Associations between adverse childhood experiences and obstetrical outcomes in a predominantly Black-identifying and low-income pregnant population

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BACKGROUND: Recent literature indicates that adverse childhood experiences have been associated with poor obstetrical outcomes, including pregnancy loss, preterm birth, and low birthweight. Several studies have been conducted in primarily self-identified White individuals who report middle to high income levels. Less is known about the impact of adverse childhood experiences on obstetrical outcomes in minority-identifying and low-income populations, who are known to experience a greater number of adverse childhood experiences and are at higher risk of maternal morbidity.

OBJECTIVE: This study aimed to examine associations between adverse childhood experiences and a broad range of obstetrical outcomes among predominantly Black-identifying pregnant persons who have low income and live in an urban area.

STUDY DESIGN: This is a single-center retrospective cohort study of pregnant persons referred to a mental healthcare manager because of elevated psychosocial risks identified by screening tools or provider concerns during the study period from April 2018 to May 2021. Pregnant persons aged <18 years and those who did not speak English were excluded. Patients completed validated mental and behavioral health screening tools including the Adverse Childhood Experiences Questionnaire. Medical charts were reviewed for obstetrical outcomes, including preterm birth, low birthweight, hypertensive disorders of pregnancy, gestational diabetes mellitus, chorioamnionitis, sexually transmitted infection, maternal group B streptococcus carrier status, type of delivery, and attendance of a postpartum visit. Associations between high (≥4) and very high (≥6) of 10 adverse childhood experience score and obstetrical outcomes were analyzed using bivariate analysis and multivariate logistic regression, adjusting for confounding factors (significant at $P<.05$ in bivariate analysis).

RESULTS: Our cohort included 192 pregnant persons, of whom 176 (91.7%) self-identified as Black or African American and 181 (94.8%) had public insurance (used as a proxy for low income). Adverse childhood experience score ≥4 was reported by 91 (47.4%) individuals and score ≥6 by 50 (26%). On univariate analysis, adverse childhood experience score ≥4 was associated with preterm birth (odds ratio, 2.17; 95% confidence interval, 1.02−4.61). Adverse childhood experience score ≥6 was associated with hypertensive disorders of pregnancy (odds ratio, 2.09; 95% confidence interval, 1.05−4.15) and preterm birth (odds ratio, 2.29; 95% confidence interval, 1.05−4.96). After accounting for chronic hypertension, associations between adverse childhood experience score and obstetrical outcomes were no longer significant.

CONCLUSION: Approximately half of the pregnant persons referred to a mental healthcare manager had a high adverse childhood experience score, underscoring the high burden of childhood trauma on populations facing long-standing systemic racism and barriers to healthcare access. High and very high adverse childhood experience score may be associated with chronic health conditions that predate pregnancy and can alter obstetrical outcomes. Obstetrical care providers have a unique opportunity to mitigate risk of associated poor health outcomes during preconception and prenatal care by screening for adverse childhood experiences.

Key words: adverse childhood experiences, Black or African American, low-income, pregnancy, urban

Introduction

Adverse childhood experiences (ACEs) are defined as potentially traumatic events that occur before the age of 18 years.[1] The landmark study published by Felitti et al[1] included 10 childhood adversities that can be classified into 3 categories: abuse, neglect, and household dysfunction. Decades of robust research have established that ACEs are associated with problematic physical and mental health outcomes in adulthood in a dose-dependent manner.[1−5] Research about long-term impacts of ACEs has led to recognition that addressing ACEs as a part of health is an underutilized clinical framework, especially in vulnerable populations.

An emerging body of literature has also revealed a relationship between higher ACEs and poor obstetrical outcomes, including risk of pregnancy loss, preterm birth, and low birthweight.[5−8] To date, many of the studies examining the impact of ACEs on pregnancy outcomes have been conducted in majority self-identified White groups with high levels of education[5,6,8] and income.[6] Given the current public health crisis in maternal morbidity and mortality, with known disproportionate burden on pregnant persons of color and those with low socioeconomic status, understanding the impact of ACEs on maternal pregnancy outcomes specifically among marginalized populations is crucial.[9]

A recent study from Miller et al[10] highlighted the correlation between self-identified Black race or Latinx

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AJOG MFM at a Glance

Why was this study conducted?

This study aimed to assess the relationship between adverse childhood experiences (ACEs) and obstetrical outcomes specifically in a population with known sociodemographic risk factors for maternal morbidity.

Key findings

High and very high levels of ACEs are associated with hypertensive disorders of pregnancy and preterm birth. However, these relationships were no longer statistically significant after accounting for chronic hypertension, reaffirming the importance of addressing preexisting conditions for obstetrical outcomes and the critical need for preconception, prenatal, and postpartum care.

What does this add to what is known?

This study addresses a research gap by examining associations between ACEs and obstetrical outcomes among a population of predominantly Black-identifying and low-income pregnant persons; these demographics have been associated with the current crisis in maternal morbidity because of systemic racism and long-standing barriers to healthcare. This study highlights the importance of prepregnancy health conditions that may help explain associations between early life adversity and obstetrical outcomes. Prepregnancy screening for ACEs may identify a point of intervention to mitigate and address comorbidities such as chronic hypertension, and offer support resources, such as brief interventions by colocated mental health clinicians and linkage to community resources, to decrease chronic stress.

ethnicity and higher ACE score, and emphasized the importance of "equity-focused research" to help understand the impact of intergenerational trauma on obstetrical outcomes and create programs to mitigate risk. The objective of the present study was to assess the relationship between ACEs and obstetrical outcomes specifically in a sample of predominantly Black-identifying and low-income pregnant persons with known sociodemographic risk factors for maternal morbidity. We hypothesized that higher ACEs among the study sample would be significantly related to poor maternal and neonatal outcomes independent of conventional obstetrical risk factors.

Materials and Methods

This single-center cohort study included pregnant persons referred to a mental healthcare manager (MHCM) because of elevated psychosocial risk between April 2018 and May 2021. Identification of high-risk patients was done either through the Edinburgh Postnatal Depression Scale, Generalized Anxiety Disorder-7 (GAD-7) screen, or individual provider concern. The clinic where our cohort was identified serves a wide catchment area and is located in a neighborhood that is considered urban and is central to the city's most impoverished and historically redlined neighborhoods. Redlined neighborhoods refer to color-coded maps created by the federal government to indicate where to insure mortgages and to whom, which resulted in widespread housing discrimination. Redlining is an example of structural racism given that predominantly Black neighborhoods were colored red to indicate increased risk to appraisers, which subsequently contributed to ongoing power and wealth disparities.[11]

Referring providers were obstetricians, midwives, and/or reproductive psychiatrists. As part of the intake process, patients completed surveys to screen for stressors and mental health symptoms, including the original Adverse Childhood Experiences (ACE) Questionnaire. The ACE Questionnaire is a validated, 10-item questionnaire used to screen for certain childhood adversities.[1,5] Each of the 10 adversities is indicated as present or absent before the age of 18 years. All participants were aged ≥18 years, spoke English fluently, and retrospectively reported on their childhood adversity and current functioning at time of referral to the MHCM. Following referral, medical charts were reviewed for obstetrical outcomes by research assistants not involved in the patients' clinical care. All procedures were approved by the University Hospitals Cleveland Medical Center's Institutional Review Board.

Demographic characteristics, including maternal education, marital status, insurance status (used as a proxy for income), and self-identified race were collected via a self-report questionnaire during prenatal care. Educational attainment was categorized on the basis of whether the patient received a high school diploma. Data about pregnancy history and current pregnancy outcomes, including gravidity, parity, self-reported tobacco use in pregnancy, self-reported marijuana or other substance use, chronic hypertension (ie, hypertension diagnosed before pregnancy), hypertensive disorders of pregnancy as defined by the American College of Obstetricians and Gynecologists,[12] gestational diabetes mellitus, sexually transmitted infections (STIs), chorioamnionitis, maternal group B streptococcus carrier status, preterm birth (defined as <37 weeks' gestation), low birthweight (defined as <2500 g), type of delivery (vaginal or cesarean), and attendance of postpartum visit were obtained through chart review of medical records. Self-reporting of other substance use was very infrequent (<5 cases), and was therefore not included in analysis. The STI variable indicates if a participant had a chlamydia, gonorrhea, HIV, herpes simplex virus, and/or syphilis infection diagnosed during pregnancy.

A total ACE score was calculated by summing the number of ACEs reported, with a possible range from 0 to 10. Total ACE scores were also evaluated as a categorical variable, with high ACE score defined by ≥4 ACEs and very high ACE score defined by ≥6 ACEs. Four and 6 were chosen as cutoff points given that

previous research has shown that ACE levels above such scores are predictive of poor adult health outcomes.[1,10,13,14]

A descriptive analysis was performed to assess the means, standard deviations, and frequencies of study variables. Pearson chi-square or Fisher exact test was used to assess bivariate associations between categorical study variables, and Pearson correlation was used similarly for continuous variables. Logistic regressions were performed for categorical outcomes that were significantly associated with categorical ACE score on bivariate analyses. Sociodemographic and pregnancy variables that were significantly associated with study outcomes in bivariate analyses (at significance level of $P<.05$) were included as predictors in multivariate logistic regression analysis. A 2-tailed P value of <.05 was considered significant. Given the use of a cohort defined by referrals in the study period, a power calculation was not performed. Statistical analyses were conducted using IBM SPSS Statistics, Version 26.0 (IBM Corp, Armonk, NY).

Results

A total of 203 individuals were referred to the MHCM and met eligibility criteria during the study period. Eleven were excluded from data analysis because of loss to follow-up, resulting in a sample of 192 for analysis. The mean ACE score for the cohort was 3.7 (standard deviation=2.7). The distribution of total ACE score is shown in the Figure; 47.4% of study participants reported an ACE score of ≥4 and 26% reported an ACE score of ≥6. Sociodemographic characteristics of the cohort are listed in Table 1. Generally, the sociodemographic variables were not associated with total ACE score; however, there were several significant associations between ACE score and clinical characteristics. Results from bivariate analyses between ACEs and sociodemographic characteristics, medical history, and pregnancy history variables are shown in Table 2. Specifically, participants with an ACE score ≥4 and ≥6 were significantly more likely to have chronic hypertension (X^2=5.35; P=.02; and X^2=5.61; P=.02; respectively) and self-reported tobacco use in pregnancy (X^2=9.26; P=.00; and X^2=5.71; P=.02; respectively). Total ACE score was positively associated with increased gravidity (P=.01) and increased number of spontaneous abortions (P=.03).

Table 3 presents bivariate associations between ACE score and current pregnancy outcomes. High and very high ACEs were significantly associated with preterm delivery (X^2=4.13; P=.04; and X^2=4.53; P=.03; respectively) but not low birthweight (X^2=2.19; P=.14; and X^2=2.23; P=.14; respectively). An ACE score ≥6 was significantly associated with diagnosis of hypertensive disorder of pregnancy (X^2=4.52; P=.03). Additional bivariate analysis was conducted to characterize the relationship between conventional obstetrical risk factors (age, education, prepregnancy chronic hypertension, self-reported tobacco use in pregnancy, self-reported marijuana use in pregnancy) and outcomes to allow for analysis of the impact of ACEs independent of other risk factors (Table 4). Chronic hypertension was significantly associated with

FIGURE
Distribution of adverse childhood experience scores

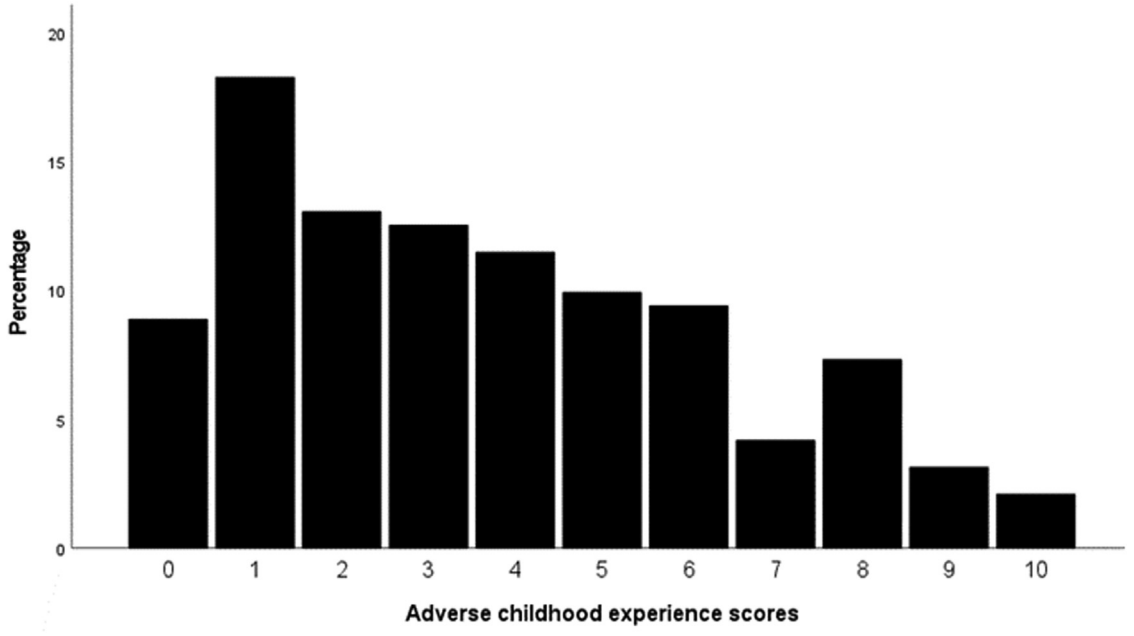

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TABLE 1
Sample characteristics (N=192)

Demographic characteristics	Mean (SD) or n (%)
Age (y)	25.5 (4.7)
Self-identified race	
Black or African American	176 (91.7)
White	11 (5.7)
Not reported	5 (2.6)
Marital status	
Single	179 (93.7)
Married	12 (6.3)
Insurance type	
Public	181 (94.8)
Private	10 (5.2)
Education	
Less than high school diploma	42 (24.4)
High school diploma or greater	130 (75.6)
Chronic hypertension	21 (11.0)
Tobacco use in pregnancy	52 (27.1)
Marijuana use in pregnancy	26 (13.5)
Gravidity	3.2 (2.1)
Term births	2.0 (1.4)
Preterm births	0.3 (0.6)
Spontaneous abortions	0.5 (1.0)
Living children	2.3 (1.4)

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hypertensive disorders of pregnancy (X^2=6.56; P=.01) and preterm birth (X^2=6.00; P=.03).

Results from logistic regression analyses between categorical ACE score and categorical pregnancy outcomes before and after adjusting for chronic hypertension are shown in Table 5. ACE scores ≥4 and ≥6 were associated with chronic hypertension (odds ratio [OR], 3.09; 95% confidence interval [CI], 1.15−8.35; and OR, 2.96; 95% CI, 1.17−7.45). ACE score ≥4 was associated with preterm birth (OR, 2.17; 95% CI, 1.02−4.61), and ACE score ≥6 was associated with preterm birth (OR, 2.29; 95% CI, 1.05−4.96) and hypertensive disorders of pregnancy (OR, 2.09; 95% CI, 1.05−4.15); however, after accounting for chronic hypertension, these associations were no longer significant (Table 5). In the adjusted models, chronic hypertension was still associated with preterm birth (ACE ≥4: OR, 2.77; 95% CI, 1.03−7.47; ACE ≥6: OR, 2.76; 95% CI, 1.02−7.48) and hypertensive disorders of pregnancy (ACE ≥6: OR, 2.79; 95% CI, 1.08−7.16).

Discussion

Principal findings

This study contributes to the current literature by examining associations between high and very high ACE scores and a broad range of obstetrical outcomes in a sample of pregnant persons known to be at high risk of adverse outcomes. Study findings are consistent with previously reported associations between higher ACEs and hypertensive disorders of pregnancy and preterm birth.[6−8,10] When chronic hypertension was accounted for, there was no longer a significant association between ACE score and hypertensive disorders of pregnancy or preterm birth, highlighting how early adversity may contribute to prepregnancy health conditions and affect pregnancy outcomes. The study also demonstrated that participants with higher ACE score were more likely to have increased gravidity and number of spontaneous abortions.

Results in the context of what is known

Compared with previous studies evaluating the impact of ACEs on pregnancy, our sample had high proportions of Black patients (91.7%; self-identified) and patients on public insurance (94.8%), 2 factors that have well-documented significant associations with pregnancy-related morbidity and mortality.[9] Our average ACE score and the numbers of pregnant persons with high and very high ACE scores (47.4% with ACE score ≥4 and 26% with ACE score ≥6) are notably higher compared with other studies with majority White pregnant populations.

Importantly, Miller et al[10] recently reported similar associations between higher levels of ACEs and hypertensive disorders of pregnancy and preterm birth in a more racially diverse population than previously studied, which was mostly married (65%) and included only a small portion (19.9%) with public health insurance. Other studies have also reported consistent results in largely White and majority college-educated samples.[5,6,8] Our study, however, uniquely focused on a sample drawn from a population with sociodemographic characteristics (ie, self-identified Black race) associated with the crisis in maternal morbidity and mortality, as well as numerous other health disparities.

Hypertensive disorders of pregnancy are among the leading causes of preventable maternal morbidity and mortality in the United States.[15] The reported US prevalence of hypertensive disorders is approximately 3.0% to 3.8% for gestational hypertension and 3.0% to 3.4% for preeclampsia.[16] In our

TABLE 2
Associations between demographics/baseline characteristics and adverse childhood experience score

Sample characteristic	ACE <4 n=101 n (%)	ACE ≥4 n=91 n (%)	*P* value	ACE <6 n=142 n (%)	ACE ≥6 *n*=50 *n* (%)	*P* value
Self-identified race			1.000			.482
Black or African American	92 (52.3)	84 (47.7)		131 (74.4)	45 (35.6)	
White	6 (54.5)	5 (45.5)		7 (63.6)	4 (36.4)	
Marital status			.770			.516
Single	93 (52.0)	86 (48.0)		133 (74.3)	46 (27.7)	
Married	7 (58.3)	5 (41.7)		8 (66.7)	4 (33.3)	
Insurance type			.750			.292
Public	94 (51.9)	87 (48.1)		135 (74.6)	46 (25.4)	
Private	6 (60.0)	4 (40.0)		6 (60.0)	4 (40.0)	
Education			.599			.305
Less than high school diploma	24 (57.1)	18 (42.9)		34 (81.0)	8 (19.0)	
High school diploma or greater	68 (52.3)	62 (47.7)		95 (73.1)	26.9 (35)	
Chronic hypertension	6 (28.6)	15 (71.4)	.021[a]	11 (52.4)	10 (47.6)	.018[a]
Tobacco use in pregnancy	18 (34.6)	34 (65.4)	.002[a]	32 (61.5)	20 (38.5)	.017[a]
Marijuana use in pregnancy	13 (50.0)	13 (50.0)	.775	16 (61.5)	10 (38.5)	.121
	Pearson correlation coefficient[b]				*P* value	
Age	0.130				.072	
Gravidity	0.196				.006[a]	
Term births	0.054				.454	
Preterm births	0.140				.053	
Spontaneous abortions	0.157				.029[a]	
Living children	0.089				.220	

Data are presented as number (percentage). Analysis by chi-square, Fisher exact test, or Pearson correlation.

ACE, adverse childhood experience.

[a] Statistically significant; [b] Pearson correlation analysis was done using total ACE score.

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study, the overall rates of 28.9% for gestational hypertension and 15.8% for preeclampsia highlight the high burden of maternal morbidity in a population of predominantly low-income, Black pregnant persons. The association between greater ACEs and hypertensive disorders of pregnancy has also been reported by others, and Miller et al[10] further reported that chronic hypertension mediated the association between ACEs and hypertensive disorders of pregnancy.[10,17,18] These findings, as well as our own findings, highlight the importance of chronic medical conditions that predate pregnancy and are associated with early adversity and poor obstetrical outcomes.

Previous studies have also found associations between higher levels of ACEs and increased risk of single and recurrent pregnancy loss, consistent with our findings.[19,20] In our study, the overall preterm birth rate was 18.4%, as opposed to a national average of 10.1%.[21] These data may support the hypothesis of a physiological link between the biologic effects of chronic stress, including systemic racism, especially for Black-identifying pregnant persons in our study, and adverse health outcomes.[22] As such, the findings support the allostatic load framework in studying the consequences of ACEs and other social determinants of health.[11] Allostatic load is an integrative measure of multisystemic dysregulation in which chronic stress and activation of the stress response system result in inflammatory, neuroendocrine, and metabolic dysregulation. Understanding ACEs in the context of allostatic load accounts for the chronic pathophysiological changes from cumulative stress exposure that lead to disease states.[23,24] There were, however, no significant associations between high or very high ACEs and low birthweight in the

TABLE 3
Associations between current pregnancy outcomes and adverse childhood experience score

Current pregnancy outcomes	ACE <4 n=101 n (%)	ACE ≥4 n=91 n (%)	*P* value	ACE <6 n=142 n (%)	ACE ≥6 n=50 n (%)	*P* value
Gestational diabetes mellitus	5 (5.1)	9 (10.3)	.172	9 (6.5)	5 (10.6)	.349
Hypertensive disorder of pregnancy[a]	26 (26.0)	29 (32.2)	.345	35 (24.8)	20 (40.8)	.033[b]
STI during pregnancy	30 (29.7)	22 (24.4)	.415	42 (29.6)	10 (20.4)	.214
GBS infection	30 (30.3)	29 (33.3)	.658	45 (32.4)	14 (29.8)	.742
Chorioamnionitis	9 (9.0)	6 (6.8)	.582	10 (7.2)	5 (10.2)	.543
Preterm delivery[c]	13 (13.0)	22 (22.4)	.042[b]	21 (14.9)	14 (28.6)	.033[b]
Low birthweight[d]	10 (10.4)	16 (18.0)	.139	16 (11.8)	10 (20.4)	.136
Cesarean delivery	25 (24.8)	29 (32.6)	.232	35 (24.8)	19 (38.8)	.068
Attendance of postpartum visit	62 (64.6)	58 (64.4)	.984	90 (65.7)	30 (61.2)	.575

Data are presented as number (percentage) for those positive for each pregnancy outcome. Analysis by chi-square or Fisher exact test.

ACE, adverse childhood experience; *GBS*, group B *Streptococcus*; *STI*, sexually transmitted infection.

[a] As defined by the American College of Obstetricians and Gynecologists; [b] Statistically significant; [c] Defined as <37 weeks' gestation; [d] Defined as <2500 g.

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current study, which is similar to the findings of Miller et al,[10] but inconsistent with other studies.[8,10,19]

Clinical implications

Given that pregnancy is a major physical and psychological transformation in which recurrent engagement with the healthcare system is encouraged, preconception and prenatal care present a unique opportunity to assess ACEs. Existing research has suggested, in fact, that the vast majority of pregnant women consider it important to discuss ACEs with their obstetrical providers.[25] With this information, providers can target interventions to mitigate poor health outcomes for mothers and infants, and work to prevent the intergenerational transmission of trauma. Obstetrical care providers can enhance screening for life stressors, provide patient education about links between childhood and ongoing trauma and current health, and make collaborative referrals to specialized mental and behavioral health services as needed. This opportunity is particularly salient in populations with long-standing social, economic, and structural barriers to healthcare access and health equity. The study also highlights an opportunity for obstetrical providers caring for high-risk populations to learn about trauma-informed care and implement antenatal screening for childhood trauma. Previous studies have suggested that specific training in trauma-informed care for primary care physicians may increase patient-centeredness and discussion of ACEs as root causes of chronic illness.[26,27] Furthermore, studies have shown that ACE screening as a standard part of prenatal care is feasible and acceptable to patients and clinicians provided adequate training and availability of behavioral health resources.[28,29]

Strengths and limitations

This study addresses the call for research on social and structural determinants of health by focusing on associations between ACEs and obstetrical outcomes among pregnant persons with low income and predominantly identifying as Black in an urban community.

This study is limited by potential recall bias inherent in retrospective reporting of childhood experiences and the limited scope of potential important adversities represented on the original ACE Questionnaire. In addition, because our clinic does not perform universal ACE screening and only pregnant persons referred to a MHCM were screened for ACEs, generalizability to the broader obstetrical population is limited. Patient ethnicity was unfortunately unknown. The size of our cohort may also limit the power to detect significant associations between ACEs and other adverse maternal and neonatal outcomes; likewise, although statistically significant, the lower limit values for some CIs in logistic regression results indicate the need to remain cautious in interpreting the findings.

Research implications

Larger cohort studies within populations who experience systemic racism and other chronic stressors are needed to assess for associations with adverse pregnancy outcomes or synergistic effects between sociodemographic characteristics and chronic medical conditions on obstetrical and neonatal outcomes. Further exploration of the relationship between mental health symptoms, ACEs, and poor obstetrical outcomes could provide utility in understanding the impact of medical and psychosocial factors in mediating the association between ACEs and pregnancy outcomes. Finally, elucidating the

TABLE 4
Associations between baseline characteristics and current pregnancy outcomes

Sample characteristic	Hypertensive disorder of pregnancy[a] OR (95% CI)			Preterm birth[b] OR (95% CI)		
Age	1.0 (0.9–1.0)			1.0 (1.0–1.1)		
	Hypertensive disorder of pregnancy			Preterm birth		
	No n (%)	Yes n (%)	*P* value	No n (%)	Yes n (%)	*P* value
Self-identified race			.511			.110
Black or African American	121 (69.5)	53 (30.5)		145 (83.3)	29 (16.7)	
White	9 (81.8)	2 (18.2)		7 (63.6)	4 (36.4)	
Marital status			.732			1.000
Single	126 (70.8)	52 (29.2)		145 (81.5)	33 (18.5)	
Married	9 (81.8)	2 (18.2)		9 (81.8)	2 (18.2)	
Insurance type			.717			.673
Public	129 (71.7)	51 (28.3)		147 (81.7)	33 (18.3)	
Private	6 (66.7)	3 (33.3)		7 (77.8)	2 (22.2)	
Education			.929			.442
Less than high school diploma	29 (70.7)	12 (29.3)		35 (85.4)	6 (14.6)	
High school diploma or greater	91 (70.0)	39 (30.0)		104 (80.0)	26 (20.0)	
Chronic hypertension	10 (47.6)	11(52.4)	.010[c]	13 (61.9)	8 (38.1)	.031[c]
Tobacco use in pregnancy	38 (74.5)	13 (25.5)	.524	38 (74.5)	13 (25.5)	.128
Marijuana use in pregnancy	20 (76.9)	55 (23.1)	.477	18 (72.0)	7 (28.0)	.265

Analysis by bivariate logistic regression, chi-square, or Fisher exact test.

CI, confidence interval; *OR*, odds ratio.

[a] As defined by the American College of Obstetricians and Gynecologists; [b] Defined as <37 weeks' gestation; [c] Statistically significant.

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relationship between childhood experiences and adult health outcomes requires consideration of family strengths and protective factors, in addition to adversity and system inequities.[30] Future studies should include measures of protective factors, assets, and strengths to create a more well-rounded understanding of how childhood trauma may be associated with obstetrical outcomes and how certain factors may mitigate the detrimental effects of adversity on such outcomes.[27]

TABLE 5
Logistic regression analysis of high and very high adverse childhood experience score and current pregnancy outcomes

ACE score	Hypertensive disorder of pregnancy[a]		Preterm birth[b]	
	OR (95% CI)	aOR (95% CI)	OR (95% CI)	aOR (95% CI)
ACE ≥4	1.35 (0.72–2.54)	1.24 (0.65–2.38)	2.17 (1.02–4.61)[c]	1.90 (0.88–4.12)
ACE ≥6	2.09 (1.05–4.15)[c]	1.91 (0.94–3.87)	2.29 (1.05–4.96)[c]	1.99 (0.90–4.41)

Multivariate logistic regression with adjustment for the following covariates (significant at $P<.05$ in bivariate analysis): chronic hypertension.

ACE, adverse childhood experiences; *aOR*, adjusted odds ratio with chronic hypertension in the model; *CI*, confidence interval; *OR*, odds ratio.

[a] As defined by the American College of Obstetricians and Gynecologists; [b] Defined as <37 weeks' gestation; [c] Statistically significant.

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Conclusions

This study demonstrated that high and very high ACEs are associated with hypertensive disorders of pregnancy and preterm birth. Findings from adjusted models also highlight the importance of prepregnancy health conditions (in this case, chronic hypertension) that may result from early life adversity and lead to poor outcomes, above and beyond pregnancy-specific conditions, consistent with literature on early life stress and adult health outcomes.[11] Obstetrical care providers have an important opportunity to assess

ACEs and other social determinants of health to identify pregnant people at increased risk of adverse obstetrical outcomes and potentially target interventions to mitigate these risks. Given that ACEs and early adversity are considered a serious public health concern on the basis of decades of research, addressing ACEs in the context of healthcare with the possibility of *preventing* ACEs in the next generation is imperative as part of a broader public health approach.[31] ■

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