Boston College

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ASSOCIATIONS BETWEEN REPRODUCTIVE COERCION, INTIMATE PARTNER VIOLENCE, AND ADVERSE BIRTH OUTCOMES AMONG POSTPARTUM WOMEN

a dissertation

by

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Abstract

Associations between reproductive coercion, intimate partner violence, and adverse birth outcomes among post-partum women

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Background: Reproductive coercion (RC) is a form of intimate partner violence (IPV) involving a partner's control of a woman's reproductive health decisions regarding pregnancy and childbearing. RC is associated with numerous negative health consequences; however, the impact on a pregnancy and developing fetus and association with adverse birth outcomes is not known.

Design: Secondary analysis of Pregnancy Risk Assessment Monitoring System (PRAMS) data, 2012 – 2015, from five states.

Purpose: To examine whether RC before pregnancy is associated with an increased likelihood of experiencing preterm birth (< 37 weeks gestational age), neonatal intensive care (NICU) after birth, and infant death.

Method: Data on women ages 17 years and older who gave birth to a live infant (N = 18,728) were analyzed. Logistic regression procedures were used to determine the odds of preterm birth, infant death, and need for NICU care among women experiencing RC while controlling for known risk factors (age, race, ethnicity, education, marital status, depression, drinking, and smoking). The moderation effect of IPV on the relationship of RC and birth outcomes was tested by including an interaction term (product of RC and IPV) in the model.

Results: No significant association between RC and preterm birth, need for NICU care, or infant death was detected. Additionally, exposure to IPV did not have a moderating effect on either the direction or magnitude of the relationship between RC and birth outcomes.

Conclusions: Despite these findings, RC remains a significant concern for nurses caring for pregnant women and women of reproductive age. This study highlights a current gap in knowledge about the ways RC can affect a pregnancy and birth outcomes. Replication studies using more robust measures of RC and data collection approaches that can most accurately identify RC experiences are needed to increase understanding.

Key words: reproductive coercion, intimate partner violence, birth outcomes, nursing, women's health

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Statement of the Problem

Reproductive coercion (RC) is a form of intimate partner violence (IPV) and an emerging concern in maternal and perinatal healthcare (Fay & Yee, 2020; Miller, Decker et al., 2010). RC, first described in 2010 by Miller et al., is broadly defined as deliberate attempts to control a woman's reproductive decisions related to pregnancy and childbearing (Grace & Anderson, 2016; Miller, Decker et al., 2010). Much like other forms of IPV**,** RC can lead to a multitude of adverse physical and mental health consequences including unintended pregnancy, sexually transmitted infections (STIs), gynecological disorders, and depression (Alexander et al., 2021; Kazmerski et al., 2015; McCauley, Falb et al., 2014; Miller, Decker et al., 2010; Moore et al., 2010). Research to-date, however, has focused almost exclusively on the health consequences of RC for the woman. As of yet, the impact of RC on a pregnancy and a developing fetus have received little scholarly attention. RC can manifest as physical violence, sexual violence, and control over a partner through the use of fear and power. It is plausible that the sequelae from these behaviors—physical trauma, stress, substance use, lack of contraception, and a limited ability to access health care—could negatively impact a pregnancy and increase the likelihood of adverse birth outcomes. Adverse birth outcomes such as low birth weight (LBW) and preterm birth (PTB) are significant risk factors for infant mortality and morbidity. Furthermore, racial disparities in PTB, LBW, and infant mortality, particularly for Black women, have persisted for decades, and alarmingly, have worsened in recent years (Ely & Driscoll, 2021; Kirby, 2017; Thoma et al., 2019). Understanding the specific impact of RC on a pregnancy and its contribution to poor birth outcomes may provide new insight to these significant and seemingly intractable problems.

RC is defined as the behaviors an intimate partner engages in to control or dictate an individual's reproductive health decisions, particularly related to the use of contraception, whether to become or stay pregnancy, and whether or if to bear children. These behaviors are predominately seen in male partners directed toward women of child-bearing age. RC occurs when male partners "demand or enforce their own reproductive intentions" without regard for the woman's desires through physical violence or emotional and psychological means (Moore et al., 2010, p. 1738). These coercive behaviors undermine a woman's ability to make autonomous decisions regarding her reproductive health and can be used to maintain dominance and control in a relationship (Grace & Anderson, 2016; Moore et al., 2010). The inability to control or make decisions about one's reproductive life has enormous bearing not only on a woman's physical health but also on her mental health, leading to adverse outcomes in both realms that often persist beyond the RC experience (Herd et al., 2016; Upadhyay et al., 2014). The impact of coercion around reproduction and childbearing may also extend to the health of the developing fetus and infant after it is born.

RC encompasses a wide spectrum of physical, psychological, and sexual behaviors enacted by an intimate partner (American College of Obstetricians and Gynecologists [ACOG], 2013a; Grace & Anderson, 2016; Miller, Decker et al., 2010). Central to all behaviors, however, is the use of fear, power, and control to control a woman's reproductive decisions and thus her reproductive outcomes (Alexander et al., 2019; Lévesque et al., 2020; Tarzia & Hegarty, 2021; Tarzia et al., 2019). RC behaviors have been conceptualized as belonging to one of three domains: (a) birth control sabotage (BCS), (b) pregnancy coercion, and (c) abortion coercion. Although the terminology naming these domains is still evolving, understanding of these domains is crystallizing. BCS, the most commonly experienced dimension, is defined as the

prevention of the use of or interference with the chosen birth control method to render it ineffective to increase the likelihood of a pregnancy occurring. Examples of BCS include throwing away birth control pills, removing vaginal rings or other intrauterine devices, and breaking or poking holes in condoms (Lévesque & Rousseau, 2019; Miller, Decker et al., 2010; Moore et al., 2010). BCS can also be achieved through psychological manipulation, such as shaming or belittling a woman for using birth control and withholding money or transportation to prevent a woman from accessing clinic services or filling prescriptions (Grace, Alexander, et al., 2020; Moore et al., 2010).

Pregnancy coercion, also referred to as pregnancy promotion or pregnancy pressure, is defined as pressuring a woman into becoming pregnant when she does not willfully desire to be pregnant (Grace & Anderson, 2016; Miller, Decker et al., 2010; Swan et al., 2020). Tactics of pregnancy coercion often take the form of emotional abuse (e.g., threatening to leave the relationship or accusing her of infidelity if she does not become pregnant, questioning her worth if she does not have children, wanting to tie the woman to him, or emphasizing undesirable weight gain; Clark et al., 2014; Holliday et al., 2018; Moore et al., 2010; Nikolajski et al., 2015; Paterno et al., 2018; Thiel de Bocanegra et al., 2010). RC can be enacted through physical tactics as well including physical force or harm, threats of physical harm, and forced unprotected sex with the explicit intent to promote pregnancy (Katz et al., 2017; Thiel de Bocanegra et al., 2010).

Abortion coercion, the third dimension, is pressure to either terminate or not to terminate a pregnancy against or without regard for the woman's desires (Grace & Anderson, 2016; Rosenbaum & DiClemente, 2020; Tarzia & Hegarty, 2021). Forcing a woman to continue a pregnancy when she does not wish to be pregnant is usually achieved by emotional manipulation or physically preventing her from seeking or obtaining an abortion (Grace & Anderson, 2016;

Moore et al., 2010; Nikolajski et al., 2015). Examples of such tactics are withholding money or transportation to the clinic (Moore et al., 2010; Nikolajski et al., 2015); causing a disturbance at the clinic so she will leave to avoid public embarrassment (Moore et al., 2010; Thiel de Bocanegra et al., 2010); or forcing her to consume food, causing a delay or cancellation of the procedure (Moore et al., 2010). Other tactics include engaging in emotional attacks on her values in choosing abortion, guilting, belittling or shaming her, or threatening to leave the relationship or withhold financial support for the baby (Lévesque & Rousseau, 2019). Male partners have also used physical tactics to enforce their desires for the pregnancy on women, including physical assault on a woman, particularly attempts to hit or injure the abdomen with the intent of causing harm to the fetus and miscarriage (Grace, Perrin, et al., 2020; Moore et al., 2010; Tarzia & Hegarty, 2021).

Birth Outcomes in the United States

LBW (less than 1,500 grams) and PTB (births at less than 37 weeks' gestation) have significant and costly health consequences on maternal and child health and are determinants of health later in life (Luu et al., 2016; Wu et al., 2018). They are powerful predictors of infant survival, the need for advanced medical care, and the likelihood of ongoing intervention to support optimal infant growth and development. Improving rates of LBW and PTB have been the central focus of public health strategies in maternal and infant health in recent years. However, despite targeted efforts, LBW and PTB remain relatively unchanged in the United States. In 2019, 8.3% of all births were infants with LBW, the highest rate since 2006 (Martin et al., 2021). More worrisome, the LBW rate has trended upward since 2014. Additionally, Black women are twice as likely to deliver an infant with LBW (14.2%) as both White women (6.9%)

and Hispanic women (7.6%). Since 2016, LBW rates among Black and Hispanic infants have continued to increase while rates among White infants have declined.

PTB rates are even more concerning. In 2020, 10.1% of all infants were born prematurely. Although this was a slight decline from 10.2% in 2019, PTB rates increased in 15 states and remained the same in four states (Martin et al., 2021). Prior to 2020, the PTB rate had been trending upward since 2014 (Osterman et al., 2022). Additionally, significant disparity exists between racial groups regarding PTB rates. The PTB rate among Black women in 2020 was 14.35 compared to 9.10 among White women (Osterman et al., 2022). Between 2016 and 2019, the increase in PTB rates among Black and Hispanic women (4.5%, 5.5% increase, respectively) was twice the rate of increase among White women (2.4% increase). States with the highest PTB rates, ranging from 11.8% to 14.2% well above the national average, are concentrated in the southeast, an area with a high proportion of Black women (Osterman et al., 2022).

LBW and PTB have significant and costly consequences on maternal and child health and are determinants of health later in life (Luu et al., 2016; Wu et al., 2018). Infants born with LBW often experience severe health problems and developmental issues, some of which become chronic (Brownridge et al., 2011; Nesari et al., 2018). Infants born prematurely are at risk for chronic diseases such as cardiovascular disorders, diabetes, and mental health problems (Luu et al., 2016). These issues are experienced disproportionately by women of color, especially Black women, and as of yet, RC has not been examined as an underlying cause.

RC and Birth Outcomes

There is strong evidence that IPV is associated with adverse birth outcomes including LBW and PTB (Campbell et al., 2000; Coker, 2007; Coker et al., 2004). However, the precise

mechanisms through which IPV leads to these outcomes is not well understood. It is plausible that RC may have a similar association with these and other adverse birth outcomes and an examination of this potential association may offer insight into the complex factors leading to a higher risk for poor birth outcomes.

To-date, only two studies have specifically looked at birth outcomes and RC. Fay and Yee (2020) reported that in a survey of pregnant women (n = 210) in an obstetrics and gynecology clinic, those who reported experiences of RC were more likely to deliver an infant with LBW. Liu, McFarlane et al. (2016) reported that women (n = 285) who were abused because they used birth control were 8 times more likely to deliver an infant prematurely. That same study also reported that women were 1.5 times more likely to have an abuse-related miscarriage if she was abused for using birth control.

Prevalence of RC

Current research examining the extent of RC indicates that between 5% and 30% of women, depending on population and setting, have experienced coercion related to pregnancy at some point in their lives (Grace & Anderson, 2016; Grace, Perrin, et al., 2020; Miller et al., 2014; PettyJohn et al., 2021; Swan et al., 2020). One national-level study estimated that 9% of all women in the United States have experienced RC (Black et al., 2011; Breiding et al., 2014). Given the social stigma and intense emotions that can accompany disclosure of RC, most reported estimates are widely believed to underestimate the actual number of women who are affected (Tarzia & Hegarty, 2021).

Furthermore, evidence is accumulating that women of color, particularly Black and multiracial women, disproportionately experience RC (Holliday et al., 2017; Moore et al., 2010; Nikolajski et al., 2015; Paterno et al., 2018). Recent studies on the prevalence of RC among

racial and ethnic populations have consistently found rates among Black women that are 2 to 4 times higher than among White women (Holliday et al., 2017; Miller et al., 2014; Miller & Silverman, 2010; Moore et al., 2010; Nikolajski et al., 2015). Reported rates of RC among multiracial women are almost twice that of White women (Holliday et al., 2017; Miller, Decker et al., 2010). In one qualitative study of women who had experienced IPV (n = 71), 60% of Black participants had also experienced RC compared to only 26% of White participants. RC is a potential yet unconsidered underlying contributor to PTB and LBW. Given the extent of RC among women of color, an examination of the role of RC as a contributor to these outcomes may lead to a deeper understanding of the cause of racial disparities in infant health outcomes.

Purpose of Study

Currently, only one study has evaluated the independent association between adverse birth outcomes with RC (Fay & Yee, 2020). The purpose of this study was to examine whether RC before pregnancy is associated with an increased likelihood of adverse perinatal health outcomes among a population-based sample of women who recently gave birth. Drawing on the current literature linking IPV to adverse birth outcomes (i.e., LBW, infant mortality, and PTB), this study sought to determine if similar associations exist between RC and LBW, PTB, neonatal intensive care (NICU) after birth, and infant death.

Research Question and Hypotheses

The research question was "What is the association between exposure to RC prior to pregnancy and an increased likelihood of experiencing an adverse birth outcome?" The specific aims were as follows: (a) To examine the odds of experiencing an adverse birth outcome among postpartum women exposed to RC prior to pregnancy and (b) test the interaction effect of exposure to RC and IPV on birth outcomes. The hypothesis was that women exposed to RC in

the form of BCS prior to a pregnancy were more likely to experience one or more adverse birth outcomes than women who are not exposed to RC. Further, the hypothesis was that exposure to RC amplified the effect of IPV on the likelihood of experiencing an adverse birth outcome.

Definition of Terms

Reproductive Coercion (RC): Behaviors or actions on the part of an intimate partner to control the reproductive health decisions of an individual capable of becoming pregnant (ACOG, 2013a).

Birth Control Sabotage (BCS): The most common domain of RC; it has been conceptualized as deliberate acts by an intimate partner to directly or indirectly interfere with or prevent the use of contraceptives (Clark et al., 2014; Miller, Decker et al., 2010; Moore et al., 2010; Nikolajski et al., 2015). Several studies have found the most frequent tactics of BCS reported by women were related to condom use, either through rendering it ineffective through manipulation, destruction, or removal, or by refusal to use (Miller, Decker et al., 2010; Northridge et al., 2017; Sutherland et al., 2015). For this study, BCS serves as the measure of RC. It is measured as interference, as defined by the woman, with her chosen method of birth control with the intent to cause pregnancy.

Intimate Partner Violence (IPV): Violence, abuse, or aggression that occurs within an intimate or sexual relationship (Bagwell-Gray et al., 2015; Breiding et al., 2015). For the purposes of this study, IPV is defined as physical violence in the form of pushing, hitting, slapping, kicking, choking, or other ways of physically hurting an intimate partner.

Intimate Partner: An intimate partner is a partner in a sexual or dating relationship (Bagwell-Gray et al., 2015; Breiding et al., 2015) as well as anyone with whom there is “a close personal relationship, characterized by emotional connectedness, ongoing physical contact,

sexual behavior, identity as a couple, and familiarity and knowledge about each other's lives" (Breiding et al., 2015, p. 11). Intimate partners include spouses (through marriage, common-law, or civil union), boyfriends, dating partners, and ongoing sexual partners. Intimate partners may or may not be cohabitating. In this study, an intimate partner is limited to a husband or partner as identified by the respondent.

Gestational Age: The duration of a pregnancy, clinically considered to be the period of time between the fertilization of the egg and the birth or delivery of the infant. Since the moment of fertilization is often not known, gestational age is estimated either from the date of the woman's last menstrual period, or based on clinical obstetric indicators (e.g., fundal height) (ACOG, 2013b). Gestational age is calculated to the nearest week and day. An infant is considered to have reached term or completed gestation when delivery occurs on or after 37 weeks and 0 days (American Academy of Pediatrics [AAP] & ACOG, 2017).

Preterm Birth (PTB): The birth of an infant prior to 37 completed weeks of gestation (ACOG, 2013b; World Health Organization [WHO], 2022). A completed gestational age of less than 37 weeks is recognized as the standard definition of PTB by the WHO as well as most organizations of obstetric healthcare professionals including the ACOG, American Academy of Family Physicians, American College of Nurse-Midwives, Association of Women's Health, Obstetric and Neonatal Nurses, and Society for Maternal–Fetal Medicine. This definition of PTB is used in this study.

Infant Death: In epidemiological terms, infant deaths are deaths that occur within the first 12 months of life and are used to calculate infant mortality rates and infant death rates for a population (Adams et al., 2010). However, because the Pregnancy Risk Assessment Monitoring System (PRAMS) survey is administered within 2–6 months after delivery, infant death using

this definition cannot be accurately measured. For the purposes of this study, infant death refers to the death of an infant who was born alive prior to the time of the survey.

Review of the Literature

Theoretical Framework

Theory is used in quantitative research to substantiate predictions about relationships among concepts of interest, deductively derive questions and hypothesis, and evaluate findings for the degree of support of the chosen theory (Creswell, 2014; Polit & Beck, 2012). Theoretical frameworks provide an "overarching explanation for how and why one would expect the independent variable to explain or predict the dependent variable" (Creswell, 2014, p. 54). In formulating a theoretical perspective for studying the impact of RC on a pregnancy, the socioecological model provides a useful theoretical framework to guide study design. The etiology of pregnancy outcomes is influenced by a multitude of risk factors and exposures experienced by a woman within her specific social environment. Ecological theories seek to integrate perspectives from the specific domains of biology, psychology, and sociology to understand how specific health outcomes, such LBW and PTB, may be shaped by individual factors as well as factors within the broader societal context in which women live. Socioecological models have previously been used in research examining adverse perinatal health outcomes including PTB, infant morbidity and mortality, and maternal mortality, and provide a useful framework for examining the impact of RC on these outcomes (Alio et al., 2010; Giurgescu et al., 2022).

The social ecological model (SEM) is a theory-based framework that views health as a function of individuals and their interaction with the environment. The SEM theoretical framework evolved from the seminal work done by Urie Bronfenbrenner on human development in the 1970s, which was subsequently formalized into a theory in the 1980s (Bronfenbrenner, 1977, 1979). Bronfenbrenner theorized that human behavior was influenced by interactions of

individuals with their social environment at multiple and interconnected levels. The SEM centers the individual within five nested hierarchical layers: microsystem, mesosystem, exosystem, macrosystem, and chronosystem (Bronfenbrenner, 1979). The SEM asserts that determinants influencing health extend across and between these multiple levels and that health outcomes are influenced not only by intrapersonal attributes but also by the social environment within which humans are embedded (Alio et al., 2010). Further, the model emphasizes the *interaction* between individuals and their environment including with other people within their social circle, the wider community, and societal structures as a determinant of health. Because the concept of health is broadly conceptualized in the SEM, it has wide-ranging applicability in nursing research and provided a useful framework for this study.

In the SEM, the individual is centered within multiple layers of influence, the first of which is the microsystem. The microsystem encompasses individual factors that can influence health and health outcomes. Microsystem factors are closest to the individual and exert the strongest influences on individual health outcomes. This level also encompasses the interactions and relationships between the individual and their immediate surroundings. Intrapersonal factors include intrinsic characteristics such as age and gender; sociodemographic characteristics such as education and income; and cognitive factors such knowledge, attitudes, and beliefs. The individual level also includes biologic and genetic factors such as individual health history, nutritional status, and medical conditions; behavioral factors such as smoking and substance use behaviors; and psychosocial factors such as stress, anxiety, and depression (Vamos et al., 2022). Individual factors such as psychological stress, and stress-related biological mechanisms (e.g., cortisol, systemic inflammation) may moderate the effect of RC on birth outcomes.

The second level, the mesosystem, emphasizes the role of interpersonal relationships and their influence on health outcomes for an individual. Relationships with family, particularly intimate partners, but also parents, children, friends, and peers, are considered in this level. Other social relationships such as with a healthcare provider, teachers, or coaches are also described within this level. Partner influence or approval of contraception is an example of interpersonal-level factor-influencing behavior.

The exosystem, or community level, looks beyond immediate interactions to consider the role of healthcare systems, schools, workplaces, neighborhoods, and churches in determining health. This level refers to the availability and access to healthcare services, including prenatal care, contraceptive care, and primary healthcare services.

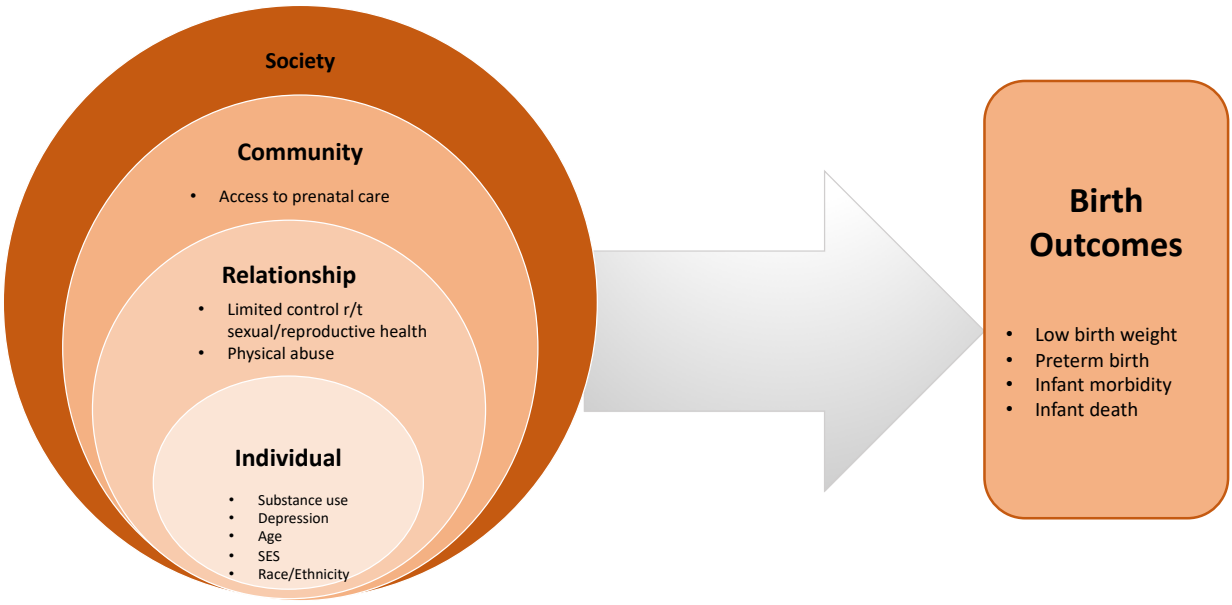
Finally, the societal level considers the role of macrosystems, such as societal structures and norms, political systems, religious systems, and cultural influences, on individual behavior. Although these systems may not have a direct impact on individual behavior, they exert both negative and positive interactive forces on individuals living within them. The chronosystem, the outermost level, refers to internal and external elements to time and historical context.

Applying the socioecological model to perinatal health suggests that birth outcomes are impacted by individual and relationship characteristics (Alio et al., 2010). Causal factors of LBW, PTB, and other adverse birth outcomes are complex and multifactorial. However, as shown in Figure 1, there is much evidence linking socioeconomic factors (e.g. low education, low income), chronic stress, IPV, and inadequate prenatal care to a higher incidence of PTB and other adverse perinatal health outcomes (Handler & Kennelly, 2022; Nesari et al., 2018; Pastor-Moreno et al., 2020). This study sought to examine a relationship factor, RC, and its potential

impact on birth outcomes, while controlling for individual factors known to negatively impact a pregnancy.

Figure 1

Ecological Approach to Birth Outcomes



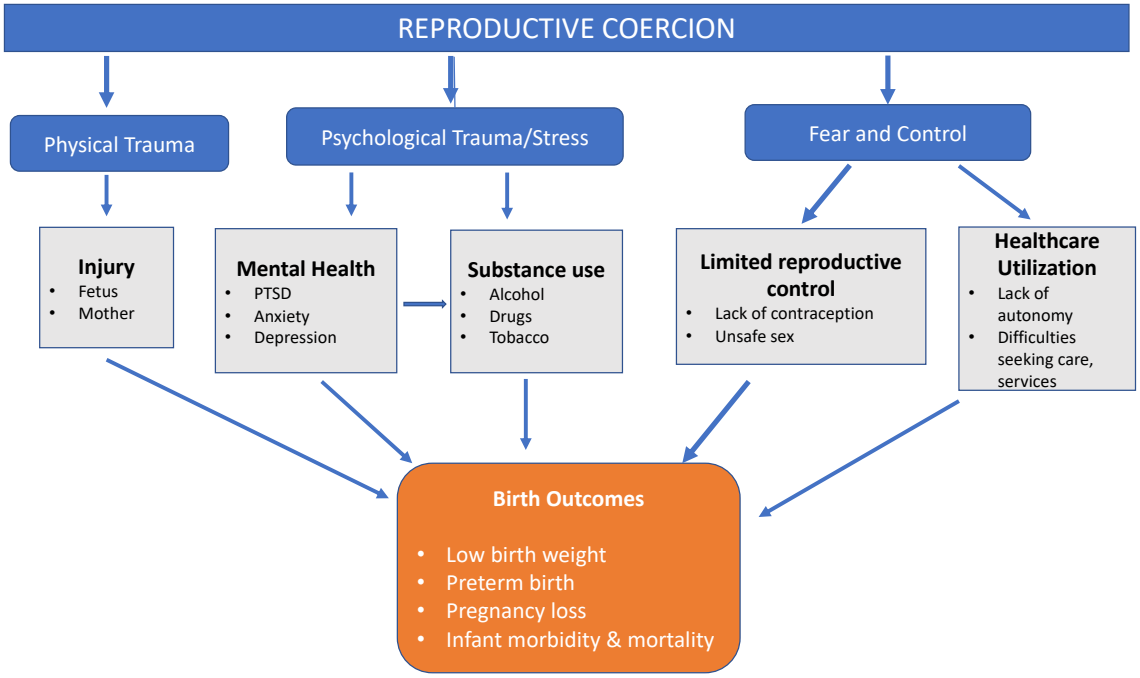
Pathways and Health Effects of IPV

The health consequences from IPV have been extensively documented. The WHO has put forth a conceptual framework based on existing literature on health consequences from IPV, which has been widely adopted in the academic and practice community. This framework outlines the pathways that suggest IPV can lead to negative health consequences in several domains: physical health, mental health, and sexual and reproductive health. The model shows several pathways linking IPV to LBW infants, PTB, and other adverse perinatal outcomes and, although not linked in the model, a third pathway linking physical trauma and perinatal health

has also been substantiated. The framework now includes a pathway linking forms of abuse centered on fear and control, such as RC, to negative maternal and perinatal health outcomes (Garcia-Moreno et al., 2013). Using this framework and the models proposed by Coker (2007) and Moore et al. (2010), a conceptual framework outlining potential pathways linking RC to perinatal health outcomes was developed to ground this study as depicted in Figure 2.

Figure 2

Pathways Between RC and Birth Outcomes



Literature Review

RC is a newly described phenomenon, and the body of research to-date is not extensive. This review includes literature published since 2010 when RC was first described in a seminal article by Miller, Decker, et al. (2010) and is limited to RC in adult women from a male intimate partner. RC overwhelmingly affects women of childbearing age who have sex with men and the

majority of extant literature on RC is in this population. Although RC can occur within same-sex relationships, in a female-to-male direction, and within other familial relationships (e.g., parents or parents-in-law as perpetrators), the research on RC within these relationship dynamics is scant. Research on RC within these other dynamics was outside the specific focus of this dissertation study and, therefore, is not included in this review. Additionally, within the field of sexual and reproductive health, the recognition exists that not all people who can get pregnant identify as women, and RC can be experienced by individuals with nonnormative gender identities. The literature published to-date on RC, for the most part, has not included examination of gender identity and has primarily only included participants who identify as gender-normative women. RC in transgendered and gender-diverse individuals has not yet been explored and is an area rich for future exploration.

Definition

Although the terminology is still evolving, RC has been described as belonging to one of three dimensions: (a) BCS (i.e., direct or indirect deliberate interference with contraception), (b) pregnancy coercion (i.e., forcing or pressuring a woman to become or to stay pregnant), and (c) abortion coercion (i.e., controlling or dictating the outcome of a pregnancy once it has occurred either by preventing a wanted termination or coercing a woman to seek termination against her wishes; Fleury-Steiner & Miller, 2019; Grace & Anderson, 2016; Miller, Decker, et al., 2010; Moore et al., 2010).

BCS. BCS, also described as contraception sabotage, is one of three dimensions of RC that has been described in the literature. This behavior has been conceptualized as deliberate acts by an intimate partner to interfere with, or prevent the use of, contraceptives to increase the likelihood of a pregnancy (Clark et al., 2014; Gidycz et al., 2006; Grace, Alexander, et al., 2020;

Miller, Jordan, et al., 2010; Moore et al., 2010). These behaviors can take the form of direct acts such as throwing away birth control pills or other single-use contraceptive methods, breaking or poking holes in condoms, surreptitious condom removal during sex, and forced removal of vaginal rings or intrauterine devices (Clark et al., 2014; Katz et al., 2017; Lévesque & Rousseau, 2019; Miller, Decker, et al., 2010). Indirect interference with the use of contraceptives includes emotional or psychological attempts to convince a woman not to use birth control, or by preventing her from obtaining birth control by blocking access to clinics or resources to purchase over-the-counter methods (Borrero et al., 2015). A partner may threaten violence or physical harm. He may also use emotional or psychological threats such as accusing a woman of infidelity if she wants to use or requests him to use contraceptives, demeaning her worth if she does not provide children, and discouraging the use of hormonal birth control due to the potential for undesirable weight gain to occur (Moore et al., 2010; Thiel de Bocanegra et al., 2010). Other examples include preventing a woman from attending family planning clinics or getting prescription refills by withholding money or transportation (Grace, Alexander, et al., 2020; Moore et al., 2010). Several studies have found the most frequent tactics of BCS reported by women experiencing RC were condom manipulation and nonuse, either through rendering it ineffective through manipulation, destruction, or removal, or by refusal to use (Miller, Decker, et al., 2010; Northridge et al., 2017; Phillips et al., 2016; Sutherland et al., 2015; Swan et al., 2020).

Pregnancy Coercion. Pregnancy coercion is the second dimension of RC described in the literature. This dimension has also been described using the terms “pregnancy pressure” or “pregnancy promotion.” Pregnancy coercion is described as physical, verbal, or psychological behaviors or actions to coerce a woman into becoming pregnant or staying pregnant when she does not want to be (ACOG, 2013a; Miller, Decker, et al., 2010; Swan et al., 2020). Examples

include forced unprotected sex; physical harm or threat of harm to the women if she does not become pregnant; emotional or psychological coercion using threats to leave the relationship; questioning her worth if she does not have children; and guilting, belittling, or shaming a woman for not wanting to become pregnant or continue a pregnancy (Clark et al., 2014; Grace, Alexander, et al., 2020; Moore et al., 2010; Paterno et al., 2018).

Abortion Coercion. Abortion coercion is a third dimension of RC described in the literature. This term is used to describe a partner's attempts to control the outcome of a pregnancy and can be exerted in either of two directions: as pressure to terminate a pregnancy, or pressure to prevent a woman from terminating a pregnancy if she so desires (ACOG, 2013a; Chibber et al., 2014; Foster et al., 2012; Miller, Decker, et al., 2010; Moore et al., 2010; Silverman et al., 2011). This includes both forcing a woman to continue or terminate a pregnancy she wants to keep (Grace & Anderson, 2016; Nikolajski et al., 2015; Thiel de Bocanegra et al., 2010).

A variety of specific tactics used to coerce an end to a pregnancy have been documented in the literature. Male partners have engaged in physical abuse to the woman such as by kicking or striking her in the abdomen to cause harm to the fetus and induce miscarriage (Grace, Perrin, et al., 2020; Moore et al., 2010; Tarzia & Hegarty, 2021). Emotional manipulation to pressure a woman into an abortion has also been described, such as threatening to leave the relationship, kick her out of their shared home, or withhold financial support for the woman and baby (Lévesque et al., 2020; Tarzia, 2020).

Preventing a woman from seeking an abortion is the more common direction of abortion coercion. Tactics used to prevent termination of a pregnancy include preventing access to abortion care by withholding money or transportation (Moore et al., 2010; Nikolajski et al.,

2015), causing a disturbance at the clinic so the woman leaves to avoid embarrassment or involvement of law enforcement (Grace & Anderson, 2016; Thiel de Bocanegra et al., 2010), and forcing a woman to eat so that the termination procedure cannot be performed (Miller, Decker, et al., 2010; Moore et al., 2010).

This dimension of RC is particularly difficult to measure due, in part, to the sensitivity around abortion and motherhood. Women may be reluctant to disclose being forced into an abortion because of the stigma associated with abortion and not wanting children. Additionally, many measurements of RC do not assess abortion coercion or directing the outcome of pregnancy. The Reproductive Coercion Scale (RCS), which is the only validated instrument for measuring RC, and has been the most widely used, does not measure abortion coercion; therefore, the extent of this form of RC is largely unknown (McCauley et al., 2017).

Intent

In the scholarship that has emerged since RC was first described, some have asserted that a defining characteristic of RC is a deliberate *intent* to promote or prevent a pregnancy (Tarzia & Hegarty, 2021; Tarzia et al., 2019). It has also been noted in the literature that many of these actions described as RC can also take place without an explicit intent to cause a pregnancy, for example, "stealthing," which is the nonconsensual removal of a condom during sex primarily for increased pleasure but which may also lead to pregnancy (Tarzia et al., 2020). Tarzia et al. (2019) were the first to suggest that there is a distinction between forced unprotected sex and forced reproduction; hence intent becomes the "*defining characteristic of reproductive coercion*" that distinguishes RC from other types of physical and sexual violence that may lead to pregnancy (p. 8). Scholars argue that specific intent to cause a pregnancy distinguishes violence that is reproductive in nature from other forms of IPV that are sexual in nature, such as in forced

unprotected sex for reasons other than to cause a pregnancy (Tarzia et al., 2019; Thaller & Messing, 2016). Coercive behaviors related to reproduction enacted without an explicit intent to promote or end a pregnancy have also been defined as RC and have been criticized as contributing to a "lack of conceptual clarity" around the term RC, which has led to wide variability in the measurement of RC and an inability to draw meaningful conclusions about RC's nature and extent (Tarzia et al., 2020, p. 1181).

On the contrary, other scholars suggest that a specific intent to control reproductive health decisions is not a prerequisite to consider an action as RC as intent does not factor into the consequences or lessen the impact on reproductive decisions. Additionally, the perpetrator's intent is usually not measured or known and therefore cannot be factored into identifying RC. Furthermore, screening and intervention are not likely to be significantly different based solely on intent. Several qualitative studies have examined women's perceptions of male intent and found that men were motivated to establish a strong connection to a partner such as through a child because of "emotional as well as utilitarian" needs such as emotional support and connection to the outside during incarceration, or to provide for his basic needs, and a home to return to once no longer incarcerated (Nikolajski et al., 2015, p. 221; Paterno et al., 2018). Currently, there is no consensus on whether intent should be considered a defining characteristic of RC and further exploration of the male's perspective is needed to fully understand the role of intent and how intent modulates the perpetration of RC (Tarzia & Hegarty, 2021).

Power and Control

Recent literature has examined the concept of power and control and there is support that power and control is a central characteristic of RC behaviors (Alexander et al., 2019; Grace, Alexander, et al., 2020; Lévesque & Rousseau, 2019; Tarzia & Hegarty, 2021; Tarzia et al.,

2019). Tarzia and Hegarty (2021) proposed an expanded definition of RC that "centers the elements of intent, fear, and control," asserting that the need for control and holding power over a partner is a central defining characteristic of RC:

> Reproductive coercion and abuse is defined as any deliberate attempt to dictate a woman's reproductive choices or interfere with her reproductive autonomy. It can include physical, psychological, or sexual tactics, and occurs in a **context of fear and/or control** in an interpersonal relationship. (p. 8)

Several studies have documented perceptions of power and control as motivating factors in RC. Tarzia et al. (2019) explored the perceptions of RC among healthcare professionals, including nurses, as reported by their female patients. Tarzia et al. (2019) reported that many of the participants identified that "control and autonomy were key to understanding reproductive coercion" (p. 8). The participants in this study identified numerous aspects of control, including control over contraception, control over a woman's own body, control over another person, and lack of autonomy in decision-making around reproductive health issues as central to women's descriptions of RC experiences. Additional studies have also reported control as a central feature of RC. Some reasons that have been reported by Black men who have engaged in tactics to coerce or convince a woman to become pregnant include "wanting to tie her to him forever" (Moore et al., 2010, p. 1739) and wanting to establish stability through the connection of having a child together such as prior to extended incarceration (Alexander et al., 2018; Alexander et al., 2019; Moore et al., 2010). In a study of gang-affiliated Latina women, Miller et al. (2011) reported that perceived male's reasons for actively trying to get a partner pregnant included "wanting to have a nuclear family or that they wanted a way to make the woman stay in the relationship" (p. 78). Holliday et al. (2018) reported that women described that their partners

used the connection with their children as a means to leverage control over a woman's reproductive decisions to align with his own desires and intentions. In a qualitative study of RC in women from ethnic and minority backgrounds, Tarzia, Douglas et al. (2021) found that the use of pregnancy as a mechanism of control was identified as a major theme and that forcing women to be "constantly pregnant and caring for small children effectively imprisoned women in the home" (p. 8).

RC has been conceptualized as the mechanism by which an abusive partner can exert control over a woman (Grace, Alexander, et al., 2020; Katz & Sutherland, 2017; Kazmerski et al., 2015; Lévesque & Rousseau, 2019; Tarzia et al., 2019). Women's "bodies [are] held hostage by a partner…. through the fear that they will be harmed, physically, psychologically, financially, or sexually" (Tarzia & Hegarty, 2021, p. 2). By " using a woman's reproductive capacity as a weapon against them" (Tarzia et al., 2019, p. 1396), RC can be used as a mechanism to control a partner both in the near-term and potentially for life if a child results between the two partners. Being tied to a partner through a child can lead to economic dependence on the partner, thereby limiting her ability to leave an abusive partner.

RC as a Form of IPV

RC has been conceptualized as a "distinct subtype of intimate partner violence" (Fay & Yee, 2018, p. 519) in which an intimate partner uses threats, intimidation, or violence to direct or control an individual's reproductive health decisions (ACOG, 2013a; Grace & Anderson, 2016; Miller, Jordan, et al., 2010; Miller et al., 2014; Moore et al., 2010; Tarzia et al., 2019). RC has been called a "*neglected form of violence against women*" (Tarzia et al., 2020, p. 1175); "*a gendered form of coercive control*" (Fleury-Steiner & Miller, 2019, p. 1236); and a "*hidden form of intimate partner violence*" (Tarzia et al., 2019, p. 1402). IPV is widely understood to include

not only physical acts of violence but also the use of fear and emotional manipulation as mechanisms of control of an intimate partner (Chavis & Hill, 2009; Domestic Abuse Prevention Programs, n.d.). Psychological and emotional abuse, including coercive tactics, has been incorporated into the uniform definition of IPV (ACOG, 2012; Breiding et al., 2015). Coercive behaviors directed at controlling reproduction such as interference with the use of contraception and coercing a woman into a pregnancy and child-bearing certainly align with this conceptualization of IPV (Fay & Yee, 2018; Moore et al., 2010). Broadening understanding of the different types of tactics used by an abusive partner can inform efforts to target support and intervention for women experiencing this type of abuse (Fleury-Steiner & Miller, 2019).

Scholarly debate has arisen, however, about whether RC is a distinct phenomenon in itself rather than another a form of IPV (Fleury-Steiner & Miller, 2019; Grace, Decker, et al., 2020; Tarzia & Hegarty, 2021; Tarzia et al., 2019). Tarzia and Hegarty (2021), for example, asserted that centering intent in the definition of RC helps distinguish RC behaviors that are specifically directed at controlling reproduction from other types of sexual violence such as stealthing (i.e., the surreptitious nonconsensual removal of condoms during intercourse), which may lead to pregnancy but without that specific intention. These behaviors without regard for intent could be considered RC but are different in nature than behaviors specifically aimed at achieving a pregnancy, and potentially may have different clinical interventions and support for women who experience it. This “lack of conceptual clarity” leads to a poor understanding of the risk factors as well as difficulties in implementing targetable interventions and evaluating the effectiveness of such interventions in the healthcare setting (Tarzia & Hegarty, 2021, p. 1).

Extent and Nature

Prevalence

It is estimated that 5%–30% of women in the United States experience RC at some point in their lifetime (Grace & Anderson, 2016). However, reported prevalence rates vary widely depending on population and setting. Thus far, prevalence data have largely been drawn from small samples of adult women seeking reproductive or primary healthcare in community-based settings such as reproductive health or family planning clinics, prenatal care clinics, shelters, and college campuses. Overall prevalence estimates range from 5% to 30% (Addington, 2021; Miller, Decker, et al., 2010; Rosenbaum & DiClemente, 2020; Skracic et al., 2021); in urban family planning or obstetric clinics, the range is slightly higher at 13%–16% (Anderson et al., 2017; Clark et al., 2014; Kazmerski et al., 2015; Moore et al., 2010); and among college women, reported estimates include 8% (Sutherland et al., 2015), 11% (Swan et al., 2020), and 30% (Katz & Sutherland, 2017). The latter study, which was the highest rate among college women reported in the literature, used a broader measure of RC that did not include intent as the instrument nor the question stem "so that you would get pregnant," which may account for the higher estimation. One study found an 11% prevalence rate among a sample of adult women veterans, a population at increased risk for IPV (Rosenfeld et al., 2018). Additionally, there are emerging indications that women of color disproportionately experience RC, particularly Black and multiracial women (Holliday et al., 2018; Miller et al., 2014; Skracic et al., 2021).

Prevalence at the population-level is largely unknown. Prevalence estimates derived from nationally representative data have been reported in only two studies. The National Intimate Partner Violence Survey (NISVS) is an ongoing nationally representative random-digit-dial telephone survey of English or Spanish-speaking adults and collects data on IPV, sexual

violence, and stalking (Smith et al., 2018). The most recent NISVS (2013) that examined RC estimated that 9% of all women in the U.S., ages 18 to 49, have experienced RC at some point in their lifetime (Breiding et al., 2014). Utilizing the population-based PRAMS, a state-administered telephone survey of women who had a recent live birth, Samankasikorn et al. (2019) reported a population prevalence estimate of 1.1% (N = 20,252). This estimate, however, is constrained by several limitations as the survey assesses only one dimension of RC (BCS) and data were collected only from six states.

Understanding of the nature of RC—who it affects, what are the risk factors—is still limited; however, a clear picture is beginning to emerge that women experiencing social vulnerabilities and marginalization are more at-risk for experiencing RC from an intimate partner. RC research has consistently found a higher prevalence of RC experiences among women who belong to racial and ethnic minority groups and those who have adverse sociodemographic characteristics such as low education and low income. Not surprisingly, the risk factors for RC closely mirror those of IPV.

Racial and Ethnic Disparities

Non-White race appears to be a significant risk factor for experiencing RC (Grace, Perrin, et al., 2020; PettyJohn et al., 2021). Prevalence at the population-level by race or ethnicity is not currently well understood as RC has not been examined by race and ethnicity in nationally representative samples. However, findings from numerous smaller studies have indicated that RC disproportionately impacts racial and ethnic minority women of color. Women who identify as African American, multiracial, or in an "other" racial category as well as Hispanic/Latina women appear to be at the highest risk of experiencing RC at nearly twice the rates of their White counterparts (Holliday et al., 2018; PettyJohn et al., 2021). Holliday et al.

(2017) reported that Black (37.1%) and multiracial women (29.0%) disproportionately experience RC compared to White women (18.0%).

Studies among young Black women consistently report higher rates of RC experiences compared with women of other races and ethnicities. Miller et al. (2014) reported that more Black women experienced recent (previous 3 months) RC (12.5%) than White (3.5%), Hispanic (8.8%), Asian (7.3%), and multiracial (5.9%) women. The highest prevalence estimates of lifetime experiences of RC among all populations have been reported in studies done with samples of all or majority African American women: 28% (Paterno et al., 2018), 30.6% (Willie et al., 2019), and 37% (Holliday et al., 2017). Rosenfeld et al. (2018) found that women veterans who were Black or from other race groups were more than 2 times as likely to report RC as White women veterans.

Similarly, Latina women appear to also have a higher risk for experiencing RC. Grace, Decker, et al. (2020) reported that 16.8% of a sample of Latina women (N = 482) had experienced RC from a partner in the last 12 months. Studies done with samples with relatively large proportions of Latina women reported prevalence rates of 13.5% (30% Latina; Kazmerski et al., 2015); 16% (41.8% Latina; Clark et al., 2014); and 24% (51% Latina; Phillips et al., 2016). Several studies have found a higher risk of lifetime RC among Latina women when compared to White women (Clark et al., 2014; Holliday et al., 2017; Miller, Decker, et al., 2010; Sutherland et al., 2015). Although some studies have not found an association between Latina ethnicity and RC (Samankasikorn et al., 2019; Thaller & Messing, 2016), these are rapidly being eclipsed by the increasing number of studies with findings that Latina women disproportionately experience RC.

Demographic Risk Factors

In addition to race and ethnicity, certain demographic characteristics appear to be risk factors for experiencing RC. Young age, lower education, and lower socioeconomic status all seem to be associated with a higher risk of RC (Swan et al., 2020). Several studies have reported findings that women of younger age are more likely to experience RC than women of older ages (Grace, Decker, et al., 2020; Miller et al., 2014; Rosenfeld et al., 2018; Swan et al., 2020; Thiel de Bocanegra et al., 2010). In contrast, Miller, Decker et al. (2010) reported that lifetime experiences of RC were greater in older women, attributing the higher rate of exposure to a higher number of relationships over a longer lifetime. Significant findings in this study were that a significant proportion, 12% to18%, of women ages 16 to 20 years, the youngest cohort in the study, experienced RC. In a study among a sample of Latina women (N = 482), Grace, Decker, et al. (2020) reported younger age was a statistically significant risk factor for RC.

Women with lower education levels seem to be more at risk than women with higher levels of education. Miller, Decker, et al. (2010) reported that, among women ages 16 to 29 years (N = 1278), those with less than a high school degree were more likely to experience RC in the form of pregnancy coercion and BCS, a finding that has been consistent with later studies (Miller et al., 2014; Swan et al., 2020; Thiel de Bocanegra et al., 2010; Upadhyay et al., 2014).

Lower socioeconomic status appears to be associated with a higher risk of experiencing RC. Two studies have reported an association between receiving free care or having no health insurance, a measure of socioeconomic status, as more likely to experience RC than women who have private insurance (Clark et al., 2014; Grace & Anderson, 2016; Skracic et al., 2021). In one qualitative study of low-income women (n = 66), RC rates among African American women—over 80% of whom were on public insurance and in the lowest income bracket (less than $20,000

annual income)—were reported at 52.8%, significantly higher than overall prevalence estimates (Nikolajski et al., 2015).

Relationship Risk Factors

Relationship characteristics have been examined as contributors to risk for experiencing RC. Relationship risk factors include greater age discrepancy with a partner, being single or in a casual dating relationship (Clark et al., 2014; Miller, Decker, et al., 2010; Miller et al., 2014; Rosenbaum & DiClemente, 2020; Rosenfeld et al., 2018), being in a transient relationship such as when the male partner is facing impending incarceration (Moore et al., 2010; Nikolajski et al., 2015), and having multiple dating partners (Basile et al., 2018; Katz et al., 2017). Additionally, low levels of trust within a relationship is reported to have an inverse association with risk of past-year RC (i.e., lower levels of trust are associated with greater odds of experiencing RC; Paterno et al., 2018) In contrast, some studies have observed that RC occurs more often in long-term dating relationships (Katz et al., 2017) or that there is no difference in experiences of RC in relationships of less than 2 years compared to more than 2 years (Paterno et al., 2018). Additionally, Phillips et al. (2016) reported that women who engage in transactional sex or report a lack of personal safety, both of which make a woman vulnerable to demands from an abusive partner, are more likely to experience RC. In a sample of African American women recruited from community and street HIV/STI programs, Rosenbaum and DiClemente (2020) also reported that exchange sex was a factor associated with a greater risk for RC.

As with other forms of IPV, prevalence estimates of RC are likely to be underestimations as most RC is likely to be unrecognized, as screening is infrequently done, and unreported (Garcia-Moreno et al., 2013). Additionally, assessment of the extent of RC is fraught with measurement challenges as differences in the definition (such as whether intent is included or

how many domains are assessed), variations in the instrument or assessment tool used, and differences in temporal measurement (lifetime v. recent RC) make it difficult to establish reliable prevalence estimates. As Tarzia and Hegarty (2021) asserted, the lack of "conceptual clarity" (p. 1) of RC makes it difficult to compare findings across studies and significantly impacts the ability to establish reliable prevalence estimates. Additionally, most studies have been done in cisgender women who have sex with men. Very little is known about individuals who can get pregnant but do not identify as women and smaller racial groups such as Native Americans or Pacific Islanders, both vulnerable populations that are known to have an increased risk for IPV and are likely to also have higher rates of RC.

Intersection with IPV

Co-occurrence of RC and IPV. Current evidence strongly suggests that women experiencing RC are also likely to be experiencing other forms of interpersonal violence including physical and sexual violence from an intimate partner (Basile et al., 2019; Clark et al., 2014; Grace & Anderson, 2016; Miller, Decker, et al., 2010; Willie et al., 2019). The expanding research body on RC has revealed the complexity of the intersections between RC and other forms of IPV and abuse (Fleury-Steiner & Miller, 2019). Several studies have found a strong association between RC and experiences of IPV. In a study of college students, Swan et al. (2020) reported that 100% of women experiencing RC had also experienced at least one other form of IPV. Miller, Decker, et al. (2010) surveyed nearly 1,300 women and girls ages 16 to 29 years seeking care at family planning clinics and reported that 79% of women reporting BCS and 74% of women reporting pregnancy coercion also report experiencing IPV. Clark et al. (2014) reported that 32% of women (N = 641) who had experienced RC had also experienced partner sexual or physical assault within the same relationship. Thaller and Messing (2016) found that

women who reported RC were significantly more likely to score higher on the "HITS (Hit, Insulted, Threaten, and Scream abuse assessment tool than women who did not report RC. In a study of 1,200 women seeking care from a family planning clinic, more than a third of the women who reported experiences of IPV also experienced RC (Kazmerski et al., 2015). Finally, Fleury-Steiner and Miller (2019) reported that one in four women seeking a protective order against an abusive partner also experienced either BCS or pressure to become pregnant from the partner from whom they were seeking protection. Basile et al. (2018) reported that among women raped by an intimate partner, 30% report RC and that women who became pregnant as a result of partner rape were more likely to report that their partner wanted them to get pregnant or prevented them from using birth control. Grace, Decker, et al. (2020) found that, among a sample of Latina women (N = 482), 32.1% of those who experienced RC in the past year also experienced IPV in that same year, and 11.4% experienced RC without IPV. RC has also been positively associated with IPV occurring during pregnancy (McCauley et al., 2015). One study reported a population-level association between RC and IPV (Samankasikorn et al., 2019).

Similar associations have been seen in adolescents and young adult women. Northridge et al. (2017) reported, similarly, that adolescents experiencing RC were 5 times as likely to also report experiencing IPV than those not experiencing RC. Sutherland et al. (2015) reported that, among college-aged women experiencing either BCS or pregnancy coercion, 68% and 59% (respectively) also experienced IPV in the form of physical or sexual abuse.

Of note, several studies have failed to demonstrate a relationship between RC and other forms of interpersonal violence. In a study among male and female college-age students, Swan et al. (2020) reported that no association was found between RC and physical IPV, which may potentially be explained because IPV was measured by type. RC and IPV are not always

measured within the same relationship; RC is measured in different time frames (i.e., recent v. lifetime) and IPV is often measured as a broad category rather than by its physical, sexual, or psychological subforms. Differences in measurement of RC and IPV make comparisons difficult due to variations in the measurement of IPV and RC (i.e., with different partners, within different time frames (recent v. lifetime), and IPV overall or by types). Despite these findings, evidence is rapidly accumulating that RC and IPV are strongly associated.

Temporal Relationship. The temporal order of how RC and IPV are experienced is a major gap in the research and has not been deeply examined. Currently, it is not well understood if IPV is predictive of RC or vice-versa, or if they occur independently. Some scholars have argued that RC often precedes IPV in an abusive relationship (Kazmerski et al., 2015; Miller, Jordan, et al., 2010). Others, however, have argued that IPV is how RC is enacted and that IPV is the mechanism by which a partner can force their intentions on a partner's reproductive health decisions, stating that "reproductive coercion [and abuse] is physical, psychological, or sexual violence harnessed for the express intent of promoting or preventing a pregnancy" (Tarzia & Hegarty, 2021, p. 5). One study examined RC on a temporal continuum using the categories before intercourse, during intercourse, and postconception, although findings of this study include not being able to elucidate timing of reproductive control with IPV (Moore et al., 2010).

RC is commonly experienced with co-occurring IPV but does not always occur with other forms of IPV. It has been documented in the literature that RC happens even in the absence of co-occurring physical IPV (Miller, Decker, et al., 2010; Moore et al., 2010). One study looked at RC along a temporal continuum of before intercourse, during intercourse, and postconception and IPV and found that RC was not an "escalating sequence of events" and "rarely occurred in isolation of other events of reproductive control" (Moore et al., 2010, p. 1742). Kazmerski et al.

(2015) reported that only one in 20 women in the total sample reported both IPV and RC compared to 13.5% who reported RC alone. These findings suggest that a predictable temporal pattern to experiences of IPV and RC has not been found.

RC is strongly associated with IPV and although RC can occur without other forms of IPV, it is clear that women experiencing RC are at an increased risk for experiencing other forms of violence within an intimate relationship. Further research on the frequency of occurrence of RC, the forms of RC, and timing with other forms of IPV will further understanding of the temporal relation between RC and IPV.

Health Consequences

Reproductive Health

RC and IPV have a significant negative impact on a woman's physical and mental health. The association between IPV and adverse physical, reproductive, and mental health consequences has been thoroughly and extensively documented in the literature (Campbell et al., 2000; Campbell, 2002; Campbell & Soeken, 1999; Coker, 2007; Coker et al., 2002; Coker et al., 2004; Hathaway et al., 2005; Pallitto et al., 2005; Wuest et al., 2008). Women who have experienced IPV are consistently found to have worse sexual and reproductive health outcomes compared to women who have not experienced IPV. However, the mechanisms through which IPV results in these negative outcomes are not thoroughly understood (Moore et al., 2010). Moore et al. (2010), as well as other scholars, have asserted that controlling a woman's reproductive actions is a potential process by which IPV can lead to negative reproductive health outcomes such as unintended pregnancy, short interpregnancy intervals, STI, and the women's inability to meet their fertility goals (Moore et al., 2010).

Coker (2007) put forth a conceptual model constructing the potential relation between IPV and the resultant health consequences. The model seeks to explain and identify gaps in direct and indirect mechanisms by which physical, sexual, and psychological IPV leads to negative sexual and reproductive health outcomes. The model highlights that the specific mechanisms by which IPV leads to negative sexual health outcomes has not been fully established. Moore et al. (2010) asserted that RC is a "proximal mechanism" that explains one direct pathway in which IPV can result in negative sexual and reproductive health outcomes (p. 1742). Moore et al. (2010) proposed an extension of Coker's conceptual model by overlaying RC within the framework and adding a pathway linking pregnancy coercion to decreased contraceptive use, increased unwanted pregnancy, increased unwanted births, and increased unwanted abortion (Coker, 2007; Moore et al., 2010).

Impact on Contraceptive Use

RC has been associated with lower rates of contraceptive use as well as inconsistent and nonuse of contraceptives (Alexander et al., 2018; Katz et al., 2017; PettyJohn et al., 2021). Two dimensions of RC, BCS and pregnancy coercion, directly impede an individual's ability to properly use a preferred method of contraception and compromise their ability to avoid an unwanted pregnancy (Finer & Zolna, 2016; John & Edmeades, 2018). Women experiencing RC are more likely to report experiencing delays or barriers in getting contraception, particularly methods requiring a prescription (Early et al., 2015), and hiding contraceptives from their abusive partner (Holliday et al., 2018; Thaller & Messing, 2016; Thiel de Bocanegra et al., 2010). Lower contraceptive use in the presence of RC has been attributed to subtle and overt actions from an intimate partner, such as refusal or resistance to using condoms (Miller, Decker, et al., 2010; Thiel de Bocanegra et al., 2010), forced unprotected sex without the use of

contraceptives (Miller et al., 2011; Silverman et al., 2011) and exaggeration of potential undesirable side effects from contraception such as weight gain (Paterno et al., 2018; Thiel de Bocanegra et al., 2010), and direct physical interference with birth control (Thiel de Bocanegra et al., 2010; Willie et al., 2021). Katz et al. (2017) observed that contraceptive nonuse was associated with RC even in the absence of physical or sexual partner violence. It has also been reported that women experiencing RC are more likely to report seeking reproductive healthcare services for pregnancy testing (Kazmerski et al., 2015) and using emergency contraception (Gee et al., 2009; Kazmerski et al., 2015; Thiel de Bocanegra et al., 2010).

Unintended Pregnancy

Recent scholarship has shown that women who experience RC from an intimate partner are at a greater risk for experiencing an unintended pregnancy (Holliday et al., 2017; Miller, Decker, et al., 2010; Sutherland et al., 2015). Unintended pregnancy is linked to a number of behaviors (e.g., delaying prenatal care, using tobacco and other substances) that can negatively impact the outcome of a pregnancy, leading to PTB, LBW, and other negative fetal and infant health outcomes, some that are potentially lifelong (Finer & Zolna, 2016). RC may be a hidden contributor to the occurrence of these behaviors and increasing understanding of how RC may be linked with unintended pregnancy is important to address these potential impacts on birth outcomes. Miller, Decker, et al. (2010) first reported an explicit association between RC and unintended pregnancy. Since that time, evidence that RC is strongly associated with unintended pregnancy has rapidly accumulated (Kazmerski et al., 2015; Miller et al., 2011; Miller et al., 2014; Rosenbaum & DiClemente, 2020). Moreover, it appears this association is greater in women with marginalized identities (Alhusen et al., 2020; Grace, Decker, et al., 2020; Holliday et al., 2017).

An increased risk of unintended pregnancy among women who have experienced RC has been reported in numerous studies (Miller, Decker, et al., 2010). Miller, Decker, et al. (2010) reported that, among women ages 16 to 29 years (N = 1278), those who reported RC, either in the form of pregnancy coercion or BCS, were almost twice as likely (AOR = 1.83) to also experience unintended pregnancy compared to women who did not experience RC. Other studies have reported similar findings. Miller et al. (2014) reported that, in a sample of women ages 16 to 29 years (N = 3539), women who experienced RC within the previous 3 months were 1.79 times more likely to experience an unintended pregnancy within the past 12 months than women who had not experienced RC. Holliday et al. (2017) similarly reported that women experiencing RC were more than 1.5 times at risk for unintended pregnancy than those not exposed to RC. Liu, McFarlane et al. (2016) reported that 14.3% of women (N = 282) attributed a recent pregnancy to a partner's refusal to allow the woman to use birth control; more than a third attributed it to a partner's refusal to use birth control.

Studies have found the risk of unintended pregnancy is greater among women with other vulnerabilities. In a study of women ages 16 to 24 years with a history of foster care involvement, those experiencing RC were more than 5 times as likely to experience an unintended pregnancy in their lifetime (PettyJohn et al., 2021). In a longitudinal study of Black women ages 18 to 24 years recruited from community and street settings, Rosenbaum and DiClemente (2020) reported that women exposed to RC had almost 3 times the risk of unintended pregnancy than those not exposed to RC (AOR = 2.95). Among those women who became pregnant during the course of this study, assessed at 6, 9, and 12 months, between 16.7% and 29.6% reported having also experienced pregnancy coercion or BCS (Rosenbaum & DiClemente, 2020). Lastly, Rosenfeld et al. (2018) reported that, among a sample of women

veterans (N = 1241), those who had experienced military sexual trauma were more likely to report RC than women veterans who had not and were more than twice as likely to experience a pregnancy in the previous 12 months if they had been exposed to RC. In the only population level examination of RC and unintended pregnancy risk, Samankasikorn et al. (2019) found that, in the context of RC, the risk of unintended pregnancy was more than twice the risk when no RC was experienced.

Recent qualitative studies provide context for these findings. In a qualitative study of gang-affiliated Latina women, Miller et al. (2011) cited the "clustering of violence exposures" (p. 82; i.e., community and gang violence) as factors that increase the risk for unintended pregnancy, citing forced sex and gang rape as an expected part of gang involvement as an amplifier for the risk of RC and unintended pregnancy. In a qualitative study of non-Latina Black and non-Latina White women (N = 44), Holliday et al. (2018) reported that although unintended pregnancy prevalence was similar for the two groups, rates of RC were more than twice among Black participants. Alhusen et al. (2020) reported that, among a sample of disabled women (N = 9), "reproductive coercion was a common experience ultimately leading to unintended pregnancy" with participants describing specific ways a partner "used their disability" to pressure or force a woman into a pregnancy (p. 4).

The association between RC and unintended pregnancy has been demonstrated in studies using different temporal measures of RC. Several studies measuring recent experiences (within the previous 12 months) of RC reported an association with an increased risk of unintended pregnancy in the last year (Jones et al., 2016; Rosenfeld et al., 2018). Miller et al. (2014) demonstrated a temporal association linking recent (previous 3 months) RC and past-year unintended pregnancy. Likewise, several studies using lifetime experiences of RC as the measure

have also reported an association with increased risk of unintended pregnancy, although these studies were not able to link unintended pregnancy with specific experiences of RC (Miller, Decker, et al., 2010; Rosenbaum & DiClemente, 2020; Sutherland et al., 2015).

Racial and Ethnic Disparities. The risk for unintended pregnancy in the context of RC is even greater for racial and ethnic minority women (Holliday et al., 2017; Holliday et al., 2018; Miller et al., 2011; Nikolajski et al., 2015). Racial disparities in rates of unintended pregnancy disproportionately affect Black and multiracial women who are more than twice as likely as White women to experience an unintended pregnancy (Finer & Zolna, 2016). RC may account for this disparity in unintended pregnancy rates among Black and Latina women; however, RC has thus far been relatively unexplored as a contributor to unintended pregnancy among minority women (Holliday et al., 2017; Nikolajski et al., 2015).

Studies have found that non-White race is significantly associated with experiencing RC (Holliday et al., 2017; Nikolajski et al., 2015; Thaller & Messing, 2016). In a study examining race-specific effects of RC on the risk for unintended pregnancy, Holliday et al. (2017) found that Black women had a significantly higher risk (AOR = 1.72) of experiencing an unintended pregnancy compared to Black women who had not experienced RC. Although this was similar to the risk seen in White women, the authors suggested that this may be a driver of the disparity in unintended pregnancy rates seen between Black and White women given the higher rates of RC among Black women. In this study, unintended pregnancy was reported by 50.3% of Black women participants, 47.2% of multiracial participants, and 37.1% of White women participants. In a study among Black women ages 18 to 24 years (N = 560), Rosenbaum and DiClemente (2020) reported that women who had experienced RC were more likely to experience unintended pregnancy than those who did not experience RC, which is consistent with prior research. In a

qualitative study with low-income Black and White women (N = 66), Nikolajski et al. (2015) found that African-American women experienced RC from a partner at greater rates than White women and were more likely to experience a current or prior pregnancy as a result.

Understanding unintended pregnancy risk in the context of RC is less clear for Latina and Latina women. In one of the earliest studies, Miller, Decker, et al. (2010) reported that although Latina women experienced higher rates of RC than White women, rates of unintended pregnancy among Latina women were not greater than those observed among White women. This may be attributable to the cultural norms around motherhood and childbearing that make it difficult for Latina women to disclose that a pregnancy is unwanted (Postmus et al., 2014). In a study by Grace, Decker, et al. (2020) of Latina women ages 15 to 45 years, participants reported that experiencing RC from a partner significantly and negatively affected their ability to plan and control when to get pregnant. Additionally, in a qualitative study among residents of a domestic violence shelter (N = 53), Thiel de Bocanegra et al. (2010) reported that women whose primary language is not English reported more experiences of forced sex (76% v. 47%) and BCS (65% v. 42%) than women whose primary language is English.

Although confidence is increasing that there is strong association between RC and unintended pregnancy among minority women, it is worth noting that several studies have failed to find this association. Holliday et al. (2017) examined racial differences in the effect of RC on unintended pregnancy and reported that although Latina, multiracial, and Asian Pacific Islander women experienced RC at greater rates than White women, no statistically significant difference in risk of unintended pregnancy was found. Samankasikorn et al. (2019) reported that no significant association was found between RC and unintended pregnancy once statistical models were adjusted for sociodemographic characteristics (i.e., age, race, ethnicity, education, etc.)(N =

20,252). However, an abundance of studies in the literature have reported an increased risk of unintended pregnancy among women who have experienced RC, suggesting that there is a significant link between experiencing RC from a partner and an unplanned pregnancy and that this risk is likely to be greater in racial and ethnic women as well as women with other marginalized identities (Alhusen et al., 2020; Gee et al., 2009; Miller, Decker et al., 2010; Miller et al., 2011; Samankasikorn et al., 2019).

Effect of IPV. IPV is strongly linked with unintended pregnancy, an association that is extensively documented in the literature (Campbell et al., 2000; Coker, 2007; Hill et al., 2016; Pallitto et al., 2005; Pallitto et al., 2013). However, the mechanisms by which IPV can result in unintended pregnancy are still inadequately understood. Several recent studies have posited that RC may be a mechanism by which IPV, in the form of control and abuse, could lead to unintended pregnancy (Clark et al., 2014; Kazmerski et al., 2015; Miller, Decker, et al., 2010; Miller et al., 2014; Moore et al., 2010; PettyJohn et al., 2021). From the extant literature, however, the contribution of RC alone versus in conjunction with other forms of partner violence is not clear and questions regarding the chronicity and interplay of these two experiences and ways in which they contribute to unintended pregnancy both independently and in conjunction with each other have yet to be thoroughly addressed (Grace, Decker, et al., 2020).

RC is often but not always experienced with other forms of IPV (Grace & Anderson, 2016; Holliday et al., 2017; Miller, Decker, et al., 2010). RC has been linked to an increased risk of unintended pregnancy both in the presence and absence of IPV (Miller, Decker, et al., 2010; Miller et al., 2014; Samankasikorn et al., 2019). Evidence from several studies suggest, however, that the risk of unintended pregnancy is greatest when a woman is exposed to both RC and IPV. Two studies have found that women experiencing both RC and another form of partner violence

are twice as likely to experience unintended pregnancy in the previous year compared to women not exposed to RC or IPV (Miller, Decker, et al., 2010; Miller et al., 2014). Women experiencing sexual violence from a partner are at an increased risk for unintended pregnancy in the context of RC. Forced unprotected sex and other forms of IPV that affect or prevent contraception use, such as BCS, have been associated with a higher number of pregnancies (Gee et al., 2009). In a recent examination of the national prevalence of rape-related pregnancy, it was found that 30% of women who were raped by an intimate partner and became pregnant had also experienced RC during their lifetime (Basile et al., 2018). However, even in the absence of other physical or sexual partner violence occurring within the relationship, an association has been noted between recent RC (within the last 12 months) alone and unintended pregnancy (Kazmerski et al., 2015; Miller et al., 2014).

Recent scholarship suggests RC likely has a "synergistic effect" on the occurrence of unintended pregnancy, particularly when experienced in the context of other types of violent or abusive behaviors in an intimate relationship (Grace, Decker, et al., 2020, p. 22). Further exploration of the nature of the association between RC and unintended pregnancy, both in the presence and absence of IPV, is needed, particularly with longitudinal studies that may better elucidate understanding of the chronicity of these experiences; this will also deepen understanding of the pathways in which RC is linked to unintended pregnancy. Understanding how RC functions as a driver of unintended pregnancy among women can inform healthcare strategies for unintended pregnancy prevention including targeted birth control counseling, patient-centered options counseling, and sensitive interventions and support.

Abortion

RC that results in unintended pregnancy appears to be linked to increased abortion seeking and a greater likelihood of lifetime and multiple abortions (McCauley et al., 2015; Thiel de Bocanegra et al., 2010). Silverman et al. (2011) examined a sample of females aged 14 to 20 years who sought care at an adolescent health clinic (N = 356) and found that, with pregnancies ending in abortion, there was greater decisional conflict between partners regarding the pregnancy and greater involvement by men in making decisions related to the pregnancy when abuse was also occurring. Although this study did specifically measure RC from a partner, it suggests that RC may be a factor. Liu, McFarlane et al. (2016) reported that participants were 28 times more likely to have abuse-induced miscarriages if their pregnancies resulted because their abusers did not use birth control (OR = 28.70, $p < .05$).

Experiencing RC may impact an individual's decisions related to seeking an abortion. Women experiencing IPV are more likely to seek abortion services and several studies have suggested that women experiencing RC are also more likely to seek an abortion (Fay & Yee, 2018; Silverman et al., 2011). Additionally, one study reported an increased likelihood of repeat abortions among women experiencing RC (McCauley et al., 2015). One study reported a stronger association between RC and seeking services at abortion facilities compared to family planning facilities, although this difference was not significant (Upadhyay et al., 2014). Silverman et al. (2011) reported that, in pregnancies ending in abortion, there was greater decisional conflict between partners regarding the pregnancy and greater involvement by men in making decisions related to the pregnancy when abuse was also occurring. Although this study did not specifically measure RC from a partner, it suggests that RC may be a factor (Silverman et

al., 2011). In this same study, Black women were more likely to report a recent or planned abortion compared to White women (Nikolajski et al., 2015).

Sexual Health

RC has been associated with negative sexual health outcomes for women including STIs, HIV, and urinary and pelvic tract disorder (Rosenbaum & DiClemente, 2020). Experiencing sexual abuse, including RC, impacts a woman's ability to use contraceptive methods that also protect against STIs including HIV (Allsworth et al., 2013). RC can impede a woman's ability to use condoms, contributing to an increased risk of acquiring STIs (John & Edmeades, 2018). Women experiencing RC are more likely to be diagnosed with an STI (Decker et al., 2014; Jones et al., 2016; McCauley, Dick, et al., 2014; Northridge et al., 2017) and are more likely to have multiple encounters for STI testing and treatment (Kazmerski et al., 2015). Northridge et al. (2017) reported a rate of chlamydia as 3 times higher among women experiencing RC than among women who do not experience RC. Women experiencing RC may be at a greater risk for HIV acquisition; however, to date, no studies have explicitly examined the link between RC and HIV acquisition (Willie et al., 2017). Anderson et al. (2017) reported a prevalence rate of 16.4% for RC among women living with HIV, which aligns with rates in other similar at-risk populations. Women with HIV may be more susceptible to RC because of fear of disclosing their HIV status as a reason for not wanting a pregnancy, or maybe pressured into abortion because of their positive status (Anderson et al., 2017). RC has been associated with high risk-sexual behaviors such as transactional sex, a known risk factor for STIs (Phillips et al., 2016).

Mental Health

Although the psychological consequences of RC to a woman's mental and emotional well-being have not been widely studied, several studies have suggested that RC can have an

enormous impact on a woman's mental health. RC has been associated with increased stress, anxiety, depression, and posttraumatic stress disorder (PTSD; Alexander et al., 2016; Anderson et al., 2017; Lévesque et al., 2020; McCauley, Falb, et al., 2014; Steinberg et al., 2016; Thaller & Messing, 2016). Several studies have demonstrated an association between RC and myriad adverse mental health outcomes. However, evidence is accumulating that, similar to IPV, RC has a significant impact on a woman's mental health, including chronic conditions lasting well beyond the RC experience (PettyJohn et al., 2021). Other mental health consequences that have been linked to RC include self-blame, guilt, shame, sense of loss of control, insecurity, and nightmares (Lévesque et al., 2020). In a study by Grace, Perrin, et al. (2020), RC was found to be a significant predictor of depression; however, it was unclear if RC precipitated or followed the depressive symptoms. However, findings from this study indicate that RC experiences were additive in their contribution to depression when IPV was also experienced (Grace, Perrin, et al., 2020). Additionally, women experiencing RC have been found to have an increased risk of PTSD and suicidal ideation (Alexander et al., 2016; McCauley, Falb, et al., 2014; Steinberg et al., 2016; Thaller & Messing, 2016). Anderson et al. (2017) reported that almost two-thirds (64%) of the women reporting RC were also positive for recent PTSD symptoms (compared to 27% of women who did not report RC). These findings have important clinical implications and indicate a need to integrate depression screening with IPV and RC screening protocols and provide comprehensive support services that also address depression and mental health concerns (Grace, Perrin, et al., 2020).

The impact of experiencing RC on women's mental health has not been widely studied and direct associations have not been established. The mental health impacts associated with IPV, including anxiety, chronic stress, depression, and substance use, have been well established

in the literature (Campbell, 2002; Coker et al., 2002; Ellsberg et al., 2008). Because it is likely that RC would impact mental health in similar ways, more research in this area is critically needed.

Conclusion

Knowing the extent of RC experienced among specific populations has implications for nursing practice and the care of women experiencing abuse in an intimate relationship. Understanding racial and ethnic differences, as well as the sociodemographic characteristics of women who are most likely to experience RC will inform screening and identification practices, allow for targeted contraceptive counseling and provision, and the development of effective and clinical intervention and support strategies.

Design and Methods

This chapter outlines the design and methods for an investigation of the association of RC and adverse birth outcomes using a previously collected population-level dataset from the PRAMS, an ongoing, prospective community-based surveillance system managed by the Centers for Disease Control and Prevention (CDC), and one of only two national-level sources of data on RC (National Center for Chronic Disease Prevention and Health Promotion, 2012–2015). The purpose of the analysis was to examine whether RC before pregnancy is associated with an increased likelihood of adverse perinatal health outcomes among a population-based sample of women who recently gave birth. Previous scholarship has demonstrated a strong correlation between IPV and adverse birth outcomes, including LBW and PTB, fetal death, miscarriage, and the need for NICU care (Alhusen et al., 2014; Alhusen et al., 2013; Hill et al., 2016). However, the impact of RC specifically on birth outcomes has not been well examined. It is hypothesized that women exposed to RC prior to pregnancy have a greater likelihood of adverse birth outcomes than women not exposed. Further, it is hypothesized that this risk is impacted when women are also exposed to physical IPV. Thus, I sought to answer following question: What is the association between exposure to RC prior to pregnancy and an increased likelihood of experiencing an adverse birth outcome? There were two specific aims: (1) examine the odds of experiencing an adverse birth outcome among postpartum women exposed to RC prior to pregnancy and (2) test the interaction effect of exposure to RC and IPV on birth outcomes.

Design

The study is a secondary analysis of data collected through the PRAMS system from 2012 through 2015, hereafter referred to as the parent study. Previous studies of RC have primarily used small, clinic-based samples with limited generalizability to general populations

(Grace & Anderson, 2016; Grace & Fleming, 2016). The PRAMS data allow for an examination of RC and its impact on birth outcomes using a nationally representative sample of women who have recently given birth. Population-based secondary data, such as those contained in the PRAMS, allow for broad generalizability compared with the more limited representativeness of other studies using primary data collected from a single local population.

Parent Study

Implemented in 1987, the PRAMS is an initiative to reduce infant mortality and LBW and promote healthy pregnancy and safe delivery. The primary mission of PRAMS is to assist state health departments with epidemiologic surveillance of maternal behaviors, conditions, and experiences that could influence a pregnancy and subsequent health of the infant. It is intended to be a supplement to vital records data and used for planning, implementing, and monitoring perinatal health programs (CDC, 2017). Insights gained from PRAMS data have been used to develop health education/health promotion campaigns (e.g., folic acid during pregnancy, increasing flu vaccination), plan statewide health promotion initiatives (Tobacco Free Pregnancy), support the implementation of clinical recommendations (IPV screening in women's health services), and evaluate health programs and education efforts (CDC, 2021). It has also been used to monitor progress on several maternal and infant health objectives put forth in the national Healthy People initiatives. Numerous publications have resulted from studies using PRAMS data, primarily focused on the analysis of prevalence and trend data. Surveillance and epidemiologic data from PRAMS are often reported in the Morbidity and Mortality Weekly Report published by the CDC. Results of studies using PRAMS data have been used to influence policy and legislation on a wide range of health and healthcare issues including increasing breastfeeding support in the workplace, improving access to contraception, and expanding dental

coverage to pregnant women (CDC, 2021). PRAMS data have also been used to provide rationale and justification for funding requests and meet Title V Block Grant requirements such as needs assessments.

Data Collection in Parent Study

The PRAMS uses a population-based approach to collect data on self-reported maternal health behaviors, conditions, and experiences before, during, and after pregnancy that have known impacts, positive and negative, on the health of a pregnancy (CDC, 2017). Data are collected on behaviors that promote a healthy pregnancy including early access to prenatal care, taking multivitamins, and visits for oral care and hygiene. Cigarette smoking and alcohol and drug use, behaviors known to negatively impact a pregnancy, are also measured.

The PRAMS is administered by individual states and jurisdictions. Currently 46 states conduct state-level PRAMS surveys, in addition to the U.S. territories of Puerto Rico and the Northern Mariana Islands (CDC, 2022b). Washington D.C. and New York City conduct city-specific surveys in addition to state-wide surveys. California, Idaho, Ohio, and North Carolina do not participate in the current PRAMS survey. Approximately 83% of all births in the United States are represented in the national PRAMS dataset (Shulman et al., 2018). Data collection is conducted on a monthly basis in each participating jurisdiction via a survey of a sample of new mothers. Data are then submitted to the CDC for population-level analysis across the United States. Since its inception, the PRAMS has completed seven cycles (Phases 1–7) of data collection and is currently in Phase 8 (2016–present).

The PRAMS survey uses a cross-sectional approach to data collection, creating a "snapshot" of maternal health behaviors in women who have recently been pregnant and given birth (Ruel et al., 2016). The PRAMS offers a rich source of information on the phenomenon of

RC thus far unexplored at the population level. Specifically, the PRAMS measures BCS (i.e., deliberate attempts from a partner to interfere with birth control methods with the intent to cause a pregnancy), the most commonly experienced dimension of RC (Katz et al., 2017; Miller, Decker et al., 2010; Skracic et al., 2021; Swan et al., 2020). This study adds valuable contributions to the knowledge base regarding RC as it is the first examination of RC's potential impact on birth outcomes using population-level data.

Sampling in Parent Study

The PRAMS utilizes a mixed-mode survey methodology based on Dillman's tailored design method (Dillman, 2000). Mixed-mode survey methodology is a data collection approach that utilizes more than one mode of survey administration (Dillman, 2000). The PRAMS uses three modes of data collection: postal mail, internet, and telephone interview (CDC, 2017). Potential respondents are first contacted by mail and receive a paper version of the survey, which also contains a link to the online portal. The multimode survey format was selected to achieve the highest possible response rates and increase participation of hard-to-reach women who may not be represented in the sample without additional outreach. Postal mail is the primary form of data collection, which has advantages of low costs and ease of obtaining mailing addresses from birth registry data. Secondly, data are also collected electronically via an online link included in the mailed questionnaire, concurrently with collection via postal mail. After receiving the paper survey in the mail, respondents can choose to complete and return the survey in a postage-paid envelope or access the survey via the secure unique online portal link. Women who have been selected for recruitment who do not respond via mail or internet are then contacted by trained interviewers who attempt to collect responses to the survey questions via live telephone conversation. Follow-up with a telephone interview has been shown to increase the overall

response rate by up to 22%, with the greatest increases noted in the hardest-to-reach populations (CDC, 2017).

Survey research designs typically use only one mode of data collection. The use of varied modes and mechanisms for collecting data can introduce mode bias as participants may respond differently according to the mode in which they are asked. The Dillman method attempts to minimize mode bias by accounting for the different modes in the design process through linking design and implementation procedures for the primary mode, which, for the PRAMS, is the self-administered paper-based survey, with the corresponding procedures for online survey modes and telephonic interview modes (Dillman, 2000). Additionally, the PRAMS uses a multicontact approach, also based on the Dillman model, to achieve the highest possible response rates. Potential participants are contacted in multiple, varied ways based on the timing, variation, and mode of contacts (i.e., introductory letters, mailed reminders, etc.) as outlined by Dillman to increase the likelihood of response (Dillman, 2000).

Target Population in Parent Study

The target population for the PRAMS survey is women who have delivered a live infant in the previous 2 to 6 months (Shulman et al., 2018). Women who have experienced stillbirth, fetal death, and induced abortions are excluded from the sample, as are women whose infants are adopted. However, women whose infants died after being born alive are included in the sample. Per PRAMS protocol, only women who are residents of and have delivered the infant within the jurisdiction are included in the sampling frame.

The sampling frame consists of jurisdictional birth certificates that are filed within the jurisdiction during the survey time period. Birth records that are missing the mother's last name or filed more than 6 months after the birth are not included (CDC, 2017). On a monthly basis,

each participating jurisdiction employs a random selection process to identify a stratified sample of 100 to 300 women who gave birth to a live infant within the previous 2 to 6 months with the goal of reaching an annual sample size of 1,000 to 3,000 women. A random selection process based on the sampling fraction is used to ensure each eligible record has an equal probability of being selected.

The PRAMS uses a stratified sampling approach to increase survey of certain subpopulations of interest. Sites can choose the specific stratification variables in which to oversample based on their specific needs and priorities. The desired sample size for each stratum is 400 women; however, this may be adjusted based on the proportion of the site's population that is comprised of the stratum population. In some instances, the oversampled stratum sample size may equate to a proportion of the overall population that is too large, which introduces the risk of violating the assumption of an infinitely large population size (N). When the ratio of the sample size (n) to the population size (N) is greater than 5–10%, the finite population correction factor is used (CDC, 2017). The finite population correction factor is used to adjust the variance estimate of the sampling distribution. Adjustment of the variance estimate is necessary because as the population becomes smaller and the sample size (i.e., the strata) becomes larger, the sample observations are no longer independent of each other, distorting variance estimates (Knaub, 2011). In other cases, women in certain strata may be difficult to reach (such as due to unstable housing or mental health conditions), necessitating larger stratum-specific samples to achieve statistical power. In these cases, the desired sample size is increased. The minimum acceptable response rate for analysis is 60% for the years 2012–2014 and 55% for the year 2015 (CDC, 2022b).

The sampling design of the PRAMS is complex. Consequently, the data can be weighted to account for differences in sample size in each stratum resulting from oversampling strategies, such as nonresponse (i.e., surveys with no or partial responses) and noncoverage (i.e., omissions in the sampling frame). An analysis weight is calculated for each respondent that adjusts for the sampling weight, nonresponse rate, and noncoverage weight. The data set used for this analysis includes raw data variables as well as analysis weights that can be applied to the study variables to conduct certain inferential statistical analyses.

There is a lack of consensus in the statistical literature on whether weighting in complex samples should be used for regression models (Gelman, 2007; Haddad et al., 2022; Korn & Graubard, 1995). The use of weighting can have several disadvantages. It can increase standard errors, leading to reduced precision and more variability in results, and introduce bias into the analysis approach. All statistical procedures in the study were conducted using unweighted variables (Avery et al., 2019).

Data Collection Procedures in Parent Study

All PRAMS sites use the same Core Questionnaire as the primary means of data collection. Questionnaires are sent first by mail, up to three attempts, with a self-addressed postage-paid return envelope. Mailed questionnaires include an online link and participant-specific access code and participants can elect to respond electronically. Women are contacted within 2 to 6 months after delivery, with most women contacted within 2 to 3 months. Women are contacted no earlier than 2 months and data collection must be complete no later than 9 months after delivery to minimize recall bias. Women who have not responded to the third mailed questionnaire are contacted by telephone by interviewers who are trained in techniques to encourage participation and conduct interviews involving sensitive issues. Up to 15 contact

attempts are made at different times and days over a period of 3 to 5 weeks. Participation is limited to women who speak either English or Spanish (CDC, 2017).

Instruments Utilized in Parent Study

The primary data collection instrument is the 52-item Phase 7 Core Questionnaire, hereafter referred to as the Core Questionnaire. The full Phase 7 Core Questionnaire is included as Appendix A. The Core Questionnaire measures preconception health and healthcare, contraceptive use, pregnancy intention, substance use, number of visits and entry into prenatal care, breastfeeding, depression, and reproductive health history. It is used by all participating sites and cannot be changed or deviated from during any current PRAMS phase. However, sites can supplement the Core Questionnaire with pretested Standard Questions. The Standard Questions address additional topics of interest, including topical and emerging issues, that sites can opt to use based on their specific needs and health priorities. One item in the Standard Questions assesses BCS from an intimate partner prior to pregnancy. Additionally, sites can develop questions for use within their jurisdiction; no data obtained from state-specific questions were used in this study.

Study Sample

I used data collected during PRAMS Phase 7 (2012–2015) for this study. Eight states used the supplemental question on BCS; however, data from only five states were included in the sample (MD, MA, OH, IA, VA). Data from three states were not included due to either the lack of a data sharing agreement (TX) or the response rate did not meet the threshold for analysis (SC, HI). Only respondents aged 17 and older were included in the analysis for the current study. Respondents aged 16 and younger were not uniformly across the five states asked the questions pertaining to IPV or RC and were therefore excluded from this study. The initial dataset from the

five states included 19,431 participants. Observations that are missing data on the RC variable (BCS) were removed (n = 371). The final sample size for analysis was determined after missing data on other variables were evaluated. The final sample size for analysis included a minimum of 18,000 women.

Calculating the power of a statistical test (i.e., the probability that the test will produce statistically significant results) is a critical component of research study design. Power estimates can be used to determine the minimum sample size needed for detecting the hypothesized effect size of the phenomenon of interest at a desired statistical significance level (Cohen, 1988). Study designs that are not sufficiently powered have a lower probability of detecting significant relationships even if they are present and can erode confidence in conclusions asserted about relationships of interest (Wang et al., 2013). Adequately powered studies reduce the likelihood of false or misleading interpretations of study results. Previous literature that examined RC at the population level indicate that RC is a relatively rare phenomenon, estimated at 1.9% to 9% of women. Therefore, RC is hypothesized to have a low effect size, defined as the degree to which the phenomenon (RC) is present in the population (Black et al., 2011; Polit & Sherman, 1990; Samankasikorn et al., 2019). An *a priori* power analysis for regression techniques was conducted using the standalone software G*Power 3.1 (Faul et al., 2007) guided by the following input parameters: a small effect size ($f^2 = 0.02$), .05 significance level, and 10 predictor variables. This calculation yields a minimum sample size of 1,229 is needed to achieve 95% power. The anticipated sample size of this study was 15,000, which was well above the estimated minimum, increasing confidence that the study was sufficiently powered to detect an association between RC and birth outcomes.

Study Variables

The variables chosen for the analysis in the current study were chosen based on the conceptual and theoretical frameworks guiding this study. Table 1 presents the 13 variables chosen for this analysis. The PRAMS dataset includes over 600 variables; only those that measured constructs described in the conceptual framework and had the potential to inform the research question were selected.

Table 1

Study Variables

Construct	Variable Name	Variable Description	Operational Definition	Data Source	Level of Measurement	Variable Type
			INDEPENDENT VARIABLES			
Reproductive coercion	COERCION	Partner interference with birth control before pregnancy	0 = NO 1 = YES	Standard Question Z8	Ordinal	Direct
Intimate partner violence	ABUSE_TOT	Abuse from husband/partner in 12 months before and/or during pregnancy	0 = NO ABUSE 1 = ABUSE BEFORE OR DURING PREG	Core Questionnaire Q37, Q38	Ordinal	Recoded
			DEPENDENT VARIABLES			
Infant death	INF_DEAD	Infant living at time of survey completion	0 = NOT DEAD (ALIVE) 1 = DEAD	Core Questionnaire Q43	Ordinal	Direct
Term or Preterm Birth	PTB	Clinical estimate of gestational age days	0 = NOT PRETERM (TERM) 1 = PRETERM	Birth certificate	Ordinal Dichotomous	Recoded
Neonatal ICU care	INF_ICU	Neonate needed intensive care after birth	0 = NO 1 = YES	Core Questionnaire Q41	Ordinal Dichotomous	Direct

Construct	Variable Name	Variable Description	Operational Definition	Data Source	Level of Measurement	Variable Type
DEMOGRAPHIC VARIABLES						
Age	MAT_AGE	Maternal age, years grouped	0 = <=19 YEARS 1 = 20-34 YEARS 2 = 35+ YEARS	Core Questionnaire Q3	Ordinal	Recoded
Marital Status	MARRIED	Marital status	0 = MARRIED 1 = OTHER	Birth certificate	Nominal Dichotomous	Direct
Education Level	MAT_ED	Maternal education	0 = < HS 1 = HS DIPLOMA 2 = > HS	Birth certificate	Ordinal	Direct
Race	MAT_RACE	Maternal race	0 = OTHER 1 = BLACK 2 = WHITE	Birth certificate	Nominal	Recoded
Ethnicity	HISP_BC	Hispanic ethnicity	0 = NO 1 =YES	Birth certificate	Nominal Dichotomous	Direct
CONTROL VARIABLES						
Drinking	DRINK	Drank alcohol in last 3 months of pregnancy	0 = NO 1 = YES	Core Questionnaire Q35	Ordinal	Direct
Smoking	SMOKE	Smoked cigarettes in last 3 months of pregnancy	0 = NO 1 = YES	Core Questionnaire Q31	Ordinal	Direct
Depression	DEPRESS	Maternal depression before pregnancy	0 = NO 1 = YES	Core Questionnaire Q11	Ordinal	Direct

RC

In this study, RC is the independent, or predictor, variable. RC was measured by the item *"Before you got pregnant, did your husband or partner ever try to keep you from using your birth control so that you would get pregnant when you didn't want to?*" This item measures BCS, one dimension of RC. An affirmative answer (Yes) to this item was categorized as positive for RC; a negative response (No) to this item was categorized as the absence of RC. The Standard Question Z8 used by the five states listed herein is included as Appendix B.

Birth Outcomes

The dependent, or outcome, variables selected for inclusion in this study are four birth outcome variables selected based on the conceptual framework from among the applicable variables in the dataset. The three dependent variables are PTB, need for NICU care, and infant death. Infant death and NICU care are measured on the Core Questionnaire. The variable PTB is extracted from birth certificate files associated with the respondent.

PTB. A clinical estimate of the gestational age of the fetus at the time of delivery is extracted from the birth certificate data. Estimated gestational age is recorded in days completed and coded into the variable BC_GEST. This variable was recoded into the variable PTB, a dichotomous variable where 0 = Term, 37 Weeks, 0 days and later, and 1 = Preterm, less than 37 weeks and 0 days gestation. Gestational age less than 37 weeks at delivery is widely considered to be a PTB (full gestation is 40 completed weeks) within the field of maternal-fetal medicine (ACOG, 2013b).

NICU Care. The need for NICU care after delivery is measured on the Core Questionnaire. The need for intensive care is coded into the variable INF_ICU, a dichotomous variable where Yes = ICU care was needed and No = ICU care was not needed. This variable was coded as 0 = no NICU needed and 1 = NICU needed.

Infant Death. The Core Questionnaire contains one item that measures the status of the infant, either alive or dead, at the time of survey completion, which is coded to the variable INF_LIVE. Only infants born alive are included in the sample; fetal deaths (i.e., death of fetus occurring before delivery) are not included. This variable was recoded into the INF_Death variable where 0 = infant not dead (alive) and 1 = infant dead.

Control Variables

IPV. IPV is measured by two items on the Core Questionnaire: "In the 12 months before you got pregnant with your new baby, did any of the following people, push, hit, slap, choke, or physically hurt you in any way?" and "During your most recent pregnancy, did any of the following people push, hit, slap, choke, or physically hurt you in any way?" The response for "partner/husband" is coded into the variables PAB6HUS (abuse before pregnancy by a partner or husband) and PAD6HUS (abuse during pregnancy by a partner or husband). A new variable, ABUSE_TOT, was computed where the values of PAD6HUS and PAB6HUS (1 = yes, 0 = no) were recoded to values of "0," indicating no experiences of IPV, and a value of "1," indicating abuse either before or during pregnancy.

Depression. Maternal depression is assessed on the Core Questionnaire. One item measures depression prior to pregnancy as identified by a healthcare provider. Depression prior to pregnancy is coded into the variable BPG_DEPRS, a dichotomous variable with values 0 = No and 1 = Yes.

Drinking. Maternal drinking is measured on the Core Questionnaire as yes or no to drinking in the last 3 months of pregnancy. The DRINK variable is coded as 0 = no drinking and 1 = yes drinking in the last 3 months of pregnancy.

Smoking. Maternal smoking is assessed on the Core Questionnaire as yes or no to cigarettes smoked during the last 3 months of pregnancy. The variable SMOKE is coded as 0 = no smoking and 1 = yes smoking in the last 3 months of pregnancy. Smoking is limited to cigarettes only as other mechanisms for smoking, such as vaping, were not assessed at all sites included in this study.

Demographic Variables

All demographic data were extracted from birth certificate data with the exception of income, which is measured on the Core Questionnaire. Maternal age, MAT_AGE, is measured as a numeric value grouped into seven categories (<=17, 18 to 19, 20 to 24, 25 to 29, 30 to 34, 35 to 39, 40+ years). The MAT_AGE variable was collapsed to three categories: 19 years and under, 20 to 34 years, and 35 years and older. The variable MAT_ED is a measure of maternal educational level on a 6-category scale: 0 to 8 years, 9 to 11 years, 12 years, 13 to 15 years, and 16 or more years. The MAT_ED variable was collapsed to three categories: Less than high school, high school diploma, and more than high school. The variable MAT_RACE measures self-reported race of the mother using eleven categories. The MAT_RACE variable was recomputed to three categories: White, Black, and other race. Hispanic/Latina ethnicity is a dichotomous variable, HISP_BC, measured as yes or no and coded as 0 = not Hispanic/Latina and 1 = Hispanic/Latina.

Data Management

PRAMS data are available to researchers upon request and approval of an acceptable research proposal. I made a request on September 27, 2021 by submitting the PRAMS Proposal Application (see Appendix C) to the PRAMS Working Group, Division of Reproductive Health, National Center for Chronic Disease Prevention and Health Promotion within the CDC. Notification of approval from the CDC was received on October 20, 2021 (see Appendix D). I received the data in SAS format via a link to the CDC shared portal on January 11, 2022. Once downloaded from the CDC site, the data were stored on a password-protected laptop with full encryption in an office only accessible by me. The laptop was kept in a locked file when not in

use and was not removed from the premises of usual use. No data were stored in hard copy, on cloud drives, or on external drives.

Data Analysis Plan

The data were analyzed using the statistical software package IBM SPSS® Version 23. Data cleaning was conducted including calculating frequencies of each variable and checking for variable values outside the appropriate range. Missing data is a significant issue encountered in practically all research studies (Baraldi & Enders, 2013). Best practice is to address potential issues in the study design and execution to mitigate such issues as nonresponse, survey fatigue, and response bias. This study was an examination of previously collected data, so the ability to address issues that could contribute to missing data in the design or data collection phase was not possible. Prior to conducting data analysis, analysis of missing data on the study variables was conducted through SPSS by calculating frequencies, constructing correlation matrices, and analyzing the amount of missingness in the full data set compared to the subset of the sample that was positive for exposure to RC. Using the classically defined missing data mechanisms, it was determined that the data were missing at random, meaning that the propensity of the missing data was related to other variables in the dataset but not to the value of the variable itself (Little & Rubin, 2002; Rubin, 1976).

The goal was to preserve as much data as possible in the positive RC group while utilizing missing data approaches that best approximated the parameter estimates of the full population and minimized introduction of bias (Wang et al., 2013). The missing values analysis revealed that the missing data amount was very low across all study variables, for most variables it was 2% of cases and below. One variable, maternal age, was not missing data on any case. Income data was one exception, which was missing data for 6.8% of the cases. Given the

relatively large number of cases with missing data and the availability of the education variable to serve as an indicator of socioeconomic status, the decision was made to omit the income variable from the regression analyses. The education variable was missing data on 1.1% of cases. Observations that were missing data on the key predictor variable, RC, were removed from the sample (n = 371). Missing data on the other variables was addressed either through listwise deletion or recoding of variables into Yes v. Other categories. Although listwise deletion can typically lead to the introduction of bias in data that are not missing completely at random, when missingness on the independent variables is not dependent on the predictor variable, listwise deletion is the method most robust to violations of the assumption that data are missing at random (Allison, 2011). The missing data analysis revealed that missing data on the independent variables were not associated with the predictor variable, RC. Additionally, the percentage of cases with missing data was very low in most cases. The methodological literature cites a threshold level of missing data of 5% at which point all modern missing data techniques will yield similar results (Tabachnick & Fidell, 2020). Table 2 presents the missing data approach utilized for each variable. The final sample size for analysis was 18,727.

Table 2

Missing Data Approaches

Variable	Approach	n (%)
Reproductive coercion	Deletion	371 (1.9)
Abuse before pregnancy	Deletion	62 (.3)
Abuse during pregnancy	Deletion	22 (.1)
Gestational Age	Deletion	16 (> .1)
Maternal Education	Deletion	185 (1.0)
Race	Recoded	
Infant Death	Recoded	
Hispanic	Recoded	
Drinking	Recoded	
Smoking	Recoded	
Depression	Recoded	

Description of the sample was done by analyzing the demographic variables using univariate descriptive statistical techniques (Grove et al., 2013; Wood & Ross-Kerr, 2011). Descriptive statistics was calculated for the following six demographic variables: age, marital status, education level, race, ethnicity, and income. The variable IPV was also analyzed using descriptive statistics to inform sample characteristics. Frequencies and percentages were calculated for categorical variables (age, marital status, education level, race, ethnicity). Descriptive statistics was computed after weighting adjustments were applied. All demographic data were extracted from birth certificate data with the exception of income, which is measured on the Core Questionnaire. Bivariate nonparametric statistics (2-group independent sample chi

square) was calculated for each of the five demographic variables between women with exposure to RC and women without exposure to RC.

Outcome Variables

Regression analysis seeks to identify predictors or explanatory factors (i.e., the independent variable(s)) to predict or explain the value of the dependent, or outcome, variables (Grove et al., 2013; Grove & Cipher, 2017). Multiple regression is a useful statistical technique for assessing the relationship between one predictor variable and multiple outcome variables. The goal of regression analysis is to examine potential relationships between a predictor, or dependent, variable and one or more independent, or outcome, variables (Tabachnick & Fidell, 2020). This study sought to use regression analysis to examine the predictive value of RC on three birth outcome variables: PTB, infant death, and NICU care. Eight covariates were entered into the regression model: age, race, ethnicity, education level, marital status, depression, drinking, and smoking. All regression procedures were computed on unweighted variables.

Logistic regression procedures can provide statistical models to examine potential relationships between RC and the outcome variables of PTB, infant death, and need for NICU care. Logistic regression is the appropriate statistical technique for analyzing the relationship of an outcome or dependent variable to one or more predictor variables when the dependent variable is dichotomous (i.e., having only two categories). This was the case for three outcome variables in this study: PTB (yes or no), need for NICU care (yes or no), and infant death (yes or no; Boslaugh, 2008; Tabachnick & Fidell, 2020). The goal of logistic regression analysis is to correctly predict the category of the outcome for each individual case using the logit function to make statistical inferences about coefficients in the regression equation. The logistic regression function makes no assumption of normality in the distribution of the predictor variable and can

therefore be used for nonlinear predictor variables. The outcome variables of PTB, infant death, and need for NICU care are measured as dichotomous, categorical variables (Munro, 2005) and logistic regression was used to determine the odds of experiencing PTB, infant death, and need for NICU care for women experiencing RC. Seven covariates were entered into the logistic regression model: age, race, ethnicity, income, depression, drinking, and smoking.

The research hypotheses were as follows:

H_0 = Experiencing RC does not predict PTB

H_0 = Experiencing RC does not predict infant death

H_0 = Experiencing RC does not predict NICU care

Control Variables

Drinking alcohol and smoking cigarettes are known to have adverse effects on birth outcomes, notably LBW, PTB, and perinatal mortality (Dietz et al., 2010; Ion & Bernal, 2015). The variables for drinking and smoking were included in both regression models as control variables.

The impact of maternal depression during and after pregnancy on infant health is less well understood. A systematic review of prenatal depression found that depression was significantly associated with LBW, particularly among women of color, but that evidence was lacking that linked depression with PTB (Accortt et al., 2015; Dadi et al., 2020). There is some evidence that maternal depression in the postnatal period can impact infants beyond the pregnancy and delivery including higher rates of infant hospitalization and mortality before the age of 1 year (Jacques et al., 2019). In this analysis, maternal depression was incorporated into the regression model as a control variable to isolate the effects of depression from RC. The

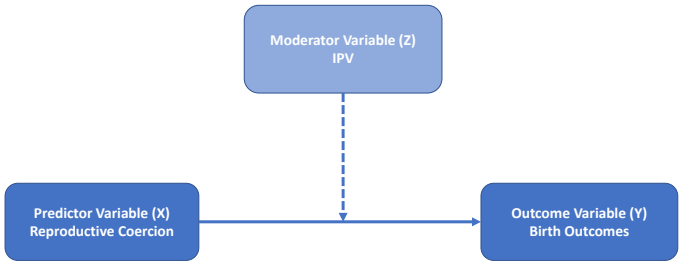
variable BPG_DPRS (healthcare provider identified depression) was used in the regression model for PTB, NICU care, and infant death.

Moderation Variable

Moderation is said to occur when the effect of a predictor or independent variable on a dependent or outcome variable varies in strength and/or direction as a function of a third, or moderating, variable (Baron & Kenny, 1986; Frazier et al., 2004; Marsh et al., 2013). The moderator variable quantifies the relationship between the predictor and outcome variables (MacKinnon, 2011). A statistical model that tests the effect of moderator variables addresses the questions of under what conditions, or for what groups, a predictor variable most strongly explains or causes the outcome variable. This type of analysis holds much potential for understanding the effect of RC on birth outcomes (Frazier et al., 2004; MacKinnon, 2011). It is imperative that strong theoretical arguments drive the identification of potential moderator variables and that justification for the hypothesized effects of the moderator and how it will better explain the phenomenon of interest must be clearly explicated. With adequate theoretical justification, moderating variables can also be tested in exploratory models to examine previously unexplored effects. Figure 3 illustrates the moderation effect of a predictor variable, IPV, on the relationship between RC and birth outcomes, the outcome variables.

Figure 3

Conceptual Model of Moderation Effect of IPV



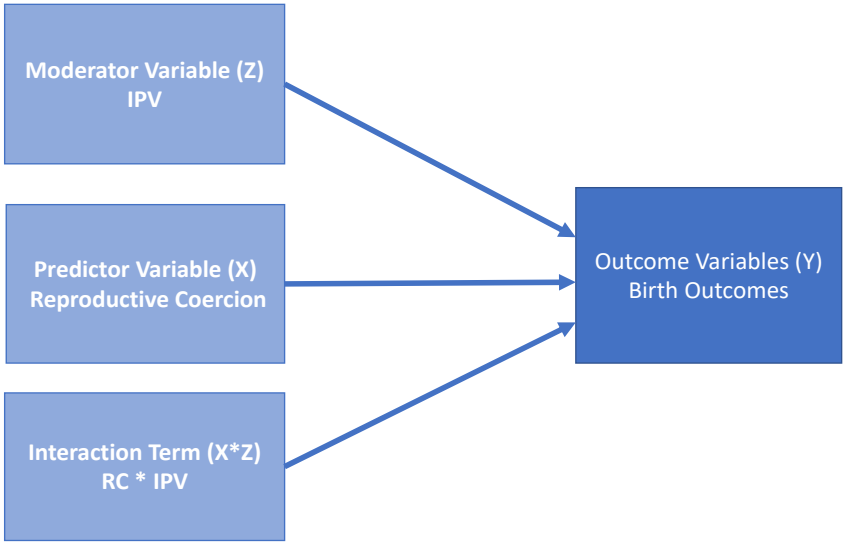
Moderating effects have been described as having one of three types of influence: enhancing, buffering, or antagonistic (Cohen et al., 2013; Frazier et al., 2004). An enhancing interaction results when both the predictor and moderator affect the outcome variable in the same direction, the moderator has an additive effect, and when considered together, the effects are greater than either alone. A buffering interaction occurs when the moderator variable decreases the effect of the predictor variable on the outcome. An antagonistic interaction occurs when the moderator variable reverses the relationship's direction (Frazier et al., 2004; Memon et al., 2019).

The main objective of moderation analysis is to "measure and test the differential effect of the independent variable on the dependent variable as a function of the moderator" (Baron & Kenny, 1986, p. 1174). Simple moderation effects can be assessed through the use of multiple regression analysis (Cohen et al., 2013; Frazier et al., 2004; Memon et al., 2019). The goal is to determine if the relationship between the predictor and outcome variables is stronger for some people than for others. Moderating variables are constructed by the researcher by taking the

product of two predictor variables and determining the joint impact of both independent variables on the dependent, or outcome, variables (Creswell, 2014). Moderator variables can be categorical or continuous and were thus appropriate for the variables in this study. Figure 4 illustrates the statistical model that includes the interaction term created from the predictor variables of RC and IPV.

Figure 4

Statistical Model with Interaction Term



Based on the extensive literature base linking IPV to a wide range of health consequences, I hypothesized that exposure to physical IPV has an amplifying effect on the effect of RC on birth outcomes, namely, that exposure to both RC and IPV increases the likelihood of adverse birth outcomes compared to the effect of RC alone. To test moderation, statistical procedures were employed to examine the interaction effect between RC and IPV

(Hayes, 2017; Hayes & Rockwood, 2017). Logistic regression models can include interactions among the predictor variables (Tabachnick & Fidell, 2020). For this study, an interaction term was created by calculating the product of the predictor variables (RC and IPV) and treating that result as a separate third predictor variable. This interaction term was then entered into the regression model to determine if the moderation effect of IPV is a significant predictor of birth outcomes.

The research hypothesis for this question was as follows:

H_0 = The effect of RC on birth outcomes is not dependent on exposure to physical IPV.

Protection of Human Subjects

The PRAMS survey approach has been reviewed and approved by the CDC's Institutional Review Board (IRB) and undergoes additional review on an annual basis. Participating states also must undergo initial IRB review at the federal and local levels for their state-specific surveillance methodology prior to data collection as well as an ongoing annual review. An informed consent document is included with each mailed questionnaire, and within each online questionnaire, and consent is inferred upon return of the completed questionnaire. Consent is obtained by trained interviewers prior to all telephone interviews (CDC, 2017).

This study used data provided by the CDC that were deidentified and did not include participant identifiers such as name, birthdate, address, IP address, or the like. A data sharing agreement was executed on September 21, 2021 between the CDC and myself that governed the use of the PRAMS data for this study (see Appendix E). This study was a secondary analysis of publicly available, previously collected data and posed little to no risk of harm to participants. The study was submitted to the Boston College IRB on December 23, 2021 and was granted an exemption from review on January 19, 2022 (see Appendix F). An amendment to the initial IRB

application reflecting a change from the Phase 8 dataset to the Phase 7 dataset to be used for the study was submitted on February 1, 2022 and approved on February 2, 2022 (see Appendix G).

Results

This chapter presents the results of the data analyses performed to address the aims of the study. Descriptive and bivariate analyses were conducted and are presented to describe the sample characteristics. Multivariate analyses were performed using logistic regression procedures to assess the relationship between the predictor variable, RC, and three adverse birth outcomes: PTB, need for NICU care, and infant death in the postpartum period. Models were constructed with the predictor variables and sociodemographic and health behavior covariates as described in Chapter 3. Finally, the moderation of the relationship of RC on birth outcomes from exposure to IPV was examined by including an interaction term in the regression model.

Missing Data and Cleaning Approach

The initial dataset received from the CDC included survey responses from 19,342 women residing in five states: Maryland, Massachusetts, Ohio, Iowa, and Virginia. Data were cleaned, recoded, and analyzed for missing data patterns using descriptive statistics. Cases that were missing data on the primary independent variable, RC, were removed from the sample (n = 372). All other study variables were missing data for less than 5% of cases. Most procedures for handling missing data will likely yield similar results given this small amount of missing data (Tabachnick & Fidell, 2020). Cases that were missing data on study variables were either deleted casewise or recoded into the 0 category. Variables with more than two categories (age, race, education) were recoded using dummy coding. Age less than/equal to 19 years = AGE_DUM1, Age 20–34 years = AGE_DUM2, and age of 35 years and older = AGE_DUM3. For age, the 20–34 year age category was used as the reference category as this most closely matches the clinically defined reproductive period (Adams et al., 2010). Race was coded as RACE_DUM1 = Black, RACE_DUM 2 = Other, and RACE_DUM3 = White. White race was designated as the

reference category for the race variable. Education was coded as EDUC_DUM1 = less than high school, EDUC_DUM2 = high school diploma, and EDUC_DUM3 = more than a high school education. Education greater than high school was designated as the reference category for education based on prior research demonstrating that higher education is associated with better birth outcomes (Braveman et al., 2015; Thoma et al., 2019). The final sample size used for analysis was 18,728.

Description of Sample

The final sample was comprised of primarily White women (54.4%) between the ages of 20 and 34 years (76.5%) as shown in Table 3. Black women comprised 24.9% of the sample, which is higher than the percentage of the general U.S. population that is Black (13.4%; United States Census Bureau, 2021). Asian, Native American, Hawaiian, Pacific Islander, other non-White races, and mixed-race women comprised 20.8% of the sample. Almost 20% of the women in the sample identified as Hispanic/Latina. Women ages 17–19 made up 4.7% of the sample, and 18.8% of the sample were women aged 35 years and greater, which is considered advanced maternal age for pregnancy (AAP & ACOG, 2017). The majority of the women were married (61.8%) and had more than a high school education (67.0%).

Table 3

Demographic Characteristics by Exposure to Reproductive Coercion

	Overall N = 18,728		RC + n = 321		RC - n = 18,127			
	n	%	n	%	n	%	X^2	p
Maternal age, years							18.636	<.001
17 - 19	883	4.70	29	9.03	65	4.64		
20 - 34	14329	76.50	250	77.88	472	76.49		
> = 35	3516	18.80	42	13.08	64	18.87		
Race/ethnicity								
Black	4657	24.90	128	39.88	233	24.60	69.292	<.001
White	10182	54.40	102	31.78	271	54.76		
Other	3889	20.80	91	28.35	97	20.63		
Hispanic	3727	19.90	63	19.63	136	19.72	.002	.966
Marital status							32.885	<.001
Married	11580	61.80	172	53.58	438	37.90		
Other	7148	38.20	149	46.42	163	62.91		
Education							25.527	<.001
Less than high school	2485	13.30	59	18.38	1.26	13.18		
High school diploma	3689	19.70	89	27.73	171	19.56		
More than high school	12554	67.00	173	53.89	304	67.26		

Note. RC = Reproductive coercion.

RC was a relatively rare experience, as expected, with only 1.7% (n = 321) of the sample having experienced RC prior to pregnancy. RC was measured on the PRAMS survey as interference with birth control from a partner and used as the measure of RC for in this study. This prevalence rate is similar to previous research in population-level samples (Samankasikorn et al., 2019). Similarly, IPV was also relatively rare: 3.2% of women in the sample reported

experiencing IPV from a husband or partner. This prevalence rate of IPV is lower than other reported rates in large population-level samples (Breiding et al., 2014).

Three health behaviors and conditions were used in this study: drinking alcohol in the last 3 months of pregnancy, smoking cigarettes in the last 3 months of pregnancy, and healthcare-provider-identified depression. As shown in Table 4, almost 8% of women in the sample drank alcohol in the last 3 months of pregnancy and, similarly, 8.0% of women smoked in the last 3 months of pregnancy. Ten percent of women in the sample had been told by a healthcare provider prior to the pregnancy that they had symptoms of depression. As shown in Table 5, adverse birth outcomes were relatively rare events for women in this sample. Fourteen percent of women in the sample experienced PTB. Sixteen percent of infants required NICU care after delivery. Infant death after delivery occurred for 2.7% of the women in the sample.

Table 4

Health Behaviors and Experiences Before and During Pregnancy

	Overall		RC +		RC -			
	N = 18,728		n = 321		n = 18,127			
	n	%	n	%	n	%	χ^2	p
Drank, last 3 months of pregnancy	1487	7.94	21	6.54	1466	7.96	$\chi^2 = .873$	.350
Smoked, last 3 months of pregnancy	1500	8.01	32	9.97	1468	7.98	$\chi^2 = 1.702$	.192
Healthcare provider identified depression	1880	10.04	54	16.82	1826	9.92	$\chi^2 = 16.644$	<.001
Intimate partner violence	601	3.21	59	18.38	542	2.94	$\chi^2 = 242.004$	<.001

Note. RC = Reproductive coercion.

Table 5

Birth Outcomes by Exposure to Reproductive Coercion

	Overall		RC +		RC -			
	N = 18,728		n = 321		n = 18,127			
	n	%	n	%	n	%	$\chi 2$	p
Preterm birth	2652	14.16	46	14.33	2606	14.16	$\chi 2 = .008$	.930
Infant death	502	2.68	14	4.36	488	2.65	$\chi 2 = 3.537$	.060
NICU care	3011	16.08	55	17.13	2956	16.06	$\chi 2 = .270$	.603

Note. RC = Reproductive coercion.

Research Aim 1

Examine the odds of experiencing an adverse birth outcome among postpartum women exposed to RC prior to pregnancy.

Predictor Variables

The main predictor variable used in the analysis is RC prior to pregnancy as measured on the PRAMS survey instrument. The RC question and variable construction have been described previously in Chapter 3. Five sociodemographic maternal covariates were treated as predictor variables in the regression model: age, education, race, ethnicity, and marital status. Three maternal health behavior covariates were treated as predictors in the regression model: drinking alcohol in the last 3 months of pregnancy, smoking cigarettes in the last 3 months of pregnancy, and healthcare provider-identified depression.

Dependent Variables

Three birth outcome measures were used to test the hypothesis that RC negatively impacts a pregnancy: PTB, need for NICU care after delivery, and infant death. The meaning and

importance of these outcomes are described in Chapter 1, and coding of each variable is described in Chapter 3.

Binary Logistic Regression

Ordinal sequential logistic regression was performed for each independent variable to examine how exposure to RC predicted the likelihood of experiencing one of the three adverse birth outcomes: PTB, infant death, or need for NICU care. Logistic regression estimates the probability of the event occurring, in this case the birth outcome, given a change in the independent or predictor variables (Tabachnick & Fidell, 2020). A series of regression models were constructed for each of the three outcome variables. The first model regressed the two predictor variables (RC and partner abuse) with the birth outcome. Next, the five sociodemographic covariates (age, education level, race, ethnicity, marital status) and three health behavior covariates (drinking status, smoking status, and depression status) were added to the model. The coefficient (B) for each independent variable represents how probabilities of each particular birth outcome change given a change in exposure to RC and intimate partner abuse, the two predictor variables. Model goodness-of-fit was assessed through the Hosmer-Lemeshow test and log-likelihood test to compare the constant-only model with the full model with all predictors, which were examined to assess the model's fit.

Regression Results for PTB. Binary logistic regression was performed to assess the impact of exposure to RC and IPV on the odds that women would experience PTB. The initial model was constructed using the two dichotomous independent predictor variables (RC and IPV). The full model was constructed using the two predictor variables and sociodemographic and health behavior covariates as predictor variables (race, ethnicity, education, age, marital status, drinking status, smoking status, and depression). The full model containing all predictors

was statistically significant, X^2 (13, N = 18,728) = 223.812, p < .001, indicating that the model was able to differentiate between women who did experience PTB and those who did not. The full model correctly classified 85.8% of cases, indicating a high rate of predicting the correct category (PTB/no PTB) for each case.

The two predictor variables in the full model were not found to have a statistically significant contribution to the model, as shown in Table 6. Neither RC (p = .607, Exp(B) = 1.087, 95% CI .790, 1.497) nor IPV (p = .565, Exp(B) = .936, 95% CI .747, 1.173) were significant. However, four of the covariate predictors made a statistically significant contribution to the model including Black race (p = <.001, Exp(B) = 1.418, 95% CI 1.279, 1.571), Hispanic ethnicity (p = <.001, Exp(B) = 1.238, 95% CI 1.093, 1.403), drinking status (p = .005, Exp(B) = 1.269, 95% CI 1.074, 1.500), and advanced maternal age (p = < .001 Exp(B) = 1.560, 95% CI 1.409, 1.726). The strongest predictor of PTB was advanced maternal age as women aged 35 and older had a 1.56 times greater risk of delivering a premature infant. Black race and Hispanic ethnicity were also strong predictors. The odds that Black women would experience PTB were 1.4 times greater than among non-Black women. The odds for Hispanic women delivering prematurely were 1.238 times greater than for non-Hispanic women. Among the health covariates, drinking status was a strong predictor. The odds of experiencing PTB for women who drank during the last 3 months of a pregnancy were 1.269 times greater than for women who did not drink during their pregnancy. Marital status was associated with lower odds of PTB. The odds ratio of .737 for marital status was less than 1, indicating that the odds of married women experiencing PTB were .737 times lower than for nonmarried women.

Table 6

Logistic Regression Predicting Likelihood of Preterm Birth

	B	*SE*	Wald	*df*	*Sig*	*Exp (B)*	95% CI	
							UB	*LB*
Step 1								
Constant	-1.628	.183	79.423	1	<.001	.196		
RC	.018	.162	.013	1	.910	1.018	.742	1.399
IPV	-.199	.112	3.131	1	.077	.820	.658	1.022
Step 2								
Constant	-2.097	.223	88.324	1	<.001	.123		
RC	.084	.163	.265	1	.607	1.087	.790	1.497
IPV	-.066	.115	.331	1	.565	.936	.747	1.173
Race, Black	.349	.053	44.095	1	<.001	1.418	1.279	1.571
Race, other	.037	.058	.396	1	.529	1.037	.926	1.162
Hispanic	.214	.064	11.229	1	<.001	1.238	1.093	1.403
Age, <=19	-.105	.105	.997	1	.318	.900	.733	1.106
Age, 35+	.444	.052	73.521	1	<.001	1.560	1.409	1.726
Education, <HS	.034	.072	.223	1	.637	1.034	.899	1.191
Education, HS	.039	.057	.456	1	.500	1.039	.929	1.162
Marital status	-.305	.051	36.524	1	<.001	.737	.668	.814
Drinking	.239	.085	7.845	1	.005	1.269	1.074	1.500
Smoking	-.071	.079	.816	1	.366	.931	.798	1.087
Depression	-.089	.070	1.624	1	.203	.915	.798	1.049

Note. RC = Reproductive coercion; IPV = Intimate partner violence

Regression Results for NICU Care After Delivery. Binary logistic regression was performed to assess the impact of exposure to RC and IPV on the odds that an infant would need NICU care after delivery. The initial model was constructed using the two dichotomous independent predictor variables (RC and IPV). The full model was constructed using the two

predictor variables and sociodemographic and health behavior covariates as predictor variables (race, ethnicity, education, age, marital status, drinking status, smoking status, and depression). The full model containing all predictors was statistically significant, X^2 (13, N = 18,728) = 196.987, p < .001, indicating that the model was able to differentiate between infants who needed NICU care and those who did not. The full model correctly classified 83.9% of cases, indicating a high rate of correctly predicting the category NICU/No NICU for each case.

As shown in neither predictor variable, RC (p = .891, Exp(B) = 1.021, 95% CI .759, 1.374) nor IPV (p = .701, Exp(B) = 1.044, 95% CI .839, 1.298) made a statistically significant contribution to the model. However, several of the covariate predictors made a statistically significant contribution to the model, including Black race (p = <.001, Exp(B) = 1.388, 95% CI 1.258, 1.531), Hispanic ethnicity (p = .006, Exp(B) = 1.177, 95% CI 1.047, 1.322), and advanced maternal age (p = < .001 Exp(B) = 1.327, 95% CI 1.202, 1.466). Black race was the strongest predictor of PTB. The odds that Black infants would require NICU care were 1.4 times greater than among non-Black infants. The odds for Hispanic infants needing NICU care were 1.18 times greater than for non-Hispanic infants. Women aged 35 and older had a 1.33 times greater risk of delivering an infant who needed NICU care after delivery. The odds ratio of .776 for marital status was less than 1, indicating that the odds of married women's infants needing NICU care were .776 times lower than for non-married women.

Table 7

Logistic Regression Predicting Likelihood of NICU Care

	B	*SE*	Wald	*df*	*Sig*	*Exp (B)*	95% CI	
							UB	*LB*
Step 1								
Constant	-1.458	.172	72.016	1	<.001	.233		
RC	-.054	.151	.13	1	.718	.947	.705	1.272
IPV	-.146	.109	1.803	1	.179	.864	.699	1.069
Step 2								
Constant	-1.696	.209	66.130	1	<.001	.183		
RC	.021	.152	.019	1	.891	1.021	.759	1.374
IPV	.043	.111	.148	1	.701	1.044	.839	1.298
Race, Black	.328	.050	42.751	1	<.001	1.388	1.258	1.531
Race, Other	.029	.055	.285	1	.593	1.030	.925	1.147
Hispanic	.163	.060	7.451	1	.006	1.177	1.047	1.322
Age, <=19	-.059	.097	.369	1	.543	.943	.779	1.141
Age, 35+	.283	.051	31.228	1	<.001	1.327	1.202	1.466
Education, <HS	.075	.068	1.223	1	.269	1.078	.944	1.230
Education, HS	.065	.054	1.460	1	.227	1.067	.960	1.187
Marital status	-.254	.048	28.027	1	<.001	.776	.707	.852
Drinking	.200	.080	6.268	1	.012	1.221	1.044	1.428
Smoking	-.125	.073	2.888	1	.089	.883	.764	1.019
Depression	-.275	.063	18.864	1	<.001	.760	.671	.860

Note. RC = Reproductive coercion; IPV = Intimate partner violence.

Of the behavioral predictors, only drinking during the last 3 months of pregnancy made a statistically significant contribution to the model (p = .012, Exp (B) = 1.221, 95% CI 1.044, 1.428). Women who drank during pregnancy had a 1.221 times higher risk of delivering an infant who needed NICU care. Smoking during the last 3 months of pregnancy was associated

with an odds ratio of .089, which is less than 1, indicating that the odds of an infant of a woman who smoked during the last 3 months of her pregnancy needing NICU care was .089 times lower than for women who did not smoke during their pregnancy. Similarly, the odds ratio for healthcare-provider-identified depression was also less than 1, indicating that infants of women who were identified has having depression were .76 times less likely to need NICU care as women who were not identified as having depression. The lowered risk of NICU care among women who smoked and women with depression is an unexpected finding and does not align with current understanding of how these conditions affect a pregnancy (Ion & Bernal, 2015; Liu, Cnattingius et al., 2016). In terms of the depression variable, a possible explanation for this is how this variable was measured in the PRAMS study. The survey item assessed whether a woman had been told by a healthcare provider that she had depression or depressive symptoms. It did not measure depression using a validated instrument specific to depression screening. This could potentially explain why the study findings do not align with other research linking depression with adverse birth outcomes.

Regression Results for Infant Death. Binary logistic regression was performed to assess the relationship of exposure to RC and IPV on the odds that an infant death would occur in the postpartum period. The initial model was constructed using the two dichotomous independent predictor variables (RC and IPV). The full model was constructed using the two predictor variables and covariates as predictor variables (race, ethnicity, education, age, marital status, drinking status, smoking status, and depression). The full model containing all predictors was statistically significant, X^2 (13, N = 18,728) = 49.517, $p < .001$, indicating that the model was able to differentiate between women who did experience infant death and those who did not. The full model correctly classified 97.3% of cases. Neither RC ($p = .159$, Exp(B) = .673, 95%

CI .387, 1.168) nor IPV (p = .179, Exp(B) = .739, 95% CI .475, 1.149) made statistically significant contributions to the model.

As shown in Table 8, four of the covariate predictors made a statistically significant contribution to the model (Black race, advanced maternal age, less than a high school education, and drinking during the last 3 months of pregnancy). Drinking during pregnancy was the strongest predictor; the odds that women who drank in the last 3 months of their pregnancy would experience infant death were 1.615 times higher than for women who did not drink. The odds ratio of .723 for Black race was less than 1, indicating that the odds of Black women experiencing an infant death were .723 times lower than for non-Black women, controlling for all other factors. The odds of women of advanced maternal age experiencing an infant death were .747 times less than women aged 34 years and younger. The odds of women with less than a high school diploma were .612 times less than for women with at least a high school education. These are unexpected findings as extensive evidence in the literature links these factors with adverse outcomes, particularly for Black women (Braveman et al., 2021; Braveman et al., 2015).

Table 8

Logistic Regression Predicting Likelihood of Infant Death

	B	*SE*	Wald	*df*	*Sig*	*Exp (B)*	95% CI	
							UB	*LB*
Step 1								
Constant	-2.821	.321	77.109	1	<.001	.060		
RC	-.457	.280	2.655	1	.103	.633	.365	1.097
IPV	-.336	.220	2.334	1	.127	.714	.464	1.100
Step 2								
Constant	-2.440	.502	23.605	1	<.001	.087		
RC	-.396	.281	1.983	1	.159	.673	.387	1.168
IPV	-.303	.225	1.809	1	.179	.739	.475	1.149
Race, Black	-.325	.114	8.064	1	.005	.723	.577	.904
Race, Other	.032	.123	.070	1	.791	1.033	.812	1.314
Hispanic	-.185	.126	2.152	1	.142	.831	.650	1.064
Age, <=19	.138	.217	.406	1	.524	1.148	.751	1.756
Age, 35+	-.291	.112	6.809	1	.009	.747	.600	.930
Education, <HS	-.491	.139	12.477	1	<.001	.612	.466	.804
Education, HS	-.223	.122	3.355	1	.067	.800	.630	1.016
Marital status	.055	.108	.258	1	.611	1.056	.855	1.305
Drinking	.479	.212	5.094	1	.024	1.615	1.065	2.449
Smoking	.193	.186	1.076	1	.300	1.212	.843	1.745
Depression	-.102	.149	.467	1	.494	.903	.674	1.210

Note. RC = Reproductive coercion; IPV = Intimate partner violence.

Research Aim 2

Test the interaction effect of exposure to RC and IPV on birth outcomes.

Outcome and Predictor Variables

The same predictor variables described under Aim 1 were used in the analyses for Aim 2. The same outcome variables described under Aim 1 were used in the analyses for Aim 2.

Description of Interaction Term

The effect of a moderator variable is often considered when the relationship between a predictor variable and an outcome variable is unexpectedly weak or inconsistent such as in different subpopulations or settings (Marsh et al., 2013). Prior research has suggested a link between RC and adverse birth outcomes in smaller samples drawn from clinical settings; however, this link was not found in the larger population-based sample drawn from the community that was used for this study. An interaction term was created and used in the regression model to test the hypothesis that exposure to IPV impacts the nature of the association of RC and birth outcomes. The interaction term was created by taking the product of the reproductive variable and intimate partner variable (Aiken et al., 1991; Baron & Kenny, 1986). The interaction term was then entered into the regression model as a separate variable. A potential threat to power of the test of interactions can result from a lack of adequate observations in all conditions of the interaction, known as complete separation of groups (Tabachnick & Fidell, 2020). The number of observations in each possible condition was examined through a 2 x 2 table (see Table 9). Each cell contains greater than 20 observations, an adequate threshold providing evidence that complete separation of groups is not present (Frazier et al., 2004).

Table 9

Condition Totals for RC and IPV

		IPV	
		No	Yes
RC	No	17,865	542
	Yes	262	59

Note. RC = Reproductive coercion.

Regression Analysis of Interaction Effect

Analysis of Interaction Effect and PTB. Binary logistic regression was performed to assess the effect of the interaction between exposure to both RC and IPV on the odds that a woman would experience PTB. The initial model was constructed using the two dichotomous independent predictor variables (RC and IPV). The full model was constructed using the two predictor variables and sociodemographic and health behavior covariates as predictor variables (race, ethnicity, education, age, marital status, drinking status, smoking status, and depression), and the interaction term. The full model containing all predictors was statistically significant, X^2 (14, N = 18,728) = 223.968, $p < .001$, indicating that the model was able to differentiate between women who had a PTB from those who did not. The full model correctly classified 85.8% of cases indicating a high rate of correctly predicting the category for PTB/not PTB for each case.

As shown in Table 10, none of the predictor variables, RC (p = .761, Exp(B) = 1.056, 95% CI .744, 1.497), IPV (p = .507, Exp(B) = .924, 95% CI .731, 1.167), nor the interaction variable (p = .696, Exp(B) = 1.1.86, 95% CI .504, 2.793), made a statistically significant contribution to the model. Although these findings support the null hypothesis that RC is not associated with PTB, and that IPV does not have an amplifying effect on this association, they do not support the research hypothesis that exposure to RC does negatively impact a pregnancy in

such ways as to increase the likelihood of PTB. Additionally, the initial research hypothesis that IPV amplifies this effect was not supported. Several studies have indicated that health consequences of partner abuse are exacerbated in women who experience multiple forms of victimization, so these findings should be interpreted with caution (Coker, 2007; Ellsberg et al., 2008).

Table 10

Logistic Regression of Interaction Effect and Preterm Birth

	B	*SE*	Wald	*df*	*Sig*	*Exp (B)*	95% CI	
							UB	*LB*
Constant	-2.226	.403	30.569	1	<.001	.108		
Interaction	.171	.437	.153	1	.696	1.186	.504	2.793
RC	.054	.178	.093	1	.761	1.056	.744	1.497
IPV	-.079	.119	.440	1	.507	.924	.731	1.167
Race, Black	.349	.053	44.008	1	<.001	1.417	1.278	1.571
Race, Other	.036	.058	.389	1	.533	1.037	.925	1.162
Hispanic	.214	.064	11.239	1	<.001	1.239	1.093	1.403
Age, <=19	-.104	.105	.977	1	.323	.901	.734	1.107
Age, 35+	.444	.052	73.489	1	<.001	1.560	1.409	1.726
Education, <HS	.034	.072	.223	1	.637	1.035	.899	1.191
Education, HS	.039	.057	.456	1	.500	1.039	.929	1.162
Marital status	-.305	.051	36.445	1	<.001	.737	.668	.814
Drinking	.239	.085	7.839	1	.005	1.269	1.074	1.500
Smoking	-.071	.079	.804	1	.370	.932	.799	1.087
Depression	-.089	.070	1.629	1	.202	.915	.798	1.049

Note. RC = Reproductive coercion; IPV = Intimate partner violence.

As shown in Table 10, five sociodemographic variables made unique statistically significant contributions to the model (Black race, Hispanic ethnicity, marital status, and

advanced maternal age). Advanced maternal age was the strongest predictor in the model with an odds ratio of 1.560. The odds for women of advanced maternal age delivering prematurely were 1.56 times higher than for women not of advanced maternal age. Black race was also a strong predictor with an odds ratio of 1.417. Black women had 1.4 times greater odds of delivering prematurely than non-Black women, all other factors controlled. The odds for women of Hispanic ethnicity delivering prematurely are estimated at 1.239, indicating that Hispanic women have 1.239 times greater odds of PTB than women who are not Hispanic. Similarly, women who drank in the last 3 months of a pregnancy had 1.269 greater odds of PTB than women who did not drink during their pregnancy. As seen in previous analyses, marital status had a protective effect. In this model, married women were .737 times less likely to experience PTB than women who were not married.

Analysis of Interaction Effect and NICU Care. Binary logistic regression was performed to assess the effect of the interaction of exposure to both RC and IPV on the odds that an infant would require NICU care. The initial model was constructed using the two dichotomous independent predictor variables (RC and IPV). The full model was constructed using the two predictor variables and covariates as predictor variables (race, ethnicity, education, age, marital status, drinking status, smoking status, and depression), and the interaction term. The full model containing all predictors was statistically significant, X^2 (14, N = 18,728) = 198.955, $p < .001$, indicating that the model was able to differentiate between women who had an infant needing NICU care from those who did not. The full model correctly classified 83.9% of cases, indicating a high level of correctly predicting the category of NICU/no NICU care.

As shown in Table 11, none of the predictor variables, RC (p = .660, Exp(B) = .931, 95% CI .677, 1.280), IPV (p = .991, Exp(B) = .999, 95% CI .798, 1.250), nor the interaction variable

(p = .180, Exp(B) = 1.826, 95% CI .757, 4.403), made a statistically significant contribution to the model. Although these findings support the null hypothesis that RC is not associated with the need for NICU care, and that IPV does not have an amplifying effect on this association, they do not support the research hypothesis that exposure to RC does negatively impact a pregnancy in such ways as to increase the likelihood for the need for NICU care. Additionally, the initial research hypothesis that IPV amplifies this effect was not supported.

Table 11

Logistic Regression of Interaction Effect and NICU Care

	B	*SE*	Wald	*df*	*Sig*	*Exp (B)*	95% CI	
							UB	*LB*
Constant	-2.165	.421	26.484	1	<.001	.115		
Interaction	.602	.449	1.797	1	.180	1.826	.757	4.403
RC	-.071	.162	.193	1	.660	.931	.677	1.280
IPV	-.001	.115	.000	1	.991	.999	.798	1.250
Race, Black	.327	.050	42.455	1	<.001	1.386	1.257	1.529
Race, Other	.028	.055	.265	1	.607	1.029	.924	1.146
Hispanic	.163	.060	7.486	1	.006	1.177	1.047	1.323
Age, <=19	-.056	.097	.326	1	.568	.946	.782	1.145
Age, 35+	.283	.051	31.168	1	<.001	1.327	1.201	1.465
Education, <HS	.075	.068	1.229	1	.268	1.078	.944	1.230
Education, HS	.065	.054	1.464	1	.226	1.067	.960	1.187
Marital status	-.252	.048	27.779	1	<.001	.777	.707	.853
Drinking	.200	.080	6.251	1	.012	1.221	1.044	1.428
Smoking	-.123	.073	2.813	1	.094	.884	.765	1.021
Depression	-.275	.063	18.938	1	<.001	.759	.671	.860

Note. RC = Reproductive coercion; IPV = Intimate partner violence.

Additionally, six sociodemographic variables made unique statistically significant contributions to the model (Black race, Hispanic ethnicity, marital status, and advanced maternal age, drinking status, and depression). The strongest predictor of the need for NICU care was Black race when controlling for other factors in the model. The odds of an infant needing NICU care were 1.386 times higher for Black women than for non-Black women. Advanced maternal age was also a strong predictor; the odds of women of advanced age delivering an infant needing NICU care was 1.327 greater than for women not of advanced maternal age. The odds of needing NICU care was 1.177 times greater among Hispanic women compared to non-Hispanic women. Drinking during the last 3 months of pregnancy was also a strong predictor; the odds of needing NICU care among women who drank in the last 3 months of pregnancy were 1.221 times greater than for women who did not drink in the last 3 months of pregnancy. These findings align with extensive literature linking these factors with adverse birth outcomes. Two variables (marital status and depression) predicted a lesser risk of a need for NICU care. Women who were married had .777 times lower odds of needing NICU care for their infant as women who were not married. Surprisingly, depression was associated with a lower risk of needing NICU care. The odds of needing NICU care for women who were identified by a healthcare provider as being depressed were .759, meaning that these women were .759 times less likely to deliver an infant who needed NICU care. This does not align with previous research and what is known about depression and pregnancy outcomes (Liu, Cnattingius et al., 2016).

Analysis of Interaction Effect and Infant Death. Binary logistic regression was performed to assess the effect of the interaction of exposure to both RC and IPV on the odds that a woman would experience an infant death in the postpartum period. The full model was constructed using the two predictor variables (RC and IPV) and covariates as predictor variables

(race, ethnicity, education, age, marital status, drinking status, smoking status, and depression), and the interaction term. The full model containing all predictors was statistically significant, X^2 (14, N = 18,728) = 50.980, $p < .001$, indicating that the model was able to differentiate between women who had experienced an infant death from those who did not. The full model correctly classified 97.3% of cases, a high rate of correctly predicting the correct category of infant death/infant alive for each case.

As shown in Table 12, none of the predictor variables, RC ($p = .560$, Exp(B) = .818, 95% CI .417, 1.605), IPV ($p = .426$, Exp(B) = .820, 95% CI .503, 1.337), nor the interaction variable ($p = .214$, Exp(B) = .458, 95% CI .133, 1.572), made a statistically significant contribution to the model. Although these findings support the null hypothesis that RC is not associated with infant death, and that IPV does not have an amplifying effect on this association, they do not support the research hypothesis that exposure to RC does negatively impact a pregnancy in such ways as to increase the likelihood of infant death. Additionally, the initial research hypothesis that IPV amplifies this effect was not supported.

Table 12

Logistic Regression of Interaction Effect and Infant Death

	B	*SE*	Wald	*df*	*Sig*	*Exp (B)*	95% CI	
							UB	*LB*
Constant	-1.953	.607	10.361	1	.001	.142		
Interaction	-.782	.630	1.542	1	.214	.486	.133	1.572
RC	-.200	.344	.340	1	.560	.818	.417	1.605
IPV	-.198	.249	.633	1	.426	.820	.503	1.337
Race, Black	-.328	.114	8.215	1	.004	.720	.575	.901
Race, Other	.030	.123	.059	1	.808	1.030	.810	1.310
Hispanic	-.185	.126	2.173	1	.140	.831	.649	1.063
Age, <=19	.148	.217	.465	1	.495	1.160	.757	1.775
Age, 35+	-.293	.112	6.873	1	.009	.746	.600	.929
Education, <HS	-.491	.139	12.461	1	<.001	.612	.466	.804
Education, HS	-.224	.122	3.367	1	.067	.800	.630	1.015
Marital status	.052	.108	.233	1	.630	1.053	.853	1.302
Drinking	.479	.212	5.095	1	.024	1.615	1.065	2.449
Smoking	.189	.186	1.031	1	.310	1.207	.839	1.738
Depression	-.101	.149	.455	1	.500	.904	.675	1.212

Note. RC = Reproductive coercion; IPV = Intimate partner violence.

Four sociodemographic variables made unique statistically significant contributions to the model (Black race, less than a high school education, drinking status, and advanced maternal age). The odds of a woman who drank in the last 3 months of the pregnancy experiencing an infant death in the postpartum period was 1.615, meaning women who drank were 1.615 times more likely to experience an infant death. The other three variables, age 35 and greater, Black race, and less than a high school education, were found to be associated with less risk of experiencing an infant death. Women aged 35 and greater had a .746 times lower risk of infant death than women ages 34 and younger. A possible explanation is that older women are more

competent caregivers due to age and experience, greater knowledge, and generally being in more stable economic situations than younger mothers. Additionally, there is scholarly evidence that older mothers provide more sensitivity (warmth, emotional connection) and structure (provision of structured environment) to their infants than younger mothers (Bornstein et al., 2006). The odds of a Black women experiencing an infant death are .720, meaning a Black woman is .720 times less likely to experience an infant death than women of other races, including White women. These findings do not align with current knowledge regarding Black race and infant mortality (Ely & Driscoll, 2021; Kirby, 2017). Additionally, the odds of a woman with less than a high school education experiencing an infant death are .612, meaning a woman without a high school diploma is .612 times less likely to experience an infant death in the postpartum period. Although these findings for Black women and women with less than a high school education are surprising and not in line with current understanding of these characteristics, both of which are considered risk factors for adverse birth outcomes, and for infant mortality specifically, they are not comparable to other measures of infant mortality. This study assessed infant death at the time of survey (i.e., within 2 to 6 months, and no longer than 9 months, after delivery). Infant mortality is defined as death within the first 12 months of life, which is a considerably longer time period than what was measured in the current study (Adams et al., 2010).

Conclusion

The analyses for both study aims were presented and the results explained in detail. Overall, there was not a statistically significant association, as was expected, between exposure to RC and the adverse birth outcomes of PTB, need for NICU care, and infant death in the postpartum period. Additionally, no amplifying effect of exposure to IPV was detected, as was

initially hypothesized. Experiencing both RC and IPV prior to pregnancy did not increase the likelihood of experiencing an adverse birth outcome.

The regression analyses did, however, detect an association between several sociodemographic risk factors including Black race, Hispanic ethnicity, advanced maternal age (35 years and older) and low education, and PTB and need for NICU care. These findings are supported by a multitude of prior research linking these factors with PTB and infant mortality (Braveman et al., 2015; Thoma et al., 2019; Waldenström et al., 2017). The analyses suggests that women who had less than a high school education, were of advanced age, were Black, or drank alcohol during the last 3 months of pregnancy were more likely to experience their infant dying before the time of the survey.

Discussion

This study successfully met the research aims of (1) examining the association between exposure to RC prior to pregnancy and adverse birth outcomes and (2) testing the effect of IPV as a potential moderator of the relationship between RC and adverse birth outcomes. This study examined the association of RC with adverse birth outcomes among women, ages 17 and older, who gave birth to a live infant and participated in the PRAMS survey in the jurisdiction where they live (N = 18,728). Birth outcomes of interest were PTB (less than 37 completed weeks gestational age), need for NICU care after delivery, and infant death prior to survey. This study adds to the body of knowledge about RC and its impact on birth outcomes. Because this is the only study to-date of RC and birth outcomes that utilized a large population-based sample, it provides a unique perspective that has not been previously explored.

Previous research examining the association between RC and birth outcomes is limited. However, initial studies suggest that exposure to RC increases the likelihood of adverse birth outcomes (Fay & Yee, 2020; Liu, McFarlane et al., 2016). This study built on such prior research and aimed to further understanding of the impact of RC on pregnancy and infant health. As described previously, IPV is associated with a higher incidence of LBW, fetal loss, and birth of infants prior to reaching term gestation (Coker et al., 2004; Pastor-Moreno et al., 2020; Rodrigues et al., 2008). The current study hypothesized that RC impacts pregnancy and birth outcomes similar to IPV. However, the findings from this study did not support this hypothesized relationship. No significant association between RC and any of three adverse birth outcomes was detected. Additionally, this study did not find that exposure to IPV had a moderating effect on either the direction or magnitude of the relationship between RC and birth outcomes. Despite

these findings, RC remains a significant concern for pregnant women and women of reproductive age.

The number of women exposed to RC, which potentially can affect the health of their pregnancy and leave them vulnerable to adverse birth outcomes, is significant (Fay & Yee, 2020; Grace, Decker, et al., 2020; Miller, Decker et al., 2010). RC can have major health consequences, and so far, has been overlooked as a potential contributor to adverse birth outcomes. This study is the first to use a large population-based sample to explore this potential relationship between RC and adverse birth outcomes among women who have recently given birth. This study was designed to test the hypothesis that RC increases the likelihood of experiencing one or more adverse birth outcomes.

Overall, this study did not detect an association between exposure to RC prior to pregnancy, in the form of BCS, and adverse birth outcomes. Regression analysis was used to test for these associations and consistently returned results that did not detect a relationship. Experiences of RC prior to pregnancy did not increase the likelihood of experiencing a PTB, NICU care after delivery, or experiencing an infant death in the postpartum period even when controlling for other known risk factors for adverse birth outcomes including age, race, education level, and drinking and smoking during pregnancy. This finding is contrary to expectations, particularly given initial studies that suggest RC can be a negative influence on the health of a pregnancy (Fay & Yee, 2020; Liu, McFarlane et al., 2016) and the plethora of studies linking IPV to myriad negative health effects on a pregnancy. There is a wealth of evidence that IPV can have a severe and consequential impact on a pregnancy and infant health having been linked to PTB, LBW, miscarriage, fetal death, premature rupture of membranes, NICU hospitalization, and many other physiologic and traumatic effects (Nesari et al., 2018; Pastor-Moreno et al.,

2020; Pavey et al., 2014; Sarkar, 2009; Yaya et al., 2021). Given this strong association, it is surprising that a relationship between RC and any of the birth outcomes used in this study was not detected.

Incidence of RC and IPV

This exploratory study found that, in the sample of nearly 19,000 women, 1.7% (321) of women reported experiencing RC, in the form of BCS from an intimate partner, prior to their current pregnancy. This incidence rate is similar to that reported by Samankasikorn (2019), which was also based on PRAMS data, although difficult to compare to a incidence rate of lifetime RC of 9% among women ages 18–49 estimated from the NISVS (Breiding et al., 2014). It is, however, much lower than prevalence rates found in studies with smaller, clinic-based samples as well as samples of college women, military women, and other focused subpopulations (Alhusen et al., 2020; Miller, Decker et al., 2010; PettyJohn et al., 2021; Rosenfeld et al., 2018; Sutherland et al., 2015; Swan et al., 2020). It is likely that the incidence rate found in the current study is an underestimation as the spectrum of behaviors that have been documented as RC was not fully assessed in the PRAMS survey. Still, a nearly 2% population incidence rate should be a concern for all nurses and clinicians who care for pregnant women.

RC was more often reported among older, more educated, and married women, which is in contrast to several studies documenting younger age, lower education, and single status as risk factors for RC (Clark et al., 2014; Holliday et al., 2017; Miller et al., 2014). It is possible that women with more education, and who were more stable in their lives (i.e., married and older age), were more likely to answer the PRAMS survey, thus potentially skewing the sample towards these demographic characteristics.

Additionally, this study found that over 3% of the women in the sample experienced physical IPV before or during their pregnancy. This is much lower than IPV prevalence among pregnant women (14% worldwide) and in the general public (30%; Devries et al., 2010; Garcia-Moreno et al., 2013). Women who reported experiencing IPV were more likely to experience RC than those who did not report IPV. This finding is consistent with much evidence in the literature demonstrating that RC and IPV often occur together (Addington, 2021; Grace, Perrin, et al., 2020; Miller et al., 2014). This is not always the case as RC can occur without IPV, and there is yet to be clear understanding of the relationship between RC and IPV.

Prevalence of Birth Outcomes

A significant proportion of the women who responded to the PRAMS survey experienced adverse birth outcomes. Overall, 2,353 women had at least one of the three adverse birth outcomes; 1,804 women had at least two. The PTB rate in this sample was 14.2%, which is significantly higher than the national average of 10.23% and higher than any of the state-level rates for the five states from which the sample was drawn (Hamilton et al., 2021). A possible explanation for this is that the sample included a greater proportion of Black women (25%) than comprises the general U.S. population (12.9%; U.S. Census Bureau, 2020). PTB rates among Black women are significantly higher than for White women and may account for the higher than expected PTB rate in the current study sample (Braveman et al., 2021).

Infant death was the least frequently reported outcome with only 2.7% (502) of women reporting their infant had died. This outcome, whether the infant was alive, was measured at the time of survey and is a limitation of the current study as women were contacted at different times in the postpartum period, some as early as 2 months after delivery, and some as late as 9 months. The infant death measure is not a true measure of infant mortality, which is defined as infant

death within the first 12 months of life, and cannot be compared to other infant mortality metrics (Adams et al., 2010). Additionally, women who had an adverse birth outcome may have been less likely to respond to the survey, especially if they were stressed, anxious, or depressed about their baby, the issue was ongoing, such as the infant was still in NICU, or the baby had died.

Pathways of RC Impact on Birth Outcomes

The current study was based on the premise, as supported in the literature, that the health consequences of RC result from similar pathways as that of IPV (Fay & Yee, 2020; Moore et al., 2010; Tarzia & Hegarty, 2021). These pathways, illustrated in the conceptual framework and described in detail in Chapter 2, include physical trauma, psychological trauma and stress, and use of fear and control to limit access to contraception, healthcare, and resources. The current study examined only one of these pathways: fear and control, particularly related to control over the use of contraception; however, incidental findings lend insight to other pathways, namely psychological trauma and stress, and its corollary, substance use, which are discussed in the following section.

Limited Control

The current study hypothesized that women who had limited control over their reproductive health decisions, such as their ability to use contraception to prevent pregnancy, were at higher risk for experiencing an adverse birth outcome. A number of prior studies have linked RC to inconsistent contraceptive use and unintended pregnancy (Alexander et al., 2018; Grace, Decker, et al., 2020; Katz et al., 2017; Miller, Decker et al., 2010; Miller et al., 2011; Miller et al., 2014; PettyJohn et al., 2021; Samankasikorn et al., 2019; Skracic et al., 2021). Unintended pregnancy is associated with numerous risk factors for adverse birth outcomes such as late entry or no prenatal care, short pregnancy intervals, and STI infection during pregnancy

(Wolf et al., 2015). However, the current study did not detect higher rates of adverse birth outcomes among women exposed to birth control sabotage when compared to women who had not experienced RC. This is an unexpected finding that does not align with previously published research (Fay & Yee, 2020; Liu, McFarlane et al., 2016). One consideration when interpreting this finding is that the measure of RC on the PRAMS survey instrument was not robust. The current study was constrained to previously developed data elements contained in the PRAMS dataset, a fundamental limitation of secondary data analysis (Creswell, 2014). The PRAMS survey measure of RC and the data collection instrument were developed by the CDC, in collaboration with participating sites, for epidemiologic surveillance purposes and did not assess all dimensions of RC. The PRAMS survey used only one question to assess the presence or absence of BCS, did not specify a reference timeframe, and did not use a validated instrument for assessing RC. The one prior study that reported a link between RC and birth outcomes (Fay & Yee, 2020) used the full 10-item validated RCS (McCauley et al., 2017) to measure RC, which is a much more robust measure than the one-question item used on the PRAMS survey. This difference in measurement could explain the discrepant findings. Additionally, the PRAMS survey did not measure the magnitude of exposure to RC, such as frequency, duration, or number of types of RC, which also would add valuable information to the study. Using a validated tool for assessing RC, such as the RCS, would have provided greater reliability and validity in the measurement of the BCS dimension of RC as well as greater ability to compare results from the current study with previous research (Waltz et al., 2010).

Role of Stress

Factors affecting a pregnancy and infant health are numerous and complex. The role of maternal stress and its impact on a pregnancy has been an area of intense focus in recent years

and is thought to have a significant role in adverse birth outcomes, particularly PTB (Almeida et al., 2018; Giurgescu et al., 2022; Grobman et al., 2018; Traylor et al., 2020; Weber et al., 2020). The effects of stress, particularly for pregnant women of color who are routinely exposed to racism, discrimination, and health and social inequities, accumulate over a lifetime and this chronic stress is thought to be a major contributor to adverse birth outcomes for Black women (Giurgescu et al., 2022; Latendresse, 2009). Research has shown that RC can have significant mental health consequences including increased stress and anxiety as well as more severe mental disorders such as PTSD (Anderson et al., 2017; Grace, Perrin, et al., 2020; Lévesque et al., 2020; McCauley, Falb et al., 2014). Fay and Yee (2020) reported that women with a history of RC were more likely to be diagnosed with anxiety and anemia at the time of their pregnancy than women not experiencing coercion. Increased stress resulting from RC is a possible pathway in which RC could lead to a negative impact on a pregnancy.

Depression, anxiety, as well as mental health diagnoses such as PTSD, have been associated with experiencing RC (Anderson et al., 2017; Grace, Perrin, et al., 2020; Lévesque et al., 2020; PettyJohn et al., 2021). Depression and PTSD has been linked with an increased risk of pregnancy complications and neonatal morbidity in several studies (Jahan et al., 2021; Miller et al., 2021; Smith et al., 2015). Interestingly, the current study found that 10% of the women in the sample reported being told by a healthcare professional that they had depression or depressive symptoms before or during their pregnancy. This is lower than reported prevalence rates of antenatal depression that generally range between 14% and 23% (Ashley et al., 2016; Miller et al., 2021; Yonkers et al., 2009). The lower prevalence of depression in the study sample may be attributed to measurement as these studies used a validated tool, such as the Patient Health Questionnaire or Edinburgh Depression Screen, to measure depression versus the single-question

item used on the PRAMS survey that measured a woman's report of being told by an healthcare provider that she was depressed. Women in the sample who reported they were told they had depression were more likely to report experiences of RC, a finding that is supported in the literature (Lévesque et al., 2020; PettyJohn et al., 2021). However, the link between depression and RC has not been well explored and this finding highlights the need for further exploration into this area.

Substance Use

This study found that drinking in the last 3 months of pregnancy increased the likelihood of experiencing PTB, need for NICU care, and infant death. The consumption of alcohol is a well-known teratogen and is associated with numerous negative effects on fetal development including growth retardation and fetal alcohol spectrum disorders, and has been linked to a higher likelihood of PTB, LBW, and the fetus being small for their gestational age (Alhusen et al., 2013; Aliyu et al., 2011). Several studies have reported that abused pregnant women use substances, including marijuana, cigarettes, and alcohol, at higher rates than nonabused pregnant women (Alhusen et al., 2018; Alhusen et al., 2013; Kearney et al., 2003; Sarkar, 2009). It is plausible that women experiencing RC also use substances at higher rates than women who do not experience RC; however, this association has yet to be fully explicated.

Cigarette smoking in the last 3 months of pregnancy was not found to be a significant contributor to an increased likelihood of experiencing any of the three birth outcomes. Cigarette smoking during pregnancy is associated with numerous negative effects on a developing fetus including growth retardation, PTB, and LBW (Alhusen et al., 2018; Shultz et al., 2021). It is also thought to be a major cause of sudden infant death syndrome in the postpartum period (Elliott et al., 2020; Moon et al., 2007; Zhang & Wang, 2012). Surprisingly, the infants of women who

smoked cigarettes in the last 3 months of pregnancy had lower odds of needing NICU care than those of women who did not smoke. Given the amount of evidence documenting the effects of smoking on a pregnancy, this finding should not be interpreted as suggestive of a protective effect of smoking on NICU care.

Other Findings

Marital status was found to have a significant contribution to the likelihood of experiencing an adverse birth outcome. The study found that being married had a protective effect against PTB and need for NICU care as married women were less likely to have either of these outcomes compared to women who were not married. Marital status did not have a significant role in the outcome of infant death. A possible explanation for this finding is that married women are more likely to have support from a partner, be economically resourced, and have insurance than unmarried women, which is supported in the literature (Shapiro et al., 2018).

Consistent with prior research, this study found that advanced maternal age was a significant contributing factor to the likelihood of experiencing PTB and an infant needing NICU care after delivery (Aliyu et al., 2011; Thoma et al., 2019; Thompson & Suter, 2020; Waldenström et al., 2017). This finding aligns with previous research and current clinical understanding of advanced maternal age is recognized as a risk factor for PTB (ACOG & AAP, 2017).

One unanticipated finding was that Black race, advanced maternal age, and less than a high school education was not associated with a higher likelihood of experiencing infant death. These are unexpected findings and difficult to explain. Black race, advanced maternal age, and lower levels of education have all been clearly associated with increased risk for adverse birth outcomes in numerous studies (Braveman et al., 2021; Braveman et al., 2015; Thoma et al.,

2019; Thompson & Suter, 2020). Black mothers especially are at much greater risk for PTB and infant mortality than White mothers, as has been discussed previously (Braveman et al., 2021; Thoma et al., 2019). Some possible explanations are that older mothers may be better at caregiving given their maturity and life experience (Bornstein et al., 2006) and women with less than a high school degree are likely to be adolescents and may have the support of their own parents in infant caregiving (Tung et al., 2021). Given the measurement issues surrounding the infant death outcome, as discussed, these findings must be interpreted with caution.

Racial Disparity

The current study found that Black women were more likely to report RC than other races, a finding that has been documented in other studies (Holliday et al., 2017; Miller et al., 2014; Paterno et al., 2018). Consistent with prior research, the current study also found that Black race and Hispanic ethnicity were significant contributing factors to the likelihood of experiencing PTB and an infant needing NICU care after delivery (Aliyu et al., 2011; Thoma et al., 2019; Thompson & Suter, 2020; Waldenström et al., 2017). These findings broadly accord with a plethora of published research documenting the disparity in PTB rates for Black women and other women of color (Braveman et al., 2015; Giurgescu et al., 2022; Thoma et al., 2019). Taken together, these results suggest that further exploration of the potential contribution of RC to disparities in birth outcomes among women of color is warranted. Although this study did not detect a relationship between RC and birth outcomes in this sample, studies that examined this relationship specifically in Black women would provide additional insight. Disparities in perinatal health, particularly PTB, for Black women have persisted, and alarmingly have increased in recent years despite decades of national initiatives to reduce or eliminate them. All possible contributing factors must be explored.

Limitations of Study

Findings from this study should be considered in light of several limitations. First, the target population, and inclusion and exclusion criteria, for the PRAMS survey limits findings from the current study. The PRAMS survey design included only women who gave birth to a live infant. Women who had experienced stillbirth, fetal death, or had an elective termination were not included in the PRAMS survey sampling frame and therefore were not included in the current study sample (CDC, 2017). It is plausible that women who have experienced the most severe birth outcomes, such as fetal loss, compared to women who delivered a live infant, may have had higher rates of exposure to RC and IPV. Additionally, hard-to-reach women such as those who did not have a physical address (e.g., unhoused or in domestic violence shelters), or whose partners control access to mail and internet, were not included in the PRAMS survey. These women are likely more at risk for the negative impacts of RC, including the impact on birth outcomes. The omission of these potentially higher-risk women from the current study sample may have prevented the detection of the true nature of the relationship between RC and adverse birth outcomes.

Secondly, the timing of RC experiences in relation to the pregnancy of interest that was collected in the PRAMS survey was ambiguous and it was not ascertainable if the current pregnancy was linked to, or resulted from, RC. The question item used the qualifier "Before you got pregnant," which implies, but does not define, RC within a short time before the current pregnancy, and with the father of the child. A possible issue is the duration of time between RC and the outcome such as would be the case if the coercive experience occurred close to, or was linked to, the current pregnancy. It is possible that the duration of time from exposure to outcome was too short to detect an observable relationship. On the contrary, if respondents included only

RC experiences linked to the current pregnancy, and omitted earlier experiences, such as in the prior year, this may have led to a lower reported incidence, and a possible masking of the issue's true nature. Data on the temporality of the RC experience would have provided additional insight on the impact of RC and allowed for better examination of the impact of RC on a pregnancy through more sensitive measures of RC.

Lastly, PRAMS data are collected through self-report; thus, the data may be subject to social desirability, recall, and reporting biases. Intimate sexual behaviors as well as partner abuse are often associated with shame, guilt, and embarrassment and participants may be reluctant to share details of these experiences (Feder et al., 2006). Recall bias is also a concern particularly as the experience of being pregnant, becoming a mother, or giving birth to a child may affect their perception or memory of a coercive experience (CDC, 2017). The PRAMS also uses a multimodal approach to data collection, as discussed in Chapter 3, and although strategies to limit mode bias were incorporated into the PRAMs survey design and data collection approaches, it is possible that women who were interviewed by a live interviewer were less likely to report RC experiences than women who responded anonymously via paper or online survey.

Implications for Nursing

Nurses are often the first healthcare provider that women who have experienced RC encounter (Hooker & Taft, 2021). Pregnancy provides a unique opportunity for nurses to identify and support women who have experienced RC (Hill et al., 2016). Nurses in particular have frequent and extended contact with women during prenatal care visits, which creates opportunities for developing trusting relationships that facilitate the disclosure of RC and lay the foundation for effective nursing interventions both during and after pregnancy (Alexander et al.,

2021). One study of women seeking reproductive healthcare in family planning clinics (n = 1262) found that women who experience RC are more likely to seek healthcare services than those who do not (Kazmerski et al., 2015). It is likely that women who experience RC and become pregnant also seek healthcare at higher rates, given the need for prenatal care, than women who do not become pregnant.

Given these findings that conflict with published literature, this study highlights a current gap in knowledge related to the health impacts of RC, specifically, the ways in which RC can affect a pregnancy and subsequent birth outcomes. There is a need for replication studies using more robust measures of RC and data collection approaches that can most accurately identify RC experiences. Additional research, especially studies using large population-based samples, with different samples at different times, can be used to confirm these early findings and solidify the research base on which to ground nursing practice (Burns & Grove, 2011). More extensive knowledge about RC and birth outcomes is needed to drive nursing education, practice, and health systems policies that support nurses and nursing care of pregnant women experiencing RC.

Practice

Although this study did not detect a link between RC and adverse birth outcomes in this sample, RC is a serious and often unidentified health problem among pregnant women (Tarzia et al., 2019). This study provides additional evidence that a significant number of pregnant women have experienced RC from an intimate partner, highlighting a need for a targeted and effective healthcare response (Garcia-Moreno, 2015). Although recognition of RC is increasing among healthcare professionals, it is still not commonly recognized by nurses caring for women in the pre and postnatal periods (Tarzia, Cameron et al., 2021). Additionally, nurses may not be aware

that women experiencing RC needed targeted support and intervention strategies, particularly related to contraceptive care and counseling. Increased awareness among nurses of RC as a form of abuse requiring specific intervention strategies, and education and training on how to recognize RC, will improve nurses' ability to respond with patient-centered, trauma-informed, and effective clinical interventions.

A greater understanding of how RC affects pregnant women is needed for nurses to provide high quality, optimal care. Nurses who care for pregnant women are in an optimal position to address the health and psychosocial needs of women exposed to RC, particularly during the high-frequency interactions that occur with regular prenatal care. Identification through screening women exposed to RC is the first step to providing meaningful care during pregnancy and in the peripartum period. Identifying women who have experienced RC provides critical care opportunities to address potential consequences of RC such as depression, and to provide appropriate birth control counseling and options in the postpartum period. Women exposed to RC need knowledgeable, sensitive, and comprehensive care from entry to prenatal care through the peripartum period and beyond. This includes referrals and connections to domestic violence service organizations, depression screening and support, and, in the postpartum period, contraceptive care, including emergency contraception, that is not partner-dependent.

Policy

Favorable institutional support at the policy level must undergird nursing practice for nurses to most effectively care for women exposed to RC and mitigate its most negative consequences. This should include the institutional commitment to training nurses, formalized policies for screening and identification, standardized clinical practice guidelines for responding

to women exposed to RC, and establishing connections to community domestic violence support organizations. However, further research is required to accumulate enough evidence on RC and birth outcomes on which to base policy decisions. Initial studies have provided some indication that women experiencing RC are more at risk for adverse birth outcomes, supporting the need for more exploration, but the scholarship is in its infancy, and as of yet, the relationship is not well understood.

The issue of health disparities is a central concern for nurses and in nursing research. The Black-White disparity in PTB is a major concern among nurses and other healthcare providers who care for pregnant women and their infants. Rates of RC are higher among Black women than among White women and the contribution of RC to adverse birth outcomes must be explored further among women of color. The increase in disparity in adverse birth outcomes has made this an issue of grave concern.

Research

RC is a difficult behavior to measure and study. Sexual behaviors, IPV, and attitudes toward motherhood and childbearing can be associated with negative emotions such as guilt, shame, and social stigma, which present numerous challenges in elucidating women's experiences of coercion from an intimate partner. Furthermore, studies to date examining RC and birth outcomes have been done in small clinical samples and population-level data are lacking. In the current phase of the PRAMS survey (Phase 8, 2016 to present), the RC measurement item is not included in the primary survey instrument and no participating sites have elected to include the item in their site-specific survey. This represents a significant missed opportunity to gather insight on a hidden, difficult-to-study behavior with potentially significant health effects. The PRAMS initiative provides an established and mature infrastructure to collect data on RC at a

population-level. Future phases of the PRAMS survey should include questions assessing RC behaviors using the validated RCS (McCauley et al., 2017), or other validated tools or measures, as part of the Core Questionnaire. The RCS has a validated short form that assesses RC with only three items that can easily be inserted into the PRAMS Core Questionnaire for use in all sites. As more is learned about RC, including the extent of women affected and recognition of its impact, it is becoming clear that RC is an important component of IPV to understand and address.

Future studies examining the impact of RC on a pregnancy and birth outcomes should be done with women experiencing all possible pregnancy outcomes, particularly the most severe (e.g., stillbirth, fetal death, miscarriage), to provide the fullest examination of the impact of RC on a pregnancy. The true nature of the relationship between RC and birth outcomes may have been hidden in the current study because women with the most severe outcomes, and possibly experiencing the greatest impact of RC, were not included.

Conclusion

PTB remains a leading cause of infant morbidity and mortality and has serious and costly consequences for women and infants, particularly for Black women and women of color (Thoma et al., 2019). The causes of PTB are not entirely understood; however, contributing factors are numerous and complex. Prior research has provided much evidence that women who experience abuse from an intimate partner are at higher risk for one or more adverse birth outcomes, including LBW, PTB, and fetal loss (Nesari et al., 2018). The role of RC in the occurrence of adverse birth outcomes is not well understood as it has not been adequately considered in previous research. Despite nonsignificant findings, this study underscores the need for more robust examination, through replication studies with more robust measures, of RC and its impacts on a pregnancy.

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Appendix A

Pregnancy Risk Assessment Monitoring System (PRAMS) Proposal Application Form

Please complete one form per proposal. Refer to Proposal Form Instructions beginning on page 2.

Date:	21-September-2021
Principal researcher's name and title:	Laura K. Suzuki, RN, MPH, PhD Candidate
Principal researcher's affiliation:	Boston College, William F. Connell School of Nursing
Address	
Phone number:	
E-mail:	SUZUKIL@BC.EDU
Names and affiliations of other researchers:	Dr. Susan Kelly-Weeder, Dr. Allyssa Harris, Boston College; Dr. Melissa Sutherland, Binghamton University; Dr. Monica Onyango, Boston University
Proposal title:	Association of reproductive coercion, intimate partner violence, and reproductive hea
Submission information	**Check all that apply and complete applicable instructions** ■ This is a new proposal ☐ Proposal was previously submitted and approved ☐ Requesting additional year(s) of data • Specify year(s): • Indicate the primary author's name and date you received your previous dataset • Include the PDF of the previously approved proposal application form in your submission ☐ Requesting additional indicator(s) • Specify variable(s): • Indicate the primary author's name and date you received your previous dataset • Update the abstract to include a justification for these additional questionnaire variables • Include the PDF of the previously approved proposal application form in your submission ☐ Requesting a new investigator be added • Submit an updated and signed data sharing agreement • Include the PDF of the previously approved proposal application form in your submission ☐ Proposal was previously submitted but not approved • Indicate the primary author's name and title of the previously submitted proposal • Indicate the date the proposal was previously submitted • Include the PDF of the previously submitted proposal in your submission • Please clearly mark the changes that have been made in your new proposal

Abstract: Please attach an abstract of 350 words or less describing your project. Include the 5 items listed to the right.	1. Research Question(s) 2. Methods and software 3. Discussion of intended outcome of analysis 4. Rationale for using PRAMS as the data source 5. (If applicable) Justification for additional questionnaire indicators not part of the PRAMS Analytic Research File 6. Type of publication (journal article, thesis, dissertation, report, etc.)
Years of PRAMS data requested: Phase 8 (2016-2019) Phase 7 (2012-2015) Phase 6 (2009–2011) Phase 5 (2004–2008) Phase 4 (2000–2003) Phase 3 (1996–1999) Phase 2 (1990–1995) Phase 1 (1988–1989)	Check all that apply ☐ Most recent year of data available ■ List of specific years: Phase 7 (2012-2015) Phase 8 (2016-2019)
States/sites requested:	Check one option ☐ All states/sites with most recent year of data available ▣ All states/sites with data available for years requested above ☐ List of specific states/sites:
Indicator list: Please attach list (only if requesting questionnaire indicators not part of the core PRAMS Research File)	Please review the variables included in the PRAMS Analytic Research File. If you would like to request any additional questionnaire variables that are not part of the core research file, please attach a specific list. A justification should also be included in your abstract.

NOTE TO RESEARCHERS: Any requests for additional birth certificate variables which are not included in the PRAMS Analytic Research File are not processed by CDC. These requests go directly to the PRAMS coordinators in the states of interest. Researchers are responsible for obtaining individual state approvals for these requests. CDC will create datasets for these requests only upon receipt of written permission from each requested state. PRAMS coordinator contact information is available at http://www.cdc.gov/PRAMS/states.htm.

PROPOSAL FORM INSTRUCTIONS

Please provide the following information on the form. Please submit a separate form for each study.

Principal Researcher & Title:
Write the name of the principal researcher, and include their credentials and title (e.g., Jane Doe, Ph.D, Associate Professor). This person will be the primary point of contact for CDC and the states regarding the proposal.

Principal Researcher Affiliation:
Write the affiliation of the principal researcher (e.g. Emory University, Rollins School of Public Health).

Address: Write the address for mail correspondence. This address will be used when mailing out the dataset. A physical address must be provided (no P.O. boxes) for FedEx delivery.

PRAMS Proposal Application

Impact of reproductive coercion and intimate partner violence on health behaviors before and during pregnancy

Reproductive coercion is a form of intimate partner violence that involves the control of a partner's decisions regarding contraception and reproduction (ACOG, 2013; Miller et al., 2010; Grace & Anderson, 2016). Partners exert control through the use of violence, threats, or psychological aggression to coerce a woman into a pregnancy, or to terminate a pregnancy, against her wishes (Grace & Anderson, 2016; Paterno, 2018; Miller, 2014; Moore, Frowirth, & Miller, 2010). Reproductive coercion is associated with inconsistent and non-use of contraceptives and an increased risk for unplanned pregnancy (Early, 2015: Katz, Poleshuck, Beach, & Olin, 2017; PettyJohn et al., 2021; Rosenbaum & DiClemente, 2021; Skracic, Lewin, & Steinberg, 2020). It is likely that women experiencing reproductive coercion that results in an unplanned pregnancy are limited in their ability to engage in healthy behaviors to support healthy birth outcomes. Additionally, these women may be more likely to engage in risky behaviors such as smoking and alcohol use that may negatively impact birth outcomes. Reproductive coercion often occurs along with other forms of intimate partner violence which may create a synergistic effect on the woman's ability to engage in healthy behaviors to support a pregnancy (Grace & Anderson, 2016; Grace et al., 2020; Kazmerski et al., 2015; Fleury-Steiner & Miller, 2019). The purpose of this study is to examine the relationship between reproductive coercion with and without co-occurring intimate partner violence and health behaviors before and during pregnancy.

Statistical analysis, including regression analysis, will be conducted using IBM SPSS® Software Version 28 to analyze differences in pre-pregnancy and prenatal health behaviors in reproductive coercion alone, reproductive coercion and intimate partner violence, and no experiences of reproductive coercion or intimate partner violence abuse.

The results of this study will describe the impacts of reproductive coercion on pre-pregnancy and prenatal health behaviors that may influence birth outcomes. To date, no study has examined the impact of reproductive coercion on health behaviors during the pre-pregnancy and prenatal period, a critical time for optimizing fetal health and improving birth outcomes.

Reproductive coercion is a largely hidden form of intimate partner violence and little data exists that examines this phenomenon directly (Tarzia & Hegarty, 2021). PRAMS is the only nationally representative source for data on reproductive coercion and pre-pregnancy and prenatal health behaviors. Assessment of alcohol use during pregnancy was done in the Core questionnaire in Phase 7; however, in Phase 8 it is included in the Standard questionnaire and thus is requested as a supplement to the core dataset.

This study is being conducted to fulfill the dissertation requirement for the Doctor of Philosophy degree. Two publications are planned: 1.) Doctoral dissertation and 2.) Impact of reproductive coercion with and without intimate partner violence on pre-pregnancy and prenatal health behaviors.
Additional indicators requested are:

1.) Reproductive coercion, Standard question Z8, Phases 7 and 8.

Z8: Before you got pregnant with your new baby, did your husband or partner ever try to keep you from using your birth control so that you would get pregnant when you didn't want to? For example did they hide your birth control, throw it away or do anything else to keep you from using it?

Used by: MA68, MD70, OH69, SC71, TX77, VA71 (Phase 7)
Used by: IN70 (Phase 8)*
****NOTE: All states using question Z8 in Phase 8 are requested.***

2.) Intimate partner violence, Standard questions Z9 and Z14, Phase 8 only

Z9: During any of the following time periods, did your husband or partner threaten you, limit your activities against your will, or make you feel unsafe in any other way?

During the 12 months before I got pregnant
During my most recent pregnancy
Since my new baby was born

Used by: AK79, IA72, IL75, IN75, MD64, OH87, VA77, WY63 (Phase 8)

Z14: During the *12 months before* you got pregnant with your new baby, did any of the following things happened to you?

1. My husband or partner threatened me or made me feel unsafe in some way
2. I was frightened for my safety or my family's safety because of the anger or threats of my husband or partner
3. My husband or partner tried to control my daily activities, for example, controlling who I could talk to or where I could go
4. My husband or partner forced me to take part in touching or any sexual activity when I did not want to

***Requested for all states using question Z14 in Phase 8.**

3.) Alcohol use during pregnancy, Standard question JJ3, Phase 8 only

JJ3. (Phase 7, Core 35) During the *last 3 months* of your pregnancy, how many alcoholic drinks did you have in an average week?

14 drinks or more a week

8 to 13 drinks a week
4 to 7 drinks a week
1 to 3 drinks a week
Less than 1 drink a week
I didn’t drink then

Used by: Used by: AK42, CO40, CT42, DE45, GA45, HI41, LA37, MD33, ME39, MN38, MO46, MS44, MT43, NC42, NE53, NJ49, NYS42, OH43, PA48, SD43, TN53, TX42, VA43, VT40, WA34, WY30 (Phase 8)

Appendix B

External Researcher Data Sharing Agreement

CDC PRAMS AGREEMENT FOR SHARING MULTI-STATE DATA WITH EXTERNAL RESEARCHERS

I, Laura K. Suzuki, as principal investigator/coinvestigator on this proposed analysis of Pregnancy Risk Assessment Monitoring System (PRAMS) data, agree to the following requirements for the use of PRAMS data and assure compliance with the requirements by all staff and collaborators approved as part of this agreement.

1. I will not use these data except for statistical analysis and reporting as described in the attached proposal, titled Association of reproductive coercion, intimate partner violence, and sexual and reproductive health outcomes, which accompanies this statement.

2. I will not use nor permit approved collaborators and staff to use these data to conduct analyses other than those described in the proposal.

3. I will not release the data set or any part of it to any person other than those listed as collaborators in the attached proposal. I will assure that all approved collaborators understand that they may not share the data set or any part of it.

4. I will neither attempt, nor permit others to attempt, to use the data set or link it with other data sets to learn the identity of any participant. If the identity of a respondent should be inadvertently discovered, I will not use and/or distribute this information, nor will I permit others to use the information. I will inform the CDC PRAMS staff at PRAMSProposals@cdc.gov of the discovery but will not disclose any identifiable data in the e-mail, so they can prevent future discoveries. I pledge that neither I nor other members of my team will inform anyone else of this knowledge.

5. All oral or written presentations of the results of the analyses will include an acknowledgment of the PRAMS Working Group and the Centers for Disease Control and Prevention (CDC).

6. All oral or written presentations of the results of the analyses will be submitted to the CDC at least 3 weeks prior to presentation or submission to a journal so presentations can be forwarded to the PRAMS participating states for their information. States will have two weeks to submit comments on the presentation/manuscript to the author. The acronym "PRAMS" will be submitted as a keyword for any publication.

7. CDC PRAMS staff and staff from states whose data were used in the analysis will be notified upon final publication of an article and provided with citation information.

8. When the proposed analyses are completed, all copies of these data will be destroyed (confirmed in writing to PRAMSProposals@cdc.gov) or returned to CDC.

My signature and the signatures of all co-investigators indicate our agreement to comply with these requirements.

Name of principal investigator:

Laura K. Suzuki, PhD Candidate, Boston College School of Nursing

Title and Organization:

Signature: _____ Date: 21-September-2021

Name of collaborator:

Signature: _____ Date: _____

Appendix C

Gmail

Status of Your PRAMS proposal

PRAMSProposals (CDC) <PRAMSProposals@cdc.gov> Wed, Oct 20, 2021 at 12:42 PM
To: laura suzuki <lauraksuzuki@gmail.com>
Cc: "PRAMSProposals (CDC)" <PRAMSProposals@cdc.gov>

Greetings Laura,

Thank you for the submission of your PRAMS proposal last month. It has been reviewed and approved by CDC PRAMS. It is currently being reviewed by the PRAMS sites. The deadline for their feedback is Nov 1. You can anticipate receiving your dataset approximately early to mid November.

If you have any questions, please don't hesitate to contact me.

All The Best,

Gary

Gary Stuart

Public Health Advisor

Pregnancy Risk Assessment Monitoring System (PRAMS)

Division of Reproductive Health
Centers for Disease Control & Prevention

Teleworking Phone #: (404) 909-1434

From: laura suzuki <lauraksuzuki@gmail.com>
Sent: Monday, September 27, 2021 9:39 AM
To: PRAMSProposals (CDC) <PRAMSProposals@cdc.gov>
Cc: Laura Suzuki <Suzukil@bc.edu>
Subject: PRAMS Proposal Application

Dear PRAMS Working Group:

Appendix D

Pregnancy Risk Assessment Monitoring System (PRAMS)

Phase 7 Core Questionnaire – FINAL
1/30/2012

Please check the box next to your answer or follow the directions included with the question. You may be asked to skip some questions that do not apply to you.

BEFORE PREGNANCY

The first questions are about *you*.

1. **How tall are *you* without shoes?**

   Feet and Inches
   OR
   Centimeters

2. ***Just before* you got pregnant with your *new* baby, how much did you weigh?**

   Pounds
   OR
   Kilos

3. **What is *your* date of birth?**

   Month/Day/Year

4. ***Before* you got pregnant with your new baby, did you ever have any other babies who were born alive?**

   No → **Go to Question 7**
   Yes

5. **Did the baby born *just before* your new one weigh 5 pounds, 8 ounces (2.5 kilos) or *less* at birth?**

   No
   Yes

6. **Was the baby *just before* your new one born *earlier* than 3 weeks before his or her due date?**

   No
   Yes

Insertion point for Standard question(s) FF4
Insertion point for Standard question(s) K1

The next questions are about the time *before* you got pregnant with your *new* baby.

7. At any time during the *12 months before* you got pregnant with your new baby, did you do any of the following things? For each item, check **No** if you did not do it or **Yes** if you did it.

	No	Yes
a. I was dieting (changing my eating habits) to lose weight		
b. I was exercising 3 or more days of the week		
c. I was regularly taking prescription medicines other than birth control		
d. I visited a health care worker and was checked for diabetes		
e. I visited a health care worker and was checked for high blood pressure		
f. I visited a health care worker and was checked for depression or anxiety		
g. I talked to a health care worker about my family medical history		
h. I had my teeth cleaned by a dentist or dental hygienist		

8. During the *month before* you got pregnant with your new baby, what kind of *health insurance* did you have? Check ALL that apply

Private health insurance from my job or the job of my husband, partner, or parents
Private health insurance purchased directly from an insurance company
Medicaid (required: *state Medicaid name*)
State-specific option (Other government plan or program such as SCHIP/CHIP or health reform exchange program)
State-specific option (Other government plan or program not listed above such as MCH program, indigent program or family planning program)
State-specific option (TRICARE or other military health care)
State-specific option (IHS or tribal)
Some other kind of health insurance => Please tell us_____
I did not have any health insurance during the *month before* I got pregnant

NOTE: For the insurance questions, states should add specific plan names wherever possible.

Insertion point for Standard question(s) DD4, DD5, DD6, DD7

9. During the *month before* you got pregnant with your new baby, how many times a week did you take a multivitamin, a prenatal vitamin, or a folic acid vitamin?

I didn't take a multivitamin, prenatal vitamin, or folic acid vitamin in the *month before* I got pregnant
1 to 3 times a week
4 to 6 times a week
Every day of the week

Insertion point for Standard question(s) G8

10. *Before* you got pregnant with your new baby, did a doctor, nurse, or other health care worker talk to you about how to improve your health before pregnancy?

No
Yes

Insertion point for Standard question(s) L18
Insertion point for Standard question(s) L10

11. *Before* you got pregnant with your new baby, did a doctor, nurse, or other health care worker tell you that you had any of the following health conditions? For each one, check **No** if you did not have the condition or **Yes** if you did.

	No	Yes
a. Type 1 or Type 2 diabetes (NOT the same as gestational diabetes or diabetes that starts during pregnancy)		
b. High blood pressure or hypertension		
c. Depression		

Insertion point for Standard question(s) L11

The next questions are about the time when you got pregnant with your new baby.

12. Thinking back to *just before* you got pregnant with your new baby, how did you feel about becoming pregnant? Check ONE answer

I wanted to be pregnant later
I wanted to be pregnant sooner → **Go to Question 14**
I wanted to be pregnant then → **Go to Question 14**
I didn't want to be pregnant then or at any time in the future → **Go to Question 14**
I wasn't sure what I wanted → **Go to Question 14**

13. How much longer did you want to wait to become pregnant?

Less than 1 year
1 year to less than 2 years
2 years to less than 3 years
3 years to 5 years
More than 5 years

14. When you got pregnant with your new baby, were you trying to get pregnant?

No
Yes → **Go to Question 17**

Insertion point for Standard question(s) Q7

15. When you got pregnant with your new baby, were you or your husband or partner doing anything to keep from getting pregnant? Some things people do to keep from getting pregnant include using birth control pills, condoms, withdrawal, or natural family planning.

No
Yes → **Go to Question 17**

16. What were your reasons or your husband's or partner's reasons for not doing anything to keep from getting pregnant? Check ALL that apply

I didn't mind if I got pregnant
I thought I could not get pregnant at that time
I had side effects from the birth control method I was using
I had problems getting birth control when I needed it
I thought my husband or partner or I was sterile (could not get pregnant at all)
My husband or partner didn't want to use anything
I forgot to use a birth control method
Other → Please tell us:

Insertion point for Standard question(s) E3
Insertion point for Standard question(s) A1–A2, A4-A5

DURING PREGNANCY

The next questions are about the prenatal care you received during your most recent pregnancy. Prenatal care includes visits to a doctor, nurse, or other health care worker before your baby was born to get checkups and advice about pregnancy. (It may help to look at the calendar when you answer these questions.)

Insertion point for Standard question(s) R19

17. How many weeks *or* months pregnant were you when you had your first visit for prenatal care? Do not count a visit that was only for a pregnancy test or only for WIC (the Special Supplemental Nutrition Program for Women, Infants, and Children).

Weeks
OR
Months

I didn't go for prenatal care → **Go to Question 20**

Insertion point for Standard question(s) R20, R21
Insertion point for Standard question(s) R15

18. During *your most recent* pregnancy, what kind of *health insurance* did you have to pay for your *prenatal care*?
Check ALL that apply

Private health insurance from my job or the job of my husband, partner, or parents
Private health insurance purchased directly from an insurance company
Medicaid (required: *state Medicaid name*)
State-specific option (Other government plan or program such as SCHIP/CHIP or health reform exchange program)
State-specific option (Other government plan or program not listed above such as state MCH program, indigent program or family planning program, etc)
State-specific option (TRICARE or other military health care)
State-specific option (IHS or tribal)
Some other kind of health insurance => Please tell us_____
I did not have any health insurance to pay for my *prenatal care*

NOTE: For the insurance questions, states should add specific plan names wherever possible.

Insertion point for Standard question(s) DD8, DD9, DD10, DD11

19. *During any of your prenatal care visits*, did a doctor, nurse, or other health care worker talk with you about any of the things listed below? *Please count only discussions,* not reading materials or videos. For each item, check **No** if no one talked with you about it or **Yes** if someone did.

	No	**Yes**
a. How much weight I should gain during my pregnancy		
b. How smoking during pregnancy could affect my baby		
c. Breastfeeding my baby		
d. How drinking alcohol during pregnancy could affect my baby		
e. Using a seat belt during my pregnancy		
f. Medicines that are safe to take during my pregnancy		
g. How using illegal drugs could affect my baby		
h. Doing tests to screen for birth defects or diseases that run in my family		
i. The signs and symptoms of preterm labor (labor more than 3 weeks before the baby is due)		
j. Getting tested for HIV (the virus that causes AIDS)		

k. What to do if I feel depressed during my pregnancy or after my baby is born
l. Physical abuse to women by their husbands or partners

Insertion point for Standard question R17
Insertion point for Standard question R16
Insertion point for Standard question R1
Insertion point for Standard question(s) R3, R4, R18, R5
Insertion point for Standard question R12
Insertion point for Standard question K4
Insertion point for Standard question R14
Insertion point for Standard question(s) R9–R11
Insertion point for Standard question(s) R6–R8, R13

20. At any time during *your most recent* pregnancy or delivery, did you have a test for HIV (the virus that causes AIDS)?

No
Yes
I don't know

Insertion point for Standard question(s) I7
Insertion point for Standard question(s) I4–I6
Insertion point for Standard question(s) I2–I3
Insertion point for Standard question(s) G5
Insertion point for Standard question(s) G1–G4

21. During the 12 months *before the delivery* of your new baby, did a doctor, nurse, or other health care worker *offer* you a flu shot or *tell* you to get one?

No
Yes

22. During the 12 months *before the delivery* of your new baby, did you *get* a flu shot? Check ONE answer

No → **Go to Question 24**
Yes, before my pregnancy
Yes, during my pregnancy

23. During what month and year did you get the flu shot?

Month/Year

I don't remember

Insertion point for Standard question(s) L19, L14, L15

24. This question is about the care of your teeth *during your most recent* pregnancy. For each item, check **No** if it is not true or does not apply to you or **Yes** if it is true.

	No	**Yes**
a. I knew it was important to care for my teeth and gums during my pregnancy		
b. A dental or other health care worker talked with me about how to care for my teeth and gums I had my teeth cleaned by a dentist or dental hygienist		
c. I had insurance to cover dental care during my pregnancy		
d. I needed to see a dentist for a **problem**		
e. I went to a dentist or dental clinic about a **problem**		

Insertion point for Standard question(s) Y5, Y6

25. During *your most recent* pregnancy, did you take a class or classes to prepare for childbirth and learn what to expect during labor and delivery?

No
Yes

26. During *your most recent* pregnancy, did a home visitor come to your home to help you prepare for your new baby? A home visitor is a nurse, a health care worker, a social worker, or other person who works for a program that helps pregnant women.

No
Yes

Insertion point for Standard question(s) V13, V14, V15

27. During *your most recent* pregnancy, were you on WIC (the Special Supplemental Nutrition Program for Women, Infants, and Children)?

No
Yes

Insertion point for Standard question(s) B7-B8

28. During *your most recent* pregnancy, were you told by a doctor, nurse, or other health care worker that you had gestational diabetes (diabetes that started during *this* pregnancy)?

No
Yes

Insertion point for Standard question(s) N7, N6
Insertion point for Standard question(s) N9
Insertion point for Standard Question(s) N8, N5
Insertion point for Standard question(s) N1–N4
Insertion point for Standard question(s) L4–L7

The next questions are about smoking cigarettes around the time of pregnancy (before, during, and after).

29. Have you smoked any cigarettes in the *past 2 years*?

No → **Go to Question 33**
Yes

30. In the *3 months before* you got pregnant, how many cigarettes did you smoke on an average day? A pack has 20 cigarettes.

41 cigarettes or more
21 to 40 cigarettes
11 to 20 cigarettes
6 to 10 cigarettes
1 to 5 cigarettes
Less than 1 cigarette
I didn't smoke then

31. In the *last 3 months* of your pregnancy, how many cigarettes did you smoke on an average day? A pack has 20 cigarettes.

41 cigarettes or more
21 to 40 cigarettes
11 to 20 cigarettes
6 to 10 cigarettes
1 to 5 cigarettes
Less than 1 cigarette
I didn't smoke then

Insertion point for Standard question AA6
Insertion point for Standard question AA1

32. How many cigarettes do you smoke on an average day *now*? A pack has 20 cigarettes.

41 cigarettes or more
21 to 40 cigarettes
11 to 20 cigarettes
6 to 10 cigarettes
1 to 5 cigarettes
Less than 1 cigarette
I don't smoke now

Insertion point for Standard question(s) AA7
Insertion point for Standard question(s) U1-U2

The next questions are about drinking alcohol around the time of pregnancy (before and during).

33. Have you had any alcoholic drinks in the *past 2 years*? A drink is 1 glass of wine, wine cooler, can or bottle of beer, shot of liquor, or mixed drink.

No → **Go to Question 36**
Yes

34. During the *3 months before* you got pregnant, how many alcoholic drinks did you have in an average week?

14 drinks or more a week
7 to 13 drinks a week
4 to 6 drinks a week
1 to 3 drinks a week
Less than 1 drink a week
I didn't drink then

Insertion point for Standard question(s) JJ1

35. During the *last 3 months* of your pregnancy, how many alcoholic drinks did you have in an average week?

14 drinks or more a week
7 to 13 drinks a week

4 to 6 drinks a week
1 to 3 drinks a week
Less than 1 drink a week
I didn't drink then

Insertion point for Standard question(s) JJ2

Pregnancy can be a difficult time for some women. The next questions are about things that may have happened *before* and *during* your most recent pregnancy.

36. This question is about things that may have happened during the *12 months before your new baby was born*. For each item, check **No** if it did not happen to you or **Yes** if it did. (It may help to look at the calendar when you answer these questions.)

	No	**Yes**
a. A close family member was very sick and had to go into the hospital		
b. I got separated or divorced from my husband or partner		
c. I moved to a new address		
d. I was homeless or had to sleep outside, in a car, or in a shelter		
e. My husband or partner lost his job		
f. I lost my job even though I wanted to go on working		
g. My husband, partner, or I had a cut in work hours or pay.		
h. I was apart from my husband or partner due to military deployment or extended work-related travel		
I argued with my husband or partner more than usual		
My husband or partner said he didn't want me to be pregnant		
i. I had problems paying the rent, mortgage, or other bills		
j. My husband, partner, or I went to jail		
k. Someone very close to me had a problem with drinking or drugs		
l. Someone very close to me died		

Insertion point for Standard question(s) P14, P17, P15–P16
Insertion point for Standard question(s) BB1 and Z7

37. During the *12 months before you got pregnant* with your new baby, did your husband or partner push, hit, slap, kick, choke, or physically hurt you in any other way?

No
Yes

Insertion point for Standard question(s) Z5, Z3,

38. During *your most recent* pregnancy, did your husband or partner push, hit, slap, kick, choke, or physically hurt you in any other way?

No
Yes

Insertion point for Standard question(s) Z6, Z4

The next questions are about your labor and delivery.

Insertion point for Standard question(s) K13, K14
Insertion point for Standard question(s) K5

39. When was your new baby born?

Month/Day/Year

Insertion point for Standard question(s) K9-K10
Insertion point for Standard question(s) K8, K3, K7, K6
Insertion point for Standard question(s) K15

40. By the end of *your most recent* pregnancy, how much weight had you gained? Check ONE answer and fill in blank if needed

I gained _____ pounds
I didn't gain any weight, but I lost_____ pounds
My weight didn't change during my pregnancy
I don't know

Insertion point for Standard question(s) DD12-DD16

AFTER PREGNANCY

The next questions are about the time since your new baby was born.

41. After your baby was delivered, was he or she put in an intensive care unit (NICU)?

No
Yes
I don't know

42. After your baby was delivered, how long did he or she stay in the hospital?

Less than 24 hours (less than 1 day)
24 to 48 hours (1 to 2 days)
3 to 5 days
6 to 14 days
More than 14 days
My baby was not born in a hospital
My baby is still in the hospital → **Go to Question 45**

Insertion point for Standard question(s) K11, K12

43. Is your baby alive now?

No → *We are very sorry for your loss.* **Go to Question 50**
Yes

44. Is your baby living with you now?

No → **Go to Question 49**
Yes

Insertion point for Standard question(s) B4

45. Did you ever breastfeed or pump breast milk to feed your new baby, even for a short period of time?

No → **Go to Question 48**
Yes

Insertion point for Standard question(s) B1

46. Are you currently breastfeeding or feeding pumped milk to your new baby?

No
Yes → **Go to Question 48**

47. How many weeks or months did you breastfeed or pump milk to feed your baby?
Weeks
OR
Months
Less than 1 week

Insertion point for Standard question(s) B2
Insertion point for Standard question(s) B3
Insertion point for Standard question(s) B10, B11
Insertion point for Standard question(s) B5–B6
Insertion point for Standard question(s) H2, H5-H7
Insertion point for Standard question(s) H1, H3, H4
Insertion point for Standard question(s) J1
Insertion point for Standard question(s) S13, F2

If your baby is still in the hospital, go to Question x.

48. In which *one* position do you *most often* lay your baby down to sleep now? Check ONE answer

On his or her side
On his or her back
On his or her stomach

Insertion point for Standard question(s) F1, F3
Insertion point for Standard question(s) X10, X6
Insertion point for Standard question(s) X3, X5
Insertion point for Standard Question X9
Insertion point for Standard question X7
Insertion point for Standard question X8
Insertion point for Standard question(s) X1–X2
Insertion point for Standard question X4
Insertion point for Standard Question(s) X11-X12
Insertion point for Standard question(s) T4–T5
Insertion point for Standard question(s) T1, T3, T2
Insertion point for Standard question(s) T6-T7

49. ***Since your new baby was born,*** **has a home visitor come to your home to help you learn how to take care of yourself or your new baby?** A home visitor is a nurse, a health care worker, a social worker, or other person who works for a program that helps mothers of newborns.

No
Yes

Insertion point for Standard question(s) V16-V18

50. Are you or your husband or partner doing anything *now* to keep from getting pregnant? Some things people do to keep from getting pregnant include using birth control pills, condoms, withdrawal, or natural family planning.

No
Yes **→ Go to Question 52**

51. What are your reasons or your husband's or partner's reasons for not doing anything to keep from getting pregnant *now*? Check ALL that apply

I am not having sex
I want to get pregnant
I don't want to use birth control
I am worried about side effects from birth control
My husband or partner doesn't want to use anything
I have problems getting birth control when I need it
I had my tubes tied or blocked
My husband or partner had a vasectomy
I am pregnant now
Other → Please tell us:

If you or your husband or partner is not doing anything to keep from getting pregnant *now*, go to Question 53.

52. What kind of birth control are you or your husband or partner using *now* to keep from getting pregnant? Check ALL that apply

Tubes tied or blocked (female sterilization, Essure®, Adiana®)
Vasectomy (male sterilization)
Birth control pill
Condoms
Injection (Depo-Provera®)
Contraceptive implant (Implanon®)
Contraceptive patch (OrthoEvra®) or vaginal ring (NuvaRing®)

IUD (including Mirena® or ParaGard®)
Natural family planning (including rhythm method)
Withdrawal (pulling out)
Not having sex (abstinence)
Other → Please tell us:

Insertion point for Standard question(s) E2

53. ***Since your new baby was born,*** **have you had a postpartum checkup for yourself?** A postpartum checkup is the regular checkup a woman has about 4-6 weeks after she gives birth.

No
Yes

Insertion point for Standard question(s) L9
Insertion point for Standard question(s) L16
Insertion point for Standard question(s) O1–O3

54. ***Since your new baby was born*****, how often have you felt down, depressed, or hopeless?**

Always
Often
Sometimes
Rarely
Never

55. ***Since your new baby was born*****, how often have you had little interest or little pleasure in doing things?**

Always
Often
Sometimes
Rarely
Never

Insertion point for Standard question(s) M12, M21 (must be used together)

56. What kind of *health insurance* do you have *now*? Check ALL that apply

Private health insurance from my job or the job of my husband, partner, or parents
Private health insurance purchased directly from an insurance company

Medicaid (required: *state Medicaid name*)
State-specific option (Other government plan or program such as SCHIP/CHIP or health reform exchange program)
State-specific option (Other government plan or program not listed above such as state MCH program, indigent program or family planning program, etc.)
State-specific option (TRICARE or other military health care)
State-specific option (IHS or tribal)
Some other kind of health insurance => Please tell us_____
I do not have health insurance *now*

NOTE: For the insurance questions, states should add specific plan names wherever possible.

Insertion point for Standard question(s) DD17, DD18, DD19, DD20
Insertion point fort Standard question DD21

OTHER EXPERIENCES

The next questions are on a variety of topics.

[STATE-SPECIFIC SECTION (Standards without insertion points and state-developed questions)]

The last questions are about the time during the *12 months before* your new baby was born.

Insertion point for Standard Question(s) P18

57. During the *12 months before* your new baby was born, what was your yearly total household income before taxes? Include your income, your husband's or partner's income, and any other income you may have received. *All information will be kept private* and will not affect any services you are now getting.

$0 to $15,000
$15,001 to $19,000
$19,001 to $22,000
$22,001 to $26,000
$26,001 to $29,000
$29,001 to $37,000
$37,001 to $44,000
$44,001 to $52,000
$52,001 to $56,000
$56,001 to $67,000
$67,001 to $79,000

$79,001 or more

Note: *States can add additional categories as long as the categories are collapsible back to the existing core categories (i.e. may add upper or lower ranges beyond what is provided or split out existing categories into sub-categories)*

58. During the *12 months before* your new baby was born, how many people, *including yourself*, depended on this income?

Number of People

59. What is today's date?

Month/Day/Year

Please use this space for any additional comments you would like to make about your experiences around the time of your pregnancy or the health of mothers and babies in [*State].*

Thanks for answering our questions!

Your answers will help us work to make [State] mothers and babies healthier.

Appendix E

Z4. **During your most recent pregnancy, did anyone else physically hurt you in any way?**

No
Yes

Z5. **During the 12 months before you got pregnant with your new baby, did an ex-husband or ex-partner push, hit, slap, kick, choke, or physically hurt you in any other way?**

No
Yes

Z6. **During your most recent pregnancy, did an ex-husband or ex-partner push, hit, slap, kick, choke, or physically hurt you in any other way?**

No
Yes

Z7. **During the 12 months before your new baby was born, did you miss any doctor appointments because you were worried about what your partner would do if you went?**

No
Yes

Z8. ***Before*** **you got pregnant with your new baby, did your husband or partner ever try to keep you from using your birth control so that you would get pregnant when you didn't want to? For example, did he hide your birth control, throw it away or do anything else to keep you from using it?**

No
Yes

Z9. **During any of the following time periods, did your husband or partner threaten you, limit your activities against your will, or make you feel unsafe in any other way? For each time period, check No if it did not happen then or Yes if it did.**

	No	**Yes**
a. During the 12 months before I got pregnant		
b. During my most recent pregnancy		
c. Since my new baby was born		

Appendix F

BOSTON COLLEGE
Institutional Review Board
Office for Research Protections
Waul House, 2nd Floor
Phone: (617) 552-4778, fax: (617) 552-0498

IRB Protocol Number: 22.168.01e

DATE: January 19, 2022

TO: Laura Suzuki

CC: Susan Kelly-Weeder

FROM: Office of Research Protections

RE: Prevalence of reproductive coercion and association with health behaviors and adverse birth outcomes

---

Notice of Evaluation – [Exempt 45 CFR 46] 4

The Office for Research Protections (ORP) has evaluated the project named above. This is a minimal risk study that has been granted an exemption from Boston College IRB review in accordance with 45 CFR 46. 4. This designation is based on the assumption that the materials that you submitted to the ORP contain a complete and accurate description of all the ways in which human subjects are involved in your research.

This exemption is given with the following conditions:

1. You will conduct the project according to the plans and protocol you submitted;
2. No further contact with ORP is necessary unless you make changes to your project, in which case you must submit these changes to ORP for IRB review. You must also report any adverse events or injuries to ORP.

Please remember to complete a project closure form in CyberIRB to close this project once it is complete. The University appreciates your efforts to conduct research in compliance with the federal regulations that have been established to ensure the protection of human subjects in research.

Date of Exemption: Wednesday, January 19, 2022

Sincerely,

Guillermo Nunez
Executive Director of Research Administration

Enclosures
jfc

Appendix G

BOSTON COLLEGE
Institutional Review Board
Office for Research Protections

Waul House, 2nd Floor

Phone: (617) 552-4778, fax: (617) 552-0498

Protocol IRB: 22.168.01e-1

TO: Laura Suzuki

CC: Susan Kelly-Weeder

FROM: Institutional Review Board – Office for Research Protections

DATE: Wednesday, February 2, 2022

RE: Prevalence of reproductive coercion and association with health behaviors and adverse birth outcomes

Notice of Evaluation- REMAINS EXEMPT 4

The Office for Research Protections (ORP) has evaluated the minor changes to the project named above. The protocol remains exempt. This is a minimal risk study that has been granted an exemption from Boston College IRB review in accordance with 45 CFR 46.101 4 Study of existing data if no identifiers or publicly available. This designation is based on the assumption that the materials that you submitted to the IRB contain a complete and accurate description of all the ways in which human subjects are involved in your research.

Description of Amendment:

- This request for amendment to the initial approved IRB protocol pertains to a change to the dataset that will be used for the proposed study. The proposed study will use the Pregnancy Risk Assessment Monitoring System (PRAMS) Phase 7 survey dataset which includes data fromthe years 2012-2015 instead of the Phase 8 PRAMS, 2016-2020, survey dataset as described in the initial application. The data collection instrument used was the Phase 7 Core Questionnaire, a 57-item survey, not the Phase 8 Core Questionnaire.

This exemption is given with the following condition:

No further contact with ORP is necessary unless you make changes to your project, in which case you must submit these changes to ORP for IRB review. You must also report any adverse events or injuries to ORP.

The University appreciates your efforts to conduct research in compliance with the federal regulations that have been established to ensure the protection of human subjects in research.

Date of Exemption: Wednesday, February 2, 2022

Sincerely,

Guillermo Nunez
Executive Director of Research Administration

Enclosures
jfc