

Relationships between paternal attitudes, paternal involvement, and infant-feeding outcomes: Mixed-methods findings from a global on-line survey of English-speaking fathers

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Abstract

The breastfeeding intention-behaviour gap remains wide in developed countries. Current studies have focused on maternal attitudes and behaviours concerning infant feeding in order to explore barriers to breastfeeding continuation. There has been limited consideration of the impact of paternal attitudes and behaviours, despite contemporary parenthood evolving and evidence indicating that there are greater levels of paternal involvement in routine childcare tasks. This mixed-methods study used a triangulation design to examine the associations between paternal attitudes towards parenthood and infant-feeding methods, levels of paternal involvement, infant-feeding outcomes, and father-infant relationships. Fathers of infants <52 weeks completed an online survey providing quantitative data ($N = 212$) and qualitative data ($N = 208$). For the quantitative data, fathers completed validated measures about their attitude towards parenthood and infant feeding, levels of paternal involvement, and infant-feeding history. For the qualitative data, questions explored influences on paternal attitudes towards infant feeding and the father-infant relationship. After controlling for covariates, regression analyses found egalitarian attitudes towards parenthood were positively associated with both attitudes towards breastfeeding and levels of paternal involvement. Positive paternal attitudes towards breastfeeding were significantly associated with increased likelihood of breastfeeding. A thematic framework analysis indicated fathers' attitudes towards infant feeding were largely influenced by their families and partners or healthcare professionals. Polarised views were expressed about the impact infant-feeding methods had on the father-infant relationship, although fathers were united in their desire to bond with their infant. Addressing paternal attitudes and the importance of father-infant involvement in domains other than feeding maybe beneficial in supporting breastfeeding and the father-infant relationship.

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KEYWORDS

attitudes, childcare, fathers, father–child relations, gender role, infant-feeding method, parenting

1 | INTRODUCTION

Since 2001, the World Health Organization (WHO) has recommended that all infants should be exclusively breastfed (EBF) up to the age of 6 months (WHO, 2015). Evidence supporting this directive has been established across all demographics, demonstrating that exclusive breastfeeding leads to multiple long-term physical and developmental benefits for the infant and physical and psychological benefits for the mother (Victora et al., 2016). Despite over 25 years of ongoing interventions to promote and support breastfeeding (WHO & UNICEF, 1990), research has found that there has been little improvement in exclusive breastfeeding rates. For example, the United Kingdom has one of the lowest rates in the world with less than 1% of infants being EBF at 6 months (McAndrew et al., 2012; Victora et al., 2016). Notably, the now redundant UK Infant Feeding Survey (IFS; Bolling et al., 2007; McAndrew et al., 2012) identified that in 2005, 76% of mothers initiated breastfeeding, which increased to 81% by 2010; however, by 6 weeks of age, exclusive breastfeeding rates fell dramatically to 23%. Similar findings have also been found in the United States, Canada, and Australia; meaning that the majority of babies in developed countries are receiving some amount of formula milk in the first 6 months of life (Australian Institute of Health and Welfare, 2011; Centers for Disease Control and Prevention, 2015; Health Canada, 2011; McAndrew et al., 2012). Overall, these findings suggest that although interventions have increased breastfeeding initiation rates, the prevalence of continuing to exclusively or predominantly breastfeed for 6 months is not increasing, illustrating a persistent intention–behaviour gap (Fallon et al., 2019).

Informal support (i.e. from partners and family members) has been consistently highlighted as crucial in enabling breastfeeding continuation (e.g. Bhairo & Elliott, 2018; Rempel et al., 2017; Wray & Garside, 2018). However, the majority of infant-feeding research focuses on the attitudes, intentions and behaviours of the mother as there is only limited research that specifically considers the father's role, attitude and influence on infant-feeding outcomes (Earle, 2002; Earle & Hadley, 2018; Roll & Cheater, 2016). Family systems theory, originally developed by Bowen (1966) and still recognised as an important model for approaching research involving families (Keller & Noone, 2020), describes family units as being emotionally connected with continuous, complex emotional interactions between individual family members, which influence feelings, thoughts and behaviours. Bowen (1978) also emphasised the need to consider intergenerational influences within families as each generation has a notable influence on the following generations. As such, when considering attitudes and behaviours concerning infant feeding, it is vital that researchers consider the wider family unit, and not solely the mothers' perspective.

Key messages

- Fathers with an egalitarian attitude towards parenthood were more likely to have a positive attitude towards breastfeeding and higher levels of paternal involvement. Positive paternal attitudes towards breastfeeding were significantly associated with an increased likelihood of breastfeeding.
- Experiences are polarised when considering the influence of feeding method on the father–infant relationship. A father's attitude towards infant feeding and bonding can significantly influence this experience.
- Breastfeeding interventions that use a family systems approach alongside social cognitive theory to target the mother–father dyad may be more effective than those that focus solely on the mother

1.1 | Paternal attitudes towards parenthood and levels of paternal involvement

Modern society places a greater emphasis, acceptance and practice on co-parenting, with fathers adopting a more involved, egalitarian parenting role (Dermott, 2008; Dermott & Miller, 2015; Gatrell & Dermott, 2018; Goodman, 2005; Singley et al., 2018; Singley & Edwards, 2015). Barbeta-Viñas and Cano (2017) described the traditional concept of fatherhood as being primarily focused on financial provision for the family, whereas modern concepts also include direct involvement with routine childcare tasks such as bathing, dressing and feeding their infant, as well as offering emotional and developmental support.

Research by Keizer (2015) found a positive association between fathers with a higher egalitarian gender role perspective and the amount of time they spent with their infant. This indicates an association between gender role attitudes (GRA), how fathers consider their role and increased levels of paternal involvement in childcare tasks.

Paternal involvement has been found to have multiple benefits on an infant's development such as improving their cognitive and physical development (Allport et al., 2018; Jeong et al., 2019; Parfitt et al., 2014). It has also been associated with improved mental health (Allport et al., 2018; Yogman & Garfield, 2016), socio-emotional skills (Jeong et al., 2019; Yogman & Garfield, 2016), and the father's transition to parenthood (Riina & Feinberg, 2012).

1.2 | Paternal involvement, infant-feeding methods and father–infant relationships

Because increased paternal involvement has been documented as a positive shift in parental responsibilities, it is paradoxical that some research has found that higher levels of paternal involvement are associated with a reduced likelihood of the infant being breastfed during the first 6 months of life (Ito et al., 2013). One explanation offered for this was that fathers who were more involved were more likely to feed their infant, thus compromising exclusive breastfeeding.

Studies have also found that some fathers feel that breastfeeding, and the subsequent lack of paternal interaction with feeding, is a barrier to bonding with their infant. As such, they experience tensions between wanting their infant to be breastfed and a desire for closeness (Bennett et al., 2016; deMontigny, Gervais, et al., 2018; deMontigny, Larivière-Bastien, et al., 2018; Sihota et al., 2019). This has been deemed by some as father's having a 'necessarily unequal bond' with their infant when compared with the mother (deMontigny, Larivière-Bastien, et al., 2018; p. 485). Furthermore, the act of feeding their infant has been identified as a defining moment in the father–infant bond (de Montigny, Larivière-Bastien, et al., 2018; Hansen et al., 2018). Some fathers have been able to identify childcare tasks other than feeding, such as bathing, playing, and singing, allowing them to bond with their EBF infant (Baldwin et al., 2019; deMontigny, Larivière-Bastien, et al., 2018). However, there is increasing evidence that suggests that fathers of breastfed infants experience a lower quality of life than those with bottle-fed infants (Chen et al., 2010), feelings of exclusion and inadequacy (Brown & Davies, 2014; Chen et al., 2010), and embarrassment of public breastfeeding (Brown & Davies, 2014; Mitchell-Box & Braun, 2012). These findings demonstrate tensions which fathers may experience surrounding infant feeding.

1.3 | Paternal attitudes towards infant feeding

Literature has suggested that the majority of fathers believe the decision to breastfeed is ultimately the mother's choice (Bennett et al., 2016). Conversely, deMontigny, Gervais, et al. (2018) found that fathers of breastfed infants considered themselves central in infant-feeding decision making, possibly to rebalance their position in the parenting dyad. Research has also found that if fathers observe breastfeeding difficulties, then they are more likely to develop negative attitudes towards breastfeeding (Hansen et al., 2018).

Studies which consider influences on maternal infant-feeding choices have found that mothers are more likely to initiate and sustain breastfeeding for longer if fathers have a positive attitude towards breastfeeding (Mitchell-Box et al., 2013; Swanson & Power, 2005; Wang et al., 2018). Family systems theory (Bowen, 1966) highlights the interconnectedness of attitudes within a family unit that could offer an explanation to this finding. Furthermore, literature indicates a shift in breastfeeding support with emphasis being placed on having a supportive partner to aid successful breastfeeding (Mannion

et al., 2013; Mitchell-Box & Braun, 2013; Rempel et al., 2017; Tohotoa et al., 2009; Wray & Garside, 2018) rather than traditional breastfeeding support which would have come from other female role models in the family (Bick et al., 1998; Majee et al., 2017).

1.4 | The present study

Overall, current research indicates that fathers are important in infant-feeding decisions and outcomes. However, the relationships between paternal involvement, attitudes towards parenthood and infant feeding, infant-feeding outcomes and the father–infant relationship are evidently complex and have not been explored comprehensively. To our knowledge, there is no quantitative research exploring these variables simultaneously. Furthermore, published qualitative research in this area tends to focus on breastfeeding and often uses the views and experiences of mothers rather than directly considering those of the father (Roll & Cheater, 2016).

The current study uses a mixed-methods triangulation design (Creswell et al., 2003) to explore the relationships between paternal involvement, attitudes towards parenthood and infant feeding, infant-feeding outcomes, and the father–infant relationship. Firstly, the study aimed to quantify the relationships between paternal attitudes, paternal involvement, and infant-feeding outcomes. As such, the following hypotheses were developed:

- **H1** Fathers' overall attitudes towards parenthood would be associated with their attitudes towards infant feeding.
- **H2** Fathers' attitudes towards parenthood and feeding would be associated with paternal involvement.
- **H3** Fathers' attitudes towards parenthood and infant feeding would influence infant-feeding outcomes, *that is, whether infants are exclusively breastfed (EBF), combination fed (COMBI) or exclusively formula fed (EFF)*.
- **H4** Paternal involvement would be associated with infant-feeding outcomes.

Secondly, the study aimed to qualitatively explore influences on paternal attitudes towards infant feeding, perceptions of infant feeding and the father–infant relationship in order to further explore the quantitative findings and develop a deeper understanding.

2 | METHODS

2.1 | Participants and recruitment

Fathers aged 18 years or over with an infant <52 weeks old were recruited via social media using an advert with a link to an online survey hosted by Qualtrics. There was an option to be entered into a prize draw for a £25 voucher as a reimbursement for the participants' time.

By means of convenience sampling, 366 participants were recruited over a 3-month period between November 2018 and

January 2019. Just under half (42%) of the participants were excluded for providing incomplete quantitative datasets, meaning that final quantitative analyses were based on 212 participants (58%), 208 of whom provided qualitative responses also.

Fathers who completed the survey, compared with those who did not complete the survey, were more likely to live in the United Kingdom (68.2% vs. 48.5%, $\chi^2 = 14.57$, $p < 0.001$), to be married (68.9% vs. 39.7%, $\chi^2 = 30.22$, $p < 0.001$), to have an education level that is above A-level/equivalent (70% vs. 46.9%, $\chi^2 = 19.83$, $p < 0.001$), to have a professional occupation (68.5% vs. 47.3%, $\chi^2 = 16.83$, $p < 0.001$), to have a daughter (74.4% vs. 62.1%, $\chi^2 = 5.37$, $p = 0.02$), to have an infant that was currently being breastfed (71.7% vs. 47.7%, $\chi^2 = 21.05$, $p < 0.001$), and to have a firstborn infant (67.9% vs. 45.9%, $\chi^2 = 18.01$, $p < 0.001$).

Although biological and non-biological fathers were eligible to participate, the final sample comprised exclusively biological fathers. Participants were predominantly white (94.8%), married (73%) and living in the United Kingdom (55.2%) with an age range of 20–53 years ($M = 31.65 \pm 5.42$). Their infants' ages ranged from 0 to 52 weeks ($M = 31.38 \pm 14.00$) and were predominantly firstborn (63.2%). Nearly 90% of the fathers' partners initiated breastfeeding, comparable with the final IFS findings from 2010 (McAndrew et al., 2012). Furthermore, 51% of the infants were EBF, 15% were fed through a combination of breast and formula feeding (COMBI), and 34% were exclusively formula fed (EFF). See *Table 1* for full demographic details.

2.2 | Design and procedure

A triangulation design (Creswell et al., 2003) was used to collect quantitative and qualitative data simultaneously to explore the relationships between paternal attitudes, paternal involvement, infant-feeding outcomes and the father–infant relationship. The purpose of this one-phase design is to obtain different but complementary data on the same topic, which allows validation or expansion of the quantitative results with qualitative data (Morse, 1991). Integration of the quantitative and qualitative data was conducted in the interpretation stage of the analyses.

Prior to the main survey, an electronic consent form and information sheet were provided with a tick box to confirm that the main points had been read and understood. There were two screening questions at the start of the survey. Firstly, a question enquired whether the participant was a father to an infant aged between 0 and 52 weeks. Secondly, a question asked the participant to provide their age. Only a positive response to the first question and those over 18 years of age were allowed entry to the main survey. Responses were fully anonymised within the survey software.

2.3 | Demographics survey

Fathers were first asked demographic questions including age, marital status, occupation, ethnicity and education level. Participants were

then asked demographic questions relating to their infant including current infant age, birth order, multiple birth status, type of delivery, current feeding method, infant gender and whether the infant had any medical problems. These questions were followed by a series of validated psychometric scales (detailed individually below) and supporting open-ended questions with unrestricted text response boxes.

2.4 | Validated psychometric scales included in survey

Gender role attitudes (GRA; Keizer, 2015)

This measure examines attitudes towards parenthood using five items with a 5-point Likert scale (1 = *strongly agree*, 5 = *strongly disagree*). Higher scores reflect a more egalitarian attitude towards gender roles. This measure has high internal consistency (Cronbach's alpha = 0.83; Keizer, 2015).

Role of the father questionnaire (ROFQ; Palkovitz, 1984)

This measure consists of fifteen items using a 5-point Likert scale (1 = *disagree strongly*, 5 = *agree strongly*). Higher scores are indicative of fathers considering their role important to the development of their child and that they should be involved in childcare. This measure has good internal consistency (Cronbach's alpha = 0.77; McBride & Rane, 1996).

Iowa infant feeding attitude scale (IIFAS; Mora et al., 1999)

This measure consists of seventeen items using a 5-point Likert scale (1 = *strongly disagree*, 5 = *strongly agree*). Higher scores indicate more positive attitudes towards breastfeeding. The Iowa Infant Feeding Attitude Scale (IIFAS) was originally validated to predict a mother's intention to breastfeed and the duration of breastfeeding if initiated. This scale has been found to be valid when used with fathers, with a high internal consistency (Cronbach's alpha = 0.78; Mitchell-Box et al., 2013).

Paternal involvement with infants scale (PIWIS; Singley et al., 2018)

The Paternal Involvement with Infants Scale (PIWIS) is a self-report instrument that measures how involved a father is with their infant. It consists of 35 items using a 7-point Likert scale to indicate the frequency of the activity concerning involvement with the infant (1 = *not at all* to 7 = *more than once a day*). There are five subscales: warmth and attunement, control and process responsibility, frustrations,

TABLE 1 Paternal and infant demographics

| Paternal and infant characteristics (N = 212) | | | |
|---|----------------|---|-----------------|
| Paternal characteristics | Value | Infant characteristics | Value |
| Age (mean years ± SD) | 31.65 (± 5.42) | Age (mean weeks ± SD) | 31.38 (± 14.00) |
| Country of residence (n/%) | | Gender (n/%) | |
| United Kingdom | 117 (55.2) | Male | 95 (44.8) |
| United States | 72 (34.0) | Female | 117 (55.2) |
| Other | 21 (9.9) | Birth order (n/%) | |
| Ethnic origin (n/%) | | 1st | 134 (63.2) |
| White | 201 (94.8) | 2nd | 57 (26.9) |
| Indian | 4 (1.9) | 3rd | 11 (5.2) |
| Other | 7 (3.3) | 4th | 6 (2.8) |
| Marital status (n/%) | | 5th and after | 1 (0.5) |
| Married | 155 (73.1) | Multiple birth (n/%) | |
| Living with partner | 51 (24.1) | Yes | 4 (1.9) |
| Other | 6 (2.8) | No | 207 (97.6) |
| Education level (n/%) | | | |
| Postgraduate | 52 (24.5) | <i>Specifically related to feeding practices:</i> | |
| Undergraduate | 67 (31.6) | Any medical problems affect feeding (n/%) | |
| A-levels ^a | 47 (22.2) | Yes | 20 (9.4) |
| GCSEs ^a | 21 (9.9) | No | 191 (90.1) |
| Other qualifications | 9 (4.2) | Was breastfeeding initiated? (n/%) | |
| None | 15 (7.1) | Yes | 190 (89.6) |
| Occupation ^b (n/%) | | No | 22 (10.4) |
| Managers ^c | 34 (16.0) | Current feeding method (n/%) | |
| Professional ^d | 88 (41.5) | EBF | 109 (51.4) |
| Admin/secretarial | 6 (2.8) | COMBI | 32 (15.1) |
| Skilled trade | 26 (12.3) | EFF | 71 (33.5) |
| Caring, leisure and other service occupations | 11 (5.2) | | |
| Sales/customer service | 25 (11.8) | | |
| Operatives ^e | 11 (5.2) | | |
| Elementary | 4 (1.9) | | |
| Not in paid employment | 7 (3.3) | | |
| Size of household (inc. participant) (n/%) | | | |
| 2 | 3 (1.4) | | |
| 3 | 125 (59) | | |
| 4 | 59 (27.8) | | |
| 5 | 16 (7.5) | | |
| 6 | 9 (4.2) | | |

Note: n = number of responses given for each question; % = % of total number of participants (N = 212).

^aOr non-UK equivalents.

^bThese are occupations as described by the Standard Occupational Classification (ONS, 2020).

^cManagers, directors and senior officials.

^dProfessional/associate professional.

^eProcess, plant or machine operatives.

indirect care, and positive engagement. Higher mean scores reflect a greater level of involvement. The measure has good internal consistency across all five subscales (Cronbach's alpha ranging from 0.77 to 0.92; Singley et al., 2018).

Open-ended qualitative questions

To achieve greater interpretability and meaningfulness of the quantitative findings, supporting open-ended questions were asked in

relation to each hypothesis. First, all fathers were asked about factors that had influenced their attitudes towards infant feeding (H1 and H3). All fathers were also asked about their relationship and involvement with their infant and how these may have been impacted by feeding methods (H2, H3 and H4). Fathers who indicated that their infant was not EBF were asked about the decisions made regarding alternative feeding methods (H2, H3 and H4).

2.5 | Ethical considerations

The study was granted full ethical approval in October 2018 from the University of Liverpool's Health and Life Sciences Research Ethics Committee (ref: 3766).

2.6 | ANALYSIS

2.6.1 | Quantitative analysis

Quantitative data were managed and analysed using IBM SPSS 25. In order to develop comprehensive models, confounders identified in previous literature were examined using the demographic data (see Table 1). Bivariate analyses (independent *t*-tests for binary variables and bivariate correlations for continuous variables) were conducted between each potential confounder, the predictor variable (e.g. IIFAS) and the outcome variable (e.g. infant-feeding method). If the analysis was significant at the 10% level ($p < 0.1$), for both the predictor and outcome variables, they were included in the final regression models. Some variables are both a predictor and an outcome variable dependent on hypothesis. Current infant-feeding method was collapsed into three categories to allow for analysis: exclusively breastfed (EBF), combination feeding any amount of breastmilk and formula milk (COMBI), and exclusively formula feeding (EFF).

To measure the overall attitudes towards parenthood (OATP), the scores from the ROFQ and the GRA scale were combined due to the established link between GRA and an individual's perspective on their role as a 'father' (Keizer, 2015; Singley et al., 2018). Combining these two measures enabled a broader consideration of factors that may influence a father's overall attitude towards parenting. As such, the measure for the OATP can be defined as evaluating how important the father considers their role to be in terms of child development, how involved they believe they should be in childcare duties and how they consider gender roles in the context of parenting. Higher scores show a more equal and engaged attitude towards parenthood.

For the first hypothesis, a hierarchical regression was used to analyse the association between OATP (predictor) and IIFAS (outcome). Relevant confounders were put in Block 1, followed by OATP in Block 2.

For the second hypothesis, a hierarchical regression was used to analyse the effect of both OATP and IIFAS (predictors) on the PIWIS (outcome). PIWIS scores were not normally distributed violating parametric assumptions for regression. Two outliers were found to be causing the negative skew in the data. After excluding those outliers,

a normal distribution was found. Relevant confounding variables were put in Block 1, followed by OATP and IIFAS in Block 2.

For the third hypothesis, crude and adjusted multinomial logistic regression models were built to analyse the relationship between OATP, IIFAS (predictors) and infant-feeding outcomes (EBF, COMBI, EFF) with EBF used as the reference category. Relevant confounding variables were included as factors in the adjusted models and the predictor variables were included as covariates.

For the fourth hypothesis, crude and adjusted multinomial logistic regression models were built to analyse the relationship between PIWIS, PIWIS subscales (predictors) and infant-feeding outcomes (EBF, COMBI, EFF) with EBF used as the reference category. Relevant confounding variables were included as factors in the adjusted models and the predictor variables were included as covariates.

2.6.2 | Qualitative analysis

Qualitative data were collected from free-text response boxes embedded within the online survey, which asked supporting open-ended questions (Terry & Braun, 2016). Data were managed and analysed in NVivo 12 using a thematic framework approach appropriate for health research (Gale et al., 2013). The hypotheses were used as a coding framework. The most illustrative quotations have been presented in the results section.

A triangulation design was used, which enables qualitative data to be used to validate or expand upon quantitative data by integrating the datasets together when interpreting the results (Creswell & Plano Clark, 2011).

3 | RESULTS

H1. Father's overall attitude towards parenthood will be associated with their attitude towards infant feeding.

A hierarchical multiple regression was used to analyse the association between a father's overall attitude towards parenthood and their attitude towards infant feeding (Table 2). The final regression model significantly predicted approximately 3% of the variance in IIFAS scores: $R^2 = 0.03$, $F(2, 209) = 5.93$, $p = 0.016$. The number of household occupants was identified as a confounding variable in bivariate analyses. This explained 2% of the variance in Step 1 but was not significant. In Step 2, there was a significant positive association between attitudes towards parenthood and attitudes towards infant feeding ($\beta = 0.17$, $p = 0.016$).

To aid understanding of what factors inform a father's attitude towards infant feeding, participants were asked an open question about who/what may have influenced their opinion of infant feeding. Analysis of the data identified that responses included information on 'family influence', often specifically related to their partner:

TABLE 2 Hierarchical regression analyses for H1 (paternal attitudes towards parenthood as a predictor of paternal attitudes towards infant feeding) and H2 (overall attitudes towards parenthood as a predictor of the level of paternal involvement)

| | Cumulative | | Simultaneous | |
|-------------------------------|-----------------------|---------------------|--------------|--------|
| | R ² change | F-change | β | p |
| IIFAS | | | | |
| Step 1 | | | | |
| Number of household occupants | 0.019 | F(1, 210) = 4.14a | 0.12 | 0.086 |
| Step 2 | | | | |
| OATP | 0.027 | F(1, 209) = 5.93a | 0.17 | 0.016 |
| PIWIS | | | | |
| Step 1 | | | | |
| Birth order | 0.05 | F(2, 203) = 5.27* | -0.18 | 0.004 |
| Breastfeeding initiation | | | 0.14 | 0.040 |
| Step 2 | | | | |
| OATP | 0.20 | F(2, 201) = 27.13** | 0.46 | <0.001 |
| IIFAS | | | -0.08 | 0.235 |

Abbreviations: IIFAS = IOWA Infant Feeding Attitudes Scale; OATP = overall attitude towards parenthood; PIWIS = Paternal Involvement with Infant Scale.

* $p < 0.05$. ** $p < 0.001$.

My mother and partner both breastfed, my sister formula fed. I formed my opinion from seeing both sides. (Participant 41, COMBI)

My wife. She did tons of research on breastfeeding and shared her findings and sources with me. (Participant 104, EBF)

These data also indicated 'healthcare professional influence' and that healthcare providers with whom participants and their partners interacted with had an influential effect on their opinions of infant feeding:

... my partner and my daughter's pediatrician influenced me because my partner knew she wanted to breastfeed and our pediatrician recommended it. (Participant 137, EBF)

Participants also provided data on their 'personal experiences or beliefs (including religion)' as an almost internalised awareness that breastfeeding is the optimal way to feed their child:

I strongly believe that breast is best, both nutrition and forming a strong mother-baby bond. (Participant 4, EBF)

My religion, Islam, gives the child the right to be breastfed for the first 2 years of life. (Participant 178, EBF)

First child exclusively formula fed. Very healthy child and feedings were less successful than second time around. (Participant 125, EFF)

I know it is the best thing for baby, has been hard watching my wife shoulder all the work of feeding and getting up but the baby's needs came first. (Participant 11, EBF)

Participants also engaged in their own 'research', which was deemed important for how they navigated new parenthood and developed attitudes towards how their infant was fed:

Just researching breast vs formula feeding. Breast may be best but not if it's causing extreme anxiety in the mother. (Participant 121, EFF)

I have done my own research about benefits of breastfeeding and waiting to wean into solids until 6 months minimum. (Participant 207, EBF)

H2. Father's overall attitudes towards parenting and infant feeding will be associated with their level of paternal involvement with infant.

The overall hierarchical regression model significantly predicted approximately 25% of the variance in the level of paternal involvement with child (PIWIS), $R^2 = 0.25$, $F(4, 201) = 16.88$, $p < 0.001$. In Step 1, baby's birth order and breastfeeding initiation significantly predicted approximately 5% of the variance in PIWIS scores. After controlling for these variables, OATP and IIFAS predicted approximately 20% of the variance in PIWIS scores, although only OATP was a significant predictor ($\beta = 0.46$; $p < 0.001$), with higher OATP scores being associated with higher PIWIS scores (see Table 2).

To aid to the interpretability of the above quantitative findings, if the participant had indicated that their infant was not EBF, a qualitative question was asked about factors that influenced the decision to introduce formula milk or solid foods. Participants mainly provided responses about sharing feeds and childcare. Responses suggested fathers wanted to have a more involved role in childcare, which in turn also allowed time to bond with their infant, which enabled them to have a 'supporting partner' role:

Allowed me to get to feed her before bed and bond. Also gave my wife a rest from breast feeding. (Participant 169, COMBI)

Sharing the feeds, life balance for wife ... (Participant 19, COMBI)

Ability to fully share childcare between both parents. (Participant 61, EFF)

Participants also provided data that focused on their 'partner experiencing feeding difficulties' or health issues of the mother and/or baby, which led to the decision to introduce formula or solid food to the infant:

Breastfeeding was too difficult and painful. (Participant 82, COMBI)

Lack of supply/mother's mental health (Participant 124, EFF)

Baby was jaundiced and in hospital ... (Participant 35, EFF)

To further understand the perspectives of fathers with EBF infants, an alternative open question was asked about whether they felt exclusive breastfeeding influenced their level of involvement with their infant. There were polarised answers in response to this question. Approximately half of the participants stated that exclusive breastfeeding did not influence their level of involvement, with many responses stating other ways in which they could enact 'paternal bonding':

I bond with him in so many other ways, bathing, playing, cuddling, stories, singing. (Participant 207, EBF)

I am involved in many other ways of parenting. (Participant 63, EBF)

Oppositely, other participants stated that they felt breastfeeding did reduce the level of involvement that they could have with their infant and considered the infant's mother to be the primary caregiver, rendering the 'paternal role as secondary'.

I do feel that I am the 'secondary' to my wife's 'primary' since I cannot feed the baby. (Participant 139, EBF)

... can't do bedtime with them or settle at night. (Participant 180, EBF)

When she's hungry or needs soothing my wife is the only one who can make her happy. (Participant 83, EBF)

Alternatively, some participants expressed that even though breastfeeding did reduce the level of involvement that they could have with their infant, they did not consider it negatively as they prioritised their belief that breastfeeding was best for the infant:

... obviously it limits the time I can feed. This is not a problem though as breast is best. (Participant 50, EBF)

H3. Father's overall attitude towards parenthood and infant feeding will be associated with the infant-feeding method.

Crude and adjusted multinomial logistic regression models (using EBF as the reference category) can be found in Table 3. In adjusted analyses, the model was found to be highly significant ($p < 0.001$). Only education level ($p = 0.039$) was found to be a significant confounding variable. Infants were 9% less likely to be in the COMBI group, compared with the EBF group, if the IIFAS scores were higher (B: -0.10 ; relative risk ratio [RRR]: 0.91; 95% CI: 0.86, 0.96). Furthermore, infants were 23% less likely to be in the EFF group, compared with the EBF group, if the IIFAS scores were higher (B: -0.26 ; RRR: 0.77; 95% CI: 0.71, 0.83). Overall attitudes towards parenthood were not associated with infant-feeding methods (see Table 3 and Figure 1).

In light of the above findings, further analysis using a three-level one-way ANOVA demonstrated that there was a significant large main effect of paternal infant-feeding attitudes on infant-feeding outcome, $F(2, 209) = 92.51$, $p < 0.001$, $\eta^2 = 0.89$. Results showed a significant difference when comparing all group combinations (EBF $[70.27 \pm 7.33]$ to COMBI $[63.38 \pm 8.95]$; EBF $[70.27 \pm 7.33]$ to EFF $[54.10 \pm 7.95]$; and COMBI $[63.38 \pm 8.95]$ to EFF $[54.10 \pm 7.95]$), all at $p < 0.001$ level, Bonferroni (see Figure 2).

Qualitative responses demonstrated that fathers recognised the importance of breastfeeding, despite the reduced time they were able to spend with their infant and the perception that 'breastfeeding was prioritised over paternal bonding':

I'm happy that my wife breast feeds as its best for baby. I still have a lot of time with the baby. (Participant 159, EBF)

TABLE 3 Adjusted multinomial logistic regression model for H3 (association between OATP, IIFAS and infant-feeding method) and H4 (association between PIWIS [total and subscales] and infant-feeding method)

| Predictor | Infant-feeding method (compared with EBF group) [§] | | | | | | | | | | | |
|------------------------|--|--------------------------|--------------|-------------------------------|--------------------------|--------------|-------------|--------------------------|--------|-----------------------------|--------------------------|--------------|
| | COMBI (crude) | | | COMBI (adjusted) [§] | | | EFF (crude) | | | EFF (adjusted) ^a | | |
| | B | RRR (95%CI) | p | B | RRR (95% CI) | p | B | RRR (95% CI) | p | B | RRR (95% CI) | p |
| OATP | 0.00 | 1.00 (0.94, 1.08) | 0.926 | -0.00 | 1.00 (0.93, 1.08) | 0.970 | 0.06 | 1.06 (0.99, 1.14) | 0.083 | 0.07 | 1.07 (0.99, 1.16) | 0.099 |
| IIFAS | -0.11 | 0.90 (0.85, 0.95) | <0.001 | -0.10 | 0.91 (0.86, 0.96) | <0.001 | -0.26 | 0.76 (0.73, 0.83) | <0.001 | -0.26 | 0.77 (0.71, 0.83) | <0.001 |
| PIWIS | 0.13 | 1.14 (1.01, 1.29) | 0.032 | 0.13 | 1.14 (1.00, 1.30) | 0.055 | 0.07 | 1.08 (0.99, 1.18) | 0.090 | 0.09 | 1.09 (0.98, 1.22) | 0.106 |
| <i>PIWIS subscales</i> | | | | | | | | | | | | |
| Warmth A | -1.68 | 0.19 (0.05, 0.70) | 0.013 | -1.69 | 0.18 (0.05, 0.75) | 0.019 | -0.96 | 0.37 (0.16, 1.19) | 0.096 | -1.10 | 0.33 (0.09, 1.18) | 0.087 |
| Control R | 0.36 | 1.44 (0.88, 2.34) | 0.144 | 0.38 | 1.46 (0.88, 2.41) | 0.139 | 0.29 | 1.36 (0.94, 1.90) | 0.108 | 0.29 | 1.33 (-0.90, 1.99) | 0.158 |
| Frustrations | 0.11 | 1.11 (0.81, 1.53) | 0.518 | 0.12 | 1.13 (0.81, 1.57) | 0.479 | 0.25 | 1.28 (0.97, 1.69) | 0.083 | 0.14 | 1.15 (0.84, 1.58) | 0.390 |
| Indirect care | -0.08 | 0.93 (0.66, 1.31) | 0.665 | -0.07 | 0.93 (0.64, 1.36) | 0.703 | -0.22 | 0.81 (0.60, 1.08) | 0.141 | -0.34 | 0.71 (0.51, 0.99) | 0.043 |
| Positive engagement | 0.53 | 1.69 (1.05, 2.73) | 0.032 | 0.48 | 1.61 (0.97, 2.70) | 0.067 | 0.19 | 1.21 (0.87, 1.69) | 0.265 | 0.36 | 1.44 (0.97, 2.13) | 0.069 |

Note: Bold type highlights the significant predictors ($p < 0.05$).

Abbreviations: B = estimated multinomial regression coefficients; COMBI = combination feeding any amount of formula and breastmilk; control R = control and responsibility; EBF = exclusively breastfed; EFF = exclusively formula fed; IIFAS = Iowa Infant Feeding Attitude Scale; OATP = overall attitudes towards parenthood; PIWIS = Paternal Involvement with Infant scale; RRR = relative risk ratio; warmth A = warmth and attunement.

[§]Models were adjusted for their relative covariates.

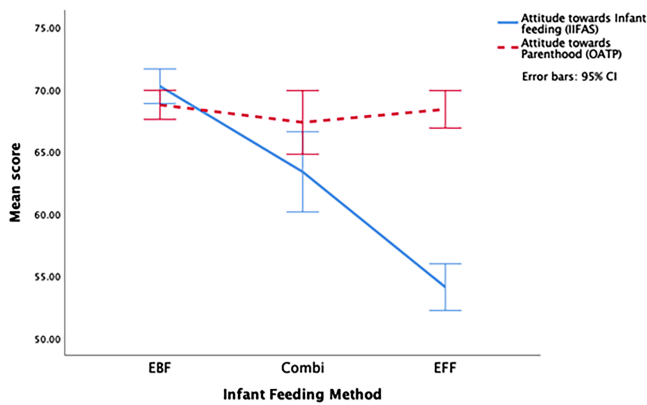
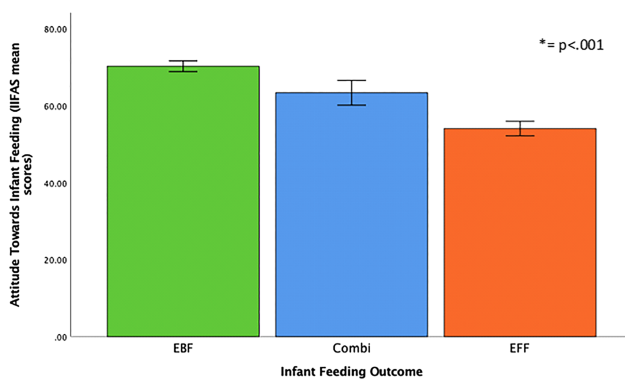


FIGURE 1 Mean scores of attitudes towards infant feeding and parenthood relative to infant feeding method



Note: EBF = exclusively breastfed; Combi = combination feeding any amount of formula and breastmilk; EFF = exclusively formula fed; IIFAS = IOWA Infant Feeding Attitudes Scale

FIGURE 2 Attitudes towards infant feeding (mean scores) by infant-feeding method

I've more time with him [since cessation of exclusive breastfeeding] but it is important to breastfeed. (Participant 150, COMBI)

Conversely, the qualitative responses also illustrated that some participants did consider 'breastfeeding perceived as a barrier' to the father–infant bond and believed that feeding their infant a bottle or solid food would help improve their bond:

We never did the breastfeeding – which helped me be close to the baby. (Participant 21, EFF)

... I was unable to help with such a big part of his life until he started solids. (Participant 198, EBF)

... Bottle feeding would mean more interaction with baby. (Participant 43, EBF)

Furthermore, data analysis found that fathers stated they were primarily influenced by their partner or family members when forming attitudes towards infant feeding, which suggests 'attitudes align within the parenting dyad':

My wife didn't want to breast feed. (Participant 39, EFF)

My wife. Before we had <Baby's Name> I had no opinion. But now I strongly believe in breastfeeding, but I also believe that it is important for dads to take on feeding responsibilities to bond with their baby. (Participant 158, COMBI)

H4. Fathers' level of paternal involvement will be associated with infant-feeding method.

Crude and adjusted multinomial logistic regression models (using EBF as the reference category) can be found in Table 3. In adjusted analyses, the model was highly significant ($p < 0.001$). However, after controlling for education level ($p = 0.020$) and breastfeeding initiation ($p < 0.001$), the overall PIWIS levels were not associated with infant-feeding method ($p = 0.072$). See Table 3 for full results.

However, as discussed by Singley et al. (2018), the PIWIS is constructed of five subscales, which consider specific aspects of paternal involvement. The multidimensional nature of this construct requires consideration of each of the five elements individually to enable a comprehensive understanding of the findings. As such, crude and adjusted models were built for the subscales. The adjusted models included education level ($p = 0.012$) and breastfeeding initiation ($p = 0.001$) as confounding variables, the PIWIS subscales as the predictor variables and infant-feeding method as the outcome variable. This analysis revealed that two of the subscales, warmth and attunement ($p = 0.019$) and indirect care ($p = 0.043$), had a significant influence on infant-feeding method. For fathers with higher warmth and attunement scores, the relative risk for being in the COMBI group was 82% lower, compared with the EBF group ($B: -1.69$; RRR: 0.18; 95% CI: 0.45, 0.75). This relationship was not significant when comparing warmth and attunement between the EBF and EFF group ($B: -1.10$; RRR: 0.33; CI: 0.09, 1.18).

For fathers undertaking more indirect care, the relative risk for being in the EFF group was 29% lower, compared with the EBF group ($B: -0.34$; RRR: 0.71; 95% CI: 0.51, 0.99). Interestingly, this finding was not significant when comparing the indirect care between the EBF and COMBI feeding groups ($B: -0.07$; RRR: 0.93; 95% CI: 0.64, 1.36). See Table 3.

Qualitative questions asked about potential changes in the father–infant relationship since the cessation of exclusive breastfeeding. The data showed a polarised response with approximately half of the participants indicating that they did consider a relationship change with their infant. Many responses alluded to the

increased father–infant bond facilitated by the act of feeding, whereby ‘alternative feeding methods facilitate paternal bonding’:

I feel the bond is much stronger as I am now able to participate in feeding him. (Participant 24, EFF)

I feel closer to him when feeding him. (Participant 118, COMBI)

Alternatively, participants stated that they did not feel any change in their father–infant relationship, either because the change in feeding method occurred when the infant was very young, or they bottle fed their baby expressed breastmilk, therefore always having ‘shared feeding responsibilities’:

No as pumping so I do a lot of the feeds and always have evenings and nights whilst wife pumps. (Participant 38, COMBI)

No, the change came early on and I prefer that I can be active in feeding. (Participant 162, EFF)

In order for me to be able to take part in feeding and give my wife a break. (Participant 158, COMBI)

Another open question asked about factors that influenced the decision to introduce formula milk/solid food to their infant. Some participants mentioned that their desire to feed their infant ultimately led to the infant being introduced to formula milk. However, most responses focused around feeding difficulties or mother/infant health issues, whereby ‘breastfeeding difficulties increased formula feeding’:

No, while my daughter was exclusively breastfed, because of her tongue and lip ties, she was bottle fed with breastmilk, not nursed. (Participant 108, COMBI)

Baby couldn't latch on and was tongue tied. (Participant 164, EFF)

Difficulty in milk getting through. Mother and child stressed. (Participant 5, EFF)

4 | DISCUSSION

This study found that fathers with higher egalitarian attitudes towards parenthood were more likely to have positive attitudes towards breastfeeding and have higher levels of paternal involvement with their infant. However, levels of paternal involvement were not found to be associated with infant-feeding outcomes. Infant-feeding outcomes were found only to be significantly associated with the father's attitudes towards infant feeding, such that a positive attitude towards

breastfeeding was significantly associated with the increased likelihood of the infant being breastfed.

Qualitative findings indicated that fathers primarily felt that their attitude towards infant feeding was influenced by their partner or family members. When considering the impact of feeding method on the father–infant relationship and levels of involvement with their infant, fathers' views were polarised. Approximately half of the fathers perceived breastfeeding as a barrier to the level of involvement that they could have with their infant, which ultimately led to a negative impact on their father–infant relationship. However, other fathers did not feel that breastfeeding was a barrier for them bonding with their infant with many of them expressing how their beliefs about the benefits of breastfeeding were prioritised above desires for their own involvement in feeding duties.

4.1 | Paternal attitudes towards infant feeding, parenthood, and infant-feeding outcomes

Data integration indicated that fathers who have a higher egalitarian attitude towards parenthood are likely to have had their views influenced by their partner or other family members when forming positive attitudes towards breastfeeding. These results support findings that suggest maternal and paternal infant-feeding attitudes are highly correlated (Mitchell-Box et al., 2013) and can be explained by means of the family systems theory, which suggests that family members seek each other's approval (Kerr, 2000). This is important when considering effective ways to include fathers in breastfeeding interventions as results demonstrate that fathers with a positive attitude towards breastfeeding were more likely to have an infant who was breastfed exclusively or in combination with formula milk. Although this study cannot establish directionality, previous literature has suggested that there is a link between a positive paternal attitude towards breastfeeding and the mother initiating and continuing breastfeeding (Hansen et al., 2018; Mitchell-Box et al., 2013; Mitchell-Box & Braun, 2013). Similarly, a negative attitude towards breastfeeding is predictive of formula feeding, which also lends support to our findings (Earle & Hadley, 2018; Hansen et al., 2018).

4.2 | Paternal attitudes towards infant feeding, parenthood, and their level of involvement

Results from this study found that fathers who had more equal and engaged attitudes towards parenthood were more likely to have higher levels of paternal involvement. Furthermore, it was found that fathers did want to be involved with an array of childcare duties and desired a high-quality bond with their infant from birth. Family systems theory would suggest that family members react to each other's expectations and attitudes (Kerr, 2000). With societal expectations shifting the role of a father to become more involved both practically and emotionally with their infant (e.g. Barbeta-Viñas & Cano, 2017), a father's desire to become more involved to meet these expectations

within the family unit is understandable. Taken together, these findings demonstrate an emphasis on mutual parental investment and show that fathers are desiring and adopting a more involved, egalitarian parenting role, regardless of feeding method (e.g. Barbeta-Viñas & Cano, 2017; Gatrell & Dermott, 2018; Keizer, 2015).

Qualitative data from this study also indicated that some fathers perceived breastfeeding as a barrier to involvement and bonding with their infant. Understanding how fathers find and accept alternative ways to bond could be informative for interventions to promote breastfeeding while being sensitive to the experience and role of the father (Baldwin et al., 2019). Earle and Hadley (2018, p. 10) found that men wanted infant-feeding health promotion to be more 'father friendly' and focused on paternal needs, which could be a reflection on some fathers feeling 'left out' of key infant-bonding experiences.

4.3 | Paternal involvement and infant-feeding outcomes

Quantitative results showed no association between overall level of paternal involvement and infant-feeding method. Current literature has demonstrated mixed findings when considering the influence of paternal involvement on infant-feeding outcomes (e.g. Ito et al., 2013). However, paternal involvement is multi-dimensional, and this study indicated that higher levels of warmth and attunement and indirect care were significantly associated with exclusive breastfeeding, when compared with combination-fed infants and exclusively formula-fed infants, respectively. Secure father–infant attachment has previously been associated with paternal warmth and attunement (Reisz et al., 2019). It is theorised that fathers who show high levels of warmth and attunement may not need to participate in feeding responsibilities to achieve a secure bond with their infant. Higher levels of indirect care were also associated with exclusive breastfeeding. Indirect care is conceptualised as assuming other tasks to stay involved with the infant (Singley et al., 2018), which in this study was supportive of breastfeeding behaviour. This finding is supported by Rempel et al. (2017) who found breastfeeding duration was reduced when a father was directly involved in breastfeeding, and in order to extend breastfeeding duration, a co-ordinated teamwork approach was essential.

The qualitative data allow us to expand upon previous work as fathers provided various reasons as to why their infant was not EBF such as the desire to share feeding responsibilities, facilitation of paternal bonding and difficulties experienced by the mother when breastfeeding. Although the quantitative findings do not show a significant relationship between levels of paternal involvement and infant-feeding outcomes, the qualitative responses demonstrate that the desire to be involved in infant feeding and to bond with their infant can be influential. The polarisation observed in the qualitative responses could explain the lack of a statistically significant relationship observed in the quantitative findings.

4.4 | Strengths and limitations

To the authors' knowledge, no other study has previously appraised the relationships between paternal attitudes, involvement and infant-feeding outcomes simultaneously while also qualitatively exploring the influences on paternal attitudes towards infant feeding and the father–infant relationship. These findings, therefore, are an original contribution to the field and provide important insights for future research to build upon.

A limitation of this study is the generalisability of the findings due to the composition of the sample. The majority of the fathers were white, married, and living in the United Kingdom. Comparison of the demographics of those fathers who did and did not complete the survey demonstrated that those who did complete the survey were also more likely to have a higher education level, a professional occupation, a daughter, a firstborn, and an infant that was currently breastfed. High breastfeeding rates relative to UK prevalence statistics are however, common in online research examining mothers (Fallon et al., 2019).

Using predominately social media parenting groups to recruit may not be the most effective recruitment method to achieve diversity (Dworkin et al., 2016). Efforts were made to recruit participants from a diverse range of social media platforms and survey distribution sites; however, we suggest that future research should consider alternative ways to recruit a more diverse sample (e.g. using community or faith groups or formula feeding support groups).

4.5 | Future policy and research

Evidence of how to support fathers' involvement with infant care has been neglected in research and policy (Baldwin et al., 2019). Policy for maternity care and infant feeding support has generally only focused on pregnant and postnatal women. A recent recommendation in NHS England's Long-Term Plan for the NHS (NHS England, 2019) reflected that fathers/partners of women who require specialist perinatal mental health services should be offered evidence-based assessment of their own mental health needs (NHS England, 2019 p.49). However, policy for infant feeding only referred to the need for all maternity units to have an evidence-based infant-feeding accreditation programme in place within the next 2 years (NHS England, 2019 p.49), neglecting the role of fathers.

In terms of research, there are major gaps in the development of interventions specifically tailored to assess paternal needs on becoming a father and to improve outcomes such as bonding and how maternity services could be revised to better support fathers' involvement with infant care and infant feeding. With significant resource constraints currently faced by healthcare funders and providers, a situation further compounded by the COVID-19 pandemic (Furlow, 2020), paternal attitudes and involvement in infant feeding are research priorities, regardless of resource setting. Future research using prospective designs should aim to measure the attitudes and

feeding intentions of mothers and fathers, before and after parenthood in relation to infant feeding outcomes.

Attitudes and social norms are a key component of social cognitive theory, which has been used to improve maternal attitudes, beliefs and intentions surrounding breastfeeding (Edwards et al., 2018; Swanson et al., 2006) and infant-feeding behaviours (Bartle & Harvey, 2017) with interventions using this model improving breastfeeding continuation rates (McKinley & Turner, 2017; Swanson et al., 2006). By combining social cognitive theory and a family network approach, we believe that there could be significant improvements in rates of continuing to exclusively or predominantly breastfeed for six months, as well as an improvement in maternal, paternal and infant physical and mental health.

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CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

CONTRIBUTIONS

LA and SAS have contributed equally and are joint first authors of this article. VF and LA conceptualised and designed the research study. LA performed the research and analysed the quantitative data. VF provided supervision of the research, and SAS prepared and curated the data and manuscript for the special issue visualisation. SAS analysed the qualitative data. LA and SAS originally drafted the manuscript with SAS, VF, LA and DB reviewing and editing it to produce the finalised draft. DB provided a critical review of the final draft, and all authors approved the final version.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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