Rapid Responses to:

RESEARCH:
Geoff Der, G David Batty, and Jan J Deary
Effect of breast feeding on intelligence in children: prospective study, sibling pairs analysis, and meta-analysis
BMJ 2006; 0: bmj.38978.699583.55v1 [Abstract]

Rapid Responses published:

- Does 1979 data hold up?
  Veronica G. (Ronnie) Falcao (6 October 2006)
- Defining breastfeeding properly could change conclusions
  Rachel Myr (6 October 2006)
- Dose of human milk not specified
  Marsha Walker, RN, IBCLC (6 October 2006)
- Whose results are biased?
  James E Akre (7 October 2006)
- mathematical manipulation
  NAOMI BAUMSLAG (7 October 2006)
- Distribution of sample by length of feeding
  Anna-Louise Hale (7 October 2006)
- No cognitive advantage for artificially fed infants given some breastmilk
  Nina J Berry (7 October 2006)
- Nice stats, too bad about the biology
  Alison Barrett (10 October 2006)
- FAS is a alcohol problem
  Miske Siebelink (13 October 2006)
- Breastfeeding and Intelligence Not Demonstrated
  James W. Prescott, Ph.D. (19 October 2006)
- Breastfeeding and Intelligence article has methodologic flaws
  Melissa C. Bartick (27 October 2006)

Does 1979 data hold up?

Veronica G. (Ronnie) Falcao, midwife 94041 USA Massachusetts Weston, Advocacy, for Breastfeeding National Alliance consultant Nurse, Lactation RN, IBCLC, Marsha Walker, RN (6 October 2006)

Although this study was just published, it appears that it was based on data collected in 1979; it is hard to know whether the data collection started from 1979 would hold up against today’s standards.

It is not surprising that there would be parental influences on intelligence, but the question is whether parental influences account for all of the intelligence that is observed in breastfed babies.

Other studies based on more modern data have found that there appears to be an increase in intelligence that is independent of parental IQ:

- Gomez-Sanchiz M, Canete R, Rodero I, Baeza JE, Gonzalez JA. Clin Pediatr (Phila). 2004 Oct;43(8):753-61. Influence of breast-feeding and parental intelligence on cognitive development in the 24-month-old children. The influence of breast feeding is attributable to maternal intelligence, based on the fact that mothers who stated they had ever breastfed their children at all, got higher scores in intelligence test apparently administered in connection with the study from which all the data were gleaned.

- Other studies based on more modern data have found that there appears to be an increase in intelligence that is independent of parental IQ:

The authors of this study conclude, seemingly without a doubt, that the observed correlation between being breastfed and performing better on a military intelligence test apparently administered in connection with the study from which all the data were gleaned.

In the article, a breastfed child is defined as one whose mother reported EVER having breastfed, thus including those children who may have had a feed of colostrum on the first day of life, as well as children who may have been exclusively breastfed for a considerable period, though since the US with its iatrogenic societal deficiency in breastfeeding, the latter group is likely to be very small indeed. Most of the so-called breastfed children in this data set were likely partially breastfed for a time period measurable in weeks, not even months. Drawing such pat conclusions about the effect of breastfeeding under such circumstances is like drawing conclusions about the effect of not smoking based on outcomes in a population where some people claimed to have smoked continuously and some only partially, occasionally, or intensively.

I await with impatience the day when all those concerned with public health view breast- and artificial feeding along such a dichotomy. This might force researchers who expect to publish their work, to define their concepts so that their research contributed something more meaningful to what already know. As it is, even the reviewers in the BMJ seem oblivious to the significant bias (equating 'any' breastfeeding at all with exclusive breastfeeding for many months) which permeates the entire premise for the article in question, and renders the conclusions, at least for this reader meaningless.

rachel@myr.no

Competing interests: None declared

Defining breastfeeding properly could change conclusions

Rachel Myr, midwife NO-4604 Kristiansand, Norway (6 October 2006)

Declaring that breastfeeding has no effect on intelligence in children based on the results of this study is highly misleading. The study fails to adjust the dose of human milk received by children labeled as breastfed. The duration of breastfeeding is meaningless unless we know the exclusivity of the children defined as having been breastfed. "Breastfed" children in this study are lumped together no matter if they breastfed once 7 days or exclusively for six months. Failure to establish an exclusively breastfed control group eliminates any meaningful conclusion. I respectfully suggest that the editors of BMJ require researchers to include an exclusively breastfed control group in research such as this prior to publishing skewed and unreliable article.

rachel@myr.no

Competing interests: Employed as staff midwife and breastfeeding specialist in public hospital in Norway

Dose of human milk not specified

Marsha Walker, RN, IBCLC Nurse, Lactation consultant National Alliance for Breastfeeding Advocacy, Weston, Massachusetts 02493 USA (6 October 2006)

Declaring that breastfeeding has no effect on intelligence in children based on the results of this study is highly misleading. The study fails to adjust the dose of human milk received by children labeled as breastfed. The duration of breastfeeding is meaningless unless we know the exclusivity of those defined as having been breastfed. "Breastfed" children in this study are lumped together no matter if they breastfed once 7 days or exclusively for six months. Failure to establish an exclusively breastfed control group eliminates any meaningful conclusion. I respectfully suggest that the editors of BMJ require researchers to include an exclusively breastfed control group in research such as this prior to publishing skewed and unreliable article.

Competing interests: None declared
Whose results are biased?

7 Oct

James E Akre, Author; Public Member, Board of Directors, International Board of Lactation Consultant Examiners, 1132 Connifion, Geneva, Switzerland

Based on everything we’ve learned in the last quarter-century about breast milk and breastfeeding, the authors’ conclusion seems totally counter-intuitive. According to Siegel (Siegel D), The Developing Mind, 1996), at birth the infant's brain is the most undifferentiated organ in the genes and early experience shape the way neurons connect to one another and thus form the specialized circuits that give rise to mental processes seems reasonable to conclude that whether we fire this process with a food based on the milk of an alien species or in a manner that is consistent with what and what we are as a species will make a significant difference in developmental outcome. Attempting to measure this difference retrospectively is inherently flawed, of course, all the more in the absence of a clear fix on what kind of breastfeeding was being practiced by the children in the study c.

What struck me first about the study and its analysis is the age of the data; or perhaps I should rather say the implications of the age of the yo. people in question, 14 to 22, who were first interviewed in 1979 and the feeding practices common during the specific period. The study cohort between 1957 and 1965. In 1957 - a year after La Leche League was founded in suburban Chicago - the national ever-breastfed rate in the US 28% (compared to 70% at present). I don’t have a figure handy for duration, but my assumption is that it was correspondingly low, especially if of contemporary national (American Academy of Pediatrics) and international (WHO) recommendations.

This period was also marked by infants being commonly fed semi-solids earlier than later - indeed, the earlier the better - as part of conv child-feeding risk. In the USA of the 1950s and 1960s it was customary to start complementary feeding before one month of age with cereal preparations, strained vegetables and fruits, and eggs and meat. Although duration of breastfeeding is dealt with briefly, there is no significant t to define what kind of breastfeeding, including duration or degree of exclusivity, or what kind of feeding practices in general, were common amongst study population. The definition of "breastfeeding status" (Table 1) is a not especially informative one-dimensional divide between "not breastfed" and "breastfed". In their discussion, the authors point out that "only a small proportion of the many studies that have shown a positive effect of breastfeeding or children’s cognitive ability control for material intelligence". They conclude by saying that "studies that do not control for maternal intelligence w probably give biased results". Under the circumstances, I would observe that studies that do not control for initial exclusivity and overall duration of breastfeeding will probably also give biased results.

Competing interests: None declared

mathematical manipulation

7 Oct

Dear Editor 1. The paper in the BMJ October 4th, 2006 by Der et al1 the effect of breastfeeding on intelligence in children; prospective study, sib analysis, and meta-analysis October 4 is fundamentally flawed especially because of it’s the loose definition of breastfeeding. The definition of breastfeeding used could mean once a day or just once. There was no effort to differentiate between exclusive breastfeeding and other forms of including mixed and exclusive breastfeeding. Suggest that the study be discounted totally on the basis of the unacceptable epidemiological definition of exclusively breastfeeding and exclusion of premature infants. The duration and frequency of breastfeeding affects the dose of breastmilk and this has been minimized instead of explored. Furthermore the study used a hodge podge of old data. 2. The meta studies cited were very selected and data w mixed quality. Some of the data was recall data even up to one year which alone is problematic and not generalizable. 3. The authors attribute intelligence to the mother. Are so called breastfeeding mothers more intelligent than mothers of formula fed? Does fathers not have any role in this?

Are the authors suggesting breastfeeding mothers are more intelligent than mothers who don’t breastfeed? Were the mothers single or married? If so then I suppose you could postulate fathers don’t count. There are a lot of reasons mothers choose not to breastfeed including formula company and advertisements. All this has been researched. 1

In my opinion this is selective mathematical manipulation is not worth the paper it is written on and does nor prove anything. Naomi Baumslag 1 Clinical Professor Georgetown University Medical School phone 301 4699210 address 7100 Oak Forest Lane Bethesda MD 1 Baumslag NA and Michelis D. (1995) Milk Money and Madness Culture and Politics of breastfeeding, Bergin and Garvey, Westport Connecticut

Competing interests: None declared

Distribution of sample by length of feeding

7 Oct

Anna Louise Hale, Breastfeeding Peer Support, 24 Maywood Close, Kinton, Newcastle Upon Tyne, NE3 3QT

I really just have a query. Your groups for duration of breastfeeding are focused on durations of less than 6 months. What was the distribution of breastfeeding sample by duration?

Competing interests: None declared

No cognitive advantage for artificially fed infants given some breastmilk

7 Oct

Nina J Berry, PhD Candidate, Centre for Youth Health Behaviour and Communication, University of Wollongong, NSW Australia 2520

Der, Betty & Deary (1) conclude that breastfeeding has no impact on cognitive development. While this study has effectively controlled for a number of confounders, it may suffer from misclassification bias. This is a problem that is common in the literature addressing effects of infant feeding in which the fact that internationally agreed definitions were developed over fifteen years ago (2). Furthermore, the World Health Organization has removed the position that exclusive breastfeeding for at least four months followed by continued breastfeeding until at least twelve months is a prerequisite physiological growth and development (11). This means that research into the effects of infant feeding ought to take exclusively breastfed infants as a reference group if it is to clearly identify the effects of infant feeding on health outcomes (12).

The authors distinguished only two groups of infants, those never breastfed and those ever breastfed. Given that only 3% of mothers reported e breastfeeding at four months, it is not unreasonable to infer that this study misclassified a number of infants as ‘breastfed’ who would have been predominantly artificially fed. It is likely that many of these infants did not receive a clinically significant dose of breastmilk or breastfeeding. It is surprising, then, that it found that “breastfeeding” did not significantly impact on the cognitive development of artificially fed infants.

As Der, Betty & Deary (1) point out there are relatively few high quality studies of the effects of infant feeding that control for maternal intelligence amongst those that do, evidence of cognitive deficit among artificially fed infants is not convincing. However, it is important to note that of the studies that the authors included in their meta-analysis (3-10) only five included a clear definition of breastfeeding and none of them included an exclusively breastfed referent group. This demonstrates that measurement error is common in the literature in this field and helps to explain the controversy that surrounds research into the effects of infant feeding.

Controlling for ‘child’s environment’ is also problematic because it may not be an independent variable. As noted by Hay et al. (4) – which the article - there is evidence that breastfeeding itself increases maternal sensitivity and responsiveness. It does not follow from this research that artificially fed infants are not at increased risk of cognitive deficit. The only conclusion that can be drawn is that artificially fed infants who are fed some breastmilk are not conferred with a cognitive advantage over their completely artificially fed counterparts. Further high quality research is needed in this area. Researchers should use internationally accepted definitions of breastfeeding (1).
compare infants who are breastfed according to World Health Organization recommendations (13) with infants who are fed a commercial breast substitute.

Nina Berry BA/BEd(Hons) DipArts(Phil)
Centre for Health Behaviour and Communication Research
University of Wollongong NSW 2250
AUSTRALIA
nina@UNSWAlumni.com

11. de Onis M. FOREWORD. Acta Paediatrica 2006;95(0):5-6.

Competing interests: None declared

**Nice stats, too bad about the biology**

10 Oct
Der et al. confidently conclude that “while breast feeding has many advantages for the child and mother, enhancement of the child’s intelligence unlikely to be among them.” In their rigorous statistical analysis, they appear to have overlooked the possibility that they didn’t find a relationship between breastfeeding and the child’s cognitive development – when one exists – while at the same time assuming that the previous studies show effects of breastfeeding on cognition are guilty of the opposite.

While no study to date has shown children to be intellectually advantaged by not being breastfed, this is dismissed by the authors as “publication bias.” They point to the size of their own study, and to the number of confounders independently controlled for, as the best indication of the validity of conclusions.

Rather than using statistics to explain away the significance of an observed effect, we need, first, to consider the probability that the effect is real. It is biologically plausible that babies who are fed with human milk achieve optimal neurological development?

Consider the World Health Organization’s recently released Multicentre Growth Reference Study. This study, based on breastfeeding as the biologically norm, showed that babies who are breastfed exclusively for around 6 months and continue to be breastfed for up to 2 years and beyond while complementary foods are added, have marked, measurable and statistically significant differences in anthropomorphic growth compared to artificial feeding babies (1). If their bodies grow differently, why shouldn’t their brains develop differently as well?

If breastfed babies’ brains develop differently, then why did Der et al. fail to find a difference in the cognitive outcomes they were assessing? The comes in looking at the data used and the population described.

In a data obtained from a US national longitudinal survey of youth, the children’s mothers who didn’t breastfeed achieved a raw score of 26 on the Forces Qualifying Test; and the children’s mothers who did breastfeed, a whopping 46. To put this into perspective, a score of 31 is the cut-off for admission to the US military. The standard errors in these two groups are both exceedingly small, thus we can be very confident that these two clearly represent two very different subsets of women. Mothers who admit they fully artificially fed their babies are at a significant cognitive disadvantage in comparison to mothers who claim to have “breastfed.” The authors give little or no consideration to defining what is meant by “breastfeeding” may have occurred for an unspecified length of time (2 days or 2 years), in an unclassified manner (exclusively or not) and with an undefined amount of breast milk delivered (breast or bottle). Each of these has biological meaning.

The danger of using different subsets to draw conclusions is that the statistical analysis of some of these confounders while simultaneously others may bury the important but smaller differences that exist within them. This has happened before.

Another study published last month, involving two of the same authors using the same data set, similarly suggested that mothers who smoke during pregnancy don’t put their children at any cognitive risk. This, the authors explained, is because any differences perceived in IQ between children smokers and non-smokers was accounted for by genetic differences in the IQ of the mothers together with the mothers’ educational achievement. Presumably, the same could be “proven” statistically for drinking alcohol in pregnancy…that fetal alcohol effects aren’t due to how much alcohol the mother drinks, but due to her intelligence. If overwhelming numbers of low-IQ women drink during pregnancy, the biological effects on the fetus drinking alcohol might be said to be explained “more by intelligence” than by drinking alcohol.

A sibling comparison could factor out these between-mother differences. Yet, a sibling study is only feasible if there is sufficient within-family variation in breastfeeding prevalence or duration (3). This variation is not commented on by the authors of this particular study, although it has been determined in a previous study, which found statistically significant effects (3). If the bulk of the “breastfeeding” group includes a population of short-duration non-exclusive breastfeeders, there won’t be much difference to detect.

And even if sufficient variation were present, a sibling study doesn’t completely eradicate the possibility of type 2 error, especially if errors occur measurement of a variable (such as an IQ test measuring “intelligence”). If measurement errors are large enough, measurement bias can complicate the true relationship between breastfeeding and cognitive outcome (3).

A further problem that plagues all such sibling studies is the reasons why siblings differ in their breastfeeding histories. It could be that one sibling is more critically ill, or that the mother was ill and on medication contraindicated in breastfeeding. In any case, it is very unlikely that the decision to breastfeed one child more than another is made randomly. The unobserved factors that lead a mother to breastfeed two children differently can have effects far-reaching, psychologically profound, yet completely undetectable by any statistical analysis.

What this study does point out – far from being the generalizable result to other developed countries suggested by the authors – are, to put it bluntly, the marked inequalities that exist in the USA between the haves and the have-nots: children who are breastfed have intelligent mothers, and children who aren’t breastfed don’t. The real tragedy will occur if, as a result of the considerable media attention this study has garnered (4, 5, 6, 7), children continue to be further disadvantaged – cognitively and otherwise – by not being breastfed.

References
1. de Onis, Mercedes. Foreword Acta Paediatrica, 2006; 450: 5-6.
5. Study says breastfeeding has no impact on a child’s intelligence http://www.cbc.ca/cp/health/061005/x100510.

Competing interests: None declared

Breastfeeding and Intelligence Not Demonstrated

James W. Prescott, Ph.D., Retired Home 19958

The article on Breastfeeding and IQ in the BMJ was read with much interest, however, the duration of breastfeeding is far too short to expect an significant effect on intelligence, as claimed. The authors report “that the median duration of breastfeeding is three months and the 95th percentile months”. This duration of breastfeeding is far too short to test the hypothesis that there is a link between breastfeeding and IQ.

There is increasing evidence that the long term health benefits of breastfeeding is to be found in the emotional-social-sexual domain rather than...
The effects of extended breastfeeding on reducing breast cancer was reported by Zheng, et al (2000). They report: "For women who breastfed for more than 24 months per child, the odds ratio was 0.46 (95% confidence interval (CI): 0.27, 0.78) when compared to those who breastfed for 1-6 months per child. A significantly reduced risk of breast cancer was also found for those whose lifetime duration of breastfeeding totaled 73-108 months (odds ratio = 0.47, 95% CI: 0.23, 0.95) and for those who breastfed for 109 months or more (odds ratio = 0.24, 95% CI: 0.11, 0.46)."

It is time that modern neurodiagnostic tools of MRI, fMRI, PET scans and other modern quantitative methods of brain evaluation be employed to determine the effect of breastfeeding on intelligence. It takes a particular kind of culture that supports a mother breastfeeding for 2.5 years or longer. See http://www.who.int/inf-pr-2001/en/note2001-07.html.

Clearly, this kind of data on breastfeeding for "two years of age and beyond", as recommended by WHO and UNICEF (Innocenti Declaration, 1990) not exist in any of the national registers on breastfeeding, unless the authors have information to the contrary. Only 2.7 percent of American mothers breastfeed at two years of life and only 1.0 percent at 2.5 years of life. (NHANES 111,1988--94) (Third National Health and Nutrition Examination Survey). (Hediger, 2001).

The effects of extended breastfeeding on reducing breast cancer was reported by Zheng, et al (2000). They report: "For women who breastfed for more than 24 months per child, the odds ratio was 0.46 (95% confidence interval (CI): 0.27, 0.78) when compared to those who breastfed for 1-6 months per child. A significantly reduced risk of breast cancer was also found for those whose lifetime duration of breastfeeding totaled 73-108 months (odds ratio = 0.47, 95% CI: 0.23, 0.95) and for those who breastfed for 109 months or more (odds ratio = 0.24, 95% CI: 0.11, 0.46)."

It is time that modern neurodiagnostic tools of MRI, fMRI, PET scans and other modern quantitative methods of brain evaluation be employed to determine the effect of breastfeeding on intelligence. It takes a particular kind of culture that supports a mother breastfeeding for 2.5 years or longer. See http://www.who.int/inf-pr-2001/en/note2001-07.html.

Clearly, this kind of data on breastfeeding for "two years of age and beyond", as recommended by WHO and UNICEF (Innocenti Declaration, 1990) not exist in any of the national registers on breastfeeding, unless the authors have information to the contrary. Only 2.7 percent of American mothers breastfeed at two years of life and only 1.0 percent at 2.5 years of life. (NHANES 111,1988--94) (Third National Health and Nutrition Examination Survey). (Hediger, 2001).

The effects of extended breastfeeding on reducing breast cancer was reported by Zheng, et al (2000). They report: "For women who breastfed for more than 24 months per child, the odds ratio was 0.46 (95% confidence interval (CI): 0.27, 0.78) when compared to those who breastfed for 1-6 months per child. A significantly reduced risk of breast cancer was also found for those whose lifetime duration of breastfeeding totaled 73-108 months (odds ratio = 0.47, 95% CI: 0.23, 0.95) and for those who breastfed for 109 months or more (odds ratio = 0.24, 95% CI: 0.11, 0.46)."

It is time that modern neurodiagnostic tools of MRI, fMRI, PET scans and other modern quantitative methods of brain evaluation be employed to determine the effect of breastfeeding on intelligence. It takes a particular kind of culture that supports a mother breastfeeding for 2.5 years or longer. See http://www.who.int/inf-pr-2001/en/note2001-07.html.

Clearly, this kind of data on breastfeeding for "two years of age and beyond", as recommended by WHO and UNICEF (Innocenti Declaration, 1990) not exist in any of the national registers on breastfeeding, unless the authors have information to the contrary. Only 2.7 percent of American mothers breastfeed at two years of life and only 1.0 percent at 2.5 years of life. (NHANES 111,1988--94) (Third National Health and Nutrition Examination Survey). (Hediger, 2001).

The effects of extended breastfeeding on reducing breast cancer was reported by Zheng, et al (2000). They report: "For women who breastfed for more than 24 months per child, the odds ratio was 0.46 (95% confidence interval (CI): 0.27, 0.78) when compared to those who breastfed for 1-6 months per child. A significantly reduced risk of breast cancer was also found for those whose lifetime duration of breastfeeding totaled 73-108 months (odds ratio = 0.47, 95% CI: 0.23, 0.95) and for those who breastfed for 109 months or more (odds ratio = 0.24, 95% CI: 0.11, 0.46)."

It is time that modern neurodiagnostic tools of MRI, fMRI, PET scans and other modern quantitative methods of brain evaluation be employed to determine the effect of breastfeeding on intelligence. It takes a particular kind of culture that supports a mother breastfeeding for 2.5 years or longer. See http://www.who.int/inf-pr-2001/en/note2001-07.html.

Clearly, this kind of data on breastfeeding for "two years of age and beyond", as recommended by WHO and UNICEF (Innocenti Declaration, 1990) not exist in any of the national registers on breastfeeding, unless the authors have information to the contrary. Only 2.7 percent of American mothers breastfeed at two years of life and only 1.0 percent at 2.5 years of life. (NHANES 111,1988--94) (Third National Health and Nutrition Examination Survey). (Hediger, 2001).

The effects of extended breastfeeding on reducing breast cancer was reported by Zheng, et al (2000). They report: "For women who breastfed for more than 24 months per child, the odds ratio was 0.46 (95% confidence interval (CI): 0.27, 0.78) when compared to those who breastfed for 1-6 months per child. A significantly reduced risk of breast cancer was also found for those whose lifetime duration of breastfeeding totaled 73-108 months (odds ratio = 0.47, 95% CI: 0.23, 0.95) and for those who breastfed for 109 months or more (odds ratio = 0.24, 95% CI: 0.11, 0.46)."

It is time that modern neurodiagnostic tools of MRI, fMRI, PET scans and other modern quantitative methods of brain evaluation be employed to determine the effect of breastfeeding on intelligence. It takes a particular kind of culture that supports a mother breastfeeding for 2.5 years or longer. See http://www.who.int/inf-pr-2001/en/note2001-07.html.