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Pregnancy, Birth, and Mental Health Outcomes Associated With Recent Reproductive Coercion and Intimate Partner Violence in a Crowd-Sourced National Sample

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Introduction: Reproductive coercion (RC) is a type of intimate partner violence (IPV) in which partners control reproductive health decision-making. More evidence is needed on peripartum health outcomes related to RC, with and without IPV, to inform interventions and health care response. The purpose of this study was to determine the impact of RC, with and without other forms of IPV, on pregnancy, birth, and mental health outcomes in a sample of people who were currently or recently pregnant.

Methods: We conducted a cross-sectional survey with people who had been pregnant in the past 2 years (N = 1941). Logistic regression models examined predicted outcomes with RC as a primary exposure and explored combinations of RC and IPV.

Results: A total of 23.8% of the sample reported any past-2-years RC. RC was significantly associated with most pregnancy, birth, neonatal, and mental health outcomes. People who experienced RC alone had 2.44 higher odds of having a low birth weight newborn (95% CI, 1.04-5.71) and 1.78 higher odds of postpartum depression (95% CI, 1.03-3.08) compared with people who did not experience RC or IPV. RC with other forms of IPV had a significant impact on suicidality even controlling for depression and anxiety (odds ratio, 2.85; 95% CI, 1.94-4.18), compared with those who did not experience either.

Discussion: Our findings underscore the importance of studying RC as its own construct due to its clear, independent impact on maternal health outcomes. RC, with and without physical violence, is common and detrimental to the health of pregnant and postpartum people. Greater attention to mechanisms for these associations (and the disproportionate burden on populations experiencing marginalization) is needed to interrupt and prevent harmful downstream effects.

Keywords: birth outcomes, coercion, crowdsourcing, intimate partner violence, mental health, quantitative research, reproductive health

INTRODUCTION

Intimate partner violence (IPV) refers to emotional, physical, sexual, or verbal behaviors used by a current or former partner, designed to create power and control.[1] Interpersonal reproductive coercion (RC) is a type of IPV in which partners control the reproductive health decision-making of people capable of pregnancy. It encompasses 3 general areas: (1) pregnancy pressure, (2) contraceptive interference, and (3) controlling the outcome of a pregnancy (coercing or preventing access to abortion).[2] In the United States, the prevalence of RC is 8.4% of people assigned female at birth (AFAB) in population-based data[3] and 16% of AFAB prenatal care patients.[4] Estimates are higher in other community samples (37.8% of community services participants and family planning clinic patients,[5] 35.6% of incarcerated adolescents[6]). Multiple social and contextual factors amplify RC risk, including a higher number of sex partners,[7–10] lower income,[4,11,12] historically marginalized communities such as people of color[3,7,13–15] and sexual and gender minorities,[7,16,17] younger age,[18,19] and smaller family sizes.[20] RC co-occurs with other types of IPV, including intimate partner homicide,[21] traumatic brain injury–causing events,[14] polyvictimization,[22] stalking,[7,22] cyber dating abuse,[7,14,23] and sexual violence,[7,24] highlighting the risk for severe harm among RC survivors.

RC has numerous health consequences, including sexually transmitted infections,[7,9,25] mental health disorders,[5,9,14,18,20] substance use, and smoking.[7,24] Unintended pregnancy (pregnancies that are mistimed, unplanned, or unwanted) has been linked to RC in numerous studies and may increase the risk for other poor health outcomes such as miscarriage and low birth weight (LBW).[12,13,19,26] Although the validity of current unintended pregnancy measures has been questioned related to racism and classism,[27] it is clear that RC impacts reproductive autonomy, including decisions about when and whether to become pregnant and how

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Quick Points

- Evidence is needed on pregnancy and birth outcomes related to reproductive coercion (RC), with and without other forms of intimate partner violence (IPV), to inform interventions and effective health care response.
- Findings underscore the importance of studying RC as its own construct and other forms of IPV due to its clear, independent impact on perinatal health outcomes.
- The strong association between RC that is accompanied by other forms of IPV and suicidal ideation, even controlling for depression and anxiety, indicates the critical importance of mental health support, particularly given the large burden of maternal morbidity and mortality related to mental health etiologies.

to respond to a pregnancy.[28] Additional pregnancy, birth, and neonatal outcomes have been less studied. Decreased breastfeeding is associated with RC in one study,[29] as well as lower parenting competency,[30] and RC is also associated with LBW,[18] anemia,[18] and preterm birth (PTB).[31] Limited research has examined the impact of RC with and without other forms of IPV to determine differential health impacts and synergistic effects, with the few available studies showing that RC only impacts pregnancy intention when combined with IPV.[13,19,32] Most RC research studies only include family planning patients, and few studies include people who are or were recently pregnant. More evidence is needed on pregnancy and birth outcomes related to RC, with and without violence, to inform interventions and effective health care responses. The purpose of this study was to determine the association between RC, with and without other forms of IPV, and pregnancy, birth, and mental health outcomes, in a sample of currently or recently pregnant people.

METHODS

Study Sample

We conducted a cross-sectional survey with AFAB people, aged 18 to 45, who were currently pregnant or who had been pregnant in the past 2 years (considering their most recent pregnancy if they had more than one), using the Prolific crowdsourcing platform. The 2-year limitation was chosen to improve the accuracy of memory of events during that pregnancy. Prolific recruits participants through word of mouth and social media for academic research studies, and it is shown to have more reliable respondents and produce higher quality data than other crowdsourcing platforms.[33] To our knowledge, Prolific has not previously been used in pregnancy studies, although it has been used in several rigorous public health studies looking at smoking, substance use, and IPV.[34–36] Cognitive interviewing was conducted with 3 volunteers who met eligibility criteria, to identify challenges with wording and interpretation. Data were collected using REDCap from May to September 2023 and analyzed in May to June 2024.

A total of 2715 people were invited to complete the survey, based on responses to a screening question asking if they had been pregnant in the past 2 years (whether this resulted in miscarriage, abortion, or birth, or if the pregnancy was currently at ≥12 weeks' gestation), and 1998 completed the survey (74%). Forty-eight people clicked "return survey" after completing, indicating revoked consent in the Prolific platform, and these surveys were dropped. To ensure data quality we included 2 attention check questions (for example, "If you are paying attention to this question, please select 'MILDLY DISAGREE'"), and 91 people failed one or both. After reviewing the surveys for inconsistent responses, 6 surveys were dropped. During data cleaning, 3 additional surveys were identified as having inconsistent responses suggestive of fraudulent answers and were dropped. The final number of completed surveys was 1941, a completion rate of 71.5%, which is higher than average for Prolific studies.[37] In total, 1908 surveys had complete RC data and were retained for analyses. Power analysis indicated a sample size of 2000 would be sufficient to detect statistically significant differences in key outcomes (80% power and .05 significance).

The study was approved by the George Mason University Institutional Review Board (IRB 1985246-1). Research assistants received standardized human subjects research ethics training as well as IPV research training including safety assessment, IPV resource referrals, and suicidality protocols.[38] A research assistant followed up, through the secure communication channels provided by Prolific, with every participant who responded *yes* to a question about suicidality, to assess safety and offer resources. Participants reviewed online survey informed consent covering the nature of the questions, confidentiality, and the voluntary nature of the study including that they can refuse to answer any question. Participants received $7.00 to thank them for their time (approximately 20 minutes to complete the survey) and expertise, commensurate with Prolific's guidelines for ethical reimbursement of research participants. This study is reported following Strengthening the Reporting of Observational Studies in Epidemiology guidelines (Supporting Information: Appendix S1).

Measures

Demographic measures included age, gender identity and sexual orientation, race and ethnicity, income, outcome of the incident pregnancy, country of birth, number of children, marital and relationship status, and smoking status.

Retrospective pregnancy intention was measured with the London Measure of Unplanned Pregnancy,[39] which was categorized as planned (10-12), ambivalent (4-9), and unplanned (0-3). Cronbach α was .89 in our sample.

IPV was assessed with the Humiliation, Afraid, Rape, Kick instrument, which measures experiences of emotional, sexual, and physical IPV.[40] IPV and RC measures were limited to events in the past 2 years, in order to capture events that

occurred in the same timeframe as the incident pregnancy. Responding *yes* to any of the items was coded as any IPV in the past 2 years. Cronbach α was 0.81 in our sample.

RC was measured with 13 yes-or-no questions derived from the Reproductive Coercion Scale (Supporting Information: Appendix S2).[10,13] RC questions have been used in our previous studies[19,41] and remove pregnancy-promoting intent, as survivors may not always know the intent behind the abusive behaviors they experience, and RC behaviors are likely to be harmful regardless of intent.[41,42] RC was defined as a positive response to any item. Cronbach α was 0.72 in our sample.

Pregnancy, birth, and neonatal outcomes questions asked about only the most recent pregnancy, if more than one occurred during the 2-year study timeframe, and included Pregnancy Risk Assessment Monitoring System measures.[43] PTB was measured by calculating the difference between the actual and estimated date of birth; births that occurred more than 3 weeks early were considered preterm.

The Patient Health Questionnaire (PHQ-9) was used to assess depressive symptoms at the time of the survey and categorizes depression as minimal (1-4), mild (5-9), moderate (10-14), moderately severe (15-19), and severe (20-27).[44] Cronbach α was 0.92 in our sample. These categories were then dichotomized for analysis, into "none, minimal or mild depression" and "moderate, moderate severe or severe depression." One item on the PHQ-9 assesses suicidality, asking how often over the past 2 weeks the participant has been bothered by "thoughts that you would be better off dead, or of hurting yourself."

Anxiety at the time of the survey was measured with the Overall Anxiety Severity and Impairment Scale and categorized as mild or none (0-5), moderate (6-10), severe (11-15), and extreme (16-25).[45] Cronbach α was 0.93 in our sample. These categories were then dichotomized for analysis, into "mild or no anxiety" and "moderate, severe, or extreme anxiety."

Statistical Analysis

Descriptive statistics (mean values, SDs, and frequencies) were used to describe the sample and the prevalence of RC behaviors and outcomes. The χ^2 and *t* tests examined differences between those with and without RC on risk factors, covariates, and health outcomes. Due to the nature of the outcomes examined, which were not all relevant for all participants, the full sample was not used for all analyses. Analyses excluded participants who had an abortion or miscarriage for the outcomes of late or no prenatal care, 5 or fewer prenatal care visits, bed rest, gestational diabetes, kidney or urinary tract infection, preterm labor (PTL), PTB, method of birth, need for labor induction, prolonged newborn hospitalization, LBW, any breastfeeding or pumping breastmilk, duration of breastfeeding, and postpartum depression (PPD) or postpartum anxiety. Analyses excluded participants who had an abortion for the outcomes of any smoke exposure, any substance use during pregnancy, and any alcohol use during pregnancy. Analyses excluded participants who had a miscarriage for the outcome of vaginal bleeding. Participants who were pregnant at the time of the survey were excluded from analyses of birth and neonatal outcomes.

Odds ratios (ORs) for health outcomes were calculated using multiple logistic regression for most outcomes, or multinomial logistic regression for the outcome of pregnancy intention, which has 3 categories. To account for possible multicollinearity, variables that were significantly related ($P < .05$) to RC in the bivariate analyses were simultaneously entered into the regression model with each health outcome as the dependent variable unless they were likely to be highly correlated with each other (eg, marital status and relationship status; only relationship status was included). These covariates included age, income, sexual or gender minority status, race, any children, and relationship status. The first adjusted model focused on RC as a primary exposure. In the second model, IPV was added as a covariate. The third model explored combinations of RC and IPV through a categorical variable, abbreviated as RC only (RC without other forms of IPV), IPV only (without RC), RC with IPV (RC with other forms of IPV), and none, to clarify these distinct experiences in isolation and in combination. Mean imputation was conducted for one missing item in the pregnancy intention measure (n = 31 participants, 1.6% of the full sample). Thereafter, the sample size varied to accommodate small amounts of missing data in other variables. Analyses were conducted in Stata.[46]

RESULTS

Experience of RC and Associations With Demographics

The sample's average age was 31 years, and participants were evenly divided across income categories and were predominantly White (67.4%; Table 1). The most common pregnancy outcome for the incident pregnancy was giving birth and parenting (45.5%); 27.0% had a miscarriage, 15.5% had an abortion, and 10.4% were still pregnant at the time of the survey. Most participants were born in the United States (96.4%), had children (72.4%), and were in a committed relationship (85.2%). More than a quarter of participants identified as sexual or gender minority. Of the full sample, 28.4% experienced any IPV in the past 2 years, and of the 1908 people who had complete data on the RC questions, 23.8% reported any RC in the past 2 years. 9.2% of the sample experienced RC alone, without any other types of IPV, 14.3% experienced IPV alone, without RC, and 14.0% experienced RC with IPV (data not shown). In bivariate analysis, participants were significantly more likely to experience RC if they were younger; had lower income; identified as sexual or gender minority; were Black, Hispanic, or multiracial; smoked; experienced IPV in the past 2 years; did not have children; were not in a committed relationship or married; or had chosen an abortion ($P < .001$ for all comparisons).

Pregnancy, Birth, and Mental Health Outcomes Associated With RC

Experiencing RC was significantly associated with unplanned pregnancy, late and minimal prenatal care, exposure to smoking, alcohol, and substances, requiring bed rest, vaginal bleeding, severe nausea or vomiting, and PTL (Supporting Information: Tables S1-S3). Significant birth and neonatal outcomes included PTB, need for labor induction, and LBW. Significant mental health outcomes included depression or

Table 1. Characteristics of the Study Population and Exposure to Past-2-Years Reproductive Coercion Experience (n = 1908)

Characteristic	Total	Any Past-2-Year RC Experience		
		No	Yes	*P* Value[a]
Total sample with complete RC data	1908 (100.0)	1459 (76.5)	449 (23.5)	
Age, mean (SD)	31.03 (6.015)	31.5 (5.841)	29.5 (6.313)	**<.001**
Pregnancy outcome				**<.001**
Miscarriage or ectopic	515 (27.0)	366 (25.1)	149 (33.2)	
Abortion	295 (15.5)	182 (12.5)	113 (25.2)	
Stillborn	14 (0.7)	7 (0.5)	7 (1.6)	
Gave birth, parenting	869 (45.5)	729 (50.0)	140 (31.2)	
Gave birth, someone else parenting	14 (0.7)	5 (0.3)	9 (2.0)	
Currently pregnant	198 (10.4)	168 (11.5)	30 (6.7)	
Other	3 (0.2)	2 (0.1)	1 (0.2)	
Total 2022 household income before taxes, n (%)				**<.001**
$0-$25,000	219 (11.5)	151 (10.3)	68 (15.1)	
$25,001-$50,000	439 (23.0)	307 (21.0)	132 (29.4)	
$50,001-$75,000	469 (24.6)	352 (24.1)	117 (26.1)	
$75,001-$100,000	325 (17.0)	261 (17.9)	64 (14.3)	
$100,000 or more	432 (22.6)	371 (25.4)	61 (13.6)	
Unsure	24 (1.3)	17 (1.2)	7 (1.6)	
Sexual and gender identity, n (%)				
Cisgender woman, heterosexual	1387 (72.8)	1,103 (75.7)	284 (63.5)	**<.001**
Sexual or gender minority	518 (27.2)	355 (24.3)	163 (36.5)	
Race and ethnicity, n (%)				
American Indian or Alaska Native	5 (0.3)	4 (0.3)	1 (0.2)	**<.001**
Asian	67 (3.5)	49 (3.4)	18 (4.0)	
Black, African American, or African	203 (10.6)	133 (9.1)	70 (15.6)	
Hispanic, Latino, or Spanish	112 (5.9)	76 (5.2)	36 (8.0)	
Middle Eastern or North African	5 (0.3)	4 (0.3)	1 (0.2)	
Native Hawaiian, other Pacific Islander	3 (0.2)	3 (0.2)	0 (0.0)	
White	1286 (67.4)	1,032 (70.7)	254 (56.6)	
Multiracial	218 (11.4)	152 (10.4)	66 (14.7)	
Prefer not to answer	9 (0.5)	6 (0.4)	3 (0.7)	
Born in the United States, n (%)				
No	68 (3.6)	53 (3.6)	15 (3.3)	.771
Yes	1,840 (96.4)	1,406 (96.4)	434 (96.7)	
Any children under 18 living at home, n (%)				
No	527 (27.6)	361 (24.7)	166 (37.0)	**<.001**
Yes	1381 (72.4)	1,098 (75.3)	283 (63.0)	
Relationship status at time of pregnancy, n (%)				
Not in a committed relationship	282 (14.8)	140 (9.6)	142 (31.6)	**<.001**
In a committed relationship	1626 (85.2)	1319 (90.4)	307 (68.4)	
Married at time of pregnancy, n (%)				
No	936 (49.1)	623 (42.7)	313 (69.7)	**<.001**
Yes	972 (50.9)	836 (57.3)	136 (30.3)	

(*Continued*)

Table 1. (Continued)

Characteristic	Total	Any Past-2-Year RC Experience: No	Yes	*P* Value[a]
Smoked cigarettes in the past 2 y, n (%)				
No	1540 (80.7)	1218 (83.5)	322 (71.7)	**<.001**
Yes	368 (19.3)	241 (16.5)	127 (28.3)	
Any IPV in the past 2 y, n (%)				
No	1341 (71.6)	1168 (81.3)	173 (39.7)	**<.001**
Yes	531 (28.4)	268 (18.7)	263 (60.3)	

Abbreviations: IPV, intimate partner violence; RC, reproductive coercion.
[a] Based on χ^2 or *t* test.
Bolding indicates significant associations at $P<.05$.

anxiety during the pregnancy and at the time of the survey, suicidal ideation at the time of the survey, and PPD.

Health Outcomes Associated With Categories of RC and IPV Behaviors, Adjusted Models

In the first adjusted model, all health outcomes remained significant when controlling for covariates of RC (excluding IPV as a covariate; Tables 2–4). The strongest impact of RC was on unplanned pregnancy (OR, 2.80; 95% CI, 1.96-3.99; Table 2), followed by PTB (OR, 2.73; 95% CI, 1.55-4.78; Table 3). The second adjusted model also controlled for IPV, and the odds of 10 outcomes became nonsignificant (minimal prenatal care, alcohol use, substance use, bed rest, vaginal bleeding, PTL, need for labor induction, LBW, PPD or postpartum anxiety, and anxiety at the time of the survey; Tables 2–4).

The third model examined RC and IPV experienced alone and in conjunction (RC with IPV). For most significant outcomes, the strongest association was with RC with IPV, compared with RC or IPV alone, with a few notable exceptions. People who experienced RC alone had 2.44 higher odds of having an LBW newborn (95% CI, 1.04-5.71; Table 3) and 1.78 higher odds of experiencing PPD (95% CI, 1.03-3.08; Table 4), whereas experiencing IPV alone or RC with IPV was less or not significant. RC alone was not significantly associated with unplanned pregnancy, alcohol use, substance use, vaginal bleeding, PTL, depression or anxiety in pregnancy, suicidal ideation, or anxiety at the time of the survey, although IPV alone and RC with IPV were significant ($P < .001$), indicating IPV with and without RC is primarily responsible for these associations (Table 2–4). In every case except anxiety at the time of the survey, the risk associated with RC with IPV was greater than the risk with IPV alone, indicating a synergistic effect. The strongest association in all these analyses was between unplanned pregnancy and RC with IPV (OR, 6.80; 95% CI, 3.87-11.93; Table 2), followed by suicidal ideation and RC with IPV (OR, 4.60; 95% CI, 3.31-6.40; Table 4). To further explore this relationship with suicidality, we reran this model a final time, also controlling for depression and anxiety at the time of the survey, and this association remained significant (OR, 2.85; 95% CI, 1.94-4.18), indicating an independent association of RC with IPV with suicidality, even in the absence of depression and anxiety.

DISCUSSION

Results confirm previous studies that show RC, with and without other accompanying forms of IPV, is common. Survivors of RC experience poor health outcomes, and factors associated with RC include social determinants of health such as income, race, ethnicity, and sexual or gender identity (which influence health via discrimination-based pathways[47–49]), as well as younger age, smaller family size, and relationship instability. Although most studies on RC include participants from family planning clinics, this study is unique in that it includes people with a current or recent pregnancy, providing important implications for the prevention of maternal morbidity and mortality.

This study contributes to understudied questions about the impact of RC and IPV, separately and co-occurring, and shows that the synergistic effect of RC with other forms of IPV has the strongest influence on outcomes, consistent with previous studies.[13,19,32] However, unlike 2 of those studies,[13,19] this study found that RC and IPV were each associated with distinctly different sociodemographic characteristics as well as health outcomes. RC alone was associated with pregnancy ambivalence, minimal prenatal care, substance and smoke exposure in pregnancy, severe nausea or vomiting, PTB, LBW, depression at the time of the survey, and PPD or postpartum anxiety. IPV alone was associated with an ambivalent and unplanned pregnancy, minimal prenatal care, exposure to smoking and substance use, vaginal bleeding, PTL, and all mental health outcomes including suicidality. Some outcomes were only significant when RC and IPV co-occurred, including late or no prenatal care, bedrest in pregnancy, and need for labor induction. Critically, these independent associations between violence and health complications signify to researchers, clinicians, and policymakers that greater attention to mechanisms for these associations is needed to interrupt and prevent harmful downstream effects. Studies using mixed methods and latent class analysis may help elucidate such mechanisms underlying IPV, RC, and health outcomes.

This study's findings about mental health outcomes are aligned with existing studies and add to this literature by examining PPD and suicidal ideation. Mental health outcomes associated with RC in bivariate analysis included depression or anxiety during the pregnancy and at the time of the survey, suicidal ideation at the time of the survey, and PPD. Controlling for IPV revealed that RC likely has an

Table 2. Association Between Categories of Reproductive Coercion and Intimate Partner Violence Experiences and Pregnancy Outcomes, Controlling for Covariates

	Adjusted Multiple Regression[a]				
			Model 3 (n = 1869)[e]		
Pregnancy Outcome[b]	Model 1[c] OR (95% CI) (n = 1905)	Model 2[d] OR (95% CI) (n = 1869)	RC Only OR (95% CI)	IPV Only OR (95% CI)	Both RC and IPV OR, (95% CI)
Category of pregnancy intention					
Planned	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]
Ambivalent	2.54 (1.84-3.49)[f]	2.05 (1.46-2.86)[f]	1.80 (1.20-2.71)[f]	2.00 (1.41-2.85)[f]	5.67 (3.32-9.68)[f]
Unplanned	2.80 (1.96-3.99)[f]	2.03 (1.39-2.97)[f]	1.54 (.94-2.51)	2.12 (1.41-3.20)[f]	6.80 (3.87-11.93)[f]
Late or no prenatal care[g] (n = 1076)	2.16 (1.25-3.71)[f]	1.90 (1.06-3.42)[f]	1.61 (0.71-3.62)	1.08 (0.51-2.28)	2.50 (1.24-5.03)[f]
5 or fewer prenatal care visits[g] (n = 884)	2.13 (1.06-4.32)[f]	1.67 (0.76-3.65)	2.91 (1.03-8.20)[f]	2.74 (1.13-6.65)[f]	2.78 (1.09-7.05)[f]
Any smoke exposure (from self or other person) during pregnancy[h] (n = 1593)	2.23 (1.66-3.00)[f]	1.70 (1.23-2.34)[f]	2.09 (1.33-3.27)[f]	2.65 (1.87-3.77)[f]	3.75 (2.56-5.48)[f]
Any substance use during pregnancy[h,i] (n = 1601)	1.81 (1.35-2.43)[f]	1.21 (0.87-1.67)	1.52 (0.95-2.43)	3.56 (2.54-5.00)[f]	3.59 (2.47-5.23)[f]
Any alcohol use during pregnancy[h]	1.34 (1.01-1.79)[f]	1.14 (0.84-1.56)	1.18 (0.77-1.82)	1.57 (1.12-2.21)[f]	1.74 (1.20-2.52)[f]
On bed rest (n = 1078)[g]	1.79 (1.03-3.12)[f]	1.69 (0.94-3.04)	1.67 (0.76-3.70)	1.34 (0.67-2.69)	2.29 (1.12-4.72)[f]
Gestational diabetes (n = 1085)[g]	1.02 (0.60-1.73)	0.98 (0.56-1.72)	0.73 (0.32-1.65)	0.87 (0.48-1.59)	1.21 (0.60-2.45)
Vaginal bleeding (n = 1386)[j]	1.44 (1.03-2.02)[f]	1.25 (0.87-1.80)	1.10 (0.65-1.86)	1.61 (1.07-2.44)[f]	2.28 (1.49-3.49)[f]
Kidney or urinary tract infection (n = 1089)[g]	1.01 (0.63-1.62)	0.95 (0.58-1.57)	0.93 (0.48-1.81)	1.07 (0.62-1.85)	1.05 (0.56-1.99)
Severe nausea, vomiting, dehydration	1.58 (1.21-2.06)[f]	1.51 (1.13-2.00)[f]	1.56 (1.06-2.28)[f]	1.24 (0.88-1.74)	1.79 (1.28-2.50)[f]
Preterm labor (n = 1084)[g]	1.67 (1.06-2.66)[f]	1.33 (0.81-2.20)	1.34 (0.66-2.69)	1.77 (1.03-3.03)[f]	2.36 (1.29-4.31)[f]

Abbreviations: IPV, intimate partner violence; OR, odds ratio; RC, reproductive coercion.
[a] All models include covariates age, income, sexual or gender minority status, race, any children, and relationship status.
[b] Sample sizes noted are for model 1; other sample sizes float to accommodate small amounts of missing data.
[c] Impact of RC on outcome, controlling for covariates.
[d] Impact of RC on outcome, controlling for IPV and covariates.
[e] Impact of each RC/IPV category on outcome, controlling for covariates.
[f] $P < .05$.
[g] Includes only participants who did not have an abortion or miscarriage.
[h] Includes only participants who did not have an abortion.
[i] Does not include over-the-counter medications, alcohol, or smoking.
[j] Includes only participants who did not have a miscarriage.

Table 3. Association Between Categories of Reproductive Coercion and Intimate Partner Violence Experiences and Birth and Neonatal Outcomes, Controlling for Covariates

	Adjusted Multiple Regression[a]				
			Model 3[f] (n = 1869)		
Birth and Neonatal Outcome[b,c]	Model 1[d] OR (95% CI) (n = 1905)	Model 2[e] OR (95% CI) (n = 1869)	RC Only OR (95% CI)	IPV Only OR (95% CI)	Both RC and IPV OR (95% CI)
Preterm birth (n = 847)	2.73 (1.55-4.78)[g]	2.28 (1.23-4.21)[g]	2.92 (1.35-6.34)[g]	1.83 (0.91-3.68)	3.02 (1.39-6.58)[g]
Method of birth: cesarean (n = 886)	0.94 (0.62-1.43)	0.91 (0.58-1.43)	0.98 (0.54-1.77)	1.10 (0.70-1.72)	0.91 (0.51-1.63)
Need for labor induction (n = 877)	1.46 (1.00-2.13)[g]	1.40 (0.93-2.08)	1.20 (0.71-2.03)	1.07 (0.70-1.62)	1.82 (1.08-3.08)[g]
Prolonged newborn hospitalization (n = 869)[h]	1.25 (0.78-2.01)	1.18 (0.71-1.96)	1.36 (0.70-2.63)	1.24 (0.73-2.10)	1.21 (0.63-2.33)
Low birth weight (<5 lb, 8 oz) (n = 883)	1.98 (1.08-3.65)[g]	1.75 (0.88-3.46)	2.44 (1.04-5.71)[g]	1.68 (0.78-3.64)	1.92 (0.81-4.52)
Any breastfeeding/pumping breastmilk (n = 852)	0.85 (0.49-1.46)	1.02 (0.56-1.85)	0.82 (0.38-1.78)	0.73 (0.41-1.30)	0.95 (0.45-2.03)
Duration of breastfeeding: ≥6 mo (n = 440)[i]	1.17 (0.66-2.06)	1.37 (0.74-2.51)	1.60 (0.72-3.57)	0.78 (0.41-1.47)	0.87 (0.41-1.87)

Abbreviations: IPV, intimate partner violence; OR, odds ratio; RC, reproductive coercion.
[a] All models include covariates age, income, sexual or gender minority status, race, any children, and relationship status.
[b] Excludes participants who were currently pregnant or had an abortion or miscarriage.
[c] Sample sizes noted are for model 1; other sample sizes float to accommodate small amounts of missing data.
[d] Impact of RC on outcome, controlling for covariates.
[e] Impact of RC on outcome, controlling for IPV and covariates.
[f] Impact of each RC/IPV category on outcome, controlling for covariates.
[g] $P < .05$
[h] 6 or more days for cesarean, 3 or more days for vaginal.
[i] Includes only people who breastfed at all.

Table 4. Association Between Categories of Reproductive Coercion and Intimate Partner Violence Experiences and Mental Health Outcomes, Controlling for Covariates

	Adjusted Multiple Regression[a]				
			Model 3[e] (n = 1869)		
Mental Health Outcome[b]	Model 1[c] OR (95% CI) (n = 1905)	Model 2[d] OR (95% CI) (n = 1869)	RC Only OR (95% CI)	IPV Only OR (95% CI)	Both RC and IPV OR (95% CI)
Diagnosis of depression or anxiety during pregnancy	1.69 (1.34-2.14)[f]	1.44 (1.12-1.86)[f]	1.36 (0.96-1.93)	1.41 (1.06-1.89)[f]	2.18 (1.61-2.94)[f]
Moderate to severe depression at time of survey	2.19 (1.72-2.77)[f]	1.70 (1.31-2.20)[f]	2.00 (1.40-2.84)[f]	2.50 (1.86-3.34)[f]	3.57 (2.63-4.85)[f]
Any positive response to suicidality question on PHQ-9, at time of survey	2.31 (1.77-3.01)[f]	1.59 (1.18-2.13)[f]	1.51 (0.96-2.36)	2.79 (1.99-3.92)[f]	4.60 (3.31-6.40)[f]
Diagnosis of postpartum depression or anxiety since birth (n = 897)[g]	1.49 (1.01-2.21)[f]	1.30 (0.86-1.98)	1.78 (1.03-3.08)[f]	1.67 (1.08-2.58)[f]	1.47 (0.86-2.52)
Moderate to extreme anxiety at time of survey	1.58 (1.23-2.02)	1.13 (0.86-1.48)	1.37 (0.98-1.93)	3.14 (2.26-4.37)[f]	2.56 (1.82-3.59)[f]
Any positive response to suicidality question on PHQ-9, at time of survey, also controlling for anxiety and depression	1.69 (1.24-2.31)[f]	1.32 (0.94-1.84)	1.02 (0.61-1.70)	1.78 (1.21-2.63)[f]	2.85 (1.94-4.18)[f]

Abbreviations: IPV, intimate partner violence; PHQ-9, Patient Health Questionnaire; OR, odds ratio; RC, reproductive coercion.
[a] All models include covariates age, income, sexual or gender minority status, race, any children, and relationship status.
[b] Sample sizes noted are for model 1; other sample sizes float to accommodate small amounts of missing data.
[c] Impact of RC on outcome, controlling for covariates.
[d] Impact of RC on outcome, controlling for IPV and covariates.
[e] Impact of each RC/IPV category on outcome, controlling for covariates.
[f] $P < .05$.
[g] Excludes participants who were currently pregnant or had an abortion or miscarriage.

independent association with depression and anxiety in pregnancy, depression at the time of the survey, and suicidality, although PPD or postpartum anxiety and anxiety at the time of the survey appear to be explained by IPV. The impact of RC and IPV on suicidality, even in the absence of depression and anxiety, is a novel finding and particularly noteworthy, as it highlights the devastating impact of these experiences on survivors. Mental health conditions are a leading cause of maternal mortality,[50] and these findings help delineate some of this phenomenon's etiology.

Pregnancy outcomes associated with RC in bivariate analysis included unplanned and ambivalent pregnancy; late and minimal prenatal care; exposure to smoking, alcohol, and substances; bed rest; vaginal bleeding; severe nausea or vomiting; and PTL, and these all remained significant after controlling for covariates (model 1). Despite significant overlap in experiencing RC and IPV, many people experience only one, which helps elucidate the independent and synergistic effects of these behaviors. Differences between model 1 and model 2 suggest that IPV explains some of the poor pregnancy health outcomes but not all. Five pregnancy outcomes remained significant after controlling for IPV, indicating independent associations with RC (unplanned and ambivalent pregnancy, late or no prenatal care, smoke exposure, and severe nausea or vomiting). Six outcomes were no longer significant in model 2, indicating the relationship with RC is explained by IPV (minimal prenatal care, substance use, alcohol use, bed rest, vaginal bleeding, and PTL). Because most literature on RC and IPV is cross-sectional, it is possible that independent associations with either of these phenomena are related to the time course of survivor exposure to varied tactics. The significant association among IPV, RC, and pregnancy outcomes may be true across myriad manifestations of violence. Over time, as perpetrators resort to a more diverse array of behaviors to maintain power and control, the distinct and independent impacts of RC and IPV may be eliminated, accounting for the mixed associations with our findings. Furthermore, the impact of particular tactics may not be sufficiently captured by a binary metric (experienced vs not experienced). Severity, chronicity, co-occurrence with other forms of oppression, and meaningfulness to an individual will deepen or mitigate the objective harms of RC and IPV and may contribute to the varied picture of these findings.

Birth and neonatal outcomes associated with RC in bivariate analysis included PTB, need for labor induction, and LBW, and all remained significant in the adjusted model, controlling for covariates. Only one birth outcome, PTB, remained significant when controlling for IPV, indicating an independent association with RC. This is consistent with findings from one smaller study that found that being abused because they used contraception was associated with PTB in a cohort of IPV survivors,[31] but it was not consistent with the one other study examining birth outcomes, which found no association.[18] This is surprising given that our study found that experiencing preterm *labor* during pregnancy was explained by IPV and was not independently associated with RC. These differences may be because our study calculated the date difference between the actual and estimated date of birth to determine PTB. Although this, too, was subject to participant recall, it may be a more objective measure of PTL and PTB than self-report.

Several possible mechanisms may explain this study's findings. Physical trauma from IPV can cause pregnancy complications like vaginal bleeding due to placental separation. Coercive partners may restrict a pregnant person's access to regular and timely prenatal care. The ongoing stress of a violent and/or coercive relationship can cause mental health disorders such as depression or anxiety and may lead to unhealthy coping behaviors like smoking and substance use. Stress-mediated pathways and the activation of the hypothalamic-pituitary-adrenal axis may also be a causative factor in many of the outcomes, such as severe nausea or vomiting, PTL, PTB, and LBW.[51]

The Turnaway Study, a prospective cohort study of those who received or were unable to obtain a wanted abortion, provides perspective on the implications of our findings. In this study, abortion receipt was associated with decreased subsequent exposure to physical IPV,[52] and among those who gave birth, maternal health complications were greater at the 5-year follow-up.[53] Although not all who carried pregnancies to term were exposed to IPV, it highlights the important role of abortion in averting harm for individuals like those in our study, particularly among those who may have desired an abortion but were thwarted by partner interference. Finally, because abortion and miscarriage may decrease the risk of sustained exposure to violence, combining outcomes among all who had a recent pregnancy in this study may decrease the strength of associated health complications.

Implications

To our knowledge, this is the first study to identify multiple pregnancy and birth outcomes associated with RC and to explore the impact of RC on suicidality. The strong association between RC with other forms of IPV and suicidal ideation, even controlling for depression and anxiety, is an important finding, indicating the critical importance of suicide assessment and support by clinicians and victim advocates when working with survivors. For researchers, these findings also highlight the critical nature of improved understanding of phenomena like RC: the mental health impacts of RC may impact individuals through distinct pathways without more common risk factors for suicidality like depression.

Limitations

RC and IPV measures asked about these behaviors in the same time frame as the previous pregnancy (past 2 years) but did not specify if the person using these behaviors also fathered the pregnancy or about the temporality of RC and/or IPV with the incident pregnancy. However, the proximity of these 2 experiences still allows us to draw conclusions about possible stress-mediated pathways between RC and IPV and health outcomes. Data for this study were collected from an online crowdsourcing platform, which carries the risk of fraudulent responses. However, Prolific crowdsourcing platform recruits participants specifically for academic research studies and is shown to produce high-quality data[33] and to be appropriate for surveys on sensitive topics such as violence, mental health, and substance use.[36,54,55] We used several recommended fraud reduction strategies, including

spot checking for nonsensical answers and attention checks. Although data were collected anonymously, there is still a risk of social desirability bias and trigger avoidance leading to underreporting of sensitive topics such as abortion and violence, as well as a risk of a controlling partner influencing responses, which could underestimate some associations with violence. Health outcomes were mostly self-reported and were vulnerable to participant misunderstanding or misremembering, which could under- or overestimate their prevalence. Finally, the sample predominantly included White individuals, which limits generalizability as well as the ability to draw strong conclusions about the impact of interpersonal and structural racism on inequitable health outcomes. However, more than a quarter of participants identified as sexual or gender minority, which is a strength of the study, and helps shed light on a health disparity for an understudied population.

CONCLUSION

Given the growing attention to maternal health equity and maternal mortality, and disproportionate burden on populations experiencing marginalization, closer attention to mechanisms by which RC and IPV influence health outcomes is needed for tailoring interventions throughout the perinatal period. Although RC is a form of IPV, our findings underscore the importance of studying RC as its own construct in addition to other types of IPV due to its clear, independent impact on perinatal health outcomes.

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CONFLICT OF INTEREST

Karen Trister Grace reports receiving royalties from John Wiley & Sons. Kathryn Fay is a consultant for Medicines360. Elizabeth Miller reports receiving royalties for writing content for UpToDate, Wolters Kluwer. The other authors have no conflicts of interest to disclose.

SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

Appendix S1. Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Checklist

Appendix S2. Reproductive Coercion Measures

Reproductive Coercion Measures

Table S1. Pregnancy Outcomes and Exposure to Past 2 Years Reproductive Coercion Experience (n = 1,908)

Table S2. Birth and Neonatal Outcomes and Exposure to Past 2 Years Reproductive Coercion Experience (n = 900)

Table S3. Mental Health Outcomes and Exposure to Past 2 Years Reproductive Coercion Experience (n = 1,908)

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