

# Disparities in Breastfeeding Among U.S. Black Mothers: Identification of Mechanisms

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## Abstract

**Objective:** Disparities in U.S. breastfeeding rates persist among Black mothers according to birth country and between Black and White mothers, necessitating further investigation of modifiable mediating factors to inform interventions. This study seeks to examine the extent that social, maternal, infant factors and Theory of Planned Behavior (TPB) domains (attitudes, perceived control, and subjective norms) mediate the association of maternal race/birth country and breastfeeding continuation.

**Methods:** A national cohort of 2,050 mothers self-identifying as U.S.-born non-Hispanic Black ( $n=689$ ), foreign-born non-Hispanic Black ( $n=139$ ), and U.S.-born non-Hispanic White ( $n=1,222$ ) was analyzed. Using logistic regression, associations of race/birth country and any/exclusive breastfeeding at 2–6 months were examined. Structural equation modeling was used to determine whether social, maternal, and infant factors and TPB domains mediate these relationships.

**Results:** 40.0% of U.S.-born Black, 82.2% of foreign-born Black, and 57.3% of U.S.-born White mothers reported any breastfeeding at 2–6 months. Compared with U.S.-born Black mothers, odds of any breastfeeding were sevenfold higher among foreign-born Black mothers (odds ratio [OR]=7.04 95% confidence interval [CI]=4.80–10.31), which was explained partly by social/maternal/infant factors and TPB domains. Compared with U.S.-born White mothers, any breastfeeding was lower (OR=0.54, 95% CI=0.40–0.73) among U.S.-born Black mothers and higher (OR=3.81, 95% CI=2.48–5.87) among foreign-born Black mothers; these differences were also mediated by the aforementioned factors.

**Conclusions:** Among Black mothers in the United States, breastfeeding continuation varied substantially by birth country. Promotion of interventions targeting positive attitudes, perceived control, and subjective norms may reduce disparities among Black and between Black and White mothers.

**Keywords:** breastfeeding continuation, racial disparities, Black mothers

## Introduction

GREATER DURATION OF BREASTFEEDING is associated with multiple health benefits for mother–infant dyads.<sup>1,2</sup> In the United States, while breastfeeding continuation beyond 2 months has increased over the past decade,<sup>3</sup> non-Hispanic Black mothers continue to have the lowest rates of breastfeeding continuation at 6 months compared with all other

major racial/ethnic groups.<sup>4,5</sup> Moreover, compared with non-Hispanic White mothers, non-Hispanic Black mothers are less likely to practice any breastfeeding at 3 months by 14.7 percentage points.<sup>6</sup> Relatively few studies have examined differences in breastfeeding *within* U.S. non-Hispanic Black populations of mothers. For example, many existing studies have not accounted for maternal birth country,<sup>3,4,7</sup> despite extant research showing that foreign-born Black mothers are

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much more likely than their U.S.-born counterparts to initiate and continue breastfeeding.<sup>8–10</sup> Combining U.S.- and foreign-born Black mothers into a single group for investigation of strategies to promote breastfeeding continuation may be inappropriate. Reasons why breastfeeding continuation differs by birth country among non-Hispanic Black mothers has not been well studied.

Designing and implementing effective interventions that reduce disparities in breastfeeding continuation among Black mothers – whether U.S.-born or foreign-born – or those between Black and White mothers is critical to achieve health equity. To do so, a deeper understanding of the mechanisms by which such disparities in breastfeeding continuation occur is needed. In addition to birth country, an array of social factors (e.g., income and education), maternal factors (e.g., parity and age), and infant factors (e.g., birth weight) may also influence breastfeeding continuation. Furthermore, drivers of maternal decision-making to breastfeed include attitudes (perceptions about a behavior), perceived behavioral control (how much someone believes they have control of the behavior, hereafter referred to as “perceived control”), and subjective norms (what someone believes others think about whether they should engage in the behavior), reflected by the domains of the Theory of Planned Behavior (TPB).<sup>11</sup> The TPB is a well-established framework used to examine health behaviors, including breastfeeding.<sup>11</sup> The extent to which TPB domains mediate the effect of race on U.S. breastfeeding practices has not yet been studied. An investigation that comprehensively examines social, maternal, and infant factors and TPB domains to identify mediators that may serve as potential intervention targets is warranted.

In light of this knowledge gap, this study seeks to examine whether and how social, maternal, and infant factors and TPB domains mediate the association between maternal race and birth country (being born within or outside of the United States) and breastfeeding continuation at 2–6 months after birth among U.S. mothers. Using a nationally representative sample, the study compared breastfeeding continuation among non-Hispanic U.S.-born and foreign-born Black mothers with non-Hispanic U.S.-born White mothers separately, as well as examined differences between U.S.-born Black and foreign-born Black mothers.

## Materials and Methods

This study draws upon data from the Study of Attitudes and Factors Effecting (SAFE) Infant Care Practices (Principal Investigator: M.J.C.), a survey of 3,279 mothers of infants 2–6 months of age conducted between 2011 and 2014 that assessed maternal behaviors and advice received for several infant care practices, including breastfeeding. Full details about SAFE’s methodological and analytical approach have been published elsewhere.<sup>12</sup> In brief, SAFE used a stratified, two-stage clustered design to recruit a nationally representative sample of mother–infant dyads. Mothers were eligible for SAFE if they spoke English or Spanish, lived in the United States, and would be serving as a caretaker for their singleton infant at home between 2 and 6 months postpartum. Hispanic and non-Hispanic Black mothers were oversampled. Participants were recruited during their birth hospital stay from 32 hospitals with  $\geq 100$  annual births. After signing written consent, mothers completed a short enrollment survey

and a longer phone- or web-based survey at 2–6 months after discharge. For this study, the 2,050 (62.5%) SAFE participants who self-identified as U.S.-born Black ( $n=689$ ), foreign-born Black ( $n=139$ ), and U.S.-born White ( $n=1,222$ ) were analyzed. In this article, breastfeeding people are referred to as mothers; however, it should be acknowledged that people who breastfeed may be of any gender. Information reported is intended to include people of all genders. All institutional review boards approved the study.

### Main exposure variables

Race was categorized as non-Hispanic White or non-Hispanic Black and birth country as United States versus foreign-born (any non-U.S. country) per maternal self-report in the hospital enrollment survey.

### Main outcome measures: any and exclusive breastfeeding at 2–6 months

Breastfeeding continuation was assessed with the SAFE Study Follow-up Survey (2- to 6-month survey) question stating: “Over the LAST 2 weeks, what has your baby been drinking?” Responses included the following: only breast milk; mostly breast milk; equally breast milk and formula; only formula; and mostly formula. Survey responses of only breast milk, mostly breast milk, equally breast milk and formula, or mostly formula were categorized as “any breastfeeding” and only breast milk as “exclusive breastfeeding.”

### Main mediators of interest

Mothers were considered the primary caretaker if the mother reported that she and her partner cared for the baby the most and second most (i.e., the mother or partner could have been the primary or secondary caretaker). Employment outside the home before giving birth; maternal education; Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) enrollment status; and use of books or Internet as sources of infant care information were considered social factors because these factors are potentially modifiable targets of behavior change. Maternal age and parity were considered maternal factors, and infant birthweight was considered an infant factor. The aforementioned data were obtained in the hospital enrollment survey, except for use of books or Internet as sources of information, which were obtained at the 2- to 6-month survey.

The 3 TPB domains were accounted for by referring to three respective SAFE 2- to 6-month survey questions with 7-point Likert scale response options ranging from 1 (Strongly disagree) to 7 (Strongly agree). Attitudes were assessed with responses to the statement: “I think breastfeeding would...” Responses included (1) be healthy for my baby; (2) be healthy for me; (3) be pleasant for my baby; (4) be pleasant for me; (5) be good for my baby; (6) be good for me; (7) make my baby safer; (8) make my baby more comfortable; and (9) keep my baby from choking. The mean of the responses was calculated, with a mean of  $\leq 4$  categorized as “negative attitudes” and  $\geq 5$  as “positive attitudes.” Perceived control was assessed with responses to the statement: “Choosing to breastfeed my baby is mostly up to me.” Response options  $\leq 4$  were categorized as “negative control” and response options  $\geq 5$  as “positive control.”

Subjective norms were assessed with responses to the statement: “The people who are most important to me think that I should breastfeed my baby.” Response options  $\leq 4$  were categorized as “negative norms” and response options  $\geq 5$  as “positive norms.”

#### Analytic approach

First, descriptive statistics were assessed by examining social, maternal, and infant factors and TPB domains, according to race and birth country and to any/exclusive breastfeeding. The SAFE survey’s stratified, two-stage clustered sampling design was accounted for when calculating parameter estimates and standard errors. Data were weighted to account for participant dropout and to reflect the national-level distribution of maternal age and race. Next, logistic regression was used to examine associations of race and birth country as well as any/exclusive breastfeeding at 2–6 months, and direct and indirect relationships were modeled using multiple logistic regression. In models of foreign-born versus U.S.-born Black mothers, U.S.-born Black was the reference group; in models of U.S.-born Black and foreign-born Black versus U.S.-born White, U.S.-born White was the reference group.

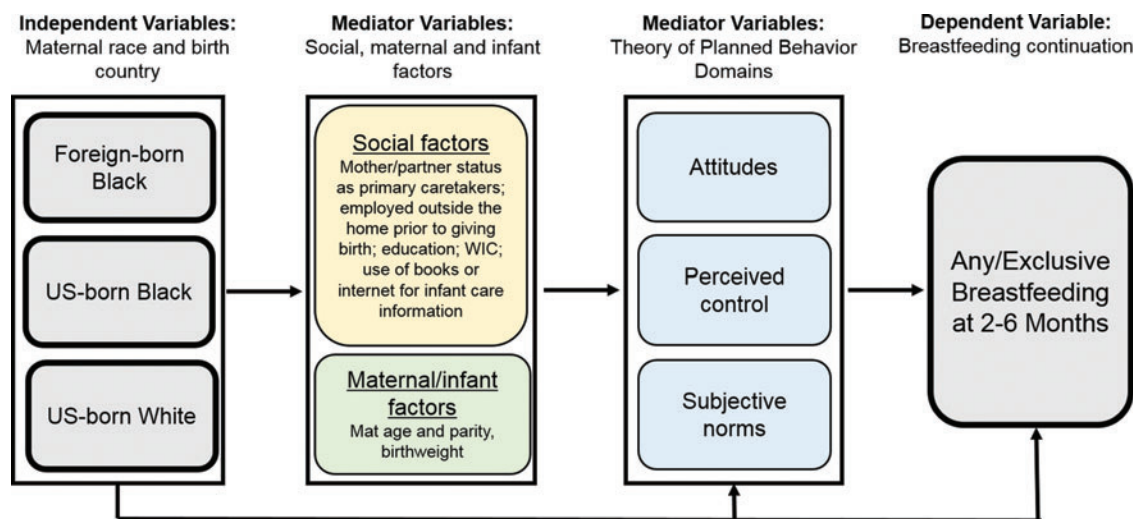
For the mediation analysis, a conceptual framework was first developed explaining the hypothesized relationship between maternal race and birth country on breastfeeding continuation, including the proposed mediators that may serve as potential targets for interventions (Fig. 1). The framework was based on existing literature describing associations between race, social, maternal, and infant factors, TPB domains, and measures of breastfeeding.<sup>13–16</sup> Next, structural equation modeling was used to identify the extent to which proposed mediators explained the relationship between maternal race/birth country and breastfeeding continuation. Structural equation modeling is a technique that combines factor analysis and multiple regression analysis to study complex associations between observed and latent variables.<sup>17,18</sup> The approach allows for the inclusion of multiple mediators in a single model, fa-

cilitating the examination of numerous explanatory steps. Categories described previously in the descriptive analysis are given in Table 1, with the exception of maternal age (categorized as  $<25$  vs.  $\geq 25$  years), education (categorized as some college or less vs. college or more), and marital status (categorized as married vs. not). Models were fit including indirect and direct pathways, deriving final models using backward elimination to drop nonsignificant ( $p \geq 0.05$ ) pathways. As time after birth influences breastfeeding duration, all models were adjusted for infant age at the time of the survey.

Finally, when significant differences were found between foreign-born Black compared with U.S.-born Black and White mothers, differences among more granular categories of foreign-born Black mothers, including African-born Black, Haitian-born Black, and Jamaican-born Black, using descriptive analysis only were explored. (The data lacked a sufficient sample size to pursue structural equation modeling analysis.) All analyses were conducted using SAS V9.4 and MPlus V7.31 statistical software packages.

#### Results

Overall, among the sample of 2,050 mothers, 1,222 (79.6%) were U.S.-born White, 689 (16.8%) were U.S.-born Black and 139 (3.6%) were foreign-born Black. Social, maternal, and infant factors are presented according to maternal race/birth country in Table 1. U.S.-born Black mothers were less often married, delivered their infants at younger ages, and had infants with lower birth weight, compared with U.S.-born White and foreign-born Black mothers. U.S.-born White mothers more often reported that they and their partners were their infant’s primary caretakers, compared with U.S.-born Black and foreign-born Black mothers. Regarding TPB domains, rates of positive attitudes, perceived control, and subjective norms were highest among foreign-born Black mothers compared with both U.S.-born Black and U.S.-born White mothers. Social, maternal, and infant factors are presented according to any/exclusive breastfeeding status in Supplementary Table S1.



**FIG. 1.** Conceptual framework depicting mediation pathways between maternal race/birth country and breastfeeding continuation. Color images are available online.

TABLE 1. MOTHER-INFANT DYAD CHARACTERISTICS ACCORDING TO MATERNAL RACE AND BIRTH COUNTRY (WEIGHTED %)

<i>Characteristic</i>	<i>Overall (N=2,050)</i>	<i>U.S.-born White (N=1,222)</i>	<i>U.S.-born Black (N=689)</i>	<i>Foreign-born Black (N=139)</i>
Overall	2,050	1,222 (79.6%)	689 (16.8%)	139 (3.6%)
Social factors				
Mother/partner served as primary caretakers	1,616 (84.6%)	1,093 (89.8%)	437 (64.5%)	86 (63.4%)
Employed outside the home before giving birth	1,274 (63.6%)	806 (64.8%)	386 (58.6%)	82 (60.3%)
Marital status				
Married	1,029 (59.4%)	827 (67.9%)	142 (21.6%)	60 (47.2%)
Never married	912 (35.7%)	337 (27.4%)	508 (73.0%)	67 (44.8%)
Sep./Div./widowed	104 (4.9%)	57 (4.7%)	36 (5.3%)	11 (8.0%)
Maternal education				
Less than high school	175 (7.6%)	72 (6.2%)	86 (12.7%)	17 (13.0%)
High school or GED	501 (21.7%)	226 (19.1%)	225 (31.4%)	50 (33.0%)
Some college	711 (34.0%)	398 (32.9%)	276 (40.5%)	37 (28.6%)
College or more	652 (36.8%)	519 (41.8%)	98 (15.3%)	35 (25.4%)
Household income				
<\$20,000	681 (26.3%)	251 (20.1%)	363 (51.5%)	67 (46.4%)
\$20,000–49,999	466 (22.2%)	256 (21.6%)	175 (24.3%)	35 (25.2%)
≥ \$50,000	398 (22.2%)	292 (24.3%)	87 (13.7%)	19 (14.5%)
Unknown	505 (29.3%)	423 (33.9%)	64 (10.4%)	18 (13.9%)
Enrolled in WIC	1,092 (45.1%)	434 (36.2%)	552 (80.6%)	106 (76.5%)
Any smoking during pregnancy	372 (20.2%)	260 (22.1%)	111 (15.3%)	1 (0.7%)
Used books for infant care information	1,131 (59.5%)	784 (63.5%)	284 (43.5%)	63 (43.3%)
Used internet for infant care information	1,461 (76.3%)	983 (80.6%)	398 (60.1%)	80 (55.5%)
Maternal factors				
Maternal age (years)				
<20	163 (6.6%)	62 (5.2%)	92 (13.1%)	9 (6.6%)
20–29	1,159 (53.3%)	654 (51.8%)	442 (63.1%)	63 (42.2%)
30+	728 (40.1%)	506 (43.0%)	155 (23.8%)	67 (51.2%)
Parity				
1	818 (40.2%)	505 (40.8%)	258 (37.6%)	55 (39.1%)
2	683 (33.9%)	424 (34.6%)	211 (30.5%)	48 (33.9%)
3+	545 (25.9%)	292 (24.6%)	217 (31.9%)	36 (27.0%)
Infant factors				
Infant age at survey (weeks)				
8–11	1,310 (66.6%)	864 (70.5%)	369 (51.2%)	77 (51.3%)
12–15	301 (14.6%)	167 (13.7%)	106 (17.1%)	28 (21.5%)
16–19	186 (8.2%)	85 (7.2%)	88 (12.7%)	13 (10.8%)
20+	253 (10.6%)	106 (8.6%)	126 (19.0%)	21 (16.4%)
Sex				
Male	1,035 (50.0%)	612 (49.6%)	347 (51.1%)	76 (54.1%)
Female	1,011 (50.0%)	608 (50.4%)	340 (48.9%)	63 (45.9%)
Birthweight (g)				
<2500	141 (5.9%)	65 (5.0%)	66 (10.3%)	10 (5.5%)
≥2500	1,902 (94.1%)	1,154 (95.0%)	619 (89.7%)	129 (94.5%)
Theory of planned behavior domains				
Attitudes				
Positive	1,842 (89.7%)	1,093 (89.3%)	613 (89.4%)	136 (99.2%)
Negative	203 (10.3%)	126 (10.7%)	75 (10.6%)	2 (0.8%)
Perceived control				
Positive	1,907 (92.9%)	1,125 (92.4%)	646 (94.3%)	136 (99.0%)
Negative	138 (7.1%)	94 (7.6%)	42 (5.7%)	2 (1.0%)
Subjective norms				
Positive	1,331 (63.6%)	778 (63.0%)	431 (61.5%)	122 (86.0%)
Negative	715 (36.4%)	441 (37.0%)	257 (38.5%)	17 (14.0%)

GED, General Education Development; WIC, Special Supplemental Nutrition Program for Women, Infants, and Children.

TABLE 2. PREVALENCE AND ODDS RATIOS OF BREASTFEEDING CONTINUATION ACCORDING TO MATERNAL RACE/BIRTH COUNTRY

	<i>No breastfeeding</i>	<i>Any breastfeeding</i>	<i>Exclusive breastfeeding</i>	
	<i>Weighted %</i>	<i>Weighted %</i>	<i>Weighted %</i>	
Overall	963 (44.7%)	1,084 (55.3%)	563 (30.9%)	
U.S.-born White	517 (42.7%)	704 (57.3%)	445 (35.1%)	
U.S.-born Black	422 (60.0%)	266 (40.0%)	90 (13.3%)	
Foreign-born Black	24 (17.8%)	114 (82.2%)	28 (20.4%)	

	<i>Direct effect (after mediation)</i>		<i>Direct effect (after mediation)</i>	
	<i>Total effect</i>	<i>Total effect</i>	<i>Total effect</i>	<i>Total effect</i>
	<i>OR (95% CI)</i>		<i>OR (95% CI)</i>	
Foreign-born Black vs. U.S.-born Black (ref)	7.04 (4.80–10.31)	5.02 (3.72–6.77)	1.66 (0.86–3.21)	1.05 (0.54–2.06)
U.S.-born Black vs. U.S.-born White (ref)	0.54 (0.40–0.73)	0.89 (0.65–1.21)	0.32 (0.24–0.43)	0.56 (0.40–0.79)
Foreign-born Black vs. U.S.-born White (ref)	3.81 (2.48–5.87)	4.47 (3.16–6.31)	0.53 (0.25–1.09)	0.59 (0.27–1.28)

Values are controlled for sampling design and adjusted for infant age at survey. CI, confidence interval; OR, odds ratio.

Prevalence and odds ratios of any/exclusive breastfeeding at 2–6 months are reported according to maternal race/birth country in Table 2. Any and exclusive breastfeeding, respectively, were reported among 57.3% and 35.1% of U.S.-born White mothers, 40.0% and 13.3% of U.S.-born Black mothers, and 82.2% and 20.4% of foreign-born Black mothers. Compared with U.S.-born Black mothers, odds of any breastfeeding were sevenfold higher among foreign-born Black mothers (odds ratio [OR]=7.04, 95% confidence interval [CI]=4.80–10.31); this direct effect estimate remained robust after accounting for possible mediators (OR=5.02, 95% CI=3.72–6.77). When comparing foreign-born Black to U.S.-born White mothers, foreign-born Black mothers also had higher odds of any breastfeeding (OR=3.81, 95% CI=2.48–5.87), which increased slightly after accounting for mediators (OR=4.47, 95% CI=3.16–6.31). In contrast, when comparing U.S.-born Black to U.S.-born White mothers, U.S.-born Black mothers had lower odds of any breastfeeding (OR=0.54, 95% CI=0.40–0.73); however, after accounting for mediators, this association was no longer present (OR=0.89, 95% CI=0.65–1.21). Regarding exclusive breastfeeding, U.S.-born Black mothers had lower odds (OR=0.32, 95% CI=0.24–0.43) compared with U.S.-born White mothers, and this result was similar after accounting for mediators (OR=0.56, 95% CI=0.40–0.79).

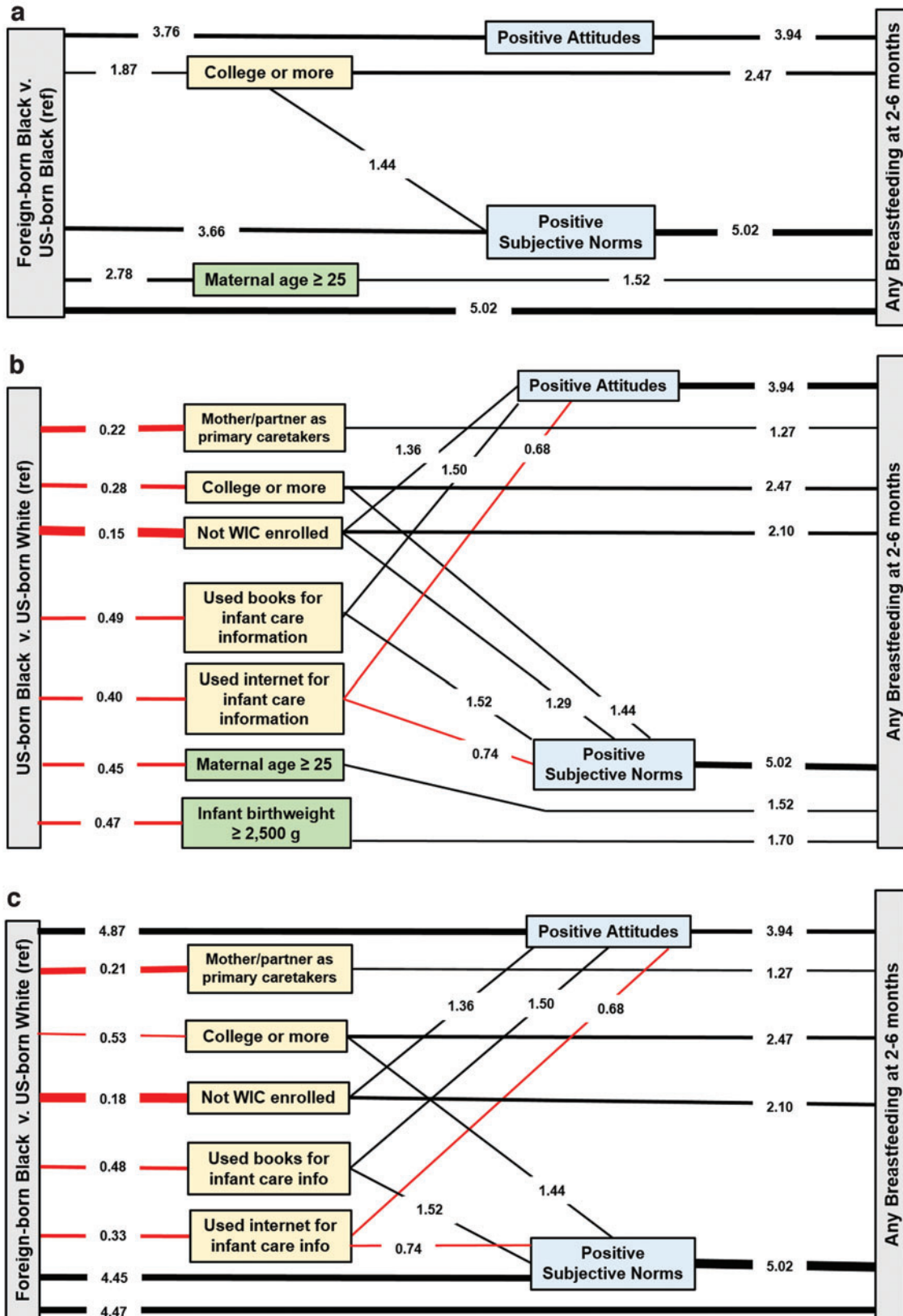
Results of the pathway analyses demonstrate the extent to which identified mediators of interest explain the relationship between maternal race/birth country and breastfeeding are given in Figures 2 and 3 and Supplementary Table S2. The association of higher any/exclusive breastfeeding among foreign-born Black mothers compared with U.S.-born Black mothers was explained in part by older maternal age, higher education level, and positive TPB domains (Figs. 2a and 3a). When comparing U.S.-born Black versus U.S.-born White mothers, the association of lower any/exclusive breastfeeding among U.S.-born Black mothers was accounted for by several social, maternal, and infant factors and TPB domains

(Figs. 2b and 3b). In particular, U.S.-born Black mothers were less likely to have social, maternal, and infant factors (Table 1; Supplementary Tables S1 and S3) that were associated with positive TPB domains and with any/exclusive breastfeeding. Specifically, they had lower maternal age and education, had infants with lower birthweight, were less likely to themselves or their partners serve as primary caretakers, and were more likely to be enrolled with WIC. Furthermore, U.S.-born Black mothers had lower reported use of books for infant care information, which was also associated with less positive TPB domains and decreased breastfeeding (Figs. 2b and 3b). Finally, when comparing foreign-born Black to U.S.-born White mothers, some of the social factors that were positively associated with breastfeeding and/or positive TPB domains, such as maternal education, role of the mother/partner as primary caretaker, and WIC enrollment were found to be *less* likely among foreign-born Black mothers. However, strong positive associations of mothers identifying as foreign-born Black with positive TPB domains and breastfeeding were found, independent of social, maternal, and infant factors (Figs. 2c and 3c).

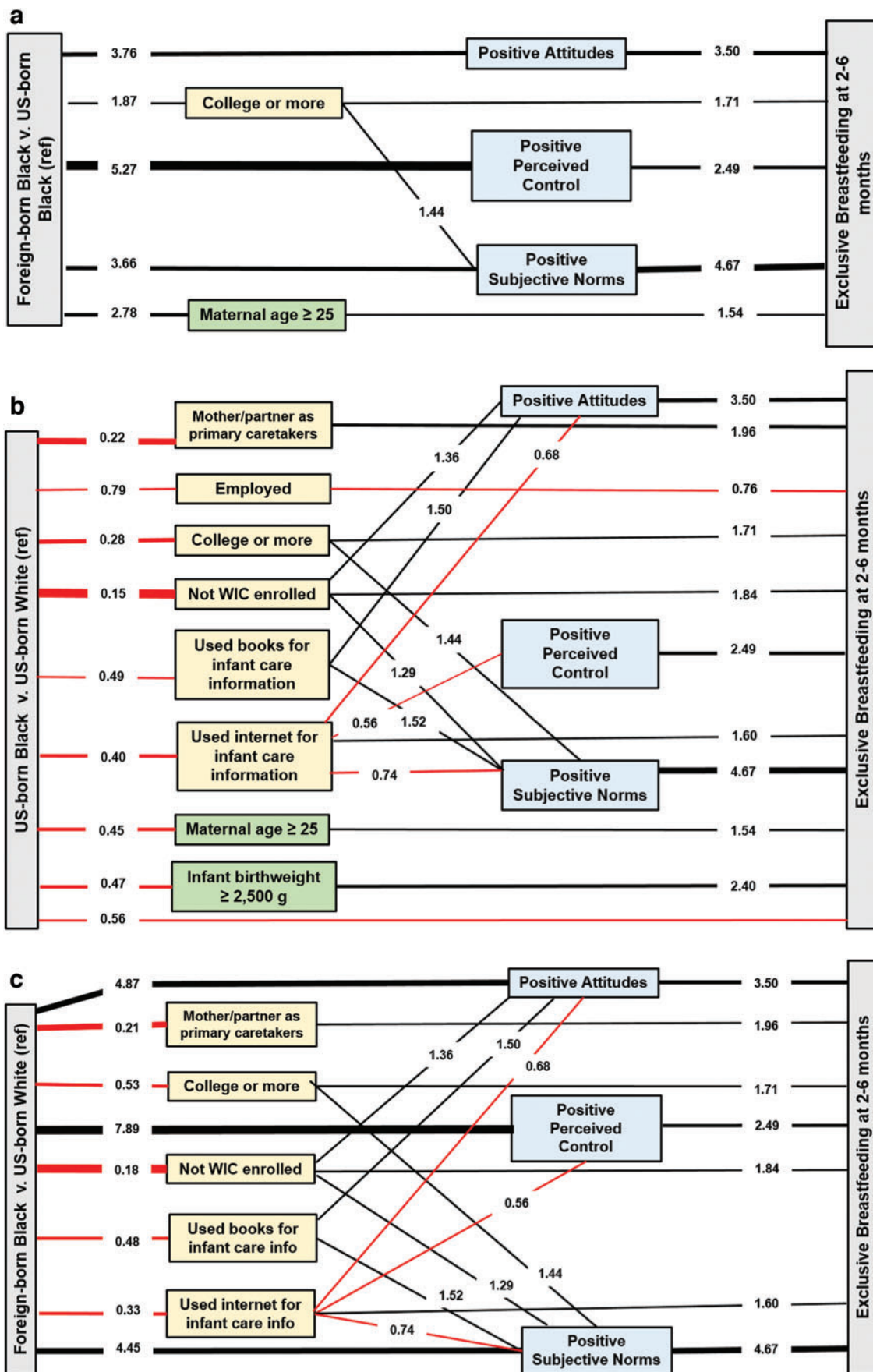
More granular categories of associations among foreign-born Black mothers are explored in Supplementary Table S3. Among 139 foreign-born Black mothers, 42 were born in any country in Africa, 47 were born in Haiti, 24 were born in Jamaica and 26 were born elsewhere. Any and exclusive breastfeeding occurred among 96.8% and 35.2% African-born mothers, 71.2% and 11.1% of Haitian-born mothers, and 88.9% and 22.9% of Jamaican-born mothers, respectively.

## Discussion

In a large, nationally representative cohort, foreign-born Black mothers had greater odds of any and exclusive breastfeeding continuation compared with U.S.-born Black mothers. Whereas social and maternal factors and positive TPB domains (attitudes, perceived control, and subjective



**FIG. 2.** Associations of maternal race/birth country and any breastfeeding at 2–6 months are shown. Panel (a) shows results of foreign-born Black versus US-born Black, panel (b) shows US-born Black versus US-born White and panel (c) shows foreign-born Black versus US-born White. *Black lines* indicate positive and *red lines* indicate negative associations ( $p < 0.05$ ). *Thickness of line* indicates strength of the association. ORs reflecting significant values in the relationships between both the predictor and mediator as well as mediator and outcome variables are presented. OR, odds ratio. Color images are available online.



**FIG. 3.** Associations of maternal race/birth country and exclusive breastfeeding at 2–6 months are shown. Panel (a) shows results of foreign-born Black versus US-born Black, panel (b) shows US-born Black versus US-born White and panel (c) shows foreign-born Black versus US-born White. *Black lines* indicate positive and *red lines* indicate negative associations ( $p < 0.05$ ). *Thickness of line* indicates strength of the association. ORs reflecting significant values in the relationships between both the predictor and mediator as well as mediator and outcome variables are presented. Color images are available online.

norms) accounted for some of these effects, being born outside the United States also contributed considerably to this relationship as an independent predictor. Maternal age, education, employment, WIC enrollment, use of books or Internet for infant care information, infant birth weight, and TPB domains contributed to disparities between U.S.-born Black and U.S.-born White mothers. Implementation and scale up of interventions that promote positive TPB domains and that target social determinants of health (such as education and employment) may foster racial equity in U.S. breastfeeding.<sup>19</sup>

This analysis highlights that foreign-born status may be a strong driver of breastfeeding continuation among Black mothers in this sample, even after accounting for social, maternal, and infant factors. For example, foreign-born and U.S.-born Black mothers both had higher rates of WIC enrollment (a proxy for income) and lower levels of education attainment compared with U.S.-born White mothers. However, when accounting for these factors, foreign-born Black mothers continued to have stronger associations of positive attitudes toward and positive subjective norms about breastfeeding than both U.S.-born Black and U.S.-born White mothers. This corroborates research that acceptance of and support for breastfeeding as the normative behavior in non-U.S. countries may be a strong driver of breastfeeding continuation.<sup>2</sup> Indeed, 23 non-U.S. countries meet the World Health Organization recommendation for rates of exclusive breastfeeding during the first 6 months of life above 60%<sup>20</sup>—a figure substantially higher than that in the United States.<sup>21</sup>

Persistence of disparities between Black and White mothers in the U.S. are often attributed to differences in socioeconomic status, employer support, access to breastfeeding education, and maternal age.<sup>4</sup> This study suggests that additional factors, such as the TPB domains of attitudes, perceived control, and subjective norms may be equally important contributors to disparities between U.S.-born Black and White mothers. These findings are consistent with existing literature. A recent qualitative study conducted with a group of U.S.-born Black mothers found that breastfeeding was not a normative behavior and rarely, if ever, discussed with family and friends (i.e., breastfeeding was not a subjective norm).<sup>22</sup> Study participants had negative attitudes toward breastfeeding.<sup>22</sup> When asked about historical implications of breastfeeding, Black mothers reported that forced wet-nursing by slaves was symbolic of the lack of choice Black mothers experienced, in contrast to mothers' right to choose formula feeding (i.e., historically, Black mothers had limited control over feeding choice).<sup>22</sup> Indeed, formula feeding was viewed as normal, convenient, and natural.<sup>22</sup> These findings suggest that changing subjective norms, such that breastfeeding is viewed as a normal practice; promoting positive attitudes about breastfeeding; and emphasizing mothers' choice and/or control over breastfeeding may help improve breastfeeding continuation among some U.S. Black mothers. These strategies targeting TPB domains should be considered alongside differences in other characteristics described previously.

Such strategies should be implemented within the context of Black mothers' experiences. Data demonstrate that Black mothers are frequently subjected to discrimination in many aspects of health care, including breastfeeding.<sup>23</sup> Robinson

et al.<sup>23</sup> found that health care providers' implicit biases about African American mothers' breastfeeding outcomes were associated with both fewer lactation support referrals and less help when breastfeeding problems occurred among African American mothers relative to their non-African American counterparts. Differential treatment because of race has led to medical mistrust among many African American and other minority communities in the United States,<sup>24</sup> and has likely exacerbated racial disparities in breastfeeding. This point emphasizes the importance of bias and the implementation of equitable breastfeeding interventions.

This study highlights the importance of TPB domains in the pathway toward breastfeeding continuation. The TPB domains have served as targets for breastfeeding interventions.<sup>11,14,25</sup> For example, interventions using video education have focused on changing attitudes and perceived control<sup>26</sup>; interventions using group prenatal care have focused on changing subjective norms.<sup>25</sup> Chapman and Pérez-Escamilla<sup>25</sup> summarized interventions associated with improved breastfeeding outcomes among underrepresented minority groups. Although these interventions did not necessarily explicitly mention use of the TPB as a framework, many of the interventions often targeted TPB domains. Effective interventions involving peer counseling or group prenatal care during which the benefits of breastfeeding and strategies to overcome typical barriers to breastfeeding were discussed likely targeted TPB domains.<sup>25</sup> Further investigation of interventions like these and scale up of existing ones—as is the case with breastfeeding peer counseling through the WIC program<sup>25</sup>—are important next steps. In addition, other experts<sup>4</sup> suggest that interventions may capitalize on changing attitudes, perceived control, and subjective norms within family and friend social networks.

Although individual-level interventions focused on promotion of TPB domains are important to promote racial equity in U.S. breastfeeding, policy-level interventions are also warranted.<sup>27</sup> This study found that employment was negatively associated with exclusive breastfeeding for U.S.-born Black mothers. Stronger support for paid parental leave and breastfeeding accommodations in the workplace are needed, especially for low-income mothers in part-time or service-based work environments, who are disproportionately Black.<sup>28–30</sup> Increased accessibility to and training for usage of high-quality breast pumps<sup>31</sup> also reflects a policy with the potential to augment individual-level interventions to improve breastfeeding among Black mothers in the United States.

This study reveals that WIC status was negatively associated with TPB domains and breastfeeding continuation. This is likely more a reflection of WIC being a proxy for low-income status rather than inadequate breastfeeding support or education by WIC.<sup>31</sup> However, it must be acknowledged that WIC enables many mothers to obtain infant formula.<sup>31</sup> Furthermore, it was found that use of books for infant care information was positively associated with positive TPB domains, whereas Internet use was not. This finding may be related to the fact that books may be more likely to consistently communicate positive breastfeeding messages, whereas there is easy access to both breastfeeding support and anti-breastfeeding sentiment on the Internet. Anti-breastfeeding sentiments could threaten positive breastfeeding intentions and practices, particularly for mothers



without professional or social support.<sup>32</sup> Promotion of credible, evidence-based sources of breastfeeding information (Internet-based or otherwise) is needed.

Although this study has multiple strengths, such as the inclusion of a nationally representative study sample and the consideration of multiple potential mediators, the sample was not large enough to enable examination of mothers by specific birth country outside the United States. As such, the results of the descriptive analysis examining birth country (Supplementary Table S3) should be interpreted with caution. Nonetheless, even in light of the heterogeneous foreign-born group, substantial differences in the main outcome of interest between foreign-born and U.S.-born mothers were found. Still, the results of this study should be interpreted in light of additional limitations. First, data on additional factors, such as prenatal care<sup>33</sup> or mode of delivery,<sup>34</sup> both of which have been shown to be associated with maternal race and breastfeeding, were not collected.<sup>33,34</sup> It is possible that these and other factors are associated with breastfeeding continuation. Second, data were derived from mothers' reports, which may be subject to social desirability bias. This may lead to an underestimation of the prevalence of nonrecommended feeding practices. Third, because mothers were recruited postpartum, prenatal breastfeeding intention—a factor associated with breastfeeding practices<sup>35</sup>—was not able to be assessed. Next, 'exclusive breastfeeding' was defined in this study as infants having received only breast milk and no formula. The survey did not capture consumption of other liquids, such as water or juice, or any solids. Therefore, the extent to which "exclusive breastfeeding" included only breast milk, as is consistent with the World Health Organization definition of exclusive breastfeeding,<sup>36</sup> was unable to be ascertained. Finally, mothers of infants who were still hospitalized at 2–6 months after birth were excluded, such that these findings cannot be generalized to the very preterm infant population.

## Conclusion

This study revealed that many potentially modifiable factors explain disparities in breastfeeding continuation among some Black communities and between some Black and White communities in the United States. Promotion of TPB domains may be a promising pathway to inform interventions geared toward breastfeeding equity in the context of consideration of the historical roots of racism and anti-breastfeeding culture. Finally, robust research on breastfeeding behaviors among foreign-born U.S. Black mothers by birth country is needed.

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## Authors' Contributions

C.B.S., and M.G.P. made substantial contributions to the conception of the work, data interpretation, and co-wrote the initial draft.

T.C.H. and S.M.K. made substantial contributions to data analysis and data interpretation, and revised the article critically for important intellectual content.

M.J.C. made substantial contributions to the conception of the work, data interpretation, and revised the article critically for important intellectual content.

E.R.C., R.Y.M., A.L.K., and F.R.H. made substantial contributions to data interpretations and revised the article critically for important intellectual content.

All authors have approved the final draft of this article and agree to be accountable for all aspects of the work.

## Disclosure Statement

C.B.S. serves as a peer reviewer for the academic journals *Maternal-Child Nutrition* and the *American Society for Nutrition*. These are volunteer positions.

M.G.P. serves on the research board of the Mother's Milk Bank Northeast and is the education chairperson for the American Academy of Pediatrics Section on Breastfeeding. These are volunteer positions.

A.L.K. is president-elect of the Academy of Breastfeeding Medicine and on the executive committee of the American Academy of Pediatrics Section on Breastfeeding. These are volunteer positions.

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## Supplementary Material

Supplementary Table S1  
Supplementary Table S2  
Supplementary Table S3

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