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Racial and Ethnic Differences in Nonresponse Rate to Experiences of Discrimination: A Secondary Analysis of the nuMoM2b Dataset

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ABSTRACT

Discrimination drives racial and ethnic disparities in maternal mortality and morbidity, imposing both a human and economic burden. Yet, discrimination is challenging to measure accurately. Little is published in perinatal literature about nonresponse bias to experiences of discrimination and how to mitigate this effect to obtain more complete information. In this secondary analysis of the Nulliparous Pregnancy Outcomes Study: Monitoring Mothers-to-Be (nuMoM2b), we used the Experiences of Discrimination (EOD) scale to examine missing responses to a question about racial or ethnic discrimination during medical care. We categorized responses as "yes," "no," or "nonresponse." Independent variables included racial and ethnic identification, age, body mass index (BMI), education, and poverty level. Logistic regression estimated the odds of nonresponse. Among 9289 participants, 121 (1.3%) reported discrimination, 8598 (92.6%) reported no discrimination, 570 (6.1%) did not respond. In the final adjusted model, racial and ethnic identification was the only statistically significant predictor of nonresponse ($p < 0.001$). Compared to the most numerous racial group, non-Hispanic white participants, Hispanic participants had 1.8 times the odds of nonresponse [95% CI: 1.3–2.3], and non-Hispanic Black participants had 1.6 times the odds [95% CI: 1.1–2.2]. When individuals most likely to experience discrimination are also the least likely to disclose it, nonresponse bias may result, leading to underestimation of prevalence and obscuring lived experiences of those most affected. Understanding the predictors of nonresponse in patient experience surveys can inform improvements in measurement of discrimination through participant recruitment, survey design, execution, and interpretation.

PATIENT OR PUBLIC CONTRIBUTION

There is no patient or public contribution. This study was based on a secondary data analysis, and as such, there was no direct involvement of patients or members of the public.

1 | Introduction and Background

Racial and ethnic inequities in maternal health outcomes represent a persistent public health crisis in the United States. In 2024, the maternal mortality rate was 17.9 deaths per 100,000 live births, with Black non-Hispanic women facing a rate of 44.8, more than three times the rate of white non-Hispanic women (14.2) (Hoyert 2026). For every maternal death, an estimated 100 women experience severe maternal morbidity (Boghossian et al. 2024), imposing an estimated $32.3 billion in medical and societal costs for a single year of births, extending up to 5 years postpartum

(O'Neil et al. 2021). Over 80% of pregnancy-related deaths are considered preventable with timely, high-quality care (Fink et al. 2023), yet discrimination and mistreatment during prenatal care are associated with inequities in access to such care (Vedam et al. 2019). In a large national survey of people who gave birth in the United States between 2010 and 2016, one in six women reported at least one form of mistreatment (such as being scolded, ignored, or threatened) by maternity staff, and women of color were significantly more likely to report mistreatment than white women, especially when they also faced socioeconomic challenges (Vedam et al. 2019). Perceived racial or ethnic discrimination in obstetric settings has been linked to higher risks of preterm birth and low birth weight (Alhusen et al. 2016), and can erode patient-provider trust, leading to lower treatment adherence, reduced care utilization, and deadly delays in seeking care (Attanasio and Kozhimannil 2015; Van Daalen et al. 2022). To understand and reduce disparities, researchers must be able to accurately measure patients' experiences of discrimination, yet measurement of discrimination presents methodological challenges.

Patient characteristics, including age, body size, education, and socioeconomic status, are associated with both the experience and reporting of discrimination in perinatal care. Younger mothers and those of advanced maternal age are more likely to perceive differential treatment during pregnancy (De Marco et al. 2008; Dillon et al. 2020; Lewis et al. 2016). Higher BMI is associated with more negative prenatal and postpartum care experiences compared to those with lower BMI (Hill et al. 2021). The relationship between education, socioeconomic status, and perceived discrimination is complex and varies by race. Among white people, lower education and income are associated with increased perceptions of discrimination, however these patterns have been shown to be reversed among Black individuals who report more discrimination at higher education levels and income (De Marco et al. 2008; Stepanikova and Oates 2017). These patterns suggest an intersectional aspect to perceived discrimination in which age, body size, education level and socioeconomic status may compound patient experience during health care (De Marco et al. 2008; Stepanikova and Oates 2017). Importantly, these characteristics may also influence whether individuals choose to report their experiences, shaping patterns of nonresponse to discrimination survey items and potentially skewing patient-reported data (Tourangeau and Yan 2007; Williams and Mohammed 2009).

Asking about experiences of discrimination can be sensitive, and not all participants may feel comfortable responding (Bouton et al. 2025; Chung et al. 2018). Those who are most stigmatized or marginalized may be especially reluctant to report experiences of discrimination due to fear, trauma, or mistrust, leading to potential misrepresentation of their experiences (Chung et al. 2018). Nonresponse bias, which occurs when those who do not respond differ systematically from those who do, can distort estimates and obscure the true prevalence of discrimination among those most affected (Tourangeau and Yan 2007; Williams and Mohammed 2009). In perinatal research, reported nonresponse rates to discrimination measures vary widely, ranging from under 1% to over 60%, varying by study design, population, and analytic approach (Barber and Robinson 2022; Canady et al. 2008; Ertel et al. 2012; Vedam et al. 2019) Despite this variability, nonresponse to discrimination measures is rarely examined or reported systematically, which is notable given that those who are most likely to experience it may also be the least likely to disclose it (Van Daalen et al. 2022; Williams and Mohammed 2009). Understanding the predictors of nonresponse is critical to interpretating discrimination data accurately and ensuring that perinatal research reflects the full range of patient experiences (Bailey et al. 2017; Williams and Mohammed 2009).

The present study addresses this gap using secondary analysis of the Nulliparous Pregnancy Outcomes Study: Monitoring Mothers-to-Be (nuMoM2b) cohort. We had two aims. Aim 1 described patterns of nonresponse to a survey item assessing racial or ethnic discrimination during medical care, examined across racial and ethnic groups and key sociodemographic characteristics, including age, BMI, education, and socioeconomic status. Aim 2 identified participant characteristics independently associated with nonresponse using multivariable logistic regression. We hypothesized that nonresponse would not occur at random, but instead reflect underlying differences, with participants who are more likely to face discrimination being also more likely to withhold responses. Findings from this study have implications for how nonresponse bias is understood, reported, and addressed in perinatal discrimination research.

2 | Study Methods

2.1 | Study Design and Ethical Considerations

This study is a secondary analysis of the de-identified Nulliparous Pregnancy Outcomes Study: Monitoring Mothers-to-Be (nuMoM2b) dataset, a prospective cohort of 9,289 nulliparous individuals with singleton pregnancies who delivered at eight clinical centers across the United States (Haas et al. 2015). Data were collected between October 2010 and September 2013 through questionnaires, clinical evaluations, and medical record reviews during four study visits at gestational weeks 6.0–13.6, 16.0–21.6, 22.0–29.6, and at birth (Goretsky et al. 2021). Translators were available to participants as needed (Haas et al. 2015).

The dataset was obtained through the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) Data and Specimen Hub (DASH) portal (National Institute of Child Health and Human Development n.d.) under a study-specific data use agreement signed with the Office of Technology Transfer and NICHD DASH effective December 1, 2023. This study adhered to the ethical principles outlined in the Declaration of Helsinki for research involving human subjects (World Medical Association 2013).

2.2 | Data and Sample

The nuMoM2b dataset includes over 4600 data elements per participant, including sociodemographic data, medical histories, clinical measures, and birth outcomes. The analytic sample comprised participants who completed the second study visit during which the EOD instrument was administered between 16 and 21.6 weeks of gestation (Haas et al. 2015).

2.3 | Measures

2.3.1 | *Experience of Discrimination Scale*

The dependent variable was responses to the EOD item asking, "Have you ever experienced discrimination, been prevented from doing something, or been hassled or made to feel inferior during medical care because of your race, ethnicity, or color?" (Krieger 1990; Krieger et al. 2005; Krieger and Sidney 1996). Participants could answer "yes," "no," or choose not to respond (nonresponse). Krieger et al. (2005) reported Cronbach's $\alpha \geq 0.74$, test–retest reliability of $r = 0.70$), and the highest construct validity correlation ($r = 0.79$) among other self-report measures examined. Responses were not associated with social desirability bias in either Black or Latino participants (Krieger et al. 2005). The EOD has been used extensively to examine associations between discrimination and adverse birth outcomes (Larrabee Sonderlund et al. 2021).

2.3.2 | *Demographic and Socioeconomic Variables*

Demographic and socioeconomic variables were selected based on established associations with healthcare experiences and discrimination in perinatal populations (Alhusen et al. 2016; Angerer et al. 2019; De Marco et al. 2008; Hill et al. 2021; Krieger et al. 2005; Lewis et al. 2016). The primary independent variable was racial and ethnic identification, categorized as non-Hispanic White, non-Hispanic Black, Hispanic, Asian, and Other (categorical). Additional covariates include age (continuous), BMI (continuous), education level (less than high school, high school or GED, associate/technical degree, some college, college, beyond college; categorical variable), percent of the federal poverty level (FPL; continuous variable), and poverty category (> 200% of poverty, 100%–200% of poverty, and < 100% of poverty; categorical).

2.4 | Statistical Analysis

The data were reviewed for completeness, and descriptive statistics were computed for patient characteristics stratified by response type ("yes," "no," and "nonresponse"). Frequencies and percentages were reported for categorical variables, while means and standard deviations (SD) were reported for continuous variables. Chi-square tests were used to compare categorical variables across response groups; all expected cell counts assessed exceeded five. One-way analysis of variance (ANOVA) was used for continuous variables. Despite positive skewness in BMI, the large sample size supported parametric testing under the central limit theorem. Effect sizes were reported for all omnibus tests: Cohen's f for ANOVAs (where small = 0.1, moderate = 0.25, and large = 0.4) and Cramer's V for chi-square tests (where small = 0.1, moderate = 0.3, and large = 0.4). Omnibus chi-square and ANOVA tests were used to assess overall differences across response groups. However, post-hoc comparisons were not conducted. Group differences described in Section 3.2 are based on descriptive statistics and should be interpreted as exploratory.

A binary outcome variable was constructed to identify nonresponse. Each covariate was assessed individually with univariable logistic regression, and then racial and ethnic identification was modeled after adjusting for age, BMI, education level, and poverty category. Non-Hispanic white participants, the largest racial and ethnic group, served as the reference category. Multicollinearity was assessed using variance inflation factors (VIF < 4, indicating unlikely concern). No variables were excluded. Odds ratios (OR) and 95% confidence intervals (CI) are reported. All analyses were conducted using R statistical software version 4.4.2 (R Core Team 2024). Missing data on covariates were handled using complete case analysis. Participants with missing data on any model covariate were excluded from regression models. Given that the primary outcome of interest was nonresponse, multiple imputation of the dependent variable was not appropriate. Income data had the highest proportion of missing values (18.9%), which limited our ability to adjust for socioeconomic determinants of nonresponse and is acknowledged as a study limitation.

3 | Results

3.1 | Participant Description

Descriptive statistics of the selected demographic and socioeconomic variables are presented in Table 1. The open-access nuMoM2b dataset includes 9,289 participants. The majority ($n = 5595$; 60.3%) identified as non-Hispanic white with a mean age of 26.91 years (SD = 5.68). The average BMI was 26.37 (SD = 6.34). Education levels were generally high with most participants having attended or completed college, and only 755 (8.1%) not completing high school. Based on 2013 FPL guidelines, more than two-thirds (69.3%) reported household incomes ≥ 200% of the FPL, while 1217 (16.1%) reported incomes < 100%.

3.2 | Comparison of Participants by Response Type

As shown in Table 1, responses to the discrimination question varied: the majority of participants (8598; 92.6%) reported no discrimination, 121 (1.3%) reported experiencing discrimination, and 570 (6.1%) did not respond. All demographic and socioeconomic variables show statistically significant differences by response type to ethnic or racial discrimination during medical care with small effect sizes for these differences. Significant differences in response type were identified for numerical variables: age ($p < 0.001$, $f = 0.041$), BMI ($p < 0.001$, f = 0.040), and percent of the FPL ($p < 0.001$, $f = 0.084$). Chi-square tests indicated significant differences for categorical variables by racial or ethnic identification ($\chi^2(8) = 138.28$, $p < 0.001$, V = 0.086), education ($\chi^2(10) = 75.43$, $p < 0.001$, $V = 0.064$), and poverty category ($\chi^2(4) = 72.42$, $p < 0.001$, $V = 0.069$).

3.2.1 | *Race and Ethnicity*

For the significant differences observed across racial and ethnic groups, non-Hispanic white participants represented 60.3% of the overall sample and only 40% of those who reported discrimination. By contrast, Hispanic participants comprised 17% of the sample yet accounted for 32% of "yes" responses, while

TABLE 1 | Sociodemographic Characteristics of nuMoM2b Respondents (n = 9289).

Ever experienced discrimination during a medical care visit	Yes (n = 121)		No (n = 8,598)		Nonresponse (n = 570)		Total (N = 9,289)			
	n or mean	% or SD	n or mean	% or SD	n or mean	% or SD	N or mean	% or SD	p value	Effect size
	121	1.3%	8598	92.6%	570	6.1%	9289	100%		
Racial and ethnic identification[a]									< 0.001	$V = 0.086$
Non-Hispanic White	48	39.7%	5307	61.7%	240	42.7%	5595	60.3%		
Non-Hispanic Black	20	16.5%	1117	13.0%	111	19.8%	1248	13.4%		
Hispanic	39	32.2%	1392	16.2%	168	29.9%	1599	17.2%		
Asian	3	2.5%	343	4.0%	19	3.4%	365	3.9%		
Other	11	9.1%	437	5.1%	24	4.3%	472	5.1%		
Age[a]									< 0.001	$f = 0.041$
Mean (SD), years	26.77	6.01	26.98	5.63	25.96	6.27	26.91	5.68		
BMI[b]									< 0.001	$f = 0.040$
Mean (SD), kg/m^2	28.57	8.15	26.31	6.30	26.84	6.46	26.37	6.34		
Education[c]									< 0.001	$V = 0.064$
Less than high school	14	11.6%	667	7.8%	74	13.3%	755	8.1%		
High school or GED	19	15.7%	985	11.5%	91	16.4%	1,095	11.8%		
Associate/technical degree	18	14.9%	871	10.1%	45	8.1%	934	10.1%		
Some college	36	29.8%	1667	19.4%	127	22.9%	1830	19.7%		
College degree	18	14.9%	2403	28.0%	123	22.2%	2544	27.4%		
Beyond college	16	13.2%	2002	23.3%	95	17.1%	2113	22.8%		
Percent of Federal Poverty Level[d]									< 0.001	$f = 0.084$
Mean (SD), %	228.87	220.40	435.51	308.70	405.50	327.78	431.38	309.65		
Poverty category[d]									< 0.001	$V = 0.069$
> 200% of poverty	36	38.3%	4947	70.1%	244	62.7%	5227	69.3%		
100%–200% of poverty	23	24.5%	1024	14.5%	47	12.1%	1094	14.5%		
< 100% of poverty	35	37.2%	1084	15.4%	98	25.2%	1217	16.1%		

Abbreviations: BMI body mass index, GED = General Educational Development, SD = standard deviation.
Effect sizes: Cramér's V for categorical variables; Cohen's f for continuous variables.
†$p < 0.10$. *$p < 0.05$. **$p < 0.01$. ***$p < 0.001$.
[a]10 participants have missing data for age and racial and ethnic identification.
[b]210 participants have missing data for BMI.
[c]18 participants have missing data for education.
[d]1751 participants (18.9%) have missing data for income relative to the 2013 federal poverty level.

non-Hispanic Black participants comprised 13% of the sample and 17% of "yes" responses. The distribution among non-responders was more similar to those who reported discrimination, with higher proportions of Hispanic (29.9%) and non-Hispanic Black (19.8%) participants relative to their representation in the sample.

3.2.2 | *Age*

Age differed significantly by response type; participants who reported discrimination ($M = 26.77$, SD = 6.01) and non-responders ($M = 25.96$, SD = 6.27) were both younger than those who denied discrimination ($M = 26.98$, SD = 5.63) and the overall sample average ($M = 26.91$, SD = 5.68).

3.2.3 | *BMI*

BMI also differed significantly by response type, where participants who reported discrimination had the highest average BMI (M = 28.57, SD = 8.15), compared to 26.31 (SD = 6.30) among those who denied discrimination and 26.84 (SD = 6.46) among nonresponders. Overall, the average BMI of the sample was 26.37 (SD = 6.34), with participants who reported discrimination having higher BMI than the sample average.

3.2.4 | *Education*

Education levels differed significantly, where participants with less than a college education (high school diploma or less,

TABLE 2 | Unadjusted and Adjusted Binary Logistic Regression Examining Associations Between Participant Characteristics and Nonresponse to the Discrimination Question.

Patient outcomes	OR	95% CI LL	95% CI UL	*p*
Model 1: unadjusted				
Racial and ethnic identification				
Non-Hispanic White	Ref.	Ref.	Ref.	Ref.
Non-Hispanic Black	2.18	1.72	2.75	
Hispanic	2.62	2.13	3.21	
Asian	1.23	0.73	1.93	
Other	1.20	0.76	1.80	
Age	0.97	0.95	0.98	< 0.001
BMI	1.01	1.00	1.03	0.100
Education				
Less than high school	Ref.	Ref.	Ref.	Ref.
High school or GED	0.83	0.61	1.15	
Associate/technical degree	0.47	0.32	0.68	
Some college	0.69	0.51	0.93	
College degree	0.47	0.35	0.63	
Beyond college	0.43	0.32	0.60	
Poverty category[a]				
> 200% of poverty	Ref.	Ref.	Ref.	Ref.
100%–200% of poverty	0.92	0.66	1.25	
< 100% of poverty	1.79	1.40	2.27	
Model 2: adjusted				
Racial and ethnic identification				
Non-Hispanic White	Ref.	Ref.	Ref.	Ref.
Non-Hispanic Black	1.58	1.12	2.22	
Hispanic	1.75	1.30	2.33	
Asian	1.29	0.75	2.10	
Other	0.85	0.47	1.43	
Age	1.02	1.00	1.05	0.120
BMI	1.01	0.99	1.02	0.300
Education				
Less than high school	Ref.	Ref.	Ref.	Ref.
High school or GED	0.63	0.38	1.04	
Associate/technical degree	0.50	0.29	0.86	
Some college	0.65	0.42	1.03	
College degree	0.53	0.32	0.89	
Beyond college	0.51	0.30	0.88	
Poverty category[a]				
> 200% of poverty	Ref.	Ref.	Ref.	Ref.
100%–200% of poverty	0.78	0.53	1.12	
< 100% of poverty	1.23	0.85	1.75	

Note: Omnibus *p*-values for unadjusted model: racial and ethnic identification $p < 0.001$; age $p < 0.001$; education $p < 0.001$; poverty category $p < 0.001$. Omnibus *p*-values for adjusted model: racial and ethnic identification $p < 0.001$; education $p = 0.200$; poverty category $p = 0.067$.
In the unadjusted model, each variable was assessed independently against the nonresponse outcome. The adjusted model includes all variables simultaneously.
Abbreviations: BMI, body mass index; CI, confidence interval; GED, General Educational Development; LL, lower limit; OR, odds ratio; UL, upper limit.
†$p < 0.10$. *$p < 0.05$. **$p < 0.01$. ***$p < 0.001$.
[a]Poverty category based on the 2013 federal poverty level guidelines.

associate/technical degree, or some college) comprised nearly half of the sample ($n = 4614$, 49.7%) but accounted for 87 (71.9%) of the 121 participants reporting discrimination and 337 (59.1%) of the 570 nonresponders. In contrast, participants with a college degree or higher comprised just over half of the sample ($n = 4657$, 50.1%), but only 34 (28.1%) of the 121 participants reported discrimination, while representing 218 (38.2%) of the 570 nonresponders.

3.2.5 | *Economic Status*

Significant differences emerged in economic status as measured by percent of the FPL. Participants who reported discrimination had the lowest average percent FPL ($M = 228.87$, SD = 220.40), compared with 435.51 (SD = 308.70) among those who denied discrimination and 405.50 (SD = 327.78) among nonresponders. Poverty categories showed a similar pattern. While the majority of the sample lived at > 200% of the FPL (69.3%), this was true for only 38.3% of those reporting discrimination. In contrast, 14.5% of the overall sample lived between 100% and 200% of the FPL, and 16.1% lived below 100% of the FPL, but these lower-income categories were overrepresented among participants who reported discrimination (24.5% and 37.2%, respectively) and among nonresponders (12.1% and 25.2%). All comparisons in this section are based on descriptive statistics. Post-hoc comparisons were not conducted, and differences across response groups should be interpreted as exploratory.

3.3 | Factors Associated with Nonresponse

As shown in Table 2, the unadjusted model demonstrated statistical significance for most covariates. In the unadjusted model, each variable was assessed independently with the nonresponse outcome. Racial and ethnic identification, age, education, and poverty category were all significantly associated with nonresponse (all $p < 0.001$). Using non-Hispanic White participants, the largest group in the category, as the reference, the unadjusted odds of nonresponse were 2.62 times the odds among Hispanic participants (unadjusted OR = 2.62, 95% CI [2.13, 3.21]) and 2.18 times the odds among non-Hispanic Black participants (unadjusted OR = 2.18, 95% CI [1.72, 2.75]). Odds of nonresponse did not differ significantly for Asian participants

(unadjusted OR = 1.23, 95% CI [0.73, 1.93]) or those in the "Other" category (unadjusted OR = 1.20, 95% CI [0.76, 1.80]).

Age was inversely associated with nonresponse (unadjusted OR = 0.97, 95% CI [0.95, 0.98], $p < 0.001$), while BMI was not significantly associated (unadjusted OR = 1.01, 95% CI [1.00, 1.03], $p = 0.10$). Participants with higher education had lower odds of nonresponse compared with those who had less than a high school education, for example, those with a college degree (unadjusted OR = 0.47, 95% CI [0.35, 0.63]) or education beyond college (unadjusted OR = 0.43, 95% CI [0.32, 0.60]). Participants living below the FPL (< 100% of poverty) had higher odds of nonresponse (unadjusted OR = 1.79, 95% CI [1.40, 2.27]), using > 200% of the FPL as the reference category.

After adjusting for age, BMI, education, and poverty category, racial and ethnic identification remained significantly associated with nonresponse ($p < 0.001$). Using non-Hispanic White participants, the largest group in the sample, as the reference category, the adjusted odds of nonresponse were 1.75 times the odds among Hispanic participants (adjusted OR = 1.75, 95% CI [1.30, 2.33]) and 1.58 times the odds among non-Hispanic Black participants (adjusted OR = 1.58, 95% CI [1.12, 2.22]). Odds of nonresponse did not differ significantly for Asian participants (adjusted OR = 1.29, 95% CI [0.75, 2.10]) or those in the "Other" category (adjusted OR = 0.85, 95% CI [0.47, 1.43]). These findings indicate that racial and ethnic identification is significantly associated with the likelihood of nonresponse (Figure 1).

4 | Discussion

Our secondary analysis investigated predictors of nonresponse to a sensitive question about racial or ethnic discrimination during medical care in a diverse sample of 9289 pregnant individuals in the nuMoM2b dataset. We found that 570 (6.1%) of the participants did not respond to questions about whether they had ever experienced discrimination. Our final model showed that pregnant respondents who identified as Hispanic or Black were significantly more likely to choose not to respond to these questions in models adjusted for age, BMI, education, and poverty category [(Hispanic (OR 1.8, 95% CI 1.3–2.3); Black (OR 1.6, 95% CI 1.1–2.2)]. Notably, the nonresponse rate (6.1%) is roughly four times higher than the rate of reported discrimination (1.3%), underscoring the potential for biased prevalence estimates.

The nature of missing data can critically influence data analysis and interpretation. Missing data fall into three categories. Data are *Missing Completely at Random* (MCAR) when missingness is unrelated to any observed or unobserved variable, posing minimal risk of bias. In the current study, nonresponse varied by racial and ethnic identification, which rules out MCAR. More commonly, data are *Missing at Random* (MAR), where missingness is systematically related to other observed variables, but not to the value of the missing data itself. The association between nonresponse and observed covariates in this study is consistent with MAR. However, because the item itself is sensitive, *Missing Not at Random* (MNAR) cannot be ruled out. MNAR occurs when missingness is related to the value of the variable itself, such as when individuals who have experienced discrimination choose not to report it. Because MNAR is unobservable and cannot be fully explained by other variables, it is analytically challenging and can introduce nonresponse bias even after covariate adjustment. (Bhaskaran and Smeeth 2014; Schafer and Graham 2002).

It is important to contextualize the findings within the broader scope of nonresponse bias in perinatal research. While there is substantial evidence linking perceived discrimination to adverse pregnancy outcomes, less attention has been given to nonresponse to discrimination measures themselves. For example, a systematic review and meta-analysis highlighted the association between racial discrimination and adverse pregnancy

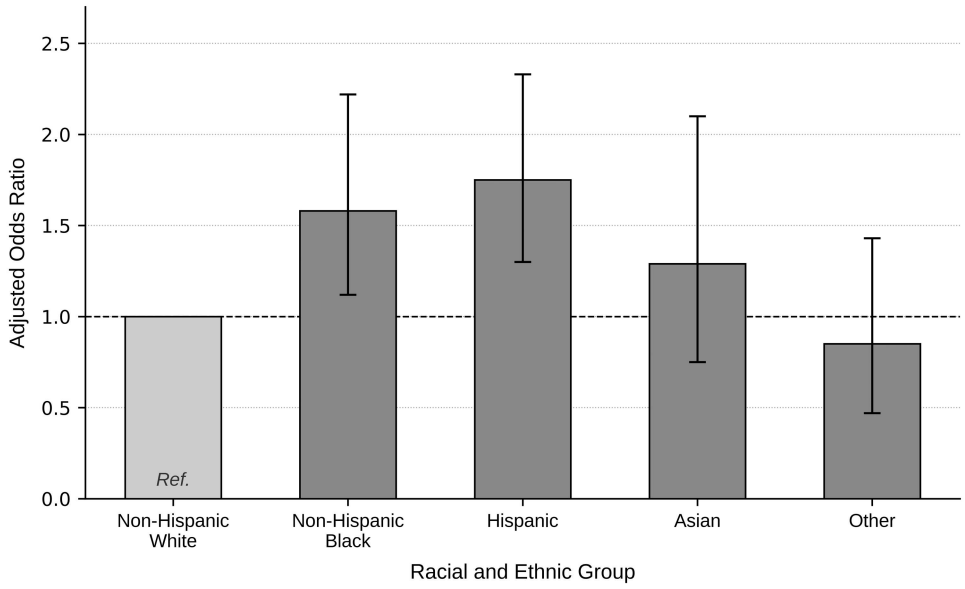

FIGURE 1 | Odds ratio of nonresponse to 'ever experienced racial or ethnic discrimination during medical care.' Bars represent adjusted odds ratios from multivariable logistic regression; error bars represent 95% confidence intervals. Non-Hispanic White participants serve as the reference category (ref.). The dashed line indicates an odds ratio of 1.0.

outcomes, noted nonresponse bias as a limitation, but did not report nonresponse rates (Van Daalen et al. 2022). Our study addresses this measurement gap by quantifying and modeling nonresponse.

Nonresponse rates to discrimination measures vary widely, from under 1% to over 60% across studies, and there is no standardized threshold for what constitutes problematic missingness (Canady et al. 2008; Schafer and Graham 2002). Rather than categorizing the 6.1% observed in this study, what is meaningful is that this rate is patterned by race and ethnicity, suggesting that nonresponse is not random, but a signal about who feels unable or unwilling to disclose.

The patterns illustrate the variability in response rates and handling of missing data among different discrimination instruments in perinatal research. While our study's nonresponse rate is within the moderate range (Schafer and Graham 2002), its association with participant racial or ethnic group suggests that dual forces, MAR and MNAR, may be driving data nonresponse. The distinction between MAR and MNAR has direct methodological implications. Since MNAR cannot be ruled out, no method—not complete case analysis nor imputation—can correct bias introduced by nonresponse. This is particularly critical when investigating sensitive topics like discrimination during pregnancy, as the ways in which researchers report and address nonresponse can significantly influence the interpretation of results and the generalizability of study findings. Reported prevalence estimates of discrimination likely underestimate the true burden especially among those most affected.

4.1 | Implications

The patterned nature of nonresponse in this study has important implications for interpreting discrimination measures (Tourangeau and Yan 2007; Williams and Mohammed 2009). This finding introduces nonresponse bias and is consistent with existing literature that those most likely to experience discrimination may be least likely to disclose it, biasing prevalence estimates downward (Cea D'Ancona 2017; Williams and Mohammed 2009). Because nonresponders to sensitive items can differ systematically from responders, researchers must avoid interpreting low reported prevalence among responders as evidence that discrimination is uncommon. If research fails to adequately gather responses from those at higher risk of discrimination, including historically stigmatized or marginalized groups, research may fail to fully illuminate the extent and impact of discrimination in healthcare (Williams and Mohammed 2009).

The rate of nonresponse to the discrimination question in this study is consistent with literature on sensitive topic surveys, where fear of retaliation, perceived stigma, mistrust in confidentiality, and social desirability bias may drive nonresponse (Tourangeau and Yan 2007). Even though participants were assured of anonymity, these assurances may not have been sufficient to overcome concerns about disclosure. Of particular interest to the interpretation of the current study is the murder of Trayvon Martin in February 2012, which occurred in the middle of participant recruitment (Khan-Cullors and Bandele 2018). Shifts in public discourse, particularly the emergence of the Black Lives Matter movement in July 2013, increased societal focus on structural racism, discrimination, and inequities (Khan-Cullors and Bandele 2018). To date, public discourse on race continues to evolve, and willingness to disclose discrimination experiences remains shaped by the sociopolitical climate at the time of data collection (Committee on Unequal Treatment Revisited: The Current State of Racial and Ethnic Disparities in Health Care 2024).

4.2 | Limitations

We relied on a single binary assessment of discrimination (i.e., ever vs. never), which may have contributed to nonresponse by oversimplifying complex experiences (Williams and Mohammed 2009). Disclosure may also be less likely when respondents must attribute another person's behavior to a specific personal factor or set of personal factors, thus asking about concrete disrespectful behaviors without requiring causal attribution may elicit higher reporting (Hausmann et al. 2010). Furthermore, missing data on income (18.9%) limited our ability to fully adjust for socioeconomic determinants of nonresponse. Additionally, the breadth and intensity of data collection across four separate time points during participants' pregnancies, totaling over 4600 features per patient, may have introduced responder burden, potentially increasing nonresponse, particularly for sensitive questions.

The political and social climate during the study period (2010–2013) may have influenced participants' willingness to disclose discrimination experiences. Data collection began prior to the murder of Trayvon Martin in February 2012 and preceded the heightened national awareness of racial inequities that emerged with the Black Lives Matter movement following the acquittal of George Zimmerman in the shooting death of Trayvon Martin, which may have had competing and differential effects on disclosure at different points in the recruitment period, limiting the interpretability of the results (Gee and Ford 2011; Paradies 2006). Finally, the circumstances surrounding the administration of the discrimination survey are not fully known. We do not know how comfortable participants felt disclosing sensitive information during prenatal visits or during their interactions with the research team, and these contextual factors may influence response patterns to sensitive questions, potentially limiting the interpretation of the results (Tourangeau and Yan 2007).

Given the potential impact of nonresponse bias, future researchers should prioritize strategies to reduce nonresponse on sensitive survey items. This includes creating safe and inclusive environments for disclosure, using culturally sensitive and inclusive language, establishing trust with participants, and offering diverse response options such as "prefer not to answer" (Cea D'Ancona 2017; Tourangeau and Yan 2007). It may also be beneficial to include qualitative components, including short-answer responses, to better understand participants' reasons for nonresponse and develop tailored strategies to improve response rates among marginalized groups (Cea D'Ancona 2017). Additionally, researchers should consider statistical

approaches to addressing missing data, such as sensitivity analyses, and should report missingness patterns alongside other results in cases of sensitive items where nonresponse bias may significantly impact implications (Schafer and Graham 2002). Imputation of the dependent variable is not appropriate when nonresponse can compound bias producing false prevalence estimates impacting interpretation of results (Bhaskaran and Smeeth 2014).

Although only race and ethnic identification predicted nonresponse in this dataset, we cannot rule out intersectional influences that our secondary data-set study was underpowered or ill-equipped to detect. Thus, the absence of detected interactions here may reflect the limits of measurement and power in this dataset, not the absence of intersectional processes. Future work could continue to investigate the compounding effects of interaction terms on nonresponse.

5 | Conclusion

Nonresponse bias can be a significant methodological and interpretive challenge when researching sensitive issues such as discrimination in healthcare. Nonresponse, particularly among racial and ethnic minorities, can limit accurate assessment of experiences of discrimination, thereby potentially skewing findings and underestimating the prevalence of discrimination in healthcare settings. Future researchers should continue to explore the drivers of nonresponse and develop strategies to enhance response rates, ensuring that the full range of experiences, particularly those of marginalized groups, is represented in healthcare research.

Author Contributions

Kathryn Kravetz Carr: conceptualization, methodology, formal analysis, software, data curation, writing – original draft preparation. **Jordan Pelkmans:** data curation, formal analysis, writing – reviewing and editing. **Lisa M. Thompson:** methodology, supervision, writing – reviewing and editing. **Melinda Higgins:** software, validation, writing – reviewing and editing. **Wenhui (Vivian) Zhang:** formal analysis, writing – reviewing and editing.

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Conflicts of Interest

One co-author, Dr. Melinda Higgins, serves as an Associate Editor for Research in Nursing & Health. All other authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available from National Institute of Child Health and Human Development. Restrictions apply to the availability of these data, which were used under license for this study. Data are available from https://www.nichd.nih.gov/research/supported/nuMoM2b with the permission of National Institute of Child Health and Human Development.

The data used in this study are from the Nulliparous Pregnancy Outcomes Study: Monitoring Mothers-to-be (nuMoM2b) and are available through the NICHD Data and Specimen Hub (DASH). Researchers may apply for access at https://dash.nichd.nih.gov. Access requires completion of a Data Use Agreement with NICHD. The data are not publicly available without an approved data use agreement.

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