



Is breast truly best? Estimating the effects of breastfeeding on long-term child health and wellbeing in the United States using sibling comparisons



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ABSTRACT

Breastfeeding rates in the U.S. are socially patterned. Previous research has documented startling racial and socioeconomic disparities in infant feeding practices. However, much of the empirical evidence regarding the effects of breastfeeding on long-term child health and wellbeing does not adequately address the high degree of selection into breastfeeding. To address this important shortcoming, we employ sibling comparisons in conjunction with 25 years of panel data from the National Longitudinal Survey of Youth (NLSY) to approximate a natural experiment and more accurately estimate what a particular child's outcome would be if he/she had been differently fed during infancy. Results from standard multiple regression models suggest that children aged 4 to 14 who were breast- as opposed to bottle-fed did significantly better on 10 of the 11 outcomes studied. Once we restrict analyses to siblings and incorporate within-family fixed effects, estimates of the association between breastfeeding and all but one indicator of child health and wellbeing dramatically decrease and fail to maintain statistical significance. Our results suggest that much of the beneficial long-term effects typically attributed to breastfeeding, per se, may primarily be due to selection pressures into infant feeding practices along key demographic characteristics such as race and socioeconomic status.

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Introduction

In 2012, the American Academy of Pediatrics (AAP) updated its original policy statement concerning breastfeeding and summarized findings from a substantial body of research to provide evidence for “diverse and compelling advantages for infants, mothers, families, and society from breastfeeding and use of human milk for infant feeding” (AAP, 2012). Similarly, *Healthy People 2020*, which provides empirically based population health objectives to improve wellbeing for all Americans, has taken an emphatic stance on infant feeding practices by declaring breastfeeding a national priority (U.S. Department of Health and Human Services, 2010). Between 2000 and 2009, the proportion of U.S. infants who were still being breastfed at six months increased from 34% to 47% (Centers for Disease Control and Prevention [CDC], 2013). It is now commonplace for expectant mothers to be counseled that “breast is best” for their infant.

Targeted policies have been initiated at both the national and local level to promote breastfeeding (AAP, 2012; Farley, 2012).

Health officials hope to increase the proportion of U.S. mothers who breastfeed at all from 74% to 82% and who continue breastfeeding at 6 months from 44% to 61% (U.S. Department of Health and Human Services, 2010). Moreover, medical professionals and public health advocates are not simply recommending that new mothers breastfeed their infants. Rather, they are emphasizing the perceived benefits of exclusive breastfeeding and hope to ensure that babies receive only human milk during the first six months of life (AAP, 2012; World Health Organization [WHO], 2013).

Clearly, these recommendations are meant to promote the health and wellbeing of both mothers and their newborns. Besides being the most economical choice, it is thought that human breast milk offers infants the most nutrient rich, easily digestible form of nourishment that will contribute to beneficial outcomes during the perinatal period, throughout childhood, and possibly into adulthood (Ip et al., 2007; U.S. Surgeon General, 2011; WHO, 2013).

Breastfeeding is thought to affect child outcomes due to superior nutrients unique to breast milk that are absent from infant formula as well as the biochemical reactions triggered by the act of breastfeeding, itself. For example, breast milk contains enzymes, hormones, growth factors, and immunologic substances that assist in creating an effective host defense to infectious agents (Guilbert, et al., 2007). These cellular attributes are particularly helpful in

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combating respiratory infections in infancy and may prevent the subsequent development of asthma and allergies (Oddy, 2004). Concerning obesity as an endpoint, the causal pathway is likely to follow two distinct mechanisms, the first of which concerns the ability of breastfed infants to more quickly and easily recognize feelings of satiety and the second of which is related to specific nutrient combinations that may influence insulin resistance and/or metabolic responses (Gillman & Mantzoros, 2007). Finally, breast milk contains long-chain polyunsaturated fatty acids that play an essential role in normal retinal and neural development (Innis, Gilley, & Werker, 2001; Rey, 2003) and might be implicated in later cognitive functioning (McCann & Ames, 2005).

That the benefits of breastfeeding are sufficiently large and long-term to support such an intense policy commitment to universalizing the behavior is assumed, but deserves systematic study. Total commitment to 6 months of exclusive breastfeeding is a very high expectation of mothers, especially in an era when a majority of women work outside the home, often in jobs with little flexibility and limited maternity leave, and in a country that offers few family policies to support newborns or their mothers (Guendelman et al., 2009; Rippeyoung & Noonan, 2012). The line between providing information about the benefits of breastfeeding and stigmatizing mothers facing structured, valid, and often difficult trade-offs in the care and financial support of their children or in fulfilling their own human potential must be drawn sensitively.

Currently, breastfeeding rates in the U.S. are socially patterned. Previous research has documented startling racial and socioeconomic disparities in infant feeding practices. Data from the 2008 National Immunization Survey reveal that 75% of White infants but only 59% of Black infants were ever breastfed. Similarly, 47% of White infants but only 30% of Black infants were still being breastfed at six months (CDC, 2013). With regard to differences in infant feeding practices according to socioeconomic status, 74% of children whose family incomes were above 185% of the federal poverty threshold but only 57% of children whose family incomes were equivalent to or fell below this threshold had ever been breastfed (Forste and Hoffman, 2008). Furthermore, mothers who completed some high school, were high school graduates, or attended some college were 64%, 60% and 39%, respectively, less likely to initiate breastfeeding than mothers who graduated from college (CDC, 2013).

The social patterning of breastfeeding has important social and scientific implications. Socially, if breastfeeding were as advantageous in both the short- and long- term as is often assumed, one would not want black or poor children to be disproportionately deprived of its benefits. (Whether current approaches to breastfeeding promotion are the best ones is another question beyond the scope of this paper.) Scientifically, disparities in infant feeding practices raise the critical question of the degree to which unobserved heterogeneity between children who were breastfed and those who were not may be driving the frequently noted positive association between breastfeeding and a wide variety of childhood outcomes. If this is the case, a well-intentioned, narrow emphasis on breastfeeding promotion would, at best, fail to realize positive benefits and, at worst, be a source of oppression for women who do not nor cannot breastfeed.

Much of the empirical evidence regarding the effects of infant feeding practices does not adequately address the high degree of selection into breastfeeding. In particular, it must be viewed as inconclusive with regard to conditions that emerge later in the life course -for example, among school-age children or teenagers as opposed to infants - since, of necessity, it often relies on observational, and in many cases cross-sectional, data and study designs that are unable to account for unobserved heterogeneity between breast- and bottle-fed children that are likely to be driving

observed differences in health and developmental trajectories. Given the greater likelihood of breastfeeding among socially and economically advantaged groups in the U.S. (Singh, Kogan, & Dee, 2007) and the extent to which race/ethnicity and socioeconomic position is known to influence childhood health and wellbeing (Currie, 2009; Mehta, Lee, & Ylitalo, 2013), these findings are likely to exaggerate the benefits of breastfeeding, per se. The current study was designed to address this possibility.

We examine eleven different outcomes - body mass index, obesity, asthma, hyperactivity, parental attachment, behavioral compliance, reading comprehension, vocabulary recognition, math ability, memory based intelligence, and scholastic competence. In order to separate the impact of factors that predict selection into breastfeeding from the "true" consequences of breastfeeding, we employ sibling comparisons to approximate a natural experiment and more accurately estimate the counterfactual question, "What would this particular child's outcomes be if she/he had been breastfed instead of bottle-fed?" Once between-family differences are taken into account, we find relatively little empirical evidence to support the notion that breastfeeding results in improved health and wellbeing for children between 4 and 14 years of age.

Breastfeeding and childhood health and wellbeing: current evidence

At first glance, the extant literature concerning the association between breastfeeding and long-term child health and wellbeing seems to be straightforward. Previous studies suggest that breastfed children are significantly less likely than their bottle-fed counterparts to be classified as obese (Arenz, Rucker, Koletzko, & von Kries, 2004; Armstrong & Reilly, 2002; Harder, Bergman, Kallischnigg, & Plageman, 2005; Weden, Brownell, and Rendall, 2012); develop asthma (Oddy, 2004); and be diagnosed with autoimmune diseases, such as Type I diabetes, (Young et al, 2002) and childhood cancers (Martin et al., 2005). Moreover, infant feeding practices appear to be associated with cognitive ability during childhood, such that full-term infants who are breast- as opposed to bottle-fed score 3–6 points higher on IQ tests (Quigley, Hockley, & Carson, 2011). However, upon more recent and rigorous evaluation, these findings appear less conclusive.

A more detailed examination of existing epidemiological studies regarding the effects of breastfeeding on subsequent child health and development reveals more questions than it does answers. Results often vary depending on the study sample employed, the age at which outcomes were measured, whether breastfeeding was defined dichotomously or in terms of duration, and which potential confounders were included in statistical analyses (Baker & Milligan, 2008; Der, Batty, & Deary, 2006; Evenhouse & Reilly, 2005; Metzger & McDade, 2010; Nelson, Gordon-Larsen, & Adair, 2005). The most problematic aspect of this literature is the extent to which children are selected into breastfeeding based upon several sociodemographic dimensions that are simultaneously associated with infant feeding practices and long-term child outcomes. Compared to bottle-fed infants, breastfed infants are significantly more likely to be white, be born into families with above average incomes, have parents with advanced educational attainment, maintain easier access to health care services, and live in safer neighborhoods with lower levels of environmental toxins (Singh et al., 2007; Van Rossen et al., 2009). Thus, comparisons of breast- and bottle-fed infants are likely to be biased by both observed and unobserved heterogeneity, of which the latter poses a greater risk when trying to assess the "true" effects of breastfeeding on subsequent childhood outcomes since these characteristics cannot be taken into account by traditional statistical approaches (ie. OLS or logit regression models).

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