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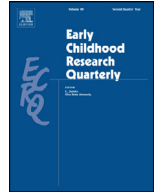
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Parental sensitivity and intrusiveness in gay-, lesbian-, and heterosexual-parent families with infants conceived using artificial reproductive techniques: Do parents' gender and caregiver role matter?

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ABSTRACT

The goal of our study was to examine whether differences in the sensitivity and intrusiveness of fathers and mothers from gay-, lesbian-, and heterosexual-parent families (57 French couples, 47 Dutch couples, and 31 British couples) with their first-born infants were explained by gender or caregiver role, while controlling for nesting within families, infant temperament, and twinship. We assessed the sensitivity and intrusiveness of 147 primary caregivers (45 fathers, 102 mothers) and 123 secondary caregivers (68 fathers and 55 mothers). All infants were conceived using assisted reproductive techniques and averaged 4 months of age. They were videotaped at home with both parents while engaged in play, feeding, and other childcare (bathing or changing) and these videotapes were coded for sensitivity and intrusiveness. Information about relative levels of caregiving, infant temperament, and twinship was collected via parent report questionnaires. Mixed linear models showed that sensitivity while playing, cleaning, and feeding were not predicted by parental gender, relative parental involvement, and the interaction between parental gender and parental caregiver role. Models for intrusiveness while playing and feeding showed similar results. However, intrusiveness during cleaning was predicted by parental gender and the interaction between parental gender and caregiver role. Post-hoc analyses showed that secondary caregiving fathers showed more intrusive behavior during cleaning ($M = 1.51$, $SD = 0.09$) than secondary caregiving mothers ($M = 1.26$, $SD = 0.10$). Our results also showed that contextual factors, such as having singletons or twins, infant temperament, and country of residence were related to parenting behavior. In sum, our findings do not support presumptions that mothers are more capable of providing better quality care than fathers, or that, at this early stage, primary caregiving parents are better attuned to their infants than those who are less involved.

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1. Introduction

Because infants need constant care, infancy is characterized by intensive parenting which may have long-lasting effects on later

child development (Bornstein, 2012). However, most research on the associations between variations in parental behavior and later child outcomes has been conducted in families with heterosexual parents (Lamb, 2012; Thompson, 2008), and primarily with mothers.

Mothers are still widely believed to provide parenting of higher quality for infants and to be fundamentally better suited for parenting than fathers although such beliefs are controversial

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(Cabrera et al., 2018). Some scholars state that fathers and mothers indeed behave differently (Grossmann et al., 2002) whereas others argue that fathers and mothers behave similarly (e.g., Fagan et al., 2014) or have complementary behaviors (Cabrera et al., 2014). In studies comparing paternal and maternal parenting, gender and caregiving role (i.e., the division of caregiving responsibilities and decision-making between parents) are often confounded – with mothers usually being the primary caregivers –making it impossible to determine whether differences between fathers and mothers are due to the parents' gender or caregiver roles. Taking caregiver role into account is important because having more child-care experience is associated with better quality parenting (Power, 1985). By including primary caregiver fathers and secondary caregiving mothers from understudied families including gay-, lesbian- and heterosexual-parent families in our research sample, we were able to disentangle the effects of gender and caregiving role by observing the early parenting behaviors of primary caregiving mothers, primary caregiving fathers, secondary caregiving mothers, and secondary caregiving fathers.

Paternal and Maternal Sensitivity

Sensitivity is the capability to both adequately observe and interpret infants' signals and needs and respond to them properly and promptly (Ainsworth et al., 2015). The concept of parental sensitivity was central to attachment theory, which states that sensitive parenting fosters the formation of secure early parent-child relationships (Ainsworth et al., 2015; Bowlby, 1969). According to attachment theory, when parents respond properly and promptly, infants learn that they can trust their parents. This trust, in turn, gives infants perceptions of efficacy and self which support their increasing independence and exploration (Lamb & Lewis, 2013) with parental sensitivity related to later development outcomes. For example, higher maternal sensitivity in infancy predicts fewer internalizing problems in preschool-aged children (Kok et al., 2013) and better social and academic competencies in adulthood (Raby et al., 2015).

Some scholars have argued that mothers evince superior parenting than fathers, especially when infants are distressed and need comfort (Grossmann et al., 2002; Paquette, 2004). Hallers-Haalboom and colleagues (2017) suggested that differences in maternal and paternal sensitivity might be explained by gender differences in the ability to assess others' emotions with females better than males at reading nonverbal signals (Hall & Matsumoto, 2004), especially subtle emotional expressions (Hoffmann et al., 2010). These skills would make it easier for mothers to read infant signals and respond sensitively.

Initial research on maternal and paternal sensitivity focused on parents with children younger than 2 years old. These studies yielded inconsistent findings: some found that mothers were more sensitive than fathers (Barnett et al., 2008; Fuertes et al., 2016; Hallers-Haalboom et al., 2014; Lovas, 2005; Volling et al., 2002), with one study only finding this difference for daughters (Schoppe-Sullivan et al., 2006); other studies found that fathers and mothers were equally sensitive (Branger et al., 2019; Braungart-Rieker et al., 1998; Feldman, 2000; Goosens & van Ijzendoorn, 1990; Martins et al., 2014). Studies with older children (ranging from 2 to 5 years old) reported no differences in the sensitivity of fathers and mothers (Belsky et al., 2005; Feldman & Klein, 2003; Steenhoff et al., 2019; Tamis-LeMonda et al., 2004). Only two studies from this era (Feldman, 2000; Feldman & Klein, 2003) stated which parent was the primary caregiver (mothers); nearly half of the studies did not mention the division of child care and the other studies reported that fathers worked more than mothers did. Thus, evidence with regard to the differential sensitivity of fathers and mothers is still mixed although it seems that, if

there are significant differences between fathers and mothers, they tend to be small and are more likely to be evident during infancy.

Paternal and Maternal Intrusiveness

Another important parenting behavior in early childhood is intrusive behavior (e.g., Belsky et al., 2007; Egeland et al., 1993). Intrusiveness involves insensitive and interfering parental behaviors that are rooted in the parents' lack of respect for their infants' autonomy (Ispe et al., 2004). Intrusive parents do not follow their infants' signals but instead pursue their own agenda while interacting. Consequently, intrusive parents dominate the interaction and do not accommodate children's input or pace (Ispe et al., 2004). Parental intrusiveness is evident in diverse types of parental behavior, including both verbal and physical behavior (e.g., Carlson & Harwood, 2003).

Parental intrusiveness is expected to affect development adversely. Infants with intrusive parents are likely to withdraw to overcome their parents' overstimulation and this might lead to avoidant attachment relationships (Ainsworth et al., 2015). Furthermore, children may feel incompetent because they are not allowed to play active roles in interactions and because their initiatives are seldom considered. This can lead to negative interpersonal behavior such as withdrawal and aggression (e.g., Pettit et al., 1991). Intrusive parental behavior also inhibits mutual parent-child exchange and regulation (Malatesta et al., 1989), hindering the development of children's self-regulation and their ability to participate in positive relationships with others (Egeland et al., 1993; Pettit et al., 1991). Indeed, parental intrusiveness has been linked to negative outcomes such as lower academic, social, and emotional skills in first and second grade (Egeland et al., 1993) and poorer cognitive performance in toddlers (Klein & Feldman, 2007).

Thus, non-intrusive parenting fosters positive child development. There are several theoretical reasons to assume that fathers might behave more intrusively than mothers. For example, fathers use more instrumental speech than mothers (Leaper et al., 1998), hindering children's activities (Hallers-Haalboom et al., 2014). In addition, earlier studies showed that fathers were more likely to tease their children (Labrell, 1996) and prohibit their infants' activities (Brachfeld-Child, 1986), which might reflect intrusive paternal behavior.

Empirical evidence with regard to these differences is mixed and when significant differences between fathers and mothers have been found, they tend to be small. Some researchers found no differences between fathers' and mothers' intrusive behavior when reading to (Frosch et al., 2001), playing with (Fuertes et al., 2016; McElwain & Volling, 1999; Volling et al., 2002), and while teaching (McElwain & Volling, 1999; Volling et al., 2002) their infants. In contrast, others found that, even though both parents tended to behave non-intrusively, mothers were less intrusive than fathers when playing with their infants (Hallers-Haalboom et al., 2014) or that fathers were less intrusive than mothers in naturalistic settings (Barnett et al., 2008; Martins et al., 2014). Results of studies involving parents and toddlers were also mixed: in one, mothers showed more nonintrusive behavior (Lovas, 2005), in another, fathers and mothers showed equal amounts of intrusive behavior (Steenhoff et al., 2019), whereas fathers showed less intrusive behavior than mothers during play in a third (Tamis-LeMonda et al., 2004). Research with four-month-olds shows that context matters (Branger et al., 2019; Leyendecker, Lamb, & Scholmerich, 1997): better quality interactions occurred during routine caregiving than during free play (Branger et al., 2019), suggesting the importance of studying parental intrusiveness in different contexts when investigating possible differences between fathers' and mothers' intrusive parenting behavior.

Caregiver role and parenting behavior

More child-care experience is associated with better quality parenting (Power, 1985). Different-sex parents typically divide responsibilities in a gendered way, with mothers taking on more of the caregiving responsibilities and spending two to three times as much time with their children than fathers (Craig & Brown, 2017; Yavorsky et al., 2015) even when both parents are employed full-time or had more egalitarian roles prior to parenthood. This was even true during the recent COVID-19 pandemic lockdowns: although fathers started to work fewer hours, often from home, and spent more time on childcare, mothers still spent much more time on childcare than fathers did (Farré et al., 2020; Manzo & Minello, 2020). It is possible that when differences favor mothers (i.e., mothers show higher quality parenting than fathers), these differences are related to the primary caregiving role of the parent and not to the gender of the parent. However, this possibility has not yet been thoroughly investigated.

Feldman (2000) showed that secondary caregiving fathers who spent more time with their children were indeed more sensitive than secondary caregiving fathers who spent less time with their children. However, none of these fathers were primary caregiving fathers. Abraham and his colleagues (2014) were the first to compare primary caregiving fathers with secondary caregiving fathers and primary caregiving mothers. They found that fathers' early caregiving experiences (including those of primary caregiving fathers with infants born through surrogacy) influenced their brain activities. More specifically, when compared with primary caregiving mothers, primary caregiving fathers showed similar brain activities in the 'parental caregiving' neural networks, while secondary caregiving fathers showed less activity in the 'parental caregiving' neural networks. This indicates that the caregiver role might be of importance while studying fathers' and mothers' parenting qualities.

To assess this possibility, it is important to include both primary and secondary caregiving mothers and fathers in research samples. Fathers who are primary caregivers from birth are still rare but this group is growing in part because gay men can now become parents within same-sex relationships by opting for surrogacy (Lev, 2004). In addition, same-sex female couples with children provide a unique opportunity to study another rare group: secondary caregiving mothers. Gay and lesbian couples share childcare tasks in a more egalitarian way than heterosexual couples do (e.g., Farr & Patterson, 2013; Goldberg et al., 2012; Vecho et al., 2011), but not all couples share child-care equally (Tornello et al., 2015; Van Rijn - Van Gelderen et al., 2020) providing unique opportunities to study the sensitivity and intrusiveness of both primary and secondary caregiving mothers and fathers. Importantly, research has consistently shown no differences in parental behavior associated with parental sexual orientation (Golombok, 2020; Lamb, 2012; Miller et al., 2017).

Research on parenting within same-sex headed families who conceived after coming out has involved adoptive parents (e.g., Farr et al., 2020), parents who conceived using assisted reproductive techniques (e.g. Carone et al., 2020), and informal co-parenting arrangements in which child rearing is shared in kinship arrangements with a third party (e.g., Bos, 2010; Erera & Segal-Engelchin, 2014). Across these studies of same-sex parenting, the ages of the children have ranged from 2 to 18 years, while the measures of parenting have also varied. Some researchers have studied warmth and discipline during observed play or structured activity (e.g., Bos et al., 2004; Golombok et al., 2018), while others have considered parent-reported parenting styles and competencies (Baiocco et al., 2015). A meta-analysis of the associations between parent-reported and observed parenting found a weak association between questionnaire- and observation-derived mea-

asures (Hendriks et al., 2018). This indicates that, although parent-reported and observed parenting are related, both ways of measuring parenting quality provide unique information about parental behavior. However, thus far, most studies of sensitivity and intrusiveness during infancy have used observational methods (e.g., see Mesman & Emmen, 2013, for an overview of observational studies of sensitivity). To enable comparisons with the results of these studies, we decided to gather observational data as well. A recent study also showed that the quality of mothers' and fathers' parenting varies depending on the context in which it occurs (Branger et al., 2019): sensitivity scores were higher in more naturalistic contexts. Therefore, the focus in the current study was on three naturalistic settings: playing, cleaning, and feeding.

Few researchers have studied the behavior of same-sex parents with infants (although see Rubio et al., 2020). This limitation is troubling because early parenting behaviour is believed to shape early parent-child relationships and children's social development (Lamb, 2012; Roisman & Fraley, 2008). More specifically, sensitive and non-intrusive parenting fosters the formation of secure early parent-child relationships (Ainsworth et al., 2015; Bowlby, 1969). As shown by a meta-analysis, this secure early attachment has long-lasting significance for children's development, fostering better social competence and fewer externalizing problems (Groh et al., 2017). It is therefore important to determine whether fathers and mothers as well as primary and secondary caregivers provide care of different quality when their infants are young.

The current study

In this study, we investigated whether differences in the sensitivity and intrusiveness of fathers and mothers from gay-, lesbian-, and heterosexual-parent families observed interacting in three contexts (playing, cleaning, and feeding) with their first-born infants were explained by gender or caregiver role. We included heterosexual-parent families who used IVF in our sample to control for the use of ARTs.

It is important to note that systems within the family are interdependent (Minuchin, 1985) and that infant temperament (i.e., biologically based, early emerging, and relatively stable individual differences in reactivity and the ability to self-regulate; Rothbart & Bates, 1998) influences the way parents feel and act. Further, having twins subjects parents to additional stressors not experienced by singletons' parents, and these stressors also affect parental behavior (Lytton & Gallagher, 2012). Therefore, we accounted for nesting within families and controlled for infant temperament and twinship when analyzing fathers' and mothers' sensitive and intrusive parenting behavior. We expected that, while controlling for infant temperament and twinship, individual differences in sensitive and intrusive behavior would be explained by caregiver role rather than gender.

2. Method

Participants

Thirty-eight two-parent gay families, 61 two-parent lesbian families, and 41 two-parent heterosexual families in three European countries (France, the Netherlands, and the United Kingdom) participated in the New Parents study (NPS; $n = 140$ families – see also: Van Rijn - van Gelderen et al., 2020). Some families did not participate in the observations, which led to an analytic sample of 36 two-parent gay families, 58 two-parent lesbian families, and 41 two-parent heterosexual families ($n = 135$, comprising 57 French couples, 47 Dutch couples, and 31 British couples).

Table 1
Demographic information about new parent study parents and their infants.

+	Mothers (n = 157)	Fathers (n = 113)	ANOVA or χ^2	Primary Caregivers (n = 147)	Secondary Caregivers (n = 123)	ANOVA or χ^2
Parents (n = 270)						
Mean age	33.26 (3.99)	37.71 (5.95)	F (1,263) = 53.14, P < 0.0001	34.93 (5.19)	35.31 (5.56)	F(1,264) = .336, P = 0.563
Ethnic identity, White	95.9%	93.1%	χ^2 (5) = 4.13, P = 0.531	95.2%	94.4%	χ^2 (5) = 3.42, P = 0.636
Length of relationship (in years)	7.24 (3.07)	9.32 (3.94)	F (1, 268) = 23.76, P < 0.0001	7.98 (3.53)	8.27 (3.69)	F (1,269) = .429, P = 0.513
Relationship status, Married	87.3%	69.9%	χ^2 (1) = 12.36, P ≤ 0.0001	80.3%	79.7%	χ^2 (1) = .015, P = 0.903
Twins, yes	7.0%	25.7%	χ^2 (1) = 18.12, P ≤ 0.0001	13.6%	16.3%	χ^2 (2) = .374, P = 0.541
Working status, fulltime			χ^2 (2) = 8.09, P = 0.018			χ^2 (2) = 20.33, P < 0.0001
Fulltime	56.1%	69.6%	F > M (P = 0.024)	51.7%	73.8%	P < S (P < 0.0001)
Part-time	31.2%	16.1%	M > F (P = 0.005)	27.2%	22.1%	ns
Not working outside home	12.7%	14.3%	ns	21.1%	4.1%	P > S (P < 0.0001)
Family Income			χ^2 (2) = 7.63, P = 0.022			χ^2 (2) = .431, P = 0.806
Under 12,706 dollar	1.9%	0.9%	ns	1.4%	1.6%	
12,706 – 42,356 dollar	32.9%	18.6%	F > M (P = 0.009)	25.3%	28.5%	
Over 42,356 dollar	65.2%	80.5%	M > F (P = 0.006)	73.3%	69.7%	
Residency			χ^2 (3) = 7.09, P = 0.069			χ^2 (3) = .544, P = 0.909
Rural area	5.7%	6.2%		5.4%	6.5%	
Small city	37.6%	27.4%		32.0%	35%	
Medium city	33.8%	29.2%		33.3%	30.1%	
Large city	22.9%	37.2%		29.3%	28.5%	

ANOVA = analysis of variance.
Note. Standard deviations are given in parentheses.

The majority of these families had singletons (85.2%) and a majority (56.1%) of the infants were girls. The mean age of the infants at the time of observation was 3.68 months (SD = 0.59) and the age of the parents ranged from 22 to 59 years (M age: 35.11; SD = 5.36). Most families lived in large- (28.9%), medium- (31.9%), or small-sized (33.3%) cities, with the remaining 5.9% based in rural settings. The average duration of the parents' relationships was 8.11 years (SD = 3.60). Eighty percent of the parents were married or in civil partnerships and 20% were cohabiting. About two-thirds (61.7%) of the parents were employed full-time. Most families (71.6%) had an annual household income of more than 42,365 US dollars. The majority of the British and Dutch parents were White (94.8%); no information about the ethnicity of the French parents was available (it was illegal to ask about ethnic background in France). As shown in Table 1, mothers (n = 157) and fathers (n = 113) differed significantly with respect to parental age, length of relationship, relationship status (married), whether the infants were singletons/twins, working status, and family income. There were no group differences with respect to ethnic identity and living location.

Primary and secondary caregivers in each family were distinguished using answers to six items on the Who Does What questionnaire (Cowan & Cowan, 1990). Both parents were asked who was responsible for their infant's weekday care: (1) when getting up, during breakfast, and when dressing the infant, (2) during the day from 9.00 a.m. to 1.00 p.m., (3) during the day from 1.00 p.m. to 5.00 p.m., (4) when having dinner, during playtime, at bedtime, (5) in the evening until midnight, and (6) when the infant needed care in the middle of the night. Response options ranged from 1 ("I do it all") to 9 ("Partner does it all"). Thirteen parents had a missing value on at least one of these items. To minimize bias and optimize power, missing data were handled by multiple imputation. We used m = 20 imputations, using the "fully conditional specification" available in IBM SPSS 25.0 (2017). We created aver-

age scores for each parent and compared the scores of partners in each of the 20 imputed datasets; the parent with the lowest average score in all datasets was labelled primary caregiver and the co-parent was labelled secondary caregiver. In five families, both parents were labelled as the primary caregiver because they reported that they were equally responsible for their infant's weekday care as indicated by similar average scores across the 20 imputed datasets. There were seven families in which, as a result of the imputation of data, the parents' reports differed across datasets (i.e., parent A had a lower average score in some datasets while parents B had a lower average score in other datasets). In these families, we also designated both parents as primary caregivers.

This resulted in 147 primary caregivers including 45 fathers (40 gay and 5 heterosexual) and 102 mothers (63 lesbian and 39 heterosexual) and 123 secondary caregivers including 68 fathers (32 gay and 36 heterosexual) and 55 mothers (53 lesbian and 2 heterosexual). As shown in Table 1, primary and secondary caregivers differed significantly only with respect to working status. As expected, primary caregiving parents more often did not work outside the home than secondary caregivers and secondary caregivers worked fulltime more often than primary caregivers did. There were no group differences with respect to all other demographic variables.

Procedure

Ethical approval was granted by the appropriate committees at the home institutions of the British, Dutch, and French collaborators before parents were recruited through fertility clinics, specialist lawyers, Child and Family Court Advisory and Support Service in the UK, LGBT and surrogacy parenting support groups, online forums, and magazines. Gay fathers participated when they had used surrogate carriers, lesbian mothers when they had used sperm donors, and heterosexual parents when they had used IVF

without sperm or egg donation to conceive. Only two-parent families with children younger than 4 months were eligible.

The families were assessed at home when their infants were 4 months old (± 14 days). Before the home visits, parents completed online questionnaires seeking demographic information. During the visit, each parent engaged in an audio-recorded interview, completed standardized questionnaires online, and participated in three video-recorded observations that were the focus of this study.

Parents were each video-recorded separately with their infant while participating in three daily tasks: playing, cleaning, and feeding. Whenever possible, the other parent was in a separate room. The timing of the observations during the visit was dependent on the infant's state and needs and parents were asked to let the researchers know when they thought the infant was ready to participate in any of these observations. For the play observation, each parent was asked to play freely with the infant for ten minutes. It was emphasized that parents could do anything they usually did with their infants. The cleaning observation could involve diaper changing or bathing (depending on the preference of the parent). Observations began when the infant was placed on the changing surface and finished when the infant was picked up from that surface or the event had clearly finished. Feeding observations began when the infant was placed on the parent's lap or in a chair and the bottle or breast was made available to the infant. They ended when the baby had finished feeding or when all attempts to feed the infant had stopped.

Measures

The three observations of daily caregiving were used to assess parental sensitivity and intrusiveness. All videos were coded by at least two raters¹ and any disagreements were discussed until consensus was reached. If consensus was not reached, raters returned to the video once all others had been coded and/or consulted other members of the team. Seven raters completed the coding, with videos coded by pairs of raters whose native language was that of the parents involved. In the Netherlands, all videos were coded by varying pairs of the three coders, and as such, for some Dutch families, different contexts were coded by different combinations of coders. In France and the U.K., all contexts were coded by the same coders because these teams comprised two coders. In addition, twenty-two percent of all videos were re-coded by a third coder from one of the other sites (i.e., the Dutch, French, or the British teams) to ensure maintenance of agreement across sites. Average absolute intra-class correlations (1, k) are reported below to demonstrate agreement between raters (before discussions) for videos coded by two or three coders.

Sensitivity

Sensitivity requires parents to be aware of and to accurately interpret their infants' signals. To show sensitivity, parents also had to respond promptly and appropriately to their infants' signals. Sensitivity was rated from generally insensitive (1) to highly sensitive (4). Videos were coded as 1 when parents showed little warmth or acceptance, spent little time interacting, and/or their attempts to interact were poorly timed or inappropriate. A score of 2 was given when parents showed some sign of insensitivity but also

showed signs of warmth and sensitivity, and videos were assigned a 3 when parents were warm, responsive, creative, and/or well-paced with no signs of insensitivity. A 4 was assigned when all signs of sensitivity were noted and there was also a special quality of shared, joyful connection characterizing at least some the interaction. Average absolute intra-class correlations (1, k) were adequate for the whole sample, 0.81, 95% C.I. [0.77, 0.83], and for the 22.1% of videos coded by three raters, 0.81, 95% C.I. [0.75, 0.85].

Intrusiveness

A parent was considered to be intrusive when his or her behavior towards the baby was overstimulating, controlling, or abrupt. Intrusiveness was rated from no intrusiveness (1) to very intrusive (4), taking into account multiple types of intrusive behavior: overstimulating and/or over-directive, controlling, and abrupt or rough. Over-stimulating or over-directive behavior included either interacting in a manner that was too fast-paced or repetitive for the infant to comfortably handle or directing the interaction while not taking into account the infant's interests and responses. Controlling behavior included making the infant perform an action (e.g., taking the infant's hand to touch a toy or restricting the infant's movements [except when needed for safety], or repeatedly invading the infant's space. Abrupt or rough behavior (e.g., roughly manipulating the baby's body), sudden shifts in behavior (e.g., parent introjects a sudden sharp admonition into a stream of positive behavior), or behavior that overtly startled the baby, were also coded as intrusive. For some types of intrusive behavior, like overstimulation, infants' response was incorporated into the coding whereas other types of behavior, such as controlling and abrupt, jarring behavior, were coded without taking the infants' response into account. Videos were coded as 1 if no instances of intrusiveness were noted, as 2 if there were one or two mild instances of controlling or abrupt behavior or the parent was over-directive or over-stimulating for less than half the observed interaction, as 3 if there were one or two moderate instances or three or more mild instances of controlling or abrupt behavior or when parents were over-directive or over-stimulating for more than half the observed interaction, and as 4 when there were at least one decidedly or three or more moderately controlling or abrupt behaviors noted. Average absolute intra-class correlations (1, k) were adequate for the whole sample, 0.83, 95% C.I. [0.81, 0.85], and for the 22.2% of videos coded by three raters, 0.79, 95% C.I. [0.74, 0.84].

Child temperament

The fussiness/difficulty subscale (9 items) of the Infant Characteristics Questionnaire (ICQ; Bates et al., 1979); French version: Bertrais, Larroque, Bouvier-Colle, & Kaminski, 1999; Dutch version: Kohnstamm, 1984) was used to obtain information about the temperament of the infants. Each parent rated the fussiness of their infant on a seven-point scale with a low score meaning easy and a high score meaning difficult. An example of the items is: "How easy or difficult is it for you to calm or soothe your baby when he and/or she is upset?" (1 = very easy, 7 = difficult). Scores were averaged per parent. Internal consistency was high (Cronbach's $\alpha = 0.82$).

Data analysis approach

Our aim was to investigate whether differences in sensitivity and intrusiveness in the three contexts were explained by parental gender (female/male) and/or caregiver role (primary/secondary), after controlling for child temperament and twinship. To do so, we performed six linear mixed models (one for each outcome) with families as a random effect, and parental gender, parental caregiver

¹ The authors K.E-D, LVR-VG, A.W., O.V, and B.R. were part of the coding team. They were trained to use a coding scheme that was developed by Nanmathi Manian (see Wang, Shapiro, & Manian, 2009), under the supervision of Marc Bornstein from the National Institute of Child Health and Development (NICHD) based upon the Emotional Availability Scales (Biringen et al., 2000). More information is available upon request.

Table 2
Means (Standard Errors) for sensitivity, intrusiveness and infant temperament by parent gender and caregiving role.

	Mothers (n = 170)	Fathers (n = 142)	Primary caregiver (n = 168)	Secondary caregiver (n = 144)	Total (n = 312)
Sensitivity					
Playing ^a	2.71 (.06)	2.67 (.06)	2.69 (.06)	2.69 (.06)	2.69 (.04)
Cleaning ^b	3.17 (.06)	3.03 (.06)	3.13 (.06)	3.07 (.07)	3.10 (.04)
Feeding ^c	2.75 (.05)	2.78 (.07)	2.77 (.05)	2.75 (.07)	2.76 (.04)
Intrusiveness					
Playing ^d	2.18 (.08)	2.48 (.09)	2.36 (.08)	2.27 (.08)	2.32 (.06)
Cleaning ^e	1.36 (.05)	1.43 (.06)	1.40 (.05)	1.38 (.06)	1.39 (.04)
Feeding ^f	1.33 (.07)	1.48 (.08)	1.39 (.06)	1.40 (.08)	1.40 (.05)
Infant Temperament	3.08 (.06)	2.83 (.06)	2.97 (.06)	2.96 (.06)	2.96 (.04)

Note. Some parents were observed with their twins (n = 42), so they were included twice in the dataset. Information is derived from the pooled dataset. Numbers of missing values per variable:

- ^a n = 6 (1.9%)
- ^b n = 11 (3.5%)
- ^c n = 61 (19.6%)
- ^d n = 5 (1.6%)
- ^e n = 11 (3.5%)
- ^f n = 61 (19.6%)

Table 3
Correlations between sensitivity, intrusiveness, and child temperament scores.

	1	2	3	4	5	6	7
1. Sensitivity - playing	1						
2. Sensitivity - feeding	.20 ^b	1					
3. Sensitivity - cleaning	.28 ^b	.22 ^b	1				
4. Intrusiveness - playing	-.43 ^b	-.16 ^b	-.10	1			
5. Intrusiveness - feeding	-.07	-.18 ^b	-.38 ^b	.13 ^a	1		
6. Intrusiveness - cleaning	-.10	-.28 ^b	-.06	.19 ^b	.11	1	
7. Infant Temperament	.01	.03	-.10	-0.6	-.02	-.12 ^a	1

Note. Calculated from dataset with imputations (pooled).

- ^a P < 0.05 (two-tailed)
- ^b P < 0.01 (two-tailed)

role, the interaction between parental gender and parental caregiver role, child temperament, and twinship as fixed effects. In the case of twins, interactions with both infants were included with controls for the dependency of the data within families in the analyses. To reduce bias and boost power, missing data in this study (see note on Table 2 for specific numbers) were handled by multiple imputation in three steps. First, we estimated missing values m times, resulting in m plausible complete versions of the incomplete data set. We used m = 20 imputations, using the “fully conditional specification” available in IBM SPSS 25.0 (2017). Second, each imputed data set was analyzed using the same statistical analysis to be used with the complete data. Third, the results from each of the m = 20 analyses were combined into a single set of “pooled” results, using Rubin’s (1987) rules for pooling estimates and SEs across imputations. Imputation was performed only when parents had at least one complete observation.

3. Results

Preliminary analyses

Descriptive statistics for the total group, as well as for the statistics by gender and by caregiver (primary or secondary) are presented in Table 2. To give an overview of the amount of imputed data, this table also shows the number of incomplete cases per variable for the total group. Correlations between variables are shown in Table 3. Inspection of the data revealed that the data for intrusiveness during cleaning and feeding were peaked and intrusiveness during feeding was also skewed. We successfully transformed these data to normality. However, there were still some outliers (ten univariate outliers and one multivariate outlier) on

scores for intrusiveness during feeding. Sensitivity analyses were run to see whether the results differed when these outliers were excluded; the results were the same.

Prior to the main analyses, the assumptions for linear mixed models were checked; these confirmed that we needed to account for the nesting. In addition, we ran six linear mixed models (sensitivity while playing, sensitivity while feeding, sensitivity while cleaning, intrusiveness while playing, intrusiveness while feeding, and intrusiveness while cleaning) with families as a random effect and family type as parameter. We found no differences between family types except for the transformed intrusiveness during feeding variable (Estimate = 0.09, SE = 0.30, P = 0.004, 95% CI [0.13, 0.65.]): gay fathers showed more intrusive behavior during feeding (M = 1.59, SE = 0.09) than heterosexual parents did (M = 1.19, SE = 0.09). We therefore added family type as a parameter to the linear mixed model for intrusiveness during feeding. We also ran six linear mixed models (sensitivity while playing, sensitivity while feeding, sensitivity while cleaning, intrusiveness while playing, intrusiveness while feeding, and intrusiveness while cleaning) with families as a random effect and country of residence as a parameter because the families from the three countries significantly differed with respect to parental age, relationship duration, marital status, twinship, work status, family income, and residential location within the country (statistical information available upon request). Results revealed that country of residence was related to all outcome measures except for the transformed feeding variables (Table 4 and Table 5 for an overview of these results). We thus added the country of residence as a parameter to all the linear mixed models for sensitivity and the linear mixed models for intrusiveness while playing and intrusiveness while cleaning.

Table 4
Preliminary linear mixed model results for sensitivity.

Effect	Sensitivity														
	Play ^a				Feed ^b				Clean ^c						
	Estimate	SE	95% CI		P	Estimate	SE	95% CI		p	Estimate	SE	95% CI		P
		LL	UL				LL	UL				LL	UL		
Fixed effects															
Intercept	3.11	.079	2.952	3.261	.000	2.96	.065	2.828	3.085	.000	3.24	.080	3.088	3.401	.000
Country of residence: U.K vs the Netherlands	-.486	.127	-.735	-.238	.000	.111	.127	-.140	.361	.384	.063	.133	-.197	.324	.634
Country of residence: France vs the Netherlands	-.680	.107	-.889	-.470	.000	-.473	.091	-.651	-.295	.000	-.359	.108	-.571	-.147	.001
Random effects															
Within families variance	.119	.042				.028	.033				.070	.048			

^a U.K.: M = 2.26, SD = 0.10; France: M = 2.43, SD = 0.07; the Netherlands: M = 3.11, SD = 0.08.

^b U.K.: M = 3.07, SD = 0.11; France: M = 2.48, SD = 0.07; the Netherlands: M = 2.96, SD = 0.07.

^c U.K.: M = 3.31, SD = 0.11; France: M = 2.87, SD = 0.07; the Netherlands: M = 3.25, SD = 0.08.

Table 5
Preliminary Linear Mixed Model Results for Intrusiveness.

Effect	Intrusiveness														
	Play ^a				Transformed Feeding ^b				Cleaning ^c						
	Estimate	SE	95% CI		P	Estimate	SE	95% CI		P	Estimate	SE	95% CI		P
		LL	UL				LL	UL				LL	UL		
Fixed effects															
Intercept	1.999	.111	1.772	2.207	.000	.103	.021	.061	.144	.000	1.52	.073	1.379	1.664	.000
Country of residence: U.K vs the Netherlands	.005	.178	-.341	.351	.977	-.065	.036	-.135	.004	.067	-.254	.119	-.487	-.022	.032
Country of residence: France vs the Netherlands	.633	.150	.340	.927	.000	.018	.030	-.041	.077	.556	-.144	.098	-.337	.049	.143
Random effects															
Within families variance	.270	.081				.006	.003				.017	.042			

^a U.K.: M = 1.99, SD = .14; France: M = 2.62, SD = .10; the Netherlands: M = 1.99, SD = .11.

^b U.K.: M = .04, SD = .03; France: M = .12, SD = .02; the Netherlands: M = .10, SD = .02.

^c U.K.: M = 1.27, SD = .09; France: M = 1.38, SD = .07; the Netherlands: M = 1.52, SD = .07.

Parental sensitivity

The three linear mixed models revealed that sensitivity scores were not predicted by parental gender, parental caregiver role, the interaction between parental gender and parental caregiver role, infant temperament, or twinship. However, sensitivity during playing was predicted by both country-of-residence parameters (the U.K. versus the Netherlands and France versus the Netherlands). The scores for sensitivity during feeding and sensitivity during cleaning were predicted by only one of the country-of-residence parameters, namely France versus the Netherlands (i.e., Dutch parents were more sensitive across the three contexts than were the French parents). For more details about the mean scores per country, please see Table 4.

Parental intrusiveness

Table 7 shows the results for the three models exploring predictors of intrusiveness. Intrusiveness during playing was not predicted by parental gender, parental caregiver role, the interaction between parental gender and parental caregiver role, and infant temperament, but it was predicted by twinship: parents with singletons played less intrusively (M = 2.15, SE = 0.08) than parents with twins (M = 2.75, SE = 0.15). The control variable country-of-residence (France vs. the Netherlands) was also a significant predictor: French parents behaved more intrusively than Dutch par-

ents during play. In addition, Dutch parents were more intrusive during feeding than British parents (Table 5). The linear mixed model for (transformed) intrusiveness during feeding also showed that intrusiveness during feeding was not predicted by parental gender, parental caregiver role, the interaction between parental gender and parental caregiver role, and infant temperament, but it was also predicted by twinship: parents with singletons were less intrusive (M = 0.09, SE = 0.01) than parents with twins (M = 0.17, SE = 0.03) while feeding. As shown in Table 7, the linear mixed model for intrusiveness during cleaning showed different results: it was predicted by parental gender, the interaction between parental gender and caregiver role, infant temperament (higher scores on infant temperament were related to lower scores on intrusiveness), and country of residence (U.K. vs the Netherlands). Dutch parents were more intrusive during cleaning than British parents (Table 5).

The results showed that, in general, fathers displayed more intrusive behavior during cleaning (M = 1.41, SD = 0.08) than mothers (M = 1.35, SD = 0.08). However, the significant interaction effect indicated that the results were more nuanced. Post hoc analyses revealed that there were no significant differences between primary caregiving fathers and secondary caregiving fathers (Estimate = -0.207, SE = 0.14, P = 0.131, 95% CI [-0.47, 0.06]), no differences between primary caregiving mothers and secondary caregiving mothers (Estimate = 0.180, SE = 0.11, P = 0.105, 95% CI [-0.037, 0.39]), and no differences between primary caregiv-

ing fathers and primary caregiving mothers (Estimate = -0.100, SE = 0.13, $P = 0.434$, 95% CI [-0.353, 0.151]). However, secondary caregiving fathers and secondary caregiving mothers did differ (Estimate = 0.260, SE = 0.13, $P = 0.048$, 95% CI [0.00, 0.52]) with secondary caregiving fathers showing more intrusive behavior during cleaning ($M = 1.51$, $SD = 0.09$) than secondary caregiving mothers ($M = 1.26$, $SD = 0.10$).

4. Discussion

The current study aimed to investigate whether parental gender and relative caregiving role explained differences in early parenting quality, as indexed by ratings of sensitivity and intrusiveness. In doing so, we examined relatively understudied families including gay- lesbian-, and heterosexual-parent families who used assisted reproductive technologies to conceive. Contrary to our expectations, the quality of observed sensitivity and intrusiveness was unrelated to caregiver role. Our analyses revealed that fathers and mothers showed similar levels of sensitive behaviors towards their infants while playing, feeding, and cleaning and similar levels of intrusive behavior towards their infants while playing and feeding. However, secondary caregiving fathers showed more intrusive behavior than secondary caregiving mothers while cleaning their infants. Our results also showed that contextual factors, such as having singletons or twins, infant temperament, and country of residence were related to parenting behavior.

We expected that caregiver role, but not gender, would be related to parental sensitivity and intrusiveness. More specifically, we hypothesized that primary caregivers would be more sensitive and less intrusive than secondary caregivers because they have more child-care experience which is known to enhance parenting quality (Power, 1985). However, this prediction was not supported, perhaps because we measured relative instead of absolute parental involvement. This might be of particular importance for our sample, because gay and lesbian couples are more likely to share childcare tasks in a more egalitarian way than heterosexual couples (e.g., Farr & Patterson, 2013; Goldberg et al., 2012; Vecho et al., 2011). Perhaps the majority of both primary and secondary caregivers in the present sample spent sufficient time with their infants to develop sensitive and non-intrusive behavior. Relative caregiving role may also play an increasingly important role in parenting quality over time. Because the infants in our sample were only 4 months old, it would be interesting to see how parenting roles may affect parenting quality over time. Alternatively, because all infants in the study were the products of planned pregnancies, the parents may have been highly motivated and thus both highly sensitive and non-intrusive (as indicated by the relatively high mean scores for sensitivity and low mean scores for intrusiveness). It would therefore be interesting to see whether similar results were obtained in a study involving primary caregiving fathers and secondary caregiving mothers who conceived naturally.

The majority of our results showed that there was also no association between parental gender and early caregiving quality. This is in line with earlier studies of parental sensitivity (Branger et al., 2019; Braungart-Rieker et al., 1998; Feldman, 2000; Goosens & van Ijzendoorn, 1990; Martins et al., 2014) and intrusiveness (Frosch et al., 2001; Fuertes et al., 2016; McElwain & Volling, 1999; Volling et al., 2002) as noted in a review by Fagan et al. (2014) which concluded that there are no fundamental differences between fathers' and mothers' parental behavior. Although we found a small difference between secondary caregiving fathers and secondary caregiving mothers in intrusiveness while cleaning, the mean scores for both groups were very low, indicating that both parents displayed low levels of intrusive behavior. Most research on parental behavior involves female primary caregivers (Ellis-Davies, 2013), even though fathers are grad-

ually assuming increased parental responsibility (see for overviews Fagan et al., 2014; Schoppe-Sullivan & Fagan, 2020). To better understand the interplay between parents' gender and caregiver role in relation to parenting behavior, research is needed on different family forms in which fathers are primary caregivers and mothers are secondary caregivers.

Having twins was related to more intrusive behavior during play and feeding. Earlier studies have shown that having twins is related to increased maternal anxiety, parenting stress (e.g. Crugnola et al., 2020) and depression (e.g. Tendais & Figueiredo, 2016), all of which are negatively related to parenting quality in the perinatal period (Seymour et al., 2015). Crugnola et al. (2020) showed that having twins was related to lower quality mother-infant interactions.

We found that country of residence was related to levels of sensitive and intrusive parenting behaviors. More specifically, Dutch parents were more sensitive than French parents across the three contexts, whereas Dutch and British parents showed similar levels of sensitive parenting behavior. Differences between countries in intrusive parenting behavior were only visible during playing and cleaning: French parents were most intrusive during playing while Dutch parents were most intrusive during feeding and cleaning. However, while there were some country-based differences, all country scores fell within a normal range, and for the most part, these between-country differences were not stable across countries or contexts. This variability across context and country further highlights the benefits of using observations from different contexts when assessing parenting quality. Future research with samples from multiple countries and assessments in diverse observational contexts is needed to investigate the stability and nature of these country-based differences in intrusive parenting behavior. One difference that may be noteworthy is in the policy and social attitudes towards same-sex parenting in the UK, the Netherlands, and France (Takács et al., 2016).

Our results have some practical implications. First, our study showed that both fathers and mothers, as well as primary and secondary caregivers, can act sensitively and non-intrusively when feeding, playing, and cleaning their infants and that their mean levels of sensitivity and intrusiveness did not differ significantly in most contexts. This suggests that, on average, parental sensitivity and intrusiveness are comparable among fathers and mothers and primary and secondary caregivers. Second, although our study showed that parents who conceive through artificial reproductive techniques tend on average to be highly sensitive and non-intrusive, parents of twins may need special attention and support. This support may be particularly needed in new parents with twins, as twin pregnancies are more likely to have complications, and twin parents are more likely to experience wellbeing challenges and strains on available attentional resources for their children in the perinatal period (Fisher & Stocky, 2003). Since early infancy is a key transitional period for new parents whose interactions with infants are believed to play a crucial role in shaping later relationships (Ainsworth et al., 2015), it is important to use this period as an opportunity for additional support. Providing support early in infancy may help first-time parents of twins to navigate this particularly intense period of caregiving. Future research may also need to consider including whole family observations (i.e., recorded observations of parents and twins together), to examine any twin family variations in parenting quality and child adaptations to parenting. With multiple birth rates on the rise internationally (Collins, 2007), there is a clear imperative for the further study of twin family development.

Although this was the first study to examine parental gender and relative parental involvement in families with infants born using assisted reproductive techniques, generalizability is limited because the parents had moderate to high socioeconomic status back-

Table 6
Linear mixed model results for sensitivity.

Effect	Sensitivity														
	Play				Feed				Clean						
	Estimate	SE	95% CI		P	Estimate	SE	95% CI		P	Estimate	SE	95% CI		P
			LL	UL				LL	UL				LL	UL	
Fixed effects															
Intercept	2.936	.262	2.421	3.451	.000	2.98	.229	2.535	3.432	.000	2.997	.275	2.459	3.535	.000
Parental gender ^a	-.006	.128	-.256	.243	.959	.080	.138	-.193	.352	.590	-.051	.139	-.324	.222	.715
Parental caregiver role ^b	-.052	.105	-.258	.154	.622	.067	.114	-.158	.292	.556	.064	.119	-.168	.297	.585
Parental gender * parental caregiver role	.100	.163	-.219	.420	.539	.027	.163	-.293	.347	.868	-.029	.186	-.392	.335	.878
Infant temperament	.036	.061	-.084	.155	.559	-.043	.052	-.145	.058	.403	.081	.065	-.047	.209	.213
Having singleton/twins ^c	.087	.140	-.186	.361	.531	.039	.115	-.186	.265	.732	-.012	.143	-.297	.268	.934
Country of residence: U.K vs the Netherlands	-.477	.130	-.732	-.222	.000	.096	.128	-.158	.349	.457	.085	.136	-.181	.351	.530
Country of residence: France vs the Netherlands	-.672	.111	-.888	-.455	.000	-.483	.094	-.667	-.299	.000	-.347	.112	-.566	-.128	.002
Random effects															
Within families variance	.121	.044				.030	.034				.073	.050			

^a 0 = male, 1 = female
^b 0 = primary, 1 = secondary
^c 0 = singleton, 1 = twins.

Table 7
Linear mixed model results for intrusiveness.

Effect	Intrusiveness														
	Play				Transformed Feed				Clean						
	Estimate	SE	95% CI		P	Estimate	SE	95% CI		P	Estimate	SE	95% CI		P
			LL	UL				LL	UL				LL	UL	
Fixed effects															
Intercept	2.706	.350	2.021	3.391	.000	.184	.079	.030	.339	.019	1.862	.251	1.370	2.354	.000
Parental gender ^a	.150	.170	-.183	.482	.378	-.048	.054	-.155	.059	.379	.268	.131	.011	.525	.041
Parental caregiver role ^b	.153	.139	-.120	.425	.273	-.045	.034	-.113	.022	.187	.187	.114	-.038	.411	.103
Parental gender * parental caregiver role ^c	-.135	.217	-.561	.290	.533	.088	.053	-.016	.191	.096	-.404	.181	-.758	.050	.025
Infant temperament	-.095	.081	-.254	.064	.242	-.008	.017	-.042	.025	.627	-.145	.060	-.263	-.027	.016
Having a singleton vs twins	-.582	.186	-.946	-.218	.002	-.079	.037	-.151	-.006	.035	-.039	.128	-.291	.212	.759
Country of residence: U.K vs the Netherlands	-.083	.172	-.420	.254	.629						-.312	.119	-.545	-.079	.009
Country of residence: France vs the Netherlands	.529	.147	.241	.816	.000						-.177	.100	-.372	.018	.075
Family Type: Gay vs heterosexual						.070	.044	-.017	.157	.117					
Family Type: Lesbian vs heterosexual						.031	.036	-.039	.101	.385					
Random effects															
Within families variance	.289	.080				.004	.003				.017	.041			

^a 0 = male, 1 = female
^b 0 = primary, 1 = secondary
^c 0 = a singleton, 1 = twins.

grounds, perhaps because of the high costs associated with the use of assisted reproduction treatments. It is therefore not possible to generalize the findings to the whole population of first-time ART parents. Some suggest that different socioeconomic backgrounds might relate to different parenting styles (Zilberstein, 2016) and divisions of caregiving by mothers and fathers (Guryan et al., 2008; Ryan et al., 2012). Future studies should include primary caregiving fathers and secondary caregiving mothers from less privileged backgrounds to see if our results hold within a more diverse context. Another limitation was that the same coders often coded more than one video involving the same parent (i.e., playing, feeding, and cleaning), although we maximized the length of time between codings of the same parent to limit possible bias. Related to this point, the combination of coders (all videos by the same coders vs mixed combinations of coders within families) made it impossible to draw any conclusion about whether the low corre-

lations between settings were attributable to coding errors. Our study was also limited by the way we measured caregiver role on the basis of individual reports of each parent's responsibilities compared to those of their partners. Results may have been different with measures of absolute rather than relative involvement. In addition, unfortunately, the sample size made it impossible to test our hypothesis in the three countries separately. A final limitation was that we only focused on two possible influences on parental behavior, namely parental gender and caregiver role. Future research with a larger sample size should include additional predictors such as parental personality and the quality of the parental relationship (for more possible determinants, see Belsky, 1984). Also, exposure to sexual minority stressors (Meyer, 2003) might have a negative influence on the levels of parenting. It would therefore be interesting to add gay fathers' and lesbian mothers' experiences with minority stress as a predictor.

In sum, early infancy is a key transition period for new parents, and the interactions they have with their infants during this period are believed to play a crucial role in shaping later relationships (Ainsworth et al., 2015). However, the vast majority of studies examining parenting quality and early parent-child relationships have focused on primary caregiving heterosexual mothers who have conceived without assisted reproduction technologies (Ellis-Davies, 2013). This narrow focus in previous research has precluded any examination of how parental gender and degree of involvement affect parental sensitivity and intrusiveness. The present findings do not support presumptions that mothers are more capable of providing good quality parenting than fathers, or that, at this early stage, primary caregiving parents are better attuned to their infants than those who are less involved. Table 6

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