

Breastfeeding Without Nursing: “If Only I’d Known More about Exclusively Pumping before Giving Birth”

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Abstract

Background: Human milk is understood to be the optimal nutrition for infants, yet many women struggle to nurse. Although exclusively pumping human milk can provide a solution, women may be unaware of this possibility and, thus, experience unnecessary frustration.

Research aim: This study aimed to (a) determine the proportion of respondents who had heard of exclusive pumping prenatally; (b) describe sources that respondents turned to and/or received breastfeeding-related information from prenatally; (c) explore the ways in which respondents learned prenatally about exclusive pumping; (d) describe how useful respondents found various information sources when learning about exclusive pumping; and (e) describe the differences between respondents who first heard the term *exclusive pumping* prenatally versus postpartum.

Methods: A cross-sectional, self-report, mixed-methods survey was administered online to a convenience sample of current and/or past exclusive pumpers ($N = 1,215$). Descriptive statistics were produced (Research aims 1–4), and chi-square tests (Research aims 1, 2, and 5) and a Mann–Whitney U test (Research aim 5) were conducted, to identify trends and compare respondents.

Results: Seventy-one percent ($n = 864$) of respondents had not heard of exclusive pumping until after giving birth. Respondents reported that very few prenatal breastfeeding information sources mentioned or explained exclusive pumping. Women who had heard about exclusive pumping prior to giving birth ($n = 291$, 24%) reported feeling more knowledgeable about how to exclusively pump and less frustrated, insecure, depressed, rejected, embarrassed, envious, burdened, guilty, and disappointed while exclusively pumping.

Conclusion: For postpartum knowledge and affective outcomes to improve, prenatal infant feeding information and education must include information about exclusive pumping.

Keywords

breastfeeding, breastfeeding difficulties, breastfeeding experience, breast pumping, human milk expression, lactation education

Background

The overwhelming majority of mothers initiate breastfeeding at birth (Victora et al., 2016), demonstrating their desire to provide optimal nutrition for their children. However, despite the negative health and emotional consequences associated with early breastfeeding cessation (Victora et al., 2016), the majority of women do not breastfeed for as long as they initially desired. Problems with the physical aspects of breastfeeding (e.g., trouble sucking or latching on), concern about low milk supply, and a perception that human milk is not sufficient to satisfy an infant are reasons most frequently cited for cessation (Newby & Davies, 2016; Odom, Li, Scanlon, Perrine, & Grummer-Strawn, 2013). Other commonly reported reasons for weaning before 6 months are pain and physical discomfort, a desire for someone else to feed the infant, being told or thinking the infant was not

gaining enough weight, and the infant losing interest in nursing (Newby & Davies, 2016; Odom et al., 2013).

In this article, *breastfeeding* is used as a catchall term for feeding human milk, whereas *nursing* is used to denote feeding directly at the breast (Eidelman, 2017). *Expression* has been used wherever possible; however, the commonly used

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term for women who express all of their milk, even if they hand express, is *exclusive pumper* (Casemore, 2014).

Exclusive Pumping

Exclusively pumping or expressing human milk (EPing) may provide a solution for some breastfeeding problems, while still providing most of the benefits of human milk. Although nursing is considered the premier form of breastfeeding (American Academy of Pediatrics, 2012; World Health Organization, 2003, 2017), the reality is that not all mothers can and/or want to nurse. In her informal online survey, Glenn (n.d.) found that EPers did not nurse because of failure to latch, pain, a need or desire to monitor intake, an infant in the neonatal intensive care unit and unable to nurse, and/or an actual or perceived low milk supply. These non-elective EPers often mourn the loss of the nursing relationship that they imagined themselves having (Casemore, 2014). There is also a small, but growing, number of mothers who elect to EP either from birth or after a period of nursing. Mothers who express nonelectively are likely to cease feeding human milk sooner than their elective counterparts (Felice, Cassano, & Rasmussen, 2016).

Breastfeeding Information Needs

Breastfeeding duration significantly increases when information, advice, and support are provided on an ongoing basis (Fu et al., 2014; Haroon, Das, Salam, Imdad, & Bhutta, 2013; Shakya et al., 2017). Whereas much of this information and support focuses on practical advice and the benefits of breastfeeding, Brown (2016) found a need for breastfeeding information that stresses benefits other than infant health (e.g., convenience, cost, and closeness), employs less of an all-or-nothing approach, and includes both the positive and negative aspects of breastfeeding. Advice also needs to be realistic; many women have expressed that they have been led to have idealized expectations of breastfeeding, which have left them “feeling unprepared when they encountered pain, problems and relentlessness of early infant feeding, leading to feelings of guilt and inadequacy over their feeding decisions” (Fox, McMullen, & Newburn, 2015, p. 147).

Sources of Information

Mothers prefer information from sources that they perceive to be trustworthy and/or that provide information from lived experience (Loudon, Buchanan, & Ruthven, 2015; Song, Cramer, McRoy, & May, 2013). This includes health care providers, family members, and friends (Grimes, Forster, & Newton, 2014; Kamali, Ahmadian, Khajouei, & Bahaadinbeigy, 2018; McDougall & Ecclestone, 2015). Books and other printed materials were found to be among

Key Messages

- Exclusively pumping human milk can provide a solution for those who struggle to nurse at the breast, yet many may be unaware of this possibility despite prenatal breastfeeding education.
- A survey of 1,215 past and/or current exclusive pumpers revealed that most respondents (71%) had not heard of exclusive pumping until after giving birth.
- Those who had heard about exclusive pumping prior to giving birth reported feeling more knowledgeable about how to exclusively pump and less frustrated, depressed, insecure, embarrassed, burdened, envious, disappointed, guilty, and rejected while exclusively pumping.
- The findings from this study provide evidence of the importance that prenatal infant feeding information and education include information about exclusive pumping.

the most useful sources in some studies (e.g., Grimes et al., 2014), whereas other researchers did not report these sources as highly (McDougall & Ecclestone, 2015). The Internet—both static Web sites and interactive social networks and forums—is an important and frequently used source of information (Papen, 2013; Sayakhot & Carolan-Olah, 2016). Women who are employed and women with higher education levels have been reported more likely to use the Internet to look up pregnancy-related information (Grimes et al., 2014; Sayakhot & Carolan-Olah, 2016; Song et al., 2013).

Whereas sources of infant feeding information mirror those for general motherhood topics, the attitudes and knowledge of those around mothers play a large role in shaping information behavior (Rollins et al., 2016; Spiro, 2016). Other sources of information about breastfeeding include community-based peer groups (Shakya et al., 2017), the infant’s grandmother(s) (Cox, Giglia, & Binns, 2017; Karmacharya, Cunningham, Choufani, & Kadiyala, 2017), and online social networks (Gray, 2013; McKeever & McKeever, 2017). Although a number of researchers have found that the most influential person in the initial decision to breastfeed is the infant’s father (Sherriff, Hall, & Panton, 2014), fathers have rarely been singled out as an information source.

Outcomes of Breastfeeding Information Seeking

Although several researchers have concluded that breastfeeding outcomes are improved following prenatal education (Cox et al., 2017), Lumbiganon and colleagues’ (2016)

meta-analysis of 24 studies found that there was no conclusive evidence indicating that prenatal peer counseling, lactation consultation, or formal education increased breastfeeding initiation and duration. However, information about EPing can be distinguished from nursing information: Although most pregnant women know that nursing is one of their infant feeding options, many may not know that EPing is also an option. There is no research on the influence of prenatal education that includes EPing information on breastfeeding initiation and duration.

Lambert and Loiselle (2007) identified three other positive outcomes, in addition to physical outcomes (e.g., breastfeeding initiation and duration), of health information seeking: cognitive, such as increased knowledge and informed decision making; behavioral, including increased self-care abilities and adherence to treatment; and affective, including decreased anxiety, fear, and distress. Although most outcomes are positive, when information is confusing, overwhelming, incomplete, or wrong, it can be a burden, cause anxiety, and even lead to information avoidance (Crook, Stephens, Pastorek, Mackert, & Donovan, 2015; Rood et al., 2014).

Barriers to Information Seeking

Loudon et al. (2015) identified four barriers to information seeking mentioned by the mothers throughout their study: “lack of time and opportunity; conflicting information from different sources; requiring information about potentially contentious or sensitive topics; and lack of engagement with peers” (p. 36). They also found that, even online, “mothers feared being ‘judged’ by other mothers, family and health-care professionals about their parenting choices, causing them to hold back and refrain from seeking advice on contentious or sensitive topics in particular” (p. 39).

Conflicting information creates a barrier to successful breastfeeding and may lead to trust issues, deference to the source people deem (potentially incorrectly) most credible, and increased anxiety (Carpenter et al., 2015). Mothers in the Fox et al. (2015) study reported that breastfeeding “advice was often inadequate, contradictory and undermined their confidence in their feeding abilities” (p. 152). Their findings highlight the importance of thorough, consistent, and up-to-date education and training for all lactation care providers.

To the author’s knowledge, there is no existing research solely focused on EPers, yet breastfeeding without nursing seems to be growing in popularity (Felice & Rasmussen, 2015). Despite this increase and the importance of maximizing breastfeeding rates, little is known about EPers’ information behavior, that is, the “totality of human behavior in relation to sources and channels of information, including both active and passive information seeking, and information use” (Wilson, 2000, p. 49). The results of this study, with its focus on information behavior, will enable us to identify the information needs, seeking, and use of EPers before they

give birth. The identification of critical information deficiencies is vital to creating evidence-based change to breastfeeding policy, education, and practice—change that has the potential to increase the incidence and duration of breastfeeding, improve the lived experiences of EPers, and support the practice of EPing. Therefore, the research aims of this study were as follows:

1. Determine the proportion of respondents who had heard of EPing prenatally.
2. Describe sources that respondents turned to and/or received breastfeeding-related information from prenatally.
3. Explore the ways in which respondents learned prenatally about EPing.
4. Describe how useful respondents found various information sources when learning about EPing.
5. Describe the differences between the perceptions of respondents who first heard the term *exclusive pumping* prenatally and those who first heard it postpartum.

Methods

Design

The subset of data analyzed for this article was collected as part of a parent study broadly investigating the lived experiences, and especially the information behavior, of EPers. The parent study comprised an initial cross-sectional, self-report online survey, described below, and a series of follow-up surveys sent to a subsample of initial survey respondents; the current study analyzed a portion of data from the initial survey only, the prenatal subset.

A survey design was chosen so that diverse types of data could be collected and that respondents recruited online could conveniently respond in their own time without having to disclose potentially sensitive information face to face. This study protocol was reviewed and approved by the University of Maryland’s Institutional Review Board (Reference 1026503-2).

Setting

Data collection for the parent study occurred between March 7, 2017, and March 7, 2018. The prenatal subset was limited to responses submitted during March 2017. This study was conducted as part of a doctor of philosophy degree in information studies being undertaken at the College of Information Studies at a large, public university in the mid-Atlantic region of the United States. Given the online nature of the survey, it is difficult to truly assess the socioeconomic context or breastfeeding rates of the population; however, all but three respondents were from developed nations (United Nations, 2014), all read and wrote English, and all had access to the

Internet. In the United States, where 82% ($n = 992$) of respondents resided, breastfeeding rates of infants born in 2013 were 81% (ever breastfed), 52% (at 6 months), and 22% (exclusively through 6 months; Centers for Disease Control and Prevention, 2016).

Sample

The target population for this study was current or former EPer. An a priori power analysis to determine sample size was not possible because of lack of prior data. A convenience sample was recruited through online groups and an email newsletter (see the Supplementary Material available online). These groups were either personally familiar to the author or found through an Internet search for *exclusive pumping*. Snowball sampling also added respondents; respondents shared the opportunity to participate in this research by online and offline word of mouth. The study inclusion criteria were (a) at least 18 years of age and (b) either a current or former EPer. There were no exclusion criteria.

The subset of data analyzed for this article comprises survey responses by respondents who had completed 75% of the survey during March 2017. By 75% completion, respondents had answered all but one question responsive to the research aims. Of 1,563 responses recorded during March 2017, 1,215 responses (77%) met these inclusion criteria. Respondents were overwhelmingly married, White, well educated, and U.S. residents. The median year of birth was 1986 (age: $M = 31.5$ years, $SD = 4.54$). Detailed demographic characteristics are shown in Table 1.

Measurement

In this study, *breastfeeding* was defined as feeding human milk by any mother. *Nursing* was used to denote feeding directly at the breast. *Exclusive pumping* meant only expressing human milk; an *exclusive pumper* was anyone who practices or had practiced EPing.

The survey was created in Qualtrics (2018) and contained open- and/or closed-ended questions concerning the following categories: consent to participate, inclusion criteria, demographics, “grief pumping” (expressing human milk to donate after the loss of an infant), employment, circumstances surrounding each episode of EPing, reasons for EPing, information behavior regarding EPing, experiences of EPing in general, feelings about EPing, breast pumps, general health, future EPing, and willingness to participate further (for the full survey, see the Supplementary Material). The prenatal subset consisted of responses to demographic and employment questions, as well as the questions set out in Table 2.

Questions were developed from personal knowledge of and published literature about information behavior, EPing, and/or the prenatal period and in close consultation with colleagues more experienced in survey methodology. After it

was edited and tested by academic peers, the complete survey was pilot tested by four EPer (two respected leaders within online EPing groups, an author of an EPing newsletter, and a personal friend with a master of public policy degree); the minor changes/additions made (wording, technical issues, and two additional questions) as a result of pilot testing did not affect questions in the prenatal subset.

Data Collection

Respondents confirmed (a) at the time of consenting to participate (Survey Question 1) and (b) immediately after consenting (Survey Question 2). Any respondent answering “no” to Question 1 or 2 was barred from responding further. Data were stored in compliance with the University of Maryland Institutional Review Board requirements. Measures to protect confidentiality included not collecting names of respondents, asking only for an email address if willing to participate further, excluding those email addresses in data downloads, and allowing only two people access to the raw data. Respondents accessed and completed the survey through a URL accessible on any Web-enabled device.

Data Analysis

Qualifying survey responses were downloaded from Qualtrics and data were cleaned in Microsoft Excel. Data were then analyzed in Excel using the XLSTAT plug-in (Addinsoft, 2017). A nonnormal distribution of data was assumed and statistical significance was determined using a 95% confidence interval ($p < .05$), unless otherwise noted. Table 2 shows the questions analyzed and types of analysis performed for each research aim.

Results

Research Aim 1: When Respondents First Heard the Term Exclusive Pumping

Seventy-one percent ($n = 864$) of respondents heard the term *exclusive pumping* only after they had given birth (missing responses = 1, 0.1%). Just 14% ($n = 164$) heard it before pregnancy and 10% ($n = 127$) during. Five percent ($n = 59$) could not recall when they heard the term. Multiparous respondents were significantly more likely to have heard the term prenatally than were primiparous respondents, $\chi^2(1, n = 1,152) = 5.30$ (missing responses = 63, 5%).

Research Aim 2: Prenatal Breastfeeding Education

Sixty-three percent ($n = 765$) of respondents had received prenatal breastfeeding education (missing responses = 1, 0.1%). There was no statistically significant association between receiving prenatal education and when respondents

Table 1. Demographic Characteristics of Respondents (N = 1,215)

Characteristic	n (%)
Year of birth	
Before 1970	3 (0.2)
1970–1974	6 (0.5)
1975–1979	104 (8.6)
1980–1984	355 (29.2)
1985–1989	518 (42.6)
1990–1994	192 (15.8)
1995–1999	22 (1.8)
Marital status	
Married	1,042 (85.8)
In a committed relationship	152 (12.5)
Separated	2 (0.2)
Divorced	5 (0.4)
Single	10 (0.8)
Widowed	1 (0.1)
Other ^a	2 (0.2)
Number of children birthed	
0	1 (0.1)
1	811 (66.7)
2	301 (24.8)
3	69 (5.7)
4	21 (1.7)
5 or more	9 (0.7)
Education	
Less than high school diploma	4 (0.3)
High school graduate (high school diploma or equivalent including GED)	58 (4.8)
Some college but no degree	205 (16.9)
Associate degree	106 (8.7)
Bachelor's degree	379 (31.2)
Some graduate or professional school	86 (7.1)
Master's degree	275 (22.6)
Doctoral or professional degree (PhD, JD, MD)	79 (6.5)
Other ^b	13 (1.1)
Employment^c	
Full time	664 (54.7)
Part time	217 (17.9)
On maternity leave	167 (13.8)
Stay-at-home parent	328 (27.0)
Student	68 (5.6)
Unemployed	17 (1.4)
Disabled	4 (0.3)
Other	27 (2.2)
Household income (USD)	
Less than \$10,000	17 (1.4)
\$10,000–\$29,999	66 (5.4)
\$30,000–\$49,999	128 (10.5)
\$50,000–\$69,999	198 (16.3)
\$70,000–\$99,999	305 (25.1)
\$100,000–\$149,999	252 (20.7)
\$150,000 or more	175 (14.4)
Prefer not to answer	73 (6.0)

(continued)

Table 1. (continued)

Characteristic	n (%)
Race/ethnicity^c	
White, not Hispanic or Latina	1,016 (83.6)
White, Hispanic or Latina	55 (4.5)
Black or African American	15 (1.2)
American Indian or Alaska Native	2 (0.2)
Asian	72 (6.0)
Mixed race ^d	32 (2.6)
Other ^e	5 (0.4)
Prefer not to answer	12 (1.0)
Current country of residence	
Australia	38 (3.1)
Canada	64 (5.3)
India	6 (0.5)
Malaysia	6 (0.5)
Singapore	16 (1.4)
United Kingdom	37 (3.0)
United States	992 (81.6)
Other ^f	22 (1.8)

Note. Number of missing responses: year of birth = 15 (1.2%); marital status = 1 (0.1%); number of children given birth to = 3 (1.2%); education = 7 (0.6%); employment = 1 (0.1%); household income = 1 (0.1%); race/ethnicity = 5 (0.4%); country of residence = 34 (2.8%). GED = general equivalency diploma.

^aPolyamorous = 2 (0.2%). ^bTrade school/certificate = 4 (0.3%); certified managing accountant/certified accountant = 3 (0.2%); licensed vocational nurse = 1 (0.1%); public health nurse = 1 (0.1%); dental assistant = 1 (0.1%); agents representative certificate = 1 (0.1%); "DEP" = 1 (0.1%); specialized college certification = 1 (0.1%). ^cRespondents could select multiple answers. ^dThis is an aggregate of respondents who selected two or more answers. ^eArmenian = 1 (0.1%); Eurasian = 1 (0.1%); Persian = 1 (0.1%); West Indian/Guyanese = 1 (0.1%); Yemenite = 1 (0.1%). ^fFinland = 4 (0.3%); Hong Kong = 3 (0.2%); Ireland = 3 (0.2%); Philippines = 2 (0.2%); Denmark = 1 (0.1%); Germany = 1 (0.1%); Greece = 1 (0.1%); Indonesia = 1 (0.1%); Israel = 1 (0.1%); Kuwait = 1 (0.1%); New Zealand = 1 (0.1%); Qatar = 1 (0.1%); South Africa = 1 (0.1%); United Arab Emirates = 1 (0.1%).

first heard the term *exclusive pumping* (missing responses = 78, 6%) or their parity status (missing responses = 23, 2%). Figure 1 illustrates respondents' sources of prenatal breastfeeding education.

Table 3 displays the number of respondents consulting different information sources when respondents did their own research/reading about breastfeeding. Web sites that respondents visited included Kellymom.com, BabyCenter.com, and the Australian Breastfeeding Association; online forums included the group or discussion features on Facebook, BabyCenter.com, and TheBump.com.

Research Aim 3: Ways Respondents Learned Prenatally about EPing

Respondents indicated that no information source was highly likely to mention or explain EPing (see Figure 1). Sources that were most likely to mention or explain EPing were

Table 2. Questions and Analysis in Relation to Research Aims

Research aim and purpose	Question	Available responses	Analysis conducted
I. Determine the proportion of respondents who had heard of exclusive pumping prenatally.	Q102. When did you first hear the term <i>exclusive pumping</i> ?	Multiple choice, single answer: <ul style="list-style-type: none"> • Before I was pregnant • While I was pregnant • After I gave birth • I don't remember • I prefer not to answer 	Descriptive statistics
To assess whether there was an association with parity	Q14. How many children have you given birth to?	Multiple choice, single answer: <ul style="list-style-type: none"> • 0 • 1 • 2 • 3 • 4 • 5 or more • I prefer not to answer 	Chi-square test of independence conducted on contingency table (heard before birth/heard after birth × primiparous/multiparous)
2. Describe sources that respondents turned to and/or received breastfeeding-related information from prenatally.	Q104. Did you receive breastfeeding education before the birth of your child/children?	Multiple choice, single answer: <ul style="list-style-type: none"> • Yes • No • I don't remember • I prefer not to answer 	Descriptive statistics
To assess whether there was an association with when respondents first heard the term <i>exclusive pumping</i>	Q102. When did you first hear the term <i>exclusive pumping</i> ?	See above.	Chi-square test of independence conducted on contingency table (heard before birth/heard after birth × education/no education)
To assess whether there was an association with parity	Q14. How many children have you given birth to?	See above.	Chi-square test of independence conducted on contingency table (primiparous/multiparous × education/no education)
To determine the sources of prenatal breastfeeding education	(If "yes" to Q104): Q105. Who provided the breastfeeding education you received before the birth of your child/children?	Multiple choice, multiple answers: <ul style="list-style-type: none"> • I did my own research/reading • Doctor (one-on-one) • Nurse (one-on-one) • Midwife (one-on-one) • Lactation consultant (one-on-one) • Doula (one-on-one) • Friend or family member • Childbirth/parenting class that included breastfeeding information. The class was run by: [text box] • Class specifically about breastfeeding. The class was run by: [text box] • Other (please explain): [text box] 	Descriptive statistics
To determine the sources of information when respondents conducted their own research/reading	(If "I did my own research/reading" selected in Q105): Q106. You indicated that you did your own research/reading about breastfeeding before the birth of your child/children. What sources of information did you use?	Multiple choice, multiple answers: <ul style="list-style-type: none"> • Books • Newspapers • Radio • Magazines • Leaflets/pamphlets • Journal articles • Television • Web sites (static). If you remember where, please tell me here: [text box] • Online forum (e.g., Facebook group, chat room). If you remember where, please tell me here: [text box] • Doctor • Nurse • Midwife • Lactation consultant • Doula • Friend/family member • Other (please explain): [text box] • I don't remember • I prefer not to answer 	Descriptive statistics

(continued)

Table 2. (continued)

Research aim and purpose	Question	Available responses	Analysis conducted
3. Explore the ways in which respondents learned prenatally about exclusive pumping. 4. Describe how useful respondents found various information sources when learning about exclusive pumping.	Q107. You indicated that you received breastfeeding education from the following sources before the birth of your child/children. Please indicate which sources mentioned and/or explained exclusive pumping and rate the usefulness of the information from each source.	Side-by-side matrix table (respondent's choices from Q105 automatically populated the table). For each source that respondent selected in Q105, choices were: <ul style="list-style-type: none"> • <i>Exclusive pumping was . . .</i> <ul style="list-style-type: none"> ○ <i>Mentioned</i> ○ <i>Explained</i> • <i>If exclusive pumping was mentioned or explained, how useful was the information?</i> <ul style="list-style-type: none"> ○ <i>Very useful</i> ○ <i>Somewhat useful</i> ○ <i>Neutral</i> ○ <i>Somewhat not useful</i> ○ <i>Not at all useful</i> ○ <i>I don't remember</i> 	Descriptive statistics
5. Describe the differences between the perceptions of respondents who first heard the term <i>exclusive pumping</i> prenatally and those who first heard it postpartum.	Q112. When you first started to exclusively pump, how knowledgeable did you feel about how to exclusively pump? Please slide the indicator along the bars. (0 = <i>no knowledge at all</i> ; 100 = <i>expert</i>)	Graphic interval rating: Respondents could move a slider from 0 to 100.	Descriptive statistics
To assess whether there was an association between knowledge and when respondents first heard the term <i>exclusive pumping</i>	Q102. When did you first hear the term <i>exclusive pumping</i> ?	See above.	Mann-Whitney <i>U</i> test conducted to compare respondents who heard before birth with those who heard after birth
To assess whether there was an association between knowledge and parity	Q14. How many children have you given birth to?	See above.	Mann-Whitney <i>U</i> test conducted to compare primiparous and multiparous respondents
To assess whether there was an association between emotions and when respondents first heard the term <i>exclusive pumping</i>	Q136. Below is a list of feelings and emotions. Select all those that you have ever felt about exclusive pumping.	Multiple choice, multiple answers selected from (order of words randomized per respondent): <i>Angry, depressed, disappointed, burdened, pissed off, miserable, grieving, scared, ashamed, apathetic, rejected, insecure, apologetic, detached, resentful, vulnerable, embarrassed, lonely, envious, challenged, guilty, happy, loving, controlled, defiant, hopeful, caring, grateful, capable, confused, devoted, powerless, focused, indecisive, intimate, restricted, productive, discouraged, uncaring, anxious, strong, hurt, adequate, humble, uncertain, abandoned, lazy, regretful, frustrated, belittled, unmotivated, worthless, sad, cheated, inadequate, bitter.</i>	Chi-square test of independence conducted on contingency tables (heard before birth/heard after birth × felt [emotion]/did not feel [emotion])
To assess whether there was an association between emotions and parity	Q136. Below is a list of feelings and emotions. Select all those that you have ever felt about exclusive pumping.	See above.	Chi-square test of independence conducted on contingency tables (primiparous/multiparous × felt [emotion]/did not feel [emotion])
To assess whether there was an association between postpartum depression or postpartum anxiety and when respondents first heard the term <i>exclusive pumping</i>	Q162. Did or do you suffer from postpartum depression and/or postpartum anxiety?	Multiple choice, single answer: <ul style="list-style-type: none"> • <i>Yes, currently</i> • <i>Yes, previously</i> • <i>I'm not sure</i> • <i>No</i> • <i>I prefer not to answer</i> 	Chi-square test of independence conducted on contingency tables (heard before birth/heard after birth × postpartum depression or postpartum anxiety/no postpartum depression or postpartum anxiety)

Table 3. Information Sources Used by Respondents Conducting Their Own Research/Reading (n = 442)

Information source	n (%)
Web site (static)	347 (78.5)
Book	254 (57.5)
Online forum	189 (42.8)
Friend/family member	136 (30.8)
Leaflet/pamphlet	96 (21.7)
Journal article	71 (16.1)
Lactation care provider	57 (12.9)
Doctor	40 (9.0)
Magazine	39 (8.8)
Midwife	37 (8.4)
Nurse	26 (5.9)
Doula	15 (3.4)
Other ^a	13 (2.9)

^aLearned as part of health care training (nurse, dietitian): 8 (1.8%); La Leche League: 2 (0.5%); Google: 1 (0.2%); Podcasts: 1 (0.2%); attended Special Supplemental Nutrition Program for Women, Infants, and Children appointment with friend: 1 (0.2%).

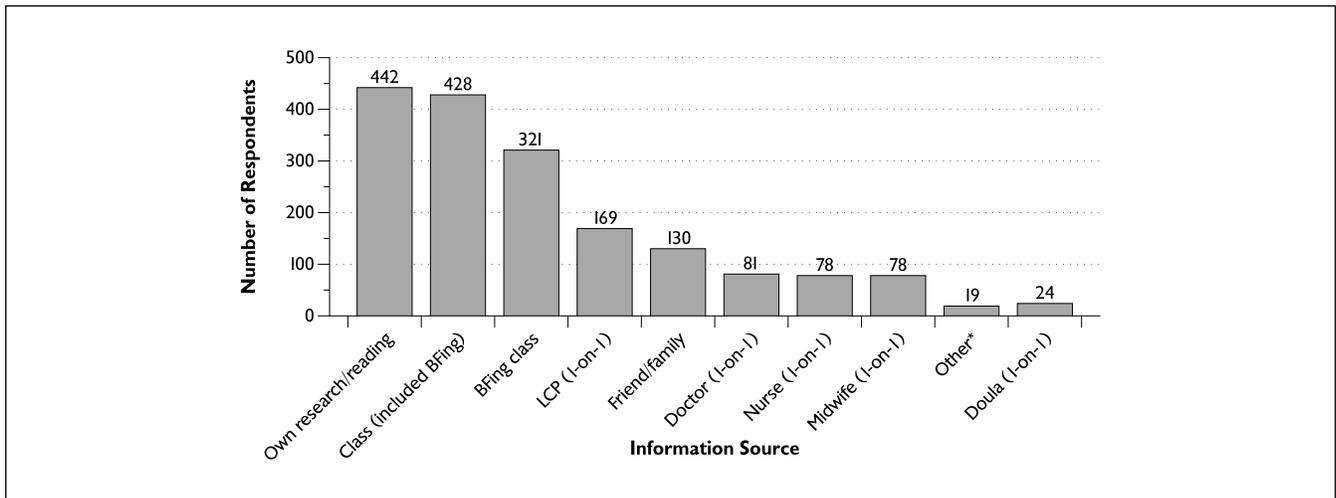


Figure 1. Sources of prenatal breastfeeding and whether exclusive pumping was mentioned or explained (n = 765). *Other: occupational training (nurse, doula, medical doctor, etc.): 10; online training course (provided by UnitedHealthcare, Kaiser, or Medela): 3; La Leche League: 2; Special Supplemental Nutrition Program for Women, Infants, and Children: 2; delivery hospital: 2. BFing = breastfeeding; LCP = lactation care provider.

respondents’ own research/reading or a friend/family member; few classes mentioned or explained EPing.

Research Aim 4: Usefulness of Information Sources When Learning about EPing

When EPing was mentioned or explained, personal interactions were more useful than classes (see Figure 2). Respondents found the most useful sources of prenatal EPing information to be their own research/reading and friends/family members; EPing information from prenatal classes was the least useful.

Research Aim 5: Differences in the Perceptions of Respondents Who First Heard the Term Exclusive Pumping Prenatally versus Postpartum

Respondents rated their level of knowledge about a series of topics when they first started EPing on a scale from 0 (*no knowledge at all*) to 100 (*expert*). Regarding their knowledge about how to EP (vs. pumping to supplement nursing), respondents’ mean score was 32.98 (SD = 31.21; missing responses = 124, 10%). There was a significant effect for when respondents first heard the term *exclusive pumping*: Those who had heard it prenatally (n = 820, 67%) rated their

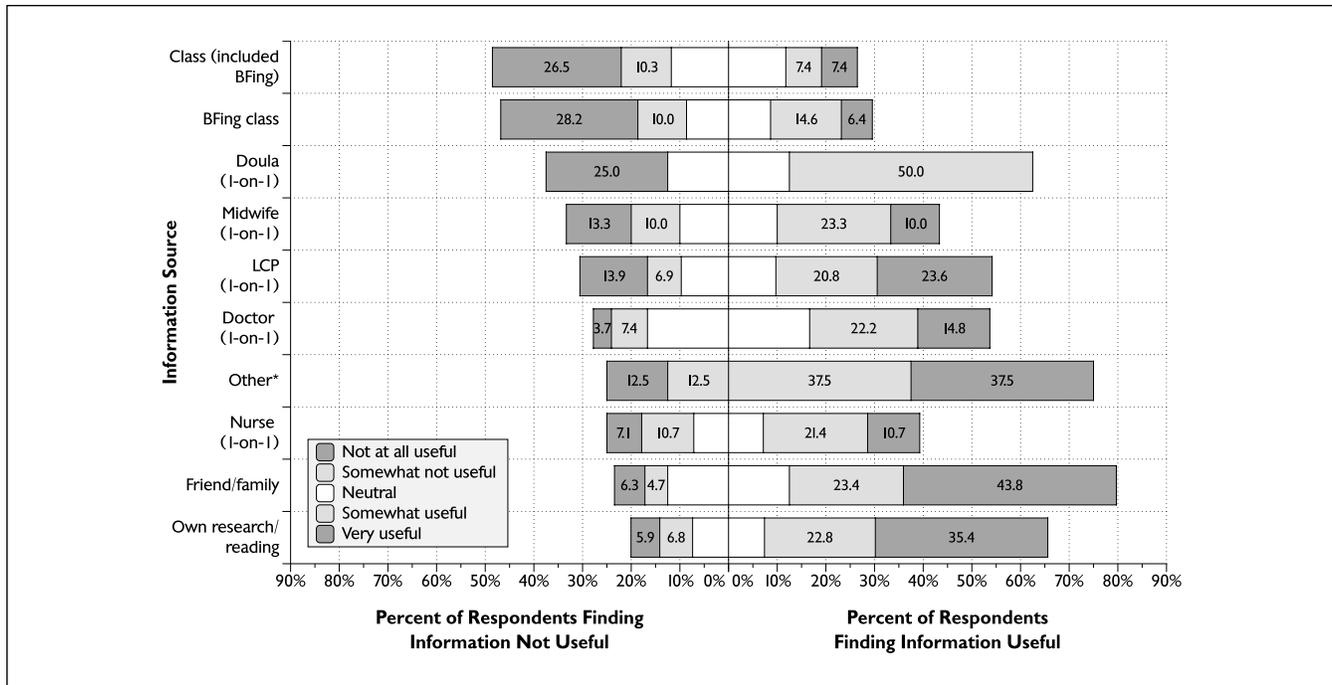


Figure 2. Usefulness of information about exclusive pumping from various types of sources. *Other: occupational training (nurse, doula, medical doctor, etc.); online training course (provided by UnitedHealthcare, Kaiser, or Medela); La Leche League; Special Supplemental Nutrition Program for Women, Infants, and Children; and delivery hospital. BFing = breastfeeding; LCP = lactation care provider.

knowledge almost 20 points higher ($M = 46.85$, $SD = 32.52$) than those who had heard the term postpartum ($M = 28.25$, $SD = 29.23$; $n = 274$, 23%; $U = 8.436$, $p = .0001$). Multiparous respondents ($n = 302$, 25%) felt significantly more knowledgeable ($M = 38.34$, $SD = 33.80$) than did primiparous respondents ($M = 30.76$, $SD = 29.83$; $n = 789$, 65%; $U = 2.82$, $p = .005$).

Figure 3 depicts a weighted word cloud (the bigger the word, the greater number of respondents who selected it; DePaolo & Wilkinson, 2014) representing which emotions were selected more or less frequently (missing responses = 59). Respondents who had first heard the term *exclusive pumping* postpartum were significantly more likely to feel frustrated ($\chi^2 = 10.78$, $p = .001$), insecure ($\chi^2 = 6.42$, $p = .011$), depressed ($\chi^2 = 6.01$, $p = .014$), rejected ($\chi^2 = 5.61$, $p = .018$), embarrassed ($\chi^2 = 5.55$, $p = .018$), envious ($\chi^2 = 4.31$, $p = .038$), burdened ($\chi^2 = 4.26$, $p = .039$), guilty ($\chi^2 = 4.11$, $p = .043$), and disappointed ($\chi^2 = 3.87$, $p = .049$) (all tests $df = 1$, $n = 1,156$). Of those who first heard the term postpartum, primiparous respondents were significantly more likely to feel discouraged ($\chi^2 = 6.48$, $p = .011$) and burdened ($\chi^2 = 6.29$, $p = .012$) than were multiparous respondents (both tests $df = 1$, $n = 1,079$). There were no emotions selected significantly more frequently by those who had first heard the term *exclusive pumping* prenatally and no significant association between when respondents first heard the term *exclusive pumping* and self-reports of postpartum depression or postpartum anxiety.



Figure 3. Word cloud of emotions felt by respondents toward exclusive pumping.

Discussion

These findings afford us an opportunity to learn about the prenatal information behaviors of EPer and provide a basis for future work studying this population. The fact that the majority of respondents heard the term *exclusive pumping* only postpartum, even if they had received prenatal education, is unsurprising given that prenatal education classes were not likely to mention or explain EPing, therefore proving inadequate and thus reinforcing the feeling of unpreparedness if nursing failed to go as planned (Fox et al., 2015). Respondents who had heard the term prenatally felt significantly more knowledgeable about how to EP, thus

demonstrating positive cognitive outcomes (Lambert & Loiselle, 2007). Furthermore, significantly fewer respondents from this group reported feeling certain negative emotions about EPing—a more positive affective outcome (Lambert & Loiselle, 2007).

Although the cause of this increased perception of knowledge and fewer reports of these emotions is impossible to determine from these data, they suggest that knowing about EPing prevents it from being seen as a last resort and, rather, presents it as a potential and viable breastfeeding option. However, learning about EPing could be a challenge when very few prenatal breastfeeding classes mentioned EPing and even fewer explained it, demonstrating the nursing-focused curriculum and promotion of a potentially unrealistic and difficult outcome for many mothers (Brown, 2016).

Reflecting previous findings, the use of the Internet and social networks/online forums as a primary method of research is not surprising, especially because of this sample's high level of education and rate of employment. That the sample was predominantly recruited online is an additional explanation for this result. Although the Internet was a popular source, respondents' own research/reading and friends/family members were deemed the most useful sources of EPing information, mirroring findings in prior studies on breastfeeding information more generally (Kamali et al., 2018; McDougall & Ecclestone, 2015). Conversely, respondents found EPing information in prenatal classes "not useful," which calls into question the instructors' knowledge and information they provided about EPing.

The few areas in which there was a significant difference between primiparous and multiparous respondents could be reflected by a general increase in knowledge between births. However, with respect to when respondents first heard the term *exclusive pumping*, the wording of the answers was unintentionally ambiguous ("before I was pregnant," "while I was pregnant," and "after I gave birth"); it is therefore impossible to know which child multiparous respondents used as their reference.

The lived experiences of EPer is an area ripe for further study. In my own work, analysis of the remainder of the initial survey is ongoing and continues to produce interesting and novel findings. In addition, follow-up surveys have been sent out every 2 months to respondents who are still EPing (plus one survey after they cease to EP) in order to gather longitudinal data, which is still ongoing. In general, there is clearly a need for prenatal education that is more inclusive of EPing; effective ways to educate the educators and for them to communicate EPing information need to be investigated.

We can conclude from this study that knowledge and emotional outcomes may be improved when EPing information is included in prenatal education; therefore, lactation care providers should include this topic in their practice. The initial survey from the parent study asked what information

EPer needed when they first started to EP: Preliminary analysis shows that the most important information was how often to pump, how long each pumping session should be, and how to maintain supply. Further data analysis will provide substantive suggestions as to what to prioritize when providing EPing information within prenatal education.

Limitations

The convenience sampling methods used in this study resulted in a biased sample—respondents were overwhelmingly married, White, and living in the United States, with higher-than-average household incomes and education levels. Additionally, the question "Did you receive breastfeeding education before the birth of your child/children?" was poorly worded: Respondents may not have considered their own research/reading to be education. As described above, answers to the question "When did you first hear the term *exclusive pumping*?" were also ambiguous.

My own bias also may have affected the results. As there are no existing studies on the information behavior of EPer, I drew heavily on my own personal EPing experience, perhaps causing researcher bias. Nevertheless, I aimed to be neutral and comprehensive in designing the survey, along with neutral and systematic when analyzing the data.

Conclusion

Evidence has been provided about the need for EPing information to be included in prenatal education. As EPing grows in popularity, it is the responsibility of lactation educators to provide accurate and useful information to expectant parents on this topic. This study has begun to uncover what information EPer consider accurate and useful and when and how they prefer this information to be made available to them.

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Supplementary Material

Supplementary Material may be found in the "Supplemental material" tab in the online version of this article.

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