

Prolonged breastfeeding for 24 months or more and mental health at 6 years of age: evidence from the 2004 Pelotas Birth Cohort Study, Brazil

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Background: There is scarce and conflicting evidence on medium- to long-term effects of prolonged breastfeeding on child behavior. **Method:** A population-based birth cohort study started in 2004 in the city of Pelotas, Southern Brazil. Children were followed up at 3, 12, 24, and 48 months and 6 years of age. Breastfeeding duration was determined based on information collected around the time of weaning. Psychiatric disorders were assessed using the Development and Well-Being Assessment (DAWBA). Children who were never breastfed were excluded from the analysis. Crude and adjusted analyses were performed using Poisson regression with robust variance. **Results:** Data on breastfeeding and mental health at the age of 6 years were available for 3377 children. Prevalence of breastfeeding for 24–35 months and ≥ 36 months was 16.1% (95% CI: 14.8–17.3) and 8.1% (95% CI: 7.2–9.1), respectively. Prevalence of psychiatric disorders among those who were breastfed for <24 months, 24–35 months and ≥ 36 months was 12.4% (95% CI: 11.1–13.7), 13.1% (95% CI: 10.4–16.2) and 12.3% (95% CI: 8.7–16.8), respectively. No association was found between breastfeeding for 24 months or more and psychiatric disorders among children aged 6 years both in the crude and adjusted analyses. **Conclusions:** In this cohort there was no association between breastfeeding for 24 months or more and an increased prevalence of psychiatric disorders at the age of 6 years. Studies analyzing the medium- and long-term effects of prolonged breastfeeding for 2 years or more are scarce and further research is needed regarding this practice.

Key Practitioner Message

- Breastfeeding for ≥ 24 months is not associated with increased rates of psychiatric disorders at the age of 6 years.
- Prolonged breastfeeding is associated with neurodevelopmental and mental health advantages.
- These findings strongly support the WHO recommendation to maintain breastfeeding for 2 years or more.

Keywords: Mental disorders; psychological phenomena; prolonged breastfeeding

Introduction

The World Health Organization (WHO) recommends that breastfeeding be started at the first hour of life and be extended for 6 months as exclusive breastfeeding, without addition of any other type of liquid or food, and that at 6 months of age suitable supplementary foods be introduced, while breastfeeding is kept for 2 years or more (World Health Organization. Office of Press and Public Relations., 2001). The recommendation for providing supplementary nutrition while breastfeeding is kept for 2 years or more was presented as a joint declaration by WHO and UNICEF – the 1990 *Innocenti Declaration* (UNICEF, United Nations Children’s Fund, & Innocenti Research Centre, 2005). For some authors the main rationale for promoting breastfeeding for 2 years or more is based on the fact that, during the second year of life of the child, breast milk could remain as a key

source of vitamin A, calcium, and proteins, in addition to protecting against infectious agents (Hill, Edmond, & Kirkwood, 2004).

Several authors have observed that breastfeeding duration is associated with a number of benefits in childhood and adult life. Recent studies showed evidence to support long-term benefits of breastfeeding on intelligence. A systematic review and meta-analysis showed that breastfeeding was associated with increased performance in intelligence tests in childhood and adolescence of 3.5 points on average (Horta, Loret de Mola, & Victora, 2015). A study based on the data of the population-based birth cohort study initiated in 1982 in the city of Pelotas, Brazil, showed that participants who were breastfed for 12 months or more had higher IQ scores, more years of education, and higher monthly income at 30 years than those who were breastfed for <1 month (Victora et al., 2015).

However, there are conflicting findings on medium- to long-term effects of breastfeeding on child behavior and development. Results from the Western Australian Pregnancy Cohort (Raine) showed that breastfeeding for 6 months or more was associated with a lower rate of internalizing and externalizing disorders during childhood and early adolescence (Oddy et al., 2010). Using data from a large population-based UK cohort (Millennium Cohort Study), investigators reported that term children breastfed for 4 months or longer were less likely to have behavioral problems at age 5 years compared with never breastfed children (Heikkila, Sacker, Kelly, Renfrew, & Quigley, 2011). However, other authors found no association between breastfeeding duration and mental health problems at 6 years (Kramer et al., 2008; Lind, Li, Perrine, & Schieve, 2014), or criminal behaviors by age 25 years (Caicedo, Goncalves, Gonzalez, & Victora, 2010). Regarding child development, a systematic review found two studies that assessed the association between prolonged breastfeeding, breastfeeding beyond the age of 23 months, and child development (Delgado & Matijasevich, 2013). These two studies did not report any impact (positive or detrimental) of breastfeeding for 2 years or more on child development. (Daniels & Adair, 2005; Duazo, Avila, & Kuzawa, 2010). A study from the Millennium Cohort Study reported that longer duration of breastfeeding was associated with better educational achievement at age 5 (Heikkila, Kelly, Renfrew, Sacker, & Quigley, 2014). Conversely, a recent study based on a prospective cohort study (Project Viva) did not find an association between breastfeeding duration and executive function, behavior, or social-emotional development in midchildhood. (Belfort et al., 2016) Neither of the last two studies investigated the effects of breastfeeding beyond the age of 12 months.

Given the scarcity of information on the potential medium- to long-term effects of prolonged breastfeeding on child mental health, the present study aimed to describe the effects of breastfeeding for 24 months or more on psychiatric disorders at the age 6 years among children from the 2004 Pelotas Birth Cohort Study.

Methods

Population and study design

A population-based cohort study of children born to mothers living in the urban area of Pelotas, State of Rio Grande do Sul, southern Brazil, was started in 2004. Pelotas had a population of 328,275 inhabitants in 2010 (2010 Population Census) and more than 99% of children were born in hospital settings. Trained interviewers visited the city's five maternity hospitals on a daily basis throughout 2004. Within the first 24 hr after delivery, mothers were invited to participate in the study and were interviewed using a pretested standardized questionnaire. Detailed information was obtained about demographic, socioeconomic, behavioral and biological characteristics, reproductive history, and healthcare utilization. The response rate at baseline was greater than 99%. After the initial recruitment, several follow-ups were conducted. A detailed description of the methodology is given elsewhere (Barros et al., 2006; Santos et al., 2011, 2014).

Assessment of a child's psychiatric disorders

At the 6-year follow-up, a child's psychiatric disorders were assessed using the Development and Well-Being Assessment (DAWBA). The DAWBA consists of a structured interview, as well as open-ended questions, about the presence of psychiatric

symptoms. It also assesses the impact of symptoms on the child's life. The DAWBA is designed to generate psychiatric diagnoses according to the International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD-10) (World Health Organization, 1993) and the Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition (DSM-IV) (American Psychiatric Association, 1994) criteria for ages 5–17 years. The DAWBA was developed by Goodman et al. (Goodman, Ford, Richards, Gatward, & Meltzer, 2000) and validated in the Brazilian population (Fleitlich-Bilyk & Goodman, 2004). The Strengths and Difficulties Questionnaire (SDQ) was also administered at the beginning of the interview, as a psychiatric screen. Thus, SDQ scores obtained on the subscales of emotional problems, conduct problems, and hyperactivity were used to determine which sections of the DAWBA would be administered. In our study, the DAWBA included the sections for separation anxiety disorder, specific phobia, social phobia, generalized anxiety disorder, posttraumatic stress disorder, panic disorder and agoraphobia, obsessive-compulsive disorder, attention-deficit hyperactivity disorder (ADHD), oppositional defiant disorder, conduct disorder, eating disorders, and tic disorders. The DAWBA was administered to mothers or caregivers by trained psychologists. Psychologists were trained through lessons about the functioning of DAWBA and psychopathology by a child psychiatrist and a psychologist. In the present study, the primary outcome measure was the presence of any psychiatric disorder identified in the DAWBA test. The ICD-10 was used for disease classification.

Main exposure variable

The main exposure was breastfeeding duration. Information on breastfeeding was obtained at the perinatal interview (at the hospital of birth) and at 3, 12, 24, and 48 months. Breastfeeding duration was determined based on the information collected around the time of weaning to reduce the recall period and thus minimize recall bias. Children who were never breastfed were excluded from the analysis. Breastfeeding duration was categorized as <24 ($n = 2559$); 24–35 ($n = 543$); and ≥ 36 months ($n = 275$). The terms 'extended', 'sustained', and 'prolonged' breastfeeding have been used interchangeably in the literature to refer to different points of breastfeeding termination. (Brockway & Venturato, 2016) In the present study, we defined 'prolonged breastfeeding' as breastfeeding beyond the age of 23 months (≥ 24 months).

Covariates

Explanatory variables were collected in the perinatal interview and included: socioeconomic position (SEP); maternal education; marital status; maternal skin color; age; parity; and smoking during pregnancy. For SEP, an indicator of wealth was created and categorized into quintiles. The wealth index was constructed based on principal components analysis of the ownership of domestic goods (e.g., color television, car, and computer) and characteristics of the residence (e.g., number of bathrooms, the presence of a maid, rental or owned home). For analysis, the first principal component was used.

Maternal schooling at the time of delivery was described as complete years of formal education (0–4; 5–8; ≥ 9 years). Marital status indicated whether the mother was living with a partner or not; skin color was self-reported by the mother (white; mixed; black; other); maternal age was recorded in years (<18; 18–35; >35 years); parity was defined as the number of previous viable pregnancies (0; 1; and 2 or more); and smoking during pregnancy was assessed retrospectively at birth. Regular smokers were defined as those women who smoked at least one cigarette daily in any trimester of pregnancy.

Child variables included type of delivery (vaginal; cesarean); newborn gender (male; female); birth weight; and gestational age. Birth weight was categorized as <2500 g, 2500–3999 g, and ≥ 4000 g. Estimates of gestational age were based on the last menstrual period (LMP), providing they were consistent with predicted birthweight, length, and head circumference, based on the normal curves for these parameters for each week

of gestational age. If LMP-based gestational age was unknown or inconsistent, we adopted the clinical maturity estimate based on the Dubowitz method which was performed on almost all newborns (Dubowitz, Dubowitz, & Goldberg, 1970). Births before the 37th week of pregnancy were classified as preterm.

Statistical analysis

A crude analysis was performed to assess the association between breastfeeding for 24 months or more and psychiatric disorders using the chi-square test, with a 5% significance level. Linear trend tests were performed when appropriate. Prevalence rates and 95% confidence intervals were also estimated.

The multivariate analysis was performed with adjustments for socioeconomic and maternal variables (wealth index, maternal education, maternal skin color, maternal age, and parity) and child variables (type of delivery and birth weight). Multivariate analysis was performed using Poisson regression with robust variance and prevalence ratios and 95% confidence intervals (95% CIs) were obtained. The advantage of using Poisson regression with robust variance than Logistic regression to analyze cross-sectional (or longitudinal) data with binary outcomes is that the prevalence ratio as the measure of association is more interpretable and easy to communicate, especially to non-epidemiologists. (Barros & Hirakata, 2003).

As the proportion of missing values in our database was 18%, in order to increase efficiency in the analyses and minimize selection bias, multiple imputation was the method chosen for handling missing data problems (Royston, 2005; Spratt et al., 2010; Sterne et al., 2009). The method for imputation and subsequent analysis of the file-in data involved two steps. In the first step, all variables were imputed together allowing the missing values for each variable to be predicted from all of the other variables (using 'mi impute' command). Twenty imputed complete datasets were created by chained equations, with an appropriate level of randomness. Finally, to estimate the relationship between breastfeeding duration and psychiatric disorders at the age of 6 years, these datasets were analyzed by Poisson regression using 'mi estimate' command to obtain the estimated prevalence rates and 95% confidence intervals by averaging the results from analysis of each of these 20 datasets using Rubin's rules. All the analyses were repeated with no imputation for missing values (complete dataset). We present the results from the multivariate multiple imputation analysis as our main results, and results from the analysis of participants with complete observed data (see Table S1 available online).

Statistical analysis was performed using Stata version 13 (StataCorp, 2013).

Ethical issues

All follow-ups of the study were approved by the Research Ethics Committee of the Federal University of Pelotas Medical School, a member of the Brazilian National Committee of Research Ethics. At each follow-up all mothers or caregivers signed an informed consent form that stated the purposes of the research study and informed that they were free to decide whether or not to participate. Based on the child psychiatrist's evaluation, children who needed further assessment and advice were referred to local care services available in the city.

Results

Children's age in the fifth follow-up of the 2004 Pelotas Cohort study ranged between 5.9 and 7.6 years (mean 6.8; standard deviation [SD] 0.3 years). Of the 4231 children who were originally part of the cohort, 95 died in the first 6 years of life, 27 refused to participate, and 388 children could not be found. After excluding children that were never breastfed ($n = 115$), there was information available on breastfeeding and child's psychiatric disorders for 1762 males and 1616 females ($n = 3378$). Children that were never breastfed were excluded

because most of them were born ill, required special care after birth, and almost half of them ($n = 52$) died in the first year of life. Missing information on breastfeeding duration or psychiatric disorders was more common among children born with <2500 g or before 37 weeks of gestation ($p = .025$ and $p = .026$, respectively).

The prevalence of any psychiatric disorder among 6-year-old children was 12.5% (95% CI: 11.4–13.7%). About three quarter of the children breastfed for <24 months (75.8% 95% CI: 74.3–77.2). Children breastfed for 24–35 months and for 36 months or more were 16.1% (95% CI: 14.9–17.4) and 8.2% (95% CI: 7.3–9.1) of the cohort, respectively.

Table 1 shows breastfeeding duration according to maternal and child characteristics. Breastfeeding for 24 months or more was more common among children of families in the lowest wealth quintile, born to mothers with <5 years of schooling, mothers with mixed or black skin color, mothers over 35 years of age, and multiparous. In contrast, breastfeeding for 24 months or more was less common among children born by cesarean section or with low birth weight. There was no association between breastfeeding duration and maternal marital status ($p = .134$), smoking during pregnancy ($p = .417$), child's gender ($p = .634$), gestational age at birth ($p = .085$), and psychiatric disorders at age 6 years ($p = .904$).

Table 2 shows the distribution of psychiatric disorders according to maternal and child characteristics. Higher frequency of psychiatric disorders was seen among children born to women not living with a partner ($p = .018$), women who smoked during pregnancy ($p < .001$), and among male children ($p = .009$). Prevalence of psychiatric disorders among those who were breastfed for 24–35 months and for ≥ 36 months was 13.1% (95% CI: 10.4–16.2) and 12.3% (95% CI: 8.7–16.8), respectively, similar to the prevalence observed among those who were breastfed for <24 months (12.4%; 95% CI: 11.1–13.7) (Table 2). After adjusting this association for potential confounders, the association remained unchanged. Results from the multivariate multiple imputation (Table 3) were very similar to those obtained among individuals with complete observed data (Table S1).

Discussion

The prevalence of breastfeeding for 24 months or more among Brazilian children from the 2004 Pelotas birth cohort was 24.1%. This duration of breastfeeding was more common in poor households, and among mothers with mixed or black skin color, with low level of education, above 35 years, and multiparous. Breastfeeding for 24 months or more was observed less frequently among children born with low birthweight and among those born by cesarean section. In the present analyses, no association was found between breastfeeding for 24 months or more and psychiatric disorders among children aged 6 years both in the crude and adjusted analyses.

The prevalence of psychiatric disorders in children aged 6 years found in the present study is in an intermediate position between the prevalence observed in low (Alyahri & Goodman, 2008; Mullick & Goodman, 2005) – and high-income countries (Ford, Goodman, & Meltzer,

Table 1. Description of the population and distribution of breastfeeding duration according to maternal and child characteristics ($n = 3378$)

Variables	<i>n</i>	Breastfeeding duration (months)			<i>p</i> value ^a
		<24%	24–35%	≥36%	
Socioeconomic characteristics					
Wealth index ($n = 3378$)					
1 (poorest)	624	71.2	19.2	9.8	<.001
2	702	71.7	18.8	9.5	
3	683	76.0	15.8	8.2	
4	712	76.1	16.7	7.2	
5 (wealthiest)	657	84.0	9.9	6.1	
Maternal education (years) ($n = 3345$)					
0–4	503	71.0	17.9	11.1	.001
5–8	1395	74.4	16.7	8.9	
≥9	1447	78.8	15.1	6.1	
Marital status ($n = 3378$)					
Not living with a partner	532	76.9	17.1	6.0	.134
Living with a partner	2846	75.6	16.0	8.4	
Mother's skin color ($n = 3341$)					
White	2084	78.6	14.2	7.2	<.001
Mixed	666	74.6	17.7	7.7	
Black	557	66.2	21.2	12.6	
Other	34	76.5	14.7	8.8	
Maternal variables					
Age (years) ($n = 3377$)					
<18	312	77.6	15.4	7.0	.004
18–35	2701	76.7	15.3	8.0	
>35	364	67.6	22.2	10.2	
Parity ($n = 3377$)					
0	1338	79.6	14.4	6.0	<.001
1	898	74.3	16.0	9.7	
≥2	1141	72.5	18.1	9.4	
Smoking during pregnancy ($n = 3378$)					
No	2467	75.5	16.6	7.9	.417
Yes	911	76.5	14.8	8.7	
Child variables					
Type of delivery ($n = 3378$)					
Vaginal	1846	73.7	17.7	8.6	.008
Cesarean	1532	78.3	14.2	7.5	
Gender ($n = 3378$)					
Male	1762	76.4	15.6	8.0	.634
Female	1616	75.1	16.6	8.3	
Birth weight (g) ($n = 3377$)					
<2500	288	83.0	11.8	5.2	.018
2500–3999	2926	75.0	16.7	8.3	
≥4000	163	77.3	12.3	10.4	
Gestational age (wks) ($n = 3374$)					
<37	444	79.9	13.3	6.8	.085
≥37	2930	75.1	16.5	8.4	
Psychiatric disorders at age 6 years ($n = 3378$)					
No	2956	75.8	16.0	8.3	.904
Yes	422	75.1	16.8	8.2	

^achi-square test for heterogeneity.

2003; Heiervang et al., 2007). In an urban area of the Southeastern Brazil, Fleitlich-Bilyk and Goodman (Fleitlich-Bilyk & Goodman, 2004) conducted a study with 1251 Brazilian children aged 7–14 years living in the city of São Paulo using the DAWBA. They found that 12.7% (95% CI: 9.8–15.5) of the sample had at least one psychiatric disorder.

Proposals such as the World Breastfeeding Trends Initiative organized by the International Baby Food Action Network, have attempted to measure and compare the

Table 2. Psychiatric disorders according to maternal and child's characteristics ($n = 3378$)

Variables	%	<i>p</i> value ^a
Socioeconomic characteristics		
Wealth index ($n = 3378$)		
1 (poorest)	13.6	.346
2	13.4	
3	14.3	
4	13.1	
5 (wealthiest)	7.9	
Maternal education (years) ($n = 3345$)		
0–4	12.9	.824
5–8	14.6	
≥9	10.6	
Mother's skin color ($n = 3341$)		
White	11.8	.149
Mixed	14.1	
Black	12.7	
Other	11.7	
Maternal variables		
Age (years) ($n = 3377$)		
<18	12.2	.857
8–35	12.9	
>35	9.6	
Parity ($n = 3377$)		
0	12.6	.936
1	11.1	
≥2	13.5	
Child variables		
Type of delivery ($n = 3378$)		
Vaginal	12.9	.444
Cesarean	12.0	
Gender ($n = 3378$)		
Male	13.9	.009
Female	10.9	
Birth weight (g) ($n = 3377$)		
<2500	10.4	.270
2500–3999	12.7	
≥4000	11.7	
Breastfeeding duration (months) ($n = 3377$)		
<24	12.4	.904
24–35	13.1	
≥36	12.3	

^achi-square test for heterogeneity.

duration of breastfeeding in different countries (International Baby Food Action Network, 2012). Increasing trends toward breastfeeding for 24 months or more were observed in the past decade, especially in South Asia (Breastfeeding Promotion Network of India (BPNI), & International Baby Food Action Network (IBFAN) 2008, 2010). The prevalence of breastfeeding for 24 months or more found in the present study was below the combined prevalence reported in a systematic review undertaken to identify studies describing the world prevalence of breastfeeding for 2 years or more (Delgado & Matijasevich, 2013). The combined prevalence based on the 11 studies evaluated, was 33% (95% CI: 0.23–0.42). However, great heterogeneity was observed in the prevalence of breastfeeding in different countries. There were places, such as Iran, in which the prevalence of breastfeeding for 2 years was approximately 1% (Rakhshani & Mohammadi, 2009), while in places like Bangladesh it was higher than 90% (Huffman, Chowdhury, Chakraborty, & Simpson, 1980).

Table 3. Crude and adjusted association between breastfeeding duration and psychiatric disorders at the age of 6 years (with multivariate multiple imputation for missing data)

Breastfeeding duration (months)	Crude model		Adjusted model ^a	
	PR (95% CI) ^b	<i>p</i> -value	PR (95% CI) ^b	<i>p</i> -value
<24	1.00	.903	1.00	.966
24–35	1.03 (0.80; 1.33)		1.01 (0.78; 1.31)	
≥36	1.02 (0.72; 1.44)		0.99 (0.70; 1.41)	

^aAdjusted model: crude model plus adjustment for wealth index, maternal education, maternal skin color, maternal age, parity, type of delivery, and birth weight.

^bPR (95% CI) = prevalence rate and 95% confidence intervals.

We found few studies that evaluated the effects of prolonged breastfeeding on different aspects of children development and mental health. Heikkila et al. (Heikkila et al., 2011) evaluated the association between breastfeeding and behavioral problems (assessed with the Strengths and Difficulties Questionnaires, SDQ) in 9525 children of age 5 years born with 37 or more weeks of gestational age and 512 children born pre-term. Children born at term and who were breastfed for a period ≥4 months had lower odds of having behavior problems compared to those never breastfed, both for the global SDQ scale and its subscales. Heikkila et al. (Heikkila et al., 2014) also explored whether the duration of breastfeeding was associated with educational achievement at age 5. Educational achievement was measured at the end of the child's first school year. Authors reported that children who had been breastfed for longer than 4 months showed better educational achievement at age five than never breastfed children.

Oddy et al. (Oddy et al., 2010) followed up a cohort of 2900 Australian women and their children for 14 years (Western Australian Pregnancy Cohort study). They assessed the effects of breastfeeding for more than 6 months on mental health by comparing syndromic groups listed in the Child Behavior Checklist (CBCL) including internalizing (withdrawal syndromes, anxiety/depression, and somatic complaints) and externalizing disorders (aggressive and delinquent behavior) in children aged 2, 6, 8, 10 and 14 years. They found that children who breastfed for <6 months (including those not breastfed at all) had higher average of behavioral problems compared to those breastfed for 6 months or more at all evaluated ages during childhood and adolescence. Conversely, in a randomized clinical trial conducted in Belarus to assess the effects of breastfeeding during the first 12 months of life on several mental health problems during childhood, no association was found between prolonged breastfeeding and emotional or behavior problems at the age of 6.5 years. (Kramer et al., 2008).

Daniels et al. (Daniels & Adair, 2005) evaluated a cohort with 1984 children to assess the relationship between breastfeeding duration and cognitive ability measured at 8.5 and 11.5 years of age using a test of nonverbal intelligence – the Philippine Nonverbal Intelligence Test. They found that children who were breastfed for 2 years or more showed similar cognitive ability scores to those children who were breastfed for <6 months. Belfort et al. (Belfort et al., 2016) examined data from a prospective, longitudinal cohort study of over 1000 mother–child pairs (Project Viva), to assess

the association between breastfeeding duration and child executive function, behavior and social-emotional development. Authors found that the duration of any breastfeeding or of exclusive breastfeeding was not associated with better executive function, behavior, or social-emotional development in midchildhood (median age, 7.7 years).

Duazo et al. (Duazo et al., 2010) evaluated a cohort of 2752 children to assess the effects of breastfeeding duration on psychosocial development measured at 5 and 6 years of age using the Philippine Revised Early Childhood Care and Development Checklist. They found that, at the age of 5, children who were breastfed for 2 years or more showed similar psychosocial development scores than those who were breastfed for <12 months. Similar results were found at the age of 6.

Caicedo et al. (Caicedo et al., 2010) analyzed judicial data from participants of the 1982 Pelotas cohort study who were convicted of violent offenses between the ages of 12–25 years. They assessed these data against breastfeeding duration (categorized into six groups: <1; 1–2.9; 3–5.9; 6–8.9; 9–11.9; ≥12 months) and found no association between breastfeeding duration and juvenile delinquent behavior during adolescence and young adulthood.

The main strengths of the study were derived from the use of prospective information obtained among a large unselected population with a high response rate. The use of multiple imputation analysis to assess the impact of missing values resulted in effect estimates that were essentially the same as those without imputation, which provides some assurance against substantial selection bias. There is evidence that maternal recall can provide reliable estimates of breastfeeding duration, especially when the time between weaning and the mother's interview is <3 years (Gillespie, d'Arcy, Schwartz, Bobo, & Foxman, 2006; Li, Scanlon, & Serdula, 2005). In this study, the earliest available information on stopping breastfeeding was used to decrease the recall period and thus minimize the possibility of recall bias.

Conclusions

The present study offered evidence that breastfeeding for 24 months or more, even for 3 years, is not associated with increased rates of psychiatric disorders at the age of 6 years. These findings strongly support the WHO recommendation to maintain breastfeeding for 2 years or more (World Health Organization. Office of Press and Public Relations., 2001). Studies analyzing the medium- and long-term effects of breastfeeding beyond the age of

23 months are scarce and further research is needed regarding this practice.

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Supporting information

Additional Supporting Information may be found in the online version of this article:

Table S1. Crude and adjusted association between breastfeeding duration and psychiatric disorders at the age of 6 years among individuals with complete observed data.

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