midwives, health visitors, general practitioners and mental health nurses. The findings presented here suggest that non-donor AR parents, particularly fathers, may require assessment of psychosocial support as they transition through pregnancy and birth into early parenthood.

Suggestions for future research

Reviewing and evaluating quality across a heterogeneous selection of studies is problematic (Knafl & Whittemore, 2017) but using Shepherd et al.'s (2006) criteria allowed the application of a more holistic approach to appraisal. Our thematic narrative has clarified the state of the literature in the field and suggested topics for future research, namely the need for research into men's experiences of parenting after non-donor AR and the need for wider and more inclusive methodologies and measures to capture the nuances and complexities of transition to non-donor AR parenthood.

A further area for future research includes an understanding of how setting and location as well as time points at which the data are collected influence both fathers' and mothers' experiences of AR parenthood. Given the small sizes of the samples and the use of the same samples over time, we cannot assume that these studies are representative of a country or culture or of the non-donor AR population.

Conclusions

The support needs of all AR parents go unrecognised in primary care (Torr, 2001). Our review shows that non-donor AR parents may have different needs to donor and SC couples as they transition to parenthood. Our findings suggest that there may be three psychosocial factors which shape the transition to parenthood for non-donor AR couples differently to SC couples.

Further research is needed to determine whether the psychosocial factors we have identified in this review are repeated in empirical work with discrete samples of non-donor AR couples. Qualitative studies would allow practitioners to hear what couples perceive they need and how best to meet those needs as they transition after non-donor AR to parenthood.

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Acknowledgements

611 **Figures and tables**

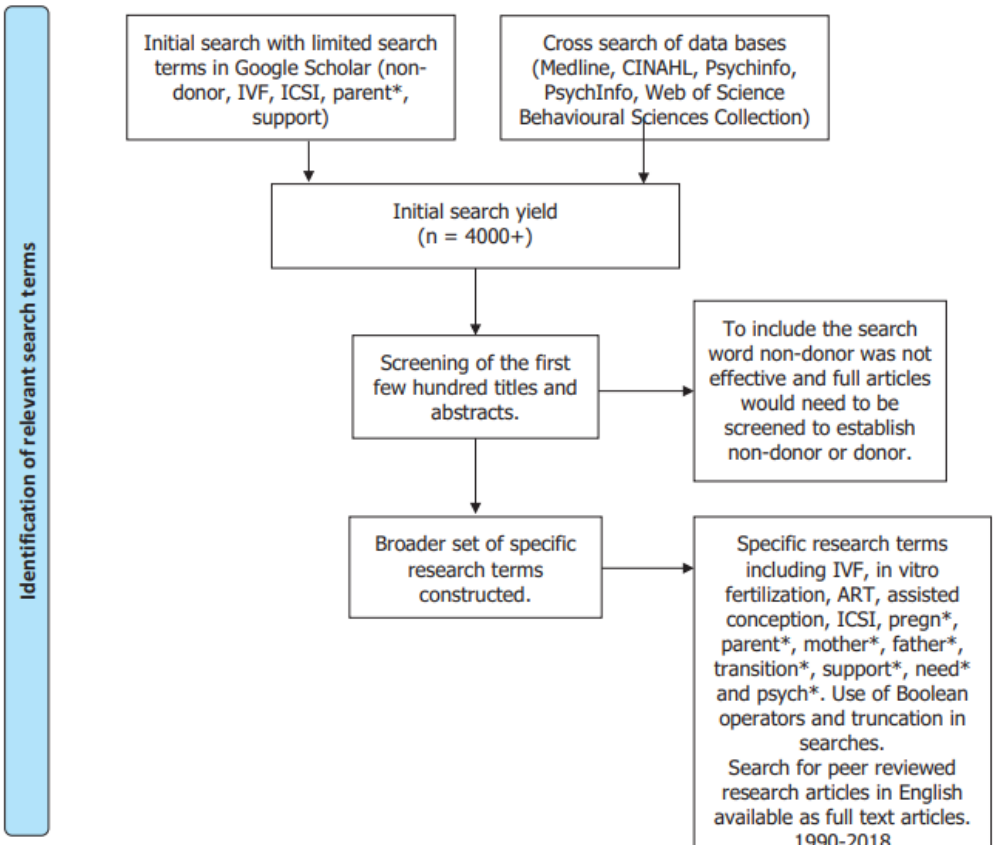

Figure 1. Search term construction.

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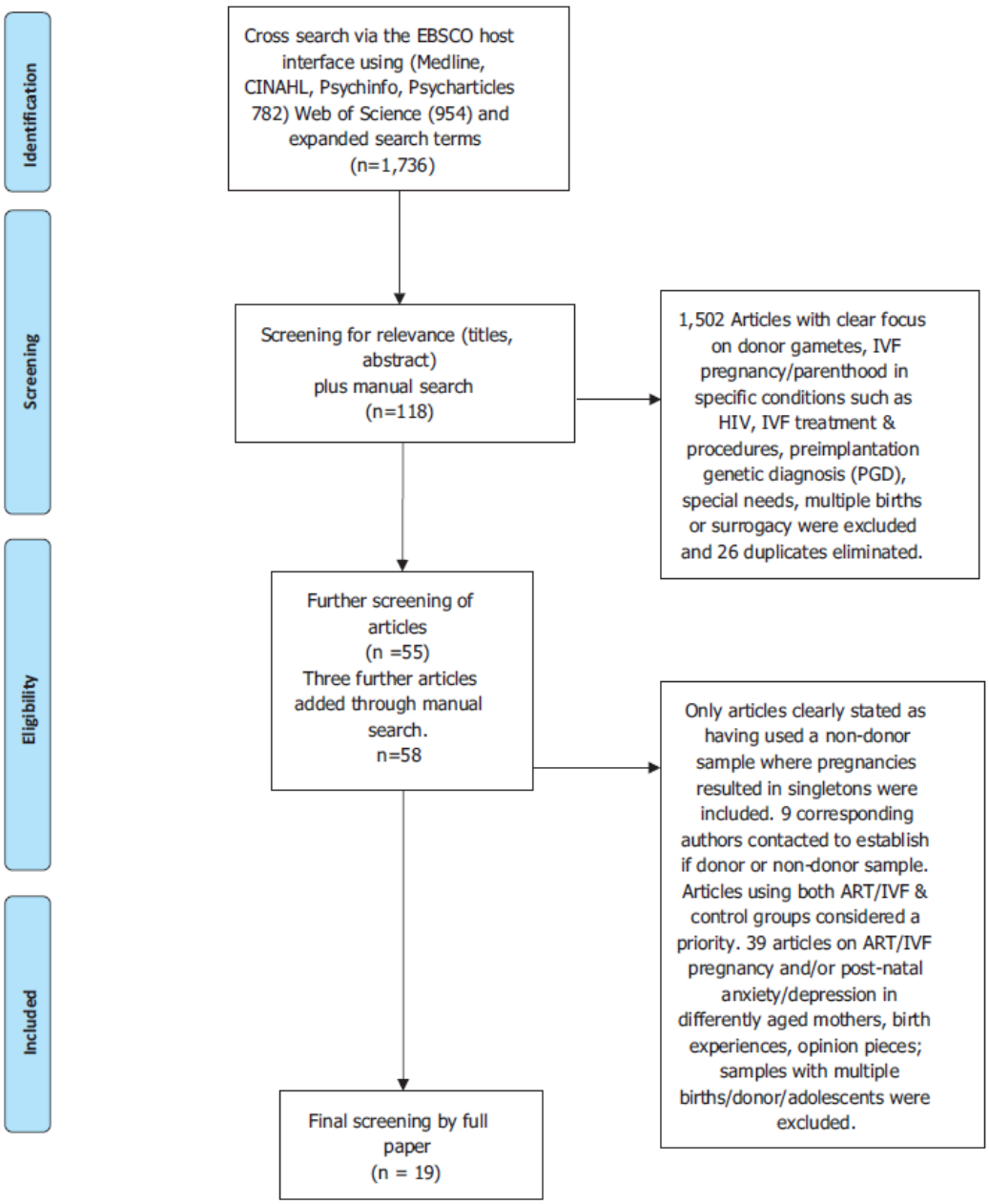

Figure 2. Literature search process.

Table 1. Reviewed articles.

	Authors, Year Title Country	Research design Methods	Sample	Comparison/ Control group	Focus	Findings	Theme
1	Barnes et al., 2004 *The influence of assisted reproduction on family functioning and development: results from a European study* UK, Belgium, Denmark and Sweden.	Quantitative Questionnaires, scales: GHQ, short form PSI, DAS.	Couples, 5 years after birth UK (IVF 156, ICSI 189, SC 163); Belgium (IVF 135, ICSI 190, SC 188); Denmark (IVF 67, ICSI 66, SC 70); Sweden (IVF 66, ICSI 67, SC 67). Totals are UK (n=580), Belgium (n=513), Denmark and Sweden (n=405). A research group in Greece was a collaborator but did not distribute parental questionnaires, and no Greek results are reported in this paper. Personal communication with authors Summer 2017	Yes	Well-being and adaption to parental role in parents of ICSI conceived children compared to IVF and SC groups.	Very few differences between the conception type groups with respect to parental well-being. Mothers of ICSI conceived children were more committed to being a parent than the naturally conceived group and reported fewer hostile or aggressive feelings to their children.	Emotional well-being
2	Cairo et al., 2012 *Family Interactions in IVF families: change over the transition to parenthood* Switzerland	Quantitative Structured observation using LTP Questionnaires, scales: DAS, ABQ pre-and postnatal version.	Couples, pregnancy and 9 months after birth 31 IVF 41 SC (reference sample not controls)	Yes	Transition/change from pregnancy to parenthood in IVF families	Family alliance, marital satisfaction and parental attachment scores were similar or higher in the IVF sample than the reference sample during fifth month pregnancy but a decrease in family alliance scores had occurred in the IVF sample when the babies were 9 months. It is concluded that postnatal support is needed for IVF families.	Relationships
3	Colpin et al., 1995 *New reproductive technology and the family: The parent-child relationship following in-vitro fertilization* Belgium Pilot study for paper 4.	Quantitative Structured observation using Erickson rating scales and translated parental attitudes and emotions scale. Questionnaires, scales: PBI, STAI, ZDS, adapted MMQ.	Couples, 24–30 months after birth 31 IVF 31 SC	Yes	Parent–child relationship and parents psychosocial functioning	No differences found between IVF/SC couples in relation to parent-child relationships or parents psychosocial functioning, including marital relationship. Employed IVF mothers	Relationships

(*continued*)

Table 1. Continued.

	Authors, Year Title Country	Research design Methods	Sample	Comparison/ Control group	Focus	Findings	Theme
						showed less respect for their child's autonomy compared to non-employed IVF mothers and employed comparison mothers.	
4	Colpin and Soenen, 2002 *Parenting and psychosocial development of IVF children: a follow-up study* Belgium	Quantitative Questionnaires, scales: Adapted version NCRQ, PSI, QPG, CBCL, TRF (teacher rated).	Couples, 8–9 years after birth 27 IVF 23 SC Same sample as paper 3	Yes	Follow-up study. Parent–child relationship (and children's psychosocial development)	No significant differences found	Relationships
5	Cook et al., 1997 *The European study of assisted reproduction families: a comparison of family functioning and child development between Eastern and Western Europe.* UK, the Netherlands, Spain, Italy and Bulgaria	Quantitative Same measures as paper 12 (Golombok et al., 1996).	Couples, 4-8 years after birth Bulgaria (20 IVF, 19 DI, 20 Adoptive, 20 SC). UK, Netherlands, Spain, Italy (116 IVF, 111 DI, 115 Adoptive, 120 SC) UK, Netherlands, Spain and Italy samples same as Paper 12	Yes	Comparison of family relationships and social and emotional development of children in ART families in East and West European countries	Greater differences in parental adjustment and child behaviour in ART families in Eastern Europe.	Relationships
6	Flykt et al., 2009 *Prenatal expectations in transition to parenthood: former infertility and family dynamic considerations* Finland	Quantitative Questionnaires, scales: Author devised, SFPT, PSI.	Couples, Pregnancy and 12 months after birth 367 ART 378 SC Personal communication with authors Summer 2017	Yes	How prenatal expectations of relationship with child predicts parenting stress in first year	Few differences between ART and SC parents and association between prenatal expectations and subsequent parenting stress similar. Because of long preparation, ART parents may be able to find their parental roles sooner.	Emotional well-being
7	Gameiro et al., 2010 *Social nesting: Changes in Social Network and Support Across the Transition to Parenthood in Couples That Conceived Spontaneously or Through Assisted Reproductive Technologies* Portugal	Quantitative Questionnaires, scales: adapted CNS.	Couples and women Pregnancy and 4 months after birth 22 ART couples, 9 ART women 24 SC couples, 4 SC women Personal communication with authors Summer 2017	Yes	Study into changes in social networks and support across transition to parenthood	Irrespective of type of conception parents turned to their nuclear family perceiving extended family and friends as less important in this context	Social Support
8	Gameiro, Canavarro, et al., 2011 *Parental investment in couples who conceived*	Quantitative Questionnaires, scales: BSI, translated ENRICH inventory, CNS, PIC.	Couples, Pregnancy and 4 months after birth 39 ART 34 SC	Yes	The study looked at how PIC varies as function of type of	Form of conception or gender did not affect PIC but marital relationship and	Social Support

(*continued*)

Table 1. Continued.

	Authors, Year Title Country	Research design Methods	Sample	Comparison/ Control group	Focus	Findings	Theme
	spontaneously or with assisted reproductive techniques Portugal		Same sample as Paper 7 Personal communication with authors Summer 2017		conception, gender and other variables	support from friends and family did.	
9	Gameiro, Moura-Ramos, et al., 2011 *Network support and parenting in mothers and fathers who conceived spontaneously or through assisted reproduction* Portugal	Quantitative Questionnaires, scales: CNS, translated PSI, translated PIC	Couples, Pregnancy and 4 months after birth 35 ART 31 SC Same sample as Paper 7 Personal communication with authors Summer 2017	Yes	The study examined the importance of network support and parental stress and investment in the child	No differences in the way ART couples and SC couples adjust to parenthood or care for their children were detected which depend on network support	Social Support
10	Gibson et al., 2000 *The Mother-Child Relationship Following In Vitro Fertilisation (IVF): Infant Attachment, Responsivity, and Maternal Sensitivity* Australia	Quantitative Structured observation of mother-child interactions, Emotional Availability Scales Questionnaires, scales: Author devised questionnaire.	Mothers, Pregnancy and 12 months after birth 65 IVF 61 SC	Yes	Nature of the mother-child relationship and adjustment to parenthood	No significant group differences on infant attachment or maternal-child interactions	Gendered experiences
11	Golombok et al., 1995** *Families created by the new reproductive technologies: quality of parenting and social and emotional development of the children* UK	Quantitative Interviews (mothers) for"quality of parenting" assessed by adapted Quinton&Rutter (1988) technique. Questionnaires, scales: GRIMS, STAI, BDI, PSI short form. Children's emotions, behaviour and relationships also assessed by Rutter A and B scales (mother/ teacher completed), adapted SAT, adapted FRT, PSPCSAYC (children).	Couples, 4-8 years after birth 41 IVF, 45 DI 43 SC controls 55 Adopted	Yes	Family relationships and social and emotional development of children	Quality of parenting in families conceived by ART superior to that of families with a naturally conceived child	Relationships
12	Golombok et al., 1996** *The European study of assisted reproduction families: family functioning and child development.* UK, the Netherlands, Spain and Italy	Quantitative (For measures, see also Golombok et al., 1995).	Couples, 4-8 years after birth UK (41 IVF, 45 DI, 43 SC, 55 Adopted); Spain (26 IVF, 23 DI, 18 SC, 10 Adopt); Italy (19 IVF, 14 DI, 25 SC, 25 Adopt); Netherlands (30 IVF, 29	Yes	Family relationships and social and emotional development of children: European comparison	Also showed quality of ART parenting to be superior (greater warmth, interaction, less stress) to SC parents. Quality of parenting and socio-emotional	Relationships

(*continued*)

Table 1. Continued.

	Authors, Year Title Country	Research design Methods	Sample	Comparison/ Control group	Focus	Findings	Theme
			DI, 26 SC, 25 Adopt). UK sample same as Paper 11			development of children similar in each of four countries studied	
13	Hahn and DiPietro, 2001 *In Vitro fertilization and the family: Quality of parenting, family functioning and child psychosocial adjustment* Taiwan	Quantitative Postal questionnaires, scales: Author devised, PSI, PPS, Family APGAR Index, PCI, CRD, ECBI, (mothers). Author devised, Parent Report, Child-Rearing Practice Report Block, PSBC, SESBI, (Teachers).	Mothers and Teachers, 3-7 years after birth 54 IVF 59 SC	Yes	Associations between IVF and quality of parenting, family functioning and emotional and behavioural adjustment	IVF mothers reported greater protectiveness, including separation anxiety, towards their children but their behaviours were not limiting to child development. Mothers of a single child conceived by IVF reported less stress than other mothers. IVF women reported less satisfaction with aspects of family and marital functioning.	Gendered experiences
14	Hjelmstedt and Collins, 2008 *Psychological functioning and predictors of father-infant relationship in IVF fathers and controls* Sweden	Quantitative Questionnaires, scales: PFA, FIAI, STAI, KSP, EDPS.	Fathers, Pregnancy and 2 months after birth 53 IVF 36 SC	Yes	To assess if early father-child relationship was relative to the fathers' prenatal relationship with the child, personality traits, anxiety and symptoms of depression	IVF fathers were as attached to their children as the control group but were more anxious and indirectly aggressive and may benefit from emotional support.	Gendered experiences
15	Jongbloed-Pereboom et al., 2012 *The impact of IVF/ICSI on parental well-being and anxiety 1 year after childbirth* The Netherlands	Quantitative Questionnaires, scales: STAI, GHQ.	Couples, 1 year after birth 113 IVF/ICSI 83 sub fertile SC	Yes	To examine if factors associated with IVF/ICSI affect anxiety and mental health in couples	Although the study did not use baseline data associated with anxiety and mental health, results indicate that IVF/ICSI was not associated with increased anxiety or mental health issues 1 year post-partum	Emotional well-being
16	McMahon et al., 1997 *Psychosocial adjustment and the quality of the mother-child relationship at four months post-partum after conception by in vitro fertilization* Australia	Quantitative Semi structured interviews rated by author devised scale. Questionnaires, scales: STAI, EPDS, DAS, modified SEW, BAP, MSES, NPI, STSI,	Mothers, 4 months after birth 65 IVF 62 SC	yes	Psychological adjustment to early motherhood	No differences between the IVF and control groups for mothers on global measures of anxiety, depression or marital satisfaction. IVF mothers reported lower self-esteem and	Gendered experiences

(*continued*)

Table 1. Continued.

	Authors, Year Title Country	Research design Methods	Sample	Comparison/ Control group	Focus	Findings	Theme
		MPAS, MSAS; videotaped mother-infant interactions.				maternal self-efficacy, although observations of maternal behaviours did not reveal differences in the quality of interactions with their infants. Group adjustment difficulties were mostly accounted for by mothers who underwent repeated treatment cycles.	
17	McMahon et al., 2003** *Parents of 5-Year old In vitro fertilization children: Psychological adjustment, parenting stress, and the influence of subsequent In vitro fertilization treatment* Australia	Quantitative Semi structured interviews for "current family situation, child health history and subsequent reproductive history" rated by validated scales. Questionnaires, scales: GHQ, STAI, DAS, LCBS, PSI, CECS.	Couples, 5 years after birth 66 IVF 46 SC Same sample as Paper 16 Mixed singleton/twins Group analysis repeated excluding twins (IVF = 12, SC = 3)	yes	Psychological adjustment and parenting stress of mothers and fathers	IVF mothers reported more external locus of control than other mothers, but no significant group differences for psychological adjustment, parenting stress or emotional control; also when twins were exduded. Demonstrated relationships between number of treatment cycles and psychological adjustment for IVF mothers (included twins)	Emotional well-being
18	Nekkebroeck et al, 2010 *International comparison of parenting styles in ICSI, IVF and natural conception families: Results from a European study* UK, Belgium, Denmark and Sweden	Quantitative Questionnaires, scales: GHQ, PSI short form, DAS.	Same sample as Paper 1 (Barnes et al., 2004) although authors state further participants added, exact numbers in groups are unknown. Totals are UK (n = 510), Belgium (n = 512), Denmark and Sweden (n = 400) Personal communication with authors Summer 2017	Yes	The study aimed to explore potential cultural impact in different European countries on parenting styles following IVF/ ICSI conception	In the UK men and women reported less marital satisfaction compared to the other countries and UK women reported more stress. From a Belgian perspective mothers were committed to their work and fathers were less committed to parenting than those in the UK and the Nordic countries.	Gendered experiences

(*continued*)

Table 1. Continued.

	Authors, Year Title Country	Research design Methods	Sample	Comparison/ Control group	Focus	Findings	Theme
						Women in the Nordic countries expressed less negative feelings towards their children compared to those in the other countries. It is concluded that cultural differences need to be considered when investigating the wellbeing of ART parents and their children.	
19	Walker et al., 2017 *Experiences of physical activity during pregnancy resulting from in vitro fertilisation: an interpretative phenomenological analysis* UK	Qualitative Semi-structured interviews and a phenomenological approach (IPA).	Women, pregnancy or 2 years after birth 8 IVF Personal communication with authors Summer 2017	No	The study aimed to explore the experience and decision-making processes related to physical activity for IVF women	Three major themes were developed: 'navigating away from childlessness to motherhood', 'negotiating a safe passage' and 'balancing the challenges of pregnancy with the needs of self'. Physical activity gave a sense of control and was perceived as soothing however there were concerns about safety.	Gendered experiences

ABQ: Antenatal Bonding Questionnaire; BAP: Being a Parent; BDI: Beck Depression Inventory; BSI: BSI-Depression; CBCL: Child Behaviour Checklist; CECS: Courtauld Emotional Control Scale; CNS: Convoy-Network Support; CRD: Child-Rearing Disagreements scale; DAS: Dyadic Adjustment Scale; ECBI: Eyberg Child Behaviour Inventory; EDPS: Edinburgh Postnatal Depression Scale; FIAI: Father–Infant Attachment Inventory; FRT: Family Relations Test; GHQ: General Health Questionnaire; GRIMS: Golombok Rust Inventory of Marital State; KSP: Karolinska Scales of Personality; LCBS: Locus of Control of Behaviour Scale; LTP: Lausanne Trilogue Play; MMQ: Maudsley Marital Questionnaire; MPAS: Maternal Postnatal Attachment Questionnaire; MSAS: Maternal Separation Anxiety Scale; MSES: Maternal Self-Efficacy Scale; NCRQ: Nijmegen Childrearing Questionnaire; NPI: Neonatal Perception Inventory; PBI: Parental Bonding Instrument; PCI: Primary Communication Inventory; PFA: Paternal Foetal Attachment Scale; PIC: Parental Investment with Child; PPS: Parent Protection Scale; PSBC: Pre-School Behavior Checklist; PSI: Parenting Stress Index; PSPCSAYC: Pictorial Scale of Perceived Competence and Social Acceptance for Young Children; QPG: Questionnaire Parenting Goals; SAT: Separation Anxiety Test; SESBI: Sutter-Eyberg Student Behavior Inventory; SEW: *Self-Esteem as a Woman;* SFPT: Subjective Family Picture Test; STAI: State Trait Anxiety Inventory; STSI: Short Temperament Scale for Infants; TRF: Teacher's Report Form; ZDS: Zung Depression Scale.

**One study (McMahon et al., 2003 see Table 1) sampled twins and singletons but analysed singleton data separately from twin data. Two studies (Golombok et al., 1995; Golombok et al., 1996) included four discrete samples of spontaneously conceiving (SC), non-donor IVF, donor insemination (DI) and adoptive parents. The analysis clearly distinguished between non-donor IVF and DI parents. Both McMahon et al. (2003) and Golombok et al. (1995, 1996) were retained in our review.

Table 2. Quality criteria grading.

Article	i)	ii)	iii)	iv)	v)	vi)	vii)	Score
1	x	x	x	x	x		x	6
2	x	x	x	x	x	x	x	7
3	x		x	x	x		x	6
4	x	x	x	Previous pilot study (3)	x		x	6
5	x	x	x	x	x	x	x	7
6	x	x	x	x	x		x	6
7	x	x	x	x	x		x	6
8	x	x	x	x	x		x	6
9	x	x	x	x	x		x	6
10	x	x	x	x	x		x	6
11	x	x	x	x	x		x	6
12	x	x	x	x	x	x	x	7
13	x	x	x	x	x		x	6
14	x	x	x	x	Possibly reported in detail elsewhere		x	5
15	x	x		x			x	4
16	x	x	x	x	x		x	6
17	x	x	x	x	x		x	6
18	x	x	x		x		x	5
19	x	x	x	x	x	x	x	7

Non-intervention studies were assessed according to a total of seven criteria (common to sets of criteria proposed by four research groups for qualitative research (Boulton et al.,1996; Cobb & Hagemaster, 1987; Mays & Pope, 1995; Medical Sociology Group, 1996): (i) an explicit account of theoretical framework and/or the inclusion of a literature review which outlined a rationale for the intervention; (ii) clearly stated aims and objectives; (iii) a clear description of context which includes detail on factors important for interpreting the results; (iv) a clear description of the sample; (v) a clear description of methodology, including systematic data collection methods; (vi) analysis of the data by more than one researcher (vii) the inclusion of sufficient original data to mediate between data and interpretation. Shepherd et al. (2006).

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Table 3. Search terms and strategy CINHAL, MEDLINE, PsychARTICLES, PsychINFO.

Search1	IVF or *In vitro* fertilization
Search 2	Assisted reproductive technology or ART or assisted conception
Search 3	Intracytoplasmic sperm injection or ICSI
Search 4	Pregnant or parent or mother or father and transition
Search 5	Support or need or psych
Search 6	Combine search 1, search 2 and search 3 with **OR**
Search 7	combine search 4, search 5 and search 6 with **AND**

Limits: 1990–2018.
Peer reviewed, full text articles only.
English.

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Table 4. Identified psychosocial factors which shape the transition to non-donor AR parenthood in comparison with SC parents.

Theme 1: Social support	AR women perceived less support from friends than did SC women (Gameiro et al., 2010)
Theme 2: Relationships	Family alliance scores reduced in the IVF sample when the babies were 9 months (Cairo et al., 2012)
	Employed IVF mothers showed less respect for their child's autonomy compared to non-employed IVF mothers and employed comparison mothers (Colpin et al., 1995)
	Different scores in parental adjustment and child behaviour in ART families in Eastern Europe compared to families in Western Europe (Cook et al., 1997)
	IVF mothers reported greater protectiveness, including separation anxiety, towards their children (Hahn & Pietro, 2001)
	IVF UK couples reported less marital satisfaction (Hahn & Pietro, 2001)
	IVF fathers were more anxious and indirectly aggressive (Hjelmstedt & Collins, 2008)
	Non-donor AR couples did not experience increased anxiety or mental health issues one year after birth. An association found between a higher number of treatment cycles and female cause for infertility (women) and longer wait for pregnancy (men) with lower anxiety and good mental health (Jongbloed-Pereboom et al., 2012).
	Cultural differences need to be considered when investigating the wellbeing of ART parents and their children. (Nekkebroeck et al., 2010)
Theme 3: Parents' emotional well-being	IVF mothers reported lower self-esteem and maternal self-efficacy and less satisfaction with aspects of family and marital functioning. Observations of maternal behaviours did not reveal differences in the quality of interactions with their infants, and early adjustment difficulties were mostly accounted for by those mothers who underwent repeated IVF treatment cycles (McMahon et al., 1997)
	IVF mothers reported raised external locus of control. High numbers of IVF treatments also predicted lower (more defensive) scores on the PSI's Defensive Responding domain. (McMahon et al., 2003)
	Physical exercise improved IVF mothers' sense of control during unstable transition (Walker et al., 2017)

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