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Association Between Stressful Life Events and Exclusive Breastfeeding Among Mothers in the United States

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Abstract

Background: Despite the known benefits of breastfeeding, many women in the United States do not exclusively breastfeed for the recommended 6 months due to various factors. Limited studies have examined the association between prenatal stressful life events and exclusive breastfeeding duration. The aim of this study was to examine the association between prenatal stressful life events and exclusive breastfeeding duration for 3 months among mothers in the United States.
Methods: We analyzed data from 2009 to 2011 (Phase 6) Pregnancy Risk Assessment and Monitoring System (PRAMS; $n = 43{,}934$). Multivariable logistic regression analyses were performed to estimate adjusted odds ratios (ORs) and 95% confidence intervals (95% CIs).
Results: Overall, 43% of the study participants exclusively breastfed for 3 months and 52.1% reported having no stressful life events during pregnancy. In the multivariable model, there was a statistically significant interaction between maternal age and number of stressful life events on 3-month exclusive breastfeeding, the odds of exclusive breastfeeding for 3 months were lower among women ≤24 years old who experienced at least ≥2 stressful life events compared with women who did not experience any stressful life events: OR 95% CI 0.80 (0.66–0.98) for 1–2 stressful life events, 0.67 (0.54–0.82) for 3–5 stressful life events, and 0.58 (0.43–0.80) for ≥6 stressful life events, respectively.
Conclusions: Identification of stressful life event exposure among young mothers is important for extending support toward this population to increase exclusive breastfeeding duration.

Keywords: exclusive breastfeeding, stressful life events, PRAMS

Introduction

Breastfeeding practices recommended by the American Academy of Pediatrics involve 6 months of exclusive breastfeeding with continued breastfeeding for ~1 year alongside the introduction of complementary foods to achieve optimal, overall development.[1] However, ~57% of infants in the United States were exclusively breastfed at 6 months in 2015.[1] Exclusive breastfeeding is defined as infants receiving only breast milk without additional nutrition supplementations such as food or drink, which include water other than vitamins, minerals, and medications.[2] There are many well-known benefits of exclusive breastfeeding for both infants and mothers in the United States.[3]

Despite the benefits of breastfeeding, many women do not exclusively breastfeed for the recommended duration due to various biological, psychological, and social factors.[4,5] Social factors such as psychosocial stressors can negatively impact health outcomes, and have been linked to low birth weight, preterm births, and developmental delays among children.[6–8] As found in separate studies, psychological stressors such as perceived stressful life events were associated with decreased breastfeeding initiation among postpartum women, increased likelihood of preterm births, and low birth weight among infants.[9–11] In 2010, 70.2% of women reported at least one stressful life event during pregnancy with variation by state and maternal demographic characteristics.[8]

To our knowledge, limited studies have examined the association between prenatal stressful life events and exclusive breastfeeding duration. The literature suggests that delayed onset and early cessation of breastfeeding practices are associated with various stressful life events, and can interfere with breastfeeding intentions.[12,13] Previous

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studies have typically used stressful life events as an adjusted factor and not a primary exposure when assessing breastfeeding duration.[14] This study investigates the association between prenatal stressful life events and exclusive breastfeeding duration for 3 months among mothers in the United States.

Materials and Methods

A secondary data analysis was conducted using data from 2009 to 2011 (Phase 6) Pregnancy Risk Assessment and Monitoring System (PRAMS). PRAMS is an ongoing state- and population-based standardized surveillance system administered by the Centers for Disease Control and Prevention (CDC) and state health departments that collect self-reported data related to preconception, pregnancy, and postpartum experiences and behaviors among women who have had a recent live birth.[15] The data are used to identify women and infants at high risk of health problems, to monitor changes in health status, and to measure progress toward goals in improving maternal–infant health.[16] PRAMS data represent ~83% of all births in the United States.[16] The sampling frame constitutes birth certificate files of recent live births in PRAMS participating states. A complex survey design was used to account for nonresponse and to oversample women with adverse birth outcomes and racial/ethnic minority.[15] A detailed description of PRAMS study design and sampling methods is available elsewhere.[15] This study sample consisted of 57,518 women who participated in PRAMS Phase 6 for whom data on duration of exclusive breastfeeding and number of stressful life events experienced during the 12 months before and during the most recent pregnancy were available. We excluded participants with missing data ($n = 13{,}584$) on covariates included in the multivariable model. The final sample for this study consisted of 43,934 women. This study was determined to be exempt from ethical approval because it was a secondary analysis of a publicly available deidentified dataset.

The main outcome of interest was exclusive breastfeeding at 3 months postpartum. Participants were asked, ''Did you ever breastfeed or pump breast milk to feed your new baby, even for a short period of time?'' ''How many weeks or months did you breastfeed or pump milk to feed your baby?'' ''How old was your new baby the first time he or she drank liquids other than breast milk (such as formula, water, juice, tea, or cow's milk)?'' and ''How old was your new baby the first time he or she ate food (such as baby cereal, baby food, or any other food)?'' These variables were dummy coded, where women who responded, respectively, ''yes,'' ''weeks/months,'' ''My baby has not had any liquids other than breast milk,'' or ''My baby has not eaten any foods'' were coded ''yes'' for exclusive breastfeeding. Women who responded ''no'' and ''My baby was less than 1 week old'' were coded ''no'' for exclusive breastfeeding. For exclusive breastfeeding at month 3 postpartum, the calculated composite variable of weeks of exclusive breastfeeding duration was dichotomized; exclusive breastfeeding for ~12 weeks was coded ''yes'' and lack of exclusive breastfeeding for ~12 weeks was coded ''no.''

The main exposure variable was self-reported total number of stressful life events experienced during the 12 months before and during the recent pregnancy. Women were able to choose from the following responses: ''a close family member was very sick and had to go into the hospital,'' ''separated or divorced from my husband or partner,'' ''moved to a new address,'' ''was homeless,'' ''husband or partner lost his job,'' ''lost my job even though I wanted to go on working,'' ''argued with my husband or partner more than usual,'' ''husband or partner said he didn't want me to be pregnant,'' ''had a lot of bills I couldn't pay,'' ''was in a physical fight,'' ''husband or partner or I went to jail,'' ''someone very close to me had a problem with drinking or drugs,'' or ''someone very close to me died.'' The number of stressors was categorized into four groups: 0 (none), 1–2 stressors, 3–5 stressors, and ≥6 stressors.

Covariates selected based on the literature included maternal age (≤19, 20–24, 25–29, 30–34, and ≥35), level of education (less than high school, high school, higher than high school), race and ethnicity (Non-Hispanic White, Non-Hispanic Black, Hispanic, Other), marital status (married, other), smoking status (yes, no), mode of delivery (vaginal, not cesarean), pregnancy intention (yes, no), gestational diabetes (yes, no), body mass index (BMI; underweight, normal, overweight), prenatal health insurance status (uninsured, Medicaid, private insurance, which included insurance through employer, paid by someone else, Tricare, or any other source of private insurance), Kotelchuck index of prenatal care (inadequate, intermediate, adequate, and adequate plus), and WIC enrollment (yes, no). Maternal BMI was calculated using the formula $\text{BMI} = 703 \times \text{weight, in pounds}/(\text{height, in inches})\hat{}2$, and was categorized based on the Institute of Medicine classifications. Records with ''do not know/not sure,'' ''unknown,'' or ''refused'' responses or missing data were excluded from each of the demographic and socioeconomic variables to minimize invalid estimates due to varying samples used to estimate parameters and make our findings generalizable to women in the United States.

Statistical analysis

Frequencies and percentages were used to describe the sample characteristics. The bivariate association between exclusive breastfeeding for 3 months, covariates, and the number of stressful life events was examined using the Rao-Scott chi-square test. Logistic regression procedures were applied to determine the association between number of stressors and exclusive breastfeeding for 3 months adjusting for all covariates listed in Table 1. Significant variables at the $p = 0.2$ level in the bivariate analyses were included in the multivariable logistic regression model. Pairwise interactions between stressful life events and each covariate were examined to test whether the relationships between stressful life events and exclusive breastfeeding for 3 months differ across categories of each covariate. Odds ratios (ORs), the 95% confidence intervals (CIs) for ORs, and p values were calculated for each of the independent variables. Regression diagnostics were used to assess for potential collinearity. The tests for multicollinearity, variance inflation factor, and tolerance were within acceptable limits. A value of $p < 0.05$ was considered statistically significant. To account for the complex survey, PROC SURVEY procedures were conducted using SAS 9.4 (SAS Institute, Inc., Cary, NC).

Table 1. Maternal Characteristics by Exclusive Breastfeeding at 3 Months (N=43,934)

Characteristics	*Overall* N=*43,934,* N *(%)*	*Exclusively breastfeed* *No* n=*24,908* n *(%)*	*Exclusively breastfeed* *Yes* N=*19,026* n *(%)*	p
Age				<0.0001
≤24	12,709 (24.6)	9,078 (70.9)	3,631 (29.1)	
25–29	13,294 (31.2)	7,215 (52.8)	6,079 (47.2)	
30–34	11,415 (29.4)	5,484 (46.1)	5,931 (53.9)	
≥35	6,516 (14.7)	3,131 (46.7)	3,385 (53.3)	
Education				<0.0001
<High school	14,142 (27.1)	9,937 (69.7)	4,205 (30.3)	
High school	12,949 (28.8)	7,658 (57.4)	5,291 (42.6)	
>High school	16,843 (44.1)	7,313 (43.1)	9,530 (56.9)	
Marital status				<0.0001
Married	30,005 (74.5)	14,893 (48.5)	15,112 (51.5)	
Other	13,929 (25.5)	10,015 (71.6)	3,914 (28.4)	
Smoking during pregnancy				<0.0001
Yes	3,891 (6.6)	3,032 (77.4)	859 (22.6)	
No	40,043 (93.4)	21,876 (52.8)	18,167 (47.2)	
No. of stressors experienced				<0.0001
None	13,589 (33.4)	6,736 (47.9)	6,853 (52.1)	
1–2	18,707 (43.4)	10,259 (52.9)	8,448 (47.1)	
3–5	9,311 (19.1)	6,156 (64.7)	3,155 (35.3)	
≥6	2,327 (4.1)	1,757 (74.9)	570 (25.1)	
Mode of delivery				0.1121
Vaginal	29,746 (70.4)	16,464 (53.9)	13,282 (46.0)	
Cesarean	14,188 (29.7)	8,444 (55.4)	5,744 (44.6)	
Pregnancy intention				<0.0001
Yes	27,398 (64.4)	14,249 (50.1)	13,149 (49.9)	
No	16,536 (34.6)	10,659 (62.4)	5,877 (37.6)	
Race/ethnicity				<0.0001
Non-Hispanic White	26,584 (71.2)	14,195 (51.8)	12,389 (48.2)	
Non-Hispanic Black	5,277 (7.9)	3,569 (63.2)	1,708 (36.8)	
Hispanic	5,115 (13.2)	3,256 (64.7)	1,859 (35.3)	
Other	6,958 (7.7)	3,888 (51.5)	3,070 (48.5)	
Insurance				<0.0001
Uninsured	1,053 (2.0)	531 (47.6)	522 (52.4)	
Medicaid	17,598 (33.7)	11,912 (66.8)	5,686 (33.2)	
Private	25,283 (64.3)	12,465 (48.1)	12,818 (51.9)	
WIC enrollment				<0.0001
Yes	26,553 (67.1)	12,957 (47.9)	13,596 (52.1)	
No	17,381 (32.9)	11,951 (67.7)	5,430 (32.3)	
Gestational diabetes				<0.0001
Yes	3,552 (6.9)	2,189 (60.2)	1,363 (39.8)	
No	40,382 (93.1)	22,719 (53.9)	17,663 (46.0)	
Kotelchuck index				<0.0001
Inadequate	4,061 (8.9)	2,535 (60.2)	1,526 (39.8)	
Intermediate	5,490 (13.1)	2,912 (51.7)	2,578 (48.3)	
Adequate	20,030 (50.6)	10,766 (52.7)	9,264 (47.3)	
Adequate plus	14,353 (27.6)	8,695 (56.9)	5,658 (43.0)	
Body mass index				<0.0001
Underweight	2,028 (3.9)	1,257 (57.9)	771 (42.1)	
Normal	23,799 (56.1)	12,508 (50.3)	11,291 (49.7)	
Overweight	18,107 (39.9)	11,143 (59.7)	6,964 (40.3)	
Prepregnancy depression check				<0.0001
Yes	4,952 (9.9)	3,160 (60.5)	1,792 (39.5)	
No	38,982 (90.1)	21,748 (53.7)	17,234 (46.3)	

WIC, Special Supplemental Nutrition Program for Women, Infants, and Children.

Results

Overall, 43% of women in the study exclusively breastfed for 3 months, and 52.1% reported having no stressful life events during pregnancy. With the exception of mode of delivery, all covariates showed a significant association with the status of 3-month exclusive breastfeeding (Table 1).

The bivariate associations between the women's characteristics and the number of stressors are shown in Table 2. Women between the ages of 25 and 29 years, on average, experienced 1–2 stressful life events (45.5%). Women with an education level higher than high school were more likely to experience no stressors during pregnancy compared with those who had a high school education or less (43.1% versus

TABLE 2. MATERNAL CHARACTERISTICS BY THE NUMBER OF STRESSORS (N=43,934)

	No. of stressors, n *(%)*				
	0	*1–2*	*3–5*	*≥6*	p
Characteristics					
Age					<0.0001
≤24	2,227 (19.3)	5,087 (40.4)	4,041 (31.2)	1,304 (9.2)	
25–29	4,226 (33.3)	5,828 (45.5)	2,649 (17.8)	591 (3.4)	
30–34	4,419 (40.1)	5,015 (44.4)	1,698 (13.6)	283 (1.9)	
≥35	2,667 (43.9)	2,777 (42.1)	923 (12.4)	149 (1.5)	
Education					<0.0001
<High school	3,130 (23.6)	5,613 (40.1)	4,123 (26.2)	1,276 (8.1)	
High school	3,352 (27.8)	5,477 (44.2)	3,250 (22.7)	870 (5.3)	
>High school	7,107 (43.1)	7,617 (44.9)	1,938 (11.1)	181 (0.85)	
Marital status					<0.0001
Married	11,190 (28.9)	13,588 (45.3)	4,542 (14.1)	685 (1.7)	
Other	2,399 (14.5)	5,119 (37.7)	4,769 (33.7)	1,642 (11.3)	
Smoking during pregnancy					<0.0001
Yes	483 (12.1)	1,271 (33.8)	1,453 (38.7)	684 (15.4)	
No	13,106 (34.9)	17,436 (44.1)	7,858 (17.7)	1,643 (3.3)	
Mode of delivery					0.264
Vaginal	9,203 (33.3)	12,754 (43.8)	6,213 (18.9)	1,576 (4.0)	
Cesarean	4,386 (33.9)	5,953 (42.3)	3,098 (19.5)	751 (4.3)	
Pregnancy intention					<0.0001
Yes	10,243 (39.7)	12,102 (44.5)	4,288 (13.9)	765 (1.8)	
No	3,346 (21.6)	6,605 (41.3)	5,023 (28.8)	1,562 (8.4)	
Race/ethnicity					<0.0001
Non-Hispanic White	8,808 (35.2)	11,641 (44.3)	5,048 (17.2)	1,087 (3.2)	
Non-Hispanic Black	1,093 (23.8)	1,988 (37.0)	1,666 (28.8)	530 (10.4)	
Hispanic	1,375 (26.5)	2,195 (43.1)	1,230 (25.1)	315 (5.3)	
Other	2,313 (38.7)	2,883 (42.0)	1,367 (15.8)	395 (3.4)	
Insurance					<0.0001
Uninsured	330 (33.8)	468 (46.6)	220 (16.7)	35 (2.8)	
Medicaid	3,238 (19.8)	6,702 (39.5)	5,719 (31.4)	1,939 (9.8)	
Private	10,021 (40.9)	11,537 (45.3)	3,372 (12.7)	353 (1.1)	
WIC enrollment					<0.0001
Yes	10,232 (39.9)	12,035 (45.5)	3,779 (13.1)	507 (1.5)	
No	3,357 (20.3)	6,672 (39.2)	5,532 (31.1)	1,820 (9.4)	
Gestational diabetes					0.055
Yes	1,009 (30.5)	1,531 (43.6)	793 (21.5)	219 (4.4)	
No	12,580 (33.7)	17,176 (43.4)	8,518 (18.9)	2,108 (4.1)	
Kotelchuck index					<0.0001
Inadequate	869 (22.7)	1,615 (42.3)	1,147 (26.4)	430 (8.5)	
Intermediate	1,784 (35.2)	2,251 (41.3)	1,151 (18.5)	304 (4.9)	
Adequate	6,633 (35.7)	8,680 (43.5)	3,886 (22.3)	831 (3.1)	
Adequate plus	4,303 (31.8)	6,161 (44.6)	3,127 (19.6)	762 (4.0)	
Body mass index					<0.0001
Underweight	545 (30.2)	868 (42.8)	451 (19.3)	164 (7.7)	
Normal	8,063 (36.4)	10,319 (43.7)	4,394 (16.9)	1,023 (3.1)	
Overweight	4,981 (29.6)	7,520 (43.1)	4,466 (22.1)	1,140 (5.2)	
Prepregnancy depression check					<0.0001
Yes	909 (20.4)	1,813 (39.1)	1,566 (29.6)	664 (10.9)	
No	12,680 (34.9)	16,894 (43.9)	7,745 (17.9)	1,663 (3.3)	

23.6% and 27.8%, respectively; $p < 0.0001$). Married women were less likely to experience ≥3 stressful life events when compared with women who were not married. Women who were Non-Hispanic Black, had Medicaid, not enrolled in the WIC program, and screened for prepregnancy depression were more likely to experience ≥3 stressors during pregnancy when compared with women who experienced no stressful life events in the study (Table 2).

In the multivariable adjusted model, there was a statistically significant interaction between maternal age and number of stressful life events on 3-month exclusive breastfeeding. After adjusting for prepregnancy depression checks, maternal education, maternal race, insurance, marital status, pregnancy intent, smoking, mode of delivery, and gestational diabetes, the odds of exclusive breastfeeding for 3 months were lower among women ≤24 years old who experienced at least ≥1 stressful life events compared with women who did not experience any stressful life events; OR (95% CI) 0.80 (0.66–0.98) for 1–2 stressful life events, 0.67 (0.54–0.82) for 3–5 stressful life events, and 0.58 (0.43–0.80) for ≥6 stressful life events, respectively. For women aged 25–29, compared with women who did not experience any stressful life events, the odds of 3-month exclusive breastfeeding were lower for women who experienced 3–5 and ≥6 stressful life events 0.79 (0.66–0.95) and 0.67 (0.46–0.80), respectively. However, among women ≥30 years, there was no statistically significant association between the number of stressful life events and 3-month exclusive breastfeeding (Table 3).

Discussion

In this population-based study, a strong association was identified between prenatal stressful life event exposure and exclusive breastfeeding duration. This association was independent of education level, marital status, smoking during pregnancy, mode of delivery, pregnancy intention, race, insurance, WIC enrollment, gestational diabetes, Kotelchuck index, BMI, and prepregnancy depression. Furthermore, pregnancy intention, race/ethnicity, level of education, smoking during pregnancy, and stress were significantly associated with exclusive breastfeeding and have been found by previous researchers.[17–19]

Consistent with previously published research, our findings add to the literature that has indicated a positive association between maternal age and exclusive breastfeeding.[20] There was a negative association between 3-month exclusive breastfeeding duration and prenatal stressful life events, particularly for women aged 18–29 and who experienced ≥3 stress exposures. In addition, the odds of exclusive breastfeeding were lower among women ≤24 years old who experienced ~1 stressful life event compared with those who did not experience any stressful life events. Younger mothers may lack the experience and support to breastfeed exclusively, which can lead to early cessation.[20–22]

A majority of women have reported ~1 stressful life event during pregnancy.[8] Pregnancy can be a stressful period in a woman's life, not only are physical and anatomical changes happening but life continues to manifest itself as well. Researchers found that stress associated with marital problems, financial difficulties, and environmental stressors increased the likelihood of women not exclusively breastfeeding their infants.[23–25] Sociodemographic factors that have been associated with perceived stressful life events during the prenatal period are maternal age, income, marital status, smoking, and level of education.[26,27] Unlike previous research,[20,28] this study found that regardless of race, a majority of women in the sample were likely to experience 1–2 stressful life events during pregnancy. Our findings indicate that women with an education level higher than high school were less likely to experience multiple stressful life events if any during pregnancy. Other researchers have found similar trends among women with higher levels of wealth and education.[29] This could be due to these women having more financial security and access to supportive resources and health services during pregnancy. Furthermore, among women between the ages of 30–34 and ≥35 years there was no statistically significant association between the number of stressful life events and exclusive breastfeeding for 3 months.

Women with multiple life stressors have low social and emotional support,[30] and as a result of managing these stressors in everyday life, they face challenges in sustaining exclusive breastfeeding. Similar to our findings, Buck et al. found that women who experienced ≥4 stressful life events were less likely to initiate breastfeeding when compared with women who did not report any stressful life events during pregnancy. The study also found that among women who breastfed, those exposed to stressful life events were less likely to continue up to 10 weeks.[9] Other studies have found that women who reported stressful life events were more likely to stop any breastfeeding and exclusive breastfeeding

Table 3. Association Between Number Of Stressors and Exclusive Breastfeeding Stratified by Age ($N = 43,934$)

	Multivariable-adjusted OR (95% CI)			
	Age groups			
No. of stressors	*≤24*	*25–29*	*30–34*	*≥35*
0	Reference	Reference	Reference	Reference
1–2	0.80 (0.66–0.98)[a]	0.99 (0.87–1.12)	0.93 (0.82–1.06)	1.00 (0.84–1.18)
3–5	0.67 (0.54–0.82)[b]	0.79 (0.66–0.95)[a]	0.83 (0.68–1.01)	0.82 (0.62–1.08)
≥6	0.58 (0.43–0.80)[b]	0.67 (0.46–0.97)[a]	0.68 (0.44–1.05)	0.63 (0.31–1.27)

Models adjusted for prepregnancy depression checks, maternal education, maternal race, insurance, marital status, pregnancy intent, smoking, mode of delivery, and gestational diabetes.

[a] $p < 0.05$; [b] $p < 0.001$.

95% CI, 95% confidence interval; OR, odds ratio.

by 13 weeks.[12,13] Despite differences in a few factors, the studies demonstrated a significant relationship between stressful life events and exclusive breastfeeding.

Limitations of the study relate to the self-reporting character of the collected data, potentially increasing the risk of social desirability, selection bias, and recall bias. The survey did not include questions about maternal intention to breastfeed for ~3 months and paternal support, factors that have been shown to be predictors of breastfeeding initiation and duration. The cross-sectional nature of the study also limits the findings to association rather than causal effect. Despite the limitations, the study has numerous strengths, including the uniform data collection process, the large, nationally representative sample of women in the United States, and the comprehensive list of variables that allowed adjustment for potential confounders.

Implications for practice and/or policy

Efforts that minimize exposure to stressful life events for pregnant women may improve exclusive breastfeeding practices for ~3 months. Maternal screening during the prenatal period of stressful life events serves to identify women who need additional support to promote positive breastfeeding outcomes. The findings from this study increase the awareness of how stressful life events impact breastfeeding duration among women in four different age groups. Women below the age of 30 years who experience ≥3 stressful life events during pregnancy should be identified by health care providers and thoroughly encouraged to exclusively breastfeed for the recommended 6 months. This can be done through follow-up phone calls, at-home lactation visits, and support groups. Future research should explore the level of support significant others such as partners, grandmothers, and husbands provide during pregnancy and postpartum to promote exclusive breastfeeding practices for women, especially those between the ages of 18 and 30 years. Although our findings found no significant association between the number of stressful life events and exclusive breastfeeding for 3 months among women between the ages of 30 and 34 and ≥35 years, these age groups should not be excluded from further research. Supplementary research should be conducted among this age group to identify other barriers to exclusive breastfeeding.

Conclusion

This study adds to the body of literature by examining the association between the number of maternal stressful life events that occur before or during pregnancy and 3-month exclusive breastfeeding. Our study reveals that stressful life events during pregnancy negatively influence exclusive breastfeeding duration. These findings highlight potential barriers to breastfeeding duration related to exposure to stressful life events that may help health care providers identify and improve exclusive breastfeeding, especially for young mothers.

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Disclosure Statement

The authors declare that they have no conflicts of interest.

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