

Sexual orientation disparities in adverse pregnancy outcomes

OBJECTIVE: Sexual minority (SM) individuals experience poorer health outcomes than their heterosexual counterparts in various health domains and have health profiles¹—for example, health behaviors, experiences of healthcare discrimination, and limited resources owing to structural, interpersonal, and individual stigma—that may place them at higher risk for adverse pregnancy outcomes (APOs).^{2–4} However, little research has examined disparities in these outcomes with multidimensional measures of sexual orientation.

STUDY DESIGN: We pooled 2 large cohort studies, the Nurses' Health Study 3 and the Growing Up Today Study (N=26,870 and 6508 pregnancies, respectively, from 1978 to

2024 with sexual orientation measures). We analyzed 6 self-reported outcomes: preterm birth (PTB), low birthweight (LBW), and macrosomia among live births and gestational hypertension (gHTN), gestational diabetes mellitus (GDM), and preeclampsia among pregnancies ≥20 weeks' gestation. For analyses with gHTN, GDM, and preeclampsia, we censored pregnancies after the first onset of each outcome. For gHTN, we excluded pregnancies among participants with a prepregnancy diagnosis of chronic hypertension, and for GDM, we excluded those with a prepregnancy diagnosis of diabetes. Sexual orientation was analyzed using 5 groups: completely heterosexual (reference), heterosexual with same-sex experience (defined as those who identified as completely heterosexual and reported same-sex attractions

TABLE 1
Risk ratios of adverse pregnancy outcomes by sexual orientation in Nurses' Health Study 3 (N = 26,870 pregnancies)^a and Growing Up Today Study (N = 6,508 pregnancies) from 1978–2024^b

	Outcomes											
	Preterm birth ^c (n = 32,973)		Low birthweight ^c (n = 29,054)		Macrosomia ^c (n = 29,054)		Gestational diabetes ^d (n = 32,737)		Gestational hypertension ^e (n = 32,349)		Preeclampsia ^f (n = 33,111)	
	RR	(95% CI)	RR	(95% CI)	RR	(95% CI)	RR	(95% CI)	RR	(95% CI)	RR	(95% CI)
Completely heterosexual ^g , n=27,351 ^h	1.00	–	1.00	–	1.00	–	1.00	–	1.00	–	1.00	–
Sexual minority ⁱ , n=6,027	0.93	(0.84, 1.04)	1.11	(0.96, 1.29)	1.00	(0.94, 1.07)	1.13	(0.99, 1.29)	1.21	(1.08, 1.35)	1.15	(1.01, 1.31)
Completely heterosexual ^g , n=27,351 ^h	1.00	–	1.00	–	1.00	–	1.00	–	1.00	–	1.00	–
Heterosexual with same-sex experience ⁱ , n=1,512 ^h	0.96	(0.78, 1.17)	1.03	(0.79, 1.35)	0.93	(0.82, 1.05)	1.06	(0.82, 1.35)	1.16	(0.94, 1.43)	1.18	(0.93, 1.49)
Mostly heterosexual, n=3,715 ^h	0.87	(0.76, 1.00)	1.06	(0.89, 1.28)	1.02	(0.94, 1.11)	1.09	(0.92, 1.29)	1.22	(1.06, 1.39)	1.14	(0.97, 1.34)
Bisexual, n=577 ^h	1.11	(0.83, 1.50)	1.24	(0.82, 1.88)	1.02	(0.85, 1.24)	1.36	(0.96, 1.94)	1.18	(0.85, 1.65)	1.20	(0.82, 1.75)
Lesbian, n=223 ^h	1.33	(0.88, 1.99)	2.05	(1.27, 3.31)	1.18	(0.90, 1.55)	1.56	(0.95, 2.56)	1.49	(0.96, 2.30)	0.92	(0.49, 1.72)

n, number; RR, risk ratio; CI, confidence interval.

^a The Nurses' Health Study 3 (NHS3) is an open cohort, and thus, these analyses reflect pregnancies captured in the study as of January 25, 2024; ^b Risk ratios were obtained using log-binomial models with weighted generalized estimating equations; ^c Analyses were restricted to pregnancies that resulted in live births; ^d Analyses were restricted to pregnancies that lasted ≥20 weeks. We excluded pregnancies if participants had a diagnosis of chronic diabetes prior to the pregnancy as well as subsequent pregnancies after a pregnancy with gestational diabetes; ^e Analyses were restricted to pregnancies that lasted ≥20 weeks. We excluded pregnancies if participants had a diagnosis of chronic hypertension prior to the pregnancy as well as subsequent pregnancies after a pregnancy with gestational hypertension; ^f Analyses were restricted to pregnancies that lasted ≥20 weeks. We excluded subsequent pregnancies after a pregnancy with preeclampsia; ^g In NHS3, this group consists of participants who identified as completely heterosexual and never had same-sex attractions nor partners nor previously identified as SM. In the Growing Up Today Study (GUTS), this group consists of participants who identified as completely heterosexual and never had same-sex partners; ^h Reflects number of pregnancies ≥20 weeks gestation; see Supplemental Table 1 for sexual orientation breakdown for each outcome; ⁱ Includes the following categories: heterosexual with same-sex experience, mostly heterosexual, bisexual, and lesbian; ^j In NHS3, this group consists of those who identified as completely heterosexual and either reported a prior SM identity or also reported having partners who were same-sex or non-binary or being attracted to people of the same sex or non-binary gender. In GUTS, this group consists of those who identified as completely heterosexual and also reported same-sex partners.

or behaviors), mostly heterosexual, bisexual, and lesbian. See Appendix for more details. We used log-binomial models to estimate risk ratios (RRs) and 95% confidence intervals (CIs) fit via weighted generalized estimating equations to account for multiple pregnancies per person and informative cluster sizes. To account for risks associated with multifetal gestations, we performed sensitivity analyses restricted to singleton pregnancies. We also performed sensitivity analyses adjusting for age at pregnancy.

RESULTS: Compared with pregnancies to completely heterosexual participants, those of SM groups combined had higher risks of gHTN (RR [95% CI], 1.21 [1.08–1.35]) and preeclampsia (1.15 [1.01–1.31]); no statistically significant differences were observed for PTB, LBW, macrosomia, or GDM (Table 1). Among SM subgroups, pregnancies to mostly heterosexual participants had a significantly higher risk of gHTN (1.22 [1.06–1.39]) than pregnancies to completely heterosexual participants. The magnitudes of the RRs were high for PTB, LBW, gHTN, and GDM for lesbian and bisexual participants, macrosomia for lesbian participants, and preeclampsia for bisexual participants. However, except for LBW for lesbian participants (2.05 [1.27–3.31]), these differences were not statistically significant. Lack of statistical significance for the other outcomes may be caused by inadequate power from small sample sizes of pregnancies among lesbian and bisexual participants. Sensitivity analyses restricted to singleton live births yielded similar RRs to the main analyses, with wider CIs, which was expected owing to the decreased sample size. Sensitivity analyses with age adjustment also yielded similar results.

CONCLUSION: SM individuals experience disparities in some APOs, and disparities differ by SM subgroup. Because SM individuals experience many sources of social inequities, including discrimination, stress, and lack of healthcare resources, these disparities may be attributable to multiple mechanisms.^{1,5} Future work in identifying the pathways to reduce disparities in APOs (for example, structural barriers, healthcare needs) is critical for achieving reproductive health equity. ■

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Payal Chakraborty, PhD
Department of Population Medicine
Harvard Pilgrim Health Care Institute and Harvard Medical School
Boston, MA
401 Park Dr, Suite 401 E
Boston, MA 02215
Department of Epidemiology
Harvard T.H. Chan School of Public Health
Boston, MA
pchakraborty@hsph.harvard.edu

Ellis Schroeder
Druid Hills High School
Atlanta, GA

Colleen A. Reynolds, MS
Sarah McKetta, MD, PhD
Department of Population Medicine
Harvard Pilgrim Health Care Institute and Harvard Medical School
Boston, MA
Department of Epidemiology
Harvard T.H. Chan School of Public Health
Boston, MA

Juno Obedin-Maliver, MD
Department of Obstetrics and Gynecology
Stanford School of Medicine
Palo Alto, CA
Department of Epidemiology and Population Health
Stanford University School of Medicine
Palo Alto, CA

S. Bryn Austin, ScD
Department of Social and Behavioral Sciences
Harvard T.H. Chan School of Public Health
Boston, MA
Division of Adolescent/Young Adult Medicine
Boston Children's Hospital
Boston, MA

Bethany Everett, PhD
Department of Sociology
University of Utah
Salt Lake City, UT

Sebastien Haneuse, PhD
Department of Biostatistics
Harvard T.H. Chan School of Public Health
Boston, MA

Brittany M. Charlton, ScD
Department of Population Medicine
Harvard Pilgrim Health Care Institute and Harvard Medical School
Boston, MA
Department of Epidemiology
Harvard T.H. Chan School of Public Health
Boston, MA
Division of Adolescent/Young Adult Medicine
Boston Children's Hospital
Boston, MA

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Methodological Appendix

The Growing Up Today Study. The Growing Up Today Study (GUTS) is a cohort of the offspring of participants of the Nurses' Health Study 2. Initial enrollment (GUTS1) began in 1996, when 16,882 children ages of 9–14 years were recruited into the study. A second phase of enrollment (GUTS2) began in 2004, with an additional 10,923 children ages 10–17 years recruited into the study. Starting in 2013, the cohorts were combined and followed up together. In the 2019 pregnancy “wrap up” questionnaire, participants were asked about all their pregnancies throughout their lifetime. In earlier questionnaires, participants were asked prospectively about their recent pregnancies. For the GUTS cohort, we used pregnancy data from the 2019 questionnaire when available. For participants who did not complete the 2019 questionnaire, we used pregnancy data from the prospective collection of pregnancies in prior questionnaires.

We examined six self-reported adverse pregnancy outcomes: preterm birth (defined as birth at <37 weeks of gestation), low birthweight (defined as <2500 grams or <5.5 lb birthweight), macrosomia (defined as ≥4000 grams or approximately ≥8.5 lb birthweight), gestational diabetes, pregnancy-related high-blood pressure (gestational hypertension), and preeclampsia. For the neonatal outcomes (preterm birth, low birthweight, and macrosomia) we restricted to live births. In GUTS, birthweight was not measured in the 2019 pregnancy wrap up questionnaire, so we used only the prospectively collected data on pregnancies for low birthweight and macrosomia. For the outcomes gestational diabetes, gestational hypertension, and

preeclampsia, we restricted to pregnancies that lasted 20 or more weeks, and looked at the first onset of these outcomes (i.e., we censored pregnancies after the outcome occurred). For the outcome gestational diabetes, we excluded pregnancies that occurred after a chronic diabetes diagnosis prior to the pregnancy, and for gestational hypertension we excluded pregnancies after a chronic hypertension diagnosis.

In GUTS, sexual orientation identity and partners were measured in 1999 (identity only), 2001, 2003, 2005, 2007, and 2010 for GUTS1 participants; 2008 and 2011 for GUTS2 participants; and 2013, 2014, 2015, 2016, and 2019 for all participants. Sexual orientation identity was measured using a question adapted from the Minnesota Adolescent Health Survey¹ which asked, “Which of the following best described your feelings?” with the following response options: completely heterosexual (attracted to persons of the opposite sex), mostly heterosexual, bisexual (equally attracted to men and women), mostly homosexual, completely homosexual (gay/lesbian, attracted to persons of the same sex), and not sure. Because of the availability of multiple measurements, we used the measurement of sexual orientation closest to the pregnancy starting with the 2001 measure since the 1999 measure only included sexual orientation identity. We will use the following categories for sexual orientation:

- Completely heterosexual (reference group)
- Heterosexual with same-sex experience (defined as those who identified as completely heterosexual and also reported same-sex partners)
- Mostly heterosexual
- Bisexual
- Lesbian/gay (combine mostly and completely homosexual)

The Nurses' Health Study 3. The Nurses' Health Study 3 (NHS3) is an ongoing cohort of registered nurses and nursing students born on or after January 1, 1965 living in the US or Canada. NHS3 is an open cohort, and thus, enrollment is ongoing (enrollment started in 2010). The present analyses reflect data collected up until January 25, 2024. Participants are asked to complete online surveys every 6 months. Participants reported their lifetime pregnancy history in the first survey, and all pregnancies since the start of the study in the 13th survey. In these questionnaires, participants were asked detailed questions about each of their past pregnancies, including information about pregnancy outcomes, which also included information about how the pregnancy ended (e.g., live birth), gestational length, birthweight, and pregnancy complications (e.g., gestational diabetes/hypertension and preeclampsia). We also asked participants about their sexual orientation on the 5th, 10th, and 13th surveys.

Similar to our approach in GUTS, for the neonatal outcomes (preterm birth, low birthweight, and macrosomia) we restricted to live births. For the outcomes gestational diabetes,

gestational hypertension, and preeclampsia, we restricted to pregnancies that lasted 20 or more weeks, and looked at the first onset of these outcomes. For the outcome gestational diabetes, we excluded pregnancies that occurred after a chronic diabetes diagnosis prior to the pregnancy, and for gestational hypertension we excluded pregnancies after a chronic hypertension diagnosis.

In NHS3, sexual orientation was measured on the 5th, 10th, and 13th surveys. In the 5th survey, participants were asked about sexual orientation identity (the same question as in GUTS) and partners. In the 10th and 13th survey, participants were asked about sexual orientation identity, attractions, and partners. The 13th survey additionally included information

about gender of participants' attractions and partners. We used measurement of sexual orientation closest to the pregnancy using similar categories as before:

- Completely heterosexual (reference group)
- Heterosexual with same-sex experience (defined as those who identified as completely heterosexual and either reported a prior SM identity or also reported having partners who were same-sex or non-binary or being attracted to people of the same sex or non-binary gender)
- Mostly heterosexual
- Bisexual
- Lesbian/gay (combine mostly and completely homosexual)

SUPPLEMENTARY REFERENCE

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SUPPLEMENTAL TABLE 1

Characteristics of pregnancies in Nurses' Health Study 3 (n = 26,870 pregnancies) and Growing Up Today Study (n = 6,508 pregnancies) from 1978–2024

	Completely heterosexual ^a	Heterosexual with same-sex experience ^b	Mostly heterosexual	Bisexual	Lesbian
NHS3					
Age at pregnancy, mean (SD)	29.1 (5.15)	31.0 (5.58)	29.6 (5.60)	29.3 (5.64)	29.4 (6.23)
Preterm birth, n (%)					
No	19921 (91.0%)	1069 (92.2%)	2621 (92.2%)	426 (89.9%)	170 (84.6%)
Yes	1941 (8.9%)	90 (7.8%)	219 (7.7%)	48 (10.1%)	29 (14.4%)
Missing	33 (0.2%)	0 (0%)	2 (0.1%)	0 (0%)	2 (1.0%)
Low birthweight, n (%)					
No	20578 (94.0%)	1089 (94.0%)	2646 (93.1%)	434 (91.6%)	179 (89.1%)
Yes	1022 (4.7%)	57 (4.9%)	133 (4.7%)	25 (5.3%)	19 (9.5%)
Missing	295 (1.3%)	13 (1.1%)	63 (2.2%)	15 (3.2%)	3 (1.5%)
Macrosomia, n (%)					
No	16499 (75.4%)	901 (77.7%)	2097 (73.8%)	345 (72.8%)	149 (74.1%)
Yes	5101 (23.3%)	245 (21.1%)	682 (24.0%)	114 (24.1%)	49 (24.4%)
Missing	295 (1.3%)	13 (1.1%)	63 (2.2%)	15 (3.2%)	3 (1.5%)
Gestational diabetes, n (%)					
No	20722 (95.6%)	1087 (94.9%)	2663 (95.2%)	445 (93.5%)	186 (93.5%)
Yes	959 (4.4%)	58 (5.1%)	133 (4.8%)	31 (6.5%)	13 (6.5%)
Gestational hypertension, n (%)					
No	20278 (94.6%)	1045 (93.0%)	2559 (92.9%)	441 (93.2%)	170 (90.4%)
Yes	1148 (5.4%)	79 (7.0%)	197 (7.1%)	32 (6.8%)	18 (9.6%)
Preeclampsia, n (%)					
No	20979 (95.6%)	1090 (94.1%)	2693 (94.8%)	453 (94.8%)	191 (95.0%)
Yes	973 (4.4%)	68 (5.9%)	149 (5.2%)	25 (5.2%)	10 (5.0%)
GUTS					
Age at pregnancy, mean (SD)	29.4 (3.50)	30.3 (3.27)	29.9 (3.80)	26.7 (4.57)	30.9 (4.14)
Preterm birth, n (%)					
No	4802 (93.0%)	312 (91.8%)	779 (93.4%)	84 (93.3%)	20 (100%)
Yes	354 (6.9%)	28 (8.2%)	54 (6.5%)	6 (6.7%)	0 (0%)
Missing	5 (0.1%)	0 (0%)	1 (0.1%)	0 (0%)	0 (0%)
Low birthweight, n (%)					
No	2235 (94.5%)	143 (94.7%)	323 (92.8%)	38 (90.5%)	6 (85.7%)
Yes	97 (4.1%)	6 (4.0%)	20 (5.7%)	3 (7.1%)	1 (14.3%)
Missing	34 (1.4%)	2 (1.3%)	5 (1.4%)	1 (2.4%)	0 (0%)

(continued)

SUPPLEMENTAL TABLE 1**Characteristics of pregnancies in Nurses' Health Study 3 (n = 26,870 pregnancies) and Growing Up Today Study (n = 6,508 pregnancies) from 1978–2024 (continued)**

	Completely heterosexual ^a	Heterosexual with same-sex experience ^b	Mostly heterosexual	Bisexual	Lesbian
Macrosomia, n (%)					
No	1875 (79.2%)	115 (76.2%)	278 (79.9%)	34 (81.0%)	4 (57.1%)
Yes	457 (19.3%)	34 (22.5%)	65 (18.7%)	7 (16.7%)	3 (42.9%)
Missing	34 (1.4%)	2 (1.3%)	5 (1.4%)	1 (2.4%)	0 (0%)
Gestational diabetes, n (%)					
No	4959 (96.3%)	325 (95.9%)	803 (95.4%)	86 (96.6%)	17 (85.0%)
Yes	191 (3.7%)	14 (4.1%)	39 (4.6%)	3 (3.4%)	3 (15.0%)
Gestational hypertension, n (%)					
No	4794 (93.9%)	319 (94.4%)	776 (93.7%)	85 (95.5%)	19 (90.5%)
Yes	312 (6.1%)	19 (5.6%)	52 (6.3%)	4 (4.5%)	2 (9.5%)
Preeclampsia, n (%)					
No	4974 (96.0%)	331 (96.8%)	810 (95.9%)	85 (95.5%)	20 (95.2%)
Yes	209 (4.0%)	11 (3.2%)	35 (4.1%)	4 (4.5%)	1 (4.8%)

NHS3, Nurses' Health Study 3; GUTS, Growing Up Today Study; n, number; %, percentage; SD, standard deviation.

^a In NHS3, this group consists of participants who identified as completely heterosexual and never had same-sex attractions nor partners nor previously identified as SM. In GUTS, this group consists of participants who identified as completely heterosexual and never had same-sex partners; ^b In NHS3, this group consists of those who identified as completely heterosexual and either reported a prior SM identity or also reported having partners who were same-sex or non-binary or being attracted to people of the same sex or non-binary gender. In GUTS, this group consists of those who identified as completely heterosexual and also reported same-sex partners.

SUPPLEMENTAL TABLE 2

Risk ratios of adverse pregnancy outcomes by sexual orientation in Nurses' Health Study 3 and Growing Up Today Study separately^a

	Outcomes											
	Preterm birth ^b		Low birthweight ^b		Macrosomia ^b		Gestational diabetes ^c		Gestational hypertension ^d		Preeclampsia ^e	
	RR	(95% CI)	RR	(95% CI)	RR	(95% CI)	RR	(95% CI)	RR	(95% CI)	RR	(95% CI)
NHS3												
Completely heterosexual ^f , n=22,146 ^g	1.00	–	1.00	–	1.00	–	1.00	–	1.00	–	1.00	–
Heterosexual with same-sex experience ^h , n=1,170 ^g	0.94	(0.75, 1.18)	1.01	(0.76, 1.35)	0.88	(0.77, 1.01)	1.09	(0.83, 1.43)	1.22	(0.97, 1.54)	1.29	(1.00, 1.66)
Mostly heterosexual, n=2,865 ^g	0.89	(0.76, 1.03)	1.01	(0.83, 1.23)	1.03	(0.95, 1.12)	1.10	(0.91, 1.33)	1.30	(1.12, 1.52)	1.18	(0.99, 1.41)
Bisexual, n=487 ^g	1.15	(0.84, 1.58)	1.17	(0.75, 1.83)	1.02	(0.84, 1.24)	1.39	(0.96, 2.01)	1.26	(0.89, 1.79)	1.16	(0.77, 1.74)
Lesbian, n=202 ^g	1.45	(0.97, 2.17)	1.94	(1.18, 3.19)	1.10	(0.83, 1.47)	1.33	(0.77, 2.32)	1.50	(0.95, 2.37)	0.88	(0.46, 1.69)
GUTS												
Completely heterosexual ⁱ , n=5,205 ^g	1.00	–	1.00	–	1.00	–	1.00	–	1.00	–	1.00	–
Heterosexual with same-sex experience ^j , n=342 ^g	1.05	(0.69, 1.58)	1.16	(0.52, 2.61)	1.20	(0.86, 1.66)	0.98	(0.56, 1.71)	0.98	(0.62, 1.55)	0.81	(0.43, 1.51)
Mostly heterosexual, n=850 ^g	0.84	(0.62, 1.14)	1.44	(0.88, 2.34)	0.96	(0.74, 1.23)	1.11	(0.77, 1.58)	0.98	(0.73, 1.32)	1.06	(0.73, 1.52)
Bisexual, n=90 ^g	0.79	(0.33, 1.86)	1.80	(0.56, 5.79)	1.00	(0.47, 2.10)	1.06	(0.34, 3.34)	0.82	(0.30, 2.23)	1.38	(0.52, 3.68)
Lesbian, n=21 ^g	0.00	(0.00, 0.00)	3.39	(0.55, 21.07)	2.25	(0.95, 5.32)	3.25	(1.10, 9.57)	1.48	(0.40, 5.46)	1.17	(0.17, 7.84)

NHS3, Nurses' Health Study 3; GUTS, Growing Up Today Study; n, number; RR, risk ratio; CI, confidence interval.

^a Risk ratios were obtained using log-binomial models with weighted generalized estimating equations; ^b Analyses were restricted to pregnancies that resulted in live births; ^c Analyses were restricted to pregnancies that lasted ≥ 20 weeks. We excluded pregnancies if participants had a diagnosis of chronic diabetes prior to the pregnancy as well as subsequent pregnancies after a pregnancy with gestational diabetes; ^d Analyses were restricted to pregnancies that lasted ≥ 20 weeks. We excluded pregnancies if participants had a diagnosis of chronic hypertension prior to the pregnancy as well as subsequent pregnancies after a pregnancy with gestational hypertension; ^e Analyses were restricted to pregnancies that lasted ≥ 20 weeks. We excluded subsequent pregnancies after a pregnancy with preeclampsia; ^f Those who identified as completely heterosexual and never had same-sex attractions nor partners nor previously identified as SM; ^g Reflects number of pregnancies ≥ 20 weeks gestation; see Supplemental Table 1 for sexual orientation breakdown for each outcome; ^h Those who identified as completely heterosexual and either reported a prior SM identity or also reported having partners who were same-sex or non-binary or being attracted to people of the same sex or non-binary gender; ⁱ Those who identified as completely heterosexual and never had same-sex partners; ^j Those who identified as completely heterosexual and also reported same-sex partners.

SUPPLEMENTAL TABLE 3

Risk ratios of adverse pregnancy outcomes by sexual orientation in Nurses' Health Study 3 and Growing Up Today Study among singleton live births^a

	Outcomes											
	Preterm birth ^b (n = 32,287)		Low birthweight ^b (n = 28,459)		Macrosomia ^b (n = 28,459)		Gestational diabetes ^c (n = 31,658)		Gestational hypertension ^d (n = 31,279)		Preeclampsia ^e (n = 32,011)	
	RR	(95% CI)	RR	(95% CI)	RR	(95% CI)	RR	(95% CI)	RR	(95% CI)	RR	(95% CI)
Completely heterosexual ^f , n=26,453 ^g	1.00	–	1.00	–	1.00	–	1.00	–	1.00	–	1.00	–
Sexual minority ^h , n=5,818 ^g	0.93	(0.82, 1.04)	1.15	(0.97, 1.36)	1.00	(0.94, 1.07)	1.13	(0.99, 1.30)	1.20	(1.07, 1.35)	1.14	(0.99, 1.31)
Completely heterosexual ^f , n=26,453 ^g	1.00	–	1.00	–	1.00	–	1.00	–	1.00	–	1.00	–
Heterosexual with same-sex experience ⁱ , n=1,467 ^g	1.01	(0.81, 1.25)	1.14	(0.84, 1.55)	0.92	(0.81, 1.05)	1.09	(0.85, 1.40)	1.13	(0.91, 1.40)	1.16	(0.90, 1.49)
Mostly heterosexual, n=3,594 ^g	0.84	(0.72, 0.97)	1.07	(0.86, 1.33)	1.02	(0.94, 1.11)	1.09	(0.92, 1.29)	1.23	(1.07, 1.42)	1.15	(0.98, 1.38)
Bisexual, n=555 ^g	1.20	(0.87, 1.65)	1.42	(0.90, 2.25)	1.00	(0.83, 1.22)	1.39	(0.97, 1.99)	1.15	(0.81, 1.63)	1.12	(0.75, 1.69)
Lesbian, n=202 ^g	1.14	(0.69, 1.88)	1.75	(0.93, 3.30)	1.20	(0.91, 1.59)	1.41	(0.81, 2.45)	1.42	(0.89, 2.25)	0.84	(0.42, 1.68)

n, number; RR, risk ratio; CI, confidence interval.

^a Risk ratios were obtained using log-binomial models with weighted generalized estimating equations. While we restricted singleton pregnancies, we note that medically assisted reproduction use is associated with multifetal gestations and is more common among sexual minority individuals, and thus is a mediator; ^b Analyses were restricted to pregnancies that resulted in singleton live births; ^c Analyses were restricted to pregnancies that resulted in singleton live births. We additionally excluded pregnancies if participants had a diagnosis of chronic diabetes prior to the pregnancy as well as subsequent pregnancies after a pregnancy with gestational diabetes; ^d Analyses were restricted to pregnancies that resulted in singleton live births. We additionally excluded pregnancies if participants had a diagnosis of chronic hypertension prior to the pregnancy as well as subsequent pregnancies after a pregnancy with gestational hypertension; ^e Analyses were restricted to pregnancies that resulted in singleton live births. We excluded subsequent pregnancies after a pregnancy with preeclampsia; ^f In NHS3, this group consists of participants who identified as completely heterosexual and never had same-sex attractions nor partners nor previously identified as SM. In GUTS, this group consists of participants who identified as completely heterosexual and never had same-sex partners; ^g Reflects number of single live births; ^h Includes the following categories: heterosexual with same-sex experience, mostly heterosexual, bisexual, and lesbian; ⁱ In NHS3, this group consists of those who identified as completely heterosexual and either reported a prior SM identity or also reported having partners who were same-sex or non-binary or being attracted to people of the same sex or non-binary gender. In GUTS, this group consists of those who identified as completely heterosexual and also reported same-sex partners.

SUPPLEMENTAL TABLE 4

Risk ratios of adverse pregnancy outcomes by sexual orientation in Nurses' Health Study 3 and Growing Up Today Study with adjustment for age at pregnancy^a

	Outcomes											
	Preterm birth ^b (n = 32,875)		Low birthweight ^b (n = 28,959)		Macrosomia ^b (n = 28,959)		Gestational diabetes ^c (n = 32,638)		Gestational hypertension ^d (n = 32,250)		Preeclampsia ^e (n = 33,012)	
	RR ^f	(95% CI)	RR ^f	(95% CI)	RR ^f	(95% CI)	RR ^f	(95% CI)	RR ^f	(95% CI)	RR ^f	(95% CI)
Completely heterosexual ^g , n=27,275 ^h	1.00	–	1.00	–	1.00	–	1.00	–	1.00	–	1.00	–
Sexual minority ⁱ , n=6,002 ^h	0.94	(0.85, 1.05)	1.11	(0.96, 1.29)	1.01	(0.95, 1.08)	1.09	(0.95, 1.24)	1.22	(1.09, 1.37)	1.17	(1.03, 1.34)
Completely heterosexual ^g , n=27,275 ^h	1.00	–	1.00	–	1.00	–	1.00	–	1.00	–	1.00	–
Heterosexual with same-sex experience ^j , n=1,503 ^h	0.97	(0.80, 1.19)	1.03	(0.78, 1.35)	0.94	(0.83, 1.06)	0.99	(0.77, 1.27)	1.19	(0.97, 1.47)	1.24	(0.98, 1.57)
Mostly heterosexual, n=3,705 ^h	0.88	(0.77, 1.00)	1.06	(0.88, 1.28)	1.03	(0.95, 1.11)	1.06	(0.90, 1.25)	1.22	(1.07, 1.40)	1.16	(0.99, 1.36)
Bisexual, n=572 ^h	1.12	(0.83, 1.51)	1.25	(0.82, 1.89)	1.03	(0.85, 1.24)	1.37	(0.97, 1.95)	1.16	(0.83, 1.63)	1.20	(0.82, 1.75)
Lesbian, n=222 ^h	1.34	(0.89, 2.01)	2.05	(1.27, 3.31)	1.19	(0.91, 1.56)	1.49	(0.91, 2.44)	1.51	(0.98, 2.34)	0.94	(0.51, 1.76)

n, number; RR, risk ratio; CI, confidence interval.

^a Risk ratios were obtained using log-binomial models with weighted generalized estimating equations adjusting for age at pregnancy. We note that while we adjusted for age, age may be a mediator because sexual minority individuals are more likely to have teen pregnancies and pregnancies at later ages; ^b Analyses were restricted to pregnancies that resulted in singleton live births; ^c Analyses were restricted to pregnancies that resulted in singleton live births. We excluded pregnancies if participants had a diagnosis of chronic diabetes prior to the pregnancy as well as subsequent pregnancies after a pregnancy with gestational diabetes; ^d Analyses were restricted to pregnancies that resulted in singleton live births. We excluded pregnancies if participants had a diagnosis of chronic hypertension prior to the pregnancy as well as subsequent pregnancies after a pregnancy with gestational hypertension; ^e Analyses were restricted to pregnancies that resulted in singleton live births. We excluded subsequent pregnancies after a pregnancy with preeclampsia; ^f Models are adjusted for age at pregnancy; ^g In NHS3, this group consists of participants who identified as completely heterosexual and never had same-sex attractions nor partners nor previously identified as SM. In GUTS, this group consists of participants who identified as completely heterosexual and never had same-sex partners; ^h Includes the following categories: heterosexual with same-sex experience, mostly heterosexual, bisexual, and lesbian; ⁱ Reflects number of single live births; ^j In NHS3, this group consists of those who identified as completely heterosexual and either reported a prior SM identity or also reported having partners who were same-sex or non-binary or being attracted to people of the same sex or non-binary gender. In GUTS, this group consists of those who identified as completely heterosexual and also reported same-sex partners.