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### Does Maternal Breastfeeding Have Positive Long-Term Effects On Neurocognitive Development?

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**DOES MATERNAL BREASTFEEDING HAVE POSITIVE  
LONG-TERM EFFECTS ON NEUROCOGNITIVE  
DEVELOPMENT?**

**Honors Thesis**

**Presented in Partial Fulfillment of the Requirements  
For the Degree of Bachelor of Science in Nursing**

In the School of Nursing  
at Salem State University

By

C. R.

Professor Kathleen Adee  
Faculty Advisor  
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## Table of Contents

Abstract.....	ii
Aim of study.....	1
Introduction.....	1
Background/Significance.....	2
Methodology.....	7
Results.....	8
Limitations.....	12
Implications/Conclusion.....	12
Acknowledgements.....	14
References.....	14
Literature Matrix.....	16

### **Abstract**

This study comprised a systematic review of literature based on the, long-term benefits of maternal breastfeeding on neurocognitive development in children. The immediate known benefits of breastfeeding are well documented throughout numerous research studies such as nutritional benefits and immunological growth. However, there are limited studies on the long-term effects of maternal breast feeding. The purpose of this research is to review literature on the long-term effects of maternal breastfeeding on neurocognitive development in children, specifically focusing on intelligence and language development. A total of 10 articles met the inclusion criteria and were used for this literature review. Among the different studies, the ages that were assessed are from the first year of life throughout 15 years of life. A positive impact is suggested after reviewing the research, but it only has a minor impact when being compared to children who were either formula fed or fed for shorter durations. The research reviewed shows positive effects on intelligence and language among children as old as 15 but due to the lack of existing literature, long-term benefits of neurocognitive development into adulthood could not be assessed.

*Keywords:* Maternal Breastfeeding, Neurocognitive development, long term, benefits

### **Aim of Study**

The immunological and physiological benefits of breastfeeding are well documented due to the vast collection of previous research. An element of breastfeeding that is not well studied in research is the long-term benefits of breastfeeding on neurocognitive development of children. The aim of this study is to review existing literature on the possible long-term benefits of breastfeeding on neurocognitive development of children, specifically focusing on intelligence in later life and language development. This review of literature is important to nursing because there is a lack of documented knowledge or research on the long-term effects of neurocognitive development

### **Introduction**

Research suggests a positive impact of breastfeeding on neurocognitive development. According to Maryniak (2015), nurses are strategic advocates for breastfeeding. As nurses, it is important to ensure that nurses have the knowledge to support breastfeeding mothers, including lactation practices and understanding of the importance of breast milk (Maryniak, 2015). Early skin-to-skin contact, and breastfeeding are a good start – for baby and for Mom (Maryniak, 2015). Breastfeeding creates a unique bond between the mother and infant (Coffman, 2019). According to Coffman (2019), breastfeeding provides a closeness and comfort that is hard to replicate. Skin-to-skin contact between mother and child stimulates maternal hormonal responses such as the production of prolactin and oxytocin, which may indirectly improve cognitive

development (Koh, 2017). Teaching and learning mechanisms are continuously advancing based on medical research. Identifying positive long-term benefits of breastfeeding on childhood neurocognitive development is interesting because research results assist nurses to teach best practices or influence the way breastfeeding education is implemented and promoted. It is important for nurses to be able to understand and translate research into effective teaching practices.

Successful breastfeeding is greatly dependent on education and support provided to the patient (Coffman, 2019). Effective strategies to endorse breastfeeding consist of direct collaboration, proper education for mothers and their families (including prenatal and postnatal programs with behavior-orientated counseling), and practical skills training for all healthcare practitioners (Coffman, 2019). Nurses require more information about factors that influence breastfeeding confidence in the first days of a newborn's life, because this is a critical time in the establishment of breastfeeding (Hinic, 2016). Learning about the long-term effects of breastfeeding can possibly assist nurses with the promotion of safe and proper breastfeeding practices.

### **Background**

Maternal breastfeeding has been emphasized as an influential factor in early childhood development based on biological mechanisms through which maternal breastfeeding aids children's development (Koh, 2017). Lactation is one of the essential elements for physical growth, immunological functioning, and psychological development of children, especially during the first year of life (Teles, Silva Junior, Santos Junior, Fonseca, Eugenio, 2017). Breastfeeding an infant for the first year of life is

one of the most effective strategies to promote health and prevent morbidity in developing and industrialized nations (Hinic, 2016). Exclusive breastfeeding for the first 6 months of life followed by breastfeeding with the addition of complementary foods for at least the first year of life is recommended as the “normative standard for infant feeding” (Hinic, 2016). The World Health Organization recommends mothers worldwide to exclusively breastfeed (Not using any formula or food) for the infant’s first 6 months to achieve optimal growth, development and health (Choi et al, 2018)

The composition of milk is an essential factor in brain structure and function. According to Koh (2017), the composition of breastmilk is superior to that of formula. Analysis of the brain tissue acquired during infancy indicates that more than half of its solid weight is lipid and that the fatty acid profile of an infant’s diet plays a role in the composition of brain tissue (Smith,2015). Of particular importance are two long-chain polyunsaturated fatty acids: an omega-3 (or *n*-3) fatty acid known as docosahexaenoic acid (DHA) and an omega-6 (*n*-6) fatty acid called arachidonic acid (AA) (Smith, 2015). These acids, as reported by Koh (2017), form the major structures of neuronal membranes and play critical roles in nervous system functioning by positively stimulating development of the human brain. According to Smith (2015), AA and DHA are not in all brands of infant formulas in the United States. Infants require sufficient amounts of these acids during the first few months after birth (Koh,2017). The lack of these two valuable acids in infant formulas, that stimulate brain development, leads me to question whether there are long-term developmental neurocognitive differences between breastfed children and formula fed children.

Adherence of breastfeeding varies, despite the evidence, among different

populations in the world due to several factors (Teles et al, 2017). Despite well documented maternal, infant, and societal benefits and recent improvement in breastfeeding rates, 60% of women stop breastfeeding earlier than they wish (Hinich, 2016). Breastfeeding represents an individual and conscious choice that develops within a context influenced and built by society that carries a socio-cultural heritage, determining different meanings of breastfeeding for the woman (Teles et al, 2017). Breastfeeding is not a random decision among women. Factors such as culture, anatomical issues of the breast, convenience, socioeconomic status, education, and the health of the newborn all contribute to the decision process of nutrition.

According to Hinich (2016), psychological factors, including self-efficacy, or confidence, are of unique importance because they are modifiable and can provide the foundation for the design of interventions to make progress toward national breastfeeding goals. Breastfeeding confidence and self-efficiency are significant predictors of breastfeeding intention, duration, and exclusivity (Hinich, 2016). Mothers who are more confident about breastfeeding in the early postpartum period are more likely to have longer breastfeeding durations and higher levels of exclusive breastfeeding (Hinich, 2016). Therefore, the comprehension and promotion of breastfeeding self-efficacy are necessary for nurses who work with mothers and families to demonstrate progress toward meeting public health goals for breastfeeding and to reduce preventable morbidity in this population (Hinich, 2016). Breastfeeding duration is an important factor that has been assessed throughout, 5, of the selected articles for this research to determine whether breastfeeding has long-term neurocognitive effects on childhood development.

During the post-delivery care, one role nurses and other healthcare professionals

take on is providing education to parents to promote proper newborn care. Nutrition is a vital subject matter to discuss during the early postpartum period because rapid growth and development occurs within the newborn. Optimal nutrition improves health.

According to Coffman (2016), human milk is the gold standard for infant feeding and best positions the infant for healthy growth and development. Exclusive breastfeeding up to six months is ideal because early introductions of other foods adversely affects nutrient absorption and bioavailability leading to lower breastmilk intake, lower weight gain and increased risk of diarrhea, respiratory infections and allergies (Teles, Silva Junior, Santos Junior, Fonseca, Eugenio, 2017). According to Jansen et al (2015), breastfeeding is typically infant led, with feeding occasions initiated and concluded by infants in response to intrinsic signals of hunger and satiety. Breastfeeding often requires an infant led approach, feeding on demand and allowing the infant to regulate intake whilst conversely formula feeding is open to greater caregiver manipulations (Brown, 2014). To be successful, breastfeeding often has to be baby-led (Brown, 2014). Mothers are unable to determine the exact volume consumed; therefore, energy intake is largely in the infant's control, supporting an infant's ability to self-regulate (Jansen, Mallan, Byrne, Diet, Daniels, Nicholson 2015).

Interactions postulated to promote development of healthy eating pattern in children have been conceptualized as involving both *responsiveness* and the provision of *structure* within the feeding context, a combination that has been termed *authoritative feeding* (Jansen et al, 2015). During authoritative feedings, *authoritative* parents typically respond in a warm and responsive way to their child's signals but also exert an appropriate amount of age control over their child's behavior (Brown, 2014). An

authoritative feeding approach has been associated with desired outcomes including positive child conduct, enhanced cognitive development, healthier nutritional intake and weigh-gain trajectories (Brown, 2014). According to Jansen et al (2015), these behaviors enable children to attend and recognize internal hunger and satiety cues and include providing a structured and consistent eating environment in which children are offered a choice of healthy meals and snacks. Research into the relationship between breastfeeding and later use of authoritative feeding practices is scarce and characterized by a number of methodological limitations (Jansen et al 2015).

When discussing the number of positive benefits of breastfeeding with new mothers discussed during the teaching period for new mothers it could be beneficial to include the long-term effects of breastfeeding. Studies primarily discuss the known immunological, emotional and physiological effects of breastfeeding but only a few studies that meet the five-year parameter, can identify the long-term effects of breastfeeding. Three out of five articles used for this research used cognitive developmental tests to assess intelligence of children. Understanding possible long-term effects can possibly increase the adherence of breastfeeding practices allowing nurses to further promote the need to breastfeed. The hypothesis underlying this research is that breastfeeding in general will provide positive long-term benefits on intelligence and language development. Also, children who were breastfed for longer periods of time will have greater intelligence compared to children who were breastfed for shorter durations or bottle-fed.

### **Methodology**

A systematic review of literature was used to investigate the possible long-term effects of breastfeeding on neurocognitive development in children. Articles were identified from the CINAHL and Medline plus databases. Keywords “breastfeeding” and “neurocognitive development” were heavily used to search for relevant articles. For the first advanced search using “Breastfeeding neurocognitive long-term benefits” only 53 articles were relevant according to those key words. All 53 articles were excluded, and a new search was conducted. The articles were excluded for several reasons. Articles were excluded because they did not meet the 5-year parameter, did not cover the topic of interest for this review, or did not provide access to full-text formats of the articles.

The keywords were entered into the databases by a few different formats and phrases. Using the advanced search narrowed down the article selections for this research. Criteria added for the search of potential articles included that the articles were available in English in full text. Typing the words “maternal breastfeeding” and “cognitive development” into the CINAHL database lead to Kanghyock Koh’s (2017) article, “Maternal breastfeeding and children’s cognitive development”. Koh’s (2017) study was identified on the second search and the link for Koh’s study directed the search to the Elsevier website. Elsevier’s advertisement promoted similar articles to the Koh’s study. In total three articles that met the requirements for this review, were selected through Elsevier’s advertisement.

In total 10 articles are currently being used for this systematic review of literature. Both qualitative and quantitative articles were used for this study. Six quantitative studies were selected, and 4 qualitative studies were selected. This systematic review of literature

focused on articles that were published between 2014-2019. Four articles assess the relationship of maternal breastfeeding on neurocognitive development. Two articles assess infant led feeding practicing, breastfeeding, and breastfeeding duration. The four remaining articles provide background information on breastfeeding, the known immediate benefits of breastfeeding and the nurse's role during the postpartum period for new mothers. The articles reviewed in this study suggest a positive association between breastfeeding and neurocognitive development. The articles analyzed for this study were conducted at various locations around the world including, the United States, Australia, Brazil, and South Korea.

### **Results**

Following review of the literature, several themes were examined in regard to the relationship of breastfeeding and neurocognitive development among children. The first article was a general synopsis on exclusive breastfeeding detailing the importance of lactation, the well-known documented benefits of breastfeeding, and assessing the current knowledge of new mothers who are a part of the Family Health Strategy located in Brazil. Data was collected through individual interviews with a semi-structured script. Data analysis, based on the research objectives, allowed constructing three categories, described below: knowledge about exclusive breastfeeding, benefits of exclusive breastfeeding and factors that facilitate and hinder adherence to exclusive breastfeeding (Teles, Silva Junior, Santos Junior, Fonseca, Eugenio, 2017). Teles and colleagues (2017) described that the mothers understood the true concept of exclusive breastfeeding and reported learning about the benefits of exclusive breastfeeding. According to responses,

factors that facilitated breastfeeding included practicality, low cost, and breastmilk being the ideal temperature for newborns (Teles et al. 2017). Factors that hindered exclusive breastfeeding included lack of knowledge on exclusive breastfeeding involving duration, anatomical issues of the breast, and the occurrence of newborns crying during breastfeeds (Teles et al, 2017). All 9 participants in the (Teles et al, 2017) study, completed high school for education. It can be assumed that educated people are more likely to practice healthy lifestyles, specifically breastfeeding for this research.

Boutwell (2018) believes that decisions about breastfeeding are not random among the general public. To the extent that intelligent and highly educated mothers, for example are more likely to breastfeed, and also more likely to produce intelligent children (Boutwell, 2018). This particular study explored the association between breastfeeding and intelligence during childhood and adolescence using multiple intelligence test and controlling for a range of key covariates (Boutwell 2018). Boutwell and researchers (2018), surveyed a sample of 793 families till the age of 15. Mothers were questioned on breastfeeding compliance and duration at one and 6 months. Children took three of the Woodcock-Johnson Psycho-Educational Battery tests in third grade, fifth grade, and at 15 years old.

As described before, Boutwell states breastfeeding is not random among mothers with newborns. Covariates Boutwell (2019) included were, maternal intelligence, promotion of cognitive skill, gender, race of the newborn, maternal age at birth, public assisted resources used, history of maternal depression, and hours per week of work. The binary equation model showed that mothers that engaged in any amount of breastfeeding were more likely to have children with higher intelligence scores at grade 3 ( $b = 0.467$ ,  $p$

= .010) but had no effect on children at grade five and age 15. Boutwell examined the possibility of duration of breastfeeding having an influence on intelligence of newborns. Boutwell and researchers (2018) analyzed significant findings of mothers breastfeeding for more than 1 month and not stopping before 6 months ( $b = 0.527$ ,  $p = 0.017$ ) on intelligence at Grade 3. Grade 5 students also had significant findings on intelligence with mothers who breastfed for more than 1 month and not stopping before 6 months ( $b = 0.344$ ,  $p = .028$ ). Breastfeeding throughout the first 6 months of a child's life is significantly associated with intelligence at age 15 ( $b = 0.493$ ,  $p = 0.028$ ) (Boutwell, 2019). All three childhood intelligence outcomes indicated that breastfeeding throughout the first 6 months is positively associated with significant intelligence scores.

Another study (Koh, 2017), supported the theme that breastfeeding has positive impacts on child test scores. This study examines the distributional effects of maternal breastfeeding on the cognitive test scores of 11,544 children who were born in 2000 and 2001 in the United Kingdom using a semiparametric quantile regression model (Koh, 2017). Koh (2017) used data from the Millennium Cohort Study (MCS), which was a longitudinal study of about 18,500 children who were born in 2000 and 2001 in the United Kingdom. Koh (2017) gathered specific information from four of the MCS surveys when the children were ages, 9 months, 3, 5 and 7 years old. Data was excluded for mothers with multiples births or children who were not living with their biological mothers (Koh, 2017). Koh (2017) also collected maternal data from the MCS survey which assessed maternal breastfeeding duration. A major factor of this study is the location of the study. During 2000 in the United Kingdom, exclusive breastfeeding was only recommended for 4 months. So, information that was collected from the MCS, was

based on the 4-month recommendation for breastfeeding. Due to this factor Koh (2017) also collected the effects of extended breastfeeding meaning breastfeeding for at least 6 months. Koh (2017\_) assessed cognitive development of children through six British Ability Scale (BAS) tests. BAS tests were used to measure the cognitive abilities of children aged 2.5-8 years old (Koh 2017). Information was collected on maternal demographics, maternal prenatal characteristics, and spouse/family characteristics and were used as control variables for the propensity score approach (Koh 2017).

Koh found that among children with similar propensity scores, children who were breastfed had higher test scores than their counterparts (Koh, 2017). This finding suggests that maternal breastfeeding has a positive impact on cognitive development among children with similar propensity scores. Maternal breastfeeding increased cognitive test scores by 1.04 and 0.94 points (Koh, 2017). In Table 2 of Koh's study, the impact of maternal breastfeeding is around 1.1 to 1.2 points for children below the 20<sup>th</sup> percentile of the cognitive test score distribution and around 0.5 point for children above the 80<sup>th</sup> percentile of cognitive test score distribution (Koh, 2017). This data shows us that maternal breastfeeding on children's development is greater among children with lower test scores (Koh, 2017). This indicates that maternal breastfeeding does show positive benefits in children but more specifically among children with lower scores. Koh's third table shows the estimated effects of breastfeeding with certain cutoffs. One finding Koh indicated was that the impacts of ever breastfeeding for those below the 20<sup>th</sup> percentile were about one and a half times larger than for those above the 80<sup>th</sup> percentile (Koh, 2017). The impacts of extended maternal breastfeeding for those below the 20<sup>th</sup> percentile are about five times larger for those above the 80<sup>th</sup> percentile (Koh, 2017).

Again, the data Koh analyzed showed larger effects of breastfeeding among children with lower test scores. The distributional effects become larger for the extended duration of breastfeeding (at least 6 months) (Koh,2017). Overall Koh (2017) found that the effects of maternal breastfeeding on children's test scores were greater among children with lower test scores; the scores were around 12-13% of the standard deviation. Koh's study suffered from some limitations like, breastfeeding duration was based on maternal recall and it being impossible to obtain information on unmeasurable factors such as maternal genes to include as maternal data characteristics.

### **Limitations**

This study suffered from a number of limitations. Limitations of this study included the limited number of relevant studies on this topic and variable recommended optimal time frames for exclusive breastfeeding based on geographical location. As well as limited data on the long-term impact of maternal breastfeeding into adulthood & beyond and confounding factors such as more intelligent mothers tend to breast feed. Lastly, there was limited data on mothers having more confidence and higher degree of self-efficacy. There appears to be a correlation between maternal education and breastfeeding, which may positively impact neurocognitive childhood development.

### **Nursing Implications/Conclusion**

The neonatal period is one of the most fragile stages of life. In the very early stages of life, after birth, all aspects of care towards the newborn affect how he or she will develop physically and mentally. It is essential to care for newborns at all times

because newborns are so dependent on their parents or caregiver. According Erik Erikson's theory of psychosocial development, from birth to the age of 1, newborns are learning trust vs. mistrust. Newborns are totally reliant on their parents and depending on the care they receive; they learn to trust their care providers (parents) or lack trust in their care providers. Lack of stimulation to newborns can have extreme negative effects to their physical and mental health, especially at such a young age in life. Skin-to-skin contact between mother and child stimulates maternal hormonal responses which may indirectly improve cognitive development (Koh, 2017). Activities such as playing, bathing, changing clothes, engaging the newborn with conversation, skin-to-skin, and nutrition are all-important tasks that enhance child development. It is important that nurses translate research to practice, the safest and most beneficial techniques of newborn care to help promote healthier lifestyles in the hospital setting. Nurses have a major role of providing education to patients, especially regarding newborn care and safety.

In conclusion, this research should guide nurses to identify populations that may need more support in education and promoting adherence of proper breastfeeding techniques. Due to the limited research available for this study, more nurse-led studies should be performed to understand long term impact of breastfeeding on neurocognitive and language development. Teaching mothers about the long-term benefits of breastfeeding, adopting strategies that promote breastfeeding and encouraging longer periods of breast feeding. It can be recommended that further research is certainly needed to assess the long-term effects of maternal breastfeeding and more research into specific techniques nurses can implement to improve adherence of the best feeding practices.

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### References

- Boutwell, B. (2018). On the Positive Relationship between Breastfeeding & Intelligence. *American Psychological Association, 54*(8), 1426-1433.  
doi:10.31235/osf.io/tn9w3
- Brown, A., & Arnott, B. (2014, February 12). Breastfeeding duration and early parenting behaviour: The importance of an infant-led, responsive style. Retrieved April, 2019, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3922698/>
- Choi, H. J., Kang, S. K., & Chung, M. R. (2018). The relationship between exclusive breastfeeding and infant development: A 6- and 12-month follow-up study. *Early Human Development, 127*, 42-47. doi:10.1016/j.earlhumdev.2018.08.011
- Coffman, L. (2019). The NP's role in promoting and supporting breastfeeding. *The Nurse Practitioner, 44*(3), 38-42. doi:10.1097/01.npr.0000553401.96471.77
- Hinic, K. (2016). Predictors of Breastfeeding Confidence in the Early Postpartum Period. *Journal of Obstetric, Gynecologic & Neonatal Nursing, 45*(5), 649-660.  
doi:10.1016/j.jogn.2016.04.010
- Jansen, E., Mallan, K. M., Byrne, R., Daniels, L. A., & Nicholson, J. M. (2015). Breastfeeding Duration and Authoritative Feeding Practices in First-Time

Mothers. *Journal of Human Lactation*, 32(3), 498-506.

doi:10.1177/0890334415618669

Koh, K. (2017). Maternal breastfeeding and childrens cognitive development. *Social*

*Science & Medicine*, 187, 101-108. doi:10.1016/j.socscimed.2017.06.012

Maryniak, K. (2015). Breastfeeding: An Update for Nurses. Retrieved April, 2019, from

<https://www.rn.com/nursing-news/breastfeeding-an-update-for-nurses/>

Smith, J. M. (2015). Breastfeeding and language outcomes: A review of the literature.

*Journal of Communication Disorders*, 57, 29-40.

doi:10.1016/j.jcomdis.2015.04.002

Teles, M., Ferreira da Silva Junior, R., Gualberto dos Santos Júnior, G., Fonseca, M., &

Eugênio, K. (2017). Knowledge and practices of breastfeeding of users form the family health strategy. *Journal of Nursing UFPE Online*, 11(6), 2302-2308.

doi:10.5205/reuol.10827-96111-1-ED.1106201707

Literature Matrix  
Summary of Studies

Citation Author(s)/ Year	Design	Theoretical Foundations	Target Population, Sample Size, Location	Type Intervention	Outcomes/Aims	Results	Limitations	Nursing Implications/Gaps
#1. Brian Boutwell 2018	Quantitative Study	Association between breastfeeding and intelligence during childhood and adolescence using multiple intelligence tests and controlling for a range of key covariates	790 respondents from the National Institute of Child Health and Human Development's Study of Early Child Care and Youth Development  Families were recruited from hospitals located across 10 cities within the United States	No intervention identified	Aim: assessing the correlation of breastfeeding on childhood intelligence including confounding variables: maternal intelligence, maternal education, and cognitive stimulation provided by mothers	Mothers who engaged in any sort of BF were more likely to have children with higher intelligence scores at grades 3,5, and age 15. Changes in intelligence correlated with prolonged BF and all analytical approaches suggested at least some correlation between breastfeeding and higher scores on measures of intelligence.  Results suggest a small to moderate benefit from BF	No limitations	The extent to which we can infer causal effects or determine the possible pathways of such effects of maternal breastfeeding on intelligence remains unclear
#2. Amy Brown 2014	qualitative	Breastfeeding duration & parenting behavior  Infant led, responsive style feeding	508 mothers Swansea/Durham United Kingdom	No intervention identified	Explore the association between early parenting behaviors and breastfeeding durations	Breastfeeding durations were significantly associated with parenting behaviors		Further research needed to examine how feeding practices impact infant health and development
#3. Hye Choi Su Kang Mi Chung	Quantitative longitudinal study	Benefits of maternal feeding in infants under one year	255 mothers and infants living in South Korea	No intervention	To investigate the association between breastfeeding duration and infant development	Infants who EBF for 4 months, showed better development compared to infants who were never breastfed	No limitations identified	Recommend EBF to be 6 months
#4. Lindsay Coffman	Review of lit	Nurses role in breastfeeding	No participants	Lactation interventions for all women during pregnancy and after birth	Reinforced health benefits associated with breastfeeding	Identifying barriers of breastfeeding  Education on lactation for nurses and mothers  Promoting adherence of breastfeeding	No limitations	The need for lactation education for both healthcare providers and patients
#5 Katherine Hinic	Descriptive correlational study	Predictors of breastfeeding  Self-efficacy  Education/physiological im	107 mothers/infants	No intervention	Identify factors r/t BF self-efficacy	Breast feeding self-efficacy was positively correlated to Birth satisfaction, intention to BF, EBF for 6 months and feeling prepared for birth	Convenience sampling, participants might not be apart of the general population. Geographic specificity associated with data	Nurses can use these findings to implement strategies to improve breastfeeding confidence

							collection at a single site limits generalizability	
#6. Elena Jansen, Kimberley M. Mallan, Rebecca Byrne, MNutr Diet, Lynne A. Daniels, and Jan M. Nicholson 2015	Quantitative, meta-analysis research study	Breastfeeding approaches authoritative or authoritarian  Breastfeeding duration	English-speaking first-time mothers who were at least 18 or older. Delivered a full-term health baby  458 participants  Australia Adelaide and Brisbane maternity wards	No interventions	Aim: examine associations between breastfeeding duration and a comprehensive range of maternal feeding practices	Longer duration of breastfeeding was associated with greater responsiveness and structure in feeding.  support for continued breastfeeding may assist in establishing developmentally appropriate feeding interactions that support children's self-regulatory capabilities in toddlerhood.	Self-recall  Assumptions that mothers who breastfed only gave from the breast and not expressed milk in a bottle	highlight the need to offer support to mothers who bottle feed their infant.  These mothers may benefit from targeted guidance on authoritative feeding practices, both in the context of bottle feeding and as children transition to complementary foods and spoon feeding
#7 Kanghyock Koh 2017	Longitudinal study  Semiparametric Quantile regression model	Distributional effects of maternal breastfeeding on cognitive test scores	11,544 children born in 2000-2001 in the United Kingdom	No intervention	Aim was to see if children with lower test scores benefit more from breastfeeding than those with higher scores	the effects of breastfeeding on children's test scores were greater among children with lower test scores	First, the propensity score approach is based on the assumption that there is no other confounding factor once a large number of covariates are controlled for  the data doesn't provide enough information to construct an exclusive breastfeeding variable  breastfeeding duration was based on maternal recall	Public policy aims a promoting breastfeeding might narrow disparity in children's cognition
#8 Kim Maryniak	Lit review	Breastfeeding information for nurses	No participants	No interventions	Breastfeeding awareness for nurses	Its essential for nurses to have the knowledge to support breastfeeding mothers	No limitations	None

#9 Jamie Mahurin Smith	Review of literature	Early diet might influence neurodevelopment	No participants	No intervention	Outcome: readers will be able to explain possible mechanisms by which early diet might influence neurodevelopment.	It's reasonable to believe the influence of diet on language outcomes d/t human and animal studies that have supported neurodevelopmental differences r/t breastfeeding.	No limitations	To provide accessible and competent help to mothers who encounter breastfeeding difficulties
#10 Mariza Alves Barbosa Teles, Renê Ferreira da Silva Junior, Gilberto Gualberto dos Santos Júnior, Mayane Prates Fonseca, Kelly Karoline Eugênio	descriptive, exploratory study with a qualitative approach  data collection used a semi-structured script with seven questions that guided the interviews	the present study sought to understand the knowledge of the mothers attended at a Family Health Strategy about breastfeeding	North of Minas Gerais  9 mothers were interviewed.  registered in the area covered by the FHS, have performed at least 6 prenatal consultations, have participated in educational groups in the FHS during pregnancy and puerperal consultation and follow-up of the child in the first six months of life.	No intervention	Aim: motivated by the need to reflect on the breastfeeding process, knowing the main elements that interfere in the adherence to breastfeeding, especially the EBF, as a way to instrumentalize health professionals in their practice	Most of the interviewed mothers present conceptual knowledge about exclusive breastfeeding and its benefits for the child  practice of exclusive breastfeeding during six months of the child's life in the studied scenario is deficient of breastfeeding	Self- recall	initiatives to promote its practice increasingly become a priority, for both public health policies directed at maternal and child health, as health professionals at both the hospital level as primary health care, and the community as a whole. adoption of strategies that subsidize the actions of health professionals to promote breastfeeding and factors that interfere in its duration and maintenance.