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# Breastfeeding and Child Psychosocial Development

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## Introduction

The effects of breastfeeding on children's development have important implications for both public-health policies and for the design of targeted early intervention strategies to improve the developmental outcomes of children at risk as a result of biological (e.g., prematurity) or social adversity (e.g., poverty). To date, research has provided clear support for the nutritional and health benefits of breastfeeding for the mother and child,[1] with appropriate cautions noted for women who are ill or on medication. There is also evidence of consistently positive effects of breastfeeding on intellectual development.[2-4] Less well studied is the relationship between breastfeeding and child psychosocial development.

## Subject

Most research concerned with the psychosocial effects of breastfeeding is based on observational studies due to the ethical challenges of randomly assigning mothers to either breastfeeding or formula feeding groups. Thus, for these studies there is a clear reliance on either matching or statistical adjustment for the effects of other factors correlated with feeding

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method that may also influence child outcomes such as maternal IQ and/or parenting style. This body of research has focused on the following:

1. Comparisons between breast- and bottle-feeding mother-infant dyads on a range of maternal and infant measures, such as maternal stress, well-being, parenting behaviour, the quality of early mother-infant interactions and infant self-regulation and behaviour.
2. Examining differences in maternal mood, infant state, and dyadic interactions between breast- or formula-fed groups.
3. Examining linkages between the extent of breastfeeding and children's longer-term psychosocial outcomes, including attachment to parents, behavioural adjustment and mental health.
4. Adjusting these linkages for confounding factors correlated with both the decision to breastfeed and child outcomes.

In addition to the above, there has been one prospective study that has used a cluster randomization design.[5,6] This study known as PROBIT (Promotion of Breastfeeding Intervention Trial) recruited Belarusian mothers who gave birth at either a UNICEF Baby-Friendly Hospital that actively promoted breastfeeding (intervention group) or a hospital/clinic where usual care procedures were in place (control group). Their infants were then studied prospectively across a number of outcomes.

**Problems**

The key problems in this area of investigation are as follows:

1. Separating the effects of breastfeeding from other potential confounding factors associated with breastfeeding. Specifically, the decision of whether or not to breastfeed is related to socioeconomic status (SES), maternal mental health, education, attachment history and nurturance. These factors are also related to child development outcomes. Therefore, determining the unique effects of breastfeeding on child psychosocial outcomes has been difficult and not always adequately done.
2. Nutrition and health factors such as alcohol use and medication can reduce the quality of mothers' breast milk and adversely affect infant neurological state and mother-infant interactions. Therefore, controlling for breast milk quality is also important. Few studies

have included such measures or controls.

3. Consideration is not always given to the effects of breastfeeding duration or the use of combined feeding methods on later psychosocial outcomes.
4. Considerable variability exists in the psychosocial outcomes studied and the length of developmental follow-up.
5. Finally and importantly, there is a need for more studies examining the mechanisms or pathways by which breastfeeding may influence children's short- and long-term psychosocial adjustment.

**Research Context**

Early research in this area was based predominantly on samples of mothers and infants living in developed countries. However, more recent studies have extended this work to developed and developing countries.[1] Research designs have included both cross-sectional and longitudinal approaches. Cross-sectional studies have used both retrospective and concurrent reports of maternal breastfeeding. With a few exceptions, longitudinal studies have tended to be of short duration. In both longitudinal and cross-sectional studies, outcome measures have included maternal interviews or reports, child interviews, and direct observations of feeding, play and other interactions between mothers and their infants. Longitudinal studies have included educational outcomes and parent or teacher completed screening measures of child emotional and behavioural problems. As noted above, ethical standards have meant that random assignment to feeding groups is rarely possible, making other methodological and analytical steps necessary to ensure that research outcomes are accurately attributed to the relevant factors under study.[7]

**Key Research Questions**

The key research questions in this area are as follows:

1. Does breastfeeding contribute to children's psychosocial adjustment both in the short and long term? Psychosocial outcomes of interest include the formation of a secure and close infant-mother attachment relationship, and child social and behavioural adjustment.
2. What are the mechanisms and pathways by which breastfeeding might influence child psychosocial outcomes?

**Recent Research Results**

Evidence suggests that a number of maternal and infant factors are associated with both the decision to breastfeed and the duration of breastfeeding. These factors vary a lot by setting, and especially between developed and developing countries. In developed countries, women who choose not to breastfeed and who breastfeed for a shorter length of time tend to be younger, less well educated, single mothers, are poorer, and to report lower levels of breastfeeding support.[1,8,9] In contrast, in developing countries, poorer women were more likely to breastfeed, and to breastfeed for longer periods of time.[1,10]

Additional reasons for deciding not to breastfeed can include concern about the quality and quantity of breast milk, and partner and family support, which are common across developed and developing countries.[10,11] Women who decide not to breastfeed are also more likely to have smoked during their pregnancy, be primiparous mothers (i.e., having their first child), and to have a child born low birth weight or with complex health issues such as cystic fibrosis.[9,12] Prenatal and post-natal stressful experiences may also reduce the duration of breastfeeding.[13] Finally, several studies suggest that mother's who return to work within the first 6 months postpartum or anticipate an early return to full-time employment, are less likely to breastfeed. When they do, they are also more likely to feed their babies for a shorter length of time.[14-16] Hospital policies and staff practices that support breastfeeding, as well as social support from fathers, grandmothers and other breastfeeding mothers, can help alleviate misgivings and improve breastfeeding duration and quality.[16-18]

These findings clearly indicate that infant breastfeeding is a selective process, that varies depending on a number of individual, family and community factors. Thus it is important to understand how these individual and contextual barriers to breastfeeding can be addressed.[1] Furthermore, from a research perspective, it is important that these pre-existing differences between breast and formula feeding mothers and infant be taken into account by researchers when testing associations between breast milk feeding exposure and child psychosocial outcomes. It is also important to be careful to distinguish between those factors that are confounders, and those that might best be viewed as mediators or explanatory factors involved in accounting for observed associations between breastfeeding exposure and outcome, such as the quality of the subsequent mother-infant relationship. Although most studies reviewed have attempted to control statistically for some of these differences, very few have controlled extensively for an adequate range of potential confounding factors.

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Findings from short-term outcome studies suggest that breastfeeding may have some psychosocial benefits for both mother and infant, as well as for their developing relationship. However, effect sizes tend to be small, with care experiences in both groups being very much within the normal range.  Mothers who breastfeed have been found to report lower levels of perceived stress and negative mood, higher levels of maternal attachment, and tend to perceive their infants more positively than mothers who formula-feed.[9,19-21] There is evidence to suggest that breastfeeding mothers may also spend more time in emotional care and be more sensitive to infant emotional distress cues than bottle-feeding mothers.[22,23] Relatedly, a small fMRI study of 17 mothers in the first postpartum month, found that breastfeeding mothers showed greater activation in brain areas involved in empathy and bonding than formula-feeding mothers when listening to their own infant's cry.[24] These brain areas included the superior frontal gyrus, insula, precuneus, striatum and amygdala. Greater activation in the right superior frontal gyrus and amygdala were further correlated with higher levels of maternal sensitive behaviour in a mother-infant interaction at 3 to 4 months. This is consistent with other studies demonstrating a link between breastfeeding and maternal sensitivity.[25,26,27] For example, in a longitudinal study of more than 1300 families in the USA, mothers who breast fed were observed to be more sensitive to their babies at 6, 15, 24 and 36 months.[27] Importantly, this difference persisted after statistical control for the effects of maternal mental health, the quality of the home environment in terms of infant health and stimulation and socioeconomic status. Finally, after breastfeeding, mothers also report reductions in negative mood compared to mood levels prior to breastfeeding.[20]

In terms of early infant behaviour, there is some suggestion that in the first few weeks of life breastfed babies may be characterized by improved alertness[28,29] and other aspects of neurobehavioural functioning.[30] For example, Hart et al.[30] found that one-week-old breastfed infants obtained significantly higher scores on the orientation and motor scales on the Brazelton Neonatal Behavioural Assessment Scale. In addition, they also tended have better self-regulation, fewer abnormal reflexes and fewer signs of withdrawal than formula-fed infants. Additional support for the possible self-regulatory benefits associated with breastfeeding is also provided by a short-term follow-up study of 158 infants.[31] This study found that between the ages of 13 and 52 weeks, breastfed babies consistently cried for shorter periods of time than formula-fed babies.

However, perhaps the most important question concerning the psychosocial benefits of breastfeeding concerns the longer term impacts on a child's relationships with their mother/family, as well as their behavioural and socio-emotional wellbeing. At present, findings are mixed, with several studies suggesting some limited psychosocial benefits and others not. In

with respect to the quality of mother-infant relations, a prospective longitudinal study of around 1000 young New Zealanders found a small but significant association between breastfeeding duration and adolescents' perceptions of maternal care, with a longer duration of breastfeeding being associated with increased adolescent perceptions of maternal nurturance.[9] This association persisted after statistical control for a wide range of the selection factors noted above. Another study of 2,900 Australian infants assessed at ages 1, 2 3, 5, 8, 10, and 14 years found that infants breastfed for 6 months or longer, had lower externalizing, internalizing, and total behaviour problem scores throughout childhood and into adolescence than never breastfed and infants fed for less than 6 months.[8] These differences remained after statistical control for the presence of both biological parents in the home, low income and other factors associated with poor mental health.

These findings stand in contrast to other observational and experimental studies that have failed to observe any positive effects of breastfeeding on children’s longer-term socio-emotional adjustment.[6,32] For example, in a sample of more than 1000 breastfeeding mothers and children from Project VIVA who were followed from before birth into middle childhood (mean age 7.7 years), no associations were found between breastfeeding duration (exclusive in the first 6 months and non-exclusive in the first 12 months) and parent and teacher ratings of child behaviour scores after statistical control for maternal mental health, maternal intelligence, socio-demographic characteristics and early child care.[32] Similarly, no differences in emotional, conduct, hyperactivity, peer or prosocial behaviour scores on the Strength and Difficulties Questionnaire at age 6.5 years were found between infants whose mothers in the intervention and control arms of the large PROBIT cluster randomized controlled trial of breastfeeding promotion. Given the relatively young ages of children at follow-up assessment, longer term evaluations of these cohorts will be important to see if these findings remain as children enter the more behaviourally challenging late middle childhood and adolescent years when emotional and behavioural problems often become more pronounced. But in general, there is limited and no clear evidence that breastfed babies are at lower risk of developing behaviour or mental health problems in later life.

**Mechanisms**

Several possible mechanisms may account for possible links between breastfeeding and child developmental outcomes. First, breastfeeding is associated with a reduced risk of childhood illnesses including asthma, ear infections, diarrhea, respiratory disease, and dental carries, as

well as improved immune function. Thus it is possible that caring for a healthier baby may offer greater opportunities for positive mother-infant interaction, and in turn a closer relationship. Relatedly for mothers, breastfeeding can have positive health benefits, including anti-inflammatory effects, increased sleep, decreased stress and possibly better mood, thus potentially helping to support parent engagement and care.[33] Second, it is also possible that the positive effects on child cognitive development may play a role. Third, maternal sensitivity and a closer early mother-infant bond as a consequence of increased mother infant contact associated with breastfeeding may also in part explain infant neurobehavioural outcomes in the short, and possibly longer term. Fourth, higher quality maternal interactions have been shown to improve brain development at 5, 10 and 24 months.[34] Fifth, there is growing evidence to suggest that the beneficial effects of exclusive breastfeeding may be moderated by the infant's genome,[35,36] and the metabolism of the fatty acids in maternal breast milk.[37] For example, Krol et al.[36] showed that infants exclusively breastfed for a longer duration (above the 50th percentile) showed a heightened sensitivity and interest in a happy visual stimulus (eyes) than infants exclusively breastfed for a shorter duration (below the 50$^{th}$ percentile). The authors hypothesized that the mechanism of action was through the effect of breastfeeding on the mother and infant's oxytocin system, a neurohormone implicated in attachment and bonding that increases the salience of affective stimuli.[38] In a further study, children born to mothers characterized by higher levels of omega-3 fatty acid and docosahexaenoic acid early in pregnancy have been shown to be at lower risk of emotional, behaviour and peer problems at age 5-6, although these results were not specific to breastfeeding.[35] These findings highlight a number of interesting possible mechanisms. However, further research and replication is clearly needed.

**Conclusion**

Evidence supports a link between breastfeeding and positive mother-infant and neurobehavioural outcomes in the short term. However, the extent to which these early and relatively subtle differences translate into long term differences in psychosocial functioning is less clear. Breastfed infants may be more alert, cry less, and be better able to engage in interactions with their parents than formula-fed infants. Breastfeeding may also have some stress-reducing properties for mothers and assist parenting confidence. Further research is needed to clarify the longer-term benefits of breastfeeding, and potentially with behavioural rather than just questionnaire screening measures. The mechanisms by which these associations arise have not been fully established. However, maternal sensitivity and attachment fostered through breastfeeding is one possibility. Another explanation could be that associations between

breastfeeding and improved mother-child relations may, at least in part, reflect improvements in child cognitive functioning and/or physical health associated with breastfeeding.

### Implications for Policy and Services

1. There is ample justification for the value of breastfeeding from studies of the nutritional and cognitive advantages associated with breastfeeding, as well as the psychosocial benefits. Increasingly, this information is being incorporated into strategies to promote breastfeeding.
2. Although some research is establishing a relationship between breastfeeding and improved psychosocial functioning, a large number of parent and family factors have also been shown to predict child psychosocial maladjustment. These include teenage motherhood, maternal educational under-achievement, poverty, parental antisocial behaviour and other mental-health problems, prenatal stress and maternal health, family violence, child abuse and parenting difficulties. Therefore, in order to reduce rates of behavioural and mental health problems among children and youth, broad based community and family intervention strategies, that encourage breastfeeding amongst other strategies, are likely be the most effective approaches.

#### References


1. Victora CG, Bahl R, Barros AJ, França GV, Horton S, Krasevec J, Murch S, Sankar MJ, Walker N, Rollins NC; Lancet Breastfeeding Series Group. Breastfeeding in the 21st century: epidemiology, mechanisms, and lifelong effect. *The Lancet* 2016;387(10017):475-490.
2. Kanazawa S. Breastfeeding is positively associated with child intelligence even net of parental IQ. *Developmental Psychology* 2015;51(12):1683.
3. Horta BL, Loret de Mola C, Victora CG. Breastfeeding and intelligence: a systematic review and meta-analysis. *Acta Paediatrica* 2015;104(S467):14-19.
4. Kramer MS, Aboud F, Mironova E, Vanilovich I, Platt RW, Matush L, Igumnov S, Fombonne E, Bogdanovich N, Ducruet T, Collet JP, Chalmers B, Hodnett E, Davidovsky S, Skugarevsky O, Trofimovich O, Kozlova L, Shapiro S; Promotion of Breastfeeding Intervention Trial (PROBIT) Study Group. Breastfeeding and child cognitive development: new evidence from a large randomized trial. *Archives of General Psychiatry* 2008;65(5):578-584.
5. Kramer MS, Fombonne E, Matush L, Bogdanovich N, Dahhou M, Platt RW. Long-term behavioural consequences of infant feeding: the limits of observational studies. *Paediatric and Perinatal Epidemiology* 2011;25(6):500-506.
6. Kramer MS, Fombonne E, Igumnov S, Vanilovich I, Matush L, Mironova E, Bogdanovich N, Tremblay RE, Chalmers B, Zhang X, Platt RW; Promotion of Breastfeeding Intervention Trial (PROBIT) Study Group. Effects of prolonged and exclusive breastfeeding on child behavior and maternal adjustment: evidence from a large, randomized trial. *Pediatrics* 2008;121(3):e435-440.
7. Horta BL, Victora CG, Dragoman M, Petrie K, Torgal A, Thomas T, Cremers S, Westhoff CL. Long-term effects of breastfeeding: A systematic review. *Contraception* 2013;87(4):432-6.


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8. Oddy WH, Kendall GE, Li J, Jacoby P, Robinson M, de Klerk NH, Silburn SR, Zubrick SR, Landau LI, Stanley FJ. The long-term effects of breastfeeding on child and adolescent mental health: a pregnancy cohort study followed for 14 years. *Journal of Pediatrics* 2010;156(4):568-574.
9. Fergusson DM, Woodward LJ. Breast feeding and later psychosocial adjustment. *Paediatric and Perinatal Epidemiology* 1999;13(2):144-157.
10. Balogun OO, Dagvadorj A, Anigo KM, Ota E, Sasaki S. Factors influencing breastfeeding exclusivity during the first 6 months of life in developing countries: a quantitative and qualitative systematic review. *Maternal & Child Nutrition* 2015;11(4):433-451.
11. Earland J, Ibrahim S, Harpin V. Maternal employment: does it influence feeding practices during infancy? *Journal of Human Nutrition and Dietetics* 1997;10(5):305-311.
12. Tluczek A, Clark R, McKechnie AC, Orland KM, Brown RL. Task-oriented and bottle feeding adversely affect the quality of mother-infant interactions after abnormal newborn screens. *Journal of Developmental and Behavioral Pediatrics* 2010;31(5):414-426.
13. Li J, Kendall GE, Henderson S, Downie J, Landsborough L, Oddy WH. Maternal psychosocial well-being in pregnancy and breastfeeding duration. *Acta Paediatrica* 2008;97(2):221-225.
14. Dubois L, Girard M. Social inequalities in infant feeding during the first year of life. The Longitudinal Study of Child Development in Quebec (LSCDQ 1998-2002). *Public Health Nutrition* 2003;6(8):773.
15. Fein SB, Roe B. The effect of work status on initiation and duration of breast-feeding. *American Journal of Public Health* 1998;88(7):1042-1046.
16. Dagher RK, McGovern PM, Schold JD, Randall XJ. Determinants of breastfeeding initiation and cessation among employed mothers: a prospective cohort study. *BMC Pregnancy and Childbirth* 2016;16(1):194.
17. Rayfield S, Oakley L, Quigley MA. Association between breastfeeding support and breastfeeding rates in the UK: a comparison of late preterm and term infants. *BMJ Open* 2015;5(11):e009144.
18. Ward LP, Williamson S, Burke S, Crawford-Hemphill R, Thompson AM. Improving Exclusive Breastfeeding in an Urban Academic Hospital. *Pediatrics* 2017;139(2).
19. Else-Quest NM, Hyde JS, Clark R. Breastfeeding, bonding, and the mother-infant relationship. *Merrill-Palmer Quarterly* 2003;49(4):495-517.
20. Mezzacappa ES, Katkin ES. Breast-feeding is associated with reduced perceived stress and negative mood in mothers. *Health Psychology* 2002;21(2):187.
21. Akman I, Kuscu MK, Yurdakul Z, et al. Breastfeeding duration and postpartum psychological adjustment: role of maternal attachment styles. *Journal of Paediatrics and Child Health* 2008;44(6):369-373.
22. Pearson RM, Lightman SL, Evans J. The impact of breastfeeding on mothers' attentional sensitivity towards infant distress. *Infant Behavior & Development* 2011;34(1):200-205.
23. Smith J, Ellwood M. Feeding patterns and emotional care in breastfed infants. *Social Indicators Research* 2011;101:227-231.
24. Kim P, Feldman R, Mayes LC, et al. Breastfeeding, brain activation to own infant cry, and maternal sensitivity. *Journal of Child Psychology and Psychiatry, and allied Disciplines* 2011;52(8):907-915.
25. Tharner A, Luijk MP, Raat H, et al. Breastfeeding and its relation to maternal sensitivity and infant attachment. *Journal of Developmental and Behavioral Pediatrics* 2012;33(5):396-404.
26. Britton JR, Britton HL, Gronwaldt V. Breastfeeding, sensitivity, and attachment. *Pediatrics* 2006;118(5):e1436-1443.

27. Papp LM. Longitudinal associations between breastfeeding and observed mother-child interaction qualities in early childhood. *Child: Care Health and Development* 2014;40(5):740-746.

28. Feldman R, Eidelman AI. Direct and indirect effects of breast milk on the neurobehavioral and cognitive development of premature infants. *Developmental Psychobiology* 2003;43(2):109-119.

29. Gerrish CJ, Mennella JA. Short-term influence of breastfeeding on the infants' interaction with the environment. *Developmental Psychobiology* 2000;36(1):40-48.

30. Hart S, Boylan LM, Carroll S, Musick YA, Lampe RM. Brief report: breast-fed one-week-olds demonstrate superior neurobehavioral organization. *Journal of Pediatric Psychology* 2003;28(8):529-534.

31. Baildam EM, Hillier VF, Menon S, Bannister RP, Bamford FN, Moore WM, Ward BS. Attention to infants in the first year. *Child: Care, Health and Development* 2000;26(3):199-216.

32. Belfort MB, Rifas-Shiman SL, Kleinman KP, Bellinger DC, Harris MH, Taveras EM, Gillman MW, Oken E. Infant breastfeeding duration and mid-childhood executive function, behavior, and social-emotional development. *Journal of Developmental & Behavioral Pediatrics* 2016;37(1):43-52.

33. Kendall-Tackett K. The new paradigm for depression in new mothers: current findings on maternal depression, breastfeeding and resiliency across the lifespan. *Breastfeeding Review* 2015;23(1):7.

34. Bernier A, Calkins SD, Bell MA. Longitudinal associations between the quality of mother–infant interactions and brain development across infancy. *Child Development* 2016;87(4):1159-1174.

35. Loomans EM, Van den Bergh BR, Schelling M, Vrijkotte TG, Van Eijsden M. Maternal long-chain polyunsaturated fatty acid status during early pregnancy and children's risk of problem behavior at age 5-6 years. *Journal of pediatrics* 2014;164(4):762-768.

36. Krol KM, Monakhov M, Lai PS, Ebstein RP, Grossmann T. Genetic variation in CD38 and breastfeeding experience interact to impact infants' attention to social eye cues. *Proceedings of the National Academy of Sciences of the United States of America* 2015;112(39):E5434-5442.

37. Caspi A, Williams B, Kim-Cohen J, Craig IW, Milne BJ, Poulton R, Schalkwyk LC, Taylor A, Werts H, Moffitt TE. Moderation of breastfeeding effects on the IQ by genetic variation in fatty acid metabolism. *Proceedings of the National Academy of Sciences* 2007;104(47):18860-18865.

38. Rilling JK, Young LJ. The biology of mammalian parenting and its effect on offspring social development. *Science* 2014;345(6198):771-776.