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Biogenetic Kinship in Families Formed via Reciprocal IVF: 'It Was [My Partner]'s Egg . . . But My Blood Flowed through Her'

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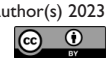

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Abstract

Reciprocal IVF is a route to parenthood that, for the first time, allows cis two-mother families (and other couples in which both partners have a uterus and egg stores) to 'share' biological

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parenthood. This family form offers a valuable opportunity for researchers to examine experiences of gestational and genetic motherhood within the same family, and this article is the first to take a sociological approach to exploring kinship within this emerging family form. Drawing upon interview data with 14 two-mother families (28 mothers) who have conceived via reciprocal IVF, we show that mothers hold complex, creative and sometimes contradictory understandings of the 'multiple motherhoods' within their family (i.e. genetic, epigenetic and gestational motherhood). Overall, mothers took an active and strategic approach to constructing kinship within their family, and these findings have theoretical, empirical and clinical implications.

Keywords
assisted reproduction, geneticisation, genetic thinking, LGBTQ+, motherhood, reciprocal IVF

Introduction

Kinship, or relatedness, has been the focus of much interdisciplinary research within recent years, with scholars focusing on the relationship between kinship and biological/genetic (biogenetic) connections. The study of assisted reproductive technologies (ARTs), such as gamete donation and surrogacy, has been central to such discussions, as new technologies create new forms of kinship (Carsten, 2012). One novel ART that has yet to be explored within the social sciences is reciprocal IVF, a technology in which couples where both partners have a uterus and/or egg stores (e.g. cis women, trans men and non-binary people assigned female at birth) can, for the first time, 'share' biological parenthood. One partner's egg is extracted and, once fertilised, this is carried by the other partner, meaning that genetic and gestational motherhood/parenthood are separated. LGBTQ+ motherhood has been identified as a rich field in which to explore the meaning of family connections (Nordqvist, 2014), and reciprocal IVF offers a particularly compelling opportunity for researchers to examine the way in which biogenetic relationships are understood and made meaningful within the family.

Within this article we draw upon interview data with 28 mothers (in 14 couples) who have conceived their children via reciprocal IVF. We utilise this rich dataset to explore how gestation, biology and genetics are understood by recipients of reciprocal IVF and to expand our knowledge of kinship in the context of increasingly complex ARTs. In doing so, we demonstrate that mothers define and display kinship in complex and malleable ways and highlight that mothers draw upon both established discourses (relating to shared substances, genetic inheritance and the quality of the parent–child relationship) and newer kinship discourses (relating to epigenetics in pregnancy) when defining kinship and connection.

Kinship, Biology and Genetics

The study of kinship, meaning the way in which we are related and connected to others, has been of long-standing interest within both academic scholarship and daily life, evidenced by a societal enthusiasm for tracing family resemblance and genealogies (Mason, 2008). While kinship has previously been the domain of anthropological study, more

recently there has been a proliferation of interdisciplinary kinship research (Carsten, 2012), sometimes termed 'new kinship studies'. Within new kinship studies, the theoretical underpinnings of kinship have been expanded upon. For instance, Mason (2008) suggested four dimensions of affinities that are made meaningful in everyday life: fixed affinities (which appear unchangeable), creative affinities (which involve imagination and active negotiation), ethereal affinities (which seem to be beyond rational or scientific explanation) and sensory affinities (which relate to physical or bodily connections). Importantly, these types of affinity intersect, and scholars have highlighted the way in which biogenetic kinship, which is often assumed to be a 'fixed' affinity, is instead actively negotiated (Carsten, 2012; Mason, 2008). Individuals actively construct and transform meanings of the biogenetic relationships, or lack thereof, in their family.

The study of ARTs and LGBTQ+ families has been central to modern kinship studies. LGBTQ+ families have challenged existing definitions of motherhood and fatherhood (Bower-Brown, 2022) and ARTs have denaturalised common understandings of how families are made, as families are created within a clinical context, often using purchased gametes (Birenbaum-Carmeli and Rudrappa, 2022). Pralat (2018) notes that ARTs may be perceived as 'unnatural' routes to LGBTQ+ parenthood, due to complex technological intervention, but paradoxically might create families that look the most 'normal' (i.e. similar to the nuclear family). ARTs are, therefore, both similar to 'natural' reproduction, in aiming to create biological family relationships, but highly different in methods, a paradox that means that they offer a particularly good opportunity to examine societal meaning making around kinship (McKinnon, 2015). For instance, ARTs such as surrogacy and egg donation have disrupted our understanding of cisgender motherhood (Gunnarsson Payne, 2016a); while previously motherhood was clear (due to pregnancy), cis motherhood can now be negotiated and contested. Motherhood exists in multiple forms: gestational motherhood, genetic motherhood and, more recently, mitochondrial motherhood, which came to prominence recently with media reports of the world's first '3 parent baby' (Hamzelou, 2016). Such changes have not been reflected in UK legislation, which only allows for a child to have one legal mother, who is the person that gives birth. ARTs therefore create 'new' forms of kinship (McKinnon, 2015), and this is the case with reciprocal IVF, which creates a genetic mother and a gestational mother within the same family.

Throughout history, different languages and terminologies have been used to discuss and understand kinship. For instance, 'blood ties' have generally been seen as an idiom for connection and inheritance (Carsten, 2013), evidenced in phrases used to denote closeness to biological relatives (e.g. 'blood is thicker than water') or animosity between different groups (e.g. 'bad blood'). However, it has been noted that the idea of 'the gene' has surpassed that of 'blood ties', in terms of what is deemed to be important for defining kinship (Franklin, 2013). Scholars have explored the symbolic and cultural meaning of the gene, which goes beyond its precise biological properties to function as a secular soul, meaning that it is thought to encompass one's true self (Nelkin and Lindee, 2004). This is related to the widespread idea of 'genetic essentialism', or the tendency to infer characteristics and behaviour based on an individual's perceived genetic make-up (Dar-Nimrod and Heine, 2011). Society has been described as becoming 'geneticised' (Ten Have, 2001), evidenced in the rising popularity of genetic ancestry kits, where individuals seek identity, heritage and family via genetic connections. Nordqvist (2017) notes

that 'genetic thinking', meaning the way in which genetics and genetic relationships are made meaningful, is now a key part of family living. Genetic thinking is evident in everyday family life, with discussions of family resemblance being underpinned by genetic essentialism (i.e. seeing family resemblances as proof of a genetic link and consequently a family relationship). When having a child, parents are impacted by assumptions that they are, or should be, the genetic parents of their children (Nordqvist, 2017), which may make non-genetic parents feel insecure.

Therefore, geneticised understandings of kinship and family are highly prevalent. However, Franklin (2013) notes that, somewhat paradoxically, as scientific knowledge about genetics increases and the limitation of our knowledge is made clearer, the plasticity of thinking about genetic kinship increases and the cultural meaning of genes becomes more ambivalent. For instance, consumers of genetic ancestry test-kits selectively choose which aspects of their geneticised ethnic/racial identities to embrace, only doing so if they provide value to their identities (Roth and Ivemark, 2018). This demonstrates that genetic thinking is complex and intertwined with other ways of doing and defining family. Rather than genetics replacing other understandings of kinship, multiple kinship discourses exist within UK contemporary society. As individuals may understand family connections and relatedness in multiple ways, at the same time, kinship has been defined as a 'multi-layered and malleable resource' (Nordqvist, 2014: 268), which holds multiple meanings in different contexts. As scientific understandings of biology change and evolve, new forms of kinship are created and existing forms of kinship are modified, and this will now be explored in the context of ARTs.

Kinship and Assisted Reproduction: Genetic and Gestational Motherhood

ARTs that are similar in procedure, such as gestational surrogacy, egg donation and reciprocal IVF, can have highly different intentions and outcomes. Thompson (2001) notes that these technologies 'trace' motherhood through different pathways; in gestational surrogacy, motherhood is traced via the genetic relationship between intended mother and child, whereas in egg donation, motherhood is traced via the gestational relationship between genetic mother and child. These different intentions impact upon how individuals view their reproductive roles. Surrogates have been found to de-emphasise the connection formed with the foetus during pregnancy (Jadva and Imrie, 2014) and egg donors have been found to see their donation as 'just an egg', forgoing a maternal connection (Almeling, 2014). Alternatively, research on gestational surrogacy in India has found that surrogates draw upon 'everyday forms of kinship', emphasising the shared blood and sweat between surrogate and foetus as more important than the genetic connection between intended mother and child (Pande, 2009). Therefore, traditional understandings of kinship, which might understand family and closeness via blood ties or shared substances, can contradict geneticised understandings of kinship.

Intended parents have been found to actively use strategies to strengthen their connection with their child. Egg donation mothers use a number of strategies to 'make the child mine', minimising the donor's contribution and emphasising their unique contribution to the child, in terms of pregnancy and a high-quality mother–child relationship (Imrie

et al., 2020). One study with egg donation mothers identified that mothers engaged in discourses of epigenetics (Gunnarsson Payne, 2016b): they minimised the donor's genetic contribution by highlighting that pregnancy and parenthood has an impact on the child's DNA. Epigenetics is the study of changes to organisms that happen due to modifications in gene expression, rather than the content of the genetic code (DNA) itself. Such modifications may happen due to environmental or behavioural factors and research has begun to highlight that the gestational environment influences foetal development via epigenetic pathways (Zuccarello et al., 2022). In a geneticised society, epigenetic discourses may allow gestational mothers who are not genetically related to their child to solidify and strengthen their maternal relationship (Gunnarsson Payne, 2016a).

Two-Mother Families

The scholarship on kinship and ARTs highlights that mothers, surrogates and egg donors seek to either minimise or maximise their genetic/gestational contribution, with the goal of delineating and asserting who the mother is, and who the mother is not (Thompson, 2001). Egg donation and surrogacy tend to have a clear delineation of 'mother' and 'not mother'. Within reciprocal IVF, however, motherhood is traced via both the gestational and genetic relationship, as both individuals involved intend to parent together. Parenthood is usually not traced via the genetic link between sperm donor and child, and two-mother families therefore need to make sense of the genetic role that the donor has played in conception (Ehrensaft, 2008).

Previous research has highlighted that two-mother families rely on genetic and interpersonal understandings of kinship (Nordqvist, 2014), to account for both mothers' contributions to parenthood. Two-mother families have also been found to minimise the importance of the sperm donor (Nordqvist, 2010) so that both mothers feel connected to their child. Relatedly, two-mother families have been found to value within-couple equality highly (Malmquist, 2015; Shaw et al., 2022). However, the biological inequality involved with non-reciprocal IVF, where one mother is the biological mother and the other is not, has been found to complicate plans for parenting equality, with some biological mothers engaging in more parenting and some non-birth mothers feeling excluded (Keegan et al., 2023; Malmquist, 2015; McInerney et al., 2021). Ehrensaft (2008: 172) suggests that mothers may ask questions of whether the baby is 'mine more than yours', highlighting that understandings of kinship as genetic/biological may play an important role in family life. As reciprocal IVF offers mothers the chance to 'share' biological motherhood, this biological inequality is reduced, and so questions of 'mine more than yours' may become obsolete. Indeed, quantitative research suggests that there are no differences in parent–child relationship quality between gestational and genetic mothers in reciprocal IVF families (Golombok et al., 2023). However, understandings of kinship are complex: societal discourse valorises genetic relationships, legal definitions of motherhood are centred on pregnancy and everyday understandings of kinship may encompass both. Additionally, genetic and gestational motherhood are 'new' forms of kinship and thus questions of belonging and kinship may be highly important within reciprocal IVF families (Shaw et al., 2022). Reciprocal IVF families therefore offer an understudied but highly valuable site of study into the nature of kinship in families formed by novel ARTs.

The Study

Within this article we draw upon data collected as part of a wider study of two-mother families who have conceived their children via reciprocal IVF. This article focuses on in-depth interviews with 28 mothers within 14 families, who were cohabiting when interviewed, with children aged 0–3 years. Mothers with older children were excluded from the analysis so as to focus on experiences of reciprocal IVF and pregnancy and separated couples were excluded to explore genetic and gestational relationships within the same household. Participants were recruited through the London Women's Clinic, an independent fertility clinic in the United Kingdom. Of the 14 families included in this article, six had more than one child at home: two families had an older child from a previous different-gender relationship, and four couples had a second child conceived via ART (either reciprocal IVF, with the reproductive roles swapped, or non-reciprocal IVF). Thirteen families utilised an identity-release donor, and one family utilised a known donor. The sample had a high socio-economic status, with most employed parents in either professional or managerial occupations (90%). Twenty-two parents provided further demographic information. Most mothers (90%) described their ethnicity as White British/White–Other and 77% of parents identified their nationality as British or Northern Irish. Further information on ethnicity and nationality is not provided to protect participant anonymity. This study received ethical approval from the University of Cambridge Psychology Research Ethics Committee.

Semi-structured interviews were conducted separately with genetic and gestational mothers within each family. Participants were asked about their motivations for choosing reciprocal IVF, experiences during the treatment process, and experiences of parenting as a same-gender couple. Throughout the interview, participants were asked about how they thought and felt about the biogenetic relationships within their family. Interviews were conducted at participants' homes or via video call, and the interviews were audio-recorded, transcribed and anonymised. Upon undertaking reflexive thematic analysis of the data for another article (Shaw et al., 2022), it became clear that participants understood and negotiated biogenetic relationships and kinship within a multitude of ways, and that these data would benefit from further analysis. Transcripts were then re-read and coded again, with participants' understandings of biogenetic relationships as the primary focus. After having engaged with existing literature on biogenetic kinship, the data were further explored and a number of contradictory and complex understandings of kinship were identified.

Below, we utilise illustrative quotations from mothers' interviews to explore the complexity of kinship in the context of novel ARTs. Quotations are presented verbatim, although ellipses indicate omission of data and square brackets indicate anonymisation or modification to data – some repetitions and filler words (e.g. sort of, like) have been tidied up to aid legibility. Pseudonyms are used for all participants. These findings are not necessarily representative of the sample as a whole, although some findings were common across the sample. Some mothers ascribed less importance to the relatively different roles of genetics and gestation, and these experiences are less explored within this article. Nonetheless, complex understandings of biogenetic relationships were present across the sample and the experiences and views in this article represent novel and interesting ways in which mothers saw, spoke about and understood biogenetic relatedness.

Results

Genetic Links and Blood Ties: 'It Was [My Partner]'s Egg . . . But My Blood Flowed through Her'

Within a societal context that privileges genetic relationships, genetic motherhood was often deemed by participants to be more 'real' and legitimate than gestational motherhood. Gestational mothers leant into dominant societal discourses about genetic relatedness, as they often stated that they were carrying a baby that was 'not mine': '[child] is no part of me, really. Which wouldn't be the case in a male and female relationship. There's always a half of that person in that child' (Rio, gestational mother). In describing her child as 'no part of me', Rio draws upon genetic understandings of kinship, and using Mason's (2008) typology, genetic relationships are seen as a 'fixed' affinity: 'Technically, [child] is biologically not mine, even though I'm the birth mother' (Camilla, gestational mother). Therefore, the gene is represented as a 'technical' scientific object (Franklin, 2013) with a high level of importance.

Given this privileging of genetic motherhood ('I've got the advantage if you like that they're my eggs and therefore I'm the biological parent' (Audrey, genetic mother)), Gloria described creatively constructing kinship with her child, via her partner's genetic connection: 'I forget actually that she isn't biologically my daughter, but she is my daughter, and I don't know if that's because she's from [partner's] egg and actually that's biological connection enough' (Gloria, gestational mother). This demonstrates that biogenetic kinship is malleable, and that the 'fixedness' of genetic relationships can also be accessed via interpersonal relationships (Mason, 2008).

Despite some gestational mothers stating that they were carrying a baby that 'wasn't mine', closeness between gestational mothers and their children opposed this geneticised understanding:

> She doesn't carry her genes but [partner] carried her and was the primary caregiver and amazing at it. And they share a really strong bond . . . it's such a strange thing that you can carry a child that isn't biologically yours and raise it and all of that. (Audrey, genetic mother)

Audrey's conception of the situation as 'strange' highlights the competing discourses around genetic relationships and gestational connections. Here a distinction is made between 'carrying genes' (e.g. genetic lineage) and carrying the baby, which can be seen as an embodiment of nurturing, or an extra nine months of bonding.

As genes were perceived to be more abstract, in some cases they were reduced to 'tiny microscopic things' (Irene, gestational mother), and mothers' understandings contradicted the genetic essentialism seen in scientific discourse. Mothers instead relied upon everyday understandings of kinship, drawing upon discourses of closeness and blood ties: 'I'm quite happy to talk about [child] and that she's [partner's], it was [partner's] egg . . . but my blood flowed through her. How much other closeness can you get to a person?' (Marsha, gestational mother). Mothers' understandings of kinship were therefore complex: by stating that the child 'belonged' to the genetic mother, this upheld genetic motherhood, whereas by drawing upon the notion of shared blood, mothers represented

closeness via blood ties. Echoing Pande's (2009) research with Indian surrogates, closeness in gestational motherhood was thought to be related to the sharing of substances more generally: 'I think there's a whole lot of [partner], I mean there has to be right? I mean you're giving them your blood, and urine and plasma and whatever else you share, oxygen, I can't think of anything stronger' (Deb, genetic mother).

Previous scholarship has suggested that genetics have become more important for defining kinship than blood ties (Franklin, 2013) but here it is possible to see both discourses being drawn upon in different ways, with shared blood/substances being seen as a particularly strong or intimate form of connection:

> I don't feel any sense of [child] not being mine, I think there's something insanely intimate and biological about carrying a baby . . . I can remember her coming out all bloody and slippery and it was just an extraordinary start to a relationship. (Jill, gestational mother)

This exemplifies Mason's (2008) conceptualisation of 'sensory' affinities, highlighting that intense physical experiences can play a role in defining kinship. In contrast, Scarlett (a genetic mother) described first seeing her baby:

> My initial reaction when I saw her was 'oh my god she's gross, she's covered in all this weird stuff' . . . I had this really overwhelmingly 'oh no I don't like her' sensation, which went away very, very quickly. But it was like 'oh shit what have we done?' Whereas the second they brought her over and put her on [partner] it was exactly what you think is gonna happen and this really lovely bonding moment. (Scarlett, genetic mother)

This quotation suggests that sensory affinities are related to wider societal discourses about the maternal instinct. In a number of families, mothers swapped reproductive roles for the second pregnancy, and some mothers' understandings of their different gestational/genetic connections continued long past pregnancy:

> It's very clearly defined in this house. Not on purpose, that the birth mum is, not the real mum, but the one they definitely go to . . . you carry them in your belly for nine months and then you give birth to them, definitely it's a different connection. (Sharon, gestational mother to son, genetic mother to daughter)

This highlights that questions of 'mine more than yours' (Ehrensaft, 2008) are ongoing within some reciprocal IVF families. However, other mothers described that their understandings of gestational/genetic connections changed over time: 'You probably think that the biological thing is gonna be a big factor but when a baby arrives and you're responsible for it, I think the bigger connections are made' (Gloria, gestational mother). This highlights the importance of the quality of the parent–child relationship in establishing kinship and that meaning making around family connections is ongoing, malleable and complex.

Pregnancy, DNA and Epigenetics: 'That'll Be the One Per Cent'

Mothers' understandings of kinship therefore both upheld and contradicted genetic understandings of kinship, by referring to a baby that 'wasn't mine', while also drawing

upon ideas relating to sharing substances, blood ties and investing time/energy in the child in pregnancy and parenting. Some mothers also drew upon the concept of epigenetics to explain the closeness between gestational mothers and their children. Penny described seeking out research on epigenetics:

> [The article] said that, 'You're providing the genes, but actually the person who is coding how to use those genes is the carrier and not the provider.' So, it was really interesting, and we felt like that, 'Yes. You provided the genes, but she did all of the coding behind it.' (Penny, genetic mother)

Here, Penny distinguishes between the provider of the genes (the genetic mother) and the coder of the genes (the gestational mother), importantly giving both mothers a role in influencing the genetic make-up of their child. Epigenetics allows both mothers to make sense of their role in conception and pregnancy, exemplifying the potent symbolic meaning of the gene (Nelkin and Lindee, 2004).

Even though many mothers were not aware of epigenetics, Robyn described a belief that DNA had to be involved in pregnancy:

> [Child]'s so like [partner], and the only way that that could have happened was if she carried him . . . I don't know if there's any studies about it, but I'm pretty sure that something has to happen, you have to share some sort of DNA or genetics with the baby that you're carrying, whether or not the egg and sperm were yours. (Robyn, genetic mother)

This suggests a more 'ethereal' understanding of DNA (Mason, 2008), and also highlights the way in which the gene is centred in discussions of resemblance, minimising the role of shared environment or parenting. Relatedly, concepts of epigenetics allowed some mothers to participate in familial 'resemblance talk': 'We do have very similar noses so there's this idea that she got a few of my genes on the inside. To make the nose. Yeah exactly [laughs]' (Jill, gestational mother).

This demonstrates that families use new kinship languages (e.g. epigenetics) to engage in traditional family practices, such as resemblance talk. A number of mothers demonstrated a creative and playful approach to discussing kinship (Nordqvist, 2014):

> Although [child] is genetically [partner's], it was my blood right that went around her system. Apparently now you share one per cent of your DNA even though you're not genetically the owner of – well not the owner – but genetically the mother of the child, you've still got one per cent of your DNA right? So we joke a lot around 'that'll be the one per cent' whenever [child] does something that's like me. (Abby, gestational mother)

Mothers therefore engaged with both epigenetic discourses and those of shared substances/blood ties, demonstrating that blood and genes might establish kinship in similar ways (Gunnarsson Payne, 2016a). Scholarship has highlighted that genes are seen as more abstract and precise than blood connections (Franklin, 2013), but in Abby's quotation blood was used in a more precise sense (e.g. sharing substances) whereas DNA was seen to be more ethereal and fluid. Notably, epigenetic discourses might allow mothers to be as close as possible to 'genetic equality', with Steph reporting an interest in egg fusing technologies:

> Any child we had would be our child but for us an ideal, the closest you can get to, not a normal, but like [resembling] us . . . in the last few years there was the technology to fuse the two eggs together. Oh wow. Yeah but I think it's gotta be tens of thousands of pounds [laughs]. (Steph, genetic mother)

Ever evolving ARTs may be sought out so that LGBTQ+ parents can have families that resemble 'normal' (i.e. nuclear) families, and this may be a safety strategy within a cisheteronormative society. Here, a distinction can be made between 'normalness' and 'naturalness', with routes to parenthood that seem less natural being utilised to form families that seem more 'normal' (Pralat, 2018). Therefore, discourses of epigenetics, although representing a novel kinship discourse, are perhaps a way for mothers to access traditional understandings of family and claim a role in their children's genetic make-up.

Strategic Kinship: Minimising the Sperm Donor and Exercising Agency

Mothers described taking a strategic approach to kinship, and used their privilege and agency to construct 'ideal' kinship within their family. Some mothers described thinking of the sperm donor as a 'theoretical person' (Abby, gestational mother), or as Bridget (gestational mother) described, '[the donor] has never featured as a person, it's just a procedure'. Reciprocal IVF allowed some mothers to minimise the donor's contribution more than non-reciprocal IVF: 'Because [partner] and I are both parents, you forget, I forget all the time that actually there's a sperm donor. I feel like we both made her' (Marsha, gestational mother).

Utilising reciprocal IVF can therefore be seen as a strategic way to create fixed affinities within the family, and in creating two biological parents, minimise the role of the sperm donor, reflecting wider assumptions about families only having two parents Although many mothers wanted to distance the donor from the conception process, they described wanting to facilitate their child's future interest in the donor: 'The children get the choice at one point to go and find who that person is, but we wanted it very much just to be our experience. Mine and [partner]'s, not an extra person' (Rio, gestational mother). Mothers also described engaging in donor matching:

> We wanted a white person, Caucasian, tall, because I'm not overly tall but I'm taller, and either Australian or Dutch Scandinavian. I don't know, I can't remember why we wanted that, but that's kind of what we were looking for. And obviously they were healthy and they were intelligent . . . we wanted someone that was representative of us, that felt like us rather than just going completely off piste. (Fi, gestational mother)

This shows that choosing donor sperm is partially about matching (e.g. not going 'off piste'), but is also about aspiring to 'good genes' (e.g. healthy, intelligent and from certain nationalities). Notably, previous research has highlighted that 'Viking DNA' is aspirational (Strand and Källén, 2021) but this quotation suggests that this extends to nationalities with similar physical stereotypes (e.g. tall, white). One couple with an ethnic minority parent described trying to decide which donor sperm to use:

> We'd found one that was a [place] donor because [partner's] Grandad is from [place], we kind of liked that heritage. Yeah so we thought 'ah that'd be perfect' but the person had a restricted profile and they didn't wanna donate to same-sex couples. (Steph, genetic mother)

This demonstrates that individuals seeking sperm from ethnic minority donors face additional barriers (Moreta et al., 2022). Steph also noted ambivalence about choosing an ethnic minority donor, in that her child was 'already gonna have two mums, do you wanna add the race, the ethnicity factor'. This is an example of 'strategic racialisation', echoing prior research with LGBTQ+ ethnic minority parents, which highlighted that parents make strategic donor decisions, balancing the desire to have a child that resembles them with the wish for their child to avoid experiencing racism (Smietana and Twine, 2022). Relatedly, a number of mothers spoke about balancing their kinship desires with their perception of what their child would want:

> I would've carried her egg and then I would've done the egg sharing and then carried my own. Actually that's changed now because I feel that's a little bit selfish to [child] in the sense that we were just ticking a genetic box . . . Whereas actually for her to have a full-blood sibling who looks like her . . . your whole mindset shifts when you have the child to less thinking about what you want. (Marsha, gestational mother)

This highlights the high importance given to genetic kinship and the complexity of genetic thinking, as mothers negotiated the kinship of multiple family members, and negotiated their individual desires with the perceived 'best interests' of their child (Finkler, 2000).

The sample had a high socio-economic status, and Toni described using her agency and economic capital to choose what she described as 'super sperm':

> The more expensive sperm bank, they've got a lot more stricter rules . . . we can say to [child], 'we had you in the best way possible so that you've limited the number of half brothers and sisters you're gonna have'. It's not like we went off to Spain, now they're saying it could be 600 or something ridiculous, so it was very important for us to spend that money. (Toni, genetic mother)

A number of mothers who were planning to have more than one child decided to prioritise their child having a 'full brother or sister' (Norma, gestational mother), by having the same genetic mother and same donor for multiple children (Nordqvist, 2014). Alternatively, Scarlett spoke about ensuring fairness by 'balancing' genetic relatedness within her family:

> We obviously can't combine our genetics . . . it was like socially combining them. So it was having at least one of each of us genetically and then it was important to us that we had the same donor for all of them . . . [it's] less giving them a connection where they're like 'oh we're all biologically related' and more giving them a bit of a level playing field where it's like 'look if we've picked a duff one at least you've all got it' rather than if you have one genius kid and one that's really sporty and one that's not good at anything, you're like oh sorry [laughs]. (Scarlett, genetic mother)

In discussing 'super sperm' and 'duff sperm', mothers drew upon geneticised understandings of kinship (Finkler, 2000) and by accounting for the donor's influence on intelligence and sporting ability, mothers held interconnected representations of social and biological heritability (Kramer, 2011; Nordqvist, 2014). Marsha described being a 'genetic engineer' when choosing the same genetic mother and sperm donor for her children:

> If she has a blood sibling and something happens and she needs a blood transfusion, they can give her blood . . . You do overthink it. But when you are manufacturing you can think about the details right? When you have no choice, you don't choose generally the genetics of the person you fall in love with, you have a baby with them. If they have like some genetic disease, you deal with it. Whereas now, we can engineer that. (Marsha, gestational mother)

Parents who use novel ARTs have been described as 'moral pioneers' (Rapp, 1988), and LGBTQ+ parents may face more moral questions about their route to parenthood than cis-heterosexual parents (Pralat, 2018). Although many mothers expressed gratitude and privilege about being able to make reproductive choices and access reciprocal IVF, a minority of mothers who had experienced pregnancy complications expressed concerns about going 'too far':

> I think it's just the fact that the babies were born early that's tarnished that for me a little bit and I think, 'Did we, were we meddling too much there?' But we'll never know that, and I actually need to not think of it like that, 'cos in many ways, it is a lovely story that we did this, and we are both involved. (Deb, genetic mother)

This highlights concerns about the 'unnaturalness' of ARTs (Pralat, 2018) and the ethical burden that is faced by parents who use novel ARTs. Deb's experience also suggests a pressure for recipients of ARTs to express positivity and gratitude about their route to parenthood, suggesting a need to explore further the narratives of parents with ambivalent experiences.

Discussion

The findings show that mothers take a creative and strategic approach to understanding biogenetic kinship. It appears that 'genetic thinking' is a key part of family living within reciprocal IVF families, particularly when mothers are planning their pregnancy and conception, and undergoing fertility treatment. Additionally, understandings of blood ties and shared substances were important in establishing kinship during pregnancy and birth. As children grew older, mothers often described that the relative importance of their gestational/genetic connection lessened over time, as kinship was established and strengthened via the 'doing' of parenting. This research expands our knowledge of how novel ARTs contribute to changing understandings of kinship.

Multiple Motherhoods: Genetics, Epigenetics and Gestation

While previous research has explored the way in which egg donors, surrogates and egg donation mothers either minimise or maximise their gestational/genetic connection

depending on intention to parent (Almeling, 2014; Imrie et al., 2020; Jadva and Imrie, 2014), findings from the current study demonstrate that reciprocal IVF mothers seek to maximise all motherhood connections, whether they be genetic, epigenetic or via shared blood/substances. These 'multiple motherhoods' allowed some mothers to further minimise the role of the sperm donor, due to both mothers having a biological connection to their child. Mothers engaged in multiple kinship discourses to understand and explain the complex biogenetic relationships in their family, and the quality of the parent–child relationship was deemed a key aspect of kinship.

Genetic motherhood was represented as an official or fixed form of kinship (Mason, 2008), and this can be understood in terms of the 'geneticisation' of kinship, and of society more broadly (Franklin, 2013; Nelkin and Lindee, 2004; Ten Have, 2001). Notably, this differs from legal definitions of motherhood, which are centred on gestation. The study's findings also demonstrate ambiguity in kinship, with supposedly 'fixed' affinities being accessed creatively or viewed ethereally (Mason, 2008), adding weight to the suggestion that the plasticity of thinking around biogenetics is increasing (Franklin, 2013). Notably, epigenetic discourses appear to play an important role for some non-genetically related mothers, a finding that has been unexplored in previous research (see Gunnarsson Payne, 2016a, 2016b for an exception). Epigenetics may allow non-genetically related mothers to claim a role in their child's genetic make-up, something that may be increasingly important in a geneticised society. However, novel ARTs do not necessarily produce 'new' ways of thinking about families, but rather draw attention to old, unspoken ideas of what family means (Nordqvist, 2017). Here, epigenetic discourses allowed mothers to be a part of their child's genetic heritage, thus perhaps allowing them to more closely resemble families who conceive via 'natural' reproduction.

Mothers had complex, and sometimes contradictory, understandings of genetic kinship. These experiences might better be understood by considering how genetics are discussed within fertility clinics. Ehrensaft (2008) notes that clinical representations of genetics are ambivalent, as there is a paradox of genes both being stated to matter and not matter. Clinics rely on the industry of constructing genetic parenthood, but also provide access to anonymous genetic material, and reassure non-genetic parents about their lack of genetic connection (Ehrensaft, 2008; McKinnon, 2015). Notably, discourses of epigenetics are beginning to enter the clinical context (see, for example, Santa Monica Fertility, 2022), with epigenetic research being used to reassure egg donation mothers that pregnancy plays an important role in child development. It has been suggested that epigenetics are a new form of genetic determinism (Mansfield, 2017) and it is therefore plausible that epigenetic discourses will be utilised to pressure non-genetic mothers to 'do pregnancy' well. Such ideas align with the wider societal discourse of parental determinism, which posits that parents' everyday micro-behaviours are causally associated with child developmental outcomes (Lee et al., 2014).

Within the sample, there were key differences in the way that mothers saw gestational and genetic motherhood. Genetic motherhood was seen as an 'official', hereditary motherhood, whereas gestational motherhood offered immediate intimacy, and these representations were present among gestational and genetic mothers alike. Genes have been described as a proxy for resemblance (Nordqvist, 2017), and blood ties and shared substances can be seen as a proxy for closeness. Carrying the genes and carrying the baby

allowed mothers to access different forms of kinship. It has been suggested that genetic motherhood is presumed to be 'given' rather than made (Nordqvist, 2017). The findings from this study suggest that gestational motherhood is made, rather than given. In other words, some gestational mothers described that they were carrying a baby that 'wasn't mine', and as such their connection with the foetus was formed in pregnancy and via the blood/substances shared between mother and child (Pande, 2009). Relatedly, gestational motherhood can be seen as fitting the ideals of intensive mothering, a prevalent motherhood ideology that outlines the importance of high maternal investment in the child (Keegan et al., 2023).

Strategic Kinship and Moral Pioneering

In accordance with other research (Smietana and Twine, 2022; Thompson, 2001), mothers viewed biogenetic kinship as a resource that could be engaged with creatively and strategically. The link between genetic mother and child was viewed differently to the link between sperm donor and child, demonstrating that intention to parent is key in determining the importance of genetic kinship. Mothers minimised the sperm donor's role in conception, but thought that the sperm itself, that is, the genetic matter, mattered. Genetic kinship can be seen as a form of capital, and when choosing a sperm donor, mothers utilised economic capital to choose the 'best sperm' and to limit the number of donor siblings their child might have. This decision-making process can be considered in light of societal discourse that stigmatises large families, particularly those of a low socio-economic status, in a neoliberal economy (Jensen and Tyler, 2015).

Some mothers aimed to establish fixed (i.e. genetic) bonds between siblings, and other mothers aimed to balance genetic relatedness within their families (with each mother having a genetic child), suggesting that competing discourses around biological equality and having 'fully' genetically related siblings might be at play. LGBTQ+ mothers have been found to value equality highly (Malmquist, 2015; Shaw et al., 2022), and so balancing genetics within the family might allow mothers to fulfil this ideal. On the other hand, having 'fully' genetically related siblings might allow mothers to resemble the nuclear family more closely, allowing them to avoid stigma. Ethnic minority mothers may also be balancing their desire to have a child that resembles both parents, in accordance with the nuclear family ideal, with a desire for their child to avoid racism (Smietana and Twine, 2022). Faced with complex decisions, mothers aimed to prioritise their children's genetic capital over their own, demonstrating the extent to which the gene is centred in family decision making. This also highlights that genetic thinking intersects with other parenting discourses, such as the notion of the 'best interests of the child'. (Epi)genetics were often discussed in a playful way, demonstrating that such conversations can make and strengthen family connections in and of themselves (Nordqvist, 2014, 2017).

Mothers had the financial and social capital to make many reproductive decisions on the journey to parenthood, and this was sometimes experienced as an ethical or moral burden (Pralat, 2018; Rapp, 1988). Technology is ever evolving, with 'effortless reciprocal IVF' now being marketed to LGBTQ+ couples (Effortless IVF, n.d.): the genetic parent 'carries' the egg and sperm cell in the vagina for five days, before the embryo is

transferred to the gestational parent, allowing both parents to be involved in gestation. As ARTs become more technologically complex, and clinics offer more potentially ineffective treatment add-ons (Harper et al., 2017), the complexity of parents' decision making is increasing. With regards to reciprocal IVF specifically, some parents choose this to successfully overcome medical issues with one partner's eggs (Shaw et al., 2022). However, pregnancies that use donor eggs may have a higher risk of complications than pregnancies that use the patient's own egg (Storgaard et al., 2017), suggesting that reciprocal IVF might carry more risks than non-reciprocal IVF. Parents need to receive high-quality clinical counselling when undertaking fertility treatment, so that they can be supported in navigating this potentially difficult decision-making process.

Conclusion

Within this article, we have explored different aspects of biological motherhood (i.e. epigenetic, genetic and gestational motherhood) and kinship within a sample of reciprocal IVF two-mother families. In doing so, we have extended our sociological understanding of the negotiation of kinship in the context of complex ARTs. Findings point to the usefulness of Mason's (2008) typology of kinship, and the relevance of 'genetic thinking' to family life (Nordqvist, 2017). More research is necessary to understand epigenetic discourses, and to explore the complex interplay between kinship established by genetic connections, shared substances, blood ties, pregnancy and the quality of the parent–child relationship. Reciprocal IVF families offer a particularly valuable opportunity to explore key questions about relatedness and connection, and future research should explore this further.

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Ethics statement

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