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Original Contribution

Differences in Perinatal Outcomes of Birthing People in Same-Sex and Different-Sex Marriages

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It is unknown whether people in same-sex relationships who give birth have different perinatal outcomes than people in different-sex relationships, despite differences in risk factors such as use of assisted reproductive technologies, obesity, smoking, and poor mental health. Marriage equality has established birth certificates as a promising new source of population-based data on births to same-sex married parents. We used birth certificate data from Massachusetts for 201,873 singletons born to married parents from 2012 to 2016. We estimated the associations of several birth outcomes with having a birth parent in a same-sex marriage using propensity score–matched and –unmatched samples. We also tested whether these associations were modified by the use of assisted reproductive technologies. People in same-sex marriages who gave birth had perinatal outcomes related to decreased fetal growth and preterm birth that were similar to those of their peers in different-sex marriages. Use of assisted reproductive technology was associated with decreased fetal growth and increased risk of preterm birth for infants with different-sex parents but not for infants with same-sex parents. More research is needed across other states and to understand why use of assisted reproductive technology is not a risk factor for poor birth outcomes for those in same-sex marriages.

assisted reproductive technology; birth outcomes; large for gestational age; LGBT persons; pregnancy; preterm birth; propensity score matching; sexual minorities

Abbreviations: ART, assisted reproductive technology; BMI, body mass index; BWGA, birthweight for gestational age percentile; CI, confidence interval; DSM, people who gave birth in different-sex marriages; IVF, in vitro fertilization; LGA, large for gestational age; SGA, small for gestational age; SSM, people who gave birth in same-sex marriages; WIC, Supplemental Nutrition Program for Women, Infants, and Children.

Stigma related to sexual orientation is a significant source of stress and a fundamental cause of health inequities (1). Sexual minority women (lesbian, bisexual, queer) have higher rates of obesity (2), smoking (3), and poor mental health (4) and lower rates of preventative health-care utilization (5, 6) than heterosexual women. These factors, along with lower incomes (7) and exposure to stress related to discrimination, are independent risk factors for poor perinatal outcomes, such as restriction in fetal growth and accelerated delivery (8–11). Racism and obesity stigmas are drivers of disparities in birth outcomes (e.g., racial inequities). However, very little is known about pregnancy and birth outcomes of sexual minority women and transgender men (12). The single published US study using nationally representative survey data found that sexual minority women have worse outcomes than heterosexual women (i.e., higher rates of stillbirth, low birthweight, and preterm birth) (12). Evidence from a Swedish study in which administrative data were used showed that girls, but not boys, of women in same-sex registered partnerships had a higher risk of a low birthweight (13).

Research on sexual orientation and birth outcomes remains challenging because sexual orientation is seldom measured at the population level. The birth certificate is a promising new source of population-level data. Since same-sex couples have been legally able to marry, most state vital records have included the names of both married parents on their children's birth certificates.

There is no consensus on the meaning of sexual orientation in health research. Research on birth outcomes commonly uses individual-level measures as proxies for conditions that operate at the societal level (14). For example, the differences between birth outcomes of Black and White mothers can be largely attributed to racism that operates at the institutional and interpersonal levels (14). An individual's sexual orientation likewise can serve as a proxy for sexual orientation–related stigma. However, sexual orientation can determine an individual's pathway to pregnancy (15), but not in the same way for all sexual minorities. Individuals in same-sex relationships in which both partners were assigned female at birth (i.e., sexual minority women, transgender men) are far more likely to use assisted reproductive technologies (ART; e.g., in vitro fertilization (IVF), intrauterine insemination) than are those in different-sex relationships (15), which could plausibly increase the risk of preterm birth and other outcomes (16). Women in same-sex couples also have pathways to pregnancy available to them that are not available to different-sex couples (e.g., reciprocal IVF, in which one partner is the egg donor and one is the gestational carrier) (17).

Sex and number of partners are also uniquely responsible for several other confounding factors. Planning and timing of pregnancies are thought to be related to birth outcomes (18). A person in a monogamous same-sex marriage is presumed to be more likely to have an intentional pregnancy than a person in a different-sex marriage. This is not true of all sexual minorities; sexual minority women actually have been found to have a higher likelihood of unintended pregnancies compared with heterosexual women with only male partners (19).

Furthermore, family structure, biological relatedness, and prenatal environment are also noted confounders in studies of the associations of parents' sexual orientation with other outcomes (e.g., early life wellbeing (20) and educational attainment (21, 22)). Marriage has been unavailable to same-sex couples until very recently. Thus, children of same-sex couples have been more likely to have parents who were unable to legally marry, be conceived in the context of a prior relationship, or be adopted. In same-sex couples who use reciprocal IVF, one parent may be the gestational parent whereas the other is biologically related, which can further introduce complexity.

In addition, health-related support may also be a confounder. Women in same-sex marriages are more likely to encourage their partner to seek health-related support than are people in different-sex marriages (23, 24). Partner support and engagement during pregnancy has been linked with decreased risk factors (25) and improved pregnancy and postpartum outcomes among married people (26).

In the present study, we addressed several of the current gaps in the literature. We used a novel population-level source of data (birth certificates), and by restricting our sample births to that occurred in the context of legal marriages, we removed confounding by marital status and birthing. Informed by a conceptual model of minority stress and different pathways to pregnancy, we examined both sexual orientation disparities (e.g., between-group differences that are not necessarily attributable to unjust social systems) and inequities specifically (e.g., avoidable and unjust between-group differences) (27) in multiple measures of fetal and infant maturity among married people. We also examined differences in birth outcomes by use of ART among people who gave birth in same-sex marriages (SSM) and people who gave birth in different-sex marriages (DSM).

We hypothesized that we would observe differences in both birth outcomes and inequities (i.e., birth outcomes would be worse among SSM than among DSM even after accounting for parental risk factors.) We also hypothesized that use of ART would explain some of those differences.

METHODS

Conceptual framework

There is growing understanding that without sound conceptual grounding, research may mask inequities or even perpetuate racism and other forms of discrimination (14). Thus, we adopted several approaches to study differences between SSM and DSM. First, we were interested in the unadjusted ("crude") difference in outcomes between these groups rather than only "adjusting away" disparities.

Next, we were also interested in understanding whether these differences would exist if the population of birthing people in different-sex marriages resembled the population in same-sex marriages. Therefore, we also adjusted for prepregnancy covariates (parity, age, race, educational level, height, and body mass index (BMI; measured as weight in kilograms divided by height in meters squared)) using multiple approaches. We opted not to adjust for ART use in any model because this variable is on the causal pathway between sexual orientation/relationship configuration and outcomes and is thus a mediator and also potential effect modifier (28). We adjusted for these covariates using regression adjustment and propensity score methods that matched each pregnancy in a same-sex couple with 3 closely matched control pregnancies in different-sex couples. This enabled assessment of common support between the comparison groups (i.e., the extent to which there is significant overlap in the characteristics of SSM and DSM in order to render a causal effect identifiable) (29, 30). The kernel density plot of the distribution of propensity scores showed sufficient common support. Within the realm of common support, this approach more closely estimated the proximal causal effect of sexual minority stigma among married birthing people on birth outcomes.

Data

We used birth certificate data from Massachusetts for all livebirths from 2012 to 2016 (n = 361,415). We excluded all births for which the birth parent was not listed as married on the birth certificate or was listed as male sex (n = 120,771), with questionable sex of one/both married parents determined by the data grantor (n = 81). We also excluded multiple-fetal gestations, infants with implausible birthweights (31), and gestations <22 weeks and >45 weeks (Figure 1). No parents were listed as intersex. Our

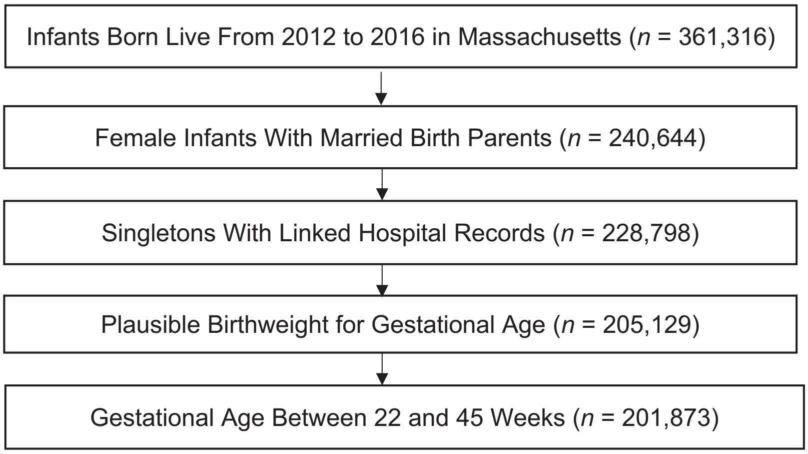

Figure 1. Sample selection of infants in study, Massachusetts, 2012–2016. The study includes infants born live to same-sex female birth parents who were married. Infants are singleton births, have a plausible birthweight for gestational age, and have a gestational age between 22 and 45 weeks.

final analytical sample included 201,873 singleton births to 172,753 birthing people**.** This study was approved by the Massachusetts Department of Health and the Oregon Health & Science institutional review boards.

Measures

Exposure variable. The predictor of interest was whether the birth parent is in a DSM (birth parent was female and other parent was male) or SSM (both parents were female).

Outcome variables. Our primary outcome variables of interest included being born small for gestational age (SGA) and large for gestational age (LGA). SGA and LGA were calculated by first estimating birthweight for gestational age percentile (BWGA), expressing fetal growth without the effect of delivery timing. We calculated BWGA from the sex-specific birth tables (32) after using the Alexander method (31) to remove implausible birthweight-for-gestational-age combinations. SGA was defined as birthweight less than the 10th percentile of BWGA and LGA as more than the 90th percentile of BWGA. Infants born SGA were excluded because acute and chronic stressors can slow fetal growth and accelerate the timing of delivery (33), thereby increasing risk for poorer later-life health and lower educational attainment (34). Infants born LGA are at risk for delivery complications (35) and childhood obesity (36). Our secondary outcomes, which were included to facilitate comparison with other studies, were preterm birth (<37 completed weeks of gestation), low birthweight (< 2,500 g), and macrosomia (birthweight > 4,000 g).

Covariates. We controlled for infant sex (female vs. male), parity (first birth vs. second birth or greater), and birth parent risk factors (age (continuous), educational attainment (high school or less, some college, bachelor's degree, or master's degree or higher), use of the Supplemental Nutrition Program for Women, Infants, and Children (WIC) as a proxy for socioeconomic status, prepregnancy body mass index (BMI; continuous), and smoking status (those who self-reported smoking in the 3 months before pregnancy or during pregnancy were considered smokers)).

Reflecting the importance of justifying adjustment for race/ethnicity on conceptual and scientific grounds (14), race/ethnicity was regarded as a marker of exposure to racism that might 1) differ in distribution between our comparison groups and 2) affect risk of birth outcomes. We did not adjust for race/ethnicity in our first comparison, and in race/ethnicity-adjusted models, our goal was to address the question, "how much of any difference between comparison groups might be attributable to differences in exposures," rather than to "adjust away" race as a marker of the health effects of racism. Race/ethnicity was collected in the birth certificate worksheet, and parents were allowed to check all that applied. We categorized this as non-Hispanic White only, non-Hispanic Black only, non-Hispanic other or multiple races, and Hispanic.

Body size of the birth parent matters greatly for determining birthweight, and height should also be considered as a separate risk factor (37) in addition to BMI (38). Given the robust literature that has shown that sexual minority women are more likely to be obese (39), we aimed to explore the issue of body size in depth by including height as an additional risk factor.

Use of ART. We included an indicator for whether a person had used any of the following, alone or in combination: fertility-enhancing drugs (gonadotropins, gonadotropin-releasing hormone agonists or antagonists, progesterone), IVF, gamete intrafallopian transfer, zygote intrafallopian transfer, intracytoplasmic sperm injection, frozen embryo transfer, or donor embryo transfer to achieve the pregnancy (collectively, ART). These were selected because they increase the risk of preterm birth by 2-fold among singleton births (40) and may increase the risk for SGA and LGA neonates (41–43). Use of intrauterine and intracervical insemination were not included because there is no evidence that these treatments impact birth outcomes alone.

Statistical approach

Propensity score-matching method. We used command "calipmatch" in Stata (StataCorp LP, College Station, Texas) to match those in SSM to DSM controls on a 1-to-3 basis without replacement. We matched on parity, age, race, educational level, BMI, and height. The baseline characteristics of individuals before and after matching were presented as frequencies, with percentages for categorical variables. Independent *t* tests were used to determine if there were significant differences between SSM and DSM before matching. Standard mean difference was calculated for each characteristic after matching. A standard mean difference < 0.2 indicated well-balanced characteristics.

Main models. We fit 5 logit models for each outcome (SGA, LGA, macrosomia, preterm birth, and low birthweight). Model 1 presented the unadjusted (crude) relationship. Model 2 was adjusted for covariates (infant sex, parity, birth parent age, educational attainment, use of WIC, prepregnancy obesity, smoking status, and year of birth). Model 3 included the variables in model 2 plus race/ethnicity. Model 4 additionally included height of birth parent with the variables in model 3. In model 5, we used a propensity score-matching approach with the matched cohort. Robust standard errors were clustered by birth parent to account for nonindependence of births for persons who gave birth more than once over the time period.

Differences by use of ART. We were interested in use of ART because it has been linked with preterm birth (16) and low birthweight (44) in the general population. We treated ART as an effect modifier instead of a confounder because it is on the pathway from exposure to outcome; ART use is strongly linked with being in a same-sex relationship. We added an indicator for whether the birth resulted from a pregnancy in which ART was used and an interaction term with same-sex couple to the prior models. For ease of interpretation of interaction effects, we transformed the coefficients in these models to predicted probabilities.

All statistical analysis was carried out with Stata, version 15.1. All significance tests were 2-tailed, and a P value < 0.05 was statistically significant.

RESULTS

Among the eligible 201,873 singleton births to married birthing people, 0.55% (1,112) were to SSM. Compared with DSM, a higher proportion of SSM had a master's or doctorate degree, were non-Hispanic white, had a higher income (not on WIC), and had private health insurance (Table 1). In addition, a higher proportion of SSM had their first birth and were older, taller, obese, current smokers, and ART users compared to DSM. We matched 92.2% of SSM (n = 1,026) each with 3 corresponding DSM (n = 3,078). All covariates in the propensity score-matching cohort were balanced, except for use of ART. The prevalence of preterm birth and measures of restricted fetal growth was similar for SSM and DSM, yet the prevalence of excessive fetal growth (LGA and high birthweight) was higher in SSM (Table 2). Even after propensity score-matching, the prevalence of high birthweight was higher among SSM than among DSM.

Results from the crude model (model 1) showed that the odds of excessive fetal growth were higher among SSM than among DSM, but there were no differences in other outcomes (Table 3). Results from model 2, which controlled for infant sex, parity, birth parent age, educational attainment, use of WIC, prepregnancy obesity, smoking status, and year of birth, showed no differences in preterm birth or low birthweight between groups. However, the odds of being SGA was lower among infants born to SSM, and the odds of high birthweight and macrosomia were still higher compared with infants born to DSM. Adding in race/ethnicity (model 3) kept results similar, except no difference in SGA was observed. The odds of being LGA were 1.3 (95% confidence interval (CI): 1.1, 1.6) times higher for births to SSM than for births to DSM. In the fully adjusted model that included height (model 4), the relationship between excessive fetal growth and being in a same-sex couple was attenuated. Results from the propensity score-matching approach (model 5) were similar to the results from the fully adjusted model 4.

Use of ART had a differential effect for those born to same-sex versus different-sex parents (Figure 2). No differences in risk of outcomes were observed by use of ART among SSM; confidence intervals all overlapped, and there were only modest percentage-point differences in risk of outcomes between those who used ART and those who did not (i.e., always below 2 percentage points). In contrast, risk of some outcomes differed significantly among DSM by use of ART. Risk of preterm birth was higher among DSM who had used ART (relative risk = 6.53; 95% CI: 6.00, 7.06) than among those who had not (3.77; 95% CI: 3.68, 3.86). Risk of low birthweight was also higher for infants born to DSM who had used ART (relative risk = 11.4; 95% CI: 10.72, 12.14) than for infants born to parents who had not used ART (relative risk = 6.76; 95% CI: 6.46, 6.87). No differences in LGA and macrosomia were observed by use of ART (data not shown).

DISCUSSION

We found that the birth outcomes of infants born to same-sex and different-sex married parents were similar. This study differs from prior work in which investigators found higher rates of poor birth outcomes among sexual minorities than among heterosexuals (12). Although researchers in that study compared bisexual or lesbian-identified women to heterosexual-identified women irrespective of their partnership status or sex of their partners, we considered family structure by comparing pregnancies of people in same-sax marriages to those of people in different-sex marriages. Many of the differences observed in the prior study could be due to higher rates of unplanned pregnancies, which occur more frequently in nonpartnered cisgender women,

Table 1. Characteristics of Same-Sex and Different-Sex Married Couples With Singleton Births, Massachusetts 2012–2016

Characteristic	Before Matching					After 1-to-3 Propensity Score Matching[a]				
	Same Sex (n = 1,112)		Different Sex (n = 200,761)		*P* Value[b]	Same Sex (n = 1,026)		Different Sex (n = 3,078)		SMD[c]
	No.	Column %	No.	Column %		No.	Column %	No.	Column %	
Female infant sex	524	47.1	97,712	48.7	0.303	487	47.5	1,501	48.8	0.03
Nulliparous	797	71.7	88,087	43.9	< 0.001	742	72.3	2,226	72.3	0.04
Age ≥35 years	588	52.9	56,513	28.1	< 0.001	524	51.1	1,518	49.3	0.00
Educational level					< 0.001					0.00
HS or less	86	7.7	28,782	14.3		80	7.8	240	7.8	
Some college	138	12.4	40,279	20.1		120	11.7	360	11.7	
Bachelor's degree	290	26.1	64,964	32.4		271	26.4	813	26.4	
Master's/doctorate degree	583	52.4	63,554	31.7		555	54.1	1,665	54.1	
Race and ethnicity					< 0.001					0.00
White NH	944	84.9	138,476	69.0		890	86.7	2,670	86.7	
Hispanic	86	7.7	21,071	10.5		69	6.7	207	6.7	
Black NH	37	3.3	12,970	6.5		27	2.6	81	2.6	
Other NH	33	3.0	26,024	13.0		40	3.9	120	3.9	
Obese (prepregnancy)[d]	255	22.9	32,041	16.0	< 0.001	207	20.9	617	20.8	0.00
Tall (height ≥68 inches)	190	17.4	900	11.2	< 0.001	161	16.0	459	15.2	0.02
WIC program use	105	9.4	36,918	18.4	< 0.001	84	8.4	265	8.8	0.01
Current smoker	60	5.4	8,047	4.0	0.052	49	4.9	105	3.5	0.07
ART or fertility drug use	455	41.0	8,261	4.1	< 0.001	423	41.3	143	4.6	0.60

Abbreviations: ART, assisted reproductive technology; HS, high school; NH, non-Hispanic; SMD, standardized mean difference; WIC, Supplemental Nutrition Program for Women, Infants, and Children.

[a] People in same-sex marriages were matched 1:3 without replacement to people in different-sex marriages based on parity, age, race, educational level, body mass index, and height.

[b] *P* value is from 2-tailed tests between people in same- and different-sex marriages.

[c] Body mass index (kg/m^2) ≥30.

[d] Value < 0.200 indicates the balance of covariates.

or among sexual minority cisgender women in relationships with cisgender men.

Our sample of births to same-sex married persons also reflects a select population; one in which the majority are White and have high levels of education achievement. Our study sample is highly resourced and perhaps therefore able to access social or economic support that buffer against stigma, particularly during a planned pregnancy. Research has so far been unable to assess the dual impact of sexual identity and gender of pregnancy partners, in large part because of unavailability of either one or both of these variables. Studies have also suggested that the experience of minority stress may be compounded by forms of other stigma experienced by sexual minority women of color (45), highlighting the need for more work to unpack of the impact of stigma and minority stress on cisgender sexual minority women's birth outcomes (46).

Relatedly, minority stress among sexual minorities in Massachusetts from 2012 to 2016 may have been lower than in other states in earlier times; this study took place in a state in which same-sex marriage had been in place for 8 years before the study began. It is possible that more support from their partners during pregnancy (documented in other areas of health) may have buffered against external sources of stigma and discrimination.

Large, striking differences in individual characteristics were found between those in same-sax marriages and those in different-sex marriages. Risk factors for fetal growth restriction that appeared at higher rates among SSM (e.g., being older, nulliparous, more obese, and a smoker during pregnancy) were also offset by several factors associated with reduced risk (e.g., a higher proportion had higher educational attainment, higher socioeconomic status as indicated by receipt of public assistance, and taller stature).

Table 2. Prevalence of Birth Outcomes of Singletons Born to Same-Sex and Different-Sex Married Couples, Massachusetts, 2012–2016

Birth Outcome	Before Matching					After 1-to-3 Propensity Score Matching				
	Same Sex (n = 1,112)		Different Sex (n = 200,761)		*P* Value[a]	Same Sex (n = 1,026)		Different Sex (n = 3,078)		*P* Value[a]
	No.	Column %	No.	Column %		No.	Column %	No.	Column %	
Preterm birth	87	7.8	14,120	7.0	0.304	70	6.8	221	7.2	0.159
Decreased fetal growth										
Low birthweight (<2,500 g)	54	4.9	7,911	3.9	0.118	45	4.4	132	4.3	0.788
SGA (<10th percentile)	81	7.3	15,993	8.0	0.402	72	7.0	223	7.2	0.515
Excessive fetal growth										
LGA (>90th percentile)	110	9.9	16,440	8.2	0.039	102	9.9	279	9.1	0.144
Macrosomia (>4,000 g)	141	12.7	20,476	10.2	0.006	134	13.1	361	11.7	0.038

Abbreviations: LGA, large for gestational age; SGA, small for gestational age.
[a] *P* value is from 2-tailed tests between people in same- and different-sex marriages.

Finally, a larger share of SSM in this sample were White and therefore had decreased exposure to racism, a risk factor for low birthweight (45).

Our matching approach yielded a few interesting observations. First, although all covariates were balanced between groups, 41% of SSM used ART compared with 5% of DSM. This highlighted that this group is still remarkably different in their pathways to pregnancy, even when attempting to make these groups look otherwise similar. Second, we were unable to match all SSM with controls, which means the

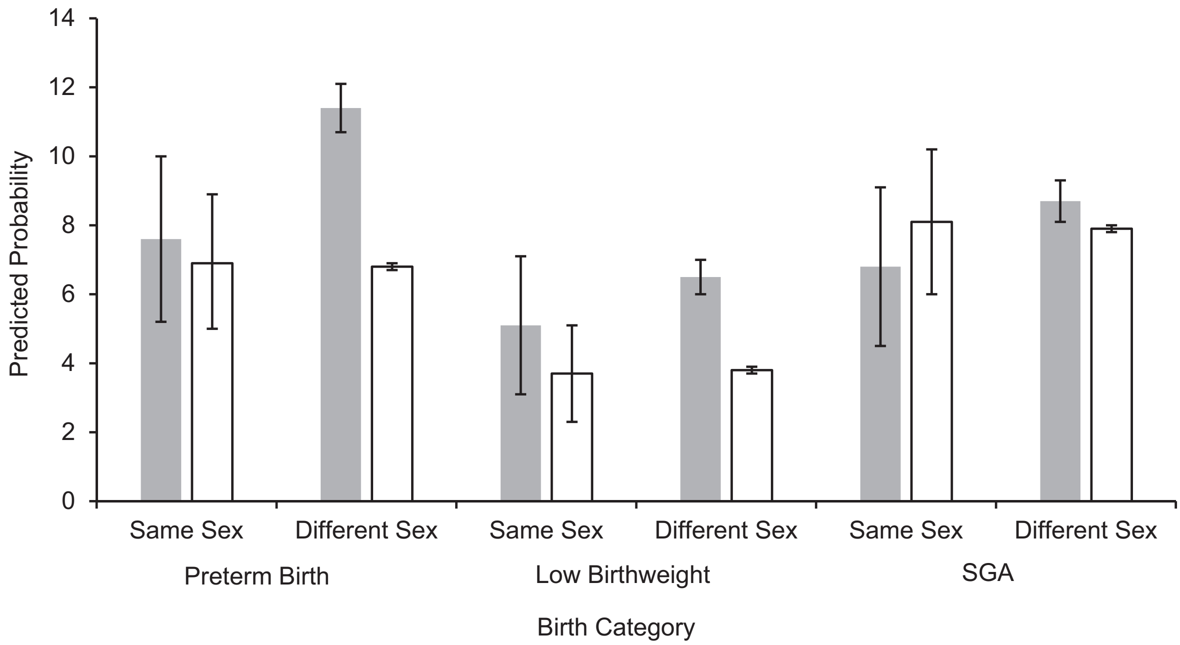

Figure 2. Predicted probabilities of fetal growth restriction and preterm birth based on use of fertility treatments among births to people in different-sex and same-sex marriages in Massachusetts, 2012–2016. Dark gray bars represent births without fertility services and white bars represent births with fertility services. All models include a term for use of fertility services and an interaction term for being in a same-sex couple; they are adjusted for infant sex, maternal parity, birth parent age, educational attainment, race, use of Supplemental Nutrition Program for Women, Infants, and Children, prepregnancy obesity (body mass index ≥30, measured in height in meters squared divided by weight in kilograms), height, smoking status, and year dummies. Robust standard errors are clustered by birth parent. Predicted probabilities of each group and their confidence intervals are included. SGA, small for gestational age.

Table 3. Differences in Birth Outcomes of Singletons Born to People in Same-Sex and Different-Sex Marriages, Massachusetts, 2012–2016

Model	No.	Birth Outcome									
		SGA[a]		LBW[b]		Preterm Birth[c]		LGA[d]		Macrosomia[e]	
		Coefficient	95% CI	Coefficient	95% CI	Coefficient	95% CI	Coefficient	95% CI	Coefficient	95% CI
Crude	201,873	0.907	0.721, 1.142	1.244	0.940, 1.646	1.122	0.896, 1.404	1.231	1.011, 1.498	1.279	1.072, 1.526
Adjusted[f]	201,873	0.797[g]	0.633, 0.982	1.011	0.761, 1.344	1.012	0.808, 1.268	1.333[g]	1.090, 1.629	1.353[g]	1.130, 1.620
Additionally adjusted for race/ethnicity	201,873	0.903	0.713, 1.142	1.031	0.765, 1.390	0.972	0.766, 1.234	1.262[g]	1.027, 1.550	1.259[g]	1.047, 1.515
Additionally adjusted for height	201,873	0.919	0.726, 1.664	1.045	0.775, 1.408	0.978	0.771, 1.242	1.217	0.989, 1.497	1.214	0.984, 1.463
After matching[h]	4,104	1.087	0.813, 1.452	0.934	0.647, 1.348	0.906	0.672, 1.221	1.119	0.873, 1.435	1.124	0.900, 1.405

Abbreviations: CI, confidence interval; LBW, low birthweight; LGA, large for gestational age; SGA, small for gestational age.

[a] Odds of being SGA (<10th percentile of birthweight for gestational age) among those born to single-sex couples compared with those born to different-sex couples.

[b] Odds of having a LBW (<2,500 g) among those born to single-sex couples compared with those born to different-sex couples.

[c] Odds of being preterm (<37 weeks' gestation) among those born to single-sex couples compared with those born to different-sex couples.

[d] Odds of being LGA (>90th percentile of birthweight for gestational age) among those born to single-sex couples compared with those born to different-sex couples.

[e] Odds of having a high birthweight (>4,000 g) among those born to single-sex couples compared with those born to different-sex couples.

[f] All adjusted models were adjusted for infant sex, parental parity, birth parent age, educational attainment, use of Supplemental Nutrition Program for Women, Infants, and Children, prepregnancy obesity (body mass index ≥30, measured as height in meters squared divided by weight in kilograms), height, smoking status, and year dummies. Robust standard errors are clustered by birth parent.

[g] $P < 0.05$.

[h] Adjusted for infant sex, parental parity, birth parent age, educational attainment, race, use of Supplemental Nutrition Program for Women, Infants, and Children, prepregnancy obesity (body mass index ≥30, measured as height in meters squared divided by weight in kilograms), height, smoking status, and year dummies. Robust standard errors are clustered by birth parent.

propensity score-matching approach is only relevant to the 92% of SSM with matches.

A striking finding was that use of fertility-enhancing drugs or IVF was associated with preterm birth and SGA among infants born to DSM but not those born to SSM. This finding may be explained by differences in the types of IVF; SSM may be more likely to use frozen embryo transfers for reciprocal IVF or if they are planning for multiple children. Alternatively, many SSM use assisted reproductive technologies without the common indication of subfertility. Current definitions of physiologic subfertility do not apply as readily to those in same-sex marriages and also may be harder to diagnose in most cases (47). Future research on pregnancies to SSM should examine underlying fertility and use of ART as separate risk factors for fetal growth restriction.

More research is also needed across different states to test whether these findings are generalizable to different regions and to different populations (e.g., populations that include more racial/ethnic and socioeconomic diversity). Research is also needed on the birth experiences of other sexual and gender minority populations (e.g., transgender and nonbinary people).

Our study has several strengths. This was the first study to account for the major confounders present in prior work (22)—parental marital structure and child biological relatedness—by comparing pregnancies of women in same-sex marriages to those in different-sex marriages. Methodologically rigorous large-scale studies of birthing people assigned female at birth are absent; prior studies have used nonprobability methods or contain small sample sizes (12).

Our study also enabled identification of our population of interest without sampling. Studies are inconsistent in how they measure sexual orientation, which makes it difficult to compare findings. Respondents must also be willing to disclose their sexual orientation; thus, sampling of sexual minorities are at risk of selection bias that can change over time as the social climate changes.

Some limitations exist. First, our study design (using birth certificates from a single state) did not allow us to measure lived experiences of stigma nor to compare variation in state policies related to discrimination. Next, people in Massachusetts are likely to differ from those living elsewhere. An estimated one-third of cisgender women of reproductive age have insurance coverage for infertility diagnosis and treatment in Massachusetts (48), so the present study may not be generalizable to states with less generous fertility coverage (49) or those with differences in gender norms and heteronormativity. This study did not capture all sexual minority women (e.g., bisexual women in different-sex relationships, unmarried people of all sexual orientations). Thus, our findings are not generalizable beyond people in same-sex marriages (50). Finally, our study only observed livebirths; stressful events may also increase the likelihood of fetal death. Future studies would benefit from inclusion of all pregnancies, including those that ended in early fetal loss. These limitations owe in part to the inherent complexity of sexual orientation, identity, and behavior; all research on sexual minority populations must engage with this complexity and align interpretation of results with the specific study question (51). Our study adds to the limited evidence base on birth outcomes among sexual minorities and people in same-sex relationships.

Despite these limitations, our results provide evidence that people in same-sex marriages have healthy pregnancies and birth outcomes, despite their increased exposure to minority stress. Understanding the risks and resiliency among diverse sexual minority populations may provide important insights into managing stress during pregnancy.

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