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Editor's Choice

The Status of Women's Reproductive Rights and Adverse Birth Outcomes

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A B S T R A C T

Background: Reproductive rights—the ability to decide whether and when to have children—shape women's socioeconomic and health trajectories across the life course. The objective of this study was to examine reproductive rights in association with preterm birth (PTB; <37 weeks) and low birth weight (LBW; <2,500g) across states in the United States.
Methods: Analysis included records for all live births in the United States in 2012 grouped by state. A reproductive rights composite index score was assigned to records from each state based on the following indicators for the year before birth (2011): mandatory sex education, expanded Medicaid eligibility for family planning services, mandatory parental involvement for minors seeking abortion, mandatory abortion waiting periods, public funding for abortion, and percentage of women in counties with abortion providers. Scores were ranked by tertile with the highest tertile reflecting states with strongest reproductive rights. We fit logistic regression models with generalized estimating equations to estimate the odds ratios and 95% confidence intervals for PTB and LBW associated with reproductive rights score controlling for maternal race, age, education, and insurance and state-level poverty.
Results: States with the strongest reproductive rights had the lowest rates of LBW and PTB (7.3% and 10.6%, respectively) compared with states with more restrictions (8.5% and 12.2%, respectively). After adjustment, women in more restricted states experienced 13% to 15% increased odds of PTB and 6% to 9% increased odds of LBW compared with women in states with the strongest rights.
Conclusions: State-level reproductive rights may influence likelihood of adverse birth outcomes among women residents.

Reproductive rights afford women the ability to decide the number, timing, and spacing of children, access to the information and resources needed to exercise voluntary choice, and the right to the highest attainable standard of health (United Nations Population Fund, 2007). In 1994, the United Nation's International Conference on Population and Development defined and endorsed reproductive rights as fundamental human rights and identified reproductive health as a core component of overall health and well-being (United Nations Population Fund, 2007). In the United States, politically and ideologically driven legislation and judicial actions in states across the country have resulted in increased restrictions on reproductive rights in recent years (NARAL-Pro Choice American Foundation, 2015), including regulations dictating the circumstances under which women may obtain effective contraception, safe and legal abortion, infertility treatment, and the comprehensive sexual education necessary to make informed decisions about their own bodies (Hess et al., 2015; Wright, Bird, & Frost, 2015). In response to increasingly limited access to abortion, the American College of Obstetricians and Gynecologists has called for cessation and repeal of legislative restrictions that are harmful to women's health (American College of Obstetricians and Gynecologists, 2014). As a result of combined federal- and state-level actions, the breadth of reproductive rights differs by state, and the contextual effect on population health within each state remains unclear.

Restricted access to abortion and limited reproductive rights may be linked to adverse birth outcomes by increasing the

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number of births that result from unintended pregnancies—either mistimed or unwanted (Haberland & Rogow, 2015; Stevenson & Potter, 2015; Henshaw, Joyce, Dennis, Finer, & Blanchard, 2009). National estimates suggest that nearly than one-half (45%) of pregnancies in the United States are unintended (Finer & Zolna, 2016). A concurrent decline in percentage of unintended pregnancies ending in abortion corresponds with an increase in unintended births (Finer & Zolna, 2014). Research suggests that across states, 18% to 37% of Medicaid-eligible women continued unwanted pregnancies to term when use of Medicaid funding for abortion was restricted (Henshaw et al., 2009). Some evidence has shown unintended pregnancies that continue to delivery have been associated with higher risks of low birth weight (LBW) and preterm birth (PTB; Kost, Landry, & Darroch, 1998; Mohllajee, Curtis, Morrow, & Marchbanks, 2007; Shah et al., 2011), morbidities associated with short- and long-term physical health consequences and deficits in growth and development (Behrman & Butler, 2007; Goldenberg & Culhane, 2007), and adverse maternal social and health outcomes, including poverty and intimate partner violence (Buckles, 2008; Miller, 2011; Pallitto, Campbell, & O'Campo, 2005). Multifaceted reasons for associations between unintended pregnancy and adverse birth outcomes may include increased stress (Orr, Miller, James, & Babones, 2000), socioeconomic and behavioral confounders including smoking and alcohol use (Hellerstedt et al., 1998), and inadequate prenatal care, particularly because such pregnancies are less likely to be recognized early in gestation (Kost & Lindberg, 2015). Racially and socioeconomically disadvantaged women may be most vulnerable to constraints on reproductive rights as they face additional barriers in accessing high-quality reproductive health care free from race- or class-based bias and discriminatory pressures around whether and when to have children (Dehlendorf et al., 2014). In addition, the majority of pregnancies (75%; Finer & Zolna, 2016) and births (77%; Mosher, Jones, & Abma, 2012) among teenagers are unintended, and teenagers' ability and opportunities to access reproductive education and health care may depend heavily on their state's policies regarding sex education and parental consent laws. Moreover, unplanned childbearing may exacerbate disadvantage by interrupting educational and employment trajectories (Buckles, 2008; Miller, 2011) and these women are at greater risk for PTB and LWB regardless of pregnancy intention (Afable-Munsuz & Braveman, 2008; Sable et al., 1997).

State-level policies that define the strength of women's reproductive rights may be linked to adverse birth outcomes when viewed conceptually as indicators of women's status within a state (McLaughlin, Xuan, Subramanian, & Koenen, 2011). Previous research has suggested the importance of gender equality and women's political, economic, and social status within communities in shaping the distribution of their health outcomes, including lower stroke, cervical cancer, and homicide mortality rates (Kawachi, Kennedy, Gupta, & Prothrow-Stith, 1999), and lower incidence of LBW, teen birth rates, and infant mortality rates (Koenen, Lincoln, & Appleton, 2006). Motivated by the previous ecological findings by Koenen et al. (2006) in data from 2001, we extend this work to a multilevel framework to examine the population average effect of state-level policies, both singularly and cumulatively, on the individual-level risk of adverse birth outcomes, with consideration for heterogeneity by race and socioeconomic status.

The climate of reproductive health policy in the United States is rapidly changing with states introducing and enacting new restrictive measures each year despite a lack of empirical evidence and rigorous evaluation of their impact on population health (Guttmacher Institute, 2012). In an effort to contribute to the limited evidence base, the purpose of this analysis was to examine the contextual effect of state-level reproductive health policies that may cumulatively shape women's ability to decide if and when to become pregnant. We aimed to estimate the risk of LBW and PTB associated with living in states where reproductive rights are more restrictive than others.

Materials and Methods

Study Design

This study is a national, multilevel, cross-sectional analysis of data from multiple secondary sources and women nested in state.

Outcomes

The National Center for Health Statistics provided records for all live births for each state and the District of Columbia in the United States in 2012. For ease of presentation, we refer to indicators from the District of Columbia as state level. The primary outcomes of interest were PTB (<37 weeks gestation) and LBW (<2,500 grams).

Exposure

A reproductive rights composite index based on a similar index developed by the Institute for Women's Policy Research (Hess et al., 2015) was used to quantify the strength of reproductive rights in each state in January 2011, that is, the preconception period for women who gave birth in 2012. The index includes six state-level policies related to women's reproductive health and rights: 1) mandatory parental consent or notification laws for minors seeking abortion, 2) mandatory waiting periods for abortion services, 3) restrictions on public funding for abortion, 4) the percentage of women living in counties with abortion providers, 5) expanded eligibility for Medicaid family planning services, and 6) mandatory sex education in schools. Data on the six policies were extracted from reports by the Guttmacher Institute's State Policies in Brief for January 2011 (Guttmacher Institute, 2011a, 2011b; 2011c). These reports provide state-level summaries of reproductive health issues and are updated monthly to reflect legislative, administrative, and judicial actions.

A composite index score was used to conceptualize how multiple restrictive policies within a state would magnify the risk of adverse birth outcome, that is, the cumulative impact over any one single policy or exposure (Evans, Li, & Whipple, 2013). The composite index was constructed based on the Institute for Women's Policy Research methodology. Each indicator was rated on a scale of 0 to 1, as follows. States where policies required minors to involve parents for either consent or notification before accessing abortion received 0 points, whereas states that did not mandate parental consent or notification received 1 point. States received 0 points if legislation required physicians to wait any number of mandatory hours after counseling before performing an abortion and 1 point if no wait was required. States that did not provide public funding for all or most medically necessary abortions for women who met income eligibility standards received 0, whereas those that did received 1 point. The percentage of women living in counties with at least one abortion provider was scaled between 0 and 1; states where all

women (100%) lived in a county with an abortion provider received 1 point. States that had enacted a state Medicaid family planning eligibility expansion—either through a State Plan Amendment or through a waiver from the federal government—received 1 point; those that did not received 0 points. States with a mandate requiring public schools (K-12) to provide sex education classes received 1 point and those without a sex education mandate received 0 points. The parental consent/notification and mandatory waiting period policies were each assigned a weight of 0.5. The remaining indicators were given a weight of 1. Weighted indicators were summed to compute a total composite index for each state. We analyzed the index as a continuous score. In addition, to compare areas with weak versus stronger rights, we categorized the composite index (low, medium, high) with the highest tertile representing states with the strongest reproductive rights. In addition to cumulative risk, individual policies were examined.

Given that 2011 was a particularly active year for state legislatures enacting reproductive health restrictions (Guttmacher Institute, 2012), for the purposes of sensitivity analyses we additionally calculated the reproductive rights composite index as above based on the status of each indicator as of January 2012.

Covariates

Adjusted models controlled for individual-level covariates extracted from birth records including maternal race (Black, Hispanic, White, other, or unknown), age (<19, 20–24, 25–29, 30–34, 35–39, 40–44, ≥45 years), education (<high school, high school graduate or GED, some college, associate's or bachelor's degree, graduate or higher degree), smoking during pregnancy (yes/no), and insurance type (public, private, self-pay, or other). Models also included estimates of the state-level poverty rate in 2011 (proportion of the state population living below the federal poverty level) derived from the American Community Survey of the U.S. Census Bureau.

Analysis

Descriptive statistics compared characteristics of women, infants, and states across tertiles of the reproductive rights composite index. Logistic regression with generalized estimating equations estimated the adjusted odds ratio (OR) and 95% confidence interval (CI) for PTB and LBW among women in states where rights were weaker (low and middle tertiles of composite index) compared with women in states where rights were strongest (highest tertile). Additionally, each indicator used in the composite index was examined separately to explore whether one policy in particular may have been driving associations between the index and the outcomes. We ran age-stratified models to explore the association between the policy requiring parental involvement for minors seeking abortion on women age less than 18 and those 18 and older separately to determine whether the association between this policy and adverse birth outcomes was exclusively among adolescent women. To test whether the harmful effects of restricted reproductive rights were greater for more disadvantaged women, models included tests for interaction by maternal race and insurance status.

Finally, in sensitivity analyses we repeated the modeling to estimate measures of association between tertiles of the composite index computed from January 2012 legislative status for both PTB and LBW.

Results

In 2011, 36 states required parental involvement (notification or consent) for minors seeking to access abortion, 24 states had a mandatory post-counseling waiting period, and 34 states prohibited use of public funds for all or most medically necessary abortions (Table 1). Across all states, on average, 57.7% of the state's population of women were living in counties with at least one abortion provider (ranging from 4% in Wyoming to 100% in DC and Hawaii). By 2011, 28 states had expanded Medicaid eligibility for family planning services either through a State Plan Amendment or a waiver from the federal government, and 21 states had mandatory sex education in schools.

The reproductive rights composite index ranged from a low of 0.23 in South Dakota to a high of 4.78 in Oregon (*M*, 2.3; *SD*, 1.2). State groupings by tertile level of composite index are listed in Table 2. Crude rates of LBW, PTB, and infant mortality were lowest in states in the highest tertile of the composite index (Table 2). These states had the largest proportion of births to Hispanic women, lowest prevalence of smoking during pregnancy, and the lowest mean poverty level relative to states in the bottom two tertiles.

In fully adjusted models, a 1-unit increase in the reproductive rights index was associated with a 4% reduction in PTB (OR, 0.96; 95% CI, 0.93–0.99), but was not associated with LBW (OR, 0.98; 95% CI, 0.96–1.01). Women in middle and low composite index states were 13% and 15% more likely to deliver preterm compared with women in states with the highest index scores (middle OR, 1.13; 95% CI, 1.01–1.26; low OR, 1.15; 95% CI, 1.04–1.27; Table 3). Women in the lowest composite index states were more likely to have a LBW infant (OR, 1.09; 95% CI, 1.00–1.19) and LBW risk was increased but not significant for women in the middle tertile (OR, 1.06; 95% CI, 0.96–1.16).

Exploration of the composite index indicators revealed parental consent/notification laws for minors seeking abortion, public funding for abortion coverage, and proportion of women in counties with an abortion provider were most strongly associated with PTB (all $p < .05$; Table 4). Women of all ages in states with a mandatory parental involvement for minors seeking abortions were 16% more likely to deliver preterm (OR, 1.16; 95% CI, 1.04–1.29) compared with women in states without such a law. Risk of PTB was 14% lower in states with provisions for use of public funds for abortion coverage (OR, 0.86; 95% CI, 0.78–0.96) compared with states with restrictions on use of funds, and odds of preterm delivery decreased 23% with each percentage increase in the proportion of women living in counties with an abortion provider (OR, 0.77; 95% CI, 0.63–0.94).

Expansion of Medicaid family planning eligibility and parental consent/notification laws for minors seeking abortion were most strongly associated with LBW (both $p < .05$), as was public funding for abortion coverage, although less strongly ($p = .05$; Table 4). Compared with women in states without Medicaid family planning expansions, women in states with expanded eligibility were 8% less likely to deliver a LBW infant (OR, 0.92; 95% CI, 0.87–0.98) and LBW risk was 9% higher in states that required parental involvement for minors seeking abortions (OR, 1.09; 95% CI, 1.00–1.18). LBW risk was reduced by 8% in states that did not restrict public funds for abortion coverage among Medicaid-eligible women compared with states that did not allow use of public funds (OR, 0.92; 95% CI, 0.85–1.00).

Results from the age-stratified analysis that examined the parental consent policy among adolescent and adult women

Table 1
States and Births in 2012 by Reproductive Rights Composite Index Indicators in 2011 ($N = 3{,}948{,}761$)

	Yes		No	
	States	*N* (%) Births	States	*N* (%) Births
Mandatory sex education	DC, DE, GA, IA, KY, MD, ME, MN, MT, NC, NJ, NM, NV, OH, OR, RI, SC, TN, UT, VT, WV	1,106,980 (28.0)	AL, AR, AZ, CA, CO, CT, FL, HI, ID, IL, IN, KS, LA, MA, MI, MO, MS, ND, NE, NH, NY, OK, PA, SD, TX, VA, WA, WI, WY	2,841,781 (72.0)
Expanded Medicaid family planning eligibility	AL, AR, AZ, CA, DE, FL, GA, IA, IL, LA, MD, MI, MN, MO, MS, NC, NM, OK, OR, PA, RI, SC, TX, VA, WA, WI, WY	3,011,900 (76.3)	AK, CO, CT, DC, HI, ID, IN, KS, KY, MA, ME, MT, ND, NE, NH, NJ, NV, OH, SD, TN, UT, VT, WV	936,861 (23.7)
Mandatory parental consent/ notification	AK, AL, AR, AZ, CO, DE, FL, GA, IA, ID, IN, KS, KY, LA, MA, MD, MI, MN, MO, MS, NC, ND, NE, OH, OK, PA, RI, SC, SD, TN, TX, UT, VA, WI, WV, WY	2,639,771 (66.9)	CA, CT, DC, HI, IL, ME, MT, NJ, NM, NV, NY, OR, WA	1,308,990 (33.1)
Mandatory waiting period	AL, AR, GA, ID, IN, KS, KY, LA, MI, MN, MO, MS, ND, NE, OH, OK, PA, SC, SD, TX, UT, VA, WI, WV	1,850,804 (46.9)	AK, AZ, CA, CT, DC, DE, FL, HI, IA, IL, MA, MD, ME, MT, NC, NH, NJ, NM, NV, NY, OR, RI, TN, VT, WA, WY	2,097,957 (53.1)
Provides public funds for abortion coverage	AK, AZ, CA, CT, HI, IL, MD, MN, MT, NJ, NM, NY, OR, WA, WV	1,571,882 (39.8)	AL, AR, CO, DC, DE, FL, GA, IA, ID, IN, KS, KY, LA, ME, MI, MO, MS, NC, ND, NE, NH, NV, OH, OK, PA, RI, SC, SD, TN, TX, UT, VA, WI, WY	2,376,879 (60.2)
		Mean (SD)		Range
Proportion of women in counties with an abortion provider		57.7% (26.5%)		4%–100%

separately included effect estimates that were similar to each other and to the age-combined analysis for both LBW and PTB (data not shown), indicating that the policy's association with adverse birth outcomes was not exclusively among minors.

Tests for effect modification of the composite index by maternal race and insurance type were nonsignificant ($p > .05$), indicating that the detrimental effects of limited reproductive rights was not exclusively experienced among racially or socioeconomically disadvantaged women.

The increased legislative activity on abortion restrictions that occurred during 2011 is evident by the lower mean composite index score across states derived from policy status as of January

Table 2
Characteristics of Births by Tertile of State Reproductive Rights Composite Index

	Low ($n = 950{,}036$)	Middle ($n = 1{,}444{,}943$)	High ($n = 1{,}553{,}782$)
States included	AL, AR, CO, ID, IN, KS, KT, LA, MS, MO, NE, ND, OH, OK, SD, VA, WI	AK, CT, DC, FL, GA, HI, IA, ME, MA, MI, MT, NV, NH, PA, SC, TN, TX, UT, WV, WY	AZ, DE, CA, IL, MD, MN, NC, NJ, NM, NY, OR, RI, WA, VT
Preterm birth (%)	12.2	12.1	10.6
Low birth weight (%)	8.5	8.4	7.3
Infant mortality per 1,000 live births, mean (SD)	6.7 (1.3)	5.9 (1.1)	7.5 (1.2)
Maternal race (%)			
Black	16.6	16.6	11.9
Hispanic	9.7	23.7	30.4
White	68.8	53.6	45.4
Other/unknown	5.0	6.1	12.3
Maternal age, y (%)			
<19	8.6	8.4	6.8
20–24	26.1	24.2	20.5
25–29	30.0	28.5	27.4
30–34	23.7	24.8	27.6
35–39	9.5	11.3	14.1
40–44	2.0	2.6	3.4
≥45	0.1	0.2	0.3
Maternal education (%)			
<High school	15.4	17.2	17.8
High school graduate or GED	25.1	26.5	23.3
Some college	22.3	21.6	20.3
Associate's or bachelor's degree	27.5	25.5	26.6
Graduate degree	9.8	9.3	12.2
Insurance type (%)			
Public	49.1	44.7	48.8
Private	41.8	44.2	43.8
Self-pay/other	9.1	11.1	7.4
Smoking at any time during pregnancy (%)	31.4	23.8	18.5
State population below federal poverty level, mean (SD)	15.7 (2.8)	16.0 (2.5)	14.7 (2.3)

Table 3
Adjusted OR and 95% CI for Preterm Birth and Low Birth Weight Associated with State-Level Reproductive Rights

	Preterm Birth	Low Birth Weight
	OR (95% CI)	OR (95% CI)
Reproductive rights composite index tertile		
High	Ref	
Middle	1.13 (1.01–1.26)	1.06 (0.96–1.16)
Low	1.15 (1.04–1.27)	1.09 (1.00–1.19)
Maternal race		
White	Ref	
Black	1.62 (1.57–1.67)	1.95 (1.88–2.01)
Hispanic	1.07 (1.01–1.14)	1.00 (0.94–1.06)
Other/unknown	1.06 (1.01–1.12)	1.25 (1.20–1.31)
Maternal education		
Graduate degree	Ref	
Associate's or bachelor's degree	1.04 (1.03–1.06)	0.96 (0.95–0.98)
Some college	1.18 (1.15–1.22)	1.06 (1.04–1.08)
High school graduate or GED	1.25 (1.21–1.29)	1.12 (1.08–1.17)
Less than high school	1.36 (1.30–1.42)	1.17 (1.10–1.24)
Maternal age (y)		
<19	Ref	
20–24	0.92 (0.89–0.95)	0.92 (0.89–0.95)
25–29	0.95 (0.92–0.98)	0.91 (0.88–0.95)
30–34	1.07 (1.04–1.11)	1.00 (0.96–1.04)
35–39	1.30 (1.26–1.34)	1.18 (1.13–1.23)
40–44	1.67 (1.61–1.72)	1.54 (1.46–1.62)
≥45	3.02 (2.80–3.26)	3.05 (2.86–3.28)
Smoking during pregnancy		
No	Ref	
Yes	1.18 (1.08–1.30)	1.51 (1.28–1.77)
Insurance type		
Private	Ref	
Public	1.09 (1.06–1.12)	1.09 (1.04–1.14)
Self-pay/other	0.99 (0.94–1.03)	0.96 (0.91–1.01)
State-level poverty	1.01 (1.00–1.03)	1.01 (1.00–1.03)

Abbreviations: CI, confidence interval; OR, odds ratio.
Note: Analyses are significant at $p < .05$.

2012 (mean scores in January 2012 of 2.19 vs. 2.28 in January 2011). However, results from sensitivity analyses predicting adverse birth outcomes from tertiles of the January 2012 composite index were not appreciably different from the primary analysis. Women in middle and low composite index states were 14% and 13% more likely to deliver preterm compared with women in states with the highest index scores (middle OR, 1.14; 95% CI, 1.01–1.30; low OR, 1.13; 95% CI, 1.01–1.27). Odds of LBW did not differ across tertiles of the 2012 composite index.

Table 4
Adjusted OR and 95% CI for Preterm Birth and Low Birth Weight–Associated Reproductive Rights Composite Indicator Components*

	Preterm Birth		Low Birth Weight	
	OR	95% CI	OR	95% CI
Reproductive rights composite index indicator				
Mandatory sex education (yes vs. no)	1.04	0.96–1.13	1.03	0.96–1.11
Expanded Medicaid family planning eligibility (yes vs. no)	0.94	0.87–1.02	0.92	0.86–0.99
Mandatory parental consent/notification (yes vs. no)	1.16	1.04–1.29	1.09	1.00–1.18
Mandatory waiting period (yes vs. no)	1.06	0.96–1.18	1.01	0.93–1.09
Provides public funds for abortion coverage (yes vs. no)	0.86	0.78–0.86	0.92	0.85–1.00
Proportion of women in counties with an abortion provider	0.77	0.63–0.94	0.88	0.74–1.05

Abbreviations: CI, confidence interval; OR, odds ratio.
Note: Analyses are significant at $p < .05$.
* Models controlled for maternal race, age, education, insurance type, smoking during pregnancy, and state-level poverty.

Discussion

The six indicators included in the reproductive rights index collectively measure the scope of women's autonomy in making and implementing informed decisions about childbearing. The findings presented here include robust associations between the breadth of women's reproductive rights and adverse birth outcomes; women in states with the strongest reproductive rights were less likely to deliver PTB or LBW infants than women in other states. In an ecologic analysis using the Institute for Women's Policy Research reproductive rights index from 1998 to 2000, Koenen et al. (2006) found that states with lower levels of reproductive rights had higher infant mortality rates after adjusting for state-level compositional and contextual factors. This is consistent with our finding of an average 13% to 15% increase in risk of PTB—the leading cause of infant mortality in the United States (Centers for Disease Control and Prevention, 2015)—among women in states with lower index scores controlling for both state- and individual-level confounders.

Among the individual indicators comprising the index, the policy requiring parental involvement for minor's access to abortion significantly increased infant mortality rates in the ecologic study (Koenen et al., 2006). Likewise, we found this policy to be the only one related to increased risk of both PTB and LBW. A recent evaluation of the parental involvement law in New Hampshire found that the incidence of abortions among minors decreased after implementation, driven primarily by a large decrease in minors from Massachusetts (where the parental consent law was more restrictive) crossing state lines to access abortion services (MacAfee, Castle, & Theiler, 2015). Parental involvement laws may shift the occurrence of minor's abortions from one state to another, but there is no strong evidence to suggest that this policy reduces incidence of abortion among minors within a state enacting such a law. In fact, a meta-analysis of parental involvement laws found that minors crossing state lines to obtain an abortion was the only consistent outcome associated with enactment of such laws (Dennis, Henshaw, Joyce, Finer, & Blanchard, 2009). Therefore, it is unlikely that this policy tangibly influences rates of unintended births and/or adverse birth outcomes among adolescents. Furthermore, in the age-stratified analysis we found that even adult women (those 18 and over) who are not impacted directly by this law were at increased risk of an adverse birth outcome compared with women in states without parental involvement laws. These findings implicate the policy's association with adverse birth outcomes as a marker of the reproductive rights climate in the state and indicator of women's status.

Two policies benefitting low-income women in particular were associated with lower rates of LBW, including expanded Medicaid eligibility for family planning and coverage of abortion services for Medicaid-eligible women by use of public funds. This finding is in line with previous work demonstrating not only improvements in maternal and child health outcomes, but financial benefits for states choosing to enact these policies (Gerstein & Markus, 2013; Lindrooth & McCullough, 2007; Meier &McFarlane, 1994). Some conflicting evidence regarding the direct impact of restricting Medicaid funding for abortion on birth weight suggests associations

may be owing to unobserved characteristics of states with legislative restrictions—those associated with both enactment of funding restrictions and with LBW—and we cannot discount this possible explanation for our finding as well (Currie, Nixon, & Cole, 1996; Henshaw et al., 2009). However, a rigorous review of literature on the impact of restrictions on Medicaid funding for abortions found consistently lower abortion rates as a result (Henshaw et al., 2009). Across a number of states, 18% to 37% of pregnancies that would have ended in Medicaid-funded abortions were instead carried to term when funding was unavailable (Henshaw et al., 2009). Because lower income women are more likely to deliver a LBW infant (Kramer, 1987), their decreased access to abortion as a result of funding restrictions may, therefore, explain in part the association between Medicaid funding restrictions and risk for LBW at the population level.

We did not find an independent association between mandatory waiting periods on adverse birth outcomes. Despite evidence that mandatory counseling waiting periods impose more burdens on women seeking abortions (Sanders, Conway, Jacobson, Torres, & Turock, 2016), there is limited evidence that such policies impact reproductive outcomes, including infant health, and finds limited impact on abortion access and timing (Joyce, Henshaw, Dennis, Finer, & Blanchard, 2009). We also did not find an association between the policy mandating sex education in schools and adverse birth outcomes, despite previous evidence indicating that states with abstinence-only education have higher teen pregnancy and birth rates compared with states that provide more comprehensive sex education (Stanger-Hall & Hall, 2011).

The sensitive and politicized debate surrounding abortion has hindered a frank discussion and evaluation of its impact on reducing unintended childbearing and its negative impact on maternal and child health. In a retrospective analysis, Krieger et al. (2015) found that U.S. infant death rates from 1960 to 1980 decreased most quickly in states that legalized abortion in 1970, with the greatest declines occurring among lower income women. Relatedly, Bitler and Madeline (2002) reported that legalization of abortion across states in the early 1970s lead to a reduction in the number of unwanted children and those born into poverty, which may have improved average infant health and living conditions in the population.

These findings suggest the pathways through which greater reproductive rights, including safe and legal access to abortion, may contribute to reduced adverse birth outcomes. The increased autonomy experienced by women in states with the strongest reproductive rights may proxy their higher relative status and greater gender equality with men. Previous research has suggested relationships between gender equality and women's health, such that communities with greater equality experience lower rates of intimate partner violence and unintended pregnancy (Pallitto & O'Campo, 2005; Yllo, 1984; Heise & Kotsadam, 2015). Greater reproductive rights may also be an indicator of other positive policies that may be linked to better birth outcomes, such as statewide nutritional policies (Abu-Saad & Fraser, 2010). Furthermore, greater reproductive rights and expansion of Medicaid in particular may improve preconception health in women within a state, thereby reducing the risk of adverse birth outcomes (Jack & Culpepper, 1990).

There are limitations to consider. First, although we assessed states' reproductive rights during the year before birth, this study was cross-sectional and prohibits any conclusions about the duration of a policy's implementation necessary to have an impact on adverse birth outcomes or about the impact of increasingly restrictive or protective reproductive rights. Given the rapidly changing reproductive policy climate, a longitudinal examination of changes in state-level contexts over time is warranted. Second, without information on maternal address or duration of time in the state of residence, we assume women lived in the state of residence listed on the birth record for the duration of her pregnancy and the year before birth. Third, although the composite index includes a comprehensive set of indicators by which to measure the strength of reproductive rights, there are undoubtedly additional contextual factors that influence reproductive decisions and subsequent birth outcomes. For example, low-income women in states that chose to expand Medicaid eligibility overall (not just for family planning services) may have benefitted from increased coverage of well-woman visits and preconception care (Johnson, Applegate, & Gee, 2015), thereby lowering their risk for an adverse birth outcome if and when they became pregnant. Medicaid expansion was not widespread enough by 2012 to include sufficient variation for analysis of this indictor, and future studies should be encouraged, particularly with consideration of Medicaid expansions enacted since passage of the Patient Protection and Affordable Care Act. Finally, birth records contain no indication about pregnancy intention, which prohibits subgroup analyses examining intended pregnancies separately from those that were unintended or mistimed. Large, national data sources with comprehensive data on women's reproductive choices and outcomes are limited, and should be encouraged in future research.

Implications for Practice and/or Policy

Despite its limitations, this analysis provides some empirical support for the hypothesis that women's status with regard to their reproductive rights influences adverse birth outcomes at the population level. States that support and promote women's abilities and resources to make reproductive decisions for themselves and their families have healthier maternal and child populations as a result. In light of this, the current political climate of increasingly curtailed reproductive rights at the state and national levels is disconcerting. The significant financial burden associated with PTB and LBW (Behrman & Butler, 2007; Markus et al., 2016; Petrou, Sach, & Davidson, 2001) and the potential cost savings associated with decreased unintended pregnancies (Monea & Thomas, 2011; Sonfield & Kost, 2013) should motivate policymakers unconvinced by health outcomes alone. Passage of more evidence-based and less ideologically driven policy is imperative to the health of the nation.

Conclusions

Women's reproductive rights in U.S. states are shaped by a number of policies that collectively define the degree to which women control their own decisions about whether and when to have children. States with fewer restrictions on access and availability of reproductive choices experience a healthier maternal and child health population with fewer infants born preterm and LBW.

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