

BEYOND BREASTFEEDING
BREASTFEEDING THROUGH EXCLUSIVE MILK EXPRESSION

by

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A dissertation submitted to the Faculty of the University of Delaware in
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DEFINITIONS OF TERMINOLOGY

- Direct breastfeeding: Refers to breastfeeding directly at the breast, also called “nursing”.
- Exclusive human milk feeding: only feeding human milk, no other foods or liquids including formula or water (World Health Organization [WHO], n.d.).
- Expression: Refers to removal of human milk from mammary glands by manual or electric methods. Is a more preferable term than “pumping” (Rasmussen et al., 2017) which does not include hand expression or expression that also includes hand techniques. Electric expression removes milk by creating, maintaining and releasing negative pressure (Biancuzzo, 1999).
- Exclusive expression: An infant receives human milk as expressed milk for all human milk feeds (Bai et al., 2016).
- Flange: The part of a breast pump that sits against breast tissue, often in a conical shape and made of plastic material.
- Human milk: refers to breast milk but is preferred as non-gendered language (Dinour, 2019) and more specifically used in the lactation research community (Rasmussen et al., 2017). Human milk and milk are used interchangeably here.
- Human milk feeding: Direct breastfeeding or feeding expressed milk

- Infant Feeding Practices Survey (IFPS): A nationwide survey administered by the Centers for Disease Control and Prevention. The second wave (IFPS II) data were collected from 2005 to 2007 and wave three is currently underway (Centers for Disease Control and Prevention, n.d.).
- Infant formula: a substitute for human milk to be fed solely to infants (United States Food and Drug Administration, n.d.).
- Interpretative phenomenological analysis (IPA): A specific form of phenomenological methodology.

ABSTRACT

While many women practice exclusive milk expression, feeding their infants only milk that has been expressed, there is little research on this phenomenon.

This interpretative phenomenological study involved interviews with 12 mothers that were practicing exclusive milk expression. Interviews were also followed up with photovoice prompts leading to multiple forms of data for analysis including interview transcripts, photographs, and narrative responses.

A major theme in the current study was exclusive expression as a valid and alternative feeding option that while difficult and stressful, provided a sense of accomplishment, and a new appreciation for their body. Participants were motivated to initiate or continue with exclusive expression for a variety of reasons and some participants found meaning in donating their milk.

Participants described a mix of positive and negative emotions including a common emotional experience of being proud. Another major theme was the exclusive pumping journey involving changes to pumping plans, goals, and concerns about milk supply. The third major theme was exclusive expression as a significant part of daily life. Mothers described the importance of support in healthcare and family and the sense of becoming support or advocate for

others. Social media was a common source for pumping information and participants reported using multiple pumps, desiring many different pump features, and experiencing the mental load of pumping, including the demanding schedule that exclusive pumping requires.

Chapter

INTRODUCTION

Introduction

There are benefits associated with feeding human milk and many expecting parents desire to feed human milk. Expression is a mode of infant feeding that allows for the benefits of human milk if breastfeeding is not an option. This study aims to provide an understanding of the experiences of exclusive milk expression.

Infant feeding today is different than in the past. Exclusive expression is a widely practiced feeding method with little research to provide understanding of maternal experiences. This study involved an Interpretative Phenomenological Analysis (IPA) of exclusive expression. For this study 12 mothers were interviewed between May and July 2023 and they also provided data in the form of images and narratives following interviews.

Context

The Benefits of Human Milk

Infant nutrition is a public health issue (American Academy of Pediatric [AAP], 2012). While infant feeding research frequently mentions health benefits of feeding human milk, the specific benefits are not always

described, but important for researchers and the general public to understand and know.

Research on infant, adolescent, and adult health outcomes have revealed significantly reduced risk for illness in infants that are fed human milk. It is important to note that these findings tend to find a dose response, with longer human milk feeding associated with a larger decrease in risk (Evenhouse & Reilly, 2005). This suggests while initiation of human milk feeding is important, so is duration.

In infancy and in the relative short term, human milk feeding is associated with a decreased risk of respiratory illnesses and otitis media (ear infections; AAP, 2012). Human milk feeding is also associated with a decreased risk of gastrointestinal tract infections and necrotizing enterocolitis (AAP, 2012), a condition of inflamed and dying intestinal tissue (Cleveland Clinic, n.d.). Meta-analyses also show that human milk feeding is associated with a decreased risk of Sudden Infant Death Syndrome (AAP, 2012). Human milk feeding is also associated with a reduced risk of allergic diseases such as asthma, atopic dermatitis, and eczema (AAP, 2012).

Long term, human milk feeding is associated with lower obesity rates in adolescence and adulthood (AAP, 2012). Diabetes risk is also reduced for infants that are fed human milk, with up to a 30% reduced risk of type I diabetes for infants fed human milk at least three months (AAP, 2012). Risk of

childhood leukemia and lymphomas are reduced in children that are fed human milk (AAP, 2012).

Maternal health outcomes are also linked to human milk feeding. Human milk feeding has been associated with a reduced risk of postpartum blood loss, postpartum depression, and ovarian cancer (AAP, 2012).

When compared to infant formula, human milk is a dynamic fluid, changing to meet the needs of an infant. For example, the milk of mothers with sons has been found to be 25% higher in energy density than the milk of mothers with daughters (Khelouf et al., 2023). Milk composition can vary change across time and differs between colostrum, transitional milk, and mature milk (Khelouf et al., 2023). Milk decreases in protein and galactose (milk sugar) in the first 6 months of human milk feeding (Grote et al., 2016). Milk also interacts uniquely with other physiological processes. As an example, human milk and infant saliva together produces hydrogen peroxide, which can inhibit growth of salmonella and staphylococcus (Al-Shehri et al., 2015).

While human milk feeding is the recommended infant feeding option, there are individual circumstances when human milk feeding is not desired, may not be possible, or may not be medically advisable. For example, some over the counter and prescription medications are contraindicated for human milk feeding (Cadwell & Turner-Maffei, 2022). Despite individual

circumstances where breastfeeding is not advised, human milk is recommended broadly as optimal for infant feeding. There is consensus that human milk feeding is the optimal nutrition for infants. It is recommended that infants are fed human milk exclusively (i.e. no other foods or substances, including baby food) for the first six months of life, and then continued in the first year and beyond as complementary foods (solid foods) are introduced (AAP, 2012; World Health Organization [WHO], 2009).

Expression as a Form of Infant Feeding

WHO has a hierarchy of infant feeding options (WHO, 2009). In this hierarchy, direct breastfeeding is the top option, followed by a mother's expressed milk (WHO, 2009). In line with this public health information, the American Academy of Pediatrics [AAP] endorses human milk expression nationally as a practice equal to feeding directly at the breast (AAP, 2012).

Human milk feeding prevalence rates are often short of public health goals in the U.S. While human milk feeding is initiated for most infants, 84.1% of infants born in 2017 were initially fed human milk, only half of infants are given any human milk at six months (Centers for Disease Control and Prevention, 2020). Therefore, the focus is on exclusivity (only human milk) and duration (Kramer & Kakuma, 2009). Infant feeding today takes a complex form (Karmaus et al., 2017). Nine trajectories of infant feeding have been outlined, highlighting how infant feeding often involves combinations. For

example, some mothers feed directly at the breast and also feed expressed milk while separated from an infant such as during employment or social events. As another example, some mothers that express milk accumulate a cache of frozen milk and these mothers can feed expressed milk when not actively expressing or when weaning has occurred. In a small study of exclusively expressing mothers, 25% of mothers fed their babies human milk beyond the time they were actively expressing (Geraghty, Sucharew, & Rasmussen, 2012).

Infant feeding practices have changed over time. Direct breastfeeding and the use of wet nurses as a predominant infant feeding method gave way to widespread use of infant formulas in the 19th and 20th century (Apple, 1987; Weaver, 2021). Direct breastfeeding decreased into the mid-20th century and steadily increased starting in the 1970s (Wright, 2001).

Human milk expression is not a recent phenomenon. Breast “sucking horns” and other devices for removing milk from the breast have been found dating back to antiquity and probably existed even earlier, although as fragile women’s objects they did not survive (Fildes, 1986). In the 16th and 17th centuries, breast sucking glasses allowed mothers to express their own milk by using mouth suction (Fildes, 1986). Expression today can occur through three options: hand expression, manual expression and electric pumps (Becker et al., 2016). Hand expression involves using the hands to massage and compress to collect milk (Cadwell & Turner-Maffei, 2022). Milk expression can also be

done with a manual pump, where the hand powers the mechanism to create negative pressure to remove milk (Becker et al., 2016). Electric powered pumps use electricity or other power source such as battery to remove milk (Becker et al., 2016). Some electric pumps need to be plugged into an electrical outlet, although newer pumps are wirelessly powered through rechargeable batteries (Hartshorn & Silver, 2021). Electric pumps are the predominant style of pump that is used (Labiner-Wolfe et al., 2008) and they usually allow for double-pumping, expressing both breasts at the same time, although this double-expression is not always utilized for pumping (Clemons & Amir, 2010) even though it an optimal practice (Cadwell & Turner-Maffei, 2022).

Knowledge and Technology Gaps

Peter Hartmann has said the “breast is the only organ without a medical specialty” (Williams, 2012, p. 174). In addition to a lack of medical discourse about the breast as an organ generally, there are significant gaps in the literature specifically on human milk. In the National Library of Medicine, there are more articles about wine, tomatoes, and coffee than on human milk (Hinde, 2016). Many health topics garner more research than human milk. As an example, there are double the number of articles about erectile dysfunction than human milk (Hinde, 2016). In the Human Microbiome Project, human milk was overlooked for study until recently (Williams, 2012). Lactation and

breastfeeding are “some of the least researched aspects of human functions” (Allers, 2017, p. 113).

More specifically, there is a gap in the literature for milk expression. While research questions have explored exclusive milk expression, frequently these questions are within literature on direct breastfeeding more broadly. In the Infant Feeding Practices Survey (IFPS), a national survey of infant feeding administered by the Centers for Disease Control and Prevention (CDC), only a few questions ask about milk expression (CDC, n.d; Karmaus et al., 2017). In a 2013 review of exclusive expression research, only 22 papers were identified covering milk expression for healthy term infants (Johns et al., 2013). Only seven of these papers discuss the prevalence and outcomes of milk expression. Although some more recent research has explored exclusive expression, this research is scant in comparison to other infant feeding research. Felice et al. (2017a, 2017b) conducted semi-structured with mothers exclusively expressing milk, although the focus of this research was on feeding practices such as storage and preparation and also mothers’ perceptions and attitudes about expressing. This research was the first qualitative investigation focusing on expression of milk. Despite this novel research, there are still literature gaps for knowledge about milk expression. Scholars have called for more qualitative research on infant feeding and mother’s lives generally (D’Ignazio et al., 2016).

Research suggests 5-6% of mothers that feed human milk exclusively express and feed (Johns et al., 2013; Shealy et al., 2008). Unfortunately, the literature on this topic has not caught up with the practices that mothers are performing. To highlight this disconnect, many mothers report expressing milk in places that compromise the safety of themselves (e.g. while driving) or the safety of the milk (e.g. in bathrooms; Rasmussen & Geraghty, 2011). While public health organizations promote guidelines for the safety of milk expression (The Academy of Breastfeeding Medicine Protocol Committee, 2010; WHO, 2009), the existing literature suggests mothers express their milk outside these recommendations. Many mothers use this form of infant feeding either as a sole method or in conjunction with other feeding methods. It is unclear the experiences of this process, the outcomes for mothers and infants, and how this feeding method aligns with breastfeeding goal achievement. Many scholars have identified this as an area needing more research and exploration (Felice & Rasmussen, 2015). Expanding and increasing research and knowledge about milk expression can guide policy implementation and the broader discourse on motherhood and childcare in the United States.

In addition to knowledge gaps, there is also a gap in technology for expression. Most pumps today are not much different from the pumps designed in the 1920's (Cohen, 2021). While some groups have tried to improve pump technology like the Massachusetts Institute of Technology (MIT) "Make the Breast Pump not Suck Hackathon" started in 2014 (Massachusetts Institute of

Technology, n.d.), pump technology is constrained by Food and Drug Administration (FDA) regulations (Cohen, 2021). These FDA regulations to patent a medical device require that devices for a new patent are similar to already existing technologies (Cohen, 2021). While in place to protect consumers, this regulation creates barriers for new technologies in expression that are drastically different from any devices already on the market (Cohen, 2021).

Expression Prevalence

There are various pathways to feeding human milk, and one pathway is exclusive pumping (Whipps et al., 2022). Of mothers that breastfeed in the U.S., 5-6% exclusively express their milk to feed (Johns et al., 2013; Shealy et al., 2008). Today, estimates suggest 1.8 million women in the U.S. are pumping (Cohen, 2021) either exclusively or for some feeds. Expressed milk is increasing in rates as a feeding method (Binns et al., 2006; Hornbeak et al., 2010). Research on milk expression often mentions that the practice is increasing, although little research has tracked prevalence rates over time to provide enough support for this declaration. Even for mothers that do feed directly at the breast, usually called nursing, a majority of these mothers also express milk (Clemons & Amir, 2010; Geraghty et al., 2005) at least some of the time. Many scholars have proposed that milk expression is a normative practice for feeding human milk today (Labiner-Wolfe et al., 2008) meaning

that people's ideas for what breastfeeding involves typically includes expression.

It is unclear how milk expression fits with long term feeding goals. Some research finds an association with expression and achievement of feeding goals and other research finds an association with expression and early cessation of human milk feeding (Johns et al., 2013). Much of the literature on expression highlights the need to research relationships between expression as a feeding method and achievement of human milk feeding goals.

Purpose

Research indicates that human milk expression is increasing as an infant feeding method (WHO, 2009; AAP, 2012) yet the mechanisms and experiences of this trend are not known. Additionally, public health organizations recommend expression as a preferred infant feeding method over infant formula, although the experiences of mothers using this infant feeding method are not understood. With 1.8 million mothers exclusively expressing in the United States (Cohen, 2021), expression remains understudied but widely practiced. The approach of the current study extends current knowledge of human milk feeding to a new area of focus, human milk expression.

Research Questions

This study was guided by three research questions to explore the lived experiences of mothers who exclusively express their milk as an infant feeding method. It is anticipated that a better understanding of these experiences can inform knowledge of this emerging feeding method and enable better support for mothers and families. This study is important because it examined a widely practiced but little-studied infant feeding method. The following research questions were addressed:

1. What are the experiences of mothers that exclusively express their milk and what meaning do these experiences have?
2. What reasons do mothers report for the decision and sustained practice of exclusive milk expression as an infant feeding method?
3. What meaning do mothers attribute to exclusive expression in terms of the duration that this infant feeding was practiced?

Research Approach

This study involved two phases including qualitative interviews followed by photovoice follow up. Phase I involved recruitment of participants using a recruitment flyer (Appendix A) in Facebook groups (Appendix B) and used an eligibility screening survey (Appendix C). In Phase I, eligible participants were identified and semi-structured interviews were conducted with twelve mothers after obtaining informed consent (Appendix D) and were

conducted using a semi-structured interview protocol (Appendix E) and demographic questionnaire (Appendix F). Participants in the interview phase were expressing milk as the exclusive infant feeding method used. Phase II involved photovoice data collection with a prompt (Appendix G). Photographs were screened with a tool (Appendix H). Institutional Review Board (IRB) approval from the University of Delaware IRB for human subjects research was obtained prior to the start of the study (Appendix I; Appendix J).

Because interviews provide deeper insights, a phenomenological methodology was well suited to explore the specific topic of exclusive expression. Interpretative phenomenological analysis (IPA) was well suited as the specific methodology to explore the experiences of mothers who exclusively express milk to feed their infants. The phenomenon of exclusive expression was explored to provide a thick description and interpretation of the eidetic reduction or essence of the phenomenon (Smith et al., 2009). This understanding of exclusive expression illuminates the experiences and adds a richer knowledge of this infant feeding method to the literature. Photovoice has been identified as a method to enrich phenomenological inquiry (Plunkett et al., 2012) and was utilized in the study to provide follow up narratives and images after interviews.

Anticipated Outcomes

It was expected that the findings from this study would be unique to the topic of exclusive milk expression. While there may be overlaps with previous literature on infant feeding, such as direct breastfeeding, I hypothesized exclusive expression to be altogether unique in essence. I also hypothesized findings to illuminate positive and negative aspects to these experiences based on previous research on similar topics (Bigalky et al., 2021; D'Ignazio et al., 2016; Felice et al., 2017a). I also hypothesized findings to emphasize the aspects of identity that mothers associated with their infant feeding, as infant feeding and identity are often intricately tied (Bucher & Spatz, 2019; Jackson et al., 2022; Rydström et al., 2021).

Researcher Assumptions

Four primary assumptions are identified for this study. First, mothers make decisions about their infants with the infant's best interest as a priority. This assumption is based on the premise that mothers often report their choice of infant feeding is based on infant health. When it comes to infant feeding, mothers in the U.S. are aware human milk is preferred over infant formula. Second, while mothers have their own intentions for infant feeding, these are negotiated or constrained by social influences, many outside a mother's control. This assumption is based on ecological theories that emphasize the various systems of influence on people's lives. Third, the transition to

parenthood, and more specifically the transition to motherhood, is an important and defining time for women in their lives and is a source of identity reformation and exploration. This assumption is based on the premise that having a child changes the dynamic of a family and adds a new identity for a mother. Finally, maternal identity is intricately tied to infant feeding in the U.S. This assumption is based on the notion that of all childrearing activities (e.g. diapering, education), infant feeding is socialized in connection to what it means to be a “good” or “bad” mother.

Research Design Overview

Rationale and Significance

Knowledge of milk expression can guide broader social and health goals to improve the lives of mothers, infants and families. The U.S. Department of Health and Human Services Healthy People has identified key measures of feeding with objectives of increasing human milk feeding rates. These include initiation of direct breastfeeding, exclusive human milk feeding until 6 months, and continued human milk feeding to a year (Healthy People, n.d.). Human milk feeding has positive health outcomes and a dose response, with longer human milk feeding associated with stronger positive outcomes (Evenhouse & Reilly, 2005). Babies fed human milk experience fewer childhood illnesses and grow to be adults with reduced risk of disease (AAP, 2012).

The World Health Organization has outlined expressed human milk as a more optimal infant feeding option than formula (WHO, 2009). Expression can be a viable option for infant feeding for mothers that do not or cannot feed directly at the breast. The current research has outlined the experiences and practices of this infant feeding method and it is possible that this becomes a more well-known and practiced feeding method in the future. Expression as a feeding method could be a benefit to mothers and infants if increased milk expression leads to decreased formula use.

Brown (2017) outlined five needs to address social barriers to feeding human milk: the need for health services, health promotion, support for maternal legal rights, support of maternal wellbeing, and reducing the influence of the formula industry. Initiatives like these can also be implemented to protect and support milk expression as an infant feeding option. Cohen (2021) has argued “the right to express milk should be an expansion of, not a substitute for, robust lactation rights” (p. 73) because people need more possibilities to feed their babies, not fewer. Other research has used a bioecological approach to frame the various systems of influence on infant feeding decisions (Bianca, 2023; Stolzer, 2005), in essence highlighting the barriers from various systems that impact infant feeding decisions, often beyond a mother or family.

Research on milk expression can inform broad knowledge about infant care and child rearing in the United States. Many scholars have argued that infant care is framed as an individual problem for mothers or families to solve (Barston, 2012; Lucas & McCarter-Spaulding, 2012) or that “choice” creates the illusion that social structures do not need to support mothers and families. The false narrative of choice has been argued for infant related care broadly. More specifically, “choice” discourse makes feeding human milk a class-based privilege, only available to those with the means to overcome lacking societal support structures (Hausman, 2008; Taylor & Wallace, 2012). As an emerging and growing topic of research, further exploration of milk expression can lead to changes in policy and general discourse of infant feeding, leading to healthier babies, mothers and families.

There have been calls for infant feeding research that examine mothers within their own social contexts, especially using qualitative methods (Spencer, 2008) and for research on human milk feeding to take a broader approach that considers complex social situations (Azad et al., 2021). Exploring infant feeding within social contexts can provide a fuller picture of the choices or lack of choices in infant feeding. Additionally, scholars have called for more qualitative research to explore the reasons mothers have for expressing (Rasmussen & Geraghty, 2011).

Researcher Perspectives

Acknowledging the researcher roles is an important process in qualitative research, as is reflexivity (Creswell & Creswell, 2018). I share the perspective of the participants in this study, with my identity as a mother. Additionally, I have personal experience feeding human milk, specifically exclusively expressing for various lengths of time to feed my two children when they were infants. I also have outsider roles, one being a practice-based perspective of a certified lactation counselor. This training has provided me with the most up-to-date and evidence-based knowledge in the field of lactation, and while I do not practice clinical work with mothers, this perspective is ever-present. These professional and personal experiences have made me an advocate for mothers and families.

Summary

Expression is an important area for research, so there is a deeper understanding of practices that are already occurring in this form of infant feeding. An approach that explores the lived experience of this infant feeding method can examine questions related to experience, reasons for selecting this method, and goals mothers had for their infant feeding. Understanding the previous literature on these topics can indicate themes in the research and also areas where there are gaps in knowledge or issues that have not been sufficiently addressed. The previous literature can be divided into three main

topics, which are also the three main research questions of the current study. One main theme of the literature is the focus on experiences, which can be divided into negative and positive experiences with further divisions into physical, psychological, social and emotional domains. Another main theme in the literature is a focus on the reasons for expression, organized as elective or non-elective. Finally, a third theme in the literature is a focus on goals mothers have for their own infant feeding, which change over time.

Chapter

LITERATURE REVIEW

Overview

Human milk expression is increasing as an infant feeding method (WHO, 2009; AAP, 2012) yet maternal experiences of this trend are not known. Public health organizations recommend expression as a preferred infant feeding method over infant formula, although the experiences of mothers using this infant feeding method are not understood. Approximately 1.8 million mothers are exclusively expressing in the United States calculated using the current number of pumping mothers using research on percentages of breastfeeding mothers, percentages of those using pumps and labor and statistics numbers on mothers with infants under one year (D'Ignazio et al., 2016). Despite high estimates of being used as a feeding method expression remains understudied. The approach of the current study extends current knowledge of human milk feeding to a new area of focus, human milk expression.

The purpose of this phenomenological study was to explore the lived experiences of exclusive expression. It focused specifically on mothers' experiences with exclusive expression. To carry out this study, it was necessary to complete a comprehensive review of the literature on the topic of exclusive human milk expression. This review of literature was ongoing throughout the data collection, analysis, and interpretation of the study.

In a systematic review of qualitative research on human milk expression for healthy term infants, only twelve studies have been identified, and only five come from the U.S (Anders, 2021; Felice et al., 2017a, 2017b; Flaherman et al., 2014; O’Sullivan et al., 2016). An additional study, Anders et al. (2023), was published immediately before data collection for the present study. Because of the limits of the existing literature, this integrative literature review (Cooper, 1989) comes from more general human milk feeding research including direct breastfeeding, although it focused on research specific to milk expression and exclusive milk expression. Additionally, the literature reviewed comes from the past 20 years.

This review explores three major bodies of literature on human milk feeding and exclusive expression. Figure 1 provides a concept map of the literature review. One major body of literature addresses experiences with expression which provides an understanding of the body of knowledge concerning maternal experience. This body of literature is divided into two main research areas: negative and positive experiences. This review further divided into physical experiences, emotional experiences, social experiences, and psychological experiences. The second body of literature reviewed is maternal reasons for expression. This literature is divided into elective and nonelective reasons with special note to the timing and changes for these reasons. The third body of literature encompasses goals for expression and includes the subtopics of goal setting and influences of goal achievement.

These three topics have been selected as topics of foundational literature because they are areas important to discuss relative to the lived experience of expression. While medically dominated views focus on outcomes of human milk feeding, a feminist approach that focuses on systemic social factors can identify the mechanisms and processes of human milk feeding as it occurs with exclusive expression.

Experiences of Expression

Research on the lived experiences of mothers that express their milk can be divided into two main findings; positive experiences and negative experiences. Overall experiences are mixed, encompassing both positive and negative experiences. Additionally, experiences can be grouped based on four main domains. There are physical experiences, emotional, social, and psychological.

For many, expression is not a planned infant feeding method. Many mothers do not decide to exclusively express as a method to feed their infant until after the baby is born. In one study, 56.8% of the mothers reported deciding to express after their baby was born, and only 20.2% of mothers decided before the birth of the baby (Clemons & Amir, 2010). Similarly, another study found that 70% of mothers that exclusively expressed had never heard of this kind of infant feeding before the birth of their baby (Jardine, 2018). In a study of the advice from mothers that had expressed, mothers

shared both positive and negative emotions including sadness if direct breastfeeding had not gone as planned (Bigalky et al., 2021). Many of the experiences of expression are unexpected and mothers often do not anticipate expression as a feeding method.

Negative Physical Experiences

Several lines of evidence suggest direct breastfeeding is associated with physical pain (Buck et al., 2020) as is expression (Flaherman et al., 2014). In interviews during the first month after giving birth, mothers found the physical aspects of direct breastfeeding to be discomfort, pain, and soreness (Kelleher, 2006). Women report ranges in pain, from mild to severe or unbearable (Kelleher, 2006). Specifically, pain involves generalized pain, soreness, discomfort, engorgement, nipple pain, raw breasts, cracked or bleeding nipples, blisters and uterine contractions (Kelleher, 2006).

Physically, women describe how human milk feeding requires them to wear special clothing (Stearns, 2009) or how it renders them immobile during the time they are expressing (Kelleher, 2006). Women also fear human milk feeding will cause breast sagging and this false perception influences feeding decisions (Bucher & Spatz, 2019).

Negative Emotional Experiences

For some women, expression is valued. For others expression is deemed less valuable, for example for women who would prefer to directly breastfeed (Johnson et al., 2012a). Therefore, emotional experiences are attributed in part to the perceptions women have. In a study of the emotional experiences of expression, many women described being surprised that being able to express was not automatic, easy or reflexive (Morse & Bottorff, 1988) or that direct breastfeeding was not as natural as they thought it would be and required a learning process (Brouwer et al., 2012; Buck et al., 2020; Stearns, 2009). Women expected expression to be like “turning on a tap” and described astonishment and disappointment when this was not case (Morse & Bottorff, p. 166). Overall, unpreparedness is major theme of human milk feeding (Buck et al., 2020). Expression is a learned body work that takes development of skills and techniques over time (Stearns, 2009). Women also described expression as very private, even more private than direct breastfeeding, and reported reluctance to express in the presence of others (Morse & Bottorff, 1988).

In human milk feeding, challenges are described in association with sadness (Rydström et al., 2021). Women describe the emotions they associate with expression as embarrassment, discomfort, expression as a necessary evil, and feeling like a slave to the pump (Morse & Bottorff, 1988). The top ten negative words for expressing in a hackathon of over 1000 mothers were: hate, pain, difficult, hurt, awkward, cry, uncomfortable, frustrating, annoy, and

embarrassing (D'Ignazio et al., 2016). Expression is described by mothers as challenging, stressful, and time-consuming (Rydström et al., 2021; Stearns, 2009). Women who exclusively expressed reported emotions such as frustration, insecurity, depression, rejection, embarrassment, envy, burden, guilt and disappointment (Jardine, 2018). Several lines of research suggest guilt and shame are negative emotions associated with infant feeding (Goulden et al., 2022; Kelleher, 2006). In a review of literature on guilt and shame related to human milk feeding, guilt was preceded by insufficient social support and led to feeling the need to defend infant feeding decisions (Jackson et al., 2022). Shame was associated with objectification, perceived lack of milk supply, fear of direct breastfeeding in public, and unrealistic feeding expectations (Jackson et al., 2022). Shame has consequences in behavior including dissociation from maternal identity, depression, fear, humiliation and avoidance (Jackson et al., 2022). Shame and guilt have also been associated with the expectations for human milk feeding. Robinson (2018) has said “breastfeeding is not about what you want to do but about *who you want to be*” referring to how infant feeding is tied to perceptions of good mothering (p. 43).

In a study of emotions and norms in human milk feeding, pressure from significant others and social norms can lead to negative emotions about human milk feeding generally (Russell et al., 2021). These negative emotions include guilt, shame and regret (Russell et al., 2021). Another mechanism is moral obligations and realities of motherhood (Russell et al., 2021). Negative

emotions can also be attributed to the disconnect between expectations and reality (Russell et al., 2021).

Negative Social Experiences

Many women report lacking support in human milk feeding, or that the support they receive is conflicting (Charlick et al., 2018; Marshall et al., 2007). While women report technical and practical support is important, emotional support is also important from their social ties (Marshall et al., 2007). In a survey of people that exclusively express, mothers report obtaining information about expression from websites, books, online forums and friends (Jardine, 2018). Research on sources of information suggest women seek out social support from those outside their networks and must intentionally find their own support for expressing. Women experience frustration when their care providers give inconsistent advice (Flaherman et al., 2014).

Human milk feeding is associated with cultural norms and has been linked to the more general trend of intensive parenting (Whipps et al., 2022). Mothers report feeling judged for their human milk feeding journey and feel as though this aspect of their life is very public (Charlick et al., 2018). In a study interviewing mothers who has intentions to breastfeed six months but stopped between two and six months, these mothers did describe difficulties, but social complexities were the greatest challenges and largely influenced human milk feeding (Charlick et al., 2018).

Additionally, expressing is described as a practice that is isolating, requiring mothers to separate themselves from social situations (D'Ignazio et al., 2016; Whipps et al., 2022). In a phenomenological study of Australian mothers, mothers often report feeling on their own due to social isolation and loneliness (Buck et al., 2020). Human milk feeding is something that mothers may want to keep private, and this may be at odds with needing support from others (Charlick et al., 2018). Human milk feeding is also seen as conflicting with sexual relationships. Breasts are socialized to be sexual and may be perceived to be at odds with infant feeding, creating a dichotomy between breasts being sexual and being nurturing, although these could coexist (Bucher & Spatz, 2019).

Negative Psychological Experiences

Human milk feeding is associated with general negative attitudes. In a study of young adults, even though young adults report wanting their future children to be fed human milk, they reported anticipated negative or mixed responses about viewing human milk feeding images, and these images for were looked at for significantly shorter times, possibly due to discomfort with human milk feeding (Austen et al., 2016).

Human milk feeding is described as a practice that makes women feel like machines, tools, or animals (Stearns, 2009). Women have described human milk feeding as a project (Bentovim, 2002) associated with providing,

supplying, demanding, and controlling (Dykes, 2004) and expression is described as a “chore” (Felice et al., 2017a; Whipps et al., 2022, p. 39). It can feel like an overwhelming sense of responsibility and women report feeling powerless (Rydström et al., 2021). In a study of women experiencing human milk feeding complications, women experienced wounds to their identity when complications arose (Rydström et al., 2021). When women did not express as much milk as their infants were consuming, they reported feelings of stress or feeling a sense of personal failure (Felice et al., 2017a).

Expressing in certain contexts can create negative psychological experiences. When expressing in the workplace, there are difficulties in finding a place to express, finding time to do so, and finding a place to store the expressed milk (Bentovim, 2002). Difficulties can lead to increased cognitive load needed to successfully manage expression, a time-based conflict (Cardenas & Major, 2005). In addition to this cognitive load, mothers may also experience psychological paradoxes, labeled strain-based conflicts (Cardenas & Major, 2005). Those with professional work juxtapose this with partially undressing in the workplace to be able to express (Bentovim, 2002) or worry about being taken seriously at work (Cardenas & Major, 2005).

Expression also may be a time of increased questions. In a study of online discussion forum posts, mothers often ask questions about the volume

of milk they should be expressing or strategies for increasing milk output (Yamada et al., 2019).

Positive Experiences

There is limited literature to explore the positive experiences of expression. Some research has outlined the physical experiences of expression. Many mothers describe expressing while driving as a way to combine tasks in the same physical space (D'Ignazio et al., 2016). Women report certain spaces feeling safer for feeding human milk in public, such as parenting room or spaces where other mothers are also feeding, where there is a feeling of “power by number” (Brouwer et al., 2012, p. 1350). Emotionally, women describe feeling pride and pleasure as emotions related to feeding human milk, and reports of amazement at the ability of the body to produce food, the sole source of food (Stearns, 2009). Russell et al. (2021) have proposed that the only way to achieve positive emotions about feeding human milk is to focus on the self. Women report feeling pride or a sense of achievement when they continue with feeding human milk or when they do not use infant formula (Buck et al., 2020). In a review of studies on the topic of combining feeding human milk and employment, many studies find women report their own determination as important to successfully feeding (presumably through expression during employment; Buckland et al., 2022; Chang et al., 2021). Self-efficacy, defined as strength, determination and confidence in feeding human milk, has been

identified as important (Buckland et al., 2022), although this importance is highlighted generally and has not been explored in expression specifically. There is little research on positive social experiences of exclusively expressing, although women who exclusively express do describe feeding human milk as a way to bond with their infant (Anders, 2021). Psychologically, some women describe joy in association with feeding human milk, for example when expectations for feeding are fulfilled (Rydström et al., 2021). With exclusive expression, women describe feeding with words such as “happy”, “proud”, “glad”, and “a good feeling” (Anders et al., 2023).

Reasons for Expression

Research has explored the reasons and motivations for why feeding human milk is selected as an infant feeding method in general, including direct breastfeeding and use of expression. One reason mother’s often report is the benefits to an infant’s health (Felice et al., 2017a; Marshall et al., 2007; Sloan et al., 2006). Another reason for feeding human milk is that it is associated with good mothering (Johnson et al., 2009), or mother’s feel obligated (Marshall et al., 2007). Mother’s also mention bonding as a reason for choosing to feed human milk (Sloan et al., 2006). Overall, infant feeding is influenced by maternal factors and motivations, but also external factors such as social norms, media representations and health care provider views (Matriano et al., 2021).

There are unique reasons mother's report for specifically using expression, either occasionally, or exclusively as a method to feed a baby. Expression could be categorized according to elective and non-elective reasons (Felice et al., 2016). Non-elective reasons include a wide range of human milk feeding issues (Bigalky et al., 2021; Johns et al., 2013; Johnson et al., 2012b; Morse & Bottorff, 1988) such as mastitis, infections or engorgement. Mother's also often report using expression as a method to manage pain associated with direct breastfeeding (Binns et al., 2006; Fan et al., 2022; Johnson et al., 2009; Labiner-Wolfe et al., 2008). Expression is also used to overcome inefficiencies with the maternal body, most often perceived or real issues with milk production (Johnson et al., 2009). Mothers also use expression if a breast is leaking while the other is being used for direct breastfeeding or as a solution to infant dispositions (e.g. sleepy, lazy; Johnson et al., 2012b). Finally, maternal employment is a common theme for use of expression (Johns et al., 2013). Employment is associated with four to six times increased likelihood of using expression as a regular feeding method compared to an only occasional feeding method (Labiner-Wolfe et al., 2008). Similarly, expression is associated with full-time employment when compared with direct breastfeeding (Bartol, 2011).

Elective reasons include using expression to allow other caregivers to feed the baby (Bigalky et al., 2021; Binns et al., 2006; Labiner-Wolfe et al., 2008) or to manage feeding in public which may be perceived as embarrassing (Johns et al., 2013). Mothers also express to know how much milk they are

producing (Johnson et al., 2012b), or to maintain or increase their milk production (Weisband et al., 2017). Removing contaminated milk (e.g. mother consumes alcohol) or to build an emergency frozen supply or supply of milk or to mix with other foods (Labiner-Wolfe et al., 2008; Weisband et al., 2017), are other reasons for expression. Some women do not want to directly breastfeed, or use expression as a means of deflecting accusations of poor mothering (Johnson et al., 2012b). Expression is also used to avoid introducing formula, and to teach a child to use an artificial nipple (Morse & Bottorff, 1988). Mothers describe using expression because it is an additional feeding option, efficient (Johnson et al., 2012b), as a way to save money (Felice et al., 2017a) and as a way of feeling empowered (Johnson et al., 2009; 2012a), autonomous (Johnson et al., 2009), and free (Johnson et al., 2012b). Some also express to donate informally or to milk banks (Labiner-Wolfe et al., 2008; Oreg, 2019). Finally, some use expression after the death of an infant, as a way of providing a positive outcome after grief and loss (Wilson, 2018).

Reasons for expressing are not static and the reasons mothers report for expression seem to change over time (Felice et al., 2017a; O'Sullivan et al., 2016). Morse and Bottorff (1988) explored reasons mothers gave for not using expression and these include lack of time (e.g. due to other childcare demands), the ease of using formula, lack of privacy or facilities, and feeling like expression is unnatural, mechanical and impossible. Expression is also not associated with singleton or multiple births, there is no difference in expression

between these groups (Geraghty et al., 2005) although those with premature or low birth weight infants are more likely to express (Johns et al., 2013).

Goals for Expression

It is unclear if expression allows mothers to reach their own feeding goals (Labiner-Wolfe et al., 2008). Research has mixed outcomes with regards to feeding goals, with some research finding associations between expression and shorter human milk feeding duration (Bai et al., 2016; Keim et al., 2017), and other research finding expression associated with longer human milk feeding duration (Johns et al., 2013; Rasmussen & Geraghty, 2011). For example, Win et al. (2006) found expression was associated with a lessened likelihood of discontinuing breastfeeding before six months. Differences in defining human milk feeding make interpretation of the research on duration and goals difficult. In a small study of expression, 25% of infants were fed human milk beyond the time the mother expressed, suggesting that feeding human milk and producing are different (Geraghty, Sucharew, & Rasmussen, 2012). Many women produce more milk than needed to be saved and stored for later use, often by freezing (Clemons & Amir, 2010; O'Sullivan et al., 2016).

When it comes to setting goals, mothers using expression in their infant feeding want to set and meet goals (Yamada et al., 2019). Most women surveyed in a study of expression felt expression was a means of achieving

feeding goals (Felice et al., 2017b) and similarly, expression is a means in the workplace to for achieving exclusive human milk feeding goals (Bentovim, 2002). In a study of human milk feeding goals, the average time-based goal for human milk feeding mothers was 8 months, regardless of whether that goal would later be met and 60% of mothers did not meet their feeding goal (Odom et al., 2013). Goal setting is negatively associated with risk of ceasing human milk feeding (Spitzmueller et al., 2016). While public health recommendations provide examples of various human milk feeding goals set by organizations, little research has focused on mother's own goals or how human milk feeding is defined as successful. In a review of literature on milk expression methods, no studies were found that asked mothers their own goals for expressing milk (Becker et al., 2016). In a study of mothers with various pathways of feeding human milk, those that exclusively expressed reported the lowest levels of goal attainment (Whipps et al., 2022). From a biomedical perspective the exclusive expression group was quite successful in exclusive human milk feeding and duration, but the mother's perceptions of their infant feeding goal attainment were low (Whipps et al., 2022).

Employment is an important factor for human milk feeding goals and duration. Negative supervisor remarks are associated with an eightfold increase in risk of discontinuing exclusive human milk feeding (Spitzmueller et al., 2016). For many mothers, expression is an only choice when returning to work (Ryan et al., 2013) and planned return to work is a predictor of expression (Bai

et al., 2016; Geraghty, Davidson, et al., 2012). In a study of human milk feeding using the IFPS I and II, longer human milk feeding durations were found after the enactment of the partially paid leave law in California in 2002, suggesting policy can influence supports for human milk feeding goal achievement and duration (Huang & Yang, 2014).

Another factor that influences meeting human milk feeding goals, and therefore human milk feeding duration, are differences in demographics. Women who fed human milk for five months or longer are distinct (Maralani & Stabler, 2018). They have more children and invest more time in children, suggesting there is a greater parenting approach, intensive parenting, that explains differences. In a qualitative study of mothers feeding human milk beyond 12 months, participants were often white and well-educated (Jackson & Hallam, 2020). Overall, many scholars have argued human milk feeding is a class-based privilege, with resources such as higher social class, being married, not working or having a salaried job or a job with fewer hours per week associated with longer human milk feeding (Thulier & Mercer, 2009). Scholars have argued similar rates of initiation but differences in duration and achievement of goals indicate social structures that impact ability to sustain human milk feeding, and that human milk feeding is a class-based privilege with inequalities (Chin & Dozier, 2012; Hausman, 2008; Smith et al., 2012; Thulier & Mercer, 2009) and differences in ability to achieve goals.

Literature Gaps

While literature on experiences of expression have indicated the negative physical, emotional, psychological and social experiences, little research has focused on the positive experiences that may occur with expression. While some studies have specified maternal reports of positive experiences, there has not been a comprehensive exploration of these experiences. Women use expression in their infant feeding and there are a wide range of reported reasons this is used. Much of the literature on reasons for human milk expression focus on individually reported reasons, but less research has focused on the social structures and systems of influence on maternal infant feeding decisions and practices. While some goals and duration of feeding human milk have been explored in previous research, often research uses medical recommendations as a starting point for goals, and little research examines mother's own goals for their infant feeding.

Summary

Some findings are consistent throughout the literature on expression, including themes of the experiences of mothers, the reasons for expressing, and the goals mothers have for expressing. Other findings and arguments are important to note, as they are consistent across the literature. One is the frequent proposition that infant feeding decisions and practices are embedded within larger parenting trends. In the U.S. and other western developed

countries, this trend is intensive parenting, the ideology that parenting requires an investment of more time, money, effort, expertise, emotions and labor than in the past (Faircloth, 2014; Hays, 1996). Another theme is that feeding human milk is embedded within inequalities, and is a class-based privilege. Both of these patterns suggest a theoretical framework for exploring expression requires one that acknowledges both contextual and cultural factors, as well as inequalities in opportunity.

There is a gap in knowledge related to exclusive expression, and what literature does exist is often from research on feeding human milk more generally. In addition, some researchers operationalize human milk feeding to include expression but others define it as breastfeeding and only direct breastfeeding at the breast. Research that addresses exclusive expression varies in definition as well. Some include only human milk feeds, other definitions include mixed feeds of human milk and infant formula. Since milk expression is emerging as a new area of research, growing within the broader field of infant feeding research, it is understandable that discussions are still working towards consensus of terminology and definitions.

Some research does specifically address research questions surrounding expression and exclusive expression and provides valuable contributions to the knowledge of this infant feeding method. This literature review uses both literature on expression and literature on breastfeeding more broadly to give a

comprehensive overview. This review has a focus on human milk feeding and expression in the United States, although literature on populations outside the U.S. are used as comparisons or when literature on a topic is lacking from a U.S. perspective. Additionally, while there is quite a lot of research on expression to provide nutrition to infants in a neonatal intensive care unit (NICU), this literature review is predominately focused on healthy infants and infant feeding across the years of infancy. Additionally, research on human milk feeding frequently comes from studies using the Infant Feeding Practices Survey. While this survey is nationally representative and longitudinal, it does not address questions of maternal experience, assess reasons for expression with thick description, and it does not assess a mother's own goals for expression.

Philosophical Underpinnings

The grounding philosophy for this study draws from phenomenology, which is a philosophy and methodology. Husserl argued phenomenological inquiry can examine human experience (Smith et al., 2009). Specifically, Husserl focused on the experiential content of consciousness and developed a method for identifying core structures of human experience (Smith et al., 2009). His method involved bracketing, or putting aside, the familiar everyday

world (Smith et al., 2009). Heidegger¹ was student of Husserl's, although his approach diverged. Heidegger emphasized intersubjectivity, the relational and overlapping nature of how humans engage with the world. Additionally, Heidegger emphasized hermeneutics, a theory of interpretation. Hermeneutics is concerned with examining something that is hidden or latent, in addition to any manifest content (Smith et al., 2009). As a specific form of phenomenology, Interpretative Phenomenological Analysis draws from Heidegger's rejection of bracketing and emphasis of interpretation.

Theoretical Framework

This study used a theoretical framework that is secondary to the phenomenological philosophy. The two components of this framework are a bioecological model and feminist approach. While this study specifically used a bioecological model, a “social-ecological model offers a valuable framework upon which to build feminist approaches to breastfeeding, capturing the feminist impulse to situate women's experiences in their full sociocultural and economic contexts” (Smith et al., 2012, p. 7). This theoretical framework is useful for recognizing the structural constraints that influence infant feeding that are outside personal control (Smith et al., 2012). A theoretical framework

¹ Heidegger's antisemitism and racism cannot be ignored but is beyond the scope of this paper (see Love & Meng, 2017).

of bioecological theory embedded in feminist theory was developed inductively after a review of the relevant literature and with consideration of the research questions. A theoretical framework that combines bioecological theory and feminist approaches is consistent for a study on women's experiences of expression, because it places value on women's stories and their embedded narratives (Van Esterik, 2012) and complex social influences.

Many scholars have noted the cultural and social nature of infant feeding (Cassidy & El Tom, 2015). Allers (2017) has stated that human milk feeding is something cultures do, not just women. In addition to cultural norms that support or discourage feeding human milk, structural barriers impact infant feeding as well (Allers, 2017; Carroll et al., 2018; Cohen, 2021; Van Esterik, 2012), with social structures in the United States making human milk feeding difficult (Allers, 2017). Azad, et al. (2020) have noted that specifically with expression, these barriers force decisions between expression or ceasing human milk feeding altogether. Being able to feed expressed milk is constructed as an individual choice in the United States (Collins, 2019), but is practiced within the social reality of unequal opportunity (Cohen, 2021).

Bioecological Theory

Bronfenbrenner's theory of human development emphasizes the complex interactions a person has with their environment (Smith & Hamon, 2017). Core to the model are forms of process, powered by person

characteristics, contexts and time (Bronfenbrenner & Morris, 2006). The model has evolved and significantly changed over time (Bronfenbrenner, 2001; Tudge et al., 2016), and there are three main phases of the theory (Rosa & Tudge, 2013). Phase one is commonly known as the ecological model (Rosa & Tudge, 2013) and first presents four main concepts of the microsystem, mesosystem, exosystem, and macrosystem (Bronfenbrenner, 1977; 1979). The second phase refined the existing theory and focused on person characteristics (Bronfenbrenner & Crouter, 1983; Bronfenbrenner & Ceci, 1993). The third phase is referred to as the bioecological theory (Bronfenbrenner & Morris, 2006). This final phase used a Process-Person-Context-Time (PPCT) model (Bronfenbrenner & Morris, 2006). Proximal processes are emphasized in this model, the reciprocal interactions a person has with the individuals, objects and symbols within their environment (Bronfenbrenner, 2001). Person characteristics, contexts of environment and changes over time also influence development and affect proximal processes (Bronfenbrenner & Morris, 2006). Bioecological theory is the most mature form of Bronfenbrenner's theory (Rosa & Tudge, 2013). As Tudge et al. (2009) proposed, the use of Bronfenbrenner's theory requires explicit clarity in which phase is being applied. This paper uses the PPCT model in the framework.

Bioecological theory has been applied in research with infant feeding (Chopel et al., 2019; Muniandy; 2022; Stolzer, 2005) and is useful for recognizing the complex process of infant feeding and the aspects beyond a

mother that influence infant feeding decisions and practices. Interestingly, in surveys asking how to improve expression technology, D'Ignazio et al. (2016) found many of the mother's responses indicated larger failings of social policy and went beyond expression technology, suggesting social influences on infant feeding need to be addressed. A review of studies related to factors influencing feeding decisions, Roll and Cheater (2016) note that other's opinions, work, and public are just as influential in feeding decisions as biological, emotional and psychological factors.

Feminist Approaches

Feminist theory has been quiet with regards to infant feeding research. More specifically, human milk feeding is missing in feminist discourse (Stearns, 2009). There is a relatively small body of literature pertaining to infant feeding research using a feminist lens (Kelleher, 2006; Smith et al., 2012; Van Esterik, 1994). There is value and utility in this application so it is unfortunate that application of feminism has not reached its full potential in the study of infant feeding. As a family theory, feminism aims to understand the perspectives of women and the often-ignored issues they face (Smith & Hamon, 2017). A basic tenet of feminist theory is bringing "public attention to what had previously been considered private issues" (Smith & Hamon, 2017, p. 316). By bringing these issues to light, feminist theory can reveal gaps in knowledge and advocate for change (Smith & Hamon, 2017). For infant

feeding, the application of feminist theory can bring private practices in infant feeding to light and can advocate for the interests of mothers and families.

Much of the literature on infant feeding approaches the topic from a medical or biological framework, which often overlooks psychosocial aspects. Feminist theory can bring a needed perspective that gives a fuller picture of mothers' experiences in feeding their infants. An important perspective could arise from the recognition that infant feeding decisions are often made as a negotiation between structural constraints.

While much of the research on infant feeding arises from a medical discourse, a feminist approach provides an emphasis on the activity of infant feeding and the experience of mothers, and does not center health outcomes as the sole focus of interest (Van Esterik, 2012). A specific feminist approach is also useful with the theoretical framework, a reproductive rights (Labbok et al., 2008) or a reproductive justice-based rights framing (Cohen, 2021). This specific form of feminist approach sees infant feeding as an extension of reproductive rights, and a justice that everyone should be granted access. This perspective frames human milk feeding as “valued part of women’s reproductive rights and lives” (Labbok et al., 2008, para. 1). While Bronfenbrenner’s bioecological model is robust as a singular model, combining it with feminist theory creates a unique framework for exploring the lived experiences of mothers that exclusively express their milk.

Chapter

METHODOLOGY

Purpose

Human milk expression is increasing as an infant feeding method (WHO, 2009; AAP, 2012) but the experiences of this infant feeding method are not known. Additionally, public health organizations recommend expression as a preferred infant feeding method second to direct breastfeeding, although the experiences of milk expression as a sole infant feeding method are not understood. With 1.8 million mothers exclusively expressing in the United States (Cohen, 2021), expression remains understudied but widely practiced. The approach of the current study extends current knowledge of breastfeeding to a new area of focus, human milk expression.

The current study aimed to address the following research questions:

1. What are the experiences of mothers that exclusively express their milk and what meaning do these experiences have?
2. What reasons do mothers report for the decision and sustained practice of exclusive milk expression as an infant feeding method?
3. What meaning do mothers attribute to exclusive expression in terms of the duration that this infant feeding was practiced?

This chapter provides an overview of the methodology of phenomenology and more specifically Interpretative Phenomenological Analysis (IPA). It provides the rationale for IPA and photovoice and it also outlines data collection, data analysis, and phenomenological text. Qualitative approaches are useful for exploration of phenomena, especially for topics with little research and with understudied samples (Creswell & Creswell, 2018). Qualitative approaches are valuable because they honor an inductive style, focus on meaning, and note the importance of recognizing the complexity in social problems (Creswell & Creswell, 2018). Phenomenology is a research design that describes lived experiences and concludes by describing the essence of experiences for those that experienced the same phenomenon (Creswell & Creswell, 2018).

For this study, a phenomenological methodology was selected because it allows for rich descriptions of explorations of meaning related to the phenomenon of exclusive expression. Photovoice was paired alongside interviews to provide an additional source of data on lived experience (Wang, 1999). While ethnography can identify shared patterns of a cultural group, it was not appropriate for this study because the focus is not on culture or interactions between individuals. A case study approach allows for analysis of a single or multiple cases, although this methodology is not appropriate because exclusive expression is not a phenomenon that can be bound as a case. Narrative inquiry can examine the stories of participants, but is not appropriate

either because the intention is to examine lived experiences. A phenomenological approach, and specifically an IPA approach was best suited for the research purpose and research questions.

Phenomenology

Phenomenology is known as both a philosophy and a methodology (Usher & Jackson, 2014). Originally, phenomenology was developed as a way of thinking about the world, with specific concern for people's experiences in the world (Usher & Jackson, 2014). Phenomenological methods are not an inflexible set of techniques, but are sensitive to the nuances of phenomenon (van Manen, 2018). Additionally, a researcher in phenomenology approaches the topic freshly, and is reflexive in approaching the topic naively (Moustakas, 1994).

As a qualitative methodology, phenomenology aims for thick and rich descriptions (Finlay, 2009). Phenomenology is the "careful and systemic reflective study of the lived experience" (Usher & Jackson, 2014, para. 1). Different than other qualitative methodologies, phenomenology does not aim to theorize about the world, but rather brings extensive insight (Usher & Jackson, 2014). While phenomenology has various approaches, all have four main core characteristics: description, phenomenological reductions, an exploration of people within situations, and essences of meaning (Giorgi, 1989). In addition, phenomenology is very much focused on experiential

meaning and how individuals come to understand their own experiences (Usher & Jackson, 2014).

Interpretative Phenomenological Analysis

Phenomenology has two philosophical underpinnings, one a branch of phenomenology originating from Husserl and the other from Heidegger (Usher & Jackson, 2014). Husserlian phenomenology suggests use of bracketing, the idea of blocking out all that is known about a phenomenology (Usher & Jackson, 2014). Heidegger, a student of Husserl, took a more interpretative approach, which recognizes that human experience is always situated within contexts and meanings. Heidegger rejected the concept of bracketing, proposing that in order to understand a phenomenon, people need to utilize their own knowledge and experiences (Usher & Jackson, 2014).

Many forms of phenomenology are rooted in hermeneutics, the meaning someone has for their experience (Smith, 2011). Smith (2011) has argued that interpretative phenomenological analysis (IPA) is the most experiential methodology that has been developed. IPA incorporates the lived experience, the participants talk about that experience, the meaning making that the participant is working through and also the emotional and other reactions that occur to that experience (Smith, 2011). IPA is similar to other forms of phenomenology, although it has other elements such as the double hermeneutic and idiographic components (Smith, 2011). Interpretive phenomenological analysis (IPA) is a specific form of phenomenology

methodology largely attributed to Johnathan Smith (Smith, 2004). IPA is a qualitative methodology that focuses on lived experiences (Eatough & Smith, 2017; Finlay, 2009) and “how individuals make meaning of their life experiences” (Pietkiewicz & Smith, 2014, p. 7). IPA is concerned with in-depth accounts and approaches the phenomenon case-by-case (Pietkiewicz & Smith, 2014; Smith & Shinebourne, 2012). IPA is a methodology used in exploration of first-person perspectives to build knowledge and epistemologically values participant’s experiences and treats participants as the experiential experts on the phenomenon (Eatough & Smith, 2017). IPA is an approach rooted in psychology and it allows for revealing the essence of a phenomenon (Eatough & Smith, 2017; Finlay, 2009) and is often used when researching underexplored phenomenon, especially health and illness related topics and those concerning identity (Smith, 2004).

IPA is different from other phenomenological methodologies in that it combines interpretation and hermeneutics (Eatough & Smith, 2017). IPA attends to things that matter to people, focusing on meaning. “IPA attends to all aspects of this lived experience, from the individual’s wishes, desires, feelings, motivations, belief systems through to how these manifest themselves or not in behavior and action” (Eatough & Smith, 2017, para. 20). The exploration of meaning using interpretative processes in IPA functions as a double hermeneutic (Smith & Osborn, 2015, p. 26). The researcher tries to

make sense of the participants meaning, and the participant is also trying to make sense (Smith & Osborn, 2015).

Semi-structured interviews allow for exploration of the phenomenon and experiential theme analysis and are the prominent method used in IPA research. Scholars have proposed multimodal forms of data collection can supplement interview forms of data (Eatough & Smith, 2017) and these could include diaries, focus groups, and written responses (Pietkiewicz & Smith, 2014; Smith, 2017).

Use of Interpretative Phenomenological Analysis

Interpretative Phenomenological Analysis (IPA) derived from work in psychology and has been suggested as uniquely situated to approach experiences from a positive psychology perspective (Smith, 2017). IPA has been used in research on topics of health and illness. Indeed, illness experience is the most dominant construct explored using IPA (Smith, 2011). IPA is not restricted to the field of psychology has been used in the fields such as education, management and the humanities (Smith, 2017). More generally, IPA is often used for work on existential issues, like those that are significantly life transforming or involve the construct of identity (Smith, 2004). In addition to patient illness experience, IPA has been used to explore the lived experience of psychological distress, caregiver experience, client experience in therapy,

reproduction, health professional experience, sex, gender, sports, and music (Smith, 2011).

Smith (1999) used IPA on research exploring the transition to motherhood, and this was when the approach first developed. Motherhood constructs have continued to be studied using IPA including motherhood during maternity leave and return to work (Millward, 2010). Other studies have used IPA in motherhood research such as the experiences of the human milk feeding journey (Charlick et al., 2018; Murad et al., 2021) and caregiver experiences with infant feeding as children transition to extra-familial childcare (Goulden, et al., 2022).

Charlick et al. (2018) provides an exemplar study using IPA on the topic of human milk feeding. In this study, mothers in Australia who had intended to feed human milk for at least six months but ceased at two to six months, were interviewed. Charlick et al. (2018) found three high-order themes including the exclusive human milk feeding journey, the challenge of feeding human milk exclusively, and human milk feeding in the 21st century. Overall, this study found that despite difficulties that were commonly experienced, social complexities were the greatest challenge and influence on decisions to stop exclusively feeding human milk. While this study focused on mothers whose intentions for exclusive human milk feeding were disrupted, it is a useful example of how an IPA approach can explore individual cases to understand lived experience. Interestingly, one participant in the study

predominately expressed milk to feed her infant, suggesting exploration of human milk feeding, in cases of exclusive milk expression, is a fitting approach for further exploration of mother's human milk feeding experiences.

Photovoice

Photovoice is a research methodology that has been used in interpretive phenomenological analysis studies as a means to elicit deeper data and to overcome the limitations of spoken language (Losada, 2022; Plunkett et al., 2012). In this study, photovoice was used to provide an additional form of data in visuals and narratives. The photovoice phase of the study invited participants in the interview phase of the study to voluntarily respond to prompts and provide photographs and narratives (stories) in response to the prompts (Appendix G). The invitation to provide photographs and narratives in response to prompts after the interviews is justified as an opportunity to freely reflect and develop stories. Photovoice can also be a way to overcome limitations in participant observation, by inviting participants to record and describe their lived experience of expression from the spaces and settings where this occurs in their lives. In a study of human milk storage, mothers were asked to send pictures of their milk on a "typical day" (Geraghty, 2011, p. 433). Women sent pictures of their milk in potentially unsanitary conditions, milk in temperature fluctuations, milk exposed to microwaves, and milk transportation is a wide range of manners. Visual data can be a useful tool for

achieving collection of data that can produce data similar to that which could be collected during participant observation.

Sample

The sample of the current study was twelve mothers that were currently expressing their milk as the exclusive method of feeding their infant. Participant demographics are outlined in Table 1. One participant, Roz, was not actively expressing at the time of our interview, she was pregnant with a surrogate and planned to express and also had expressed previously. The purposive sampling of this study is in line with the theoretical underpinnings of IPA (Smith & Shinebourne, 2012). This sample was drawn from the larger population of exclusively expressing parents. Recruitment occurred on the social media platform Facebook within parenting and exclusive pumping groups (Appendix B). Social media recruitment is effective in targeting hard to reach populations and can allow for ease of sharing recruitment information in interest and community groups (Topolovec-Vranic & Natarajan, 2016). A screening tool was used to screen for potential participants (Appendix C). This study used criterion-based sampling and participants were eligible for inclusion in the study if they were 18 years old, a mother, currently exclusively pumping, and if they consented to be further contacted for the study by email. Participants were excluded if they were not exclusively expressing milk (e.g. directly breastfeeding, using formula, not currently exclusively expressing).

Participants were recruited in May and June of 2023 and interviews occurred from May to July of 2023.

Data Collection

In phenomenological research, a first step is to develop a thoughtful question, oriented towards phenomenology. This question arises from the researcher, the research instrument, as a person both professionally but also personally and can connect to these experiences and contexts (Usher & Jackson, 2014). Phenomenology is “most appropriate when the aims of a study are to gain insight into the lived experience of a particular phenomenon” (Usher & Jackson, 2014, p. 15). Since this study aimed to explore lived experiences of exclusive expression, it is well suited for a phenomenological methodology.

Ethical considerations were addressed in various ways. Each participant was asked to give a pseudonym. This pseudonym was used in transcripts and the written monograph to protect privacy and the researcher will be the only person with knowledge of participant’s real names. Expedited Institutional Review Board approval was received (study # 2016148-2) and informed consent documentation addressed issues of privacy, confidentiality, and anonymity. Data was stored electronically on a secure server. The monograph contains excerpts from the data and will make attempts to not include reasonably identifiable personal information. Interviews were used for data

collection. Interviews are the most common form of data collection in phenomenology (Usher & Jackson, 2014) and these were audio-recorded and then transcribed. Interviews were semi-structured, using open-ended questions to generate the desired information but without leading the participant.

Each case was treated idiographically and was treated as unique until closed, when further cross-case analysis was conducted (Smith, 2004). Thus, each case was analyzed in detail. Data collection and analysis are intertwined within IPA, occurring in an alternating fashion with analysis guiding deeper exploration of the phenomenon leading to refined data collection, primarily through interviewing.

Participants

Most research using IPA uses small situated samples (Eatough & Smith, 2017) and six to eight participants is been a typical number of participants (Pietkiewicz & Smith, 2014). This study continued interviews until theme saturation occurred plus additional interviews to explore diversity of experiences. Data saturation occurred after the seventh interview but 12 interviews were conducted. Additional interviews were conducted after data saturation to selectively interview participants with diverse exclusive pumping experiences which were compared to themes. For example, Katie² was

² All names are pseudonyms

participant 12 and had experience pumping for two different children. Overall, determining saturation was an essential goal, not a certain sample size.

Participants were recruited through Facebook groups where mothers that were actively exclusive pumping were more likely to engage (e.g. mothers groups, exclusive pumping groups). Potential participants completed a short survey to determine eligibility and were offered the opportunity to consent to be contacted for an interview. All interviews were conducted over Zoom and participants were provided informed consent documents prior to the start of the interview.

Screening Tool

Recruitment occurred on social media (Facebook; Appendix B) and a screening survey (Appendix C) was used to determine participant eligibility and to request consent for participation in the interview phase of the study. Selected participants were contacted to schedule an interview in person or at a public location (e.g. public library) and all participants requested virtual interviews.

Interviews

Interviews were conducted with the researcher acting as enabler; facilitating the participant in telling their story, and bringing to life the phenomenon (Eatough & Smith, 2017). As an introduction and to build rapport

with participants I shared that I myself am a mother with exclusive pumping experience and that the goal of the study was to bring women's experiences with exclusive expression into current research. I balanced guiding and being led, treated the phenomenon as both familiar and unfamiliar, and was flexible to allow the unexpected to emerge. In addition, I used counseling skills, as IPA research often focuses on existential, identity and emotional topics (Pietkiewicz & Smith, 2014). The interviews lasted an average of 31.5 minutes. IPA interviews are often quite lengthy, averaging 45 to 90 minutes in length (Usher & Jackson, 2014). Interviews did not follow a rigid form, they started with demographic questions and an interview protocol that led to further questions that were increasingly sensitive to arising content (Smith, 2017). The interview protocol is listed in Appendix E and Table 2 provides connections from interview questions to research questions.

Photovoice Data

Photovoice data was collected after the interview phase of the study. Participants in the interview phase of the study were invited to participate in the photovoice phase. Participants were provided a prompt of questions (Appendix G) and directions for submitting photos and narratives, including explicit directions to not include faces in the photographs. Two participants responded to the photovoice prompts leading to a total of two narratives responses and three images.

Setting

Demographic information was collected from participants including: participant number (the ordinal numerical placement of the participant in the study), the pseudonym the participant selected, the number of children the participant currently has including current pregnancy, the participant age, the time the participant reports exclusively expressing with the current child and any older children, the age of child(ren), the time the participant has expressed for a current child, time the participant has previously expressed for other children, the participant's employment status, the participant's occupation, the participant's marital status, the reported household income level, and the participants highest level of education.

It is important that interview questions linked directly to research questions so that the interviews lead to the information necessary to address research questions. Table 2 provides an overview of the interview protocol questions and their connection to the three research questions.

Analysis

The process of data analysis in IPA was iterative, non-linear, and inductive (Eatough & Smith, 2017; Smith, 2004) and data analysis involved repeated examination of the data and processes of reading and rereading (Usher & Jackson, 2014). Analysis of the data was somewhat abductive because research questions were derived from existing literature and identified

gaps in knowledge, although analysis of the interview transcripts was emergent. Interview questions were developed from the research questions to provide the data needed to address the research questions. The data analysis is abductive because the data originated from deductive research questions and interview questions, but stems from inductive coding.

Analysis occurred within each interview and also with transcriptions and memos from the interviews. There was therefore no prescriptive steps in analysis, although Smith et al. (2009) have proposed a six-step process, it is quite flexible. First the researcher immersed in the data, reading and rereading the transcript. Second, an initial level of analysis involves noting and was exploratory. Third, each case was treated individually and analyzed for emergent themes and new or surprising content that the researcher was flexible to incorporate. Interviews that contained different experiences were useful as unique experiences provided insights into the phenomenon and were compared to other themes. Divergence of themes was therefore intentionally explored and valued. In the fourth step, connections were examined across emergent themes. The fifth step involved moving to the next case and finally, looking for patterns across cases. Early analysis began with emerging units of meaning, concepts or themes and moved towards higher levels of abstraction in interpretation (Finlay, 2009; Pietkiewicz & Smith, 2014; Smith, 2004). An emergent coding strategy was used through iterative processes of open coding.

Cases were explored for within-case unique experiences and cross-case analysis was used to explore convergence and divergence (Eatough & Smith, 2017; Finlay, 2009). Early analysis involved coding for emergent content, and this coding evolved to be more abstract and thematic as data collection and analysis advanced. Coding was conducted manually with verbatim transcripts of interviews and researcher memos of significant meaning written after each interview. Manual coding was used because it is congruent with the approach of IPA and leads to an intimate familiarity with the data. Photovoice data were analyzed alongside interview data and were all expanded forms of interview content. For example, images provided visual data of concepts participants had previously described in the interview and were therefore analyzed as supplemental data to interview data but provided no new insights or themes.

Trustworthiness and reflexivity was addressed as the research was conducted and trustworthiness and reflexivity is included within the data findings. For example, transparency is demonstrated by documenting choices made in data collection and the process of analysis, as when additional interviews were sought to explore the possibility of divergent experiences for mothers that had exclusively pumped for multiple infants. Researcher memos documented decisions and the researcher kept a log of decisions and memos and these are articulated within the final phenomenological piece. Credibility is addressed in reflexive research and writing, reflective memos after interviews and during data analysis, and the use of thick detailed descriptions in the

written phenomenological text. Dependability is addressed through clear documentation and an audit trail of records. Confirmability is addressed through communication of rationale for research decisions. Finally, transferability will be addressed through clear purposive sampling and depth and richness in the detail of the written text, so the reader can consider transferability outside the study.

Phenomenological Text

The creation of a phenomenological text is the end intention for a phenomenological research question (Usher & Jackson 2014) and the current study will lead to a research monograph. To orient the reader to participant context, the text provides a profile approach to each participant, in Table 3, providing specific but deidentified information pertaining to each participant.

In the written phenomenological text, the writing itself is linked to capture the essence of the phenomenon (Usher & Jackson, 2014). Descriptions of expression remain as close to the original “texture of things” to illuminate the presence of the phenomenon and to keep the phenomenon “alive” (Moustakas, 1994, p. 53). In writing, the “phenomenological nod” is a form of validation wherein the reader recognizes the phenomenological description as an experience they could have had (Van der Zalm & Bergum, 2000, p. 212). More specifically, IPA texts can use the concept of a gem to provide interpretation and understanding (Eatough & Smith, 2017). Gems are

conceptualized as a singular remark that “jumps out at the researcher” and is a key for understanding a person’s experience and meaning (Eatough & Smith, 2017, p. 14). Gems can shine with meaning, or be more suggestive or secretive in providing illumination for a phenomenon (Eatough & Smith, 2017). In presentation and dissemination of findings, themes and essential components to the phenomenon are presented along with excerpts from participant’s narratives as support (Usher & Jackson, 2014). The product in IPA, themes and essences of the phenomenon, will be closely tied to the accounts of participants (Smith, 2017). Because of the focus on human experience, phenomenological texts can be highly engaging for readers.

Smith (2011) has proposed a quality guide for assessing IPA research papers. Acceptable papers include descriptions of the principles of IPA, transparency so the reader can see the process of what was done, coherent and interesting analysis and sufficient use of the corpus of data. Smith (2011) suggests for smaller samples sizes ($n=3$ or less) extracts from every participant are used to illustrate a theme, and for larger samples ($n>8$) at least participant extracts are used for each theme along with a measure of prevalence for each theme. “Good” papers go beyond the requirements for acceptable but are well-focused, strong in interpretation, and provide the reader with an engaging and enlightening read (Smith, 2011, p. 17). Acceptable IPA research clearly subscribes to the principles of IPA (hermeneutic, phenomenological, idiographic), is transparent, has a coherent, plausible, and interesting analysis,

and has sufficient sampling of evidence for each theme. For example, one to three extracts from the corpus could be used for every participant for each theme. Alternatively, four to eight extracts from the corpus could be used for each theme with at least three participants used as evidence for each theme. A good IPA study/text goes beyond the criteria of acceptable by also having a well-focused topic, strong data and interpretation, and engagement of the reader. Smith (2011) outlines how IPA research incorporates a wide range of skills including interviewing, rigor, and interpretive flair in writing. High-quality interviewing can expand the possibilities of the corpus. Essentially, high-quality interviewing leads to high-quality data and therefore stronger data and interpretative analysis. Smith et al. (2009) has outlined key components of quality interviews including interest in participant experiences, well phrased questions, giving the participant time to think and speak, and attentive listening. IPA texts should have a clear focus, strong data, be rigorous, give sufficient space to elaborate on each theme, have an interpretative analysis and not just description, should point to convergence and divergence, and should be carefully written with an engaging narrative. This guide was used throughout the writing process of the phenomenological text to ensure quality.

While quantitative methodologies use techniques to ensure quality and rigor, these take a different form in qualitative work. One way to include quality criteria in presentation of data is to include researcher positionality, use member checking, and to establish an audit trail (Usher & Jackson, 2014). This

study will include descriptions of the step-by-step process of data analysis and explicitly outlines decisions made in participant recruitment. These components add openness to the rigor and transparency to the processes used in the study (Dodgson, 2019). Photovoice data, in the form of photographs and stories, are included in the final phenomenological text. Photographs and narratives were screened for possible identifiers (Appendix H) and these were either remedied by photographic editing or removing personal information from narratives, or if not possible, these narratives and photographs were not presented, although they still constitute data in the analysis.

Charlick et al. (2018) is an exemplary example of the data collection, analysis and phenomenological text. In this study using IPA methodology, five mothers were interviewed for an average of one hour with semi-structured interviews. The mothers had infants and were asked questions about human milk feeding. The analysis started with reading and annotation of the first case and later emergent themes, connections and patterns. Emergent themes were clustered under a higher-order theme. Later interviews followed a similar pattern and cross-case patterns were also established and documented. One higher-order theme was “The challenge of breastfeeding exclusively” with the subthemes of “inconsistent professional advice” and “the influence of peers” within that higher-order theme (Charlick et al., 2018, p. 26). The findings section of the text is organized by higher-order themes and subthemes are explained, each with supportive data from the corpus provided. The conclusion

connects findings to other research on similar topics and takes a broader look at the findings, for example discussing the complex social narrative beyond human milk feeding difficulties that affected breastfeeding duration.

Trustworthiness

The current study addresses trustworthiness with specific attention to theory and methods. The methods utilized will be presented with specifics and exact explicit procedures used, along with justifications for their use. Reflexivity is important to address (Dodgson, 2019), and will be addressed at all stages of the research in an iterative process for transparency. Explicit use of theory is another aspect to qualitative research trustworthiness (Adler, 2022). This study uses a clear outlined theoretical framework, one that combines bioecological theory and feminist approaches. This theoretical framework is disclosed and will be frequently referenced to guide the study and is useful in a study on experiences of expression, placing attention on women's lived experiences within their contexts. Additionally, credibility will be addressed with prolonged engagement with participants and through rich descriptions in the phenomenological text to connect participant experiences as quotations to the themes. Peer review will also be used within the dissertation process, with expert researchers overseeing and consulting on the process for additional credibility to the study.

Limitations

Qualitative research has limitations. Qualitative research draws from small sample sizes, and IPA samples are biased in their homogeneity. Interview data is also filtered through the views of participants and data collection is limited to the time of the interview. Additionally, the presence of the researcher during the interview may bias participant responses and all participants may not be equally articulate. Recall for information may also be problematic, although maternal recall of human milk feeding initiation and duration is reliable and valid when recalled after a period of three years or less (Li et al, 2005).

The sample of the current study was limited in the diversity of participants. The sample was mothers that were predominately white, married, college or graduate level educated, and had high income households. The findings of the study may be unique to this subpopulation of more privileged mothers and may not represent the experiences of all mothers that exclusively express. The selection method may also present bias. For example, a subordinate theme was finding information on social media. Participants were recruited through social media so therefore they may be more likely to utilize social media for information.

This study was limited in the collection of photovoice data with low response rates from participants. This may have been due to time constraints of participant's lives and the lack of participant incentives for participation. The

photovoice data that was collected did not provide insights into additional themes of qualities of the phenomenon, although it did provide alternative forms of data to support the thematic findings of interview transcript analysis.

Another limitation was the length of interviews. Interviews lasted an average of 31.5 minutes. While this interview length is consistent with other studies on expression (Anders et al., 2023), it was shorter than anticipated. This may have been due to time constraints of participants, for example two of the participants were actively caring for infants during the time of the interview. It may also have occurred due to lack of participant incentives in the study.

Delimitations

This study focuses on the experiences of only women who exclusively express their milk to feed their infants. This study does not focus on expression for infants that are unwell or in a neonatal intensive care unit (NICU) or mothers that feed donated milk to their infants. This study does not specifically intend to study milk donation, although some participants were human milk donors. This study also specifically examines people who identify as mothers and as exclusively expressing and does not explore other identities or infant feeding methods.

Summary

The present study uses Interpretative Phenomenological Analysis (IPA). This research methodology was suitable to explore and understand the experiences of mothers who exclusively express milk. Semi-structured interviews were used using a small and situated sample of mothers. Interpretation and analysis has led to a thick description and interpretation of the essence of exclusive expression (Smith et al., 2009).

Chapter

RESULTS

Overview

This chapter begins with an overview of the structure of findings and follows with a thematic presentation. Excerpts from participant interviews are provided to capture the essence of the experience of exclusive pumping along with thematic findings.

There were three main superordinate theme findings in this study: exclusive pumping as a valid and alternative option for feeding, the exclusive pumping journey, and exclusive pumping as a significant part of daily life (see Figure 2).

Participants were different in their experiences but shared the experiences of being a mother, being over the age of 18, and having exclusive pumping experience. Table 3 is a profile of each participant and Table 1 provides aggregate demographic information. Some participants were exclusive pumping for the first time (n=8) and a few participants had multiple pumping journeys (n=2). Two participants were pumping for the first time with a second child and had used a combination of direct breastfeeding and some occasional expression for their first children. Some participants began exclusive pumping immediately after the birth of their infant and others started after weeks or months of direct breastfeeding. A majority of participants were from the U.S. (n=10) and two participants were from the U.K. All participants

were white, most were employed full-time (n=10), most were married (n=10), and most participants were college educated (n=8) or had a graduate degree (n=3), and many had an annual household income over \$150,000 (n=7).

Valid and Alternative Option for Feeding

Participants described exclusive pumping as an alternate option for infant feeding besides the more common means of feeding: formula and direct breastfeeding. For participants, exclusive pumping held meaning as a valid feeding option for sustained feeding of their infants, and was perceived as an alternative to commonly known options of direct breastfeeding or formula. Many women described issues with breastfeeding soon after the birth of their child. While many women desired direct breastfeeding as the way they had wanted to feed their baby, they saw exclusive pumping as a means of providing human milk even if direct breastfeeding was not possible. Participants described exclusive pumping as something that worked and viewed it as a valid feeding option. Marie, in comparing exclusive pumping to other feeding options simply described it as “pumping just kind of worked for us” (Marie).

Emily described the sense of relief she had once exclusive pumping became a viable feeding option:

“So, we ordered the pumps. I think we were still in the hospital when she was a day old. They came the next day, and I pumped, and we got the milk and fed her the bottle, it was the relief that I felt from not having to try and feed her. I was like, this is working, I don’t, you know. So that's kind of when I just kind

of kept going down the pumping route because it was working...she was still getting the benefits of breast milk. So, although it felt like a compromise, she was still kind of getting all the benefits that we wanted her to have so kind of just felt like the natural solution for what we were kind of wanting” (Emily). “You always have access to your milk. Yeah, it's a great alternative for those that do struggle with breast feeding. So, I know a lot of people do for many, many reasons. It's a great alternative” (Emily).

Similarly, Lauren talked about the different means of feeding a baby and how exclusive pumping could be a viable option for some and Cora discussed explicitly how exclusive pumping was an option when other feeding methods do not work out: and Cora discussed explicitly how exclusive pumping was an option when other feeding methods do not work out:

“It gave me such a piece of mind to know that I was actually feeding her something, and that she was getting the sustenance that she needed that I just we never went back to direct nursing. It felt liberating in a way because it was like you know, there is more than one way to do this, there's more than one way for me to give her my milk which was my goal” (Lauren). “Pumping is just as difficult as nursing. It's just what's gonna work for you as a mom, and your day to day routine. So never, never say never. If something doesn't work, you always have another option” (Cora).

Participants described exclusive pumping as something that allowed them to continue to providing human milk, despite issues with direct breastfeeding. They also recognized that without exclusive pumping they would likely have to feed their infants formula, a less desirable feeding option. Katie described how exclusive pumping was a feeding option that allowed her to provide human milk, something uncommon within her own family:

“My mother formula fed me, and both my siblings. My mother in law formula, fed both her children. Grandparents, like the whole way back through. My sister in law is the only one who attempted it [breastfeeding], and she is a full time, nurse. And as soon as she went back to work, she couldn't keep up. So, she stopped. So like, I'm the only one that kept going” (Katie).

With her insights into medical care, Ellie provided her thoughts on how exclusive pumping could be an option to increase breastfeeding rates:

“UK has got one of the worst breastfeeding rates in the world, and actually for a lot for some people where direct feeling hasn't worked out there definitely could be an option that they might want to consider if they wanted to” (Ellie).

Participants often talked about changing perceptions of exclusive pumping. Often in their own families, older family members recalled how pumping in general was not a viable option at the time when they had infant children but was a possibility more recently:

“Her grandparents age they, you know, pumping wasn't a thing. They weren't able to donate, it wasn't that option as well, it was just breastfed or formula fed. So a lot of people are very kind of impressed about the process now” (Emily).

While a valid and alternative option for feeding their infants, the women in this study described exclusive pumping as a difficulty. Women described their time exclusively pumping as difficult but also an accomplishment and an experience that led to an increased appreciation for their bodies. One participant from outside the United States also described exclusive pumping as a uniquely American phenomenon.

Difficulty

Women often described the difficulty of exclusive pumping. The difficulty of exclusive pumping was expressed by participants in the following ways:

“I think it's probably the hardest thing mentally I've ever done in my life, so I feel like there needs to come some personal like change in growth. With that. I

thought like pregnancy was the hardest thing I did, and then I thought like giving birth was the hardest thing I did, and now I'm certain that pumping is the hardest thing that I've done, probably physically and mentally. So I think probably some strength, physically and mentally it came from it" (Alex).

"It's something that you, you wake up every day and choose to do so. I think that's a huge accomplishment. It's not like something I have to do...If I can do this, then I can do a lot of things" (Elizabeth).

"I have some serious, serious dedication skills I did not know I had, and discipline. Discipline is another good word for pumping. You have to be very disciplined. I like now. I'm like I'm proud of myself like I did that, and a lot of people are like. Oh, I don't know how you did that like that must be so hard, and maybe it was. I don't know, because I don't have that to compare to actually nursing a child, because I, I only got like a-a week of that. Maybe so like I think like overall. It's just like wow, I did it, and I'm like proud of myself for being able to do that" (Stefanie).

In addition to describing exclusive pumping as something that was difficult, participants discussed the personal skills that they called upon through their time exclusively pumping in order to continue on with daily pumping and eventually end in a place of accomplishment.

Accomplishment

Looking back on their time exclusively pumping, participants described a sense of accomplishment. This sense of accomplishment was often tied to the category of difficult; exclusive pumping is hard and therefore an accomplishment to achieve. Lauren labeled exclusively pumping a difficult but gratifying accomplishment:

"Yeah, it's a major accomplishment. I think it's it's the hardest thing I've ever done in my entire life. It's the only thing I've ever done every single day. But I say hardest in a positive way, like it's the most challenging and rewarding thing I've ever done (Lauren)."

At the time of her interview Roz was pregnant, carrying a surrogate baby, her fourth in addition to her three biological children. Roz's experiences with exclusive pumping were unique compared to other participants because the human milk she pumped was donated:

“I feel definitely like, in a sense, a sense of accomplishment, knowing that I am a have been an exclusive pumper, and like I was able to do that because it is something that is challenging. It's not something that everyone can be successful at. And I definitely feel a little empowered. I mean knowing that I was able to help people like it gave me this sense of just kind of I don't. I don't even know the word. It just gave me this like this sense of accomplishment, I guess, knowing that I helped people by being able to pump and donate exclusively” (Roz).

Appreciation for Body

Women also described finding meaning in exclusive pumping because it gave them a new appreciation for their body. Lauren described this new appreciation and she also related the appreciation for her body as an extension of the amazement she had of her body to grow her child during pregnancy:

“The appreciation I have for my body now is like, it's incredible. I've always had kind of a complicated relationship with myself. And this summer I'm noticing I'm very much more like celebratory. And in a way that I've never been in my entire life. And yeah, I'm I'm going to the beach this weekend, and I mentioned like two or three summers ago, I was like, well, I'm done with two-pieces [bathing suits]. I'm only ever wearing one pieces. I'm going to have a baby at some point like I'm done. And I, I got a bikini this year, and my friends were like we love it, but wait a second. And I was like, you know what? I am probably the most weirdly shaped I've ever been in my life right now. I'm squishy in places I've never been squishy before, but man, I feel so comfortable, and I feel so confident. And I'm like, hell yeah! This is my body. It produced a human, and then it produced milk for thirteen months. Let's do this. So as a person that made me appreciate my body more” (Lauren).

Other participants described a similar amazement at their body to produce the human milk and sole food their babies ate as infants.

“American thing”

Two of the participants interviewed were from the U.K. Ellie provided insights into the cultural associations of exclusive pumping and pumping more generally. Ellie worked as a General Practitioner and provided unique experiences of someone working within the medical field. Ellie spoke at length about how exclusive pumping was perceived by U.K society and her own thoughts about the cultural and contextual aspects of pumping. In general, Ellie perceived pumping to be deeply tied to employment and therefore an “American thing”. Ellie described purchasing her pumps from the U.S. and perceptions in the U.K that her pumping practices were unique, something seen as odd especially when she was pumping while with her infant. It is implied that mothers in the U.S. that are employed must return to work sooner, and therefore pumping is associated with pumping at work. Ellie described her perspectives from the U.K. saying:

“I guess, in the UK we still say it's quite an American thing actually, because I think that's where a lot of the market comes from. Is that sort of like you, you have to go back to work earlier...I suppose, for like when I think about pumping, or like even like pumping at work, etc. I suppose that's probably what we think of in that, especially most women in the UK. We return to work after a year so they may be pumping occasionally, but it's sort of not quite the same demand, but not really in terms of in like individuals like I, I've known a few other people before me that exclusively pumped in the UK: but again, I think it's quite uncommon here” (Ellie).

Ellie also spoke about how her medical practice would change due to her experiences exclusively pumping. Her views of infant feeding had changed and she recognizes exclusive pumping as a valid feeding option for many women.

Little Known

While a valid infant feeding option, exclusive pumping was described as something women knew little about before the birth of their child, and something others in society generally know little about. Participants often described stumbling into exclusive pumping, implying the suddenness of using this infant feeding option, either after difficulty with direct breastfeeding, or as pumping moved from infrequent to the sole means of feeding their baby. Lauren said she “kind of stumbled into this” (Lauren) and Katie similarly recalled, “when I stumbled upon exclusively pumping, and that it was an acceptable form to feed them breast milk. I was sold” (Katie). Exclusive pumping, in addition to being something participants stumbled into, was something that was discovered, found, or something participants “fell into” (Katie). Lauren described it as “Finding that there was even this other option that I'd never considered just felt incredibly liberating and validating, and, and like exciting in a way” (Lauren).

These women stumbled or fell into exclusive pumping because they did not know much about it or had not heard of it. Individually they intentionally

set out to learn out it and try it as a feeding method. They also described how little others know of exclusive pumping including family members, medical providers, or society in general. Marie described:

“To me it's great, because breast feeding from the breast does not work for all women, but that doesn't mean you can't give breast milk. That's the way I described it to my friend, because she was, you know, a month postpartum, and just her and her baby could not figure it out. You know, her milk supply was dipping. And I'm like try this like this might work for you. So it's like. It's another really good way to feed your kid that I don't think everybody talks about and knows about” (Marie).

Ellie discussed how exclusive pumping is not “seen” in the same way as other infant feeding options and also how little her medical providers knew of exclusive pumping:

“It [exclusive pumping] just needs to be seen, I think, in the same way as breast feeding...Because I think definitely when we saw like the feeding team to begin with they sort of were talking about pumping as though it would be short term. And they'd always say to me, when are you going to stop? How long are you going to keep trying this for? And I sort of kept saying that, you know, if I have carrying on with this for a year, I will do. And they were looking at me like I was completely mad, and that's the feeding team which it's not very encouraging” (Ellie).

Overall participants revealed feeling they wished they had known more about exclusive pumping as a feeding option, but also a desire for it to be widely known in general society and also by their family and medical providers.

Donation Specific Meaning

Some participants (n=4) donated their human milk to formally organized milk banks or to informal milk sharing networks. While these

participants found meaning in exclusive pumping as an accomplishment, a valid feeding option, something difficult and something that led to increased appreciation for their bodies, the participants that donated their human milk also described finding meaning in their donation:

“I feel like I'm giving something back [donating breast milk] and hoping to help the little babies, and it doesn't feel like it's any extra stress on my end to help. So, kind of it makes me feel good” (Emily).

“It was a lot of warm, fuzzy feelings from her, because it was just like I was able to help her reach that goal like, even though it wasn't her milk anymore, she still was able to get her daughter to one year because I was able to supply that for her, and that was two hundred ounces” (Katie).

Motivation

Participants described a wide variety of reasons for exclusive pumping. Overall, the original motivators and reasons for initiating exclusive pumping continued to be motivators for continuing on with exclusive pumping. The most common reason for initiating and continuing on with exclusive pumping was issues with direct breastfeeding shortly after birth. This reason is tied to the superordinate theme of exclusive pumping as a valid and alternate option since it allows for human milk feeds even when direct breastfeeding is not an option.

One motivator discussed was the idea of human milk as best nutrition. For women who had wanted to directly breastfeed, exclusive pumping was motivated by the desire to provide human milk even if direct breastfeeding was not possible or desired. Some women discussed the health benefits generally

and others discussed specific health benefits associated with feeding human milk like Ellie:

“Well, I suppose I-I knew I wanted to breastfeed in terms of it, being as for her, like, I think, nutritionally, things like risk of future diseases, I guess, like being in medicine, I knew that it could affect risk of things like asthma and diabetes and allergy, etc. So I was sort of absolutely desperate to make sure she had breast milk, and also things like the antibodies, that she would get the milk kind of reducing her risk of infection, etc., for the first of year or so of life as well. So, I think that was why I wanted to give a breast milk” (Ellie).

In addition to health benefits, women discussed being motivated to start or continue with exclusive pumping because it was associated with their infant’s general growth like hitting milestones, gaining weight, or generally thriving. When asked her motivation for exclusive pumping, Cora answered:

“Oh, primarily feeding my daughter, I mean, knowing that she's only four months, and I have a goal, hopefully, a goal of feeding her till one. It's partially the satisfaction of being able to see her grow and like, just get super chunky just from like my breast milk, which is really weird. but it's-it's obviously it's for her. I mean. I wouldn't be getting up at 12 am every day for anybody else. So but yeah, it's-it's definitely a rewarding task as a mom to struggle with the time stamps of everything. But knowing that she's getting like big and strong, and she's hitting her, you know. She's in my case, you know, my daughter's like in the 95th percentile of her age range, and her being like a female baby and like hearing that from my pediatrician is like, yes! you know, like she's doing great! like, keep going. So yeah, for sure, for sure” (Cora).

Similarly, Ann described:” Just seeing her progress like I know that she is getting quality food intake and she's meeting milestones when she should be. So that's-that's always nice to see” (Ann).

In addition to other motivators, women discussed starting or continuing with exclusive pumping because it helped protect against illness. Lauren described “I saw that, you know she had a really solid immune system, and I

don't know if it's because of the breast milk. I have no clue, but part of me likes to think that maybe it was” (Lauren). Participants also discussed how their infants were ill less frequently than they expected or when ill had less severe symptoms and this was often discussed in relation to human milk feeding. Katie described “Every time they get sick. And on the list it says, if your child is not breastfed, their symptoms could be more severe, and I'm like, all right, it could be worse” (Katie).

Another motivator for starting or continuing with exclusive pumping was the cost of formula. Some women discussed the cost of regular formula and others discussed the even higher cost of specialty formula for infants with medical conditions. Ann described the \$12 a day specialty formula her infant would need due to a dairy allergy being a large motivating factor for her to continue with exclusive pumping.

Another motivator was the contextualized issue in finding formula during a formula shortage or potential formula shortage. Emily described her fears of trying to find formula “Sometimes there are formula shortages as well. That's what absolutely terrifies me of having a formula fed baby and being able to find formula” (Emily). Lauren also described potential formula shortages as a motivator for exclusive pumping “And you know I forgot to mention another reason we did [exclusive pumping]. This is because we had our baby during the formula shortage. So it was like, do I want to be searching for formula on ebay?” (Lauren). Three participants described the formula shortage as being a

motivator to start or continue exclusive expression. In addition to those that were motivated to continue exclusively expressing due to the formula shortage, Marie had already started the weaning process when the shortage started and while the formula shortage had not been a motivator for her to start or continue exclusively expressing, it created problems when she needed to supplement her frozen milk with difficult to find formula.

While many participants transitioned from trying to directly breastfeed to exclusive pumping and saw exclusive pumping as a long-term way to provide human milk, one participant recounted how exclusive pumping was at first a short-term feeding option during illness. For Alex exclusive pumping was first a means to getting through a time of illness but it became long term:

“I actually developed thrush back to back. I couldn't kick it. I had thrush for about a month. So, when I first got thrush it was just too painful to nurse, and I started pumping. It was still extremely painful, but less so, and I told myself I would go back to nursing after the thrush cleared up, and it was a little bit less painful. But the thrush persisted. For almost a month. I had 2 rounds of, you know, medication, and like ointments and all the things. I just couldn't kick it. and I finally got rid of it around, maybe, and maybe at that point she was like five or six weeks old. and I was so used to pumping, and I was a little bit shell shocked from the whole experience that I just didn't really go back to nursing. And I just continued pumping. And now it's six months later” (Alex).

Other participants described maternal illness or an infant's lip or tongue tie as a motivation to use exclusive pumping for feeding, although these other participants saw exclusive pumping as a long-term option, while for Alex it started as temporary and later became her long-time feeding method.

For the participants who donated their milk, their milk donation was something that motivated them to continue exclusively pumping. This was not

described as the primary motivator or reason to initiate exclusive pumping, but rather an additional bonus in addition to other motivators. Roz's experience was divergent from other participants because she had experience with exclusive pumping after surrogacy and donation was a motivation for pumping but not feeding.

“So there are definitely multiple reasons for me. Number one is knowing that it helps your postpartum recovery, especially being a surrogate. I don't have a baby to take care of like I don't have that sense of purpose that new moms have after they deliver. So it kinda helps. Knowing that. Okay, I have a routine that I have to follow. I have to wake up. I have to pump. I have to do this. I you know I have this to take care of, so it gives me something to focus on, since I don't have a baby to take care of. It kind of helps that mental health aspect. I believe. It also helps your body recover more quickly, you know, helps your uterus get back to normal size. Things like that just, you know, the same as exclusively nursing would. And then, also, knowing that I'm able to donate that milk and help babies really is like a huge motivator for me” (Roz).

Participants also described how exclusive pumping allowed other caregivers, like partners or family, the ability to bond during feeding. They recognized exclusive pumping was different from direct breastfeeding in this way. While sharing feeding motivated continuation with exclusive pumping, it was not described as a reason exclusive pumping was initiated, but rather another motivator once exclusive pumping has already started.

Emotions

Women described the emotional meaning they had with exclusive pumping as being a mixture of positive and negative emotions. The emotions they described were opposed even within the same moment and their emotions

connected to exclusive pumping also changed. Participants often associated negative emotions such as frustration with their early days of pumping but later associated being proud later on in their exclusive pumping. Participants recalled these mixtures of emotions in the following ways:

“I think, a mixture of feelings, and I feel like you're sort of nurturing, and you're nourishing, you're loving, caring for your baby, but also it is a bit of a pain. So it is that sort of balance, I think, between, like the that side of things that you feel like you're doing your absolute best and you feel so proud of yourself for doing that. But at the same time you sort of like oh do I really have to put this back on? Do I really have to wash them out again? Do I really have to sterilize again? And it's sort of like that dual kind of thing” (Ellie).

“I have a love hate relationship around pumping, really. Glad. It allowed me to give my my daughter breast milk, but I also like hated every second of it. If that makes sense. So they almost all like stand out as something I-I didn't enjoy doing, or don't enjoy doing” (Alex).

Mixed emotions were also described as: “It's [weaning] very like bittersweet, but also freakin relief. Really, I can actually spend time with my kid not being hooked to a pump” (Katrina) and “So you know, a roller coaster of feelings” (Marie).

While participants recalled mixtures of emotions, overwhelmingly the most common and consistent emotion women described in relation to their pumping journey was being proud. A majority if participants, 11 of the 12 participants, used the word proud or pride in their descriptions of emotions. The only participant that did not describe a sense of pride had difficulty putting her emotions about her accomplishments into words. Table 4 provides example excerpts of how pride was described by participants. Participants described being proud as they looked back on their time and accomplishment

of exclusive pumping, and this was more evident for participants that were weaning or about to begin weaning. Participants also described pride from their support such as family or partners and they described a double feeling of pride; pride for all they accomplished in their exclusive pumping and pride that this was recognized in their social support. For participants that donated human milk, they discussed being proud of their donations as well.

In addition to being proud, participants also communicated other positive emotions including (in order of occurrence): relief, accomplished, love, calm, peace, feeling good, happy, empowered, liberation, validation, excited, rewarded, joy, freedom, and being glad. Emily described how her time pumping in the middle of the night was a peaceful time to herself:

“Yeah, its just kind of the same routine. Repeat. I mean, it's good and bad things that I mean pumping- I mean, I used to like my middle of the night pump, because I never had to worry about doing anything else at the same time. So I knew she was sleeping. It's kind of calm and peaceful. It's kind of like my alone time. But I dropped my middle of the night pump. I think about six weeks. So I kind of lost my little peaceful bubble, but that was always my favorite pump of the day. It was just my little time to myself, and just washing up all the parts at like 4 o'clock in the morning.” (Emily)

Emily also provided a photovoice response to visually illustrate this peaceful time (Figure 3) and it captures the image at night of her pumped milk with her infant sleeping in the background.

While participants detailed positive emotions associated with exclusive pumping, they also articulated negative emotions (in order of occurrence): frustration, stress, embarrassment, guilt, anxiety, sadness, worry, moodiness, depression, and anger. Overall, these negative emotions did not dominate but

were described as being balanced with the positive emotions. Often these emotions changed over time. For example, Ann recounted feelings of shame early on in her exclusive pumping, especially when pumping in public spaces but described “but that was quickly resolved, because I think, after you have a baby, all your dignity kind of just goes out the window, anyway” (Ann). Some participants recalled negative emotions as they decided to begin weaning, and often guilt was the emotion that was indicated.

Overall, participants reported experiencing a balanced mixture of positive and negative emotions. There were divergent experiences for the time in which these emotions were experienced within the timeline of exclusive pumping. For example, some participants reported feeling stronger feelings of guilt when they moved from direct breastfeeding to exclusive pumping, other participants reported feeling intense feelings of guilt as they made the decision to wean from exclusive pumping.

Alex had a divergent experience of emotions when compared to other participants. To Alex, exclusive pumping was predominately associated with negative emotions. While she did experience some positive emotions including the common experience of being proud, she largely described her negative emotions associated with exclusive pumping. Alex described that pumping had “a visceral negative reaction or emotion also comes with it” (Alex). Alex suspected she may have dysphoric milk ejection reflex (DMER), a more recently recognized topic in lactation which causes negative emotions during

lactation that can range from low mood to more extreme low mood including suicidal thoughts (Frawley & McGuinness, 2023). While Alex's emotional experience with exclusive pumping diverged from other participants, it is important to note due to her suspicions of DMER which has prevalence rates of 9.1% for breastfeeding people (Ureño et al., 2019).

The Exclusive Pumping Journey

The second superordinate theme is the exclusive pumping journey. Many (n=7) participants used the word journey when describing their time exclusively pumping. Women described how their plans for exclusive pumping, their goals for feeding, and their supply changed during their time exclusive pumping. Lauren explained why she used the word journey to describe her time exclusively pumping:

“Yeah. So journey is the word that I like to use, because number one, because my emotions kind of changed over time, because I gained more knowledge over time like it felt very much like a growth process rather than just kind of like a thing. You know people talk about like their fitness journey and how they how there's like a starting and ending. And you know all the ups and downs that came in between. And that's kind of how I framed pumping for myself is that it felt very much like I was learning a little bit every step of the way” (Lauren).

Exclusive pumping was seen in retrospect as a time of change. Lauren used the word “learning” and other participants described similar concepts of discovery throughout their time exclusive pumping.

Emily described the changes she experienced between starting with exclusive pumping and where she was at the time of the interview having exclusively pumped for nine months.

“It's definitely felt like a journey. We started in one place, and we ended up in another place and kind of gone down this path to get there like at what point I was worried that I would have just enough milk to get through the day to now having loads of excess milk that I don't know what to do with it, and going from pumping you know, six, seven, eight times a today to five, pumping in the middle of the night and having my own bubble to not-then dropping that pump. It's definitely, you know, developed over time. It's definitely been a journey” (Emily).

While journey was the most commonly used word as a metaphor for their time exclusively pumping, some participants used other terms. Emily and Stefanie both described the “path” they took and other participants used terms such as something that was “navigated” (Ann) or something that was learned (Lauren). A common pattern for the exclusive pumping journey was the account of the journey getting easier over time. Lauren recalled how early on with exclusive pumping she experienced clogged ducts and difficulty pumping while also caring for her child. She recalled the first three months as “they all kind of meld into one big memory” but later “it [exclusive pumping] got better, and it got easier, and I-I don't know what changed, but it got easier at that point” (Lauren).

Plans for Pumping

One of the aspects of the exclusive pumping journey that changed over time was plans for pumping. While a few participants anticipated and planned

to exclusively pump before the birth of their infant, others had only planned to pump occasionally, for example when returning to work. Many participants described planning and wanting to directly breastfeed but knew they would pump at least occasionally when returning to work or when separated from their infant. Emily describes this common experience of participants:

“Yeah, that was after [she learned about exclusive pumping], that was when breastfeeding had failed. We-I hadn't planned to pump until she was six weeks old, and to breastfeed, and bottle feed breast milk to kind of have that balance between me and her dad feeding her. But we just struggled with feed-breastfeeding, so early that we just went to exclusively pumping” (Emily).

Participants described how their plans for pumping changed. Exclusive pumping was recalled as something participants did not know about at all before the birth of their infant, or something they knew about but were not planning to do. A common trajectory for participants was that plans changed with direct breastfeeding, moving to plans of exclusive pumping with the discovery of it as a viable feeding option when direct breastfeeding was not.

Goals that Change

Plans for exclusive pumping changed for participants, moving from an unknown option or known but unplanned option, to a plan for the method of how they would feed their baby. After initiating a plan for exclusive pumping, participants changed their goals for exclusive pumping throughout their journeys. Participants detailed how regardless of what their original goal was, they reassessed their goal throughout their pumping journey. Reassessment

sometimes led to shorter goals for exclusive pumping, sometimes longer, and sometimes retaining goals consistently; there was not a specific pattern of goal changes that was reported across participants. Lauren described how her original goal of infant feeding was direct breastfeeding, but her time goal of providing human milk remained the same when she began exclusive pumping.

She also recounted how she reevaluated her goals every three months:

“Before she was born I had planned to directly nurse her for the first year. That was my whole goal. As soon as I realized that was not going to work, the goal became to pump for the first year. And give her the pumped milk for the whole first year. So giving her the breast milk goal, like didn't really change it. Just the vehicle changed. And then I think once I got a little bit further into pumping, I decided to re-evaluate like every three months to see if I wanted to keep going and I kept finding that I did” (Lauren).

Elizabeth also explained her reassessment that led to changing goals: “So it [the original goal] was six months, and then I realized, like, I guess I don't know too much about kids, and they're eating habits, but that it's month five, and we just started purees and he's barely eating those. So, we're going to push this to a year.” “My goal is a year. If I go a little less than that, I'll be fine because I have a huge freezer stash since I have an oversupply” (Elizabeth).

Katie explained how her exclusive pumping journey ended suddenly with her first child despite her goals to continue:

“So I exclusively pumped for my oldest for, it was ten and a half months and the only reason I stopped was because I had gotten pregnant with my second, and my supply dropped. And now I've exclusively pumped the entire two months for my second” (Katie).

Marie recounted how illness impacted her goals for exclusive pumping and how her reevaluation led to a longer duration of exclusive pumping:

“Then actually, so one special case with that was so right after I went back to work right before my son turned four months. Unfortunately, he caught RSV. And he caught- not THE Coronavirus, but another Coronavirus, and because his lungs were badly damaged, he was susceptible, and he got a secondary

bacterial infection that ended up in the hospital for a week. So, me being able to pump was amazing because and already knowing it, because, like he couldn't breastfeed, he barely could breathe. He wasn't really eating much, but I was glad that I could pump, and I could store it, and when he did want to eat he was getting breast milk because I was sick with the same thing he had. So, he was getting my antibodies and all that kind of stuff, so that, I think, is actually what kept me pushing to it to six months, and now was knowing that he's in daycare now, and it's all like, okay, no matter what. He's probably giving it to me or making antibodies. So, the fact that I could keep doing that, and I knew over the summer, and who he was going to be home with me, hopefully, he wouldn't get as sick" (Marie).

Stefanie recalled how her goal was extended based on the perceived ease of continuing the exclusive pumping routine she already established:

"My first goal was six months and then I said, let me- I think then I had like a really good routine going, and I was like I'm gonna continue. I'm gonna try, and I'm gonna go to a year. And once I got to a year I was like I'm just gonna coast it" (Stefanie).

While some participants had clear goals defined by time spent exclusively pumping or providing human milk in some way (recently expressed for previously frozen) other participants had more ambiguous goals. Some participants were unclear of their goals or were considering their goals at the time of our interview. Emily described how her goals for exclusive pumping were dependent to some degree on her child:

"So, I want her to have milk until she's about eighteen months. But obviously I know that's dependent on them a little bit. Sometimes, let's say, kind of reach a year. They start not having an interest in milk. So we're gonna kind of follow her lead a little bit when she's ready to finish. But ideally, we want her to have at least a little bit a day until she is about eighteen months" (Emily).

Roz was the participant who was pregnant with a surrogate at the time of the interview. She was considering how long she wanted to exclusively

pump based on future plans such as travel and this was based somewhat in part on her past experiences with exclusive pumping:

“We're supposed to go to Jamaica next June, like for my husband's birthday. And so I'm like thinking like, Do I want to be pumping during these trips, because, like I pumped on our honeymoon, we got married in October of 2021, and we went to Barbados for our honeymoon, and I would take my willow [pump] with me down to the beach, and I'd sit there and pump while I'm catching some rays like do I really want to do that again? So I'm like torn for how long I want to do this time. Because I know it does make a big difference and I really would like to help people again. I just don't know if I how long I want to help people, or if I want to get back to normal life because this is my last surrogacy journey, and I don't want to necessarily make my entire life about pumping for the next year or two. So I don't know” (Roz).

Alex was also considering her goals at the time of our interview:

“I don't know -well I my ultimate goal in the beginning, before I knew any better. My goal was to pump until six months, and then have enough milk in the freezer to get her to a year. Like that would have been an ideal scenario before I realized how hard it is, and that you have to produce the literally double of what your baby eats in a day in order for that to be true. So I actually have two freezers full of milk right now. I like worked really hard to stock away as much as I possibly could, so I probably have, like two or 3,000 ounces in the freezer that doesn't last that long. But I could comfortably stop right now and combo feed her, probably until a year. So that's my like decision. Now, if I'm gonna go with that, or if I'm going to keep going is having three pumps a day is not horrible like I've been in a really bad place. I'm in a decent place right now like it's annoying. But that's like the worst emotion I feel right now. I'm really annoyed every time I have to do it. But I'm not miserable. So I'm like, do I just keep this annoyance in my life for a couple more months until eight months nine. I don't know” (Alex).

It is important to note that while the themes of plans for pumping and goals may overlap, they differ. Plans refer to whether or not exclusive pumping would be a feeding option utilized, whereas goals are the specific aims for that feeding option, usually described in terms of a time goal in months age of a child.

Supply

Participants often described their supply of milk. Three categories of supply were described: oversupply, undersupply, and just enough or being someone that is a “just enougner” (Ann). Supply was often described as something inherent, the amount of milk their body produced. Some participants did describe efforts to change their supply by controlling an increase or decrease. Some participants were weaning and aiming to decrease their supply, others were attempting to increase their supply and produce more milk.

Oversupply was valued by participants as it provided more than the amount of milk an infant would need on a daily basis, allowing for the creation of a freezer stash of milk and/or donation of milk. Elizabeth described how she valued her oversupply of milk: “I’m very blessed of having an oversupply, and I’m lucky” (Elizabeth). Participants with an undersupply had differing views on their milk production. Some were pleased with a decrease in supply because it was a goal in weaning, others were disappointed because they were not producing the full amount of milk they wanted. Similarly, those that produced just enough for the average intake of milk for their infant had mixed perspectives, some pleased and others desiring more production.

Overall, participants described how their supply changed throughout their pumping journey. Early on in the pumping journey and especially in the

first days after birth, participants reported a very low supply before their milk came in.

Daily Life

The third superordinate theme was exclusive pumping as something deeply intertwined with women's daily lives. One manner exclusive pumping was ingrained in daily life was the aspect of scheduling. Exclusive pumping was described by participants as having a schedule to manage, among other schedules of daily life. Katrina described this schedule in relation to a baby's schedule and how there are two schedules to follow: "You're essentially following two schedules, you're following your pumping schedule. And then, whatever their [baby's] natural rhythm is for eating" (Katrina). Similarly, Ellie described how the schedule of exclusive pumping could potentially come to dominate life if not meshed with other aspects of daily life:

"I suppose also like not letting it dictate your life and maternity leave, and potentially sort of like plan your schedule for the day before the pumps and then actually trying to think in your head I suppose it's morning when you're going to fit the pumps in rather than vice versa because otherwise I think you could very much end up just like not leaving your house or going out" (Ellie).

Cora described how her schedule of exclusive pumping was added effort because she was pumping while also entertaining her child, showing the layering of exclusive pumping with other aspects of her daily life:

"I actually have to almost like do double the work, because I'm trying to keep her entertained while also making sure I'm hitting my like time marks throughout the day to make sure, like I keep up with my supply" (Cora).

Alex similarly found caring for her child while simultaneously pumping to be difficult: “It was really hard to juggle taking care of her and pumping at the same time” (Alex). This experience highlights a key difference between direct breastfeeding and exclusive pumping. With exclusive pumping expression may occur at times separate from when an infant is feeding, adding a separate element to the process requiring caring for an infant at the same time as expressing.

Another way exclusive pumping was ingrained in daily life was the time-consuming nature of putting on, wearing, and monitoring pumps along with storing and managing milk and also cleaning pump parts and bottles.

Katie described how this process of preparation, pumping and clean up led her to feel she was constantly pumping:

“I do the pitcher method. I'm dumping that into the fridge quick, washing pumps and then getting ready for the day, and then, by the time that I feel like I had a chance to sit down, I'm pumping again” (Katie).

Lauren described the advice she would give someone considering exclusive pumping as a feeding option. To her, pumping was something that her life revolved around although it became easier as she decreased the number of sessions she pumped per day:

“Then accepting the fact that really accepting that-that this is going to rule your life for the amount of time you decide to pump your entire life is going to revolve around your pump times. Really, the thing that made pumping easier was being able to drop sessions. realizing that I could still produce the right amount of milk. Yeah, right for us made it so much easier because I could schedule out, you know. Here are my six pump times a day. Okay, you know, everybody knows this is my schedule, and I could start planning my life again,

and I can start sleeping again, and it just it made the pump not seem like so much of a chore” (Lauren).

Exclusive pumping was also embedded into daily life as it made navigating employment more difficult. When asked what would make exclusive pumping easier, Katrina recounted the logistics of her work life as a major barrier:

“If you do a job that is not centered around patient care. I think that would make it easier, just because, like with my job, I work out patient PT [physical therapy]. And patients, if they don't show up on time, like you may have it scheduled on your schedule on like okay, this is the time I'm going to pump. But like this patient shows up half an hour late. It's going to affect like everything. So, I think having a job that is not centered around other people's schedules as much like if I had a job where I could be like, okay, I can take twenty minutes and just kind of turn off the computer for a couple of minutes and like, go do my thing and come back. I think that would make it easier” (Katrina).

Similar to how exclusive pumping was framed as a consideration of multiple schedules (infant and pumping), Katrina’s perspective adds another schedule that has to be considered on a daily basis, employment.

Another way exclusive pumping was embedded into daily life was the role it played in women’s sleep. While caring for an infant or young child may be associated with decreased sleep for parents in general, women in this study discussed how exclusive pumping impacted and interrupted their sleep. The impact on sleep was discussed as most negative during the early part of the pumping journey and was described as less significant the longer into the journey women were. The schedule women had for their daily pumping often required waking up in the middle of the night, often multiple times per night to

pump. Later in their pumping journey participants reported “dropping” (Stefanie) this pump session leading to less impact of exclusive pumping on sleep. Ellie described the extreme way exclusive pumping impacted her sleep: “I suppose right at the beginning my supply was rubbish. I was just pumping sort of almost constantly, so it was like sixteen times a day, which is ridiculous, so I wasn’t really getting any sleep” (Ellie).

Support

Participants reported varied practical support from lactation professionals when it came to exclusive pumping. Lauren outlined how she received minimal support from hospital staff, and while her pediatrician’s office provided additional support, ultimately, she felt she was supporting herself rather than receiving outside support from medical professionals:

“So they umm sort of. I have had a rocky road with pumping, because they [hospital staff] kind of gave me the quick one-two. Here is how you put it together. Stick it on and go. They didn't tell me really how to set my settings. They didn't give me a lot of guidance into, really what I what I would be doing. They told me at some point. I remember her telling me to put the the bottles in coffee mugs so they didn't tip over. And at the time I was like, Oh, okay, that makes sense. And now that I'm you know, 13 months removed from that conversation, what do you need coffee cups for? So it was...it's very... when I reflect on the early advice I was given, it's very confusing to me. So no, I would say in the hospital they really didn't teach me a lot about my pump. Thankfully my pediatrician has a lot- has a great staff of lactation consultants, and they gave me a little more advice. They... it still definitely was not as helpful as I would have expected it to be. It still felt like I was doing a lot of this by myself” (Lauren).

Similar to Lauren, Stefanie discussed that even after asking for support with a question about in her flange size, the piece of a pump that sits against

the breast, hospital staff provided information that she later found to be inaccurate:

“When I was at the hospital, I was like, hey, could you tell me what flange size I am, and they’re like oh you’re a standard size, and I was like, hmm okay, and I just- they're professional. So, I just went with that information, which was not the correct information” (Stefanie).

Lauren described her advice to those considering exclusive pumping and she views direct breastfeeding as something with a different set of clinical knowledge than exclusive pumping:

“Don't just trust like the lactation consultants simply because they're lactation consultants. They know a lot about breastfeeding. They don't always know a lot about exclusive pumping, because that's a whole different beast” (Lauren).

While Lauren and Stefanie described receiving minimal support for exclusive pumping, Ann described the hospital staff as providing discouragement towards exclusive pumping:

“I did use a hospital grade suction pump in the hospital just because breastfeeding wasn't working but they were very much discouraging the pumping aspect. I'm not sure why. It might have been just because they didn't really know much about it. But we had two different lactation consultants come into the room, and they were not very encouraging of the pumping situation” (Ann).

Cora is a case of varied support due to her multiple experiences with lactation professionals. She had a lactation consultant in the hospital after the birth of her child and also hired a lactation consultant later. These two experiences of lactation support differ:

“But the second I tried that hospital grade pump I was like, kind of like okay, this is for me like it- just it- it felt right because I was producing for her like before I left. I felt like I got a lot of positive feedback from the lactation consultant at the hospital” (Cora).

“I think that it made me really proud that I was able to figure that out on my own even after hiring a lactation consultant, and not really getting exactly what I needed from that person who I thought would be, you know my savior, so to speak” (Cora).

Cora’s two different experiences with professional lactation support highlight the variation of knowledge of exclusive pumping for lactation professionals. In addition to mixed perceptions of lactation professional knowledge about exclusive pumping, in Cora’s experience there was not an element of individualized care to provide support to her infant feeding.

While professional lactation support was varied and participants indicated differing experiences with professional lactation support, there was consistency in accounts of family and partner support. While lactation professionals were expected to provide logistical and clinical support, family support came in the form of emotional support.

“My husband is supportive. He saw how difficult it was to nurse. So, even though I was upset in the beginning to have to pump and give up nursing, he was like- just pump like just like he didn't understand where I was coming from. But he's really supportive” (Alex).

“My mom was at my house, and you know she watched me put the things on the first time, and she was like ‘this is hilarious’, first of all, but throughout the whole year she's been very kind of my champion, and she's been, you know, ‘this is your liquid gold. We've got a protect it’, and you know, if my daughters supposed to spend the night at her house, I bring her frozen milk, and she's like, ‘okay, tell me exactly what to unfreeze, because I don't want to waste any of the liquid gold’, and she's very, very supportive, and my husband's the same way. My husband, you know, like I mentioned he was the one that had the idea for me to do it. And that same day he was doing research on like what types of- you know other things you need that I didn't even know like a pumping bra, I didn't know what a pumping bra was, and he went to Target and saw it hanging, and he was like, ‘hey, maybe you could use this’” (Lauren).

In contrast to receiving positive emotional support from family and partners, participants communicated that they themselves were sources of positive support for others who exclusively pump.

“But yeah, I'm very loud about my pumping because I'm a big advocate because of the hospitals not giving that option. And I want people to know that, like I, I, my friends, who are having babies who are first-time Moms, I tell them, like don't be scared to pump or like. Learn about it now, or be ready” (Elizabeth).

“I will kind of advocate for it, because it was a huge benefit to me, especially in those early days, that you're very mentally up and down, anyway. And it just was such a huge relief to me. So I'm very kind of- I try to be quite loud about it. You know to anyone who will listen” (Emily).

“Yeah, one of my best friends actually had a son three weeks younger than my daughter. So I helped her a lot with like pumping and what to do and how to like, get on a schedule and a routine. So I helped her a lot with that” (Katrina).

“I was like one of my first friends that I knew, like of my friend group that exclusively pumped. But then once it it got out, a friend of mine who had her baby, after that she was having such issues stuff like that that I talked about it. Now she is exclusively pumping so like, just because she knew that I had done it” (Marie).

Participants shared parallels in their desire to be a source of support to others. For Elizabeth and Emily this was a more general support speaking up and advocating for exclusive pumping. For Katrina and Marie their support was specific for someone in their life that they knew was exclusive pumping.

Finding Information on Social Media

In their daily life, participants detailed various ways they sought information about exclusive pumping. Participants (n=10) reported they turned to social media to answer questions or find support. A variety of social media

platforms were utilized including Facebook, Instagram, and YouTube. A few participants described consulting organization websites like the World Health Organization and the American Academy of Pediatrics in addition to social media support.

Multiple Pumps

Most participants described owning or renting multiple pumps. Often this was for different purposes, for example a smaller and more portable pump to use while traveling and another pump for home. Some participants had multiple pumps to use in different locations such as at work and home or in different parts of the home. Katrina, when describing advice for exclusive pumping outlined her process of rotating pumps and parts to always have clean and ready pumps for the next pumping session:

“And have, like at least like two to three pumping kits, as weird as it sounds like I said I had a pump in different spots. Have you like three pumping kits, and you can kind of like, rotate through them as you like wash them like each day. I would like go through and just wash stuff. But I had the next pump set already clean and ready for me, so I just swap that out, and then you just create almost like this like cycle of stuff. So it just made it easier” (Katrina).

Participants described how multiple pumps allowed for easier integration of exclusive pumping within daily life. Multiple pumps often served different functions, for example some participants had pumps for public use that were more discreet and pumps at home that had stronger suction.

Pump Features

Participants discussed the features of pumps that they valued the most for their exclusive pumping journey. The most common feature discussed was portability, meaning a pump that did not need power from an electrical outlet. Some women described desiring more portable pumps to be able to move while pumping. For some participants this was desired for pumping while caring for a child, for others portability was desired for integrating daily pumping sessions with employment.

“I still wanted something small and portable that I can just throw in the diaper bag, or I can wear around the house. I can clip it to my pants. The mobility. I think the mobility, once your child starts moving, you need to be able to move with them, and I can't be stuck to a wall or carrying around a huge breast pump” (Stefanie).

Stefanie articulated how a portable pump was important in integrating pumping into her daily life, as her child developed and became more mobile.

A few participants described how pumps powered by an electrical outlet were more powerful than those that used batteries. They described valuing the higher suction despite the lack of portability. Another attribute of pumps that participants found important was the sound volume the pump produced during use. For some participants, a quieter pump was important as a component of having discreet pumping sessions. Elizabeth provided an image in the photovoice follow up to her interview, showing how she pumped between work meetings so the sound of pumping could not be heard in the background (Figure 4). Another attribute was the appearance of the pump

when used. Participants described valuing pumps that appeared more natural when worn. These pumps were typically cone or dome shaped cups that were worn inside a bra, as opposed to pumps that stuck out and hung down when worn. The material of pump parts was also discussed, some participants desired flanges that were specifically silicone or non-silicone. Flange size options were also discussed. Some pumps were only available with one or two flange sizes, participants described valuing pumps with a wider variety of flange options. Participants also discussed the cost of pumps as important and also the cost of replacement parts. Finally, the volume of collection cups was an important feature. Some pumps have a maximum capacity that was lower than what a participant pumped in an average session and pumps with higher volumes were valued.

Mental Load

The mental load of exclusive pumping was a component of daily life for the participants in this study. The schedule of pumping sessions, managing and storing human milk, cleaning parts, and planning the pumping journey were just some of the aspects that women in this study discussed constantly thinking about. Alex described how while pumping was difficult physically, it was also mentally difficult.

“I think it's probably the hardest thing mentally I've ever done in my life, so I feel like there needs to come some personal like change in growth. With that. I thought like pregnancy was the hardest thing I did, and then I thought like giving birth was the hardest thing I did, and now I'm certain that pumping is

the hardest thing that I've done. Probably physically and mentally. So I think probably some strength, physically and mentally it came from it” (Alex).

To Alex, while exclusive pumping was difficult, her exclusive pumping journey was also a source of pride and strength and had deep meaning in her life.

Summary

In summary, these findings suggest that mothers exclusively pumping find exclusive pumping to be a valid and alternate form of infant feeding and something that is difficult to do therefore an accomplishment they are proud of. Throughout their time pumping they see themselves as being on a pumping journey, learning and discovering as they go. Exclusive pumping is deeply embedded in their daily life and while they seek support for their own journey, they also see themselves in supportive roles for mothers exclusively pumping.

Chapter

DISCUSSION

Overview

The research questions that guided this study were:

1. What are the experiences of mothers that exclusively express their milk and what meaning do these experiences have?
2. What reasons do mothers report for the decision and sustained practice of exclusive milk expression as an infant feeding method?
3. What meaning do mothers attribute to exclusive expression in terms of the duration that this infant feeding was practiced?

Experiences and Meaning

The first research question for this study asked the experiences of expression and the meaning of these experiences. A main superordinate theme was the concept of exclusive expression as a valid and alternate feeding option. For women in this study, providing human milk was a feeding goal and exclusive expression allowed for achievement of that goal when direct breastfeeding was not possible or desired. Other studies have found exclusive expression to be a “best option” (Anders et al., 2023, p. 99) or as a “solution to a problem” when direct breastfeeding did not work (Fan et al., 2022, p. 152). The consistency of these findings across literature suggests that while some

mothers have not heard of exclusive expression before the birth of their infant (Jardine, 2018), it may be an effective and sustainable way to provide human milk, in line with health organization recommendation such as the WHO recommendation of expressed human milk as a second option to direct breastfeeding (WHO, 2009).

The women in this study reported mixed emotions about exclusive expression. Other research has found similar findings, for example Anders et al. (2023) found that women described a “love-hate relationship with pumping” (p. 99). In the current study, exclusive expression was described as something difficult but also something women felt was an accomplishment. Additionally, women in the current study detailed the positive emotions, as well as negative, that they associated with exclusive expression. While other research has described the negative emotions associated with breastfeeding generally or specifically with exclusive expression, little research has focused on positive emotions. This study finds that while there are negative emotions associated with exclusive expression, such as frustration, there are also consistent positive emotions. In the current study all participants except one (n=11) described their exclusive expression as something they had pride or were proud of. Additionally, other positive emotions were recounted including; relief, accomplished, love, calm, peace, feeling good, happy, empowered, liberation, validation, excited, rewarded, joy, freedom, and being glad. These positive experiences suggest while other research has focused on the negative

emotions of exclusive expression, there are also a wider variety of emotional experiences, including many positive emotions.

Another experience of exclusive pumping was women described developing a new appreciation for their bodies. In a study of psychological outcomes after childbirth, Berman et al. (2021) found a majority of women surveyed reported psychological growth after the birth of their child. In studies more generally with mothers breastfeeding, other research has suggested that women feel amazement at the body's ability to produce nutrition (Stearns, 2009). While some research has emphasized body dissatisfaction in the general post-partum period (Hodgkinson et al., 2014), the current study suggests for some mothers, exclusive expression may be associated with appreciation for the body.

The experience of exclusive expression as an “American thing” (Ellie) was described by one of the two participants from the U.K. While participants from the U.S. did not discuss these cultural differences in exclusive expression, Ellie recounted how the need for a breast pump, presumably due to the need to express while employed, made exclusive expression an American phenomenon. She also recalled how her expression supplies were imported from the U.S. as well. Other researchers have suggested that infant feeding is embedded within larger social contexts. In the U.S., infant feeding is intertwined with employment systems partly due to differing access to paid

maternity leave (Chang et al., 2021). Future research can continue to explore how policies such as maternal leave impact individual feeding decisions and practices and the cultural differences of infant feeding practices in developed countries in the twenty first century.

The participants in the current study described a wide variety of motivations to use exclusive expression as a feeding method. These included expression as a means to provide human milk when there were issues directly breastfeeding, to provide the best nutrition, to continue infant growth and milestone achievement, to protect against illness, the cost of formula, and to provide human milk during maternal illness, when a child had a lip or tongue tie, or to donate human milk. While many of these motivators have been addressed by previous research such as Johns et al. (2013) and Felice et al. (2017b), the secondary motivator of milk donation has not been addressed in the literature on exclusive expression and may be an avenue for future research as donating milk is a possibility for exclusive expression and as experts have called for scaled up human milk banking in the U.S. (Doherty et al., 2022). Being able to donate human milk was a secondary motivator for some participants. One participant was a surrogate and milk donation was a primary motivator, along with the desire for a healthy recovery from labor and delivery. The mothers in the current study that were human milk donors donated either with formal milk banks or informally through milk donation networks. For these mothers, milk donation was a source of meaning in helping other babies

in addition to providing nutrition for their own infants. Other research has found altruistic motivators in milk donation, for example in a survey of human milk donors Wambach et al. (2019) found donation to be motivated by extra milk, to help and give back to babies, to avoid waste, and to benefit self and others. In a study of women who expressed and donated their milk following the loss of their infant, Ward et al. (2023) found while milk donation was not the primary motivator to express, mothers' found comfort in donation. The mothers in the current study had similar recounts of their donation as secondary to other motivators and found human milk donation to be a meaningful aspect of their pumping journey.

Exclusive expression was described by participants in the current study as a significant part of their daily life. Exclusive expression requires integration into daily scheduling, for which there may already be multiple schedules including an infant's eating and sleep schedule and employment schedules. Exclusive expression is also time consuming and difficult to navigate within employment, and may cause sleep related disturbances in order to continue schedules of pumping. In a comparison study of direct breastfeeding and exclusive expression, Anders et al. (2023) found while both groups described fatigue and exhaustion, for some participants exclusive expression was considered a means to getting more sleep. Overall, these findings suggest while direct breastfeeding and exclusive expression are

associated with decreased sleep, exclusive expression may have more flexibility.

Participants in the current study described finding information about exclusive expression on social media and this avenue was frequently described as more helpful than lactation professional support. In a qualitative study of social media and breastfeeding, Black et al. (2020) found women experienced increased self-efficacy for breastfeeding with the education, accessibility, community, normalization and extended goals associated with social media breastfeeding group support. There may be limited sources of support for exclusively expressing parents. In an attempt to explore formal and informal supports for exclusive expression with a scoping review approach in the U.K, U.S., New Zealand, and Canada, Strauch et al. (2019) did not identify any paper that met search criteria for community supports for exclusive expression, although informal supports in the form of social media and websites were found. These findings are consistent with other research on exclusive pumping: that while there are community supports for breastfeeding generally (i.e. La Leche League), there are limited or no community supports for parents specifically using exclusive expression. Social media seems to fill the void for information and support. Future research can explore the accuracy of information about exclusive expression provided by informal social media support and explore the specific information sought through this support.

In the current study, women described the varied support they received. When it came to healthcare providers, women had mixed experiences with some feeling their needs were not met as expected. These findings are similar to other studies. Leurer et al. (2020) interviewed mothers with experience expressing milk at least once. While these mothers were not exclusively expressing, they reported inconsistent advice from healthcare providers when it came to expression. Similarly, Anders et al. (2023) interviewed mothers that were direct breastfeeding and expressing human milk. In this comparison of experiences, the authors found the group of women exclusively expressing felt unsupported by their health care providers. These findings suggest there are gaps in lactation support specifically for parents that exclusively express human milk. Future research can address the content and quality of various lactation provider (e.g. Internationally Board Certified Lactation Consultant (IBCLC), Certified Lactation Counselor (CLC), Certified Lactation Educator (CLE), nurse midwives, obstetricians, etc.) education, training, and professional development to address areas for curriculum improvement.

Reasons for Expression

The second research question for this study asked the reasons why mothers initiate and sustain exclusive expression. In this study, a variety of reasons were indicated for initiating and continuing with exclusive expression. The most common path towards exclusive expression in this study was early

issues with direct breastfeeding which lead to exclusive expression. For these mothers, exclusive expression still provided their infant the nutritional benefits of human milk despite issues with direct breastfeeding. Other studies also find issues with direct breastfeeding to lead to exclusive expression and while this is not the only path to exclusive expression, it is a common trajectory (Anders et al., 2023; Johns et al., 2013). Participants in the current study discussed wanting to provide health benefits and spoke of general health benefits such as growth or milestone achievement or more specific benefits such as decreased risk of allergy or diabetes. Formula cost was also discussed and was seen as a motivator to continue with exclusive expression. Some participants donated their human milk to formal milk banks or informally through donation networks and for these participants donation was an added bonus to other reasons for initiating or sustaining exclusive expression.

Some (n=3) participants discussed potential issues in finding infant formula as a reason they continued with exclusive expression. The interviews for this study were conducted in 2023, after unprecedented large-scale shortages for infant formula. In February 2022, a recall was initiated by Abbott Nutrition, an infant formula company that produces Similac, Alimentum, and Elecare (Naylor, 2022). Infant death and illness complaints were linked to cases of *chronobacter*. An Abbott Nutrition facility in Michigan was closed due to unsanitary conditions (Walker, 2022), and Abbott formulas make up 40% of the formula market in the United States (Naylor, 2022). The result of

the recall was a surge in out-of-stock rates for infant formula, and the national out-of-stock rate was 48% in May 2022 (Paris, 2022) although some shortages of formula existed before the Abbott facility closed and are linked to Covid 19 related supply chain issues (Walker, 2022). The U.S. Department of Agriculture's Women Infants and Children (WIC) program is the largest purchaser of infant formula in the country (Naylor, 2022). WIC purchasing of formula likely contributed to the cause of the shortage by reinforcing large formula production markets through the bidding process for contracts, leaving smaller companies with little ability to compete and creating an oligopoly market (Naylor, 2022). While research on the formula shortage is just now emerging, the current study suggests while parents feeding formula were directly impacted by the shortage, there were wider impacts on infant feeding including fear and anxiety about finding formula, impacting the decision making of parents using other feeding methods during this formula shortage. While research on the formula shortage is just now emerging, this study suggests the shortage had farther reaching impacts than just formula feeding parents, influencing those that utilized other feeding methods as well.

Duration

The third research question asked the meaning of exclusive expression, specifically with regards to duration of infant feeding. A superordinate finding from the current study was exclusive expression as a

valid and alternate feeding option. The mothers in this study described exclusive expression as a viable long-term infant feeding option, even though exclusive expression is lesser known when compared to formula or direct breastfeeding. Health organizations recommend expressed human milk as a feeding option second to direct breastfeeding (WHO, 2009). The current study finds that for mothers who desired to provide human milk through direct breastfeeding, exclusive expression could be a viable option when breastfeeding was no longer an option. For participants, exclusive expression was a means to provide human milk and still achieve or work towards human milk feeding goals. Additionally, for mothers in this study, exclusive expression was possibly as a long-term feeding option. These findings suggest expression can be both a temporary option for feeding and also a long-term option that is sustainable over time and can be a way to still provide human milk feedings.

Findings from the current study describe the time spent exclusively expressing as the exclusive pumping journey. This journey involved discovery and change over time including emotions, paths to pumping, goals, and motivations. While these findings are specific to exclusive expression, other breastfeeding research more generally finds that “journey” is a word used to describe the time spent feeding human milk. While other studies (Charlick et al., 2018; Prendergast & James, 2016) have outlined a “breastfeeding journey” the current study has identified a specific pumping journey associated with

exclusive expression. Within the superordinate theme of the exclusive pumping journey was the theme of plans for pumping. Plans for exclusive expression were not stable, these changed over time including the time before birth to reestablishment of plans during the pumping journey. While a few participants planned to exclusively express before their infant was born, other participants established plans after reconsideration of options, namely direct breastfeeding issues. The goals participants had for expression also changed. While plans as a theme refers to the initiation of exclusive expression, goals refer to the end point objective. In this study participants most often referred to goals in their child's age. While some participants reassessed their goal and shortened it, others reassessed their goal and extended it further. Overall, while plans may have emerged and goals reset, exclusive pumping was a journey that allowed for this viable feeding option and a sustainable means of providing human milk.

Theoretical Framework

The theoretical framework of the current study, bioecological theory combined with feminist theory can outline the findings with an established model of understanding.

Within bioecological theory the findings can be framed as systems of influence, some facilitating and some barriers. For example, at microsystem level partner support was a subordinate theme that participants described,

especially as partner support was often a positive and facilitated goal achievement. At the mesosystem level, pump features and having multiple pumps allowed for exclusive expression to be a part of daily life along with other responsibilities. At the exosystem level, healthcare support was described as mixed with some providers assisting or support exclusive expression but others having a negative attitude or not providing technical assistance when desired. At the macrosystem level, exclusive expression was described as an “American thing” by one participant and could be culturally normative in the U.S. but not other cultures. Within time, participants described how a temporal event, previous formula shortages, were a factor that motivated them to initiate or sustain exclusive expression. Overall, bioecological theory can frame the findings to highlight how systems of influence, beyond an individual mother, play a role in infant feeding.

Within feminist theory, the findings of the current study outline ways in which women’s lives are constrained within a patriarchal society but also ways in which women support each other. Subordinate themes in the current study included women being supporters to others who exclusively express and finding information about exclusive expression on social media from other women. Rather than utilizing professional lactation support, women described the value they held for finding other women’s experiences through social media. These findings suggest while women are constrained within society and with their infant feeding practices they advocate and support each other despite

those challenges. Additionally, the current study outlines while exclusive expression is a manner to feed a baby, it also provided women a new appreciation for their body, separate from childbirth, as the body produced nutrition for an infant.

Implications

Findings of this study add women's lived experience to the literature on exclusive expression. This perspective is in addition to the current medical and public health discourses on topics of infant feeding and more specifically exclusive expression. This study also brings a feminist perspective to illuminate ways in which mothers in the United States manage this form of infant feeding and found a theme of being supporters to other women. Future research can continue to explore the ways in which infant feeding is decided and constrained by systemic factors and the ways mothers provide support. The findings of this study also suggest areas where professional lactation support can be improved. Provider education and resources, for example continuing education courses on exclusive expression can allow for better support for families practicing or considering exclusive expression. This study adds knowledge of this infant feeding method to broader discourses surrounding maternal or family leave policies. While infant feeding is just one factor associated with the need for paid maternal and family leave, the current study highlights how employment is a large barrier in infant feeding. This

study give voice to women's lived experience with exclusive expression and policies can be examined to explore the alignment of women's infant feeding needs and existing policy.

Conclusion

This study set out to explore the experiences of women using exclusive expression as an infant feeding method. Three important themes constitute the findings: exclusive expression as a valid and alternate feeding option, exclusive expression as a journey, and the integration of exclusive expression as a significant part of daily life. These results suggest that while mothers may not have consistent professional support in exclusive expression, they sought informal support online and through social networks and also became supporters for others and advocates for exclusive expression. These findings would be of interest to those working in lactation care and medical care in the fields of women's health, obstetrics and neonatology. This study would also be of interest to those working in research on labor, employment and family policy. These findings provide deeper insight into the lived experience of a common but understudied infant feeding method, illuminating the unique phenomenon of exclusive expression.

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Table 1

<i>Participant Demographics</i>	
Characteristic	Number of Participants <i>n</i> (%)
Mother's Age	
25-30	2 (17%)
31-35	7 (58%)
36-40	2 (17%)
41+	1 (8%)
Number of children	
1	8 (67%)
2	3 (25%)
3	1 (8%)
Mean time spent exclusively expressing with current "journey"	7.64 months
Employment	
Full-time	10 (83%)
Part-time	2 (17%)
Marital status	
Married	10 (83%)
Single	1 (8%)
Partnered	1 (8%)
Race	
White	12 (100%)
Highest level of education	
Some college	1 (8%)
College	8 (67%)
Graduate school	3 (25%)
Household income	
\$50,000-74,999	1 (8%)
\$75,000-99,999	0
\$100,000-124,999	3 (25%)
\$125,000-149,999	1 (8%)
\$150,000 and above	7 (58%)

Note. Household income for Participants from the U.K. converted to U.S. dollars.

Table 2

Interview Protocol Questions Alignment with Research Questions

Interview Protocol Question	Research Question 1	Research Question 2	Research Question 3
1. Tell me about the reasons you use pumping to feed your baby.		X	
2. What motivates you to exclusively pump?		X	X
3. How did you first learn about pumping as an option to feed your baby?	X	X	
4. What device do you use to pump?	X		
5. How did you learn to use this device?	X		
6. What incidents of pumping stand out to you?	X		X
7. What people connected to pumping stand out to you?	X	X	X
8. How has pumping affected you?	X		X
9. What thoughts about pumping stand out to you?	X	X	X

10. What changes do you associate with pumping?	X	X	X
11. What feelings does pumping create?	X		
12. What does pumping mean to you?	X	X	X
13. Do you associate pumping with any body changes?	X		
14. Tell me about what pumping looks like on a typical day.	X		
15. What does your schedule for pumping look like?	X		
16. What aspects of your life make pumping easier?	X		X
17. What aspects of your life make pumping harder?	X		X
18. What features did you look for in your pump/pumping supplies or what features do you wish your pump/supplies have?	X		
19. How do the people in your life feel about pumping?	X	X	
20. Where do you find information for pumping questions or to solve issues?	X		

21. What emotions do you associate with pumping?	X		
22. What is/was your goal for feeding your baby?	X		X
23. How did you arrive at your goal for feeding?			X
24. Did your goal for feeding change over time?			X
25. What advice would you give someone that was thinking of exclusively pumping?	X		X
26. If you could create an ideal scenario, what does pumping look like?	X		X

Note: X indicates that the interview question and research question are aligned

Table 3
Participant Profiles of Demographic Information

Participant Number	Pseudonym	Age	Length of Time Exclusively Pumping at the Time of Interview*	Employment
1	Elizabeth	33	5 months	Defense contractor (full-time)
2	Ellie	37	12.5 months	General practitioner, family medicine (full-time)
3	Alex	32	6 months	Director at Technology Company (full-time)
4	Stefanie	33	16 months	Nanny (part-time)
5	Cora	33	4 months	Sales (Full-time)
6	Emily	27	9 months	Financial analyst (full-time)
7	Ann	35	5 months	College professor (full-time)
8	Katrina	33	19 months	Physical therapy assistant (full-time)
9	Roz	41	11 months	Marketing at agency (full-time)
10	Lauren	30	13 months	Auditor (full-time)
11	Marie	36	8 months	College professor (full-time)
12	Katie	31	12.5	Branch manager at financial institution (full-time)

*Totaled for all exclusive pumping journeys, some women had multiple pumping journeys.

Table 4

Participant Interview Excerpts for the Theme of Proud

Participant	Selected Interview Excerpts Related to Theme of Proud/Pride
Elizabeth	“I'm proud. I should say that, like I'm proud of myself for doing this for 5 months. My goal is a year. If I go a little less than that, I'll be fine because I have a huge freezer stash since I have a oversupply.”
Ellie	“So it is that sort of balance, I think, between, like the that side of things that you feel like you're doing your absolute best and you feel so proud of yourself for doing that. But at the same time you sort of like oh do I really have to put this back on? Do I really have to wash them out again? Do I really have to sterilize again? And it's sort of like that dual kind of thing.”
Alex	“Same with our family. They're supportive. My mom is still like you should just try to nurse, 6 months later. So but she's supportive and proud that I was able to get her breast milk.”
Stefanie	“I have some serious, serious dedication skills I did not know I had, and discipline. Discipline is another good word for pumping. You have to be very disciplined. I like now. I'm like I'm proud of myself like I did that, and a lot of people are like. Oh, I don't know how you did that like that must be so hard, and maybe it was. I don't know, because I don't have that to compare to actually nursing a child, because I I only got like a a week of that. Maybe so like I think like overall. It's just like wow, I did it, and i'm like proud of myself for being able to do that.”
Cora	“That took a long time to just troubleshoot not only the machine itself, but the various, you know steps you can do to increase your supply, whether it's the old wives tale of eating oatmeal, you know, every morning to get your supply up, or, you know, just taking those hot showers every time you feel a little bit like clogged up or massaging, and you know, stuff like that. that was big for me, and I think that it made me really proud that I was able to figure that out on my own even after hiring a lactation consultant, and not really getting exactly what I needed from that person who I thought would be, you know my savior, so to speak. Proud of myself for being able to figure it out.”
Emily	“I do like having that fact that I can say to the local donor hospital. and I'm quite proud of that. And how much I've donated as well. so I kind of have that pride aspect as well.”
Ann	“I feel like I've made an accomplishment, but I also feel guilty for not continuing, even though it would be a little bit unique to continue so. yeah, I mean sense of pride at times, but most of the time just kind of chugging along.”

Katrina	“Just like, I guess, that motherhood like I could provide for my kid, and especially a time when, like again, you couldn't find the specialty formulas, or even some of the basic formulas. So just be really proud like I did it.”
Lauren	“I have a lot of pride. It's it's a big, you know, being at the end of like. Oh, my God, I'm done! But I if I've removed that layer. I'm very proud of it, and I'm very, you know my daughter was exclusively breastfeed in this way for her entire life.”
Marie	“I know some hospitals are so different. I delivered at [a regional hospital], and they're like, okay, like no arguments from anybody, not even the lactation. Still, not because something's like great. Let's veer towards telling you more about pumping. So she was able to like. Give me, you know, some advice and stuff like that. So I was. I was pretty proud because I was like this works.”
Katie	“When I get to see that full day supply at the end of the day. Like, I'm super proud of myself. I'm like, yeah, I did that.”

Note. Roz was the only participant that did use the word proud to describe her exclusive pumping journey, although she did describe it as an accomplishment.

Figure 1 Concept Map of Literature Review

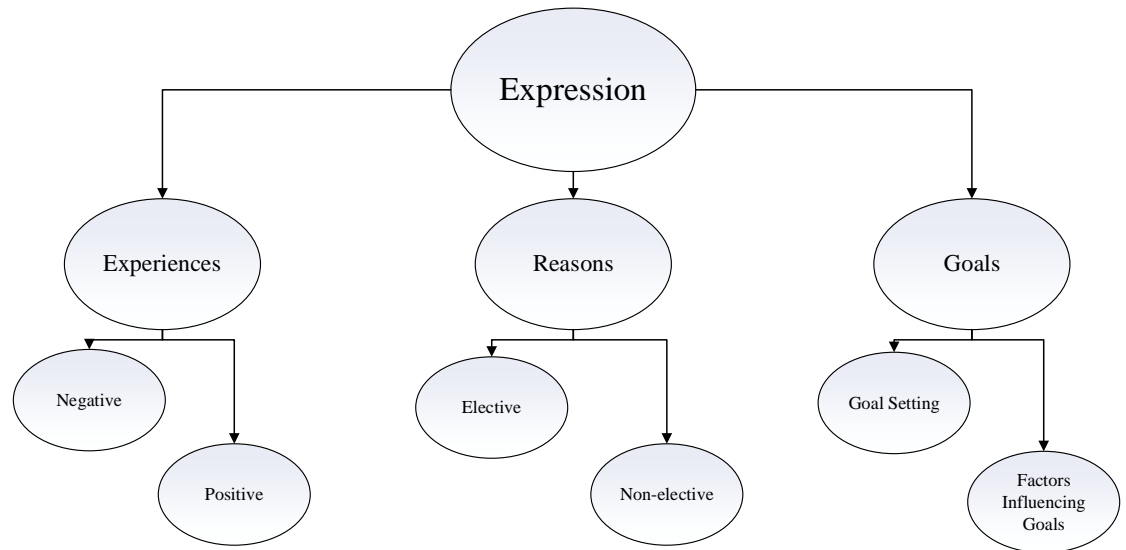


Figure 2 Concept Map of Findings

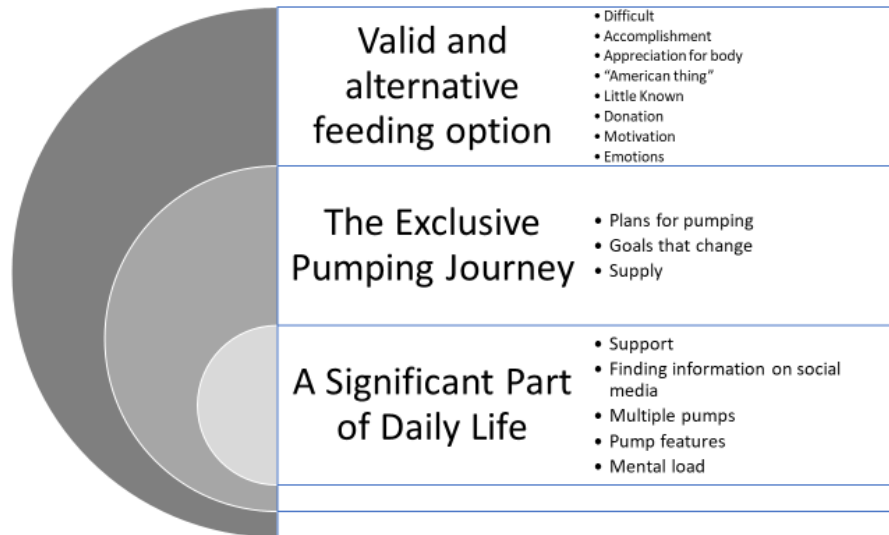


Figure 3 Photovoice submission (Emily)



Note: Photo edited to preserve confidentiality.

Figure 4 Photovoice submission (Elizabeth)



Note: Photo edited to preserve confidentiality.

Appendix A Recruitment Flyer

VOLUNTEERS NEEDED FOR A RESEARCH STUDY

**DO YOU
EXCLUSIVELY
PUMP?**



YOU ARE INVITED TO PARTICIPATE IN A 60-90 MINUTE INTERVIEW ABOUT EXCLUSIVE PUMPING AND QUESTIONS ABOUT PUMPING YOU USE PHOTOGRAPHS TO RESPOND TO.

YOU MAY BE ELIGIBLE IF YOU ARE

- **A MOTHER**
- **18 YEARS OLD OR OLDER**
- **CURRENTLY EXCLUSIVELY PUMPING**

COMPLETE THE SURVEY AND IF YOU QUALIFY YOU WILL BE CONTACTED TO SCHEDULE AN INTERVIEW



<https://forms.gle/bq7r5LHyFzx4QUEJ7>

This study is approved by The University of Delaware
Institutional Review Board #2016148-2

FOR MORE INFORMATION CONTACT KELSEY BIANCA KBIANCA@UDEL.EDU

Appendix B Facebook Groups

- Harford County Moms
- Mom's Club of Cecil County Maryland
- Bel Air MD Moms
- Newark Parents
- Exclusively Pumping Moms
- Exclusive Pumping
- Cecil County Moms
- Northern Delaware Moms
- MOD Squad (Moms of Delaware)
- Moms of Baltimore County
- Mom's of babies & young children in Baltimore County
- Maryland moms

Appendix C Recruitment Screening Survey

- Are you at 18 years of age or older?
- Are you a mother?
- Are you currently exclusively pumping?
- Do you supplement feedings with formula?
- Do you feed directly at the breast (nurse)?
- Are you willing to be contacted about a research interview?
- Email address for contact.

Appendix D Informed Consent

CONSENT TO PARTICIPATE IN A RESEARCH STUDY

Title of Study: Beyond Breastfeeding: Breastfeeding though exclusive milk expression

Principal Investigator(s): Kelsey Bianca

KEY INFORMATION

Important aspects of the study you should know about first:

- **Purpose:** The purpose of the study is to learn about the experiences of mothers that exclusively pump their breast milk.
- **Procedures:** If you choose to participate, you will be asked to engage in an interview with the researcher and respond to questions with photographs.
- **Duration:** This will take about 60 to 90 minutes.
- **Risks:** The main risk or discomfort from this research is emotional discomfort.
- **Benefits:** There is no benefit to you from this research.
- **Alternatives:** There are no known alternatives available to you other than not taking part in this study.
- **Costs and Compensation:** If you decide to participate there will be no cost to you.
- **Participation:** Taking part or not in this research study is your decision. You can decide to participate and then change your mind at any point

Please carefully read the entire document. You can ask any questions you may have before deciding If you want to participate.

You are being invited to participate in a research study. This consent form tells you about the study including its purpose, what you will be asked to do if you decide to take part, and the risks and benefits of being in the study. Please read the information below and ask us any questions you may have before you decide whether or not you want to participate.

PURPOSE OF THE STUDY

The purpose of this study is to learn about the experiences of mothers that exclusively pump their breast milk.

WHO IS BEING ASKED TO PARTICIPATE?

You will be one of approximately 12 to 15 participants in this study. You are being asked to participate because you completed the screening survey and indicated you were interested in being contacted for an interview.

PROCEDURES: WHAT WILL YOU BE ASKED TO DO?

As part of this study you will be asked to talk with a researcher about your experiences with exclusive pumping. This interview will be recorded, and you will be asked to select a pseudonym (or fake name) to use during the interview. You will also be asked to answer several questions using photographs and brief captions (like Instagram). An example of a question that you will be asked to answer with a photograph is: “What is important to pumping?”

There are no known alternatives available to you other than not taking part in this study.

WHAT ARE POSSIBLE RISKS AND DISCOMFORTS?

Possible risks of participating in this research study include negative emotional states (e.g. embarrassment or guilt) when discussing infant feeding decisions or issues.

WHAT ARE POTENTIAL BENEFITS FROM THE STUDY?

There is no direct benefit for subjects participating in this research. However, the knowledge gained from this study may provide a better understanding of the experiences of exclusively pumping.

CONFIDENTIALITY: WHO MAY KNOW THAT YOU PARTICIPATED IN THIS RESEARCH?

Your study data will be handled as confidentially as possible. If results of this study are published or presented, individual names and other personally identifiable information will not be used.

- To minimize the risks to confidentiality, I will ask you to select a pseudonym. When providing photographs, you will be asked to not include identifying information (e.g. faces). Photos will be screened to ensure no identifying information is included.

- The research team will make every effort to keep all research records that identify you confidential. The findings of this research may be presented or published. If this happens, no information that gives your name or other demographic characteristics that could identify you will be shared.
- We will keep your study data confidential and only those with permission in the research team will have access to information that identifies you. We may have to report certain information for legal or ethical reasons, such as child abuse, or intent to hurt yourself or others. If required, your records may be inspected by authorized personnel in the following groups and agencies: The University of Delaware Institutional Review Board.

COSTS AND COMPENSATION

- There are no costs associated with participating in the study.
- There is no compensation for participating in this study.

DO YOU HAVE TO TAKE PART IN THIS STUDY?

Taking part in this research study is your decision. You do not have to participate in this research. If you choose to take part, you have the right to stop at any time. If you decide later not to participate, or if you decide to stop taking part in the research, there will be no penalty or loss of benefits to which you are otherwise entitled.

Your decision to stop participation, or not to participate, will not influence current or future relationships with the University of Delaware.

INSTITUTIONAL REVIEW BOARD

This research study has been reviewed and approved by the University of Delaware Institutional Review Board (UD IRB), which is a committee formally designated to approve, monitor, and review biomedical and behavioral research involving humans. If you have any questions or concerns about your rights as a research participant, you may contact the UD IRB at hsrb-research@udel.edu or (302) 831-2137.

CONTACT INFORMATION

If you have any questions about the purpose, procedures, or any other issues related to this research study you may contact the Principal Investigator, Kelsey Bianca at kbianca@udel.edu or Dr. Settles, settlesb@udel.edu, (supervising investigator).

CONSENT TO PARTICIPATE IN THE RESEARCH STUDY:

I have read and understood the information in this form and I agree to participate in the study. I am 18 years of age or older. I have been given the opportunity to ask any questions I had and those questions have been answered to my satisfaction. I understand that I will be given a copy of this form for my records.

Printed Name of Participant

(PRINTED NAME)

Date

Signature of Participant

(SIGNATURE)

Person Obtaining Consent

(PRINTED NAME)

Date

Person Obtaining Consent

(SIGNATURE)

CONSENT TO USE PHOTOGRAPHS:

I have read and understood the information in this form and I agree to allow use of the photographs I provide in future research publications or conference presentations. I am 18 years of age or older. I have been given the opportunity to ask any questions I had and those questions have been

answered to my satisfaction. I understand that I will be given a copy of this form for my records.

Printed Name of Participant Date

(PRINTED NAME)

Signature of Participant

(SIGNATURE)

Person Obtaining Consent Date

(PRINTED NAME)

Person Obtaining Consent

(SIGNATURE)

Appendix E Semi-Structured Interview Protocol

General Starting Questions

1. How did you first learn about pumping as an option to feed your baby?

Device

2. What device do you use to pump?
3. How did you learn to use this device?
4. What features did you look for in your pump/pumping supplies or what features do you wish your pump/supplies have?

Context

5. What incidents of pumping stand out to you?
6. What aspects of your life make pumping easier?
7. What aspects of your life make pumping harder?
8. Has the pandemic influenced pumping for you?

Day to Day

9. Tell me about what pumping looks like on a typical day.
10. What does your schedule for pumping look like?

Motivations

11. Tell me about the reasons you use pumping to feed your baby.
12. What motivates you to exclusively pump?
13. What is/was your goal for feeding your baby?
14. How did you arrive at your goal for feeding?
15. Did your goal for feeding change over time?

Social and Family

16. How do the people in your life feel about pumping?
17. What people connected to pumping stand out to you?
18. Where do you find information for pumping questions or to solve issues?

Experience

19. How has pumping affected you?

20. What thoughts about pumping stand out to you?
21. What changes do you associate with pumping?
22. What feelings does pumping create?
23. What does pumping mean to you?
24. Do you associate pumping with any body changes?
25. What emotions do you associate with pumping?

Closing

26. What advice would you give someone that was thinking of exclusively pumping?
27. If you could create an ideal scenario, what does pumping look like?
28. Is there any other information about your pumping experience you want to share?

Appendix F Demographic Questionnaire

Participant number:

Pseudonym:

Number of children:

Mothers age:

Age of child(ren):

Time spent exclusively pumping (in months) for current child:

Time spent exclusively pumping (in months) for any other children (if applicable):

Age of child(ren):

Employment status:

Occupation (If applicable):

Marital status:

Household Income Level:

- Less than \$5,000
- \$5,000 - \$9,999
- \$10,000 - \$14,999
- \$15,000 - \$19,999
- \$20,000 - \$29,999
- \$30,000 - \$39,999
- \$40,000 - \$49,999
- \$50,000 - \$59,999
- \$60,000 - \$74,999
- \$75,000 - \$99,999

o \$100,000 - \$124,999

o \$125,000 - \$149,999

o \$150,000 or more

Highest level of education:

Appendix G Photovoice Participant Prompt

You are being contacted because you participated in a study about exclusive pumping. You are being asked to complete a photograph and story portion of the study. Your participation is completely voluntary. If you choose to participate, you can take and send photographs of pumping with accompanying stories in response to the following questions. You can respond to one, all, or none of the questions.

- What does an average pumping session look like?
- What is important to pumping?
- What makes pumping easier?
- What makes pumping difficult?
- What emotions do you associate with pumping?
- What do you want people to know about pumping?

It is important that your photographs and stories do not contain personal information, including faces.

Appendix H Photograph De-Identification

Reviewer ID:

Photo ID:

Date:

Instructions: The researcher will screen each photograph for identifiers.

Screening should follow the following steps:

- Step 1: Review the photograph for identifiers
- Step 2: Check any boxes that apply and note
- Step 3: Mark the location of the identifier in the photograph
- Step 4: Check recommendation regarding whether photograph includes identifier

Identifier	Notes
Any facial photography <ul style="list-style-type: none">• Face	

<p>Intrinsic to the participant</p> <ul style="list-style-type: none"> • Anatomic anomalies • Birthmark • Scar • Other 	
<p>On the participant</p> <ul style="list-style-type: none"> • Unique clothing • Jewelry • Piercings • Tattoos • Other 	
<p>Around the participant</p> <ul style="list-style-type: none"> • Unique setting • Unique surrounding • Unique location • Other 	

Recommendation:

- Category 1: Photo does not include identifiers
- Category 2: Photo includes identifiers that cannot be edited out
- Category 3: Photo includes identifiers that may be edited out - this photograph may be eligible for inclusion in Photovoice presentation after editing and re-review.

Next Steps:

- The following steps will be taken with photographs from each category:
 - o Category 1 photographs can be included in Photovoice presentations
 - o Category 2 photographs will be permanently deleted
 - o Category 3 photographs should be edited. Edited photographs will be assigned a new Photo ID and then re-reviewed following this protocol

Appendix I Institutional Review Board Approval Letter



Institutional Review Board
210H Hulihan Hall
Newark, DE 19716
Phone: 302-831-2137
Fax: 302-831-2828

DATE: April 11, 2023
TO: Kelsey Bianca, M.A.
FROM: University of Delaware IRB
STUDY TITLE: [2016148-2] Beyond Breastfeeding: Breastfeeding through exclusive milk expression
SUBMISSION TYPE: Amendment/Modification
ACTION: APPROVED
EFFECTIVE DATE: April 11, 2023
NEXT REPORT DUE: March 19, 2024
REVIEW TYPE: Expedited Review
REVIEW CATEGORY: Expedited review category # (6,7)

Thank you for your Amendment/Modification submission to the University of Delaware Institutional Review Board (UD IRB). The UD IRB has reviewed and APPROVED the proposed research and submitted documents via Expedited Review in compliance with the pertinent federal regulations.

As the Principal Investigator for this study, you are responsible for, and agree that:

- All research must be conducted in accordance with the protocol and all other study forms as approved in this submission. Any revisions to the approved study procedures or documents must be reviewed and approved by the IRB prior to their implementation. Please use the UD amendment form to request the review of any changes to approved study procedures or documents.
- Informed consent is a process that must allow prospective participants sufficient opportunity to discuss and consider whether to participate. IRB-approved and stamped consent documents must be used when enrolling participants and a written copy shall be given to the person signing the informed consent form.
- Unanticipated problems, serious adverse events involving risk to participants, and all non-compliance issues must be reported to this office in a timely fashion according with the UD requirements for reportable events. All sponsor reporting requirements must also be followed.

The UD IRB REQUIRES the submission of a PROGRESS REPORT DUE ON March 19, 2024. A continuing review/progress report form must be submitted to the UD IRB at least 45 days prior to the due date to allow for the review of that report.

If you have any questions, please contact the UD IRB Office at (302) 831-2137 or via email at hsrb-research@udel.edu. Please include the study title and reference number in all correspondence with this office.

INSTITUTIONAL REVIEW BOARD

www.udel.edu

Appendix J Institutional Review Board Amendment Approval



Institutional Review Board
210H Hulihan Hall
Newark, DE 19716
Phone: 302-831-2137
Fax: 302-831-2828

DATE: June 23, 2023
TO: Kelsey Bianca, M.A.
FROM: University of Delaware IRB
STUDY TITLE: [2016148-3] Beyond Breastfeeding: Breastfeeding through exclusive milk expression
SUBMISSION TYPE: Amendment/Modification
ACTION: APPROVED
EFFECTIVE DATE: June 23, 2023
NEXT REPORT DUE: March 19, 2024
REVIEW TYPE: Expedited Review
REVIEW CATEGORY: Expedited review category # (6,7)

Thank you for your Amendment/Modification submission to the University of Delaware Institutional Review Board (UD IRB). The UD IRB has reviewed and APPROVED the proposed research and submitted documents via Expedited Review in compliance with the pertinent federal regulations.

As the Principal Investigator for this study, you are responsible for, and agree that:

- All research must be conducted in accordance with the protocol and all other study forms as approved in this submission. Any revisions to the approved study procedures or documents must be reviewed and approved by the IRB prior to their implementation. Please use the UD amendment form to request the review of any changes to approved study procedures or documents.
- Informed consent is a process that must allow prospective participants sufficient opportunity to discuss and consider whether to participate. IRB-approved and stamped consent documents must be used when enrolling participants and a written copy shall be given to the person signing the informed consent form.
- Unanticipated problems, serious adverse events involving risk to participants, and all non-compliance issues must be reported to this office in a timely fashion according with the UD requirements for reportable events. All sponsor reporting requirements must also be followed.

The UD IRB REQUIRES the submission of a PROGRESS REPORT DUE ON March 19, 2024. A continuing review/progress report form must be submitted to the UD IRB at least 45 days prior to the due date to allow for the review of that report.

If you have any questions, please contact the UD IRB Office at (302) 831-2137 or via email at hsrb-research@udel.edu. Please include the study title and reference number in all correspondence with this office.

INSTITUTIONAL REVIEW BOARD

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