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Feeding attitudes of fathers in the United States are associated with breastfeeding success: A cross-sectional study

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Abstract

Background/Aims: Fathers are increasingly recognized as a source of breastfeeding support. This online cross-sectional study examined the relationship between fathers' feeding attitudes and breastfeeding outcomes (initiation, duration, exclusivity) and factors influencing breastfeeding. **Methods:** Demographic characteristics, anthropometric measurements, and infant feeding methods were self-reported. The Iowa Infant Feeding Attitude Scale (IIFAS) assessed the feeding attitudes of 509 fathers in the USA (34.4 ± 5.2 years). Significance was determined using chi-square tests and analysis of variance ($p < .05$). **Results:** The IIFAS categorized participants into feeding attitude groups (positive to formula feeding (PFF), $n = 142$; neutral feeding (NF), $n = 270$; positive to breastfeeding (PBF), $n = 97$). The mean IIFAS score (55.7 ± 16.0) suggested fathers have a neutral attitude toward breastfeeding. The PBF group reported a longer duration of breastfeeding (17.1 ± 7.1 months) compared to the PFF (6.1 ± 3.0 months) or NF (12.7 ± 7.3 months) groups ($p < .001$). The PFF group reported that their child initiated complementary liquids earlier (18.0 ± 5.8 weeks) compared to the NF or PBF groups (NF = 21.5 ± 13.8; PBF = 24.5 ± 9.2 weeks; $p < .001$). Initiation of complementary solids was statistically different between the PFF group (21.3 ± 5.4 weeks) and the NF and PBF groups (NF = 26.4 ± 12.0; PBF = 26.4 ± 6.1 weeks; $p < .001$). Breastfeeding initiation was associated with the feeding attitude group ($p < .001$). Among those that reported their partner initiated breastfeeding, the feeding source (breastmilk, breastmilk + formula) was associated with the feeding attitude group ($p < .001$). Reasons for not breastfeeding exclusively or breastfeeding cessation were related to concerns about maternal/child health, convenience, and processes associated with breastfeeding. **Conclusions:** Fathers' feeding attitudes are related to breastfeeding success. Research should explore education and interventions for fathers to improve breastfeeding rates.

Keywords
Breastfeeding, fathers, feeding behavior, infant feeding

Introduction

The health benefits of breastfeeding are well-recognized by practitioners throughout the world. Compared to other preventative interventions, breastfeeding has the largest potential to influence childhood mortality and is a powerful health-promoting behavior for the mother (Chowdhury et al., 2015; Meek and Noble, 2022; Victora et al., 2016). Accordingly, the American Academy of Pediatrics (AAP) and the World Health Organization (WHO) recommend infants be exclusively breastfed for the first six months of life with continued breastfeeding while introducing complementary foods for two years (Horta and Victora, 2013; WHO, 2014). Despite the well-substantiated benefits, breastfeeding prevalence among infants younger than six months is inadequate. Worldwide, just one-third of infants are exclusively breastfed, and rates are only slightly better (~37%) among low–middle-income countries (Victora et al., 2016). Based on the well-documented health benefits of breastfeeding and the suboptimal breastfeeding

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behaviors, innovative ideas are needed to improve breastfeeding practices and promote wellness for the mother–infant dyad.

Previous research and interventions to improve breastfeeding initiation and exclusivity have focused mainly on mothers and modifiable variables, such as the intention to breastfeed, breastfeeding self-efficacy, breastfeeding attitudes, education, and/or social support (Meedya et al., 2010). In recent years, however, researchers have increasingly become interested in the fathers' potential role in breastfeeding support, with some evidence suggesting that the fathers' attitude is the most critical factor influencing a mother's feeding choice and the decision to continue breastfeeding (Ayton et al., 2015; Ogbo et al., 2020; Scott et al., 1997; Shapiro and Krysik, 2010). While these studies are certainly encouraging, the existing observational evidence and the corresponding deductions on the relationship between the father's attitudes toward infant feeding behaviors and breastfeeding success are predominately summarized from research that does not uniquely concentrate on fathers. Instead, research generally focuses on the mother's perception of the father's support of breastfeeding and various breastfeeding outcomes. For instance, several observational studies have reported an association between the perceived breastfeeding support of the fathers and the mother's intention to breastfeed (Littman et al., 1994; Mueffelmann et al., 2015; Scott et al., 1997) and the initiation (Arora et al., 2000, 2017; Ayton et al., 2015; Littman et al., 1994; Scott et al., 1997, 2001), duration (Arora et al., 2000; Littman et al., 1994), and exclusivity of breastfeeding (Littman et al., 1994; Mueffelmann et al., 2015). If the mother perceives that the father does not support breastfeeding or is ambivalent toward infant feeding, the mother is less likely to initiate or continue exclusive breastfeeding (Arora et al., 2000; Ayton et al., 2015; Wallenborn et al., 2019). Similarly, the breastfeeding attitudes among males and females surveyed together are linked toward favorable levels of self-efficacy and the likelihood of breastfeeding success (Marrone et al., 2008; Mitchell-Box et al., 2013; Scott et al., 2004; Shaker et al., 2004). While these findings suggest the father's involvement is an especially powerful influence on breastfeeding decisions and practices, the relationship between the breastfeeding attitudes of fathers and infant feeding behaviors, especially in the USA, remains understudied, possibly because women are generally perceived as the parent most involved in the child's care (Johnson and Simpson, 2013; Shapiro and Krysik, 2010).

Understanding the father's breastfeeding attitudes may help researchers design effective interventions to promote breastfeeding practices and encourage healthcare practitioners to more meaningfully and consistently engage with fathers to increase breastfeeding rates. Therefore, the primary objectives of this cross-sectional study were to (1) investigate the relationship between the feeding attitudes of US fathers and the reported feeding behaviors of their infant and (2) summarize and understand the multiple factors influencing breastfeeding (i.e., interpersonal, sociocultural, and medical). The secondary objective was to examine the age when complementary liquids and solids were introduced to infants.

Methodology

This anonymous, cross-sectional, online study examined the relationship between the feeding attitudes of fathers and breastfeeding practices (initiation and duration), as well as multiple factors influencing breastfeeding practices (e.g., interpersonal, sociocultural, and medical). All methods and procedures were reviewed and approved by New York University Institutional Review Board before study recruitment.

Participants and recruitment

Participants were invited to participate and complete an anonymous web-based survey between September 2018 and August 2022 using Qualtrics (Provo, UT). Participants were eligible for participation if they: (1) were ≥18 years; (2) were a father of a child 1–3 years of age who was a full-term singleton birth (>37 weeks); (3) resided in the USA; (4) could fluently read the English language; and (5) had internet access. Information on the survey was distributed to various social media sites targeting fathers and fatherhood, including Facebook, Reddit, and Instagram, as well as through email (group listservs). If interested, potential participants could access the survey via the study link. After accessing the survey, participants provided informed consent and answered questions to assess study eligibility. Participants were offered to participate in a raffle to receive one of 25 Amazon gift cards ($25) as a study incentive.

Procedures

The survey consisted of four sections, including (1) the Iowa Infant Feeding Attitude Scale (IIFAS); (2) breastfeeding practices (initiation and duration) and the initiation of complementary liquids and solids; (3) reasons for not exclusively breastfeeding or stopping breastfeeding; and (4) self-reported demographic and anthropometric data.

The IIFAS consists of 17 questions, with approximately half the questions favorable toward breastfeeding and half favorable toward formula feeding. Participants are asked to respond to each question using a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Questions that were favorable to formula feeding were reverse-scored. A total infant feeding practices score is determined by summing the responses to each question. Scores range from 17 (reflecting a more positive attitude toward formula feeding) to 85 (reflecting a more positive attitude toward breastfeeding). The IIFAS was initially designed and validated to easily measure attitudes toward breastfeeding to predict breastfeeding intention and

initiation among women. The scale has good internal reliability, having a Cronbach's alpha of ≥0.85 in research focusing on breastfeeding and formula-feeding mothers and infants (De la Mora et al., 1999). In the current study, participants were categorized into a feeding attitude group based on the IIFAS score: (1) positive to formula feeding (scores of 17–48); (2) neutral (scores of 49–69); and (3) positive to breastfeeding (scores of 70–85) (Dungy et al., 2008).

Breastfeeding initiation was determined by asking the father if their child was ever breastfed, even for a short time (at the breast or using pumped breast milk). Fathers who reported breastfeeding initiation were asked a follow-up question regarding whether their child was fed only breastmilk or a combination of both formula and breastmilk. Fathers who reported breastfeeding initiation, either exclusively breastmilk from the breast or pump since birth or breastmilk accompanied by formula, were asked to describe breastfeeding duration by estimating the length of time that the child was breastfed (in weeks or months) and if the child was still breastfeeding. Similarly, fathers who reported that their partner initiated breastfeeding were asked to assess challenges to exclusive breastfeeding and reasons for stopping. The final section of the online study gathered demographic variables (e.g., race, ethnicity, education, work status, occupation, income, relationship status, age, and how many children they had) and self-reported anthropometric data. Height and weight measurements were used to calculate body mass index (BMI).

Statistical analysis

All data were analyzed using the IBM SPSS Statistics for Windows, Version 27.0 (IBM Corp. Released 2020; Armonk, NY, USA). Descriptive statistics were computed using means and standard deviations for the continuous data and frequencies and percentages for dichotomous/categorical data. Chi-square tests examined associations between the feeding attitude, and breastfeeding and infant feeding practices, and categorical characteristics. When statistically significant associations were observed, the residuals were examined to determine the cells contributing to the chi-square statistic. Analysis of variance examined differences between feeding attitude and breastfeeding and infant feeding practices, and continuous characteristics. Bonferroni post hoc tests were utilized to determine differences between the feeding attitude groups. $P < .05$ determined statistical significance.

Results

Although 1522 participants started the online survey, 634 participants were eliminated after data cleaning procedures detected bot responses. An additional 160 participants were eliminated because they did not meet the study eligibility criteria. Furthermore, 219 participants did not complete the IIFAS and could not be categorized into a feeding attitude group.

A total of 509 participants were included in the analysis and reported a mean IIFAS score of 55.7 ± 16.0. The total attitude score based on responses to the 17 items had a high internal reliability ($\alpha = 0.951$). The fathers were categorized into one of three feeding attitude groups: positive to formula feeding (PFF) ($n = 142$), neutral feeding (NF) ($n = 270$), and positive to breastfeeding (PBF) ($n = 97$) based on the IIFAS scores. The characteristics of the study sample are presented in Table 1. Overall, the participants were primarily white (61%) with a mean age of 34.4 ± 5.2 years and a self-reported BMI of 25.0 ± 3.5 kg/m^2. Generally, the sample was well-educated; approximately 75% of participants had bachelor's or graduate degrees. About 40% reported working in a management, professional, or related occupation, and nearly all the participants

Table 1. Demographic characteristics of fathers, stratified by feeding attitude group ($n = 509$).

Outcome measure	All participants ($n = 509$)	Positive to formula ($n = 142$)	Neutral ($n = 270$)	Positive to breastfeeding ($n = 97$)	*p*
			n (%)		
Race					<.001*
American Indian or Alaska Native	2 (0.4)	2(1.4)	0(0)	0(0)	
Asian	37 (7.3)	9 (6.3)	18 (6.7)	10 (10.3)	
Black or African-American	58 (11.4)	50 (35.2)[f]	7 (2.6)[g]	1 (1.0)[g]	
Native Hawaiian or Pacific Islander	20 (3.9)	14 (9.9)[f]	6 (2.2)	0 (0.0)[g]	
White	310 (60.9)	37 (26.1)[g]	212 (78.5)[f]	61 (62.9)	
Multiracial	51 (10.0)	17 (12.0)	14 (5.2)[g]	20 (20.6)[f]	
Other	31 (6.1)	13 (9.2)	13 (4.8)	5 (5.2)	
Ethnicity[a]					.182
Hispanic or Latino	106 (20.9)	27 (19.0)	64 (23.8)	15(15.5)	
Not Hispanic or Latino	402 (79.1)	115 (81.0)	205 (76.2)	82 (84.5)	

(continued)

Table 1. (continued)

Outcome measure	All participants ($n = 509$)	Positive to formula ($n = 142$)	Neutral ($n = 270$)	Positive to breastfeeding ($n = 97$)	p
Education[a]					<.001*
Less than high school/high school graduate	29 (5.7)	20 (14.1)[f]	7 (2.6)	2 (2.1)	
Some college/associate's degree	96 (18.9)	58 (40.8)[f]	31 (11.5)[g]	7 (7.2)[g]	
Bachelor's degree	212 (41.7)	49 (34.5)	125 (46.5)	38 (39.2)	
Graduate degree	114 (33.7)	15 (10.6)[g]	106 (39.4)	50 (51.5)[f]	
Employment status[b]					<.001*
Working	409 (80.7)	95 (66.9)	231 (86.2)	83 (85.6)	
Not working	69 (13.6)	32 (22.5)[f]	31 (11.6)	6 (6.2)[g]	
Prefer not to answer	29 (5.7)	15 (10.6)[f]	6 (2.2)[g]	8 (8.2)	
Occupation[c]					<.001*
Management, professional, and related	203 (40.4)	32 (22.5)[g]	122 (45.9)	49 (51.6)	
Service	67 (13.3)	20 (14.1)	38 (14.3)	9 (9.5)	
Sales and office	66 (13.1)	21 (14.8)	33 (12.4)	12 (12.6)	
Farming, fishing, and forestry	6 (1.2)	2 (1.4)	4 (1.5)	0 (0.0)	
Construction, extraction, and maintenance	46 (9.1)	25 (17.6)[f]	18 (6.8)	3 (3.2)	
Production, transportation, and material moving	38 (7.6)	18 (12.7)[f]	17 (6.4)	3 (3.2)	
Government	54 (10.7)	18 (12.7)	20 (7.5)	16 (16.8)	
Retired	1 (0.2)	1 (0.7)	0 (0.0)	0 (0.0)	
Unemployed	22 (4.4)	5 (3.5)	14 (5.3)	3 (3.2)	
Income[d]					<.001*
<$40,000	51 (10.1)	17 (12.0)	33 (12.4)	1 (1.0)[g]	
$40,000–$59,999	95 (18.8)	63 (44.4)[f]	23 (8.6)[g]	9 (9.3)[g]	
$60,000–$79,999	108 (21.3)	38 (26.8)	50 (18.7)	20 (20.6)	
$80,000–$99,999	91 (18.0)	13 (9.2)[g]	55 (20.6)	23 (23.7)	
$100,000–$149,999	75 (14.8)	10 (7.0)[g]	44 (16.5)	21 (21.6)	
>$150,000	86 (17.0)	1 (0.7)[g]	62 (23.2)[f]	23 (23.7)	
Father's relationship status[a]					<.001*
Married or living with partner	425 (83.7)	84 (59.2)[g]	254 (94.4)	87 (89.7)	
Divorced/separated	83 (16.3)	58 (40.8)[f]	15 (5.6)[g]	10 (10.3)	
Does child live with father now					<.001*
Yes	456 (89.6)	107 (75.4)	260 (96.3)	89 (91.8)	
No	53 (10.4)	35 (24.6)[f]	10 (3.7)[g]	8 (8.2)	
	Mean ± SD				
Father's age (years)	34.4 ± 5.2	32.7 ± 5.3^{x}	34.3 ± 4.9^{y}	37.4 ± 4.7^{z}	<.001*
Infant's age (months)	21.9 ± 7.1	21.0 ± 7.2	21.9 ± 6.8	23.2 ± 7.4	.064
Father's total number of children	2.7 ± 0.8	2.9 ± 0.8^{x}	2.6 ± 0.7^{y}	3.0 ± 0.9^{x}	<.001*
Father's height[d] (cm)	180 ± 8	177 ± 8^{x}	182 ± 9^{y}	180 ± 7^{y}	<.001*
Father's weight[e] (kg)	81 ± 12	81 ± 10	80 ± 13	82 ± 12	.414
Father's body mass index[h] (kg/m^2)	25.0 ± 3.5	25.8 ± 3.0^{x}	24.5 ± 3.8^{y}	25.4 ± 2.9^{xy}	.001*

[a]One missing response.
[b]Two missing responses.
[c]Six missing responses.
[d]Three missing responses.
[e]Four missing responses.
[f]Proportion higher than expected.
[g]Proportion lower than expected.
[h]Five missing responses.
[x,y,z]Values with different superscripts are significantly different using the Bonferroni post hoc test.
*$p < .05$.

described an income similar to or higher than the 2020 median US household income ($67,521) (United States Census Bureau, 2021).

Feeding attitudes were associated with race ($p < .001$), education ($p < .001$), occupation ($p < .001$), and reported household income ($p < .001$). There was no association between ethnicity and feeding attitude. Employment status and feeding attitude were significantly associated (<.001) with a higher-than-expected percentage of participants in the PFF ($n = 32$(22.5%)) and lower than expected

percentage of participants in the PBF ($n = 6(6.2\%)$) groups reported they were not currently working.

The father's relationship status and feeding attitude were statistically associated ($p < .001$). A lower-than-expected percentage of participants in the PFF group ($n = 84(59.2\%)$) reported they were married or living with their partner. Additionally, a higher-than-expected rate of participants in the PFF ($n = 58(40.8\%)$) and a lower-than-expected percentage of participants in the NF ($n = 15(5.6\%)$) groups reported they were divorced or separated. Feeding attitude and child's living status were statistically associated with a higher-than-expected percentage of participants in the PFF group ($n = 35(24.6\%)$) and a lower-than-expected percentage of participants in the NF group ($n = 10(3.7\%)$) reporting that the child does not currently live with the father ($p < .001$).

The father's age was statistically different among the feeding attitude groups, with the PFF group reporting the youngest age and the PBF group reporting the oldest age (PFF = 32.7 ± 5.3 years; NF = 34.3 ± 4.9 years; PBF = 37.4 ± 4.7 years) ($p < .001$). Participants who were categorized as NF had a lower mean number of children (2.6 ± 0.7) compared to those in the PFF (2.9 ± 0.8) and PBF (3.0 ± 0.9) groups ($p < .001$). There were no differences in the number of children between the PFF and PBF groups. There were no differences in the child's age between the three-feeding attitude groups. Participants in the PFF group reported a significantly higher BMI (25.8 ± 3.0 kg/m^2) than those that were in the NF (24.5 ± 3.8 kg/m^2) ($p < .001$).

Table 2 describes the breastfeeding outcome measures. The total duration of breastfeeding was longer for the PBF group (17.1 ± 7.1 months), compared to the PFF (6.1 ± 3.0 months) or NF (12.7 ± 7.3 months) groups ($p < .001$), with no differences between the NF and PFF groups. Moreover, the PFF group reported an earlier introduction of complementary liquids (including water), compared to the NF and PBF groups (PFF = 18.0 ± 5.8 weeks; NF = 21.5 ± 13.8 weeks; and PBF = 24.5 ± 9.2 weeks) ($p < .001$). Finally, the PFF reported initiating complementary solids earlier (21.3 ± 5.4 weeks) than the NF (26.4 ± 12.0 weeks) or PBF (26.4 ± 6.1 weeks) groups ($p < .001$). There were no differences in the initiation of complementary liquids or solid foods between participants in the NF and PBF groups.

Interestingly, breastfeeding initiation and feeding attitude group were associated ($p < .001$) with a higher-than-expected percentage of participants in the NF ($n = 262(97.4\%)$) and PBF ($n = 95(100.0\%)$) groups and a

Table 2. Breastfeeding initiation, duration, initiation of complementary liquids and solids, and feeding support reported by fathers, stratified by feeding attitude group ($n = 509$).

Outcome measure	All participants ($n = 509$)	Positive to formula ($n = 142$)	Neutral ($n = 270$)	Positive to breastfeeding ($n = 97$)	*p*
			Mean ± SD		
Total breastfeeding duration (months)	14.2 ± 7.6	6.1 ± 3.0[x]	12.7 ± 7.3[x]	17.1 ± 7.1[y]	<.001*
Initiation of complementary liquids (weeks)	21.1 ± 11.4	18.0 ± 5.8[x]	21.5 ± 13.8[y]	24.5 ± 9.2[y]	<.001*
Initiation of complementary solids (weeks)	25.0 ± 9.8	21.3 ± 5.4[x]	26.4 ± 12.0[y]	26.4 ± 6.1[y]	<.001*
			n(%)		
Breastfeeding initiation[a]					<.001*
Yes	390 (77.1)	33 (23.2)[f]	262 (97.4)[e]	95 (100.0)[e]	
No	116 (22.9)	109 (76.8)[e]	7 (2.6)[f]	0 (0.0)[f]	
Feeding source for those that initiated breastfeeding[b]					<.001*
Breastmilk only	234 (60.3)	5 (15.2)[f]	139 (53.5)	90 (94.7)[e]	
Breastmilk + formula	154 (39.7)	28 (84.8)[e]	121 (46.5)	5 (5.3)[f]	
Home health visitor[c]					<.001*
Yes	207 (40.7)	10 (7.1)[f]	140 (51.9)[e]	57 (58.8)[e]	
No	301 (59.3)	131 (92.9)[e]	130 (48.1)[f]	40 (41.2)[f]	
WIC program enrollment in the past month[d]					<.001*
Yes	59 (11.7)	6 (4.2)[f]	51 (19.1)[e]	2 (2.1)[f]	
No	416 (82.4)	114 (80.3)	208 (77.9)	94 (97.9)	
I do not know	30 (5.9)	22 (15.5)[e]	8 (3.0)[f]	0 (0.0)[f]	

[a]Three missing responses.
[b]Two missing responses.
[c]One missing response.
[d]Four missing responses.
[e]Proportion higher than expected.
[f]Proportion lower than expected.
[x,y,z]Values with different superscripts are significantly different using the Bonferroni post hoc test.
*$p < .05$.

lower-than-expected percentage of participants in the PFF ($n = 33(23.2\%)$) group reporting breastfeeding initiation. Among participants who reported that their partner initiated breastfeeding, the feeding source was associated with feeding attitude, with a lower-than-expected percentage of participants in the PFF group ($n = 5(15.2\%)$) and a higher-than-expected percentage of participants in the PBF ($n = 90(94.7\%)$) group reporting breastmilk only ($p < .001$). When asked about healthcare support, a higher-than-expected percentage of participants in the NF ($n = 140(51.9\%)$) and PBF ($n = 57(58.8\%)$) groups and a lower-than-expected percentage of participants in the PFF group ($n = 10(7.1\%)$) reported receiving a home health visitor, such as a nurse, health care worker, social worker, or lactation consultant ($p < .001$).

In addition to these outcome measures, fathers whose partners initiated breastfeeding ($n = 390$) reported challenges for exclusive breastfeeding (Table 3). The most frequently reported challenges included "*physical limitations from mother*" ($n = 78(20.0\%)$), "*mother went back to work or school*" ($n = 63(16.2\%)$), and "*breastmilk alone did not satisfy the baby*" ($n = 54(13.8\%)$).

Table 4 summarizes reported reasons for breastfeeding cessation among fathers whose partners initiated breastfeeding ($n = 390$). The most reported reasons included "*mother and child mutually agreed it was the right time to stop breastfeeding*" ($n = 79(20.3\%)$), "*breastmilk alone did not satisfy the baby*" ($n = 30(7.7\%)$), and "*mother became pregnant*" ($n = 30(7.7\%)$).

Discussion

This online study's findings demonstrate that the father's feeding attitudes are related to breastfeeding practices and

Table 3. Challenges for exclusive breastfeeding reported by fathers whose partners initiated breastfeeding ($n = 390$), stratified by feeding attitudes group.

Outcome measure	All participants ($n = 390$)	Positive to formula ($n = 33$)	Neutral ($n = 262$)	Positive to breastfeeding ($n = 95$)	p
	n (%)				
Baby had difficulty latching or nursing					.106
Yes	12 (3.1)	2 (6.1)	10 (3.8)	0 (0.0)	
No	378 (96.9)	31 (93.9)	252 (96.2)	95 (100.0)	
Breastmilk alone did not satisfy the baby					<.001*
Yes	54 (13.8)	6 (18.2)	47 (17.9)	1 (1.1)[b]	
No	336 (86.2)	27 (81.8)	215 (82.1)	94 (98.9)	
Baby was not gaining enough weight					.014*
Yes	24 (6.2)	2 (6.1)	22 (8.4)	0 (0.0)[b]	
No	366 (93.8)	31 (93.9)	240 (91.6)	95 (100.0)	
Physical discomfort from mother					.001*
Yes	36 (9.2)	5 (15.2)	31 (11.8)	0 (0.0)[b]	
No	354 (90.8)	28 (84.8)	231 (88.2)	95 (100.0)	
Too time consuming for mother					<.001*
Yes	36 (9.2)	14 (42.4)[a]	21 (8.0)	1 (1.1)[b]	
No	354 (90.8)	19 (57.6)[b]	241 (92.0)	94 (98.9)	
Physical limitations from mother (e.g., mother not producing enough milk					<.001*
Yes	78 (20.0)	10 (30.3)	65 (24.8)	3 (3.2)[b]	
No	312 (80.0)	23 (69.7)	197 (75.2)	92 (96.8)	
Medical reasons					.303
Yes	7 (1.8)	1 (3.0)	6 (2.3)	0 (0.0)	
No	383 (98.2)	32 (97.0)	256 (97.7)	95 (100.0)	
Mother went back to work or school					<.001*
Yes	63 (16.2)	12 (36.4)[a]	47 (17.9)	4 (4.2)[b]	
No	327 (83.8)	21 (63.6)	215 (82.1)	91 (95.8)	
Formula was more convenient					<.001*
Yes	40 (10.3)	11 (33.3)[a]	29 (11.1)[b]	0 (0.0)[b]	
No	350 (89.7)	22 (66.7)	233 (88.9)	95 (100.0)	
Other					.303
Yes	7 (1.8)	1 (3.0)	6 (2.3)	0 (0.0)	
No	383 (98.2)	32 (97.0)	256 (97.7)	95 (100.0)	

[a]Proportion higher than expected.
[b]Proportion lower than expected.
*$p < .05$.

Table 4. Reasons for breastfeeding cessation reported by fathers whose partners initiated breastfeeding ($n = 390$), stratified by feeding attitude group.

Outcome measure	All participants ($n = 390$)	Positive to formula ($n = 142$)	Neutral ($n = 270$)	Positive to breastfeeding ($n = 97$)	p
	n (%)				
Baby had difficulty latching or nursing					.332
Yes	6 (1.5)	1 (3.0)	5 (1.9)	0 (0.0)	
No	384 (98.5)	32 (97.0)	257 (98.1)	95 (100.0)	
Breastmilk alone did not satisfy the baby					.126
Yes	30 (7.7)	2 (6.1)	25 (9.5)	3 (3.2)	
No	360 (92.3)	31 (93.9)	237 (90.5)	92 (96.8)	
Baby was not gaining enough weight					.563
Yes	10 (2.6)	1 (3.0)	8 (3.1)	1 (1.1)	
No	380 (97.4)	32 (97.0)	254 (96.9)	94 (98.0)	
Physical discomfort from mother					.119
Yes	18 (4.6)	1 (3.0)	16 (6.1)	1 (1.1)	
No	372 (95.4)	32 (97.0)	246 (93.9)	94 (98.9)	
Too time consuming for mother					.140
Yes	13 (3.3)	0 (0.0)	12 (4.6)	1 (1.1)	
No	377 (96.7)	33 (100.0)	250 (95.4)	94 (98.9)	
Physical limitations from mother (e.g., mother not producing enough milk)					.125
Yes	25 (6.4)	0 (0.0)	21 (8.0)	4 (4.2)	
No	365 (93.6)	33 (100.0)	241 (92.0)	91 (95.8)	
Medical reasons					.783
Yes	1 (0.3)	0 (0.0)	1 (0.4)	0 (0.0)	
No	389 (99.7)	33 (100.0)	261 (99.6)	95 (100.0)	
Mother went back to work or school					.044*
Yes	27 (6.9)	1 (3.0)	24 (9.2)	2 (2.1)	
No	363 (93.1)	32 (97.0)	238 (90.8)	93 (97.9)	
Formula was more convenient					.103
Yes	13 (3.3)	1 (3.0)	12 (4.6)	0 (0.0)	
No	377 (96.7)	32 (97.0)	250 (95.4)	95 (100.0)	
Mother and child mutually agreed it was the right time to stop breastfeeding					<.001*
Yes	79 (20.3)	1 (3.0)[b]	45 (17.2)	33 (34.7)[a]	
No	311 (79.7)	32 (97.0)	217 (82.8)	62 (65.3)	
Mother became pregnant					<.001*
Yes	30 (7.7)	0 (0.0)	14 (5.3)	16 (16.8)[a]	
No	360 (92.3)	33 (100.0)	248 (94.7)	79 (83.2)	
Other					.788
Yes	16 (4.1)	1 (3.0)	10 (3.8)	5 (5.3)	
No	374 (95.9)	32 (97.0)	252 (96.2)	90 (94.7)	

[a]Proportion higher than expected.
[b]Proportion lower than expected.
*$p < .05$.

demonstrate the importance of including fathers in initiating and sustaining breastfeeding. In this survey, the PBF group reported that their child's breastfeeding duration was longer than the PFF or NF groups. Additionally, the PFF group reported introducing complementary liquids and solids to their child earlier than those in the NF and PBF groups. We observed a higher-than-expected percentage of participants in the NF and PBF groups and a lower-than-expected percentage in the PFF group reporting breastfeeding initiation. Moreover, we found that fathers who reported their partner initiated breastfeeding had a higher-than-expected percentage of participants in the PBF group and a lower-than-expected percentage of participants in the PFF group reporting breastmilk only as the feeding source. Finally, we described several reasons for not breastfeeding exclusively or for breastfeeding cessation, which were generally related to concerns about maternal or child health, convenience, and processes associated with breastfeeding.

In the research literature, the IIFAS has strong internal consistency (Cronbach's $\alpha = 0.85$) (De la Mora et al., 1999). In this study, the Cronbach's alpha showed a relatively high internal consistency ($\alpha = 0.951$). Our study

reported a mean IIFAS score of 55.7 ± 16.0, which is similar to mean IIFAS scores among fathers in other studies examining infant feeding attitudes and suggests fathers largely have a neutral attitude toward breastfeeding (Magnusson et al., 2017; Marrone et al., 2008; Mitchell-Box et al., 2013; Scott et al., 2004; Van Wagenen et al., 2015). For instance, Scott et al. observed Scottish fathers of breastfed and formula-fed infants to have a mean IIFAS score of 58.8 ± 9.0 (Scott et al., 2004). Like the present study, Magnusson et al. used an online survey to evaluate the infant feeding attitudes of US fathers and nonfathers. They reported an IIFAS score of 57.0 (CI: 56.3, 57.7) among males ages 21–44 years (Magnusson et al., 2017). Van Wagenen et al. also reported a neutral breastfeeding score among an internet panel of 502 US males (57.0 ± 8.1) with and without children (Van Wagenen et al., 2015).

Our study results are consistent with the existing research investigating the relationship between the father's attitudes toward infant feeding methods and breastfeeding initiation, duration, and exclusivity. For instance, Freed et al. found that US fathers with a positive attitude toward breastfeeding were more likely to have a partner who exclusively breastfed than those with a positive attitude toward formula feeding (Freed et al., 1992). In contrast, an observational study with nearly 200 fathers in Malaysia found no differences in attitudes to breastfeeding among fathers whose children were exclusively or not exclusively breastfeeding (Mohamad et al., 2015). The researchers also observed that 78% of the participants in the exclusive breastfeeding group and 85% in the non-exclusive breastfeeding group reported negative attitudes toward breastfeeding. The discrepancy in our study and these results may be partially due to a cultural difference among fathers or males in Malaysia compared to the USA. For example, the authors explained that breastfeeding in public is not as accepted in Malaysia because breastfeeding makes many Malaysian fathers feel embarrassed and uncomfortable, even if done modestly.

Research suggests that fathers are interested in breastfeeding and want to support mothers. However, fathers may feel unsure how to help or lack confidence deriving from social stereotypes about fatherhood. Many fathers have reported a lack of access to resources tailored to their unique needs, including inadequate information on addressing breastfeeding challenges (Brown and Davies, 2014; Tohotoa et al., 2009). Providing fathers with more information about breastfeeding may give them the confidence to become a stronger advocate for breastfeeding and more significant support for their partner, ultimately benefiting the mother and infant and potentially stimulating a lifelong interest in the child's nutrition. As an additional benefit, involving the father in perinatal education and support can aid in paternal adoption and improve men's health (Eskandari et al., 2017; Simbar et al., 2011). Healthcare professionals may also consider expanding the traditional mother–baby dyad to a mother–father–baby triad (Grummer-Strawn et al., 2008). Encouraging parents to work as a team could be especially valuable because assistance that is not responsive to the mother's needs can be perceived as unwanted pressure to breastfeed by the mother (Rempel et al., 2017). Lastly, because the IIFAS was specifically developed to easily assess the infant feeding attitudes and predict the feeding method (breastfeeding, combined breastfeeding, and formula, or formula) and the duration of breastfeeding in various populations, the IIFAS may be an appropriate tool for healthcare professionals to identify fathers that require education and support. For example, fathers with a more neutral attitude toward breastfeeding may be more responsive to breastfeeding education than those with a positive outlook toward formula or breastfeeding. Identifying fathers with a neutral attitude toward breastfeeding is especially important because some research suggests men may be reluctant to ask for information and support on breastfeeding (Tohotoa et al., 2009).

Our study also reported that participants in the PFF group initiated complementary liquids to their children around 4.5 months. In comparison, those in the NF and PBF groups initiated complementary liquids to their child around five and six months, respectively. In addition, fathers in the NF and PBF groups reported introducing complementary solid foods to their children at approximately 6.5 months, while those in the PFF introduced them around five months. As discussed earlier, the WHO and the AAP recommend exclusive breastfeeding for six months, with continued breastfeeding, while introducing complementary foods for up to two years (Victora et al., 2016; WHO, 2014). Introducing early solid foods is somewhat concerning because younger infants, especially those younger than four months, may not be developmentally prepared for solid foods. Despite these recommendations, many families do not adhere to the guidelines, and previous research has reported that approximately 24% of exclusively breastfed infants, 50% of mixed-fed infants, and 53% of exclusively formula-fed infants introduce solid foods early (Grummer-Strawn et al., 2008).

In our study, approximately 40% of all participants reported a home health visitor, such as a nurse, health care worker, social worker, or lactation consultant, to help care for their child's mother or child. In comparison, 12% of participants reported enrolling in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), a US program designed to protect and promote the health of low-income women, infants, and children up to 5 years. A home visitor program promotes healthy prenatal behaviors, providing breastfeeding encouragement and support, facilitating links to other services, and/or modeling positive parent bonding (DuMont et al., 2011; McGinnis et al., 2018). In contrast, WIC is a federally subsidized nutrition program for low-income pregnant, breastfeeding, and postpartum women, infants, and children under the age of 5 who are at risk for poor nutrition and is tasked with improving maternal and child health by

providing breastfeeding support, nutrition education, and food assistance (United States Department of Agriculture Food and Nutrition Service, 2022). Although WIC does not directly support fathers, many states and local WIC offices welcome and support fathers as part of the program.

While the mother's decision to breastfeed or use formula is multifaceted, the breastfeeding challenges in our study appear to be related to concerns about maternal or child health, convenience, and processes associated with breastfeeding. A systematic review by Ngoenthong et al. reported that most fathers recognize breastfeeding as the best feeding option for their infant (Ngoenthong et al., 2017). Yet, fathers portray feelings of helplessness, anxiety, and guilt when confronted with breastfeeding challenges (Ngoenthong et al., 2017). In addition, many fathers feel unprepared to support breastfeeding and describe a sense of shock when they are faced with breastfeeding problems. These findings demonstrate that breastfeeding challenges influence families, not only mothers and infants (Hansen et al., 2018). Given the important long-term benefits of breastfeeding to mothers and infants, breastfeeding education, promotion, and support are essential and should include fathers and/or families. Future research may also consider designing an intervention to help fathers overcome breastfeeding challenges to support their breastfeeding partners effectively.

This study contains limitations, and the findings must be interpreted in these contexts. First, this study is cross-sectional and cannot establish a causal relationship between the feeding attitudes of fathers and breastfeeding initiation, duration, or exclusivity. Second, this study relied on a convenience sample of internet users, and therefore, the results may not be generalizable to all fathers. Despite this, online surveys are increasingly used in public health research studies (Koo and Skinner, 2005). In this study, an online survey provided a greater reach, which may help explain the larger sample size in a generally difficult population to recruit (Evans and Mathur, 2005). Our survey link was highly advertised on social media sites, especially parenting boards focusing on fathers. While this method was successful, whether the father, mother, or fathers and mothers completed the survey is unknown. Moreover, social media recruitment centering around specific parenting initiatives may bring other biases. Despite this, the IIFAS scores of our study population were similar to the IIFAS scores of males in other observational studies. Third, this cross-sectional survey used a retrospective approach to collect information on infant feeding practices by paternal recall through a survey. Unfortunately, collecting data retrospectively may be inaccurate due to poor recall and/or the desire to provide a socially acceptable response (Bernard et al., 1984). While some research suggests that maternal recall of breastfeeding initiation and duration is a valid and reliable estimate (Li et al., 2005), no studies have investigated the validity or reliability of paternal recall of breastfeeding initiation and duration. Next, the breastfeeding attitudes of the fathers were measured at one point in time, at least one year after the child's birth. Thus, the study design inherently introduces the possibility of recall bias, and the results of this study may not reflect the breastfeeding attitudes of the fathers at the birth of their infant or the breastfeeding attitudes of fathers later in life. Next, the infant feeding attitudes were measured using a scale initially designed to assess the breastfeeding attitudes of women. However, previous studies report that IIFAS predicts breastfeeding intentions among expectant fathers and undergraduate men (Marrone et al., 2008; Mitchell-Box et al., 2013). In addition, the online survey did not differentiate between early breastfeeding initiation and delayed breastfeeding practices, which could influence breastfeeding duration, challenges associated with breastfeeding, or other feeding decisions. Like other research, for the purpose of analyses, our study categorized participants by score, stratified by the breastfeeding attitudes of the fathers (PFF, NF, and PBF groups). The original IIFAS studies by De la Mora et al. did not identify scores that would classify participants as PFF, NF, or PBF (De la Mora et al., 1999). While other studies have attempted to determine the most appropriate IIFAS cutoff score to define breastfeeding attitudes and categorize participants, the research literature is inconsistent, the grouping is not described well, and the studies are not validated (Dungy et al., 2008; Sittlington et al., 2007). Next, this study relied on self-reported health behaviors, anthropometric and demographic characteristics, and infant feeding practices. Thus, recall bias and misclassification are possible. Our participants were generally well-educated and reported a higher income than the median US household income. Interestingly, other online research has observed that participants with a higher income and education are more likely to respond to online surveys, which may help explain our study population (Sebo et al., 2017; Zuidgeest et al., 2011). Further research with a more diverse sample is necessary to determine if these results are generalizable on a population level.

This study's strengths included using a validated tool to measure the breastfeeding attitudes of fathers (the IIFAS), which has been used in several studies evaluating the breastfeeding attitudes of mothers, fathers, or mothers and fathers together (Jefferson, 2017; Karande and Perkar, 2012; Mitchell-Box et al., 2013; Scott et al., 2004; Shaker et al., 2004). A recent study in the USA found that the total scores of low-income women and their male partners were highly correlated, demonstrating the appropriateness of using the instrument for fathers (Van Wagenen et al., 2015). In addition, the sample size in our study was considerably large and uniquely focused on the breastfeeding attitudes of US fathers and the actual feeding practices of their infants. This approach is an essential methodological advantage because the breastfeeding attitudes of fathers and the actual feeding practices of their infants have yet to be explored in the literature thoroughly. These results help inform and guide future research and public health interventions to promote breastfeeding success in the USA.

Conclusion

The decision to breastfeed can considerably influence the health outcomes of the infant and mother, arguably more than any other health behavior involving the two individuals. Despite this, breastfeeding rates remain inadequate. This pilot study's findings substantiate that the father's breastfeeding attitude is associated with breastfeeding initiation, duration, and exclusivity. Healthcare professionals should recognize that the father may be a powerful instrument in enabling the child to receive the uninterrupted benefits of breastfeeding and give more attention and support to fathers, especially discussing any unique challenges that fathers may face and providing education on the benefits of breastfeeding. Additional research, especially intervention studies, is also warranted to determine the most effective ways to design breastfeeding education and support for fathers to improve and promote breastfeeding initiation, duration, and exclusivity.

Author's contributions

VS and KW contributed to the study's conceptualization, design, and methodology. JCB and VS conducted the data collection. JCB, VS, and KW managed the investigation. KW and ZF managed the formal analysis and contributed to data cleaning and data analyses. JCB and KW contributed to the interpretation of the data, the writing of the original draft, and the reviewing and editing of the manuscript. KW supervised and managed the project. All authors approved the final draft.

Availability of data and materials

Participants were informed that the data would not be shared when completing the informed consent. Thus, the data are not available for ethical and privacy reasons.

Consent for publication

All authors have approved the submitted version of the manuscript.

Declaration of conflicting interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethical statement

The study protocol was approved by New York University IRB (September 3, 2018). The participants were informed about the purpose and duration of the study, as well as data protection and retention. All research participants provided electronic consent to participate in the trial, which was voluntary and anonymous.

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Supplemental material

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