RELATIONSHIPS BETWEEN INTIMATE PARTNER VIOLENCE, PREGNANCY, MATERNAL MENTAL HEALTH, AND INFANT CARE BEHAVIORS

by

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DEDICATION

I would like to dedicate my thesis to the people who supported me throughout the writing process including but not limited to: My family, Dylan, Dr. Schafer, and my thesis committee.

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ABSTRACT

Background: Intimate Partner Violence (IPV) is a public health issue that is known to have deleterious health effects for pregnant women and their babies. Women who experience IPV during pregnancy are also likely to develop and exacerbate already existing mental health conditions. Experiences with IPV are thought to impact health behaviors, particularly how a mother copes or cares for her baby. The objective of this study is to explore the potential relationships between experiencing IPV (before and/or during pregnancy), maternal mental health, and health-related infant care behaviors (i.e., breastfeeding initiation, breastfeeding duration, well-child visits).

Methods: Data from phases 6 (years 2009-2011), 7 (2012-2015), and 8 (2016-2018) of the Centers for Disease Control and Prevention Pregnancy Risk Assessment Monitoring System (PRAMS) were used to explore maternal experiences of IPV, mental health, and infant care behaviors. Participants included in the study responded to questions regarding experiences of IPV either before or during pregnancy. Statistical procedures used included descriptive statistics, logistic regression, and survival analysis.

Results: Among the 20,363 participants who responded to IPV-related questions, 15% reported experiencing IPV before pregnancy, 20% during pregnancy, and 21% either before or during pregnancy. Most participants (85%) initiated breastfeeding, were still breastfeeding at the time of the survey (56%) and sought well-child checks (97%). On average, participants had healthful indicators for experiencing depression (mean=3.96) and lack of interest (mean=3.92). Experiencing IPV before pregnancy is

highly correlated with experiencing IPV during pregnancy; of those who experienced IPV before, 90.3% experienced IPV during pregnancy. Compared to those who did not experience IPV, and controlling for relevant demographic variables, experiencing IPV was significantly associated with breastfeeding initiation (OR=1.38, 95%CI: 1.19-1.61). While experiencing IPV was significantly associated with breastfeeding duration in bivariate analysis, the relationship did not remain significant when controlling for relevant demographic variables. Similarly, experiencing IPV was significantly associated with seeking well-child check in bivariate analysis, but that significance did not remain when relevant demographic variables were added to the model. Maternal mental health was not found to mediate any of the explored relationships between experiencing IPV and infant care behaviors.

Discussion: Results of this study support recommendations to perform routine screening for IPV in all women of reproductive age and highlight the importance of asking pregnant women about their history of experiencing IPV. Efforts to increase breastfeeding initiation should consider a mother's experience with IPV and her marital status, as both could have implications on breastfeeding outcomes.

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LIST OF ABBREVIATIONS

IPV	Intimate Partner Violence
PRAMS	Pregnancy Risk Assessment Monitoring System
CDC	Center for Disease Control and Prevention
NISVS	National Intimate Partner and Sexual Violence Survey
PTSD	Posttraumatic Stress Disorder
ACOG	American College of Obstetricians and Gynecologists
USPST	U.S. Preventive Services Task Force
HARK	Humiliation, Afraid, Rape, Kick
HITS	Hurt/Insult/Threaten/Scream
E-HITS	Extended Hurt/Insult/Threaten/Scream
PVS	Partner Violence Screen
WAST	Woman Abuse Screening Tool

CHAPTER ONE: INTRODUCTION

Overview of Intimate Partner Violence

In the United States, approximately 22% of women and between 3% and 9% of pregnant women report experiencing intimate partner violence (IPV), when defined as physical violence, sexual violence, stalking, or psychological harm by a current or former partner or spouse (Alhusen et al., 2015; Breiding et al., 2014). Incidences of IPV are often underreported (Bailey, 2010; Doi et al., 2019) and the true scope of the problem, particularly among pregnant women, could be much higher than 3-9% (Alhusen et al., 2015). Experiencing IPV during pregnancy has been associated with detrimental health effects for both mothers (e.g., insufficient prenatal care, poor nutrition, inadequate weight gain, substance use, increased prevalence of depression) and infants (e.g., low birth weight, preterm birth), indicating this is an important public health issue (Alhusen et al., 2018; Alhusen et al., 2015; Chaves et al., 2019; Chisholm et al., 2017; Jack et al., 2017; Sarkar, 2008; Shah et al., 2010). While it has been reported that incidents of IPV may increase during pregnancy (Devries et al., 2010; Gazmararian et al., 1996), it is still unclear whether or not the pattern of violence changes during pregnancy.

Compared to those who do not experience violence, mothers in relationships characterized by conflict or violence are more likely to have distorted and negative views of their infants (e.g., low psychological involvement with the infant and low engagement with parenting, low recognition and response to the infant's needs, perception that the infant is difficult to care for) before and after birth (Ahlfs-Dunn & Huth-Bocks, 2014;

Huth-Bocks, Levendosky, Theran, et al., 2004; Sokolowski et al., 2007). Additionally, mothers experiencing IPV may display higher parenting stress and use less effective parenting practices (e.g., diversion, spanking, permissiveness) (Ahlfs-Dunn & Huth-Bocks, 2014; Huth-Bocks, Levendosky, Bogat, et al., 2004). Maternal distress or poor postpartum mental health (e.g., PTSD, anxiety, depression) has been associated with poor health, neurobiological, and socioemotional outcomes among infants (Ahlfs-Dunn & Huth-Bocks, 2014; Alhusen & Wilson, 2015; Chisholm et al., 2017).

Statement of the Problem

The literature indicates a clear relationship between mothers' experience with IPV and infant health outcomes. However, little research has been done regarding the relationship between experiencing IPV and the health-related infant care behaviors of the mother (i.e., breastfeeding, well-child visits, immunizations). IPV, as a public health issue, is an 'invisible' problem and is regularly underreported (Doi et al., 2019). Given the adverse health outcomes experiencing violence presents for both mother and child (Ahlfs-Dunn & Huth-Bocks, 2014; Huth-Bocks, Levendosky, Bogat, et al., 2004), a better understanding of how IPV is associated with infant care behaviors will help to inform our prevention and intervention work in community and clinical settings. Exploring the role of experiencing IPV before and/or during pregnancy in relation to mental health and infant care behaviors may inform clinical, research, and community practice not just for women's health providers, but also breastfeeding advocates, lactation consultants, pediatric care providers, and those working in immunization clinics. Findings from this study will inform our strategies to address potentially significant risk factors for unhealthful infant care behaviors.

Rationale

In order to care for the needs of pregnant women experiencing IPV and their children, we need to first understand if IPV increases during pregnancy in relationships without a history of IPV or if IPV during pregnancy continues in relationships where it has previously existed. Second, exploring the potential relationships among maternal experience of IPV, maternal mental health, and infant care behaviors can inform our practice with mothers who may be experiencing violence and identify components needed for prevention and intervention. Results from this study may help us understand how to design prevention programs for improving infant care behaviors and health outcomes among families experiencing IPV.

Purpose

The purpose of this study is to explore the relationships between IPV, pregnancy, maternal mental health, and maternal infant care behaviors.

Research Aims

1. Explore the prevalence of participants' experience with physical IPV (e.g., push, hit, slap, kick, choke, or physically hurt) during pregnancy among those who both did and did not experience violence before pregnancy.
2. Explore the relationship between maternal experience of physical IPV (before or during pregnancy) and infant care behaviors (i.e., breastfeeding, well-child visits, immunizations).
3. Identify the role, if any, postpartum maternal mental health plays in the relationship between maternal experience of physical IPV (before or during

pregnancy) and infant care behaviors (i.e., breastfeeding, well-child visits, immunizations).

Definition of Terms

1. Intimate partner violence (IPV)
    a. IPV formal definition: "describes physical violence, sexual violence, stalking, or psychological harm by a current or former partner or spouse. This type of violence can occur among heterosexual or same-sex couples and does not require sexual intimacy" (CDC, 2019)
    b. Physical IPV (definition used in this study): A partner or ex-partner pushed, hit, slapped, kicked, choked, or physically hurt you in any other way (Alhusen et al., 2015)
2. PRAMS: Pregnancy Risk Monitoring Assessment System
3. Infant care behaviors: Breastfeeding, Well-child visits, Immunizations (elaborated on in Chapter 3 and Appendix A)
4. Maternal mental health: Degree to which mother feels down, depressed or hopeless, or has had little interest or pleasure in doing things they usually enjoyed (elaborated on in Chapter 3 and Appendix A)

Study Limitations

To address the aims of this study, I will analyze data from PRAMS (CDC's Pregnancy Risk Assessment Monitoring System). The PRAMS questionnaire is either completed over the phone with an interviewer or self-administered through the mail. Given the retrospective nature of these data collection methods, there is room for error, misinformation or recall bias (Robbins et al., 2018). Additionally, because of the

sensitive nature of some of the questions being analyzed, such as one's experience with IPV, participants might be hesitant to answer truthfully (Shulman et al., 2018).

The use of national-level secondary data allows us to see the larger picture of how issues are affecting our nation but creates limitations on the data. Some of these limitations include having a limited range of questions asked and answers given on a survey and limited control over the sample population, distribution of the survey, and data available (Bailey, 2010). For example, PRAMS only asks questions related to physical violence, rather than the whole scope of potential IPV experiences and not all US states/territories participate.

Summary

IPV is a health issue known to have deleterious effects on the health of pregnant women (Alhusen et al., 2015). The prevalence rate of IPV during pregnancy is unagreed upon among researchers in the field; some cite prevalence around 20% (Gazmararian et al., 1996) while others believe it is closer to 3-9% (Alhusen et al., 2015). It is believed that one of the reasons this statistic varies so much is due to the nature of those experiencing IPV and their reluctancy or fear of disclosing this information (Doi et al., 2019). Additionally, experiencing IPV during pregnancy is known to have potential side effects on the mother's mental health outcomes (Ahlfs-Dunn & Huth-Bocks, 2014; Huth-Bocks, Levendosky, Theran, et al., 2004). However, there are still gaps of knowledge regarding how experiencing IPV, and the role of mental health outcomes, relates to the way mothers care for their children.

CHAPTER TWO: LITERATURE REVIEW

Background

Intimate partner violence (IPV) is a complex public health issue that involves forms of aggression or violence performed by a current or past intimate partner. IPV is defined as "physical violence, sexual violence, stalking and psychological aggression (including coercive tactics) by a current or former intimate partner (i.e., spouse, boyfriend/girlfriend, dating partner, or ongoing sexual partner)"(CDC, 2019). The Pregnancy Risk Monitoring Assessment System (PRAMS), the data source used for this study, only addresses physical IPV in their questions. Due to this data limitation, the proposed study only addresses IPV in physical terms, but the research reviewed in this chapter will be broader, as according to the CDC's definition.

IPV in the United States

Intimate partner violence is a significant public health issue in the United States (US) that costs approximately $103,767 per female victim throughout the span of her life (Peterson et al., 2018). Collectively, the US government pays approximately $1.3 trillion of this life span economic burden (including medical, mental health, and lost productivity costs) for both males and females who have experienced IPV (Peterson et al., 2018).

According to the most recently updated information from the 2015 National Intimate Partner and Sexual Violence Survey (NISVS), about 1 in 3 women (36.4%) have experienced contact sexual violence, physical violence, and/or stalking by an intimate partner during their lifetime (Smith et al., 2018). Breaking down this statistic, the most

commonly faced subtype of IPV is physical violence, experienced by more than 30% of women in the US (Smith et al., 2018). In contrast, 18.3% of women have experienced contact sexual violence and 10.4% have experienced stalking (Smith et al., 2018).

IPV is reported across all social strata, locations, and cultural backgrounds. However, IPV is shown to be most prevalent among young adults aged 18 to 24 years old, when compared with older age groups (Miller & McCaw, 2019). There is also a higher rate of experiencing IPV among women who belong to racial and ethnic minority groups, including non-Hispanic American Indians/ Alaskan Native and non-Hispanic black women (Chisholm et al., 2017; Miller & McCaw, 2019). Additionally, those with mental or physical disabilities, lower income, lower educational attainment, are at higher risk of experiencing IPV (Breiding et al., 2008; Chisholm et al., 2017).

IPV and Pregnancy

Researchers have come to differing conclusions about whether the prevalence of IPV increases (Finnbogadóttir & Dykes, 2016), decreases (Alhusen et al., 2014; Campbell et al., 1998), or remains the same during pregnancy (Alhusen et al., 2015; Bailey, 2010; Pallitto & O'Campo, 2004) as compared to pre-pregnancy IPV. In a widely cited comprehensive review of the literature, the prevalence of IPV in pregnancy ranged from 1-20% (Gazmararian et al., 1996). The identified prevalence varies in research depending on the methods, population, and how IPV was defined and measured in each study. While recent research finds the range of pregnant women experiencing IPV to be from 3%-9% in the US (Alhusen et al., 2015), this range is likely underestimated because IPV cases are regularly underreported due to a reluctance to disclose violence with a partner, especially during pregnancy (Doi et al., 2019). In a review of pregnant mothers

experiencing IPV, underreporting was suspected in projects where women report not having been “abused”, but admit to experiencing violence on a specific follow-up question (Bailey, 2010). While the literature is conflicting, it seems that pregnancy does not prevent IPV (Alhusen et al., 2015) and it remains unclear if pregnancy itself is can be identified as a risk factor of IPV. This gap in the literature, of understanding the prevalence of IPV during pregnancy, as compared to before pregnancy, will be explored in aim one of this study.

Prevalence of IPV during pregnancy may be associated with sociodemographic factors (Chisholm et al., 2017). Those more likely to experience IPV while pregnant include women who are: single, young (under 35), have less than 12 years of education, are of racial and ethnic minority, and/or experiencing an unplanned pregnancy (Alhusen et al., 2015; Bailey, 2010; Breiding et al., 2014; Devries et al., 2010). Other factors associated with IPV during pregnancy include prior experience with IPV, conflict or economic stress in a relationship, and a standing male dominance within the family (Alhusen et al., 2015; Bailey, 2010; Breiding et al., 2014; Devries et al., 2010). Women who experience IPV during pregnancy are more likely (compared to those who do not experience IPV) to report health problems including severe nausea, vomiting and/or dehydration, kidney infections, exacerbation of existing medical conditions, engagement in negative health behaviors during pregnancy (e.g., alcohol and/or drug use, smoking, and delaying prenatal care), insufficient weight gain during pregnancy, preterm labor and/or preterm birth, depression, and suicide (Baird et al., 2017; Chaves et al., 2019; Chisholm et al., 2017; Miller & McCaw, 2019; Shah et al., 2010; Sharps et al., 2007). Additionally, children born to mothers who experienced IPV while pregnant may

experience low birthweight, fetal injury, stillbirth, lack of maternal emotional attachment, and developmental or behavioral issues (Berhanie et al., 2019; Doi et al., 2019; Sarkar, 2008).

IPV and Mental Health

Exposure to violence is a public health issue that has been shown to both create new mental health conditions and exacerbate existing ones, including depression, post-traumatic stress disorder, anxiety, and suicidal behaviors (Agrawal et al., 2014; Miller & McCaw, 2019; Sarkar, 2008; Shen & Kusunoki, 2019; Trabold et al., 2013). Compounding the issue, approximately 90% of women who experience physical IPV also have experiences with psychological IPV (Oliveira et al., 2017). This experience in turn displays an increased risk of negative mental health outcomes (Oliveira et al., 2017). A more direct demonstration of the effect of IPV on mental health is displayed through findings on women who experience IPV during pregnancy having an increased risk of comorbid postpartum depression, which can affect the way they think, act, and feel about themselves and their babies (Agrawal et al., 2014; Shen & Kusunoki, 2019; Trabold et al., 2013).

Considering mental health among pregnant women experiencing IPV, the biological signal that the body sends out when under this extreme stress creates changes to the hypothalamic-pituitary-adrenal-placental axis hormonal relationship (Talley et al., 2006). Such changes in the hormonal system can pose harm to both the mother and the developing baby (Talley et al., 2006). In particular, there are significant differences in Beta endorphin and Adrenocorticotropic hormone between those who experience IPV during pregnancy compared to those who do not (Sarkar, 2008; Talley et al., 2006). This

biological response suggests that violence creates a situation of extreme stress and that stress is more commonly seen in pregnant women (van Heyningen et al., 2017; Zhang et al., 2020). Women experiencing IPV during pregnancy are also two and a half times more likely to develop depressive symptoms than their counterparts with no IPV experience during pregnancy (Enlow et al., 2017).

IPV and Infant Care Behaviors

The stress and anger produced by partner conflict and felt by the mother experiencing IPV can spill over into the parent-child relationship creating a harsh and more controlling environment for the child (Gustafsson et al., 2012). Gustafsson et al. (2012) assessed parenting behaviors through home visits where they observed 10-minute-long parent-child interactions. Through these observations they found a mother's experience of IPV was positively associated with 'maternal harsh intrusive parenting' which includes the use of negative and controlling tactics. Additionally, a separate study identified IPV to be associated with more authoritarian parenting styles (Greeson et al., 2014). The authoritarian parenting style is described as the caregiver placing high demands on their child while having low responsiveness (i.e., low levels or no nurturing or constrictive feedback) towards them (Greeson et al., 2014; King et al., 2016).

The effect of these maladaptive parenting behaviors may be compounded by distress displayed by the child. For example, a mother's experience of IPV during pregnancy is associated with an increase in infant sadness and distress (Enlow et al., 2017). Such distress signals are noted by baby's fussing, crying, or showing distress while being in a confined space. Moreover, experiencing IPV during pregnancy increases a child's risk of presenting behavioral, internalizing, and/or externalizing problems; this

was especially found in those aged 1 to 4 years (Silva et al., 2018). A child's distress or behavior, combined with a mother's maladaptive parenting behaviors due to experiencing IPV, could lead to adverse issues for children later in life, such as depression and anxiety (Greeson et al., 2014; Gustafsson et al., 2012; King et al., 2016). It is clear that mother's exposure to IPV is associated with parenting and infant care behaviors which may be associated with negative outcomes for children (Greeson et al., 2014; King et al., 2016). However, there is a space for research regarding a mother's experience with IPV and her performance of other, healthful infant care behaviors such as breastfeeding, attending regular well-child visits, or seeking infant immunizations on the recommended schedule.

IPV during Pregnancy, Maternal Mental Health, and Infant Care Behaviors

Pregnant women are theorized to respond to IPV by experiencing stress and dissociation (Iverson et al., 2013). In addition, experiencing IPV may impact other health behaviors and mental health outcomes which affect how the mother copes with her situation (Alhusen et al., 2015; Iverson et al., 2013). The most common conditions that have been shown as a result of experiencing IPV are posttraumatic stress disorder (PTSD) and depression (Muzika et al., 2017; Nathanson et al., 2012; Renner, 2009). Of women who experience IPV, 57% show signs or symptoms for PTSD, along with 56% showing signs or symptoms of depression (Nathanson et al., 2012). Maternal depression, regardless of PTSD comorbidity, is associated with significant levels of mother-infant bonding impairment (e.g., less sensitive, less positive, and more negative) (Muzika et al., 2017). Consistent with these findings, maternal depression was found to mediate the association between IPV and parenting stress (Renner, 2009). Overall, these studies demonstrated that maternal depression and PTSD are some of the most prominent risk

factors associated with unhealthful infant care behaviors (Huth-Bocks, Levendosky, Bogat, et al., 2004; Huth-Bocks, Levendosky, Theran, et al., 2004; Muzika et al., 2017; Nathanson et al., 2012; Renner, 2009). Thus, a research question explored in this study is whether maternal mental health mediates the relationship between experiencing IPV and infant care behaviors.

Theoretical Considerations

Virtually all IPV can be associated with issues of power and control exercised over one's partner (Castro et al., 2020; Greeson et al., 2014; Hart et al., 2013). In heteronormative relationships, according to the Theory of Gender and Power, this power and control manifests as male dominance over females (Wingood et al., 2009). Violence perpetuated by males to gain power or control over their female counterparts can result in health issues for the female, including substance abuse disorders, depression, and PTSD (Anderson & van Ee, 2018; Karakurt et al., 2014). Considering maternal mental health and infant care behaviors may be associated with how one copes with experiencing violence (as outlined in the literature review), the Transactional Model of Stress and Coping has been used as a framework for understanding these potential associations. However, it should be noted that this project will not be testing the whole Transactional Model of Stress and Coping because we do not have access to data on measurements of coping for our sample population. Thus, the first part of the Transactional Model of Stress and Coping is being used to frame our findings of how lived experiences (like IPV) and stress can influence mothers' behaviors. Furthermore, given the available research and literature about IPV in association with maternal mental health and childcare

behaviors, this study considers the Theory of Gender and Power and the Transactional Model of Stress and Coping as a foundation for the research aims.

Theory of Gender and Power

The Theory of Gender and Power was developed by Robert Cornell in 1987 (Wingood et al., 2009). The overarching idea is that power in relationships between and within genders comes from the global dominance men have over women (Wingood et al., 2009). Many couples may engage in low-level or mutual violence with one another that does not alter the dynamic of the power in their relationship (Greeson et al., 2014). However, the larger public health issue is the problem of 'battering', which includes a pattern of behavior to gain power or control over one's partner, generally perpetuated by males (Greeson et al., 2014). Women who are exposed to violence relating to power and control are more likely to exhibit signs and symptoms of psychological stress (Hart et al., 2013; Johnson, 2006). Thus, this study is built on literature supporting the association between IPV perpetuated toward the mother and her feelings of distress.

Transactional Model of Stress and Coping

The Transactional Model of Stress and Coping is an individual-level framework used for the evaluation of coping with stressful events, such as a mother experiencing IPV before or during pregnancy (Glanz & Schwartz, 2009). In this framework, a person is thought to experience stress through the impact of an external stressor, such as IPV. This stressor then is mediated by the person's evaluation of the stressor and its potential threat or harm, along with their ability to alter the situation they are in and manage their reactions (see Figure 1) (Glanz & Schwartz, 2009). In this model there are two different types of coping strategies: problem management and emotional regulations. Problem

management focuses on changing the situation while emotional regulation deals with altering the way one thinks or feels about a stressful situation (Glanz & Schwartz, 2009)

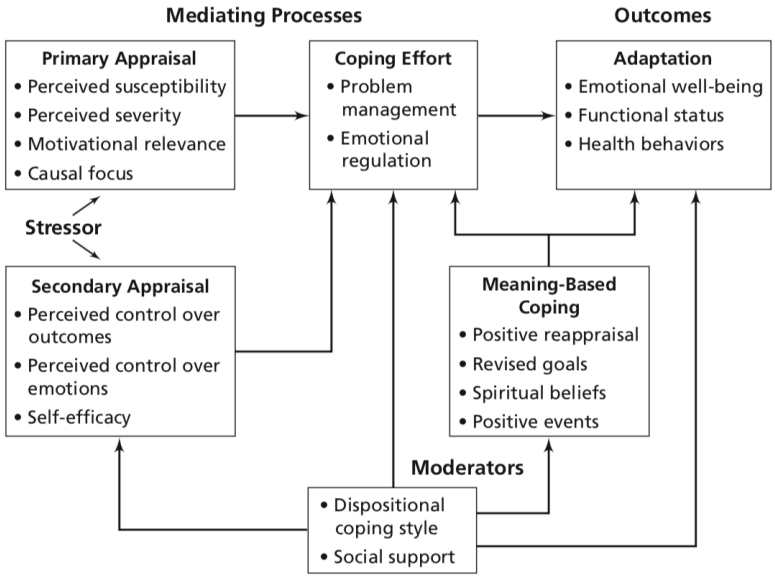

Figure 2.1 Theory of Stress and Coping from Glanz & Schwartz, 2009

In this study, the Transactional Model is a framework for how experiencing violence, which we know is associated with parenting stress outcomes, may relate to maternal mental health and infant care behaviors. Based on this framework, I hypothesize that mothers experiencing IPV who display such avoidance or denial may shift attention away from the stressor (the partner perpetrating the violence) and towards something the person feels they have more control over (their child). Given the fact that a new mother experiencing IPV and mental health issues may not have healthy coping strategies (Anderson & van Ee, 2018), this added attention toward one's child could be maladaptive and have negative health consequences (e.g., negative perception of infant) (Ahlfs-Dunn & Huth-Bocks, 2014; Gustafsson et al., 2012; Huth-Bocks, Levendosky, Theran, et al., 2004). Thus, this helps to inform us of how mothers might experience stressors, like IPV, and the influence these experiences can have on their behaviors.

Summary

Frequently, IPV is described in terms of gender and power and control over one's partner (Hart et al., 2013). This study is built on literature supporting the association between a mother's experience with IPV and her feelings of distress (Hart et al., 2013; Johnson, 2006). Continuous with how the perpetuation of violence can lead to adverse mental health effects (Alhusen et al., 2015), and how the experience of IPV and maternal mental health (Muzika et al., 2017) can affect child care behaviors, the Transactional Model of Stress and Coping has been utilized in an attempt to describe the response the mother may be experiencing and her infant care behavior. Overall, experiencing IPV around pregnancy, mother's mental health status, and infant care behaviors are significant public health issues that have been shown to create negative health outcomes for mothers and/or children.

CHAPTER THREE: METHODS

Introduction

This study will use data requested from the Centers for Disease Control and Prevention (CDC) Pregnancy Risk Assessment Monitoring System (PRAMS); specifically, survey phases 6, 7, and 8. PRAMS is an ongoing, yearly surveillance study done through the CDC and state health departments. PRAMS collects population-based data on state-specific maternal attitudes and experiences before, during and after pregnancy. The main purpose of PRAMS is to gather and analyze data and publicize research supporting the decrease of maternal and infant mortality and morbidity (Shulman et al., 2018).

To explore this study's aims regarding maternal experiences with IPV, mental health, and infant care behaviors, PRAMS data will be cleaned and statistical procedures appropriate to address each study aim (e.g., frequency, proportions, mean/standard deviation, Chi-square test [aim 1], logistic regression [aim 2 and 3], and survival analysis [aim 2 and 3]) will be conducted with SPSS software. In all analyses, results will be considered statistically significant at the $p<0.05$ level.

Data Collection, Participants, and Setting

PRAMS participants are recruited from a sample of women from approximately 47 states or territories in the United States who have had a recent live birth. Each state surveys approximately 1,300-3,400 participants each year (National Center for Chronic Disease Prevention and Health Promotion, 2019). This study will include data from the

years 2009-2018. As such, there will be approximately 99,000 participants per phase included in the study, before applying exclusion criteria. The questionnaires used by PRAMS are updated every 3 to 5 years; currently, it is in its eighth phase. This study will analyze data from all participating states in questionnaire phases 6 (years 2009-2011), 7 (years 2012-2015), and 8 (years 2016-2018).

PRAMS offers the survey in either English or Spanish and the primary data collection mode is either a mailed questionnaire with multiple follow-up attempts, and/or telephone interviews for mail non-respondents. Generally, a stratified sample of women is drawn from the current birth certificate file each month. The mail invites begin about 2 to 4 months after the mother's delivery of the baby. Mail invites include: an invitation to participate in the survey, first survey mailing (sent 3-7 days after the pre-letter), tickler (thank you or reminder note sent 10 days after initial survey packet), second survey mailing (sent 7-14 days after tickler), and third survey mailing (sent 7-14 days after the second survey packet) (Shulman et al., 2018). Telephone contact begins a week after the last survey mailing. The phone contact lasts for about 2-3 weeks where there are up to 15 call attempts made per working telephone number. These calls may be staggered over different times and days. All states involved use either response incentives or rewards to help increase participation. PRAMS makes the data available to states about 8-12 months after data collection completion (Shulman et al., 2018).

Inclusion and Exclusion Criteria

Out of the PRAMS participants, those included in the analysis will be identified through survey items corresponding with the study aims, identified in Appendix A.

Overall inclusion criteria for the current study include PRAMS participants who responded to the survey items regarding IPV either before or during pregnancy.

Those excluded from analysis include: (1) participants with reported gestational ages outside of a typical 37-45 weeks due to the increased probability of pre-term birth or pregnancy complications that may also influence the infant care behaviors of interest (Trumello et al., 2018), (2) those who reported their infants spent time in the neonatal intensive care unit (NICU) due to the increased likelihood of breastfeeding complications among mothers who are separated from their infants (Sanders & Hall, 2018) and (3) those who indicated the baby died. Given experiencing IPV was the variable of interest in this study, we also excluded participants who had missing data for both IPV questions (experiencing IPV before pregnancy or during pregnancy). If a participant had data for at least one of the IPV questions, they remained in the analysis. However, those with missing data for both were excluded because we cannot know whether they experienced IPV around the time of their pregnancy or not. We cannot assume that a blank answer means they did not experience IPV.

Study Aims, Variables, and Analysis

The key study aims, and their variables discussed in this section can also be found in Appendix A**.**

Aim One

Explore the prevalence of participants' experience with physical IPV (e.g., push, hit, slap, kick, choke, or physically hurt) during pregnancy among those who both did and did not experience violence before pregnancy.

Experience with IPV before Pregnancy

To identify a participant's experience with IPV *before* pregnancy the survey question: "In the 12 months before you got pregnant with your new baby, did any of the following people push, hit, slap, kick, choke, or physically hurt you in any other way? For each person, check No if they did not hurt you during this time or Yes if they did" will be used. Response options to be analyzed include "a. My husband or partner, b. My ex-husband or ex-partner". If participants marked the box next to "Yes", they will be considered to have experienced physical IPV prior to pregnancy. Those marking "No" will be considered as not having experienced IPV.

Experience with IPV during Pregnancy

To identify a participant's experience with IPV *during* pregnancy the survey question: "During your most recent pregnancy, did any of the following people push, hit, slap, kick, choke, or physically hurt you in any other way? For each person, check No if they did not hurt you during this time or Yes if they did" will be used. The response options being analyzed are "a. My husband or partner, b. My ex-husband or ex-partner". Again, if participants marked the box next to "Yes", they will be considered to have experienced physical IPV during pregnancy. While those marking "No" will be considered as not having experienced IPV.

Aim One Analysis

The variables discussed in Aim One will be analyzed through descriptive statistics including correlations, probability of experiencing IPV during pregnancy, relative risk, and Chi-square of independence test to check for significant differences between experiencing IPV before pregnancy (yes/no) versus during pregnancy (yes/no). See Table

3.1. Relative risk for experiencing IPV during pregnancy among those who did not experience IPV before pregnancy will be compared to the risk of experiencing IPV during pregnancy among those who experienced IPV before pregnancy using the following formula:

$$RR = (\frac{IPV\ during\ for\ those\ who\ did\ not\ experience\ before}{No\ IPV\ before\ pregnancy})/(\frac{IPV\ during\ for\ those\ who\ experience\ before}{Yes\ IPV\ before\ pregnancy}).$$

A Chi-square test was chosen as the appropriate statistical procedure because the variables are dependent (i.e., from the same sample) and are dichotomous (yes/no) responses.

Table 3.1 Prevalence of IPV in a 2x2 Matrix

	No IPV during pregnancy	**IPV during pregnancy**
No IPV before pregnancy	N, A%	N, B%
IPV before pregnancy	N, C%	N, D%

Aim Two

Explore the relationship between maternal experience of physical IPV (before pregnancy and/or during pregnancy) and infant care behaviors (i.e., breastfeeding, well-child visits, immunizations).

Experience of IPV

Experience of IPV for Aim 2 will be a calculated variable of "Any violence" consisting of the participant indicating IPV before pregnancy and/or during pregnancy. Due to missing data in the IPV variables, this "Any violence" combination allows data from more participants to be included in the analysis.

Breastfeeding

Three levels of breastfeeding behavior will be considered for analysis: intention, initiation, and duration. We did not receive adequate data from the CDC in time to measure breastfeeding intention and include the analyses in this thesis report. However, if we had the data, we would establish a mother's intention to breastfeed her infant with the question "During your most recent pregnancy, what did you think about breastfeeding your new baby? Check one answer". If the participant responded with checking the options of "'I knew I wanted to breastfeed' or 'I thought I might breastfeed'" then they are counted as displaying the intention to breastfeed. Whereas participants who checked "'I knew I would not breastfeed' or 'I didn't know what to do about breastfeeding'" will be considered as not having intended to breastfeed. To display a mother's initiation of breastfeeding the question "Did you ever breastfeed or pump breast milk to feed your new baby, even for a short period of time?" will be analyzed. With the response of "Yes" showing initiation and "No" meaning no initiation. To establish duration of breastfeeding, two questions will be considered: (1) "Are you currently breastfeeding or feeding pumped milk to your new baby?". With an answer of "Yes" displaying that they are still currently breastfeeding, and (2) "How many weeks or months did you breastfeed or feed pumped milk to your baby?" to determine breastfeeding duration among those not currently breastfeeding.

Immunizations

We did not receive adequate data from the CDC in time to measure seeking infant immunizations and include the analyses in this thesis report. However, if we had the data, we would identify participants' follow-through on immunizations with their infants,

using the question “Did your new baby have any well-baby shots or vaccinations before he or she was 3 months old? Do not count shots or vaccinations given in the hospital right after birth”. The response of “Yes” will be used to indicate the child is vaccinated and “No” will indicate the child has not been vaccinated. Finally, those in the response category of “My child has not had any well-baby shots, but he or she is not 3 months old yet”, will be excluded from the analysis as they are too young for routine vaccinations.

Well-Checks

To measure participants’ pursuit of well-checks for their infants, then we will explore participants’ responses to the question “Has your new baby had a well-baby checkup? A well-baby checkup is a regular health visit for your baby usually at 1, 2, 4, and 6 months of age”. Participants with a response of “Yes” will be counted as taking their babies to well-checks. While all other responses will be considered to have not sought well-checks.

Aim Two Analysis

The data analysis procedure includes logistic regression and survival analysis models, depending on whether the dependent variables are dichotomous or continuous, as demonstrated in the chart below (Table 3.2). When using breastfeeding duration as an outcome, if mothers who are still breastfeeding are included in the sample, survival analysis is an appropriate technique, rather than linear regression. To begin, bivariate associations will be explored between the dependent and independent variables. Demographic covariates will be added to the models if they are significantly associated with the dependent variable in bivariate analysis. Full multiple variable regression models

will be analyzed with an eye for collinearity or high correlation between possible independent variables (Morgan et al., 2020).

Table 3.2 Data Analysis Plan

Independent Variable	Dependent Variable	Regression Type
Experience IPV	Breastfeeding	Initiation = Logistic Regression Duration = Survival Analysis (used to estimate breastfeeding duration among those who may still be breastfeeding)
Experience IPV	Well-Check Ups	Logistic Regression

Aim Three

Identify the role, if any, postpartum maternal mental health plays in the relationship between maternal experience of physical IPV (pre-conception or during pregnancy) and infant care behaviors (i.e., breastfeeding, well-child visits, immunizations).

Experience of IPV

The same "Any violence" variable described for Aim 2, above, will be used for Aim 3.

Infant Care Behaviors

The same infant care behavior variables described for Aim 2 (breastfeeding, well-child checks), above, will be used for Aim 3.

Postpartum Mental Health

To assess participants' postpartum mental health, two questions will be considered: (1) "Since your new baby was born, how often have you felt down, depressed, or hopeless?" and (2) "Since your new baby was born, how often have you

had little interest or little pleasure in doing things you usually enjoyed?" These questions included responses on a Likert scale: 1=[Always] to 5=[Never]. The two variables will be averaged, creating one "mental health" variable ranging from 1-5. Mental health will be explored using this combination variable as a continuous variable and also as a median split (finding the median response and creating a dichotomous variable for those under the median versus those at or above the median).

Aim Three Analysis

Much like the analysis in aim two, aim three will use regression models to help understand how variables may be associated. If a relationship is identified between experiencing violence and any infant care behaviors in Aim 2, I am hypothesizing that maternal mental health may mediate those relationships (Ohrnberger et al., 2017). (See Figure 3.1)

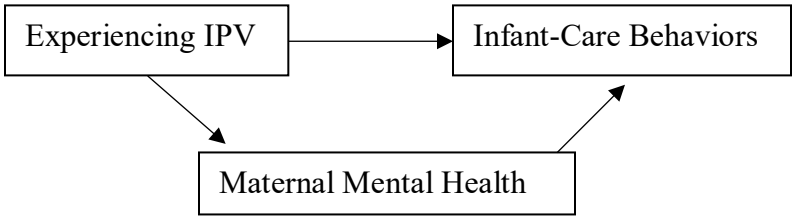

Figure 3.1 Depiction of Variables for Aim 3

The first step in the mediation analysis was already conducted in Aim 2: establishing whether there is a relationship between experiencing IPV and several infant care behaviors. The second step is to see if there is a relationship between experiencing IPV and maternal mental health. If there is a relationship between experiencing IPV and maternal mental health, then the next step in analysis is to see if there is a relationship between mental health and the infant care behaviors found to be associated with IPV in

Aim 2. This portion of analysis will look similar to the one done in Aim 2 but the independent variable “Experience IPV” is changed to “Maternal Mental Health”.

Additional Study Variables

In each analysis addressing the aims above, I will control for variables found to be associated with the outcomes. These variables may include demographic information such as: insurance status, race, age, level of education, marital status, and number of children born (i.e., singleton birth or multiples). Predictor variables such as these can play an important role in an analysis and should be controlled for as they may also be associated with the variables that are being researched (Gustafsson et al., 2012).

Research Design

Aim one will explore the prevalence of IPV during pregnancy, compared to before pregnancy. Then aim two will explore whether experiencing IPV is associated with infant care behaviors. If there are significant relationships found in aim 2, then aim 3 follows to test whether maternal mental health mediates the relationship between experiencing IPV and infant care behaviors. I am aware that if no relationships are found to be significant in Aim 2, then there is no Aim 3 of this study.

Summary

In summary, this study will explore the relationships between experiencing IPV, pregnancy, mental health, and infant care behaviors using national level PRAMS data covering the years 2009-2018. The first aim in the study will analyze and explore the relationship between pregnancy and physical IPV. This will be followed by the second aim, where statistical analysis will be done to explore the potential relationship between maternal experience of physical IPV (before and/or during pregnancy) and infant care

behaviors (i.e., breastfeeding, well-child visits). Then, only if aim two displays statistically significant results, aim three will identify the role postpartum maternal mental health plays in the relationship between infant care behaviors among women who experience physical IPV.

CHAPTER FOUR: RESULTS

Introduction

Prior to applying exclusion criteria, the PRAMS data file received from the CDC contained information on 373,924 participants. After applying exclusion criteria and eliminating large amounts of missing data, the final sample size being reported in the results section is 20,363 participants.

Characteristics of Participants

The majority of participants were married (55%), white (59%), in the 25-35-year-old age group (54%) and earned more than a high school education (53%). Most women had singleton births (99%), initiated breastfeeding (85%), were still breastfeeding at the time of the survey (56%), had taken their baby to at least one well-child check (97%), and did not use Medicaid health insurance (63%). On average, infants were 18 weeks old at the time of the interview and among those who initiated breastfeeding but stopped before the time of the survey, average breastfeeding duration was 6 weeks. Most participants reported not experiencing IPV around the time of their pregnancy. However, some participants experienced violence before pregnancy (15%), during pregnancy (20%), or both before and during pregnancy (15%). To include all participants who experienced violence around the time of pregnancy, we created an “any violence” variable. Participants were coded as having experienced “any violence” if they answered “yes” to experiencing violence before or during pregnancy. In our sample 21% of participants experienced any violence. Lastly, maternal mental health variables, experiencing

depression (mean=3.96) or lack of interest (mean=3.92) since the birth of the baby, were measured on Likert scales (1=always to 5=never, where higher number indicates better mental health). To create a single maternal mental health variable, we tried first creating a mean of both variables (mean=3.94) and then created a median split of the mean variable (median=4, 37.92% of participants had a mean score of less than 4). See Table 4.1.

Table 4.1 Participant Characteristics (N= 20,363)

	N[l]	Frequency (%)	Mean (SD), Range
Demographics			
Age	20,363		
Less than 25 years		6616 (32.49)	
25-35 years		10,895 (53.50)	
Greater than 35 years		2852 (14.01)	
White [a]	20,277	12,036 (59.36)	
More than HS education [b]	20,144	10,763 (53.43)	
Married [c]	29,349	11,248 (55.28)	
Participated in WIC [d]	15,279	7742 (50.67)	
Medicaid health insurance [e]	13,587	4985 (36.69)	
Multiples [f]	20,285	225 (1.11)	
Infant age (weeks) [g]	20,353		17.69 (4.92), 9.29-45.14
Breastfeeding at time of interview	17,044	9621 (56.45)	
Experiences with Violence			
Pre-pregnancy	19,129	2962 (15.48)	
During pregnancy	20,363	4019 (19.74)	
"Any violence" [h]	20,363	4327 (21.25)	
Behaviors			
Initiated breastfeeding	20,088	17,064 (84.95)	
Breastfeeding duration [I]	7299		6.23 (5.02), 0.50-30.00
Pursued well-child checks	6910	6734 (97.45)	
Maternal Mental Health			
Depression since birth	13,433		3.96 (1.04), 1-5
Lack of interest since birth	13,430		3.92 (1.15), 1-5
"MH average" [j]	13,371		3.94 (0.94), 1-5

"MH average" less than median [k]	13,371	5070 (37.92)

[a] White versus any other race.

[b] Versus high school education or less.

[c] Versus not married.

[d] Mother participated in WIC during pregnancy.

[e] Versus any other type of insurance or no insurance.

[f] Versus singleton birth.

[g] Infant age at time of interview was reported in days. Calculated weeks by dividing days by 7.

[h] Any violence includes pre-pregnancy or during pregnancy.

[I] Duration measured weeks among those who initiated and were not still breastfeeding at the time of the survey.

[j] Average of two mental health variables: depression and interest. (1=always, 5=never, where higher number indicates better mental health)

[k] Median=4.0

[l] Reporting N for each item due to missing variables.

Aim One: Prevalence of IPV before and during pregnancy

The 2x2 matrix showing those who did/did not experience IPV before pregnancy compared to those who did/did not experience IPV during pregnancy is shown in Table 4.2. The probability of experiencing IPV during pregnancy among those who did not experience IPV before pregnancy was 0.0083 or 0.83%. The probability of experiencing IPV during pregnancy among those who also experienced IPV before pregnancy was 0.90 or 90%. The relative risk for experiencing IPV during pregnancy between those who did not experience IPV before pregnancy compared to those who did experience IPV before pregnancy was calculated to be 0.0089 or 0.89%.

Experiencing IPV during pregnancy is correlated with experiencing violence before pregnancy ($r=0.91$, $p<0.01$), meaning those who experience violence before pregnancy are likely to experience violence during pregnancy. The two violence variables are dependent, and this relationship is significant: $X^2_{(1,\ 19{,}645)}=16454.378$, $p<0.001$.

Table 4.2 Experience with IPV Before and During Pregnancy

	No IPV during	Yes, IPV during
No IPV before	16309 (99.2%)	136 (0.8%)
Yes, IPV before	311 (9.7%)	2889 (90.3%)

Aims Two and Three: Relationships Between Violence, Infant Care Behaviors, and Maternal Mental Health

Aim two analyses explored the relationship between maternal experience of "any violence" (physical IPV before pregnancy and/or during pregnancy) and infant care behaviors (breastfeeding initiation, breastfeeding duration, and well child checks). If significant relationships were found in aim 2, the purpose of aim 3 was to identify the

role, if any, maternal mental health played in predicting infant care behaviors among women who experienced violence. To complete these analyses, bivariate logistic regression (breastfeeding initiation and well-child check) and survival analysis (breastfeeding duration) models were utilized.

Breastfeeding Initiation

Logistic regression was used to explore the relationship between maternal experience of physical IPV and breastfeeding initiation (dichotomous: 1=initiated, 0=did not initiate), as seen in Table 4.3. The "Bivariate Relationships" column shows how each variable on the left is associated with breastfeeding initiation in its own model. In bivariate analysis, there is a significant relationship between experiencing violence and breastfeeding initiation (OR 0.65, 95% CI:0.60-0.71), indicating those who experience violence have lower odds of initiating breastfeeding compared to those who did not experience violence. However, in the full model, where all the demographic variables associated with breastfeeding initiation are also included with violence in the model, experiencing violence is still significantly associated with breastfeeding duration, but in the opposite direction. In the full model, those who experience violence have higher odds of initiating breastfeeding (OR 1.38, 95% CI:1.19-1.61), compared to those who do not experience violence. Results of the full model suggest that the other demographic variables (insurance, WIC, etc.) help to buffer the experience mothers have with violence. In addition, when individually ran in bivariate models, the variables for maternal mental health are not significantly associated with the outcome of breastfeeding initiation. Since there is no significant relationships between maternal mental health and

breastfeeding initiation, mental health cannot mediate the relationship between experiencing violence and breastfeeding initiation (aim three).

Table 4.3 Logistic Regression: Breastfeeding Initiation

	Bivariate Relationships OR (95% CI)	Full Model [j] OR (95% CI)
Experiences with Violence		
"Any violence" [a]	0.65 (0.60-0.71) ***	1.38 (1.19-1.61) ***
Maternal Mental Health		
"MH average" [b]	1.05 (0.999-1.111)	
"MH average" less than median [c]	0.92 (0.83-1.02)	
Demographics		
Age		
Less than 25 years	0.56 (0.50-0.64) ***	1.11 (0.88-1.40)
25-35 years	(reference group)	(reference group)
Greater than 35 years	1.42 (1.25-1.61) ***	0.76 (0.63-0.92) **
White[d]	1.07 (0.99-1.16)	
More than HS education [e]	3.06 (2.81-3.32) ***	1.90 (1.65-2.19) ***
Married [f]	2.62 (2.42-2.84) ***	2.00 (1.72-2.34) ***
Participated in WIC [g]	0.35 (0.32-0.38) ***	0.66 (0.57-0.77) ***
Medicaid health insurance [h]	0.40 (0.36-0.44) ***	0.65 (0.56-0.75) ***
Multiples [I]	0.83 (0.58-1.18)	

*p<0.05, **p<0.01, ***p<0.001

[a] Any violence includes pre-pregnancy or during pregnancy.

[b] Average of two mental health variables: depression and interest. (1=always, 5=never, where higher number indicates better mental health)

[c] Median=4.0

[d] White versus any other race.

[e] Versus high school education or less.

[f] Versus not married.

[g] Mother participated in WIC during pregnancy.

[h] Versus any other type of insurance or no insurance.

[I] Versus singleton birth.

[j] only includes variables significantly associated with initiation from bivariate analysis

Breastfeeding Duration

Cox Regression survival analysis was used to analyze the relationship between experiencing IPV and breastfeeding duration because some participants were still breastfeeding at the time of the survey. Survival analysis allows us to include those who are still breastfeeding into the breastfeeding duration analysis. In bivariate analysis, experiencing IPV was significantly associated with breastfeeding duration (HR=1.73, 95%CI: 1.64-1.82). Hazard ratios are interpreted opposite of odds ratios, meaning experiencing IPV is associated with shorter breastfeeding duration, compared to not experiencing IPV. In the full model, where all of the demographic variables associated with breastfeeding duration were included in the model with IPV, IPV becomes non-significant. This non-significance remains after non-significant demographic variables in the full model are removed to produce the final model. This means that the other demographic variables associated with breastfeeding duration are more important in predicting how long mothers will breastfeed than if they have had any experience with IPV around the time of pregnancy. Additionally, since there was no significant relationship between experiencing IPV and breastfeeding duration (aim two), there is no relationship for maternal mental health to mediate (aim three). (See Table 4.4.)

Table 4.4 Survival Analysis: Breastfeeding Duration

	Bivariate Relationships HR (95% CI)	Full Model [k] HR (95% CI)	Final/Adjusted Model [l] HR (95% CI)
Experiences with Violence			
"Any violence" [a]	1.73 (1.64-1.82)***	1.07 (0.98-1.16)	1.07 (0.98-1.17)
Maternal Mental Health			
"MH average" [b]	0.86 (0.84-0.89)***		
"MH average" less than median [c]	1.28 (1.21-1.35)***		
Demographics			
Age (years)			
Less than 25	1.83 (1.75-1.93)***	1.26 (1.16-1.37)***	1.26 (1.16-1.36)***
25-35	(reference)	(reference)	(reference)
Greater than 35	0.85 (.079-0.92)***	1.09 (0.98-1.22)	1.09 (0.98-1.22)
White[d]	0.88 (0.84-0.93)***	0.98 (0.91-1.06)	--
More than HS education [e]	0.53 (0.50-0.55)***	0.80 (0.74-0.87)***	0.80 (0.74-0.87)***
Married [f]	0.47 (0.45-0.49)***	0.58 (0.53-0.63)***	0.58 (0.53-0.63)***
Participated in WIC [g]	2.01 (1.97-2.19)***	1.37 (1.26-1.49)***	1.37 (1.26-1.50)***
Medicaid health insurance [h]	1.84 (1.74-1.95)***	1.10 (1.01-1.20)*	1.11 (1.02-1.21)*
Multiples [i]	1.27 (1.03-1.56)*	1.46 (1.06-2.00)*	1.46 (1.06-2.00)*
Infant age (weeks) [j]	1.01 (1.01-1.02)***	1.00 (1.00-1.01)	--

*p<0.05, **p<0.01, ***p<0.001

[a] Any violence includes pre-pregnancy or during pregnancy.

[b] Average of two mental health variables: depression and interest. (1=always, 5=never, where higher number indicates better mental health)

[c] Median=4.0

[d] White versus any other race.

[e] Versus high school education or less.
[f] Versus not married.
[g] Mother participated in WIC during pregnancy.
[h] Versus any other type of insurance or no insurance.
[I] Versus singleton birth.
[j] Infant age at time of interview was reported in days. Calculated weeks by dividing days by 7.
[k] Only includes variables significantly associated with breastfeeding duration from bivariate analysis
[l] Demographic variables not significantly associated with breastfeeding duration in the full model are removed to create final model

Well-Child Checks

Logistic regression was used to explore the relationship between maternal experience of IPV and attending a well-child check appointment for their infant, as seen in Table 4.5. As displayed in the individual bivariate analysis relationships, experiencing IPV is significantly associated with lower odds of pursuing well-child checks (OR=0.68, 95% CI: 0.48-0.96). Upon including the demographic variables associated with receiving well-child checks along with the IPV variable in the full regression model, experiencing IPV becomes non-significant. Experiencing IPV remains non-significant (OR=0.79, 95% CI: 0.56-1.12) as other non-significant demographic variables are removed from the full model to create the final model. This means that, when put together in a model, the demographic variables have more predictive power than experiencing IPV did for the behavior of pursuing well-child checks. Since there is no significant relationship between experiencing IPV and pursuing well-child check (aim 2), there is not a relationship for maternal mental health to mediate (aim 3). Neither of the maternal mental health variables were associated with the well-child check outcome in bivariate analysis, either.

Table 4.5 Bivariate Regression: Well-Checks

	Bivariate Relationships OR (95% CI)	Full Model [k] OR (95% CI)	Final/Adjusted Model [l] OR (95% CI)
Experiences with Violence			
"Any violence" [a]	0.68 (0.48-0.96)*	0.97 (0.61-1.52)	0.79 (0.56-1.12)
Maternal Mental Health			
"MH average" [b]	1.10 (0.83-1.46)		
"MH average" less than median [c]	0.78 (0.45-1.35)		
Demographics			
Age (years)			
Less than 25	0.73 (0.53-0.99)*	1.31 (0.86-1.99)	1.04 (0.74-1.45)
25-35	(reference)	(reference)	(reference)
Greater than 35	2.37 (1.23-4.58)*	3.31 (1.32-8.27)*	2.49 (1.20-5.17)*
White[d]	0.92 (0.67-1.25)	--	--
More than HS education [e]	2.63 (1.90-3.64)***	2.33 (1.51-3.60)***	2.06 (1.43-2.98)***
Married [f]	1.93 (1.42-2.62)***	1.07 (0.70-1.63)	--
Participated in WIC [g]	0.45 (0.33-0.63)***	0.64 (0.41-1.01)	0.68 (0.46-0.98)*
Medicaid health insurance [h]	0.70 (0.40-1.21)	--	--
Multiples [I]	0.82 (0.20-3.39)	--	--
Infant age (weeks)[j]	0.96 (0.94-0.99)*	0.97 (0.94-1.00)	0.97 (0.94-0.995)*
Breastfeeding at time of interview	1.75 (1.21-2.54)**	1.17 (0.78-1.75)	--

*p<0.05, **p<0.01, ***p<0.001

[a] Any violence includes pre-pregnancy or during pregnancy.

[b] Average of two mental health variables: depression and interest. (1=always, 5=never, where higher number indicates better mental health)
[c] Median=4.0
[d] White versus any other race.
[e] Versus high school education or less.
[f] Versus not married.
[g] Mother participated in WIC during pregnancy.
[h] Versus any other type of insurance or no insurance.
[I] Versus singleton birth.
[j] Infant age at time of interview was reported in days. Calculated weeks by dividing days by 7.
[k] Only includes variables significantly associated with well-checks from bivariate analysis
[l] Demographic variables not significantly associated with well-checks in the full model are removed to create final model

CHAPTER FIVE: DISCUSSION

Introduction

The purpose of this study was to explore the relationships between experiencing IPV, maternal mental health, and infant care behaviors. While we did not find significant relationships between IPV and breastfeeding duration or seeking well-child checks, IPV was found to be associated with higher odds of initiating breastfeeding, compared to those who did not experience IPV. Maternal mental health, measured as a combination of depression- and loss-of-interest-related variables, was not found to mediate the relationship between IPV and breastfeeding initiation, as originally hypothesized. Further details of these findings, and implications for practice and research, are outlined below.

Summary of Key Results

Aim One

In aim one we compared the rates of participants' experience with IPV during pregnancy among those who did/did not experience IPV before pregnancy. The results of the relative risk calculation and Chi-square test indicated that those who experience IPV before pregnancy are more likely, than those who do not, to experience IPV during their pregnancy. These results are consistent with the current literature which estimates that between 9% and 20% of pregnant woman report experiencing IPV (Alhusen et al., 2015; Breiding et al., 2014). However, as other research has also noted, incidences if IPV often go underreported; thus, the true scope of the problem is not fully known (Alhusen et al., 2015; Bailey, 2010; Doi et al., 2019).

Aims Two and Three

For aim two the main goal was to explore the relationship between maternal experience of physical IPV around pregnancy (before and/or during pregnancy) and infant care behaviors (i.e., well-child visits, breastfeeding initiation and breastfeeding duration). While the goal for aim three was to build on those potential relationships and identify the role, if any, postpartum maternal mental health plays in the relationship between infant care behaviors among women who experience physical IPV results from aim 2 either gave us no relationship to mediate or mental health was not associated with the behavior. Thus, for all 3 behaviors, mental health was not found to mediate the relationship between experiencing IPV and the behavior (if a relationship existed). Bivariate regression and survival analysis (breastfeeding duration) where used in order to analyze the outcomes of these aims.

Breastfeeding Initiation

Controlling for significant demographic variables, participants who experienced IPV had greater odds of initiating breastfeeding (OR=1.38) compared to those who did not experience IPV. This finding is interesting because in bivariate analysis, the odds of initiating were lower for those who experienced IPV (OR=0.65). When investigated individually, whether a participant was married or not is the variable that "flipped" experiencing IPV. Mothers who are married are more likely to initiate breastfeeding (Kortsmit et al., 2020) and in our analysis, being married or having a partner may be strong enough to predict breastfeeding initiation, even if that partner is a source of IPV. Perhaps mothers who are married and experiencing IPV are trying to control what they can and protect their infants by initiating breastfeeding (Alhusen & Wilson, 2015; Miller-

Graff & Scheid, 2020). Additionally, when considering this change in odds ratio through the lenses of the Transactional Model of Stress and Coping, future research should explore mothers' coping strategies and whether married mothers have healthier coping strategies compared to their nonmarried counterparts.

Additionally, in our sample, mental health was not significantly associated with the behavior of breastfeeding initiation. Therefore, it could not mediate the relationship between experiencing IPV and breastfeeding initiation. These results are a bit unusual as this is not always the case when looking at the relationship of mental health and breastfeeding initiation. In a study done looking at postpartum mental health and breastfeeding practices in the US, mothers who experienced postpartum depression had lower odds of initiating breastfeeding (OR=0.79) (Wouk et al., 2017). This suggests that an improvement to be made on this research could be to consider the time frame when participants mental health begins to decline (i.e., participants had existing mental health conditions before pregnancy, or they develop postpartum).

Breastfeeding Duration

In bivariate analysis, the relationship between mothers' experience with IPV and breastfeeding duration was significant. Those who experienced IPV were likely to have shorter breastfeeding durations (or were likely to stop breastfeeding sooner) than mothers who did not experience IPV. But, upon adding in demographic characteristics, the association between IPV and breastfeeding duration became non-significant. This means that these demographic characteristics associated with breastfeeding duration have more predictive power for breastfeeding duration than experiencing IPV. Thus, no significant

relationship between IPV and breastfeeding duration means there is no relationship for mental health to mediate.

These findings about breastfeeding duration are somewhat consistent with previous research showing that the odds of stopping breastfeeding before 8 weeks were not significantly associated with experiencing violence in the 12 months before pregnancy or during pregnancy (Wallenborn et al., 2018). However, when only considering whether mothers experienced violence in the 12 months before pregnancy, the odds of stopping breastfeeding before 8 weeks was 18% higher among women who experienced violence within 12 months before pregnancy compared to those who did not (Wallenborn et al., 2018). This finding could be instructive for our study: it may be worth separating the "any violence" variable we used into the original experiencing IPV before pregnancy and experiencing IPV during pregnancy variables to see if timing matters with our sample. Future research should also consider whether participants were experiencing IPV after the birth of the baby, as this may be more strongly associated with breastfeeding duration than the other two time periods (before pregnancy or during pregnancy).

Well-Checks

When looking at just the bivariate relationship between experiencing IPV around pregnancy and obtaining a well-child check, there is an association (OR=0.68). However, upon adding in the demographic characteristics also associated with the behavior of getting a well-check, there is no longer a significant relationship between experiencing IPV and the behavior. This means that when the demographics are put together with IPV in the model, they have more predictive power than IPV on whether or not mothers will

pursue well-child checks. In addition, neither of the mental health variables were significantly associated with obtaining a well-child check. Therefore, mental health cannot mediate a relationship.

An explanation of these results could stem from 97% of the sample of those who responded to a question about well-child checks (N=6910) indicated they have pursued well-child checks. This means that there might not have been enough variability when adding in the additional demographic characteristics to the model (especially since IPV was only associated at the $p<0.05$ level in bivariate analysis). In the context of the current literature, these findings are not too surprising due to the make-up of the sample population used in this study. In other studies that looked at outcome behaviors similar to pursuing well-child checks (i.e., pursuing WIC visits), the initial bivariate relationship with IPV showed a significant association (Masho et al., 2019). However, when the study added their other demographic factors in, they too found that these factors took over the model, completely moderating the relationship that was once there.

Limitations

While there are many strengths to this study, the results are best viewed in light of some important limitations. Secondary data is helpful in understanding the larger picture of how issues affect our nation, but it also limits the number and scope of questions asked. For example, the PRAMS data has only one question related to physical IPV (not the whole scope of IPV experiences) and does not ask if participants are currently (at time of taking survey or after the baby was born) experiencing IPV, which could influence things that happen later in the baby's life (i.e., breastfeeding duration and well-checks). Being able to ask questions like these might have added more nuance and insight

to our findings. Additionally, it was difficult to condense the secondary data from the three phases of PRAMS questionnaires (phases 6, 7, 8) because some the questions and responses were asked differently or had different response options from one phase to the next (e.g., income). Large amounts of missing data, particularly around the violence questions and well-child check questions, was a challenge. To circumvent this with the IPV variables, we combined both variables for experiences for IPV before and/or during pregnancy into an "any violence" variable to allow data from more participants to be included in the analysis. This may have inflated the rate of participants experiencing IPV in this study, but we could not interpret a blank cell as a "no" response. Furthermore, due to the sensitive nature of the data and the methods used for data collection in this study, participants are prone to under or over report experiences of IPV due to re-call, response, or other biases. Lastly, PRAMS collects data from 47 states and territories in the U.S., however only 38 states are represented in the breastfeeding analyses, while only 8 states are represented in the well-check analysis. Thus, these findings should not be generalized to represent the whole of the US or those territories not presented in PRAMS.

Implications for Future Public Health Practice

While the results in this study vary depending on the infant care behavior being measured, it is clear that that women who experience IPV before and/or during their pregnancies are at risk for adverse infant care behaviors and mental health outcomes (Silverman et al., 2006; Wallenborn et al., 2018). Researchers, lactation consultants, pediatricians, and other clinicians or service providers can gain a better understanding of how IPV is associated with infant care behaviors from the significant relationship found between breastfeeding initiation and IPV. As was noted, the demographic variable of

married appeared to be the factor that caused the flip in the odds ratio displaying a relationship where participants experiencing IPV were more likely to initiate breastfeeding, compared to those who did not experience IPV. When informing and supporting mothers with breastfeeding initiation, clinicians might consider extra attention to mothers who are not married. However, this should not at all deter clinicians from encouraging married mothers from initiating breastfeeding as they can also be significantly impacted by these experiences.

Findings from this study support the American College of Obstetricians and Gynecologists (ACOG) recommendations for clinicians to perform routine screenings for IPV at the first prenatal visit, once per a trimester, during postpartum checks, and throughout routine gynecologic and preconception visits ("ACOG Committee Opinion No. 518: Intimate partner violence," 2012). The U.S. Preventive Services Task Force (USPSTF) agrees with ACOG's recommendation that "all women of reproductive age are at potential risk for IPV and should be screened" (Curry et al., 2018). Additionally, USPSTF provides several IPV screening tools that can be used to identify women who have had experiences with violence in the past year. This type of screening might be especially important for pregnant women because more than 90% of participants who experienced IPV before pregnancy also experienced IPV during pregnancy in our study. Some of the screening tools that USPSTF noted are: Humiliation, Afraid, Rape, Kick (HARK); Hurt/Insult/Threaten/Scream (HITS); Extended Hurt/Insult/Threaten/Scream (E-HITS); Partner Violence Screen (PVS); and Woman Abuse Screening Tool (WAST) (Curry et al., 2018). However, the USPSTF did discuss findings suggesting that effective interventions should address various risk factors other than just IPV (as concurrent with

this study's findings), such as providing parenting support for mothers and have an emphasis of counseling and home visits (Curry et al., 2018).

Recommendations for Future Research

Given the limitations of this study, future research should ask additional questions addressing factors such as the form or scope of IPV (i.e., ask questions about all types of IPV, not just physical) participants experience and identify participants with a current IPV experience (i.e., at the time they took the survey or after the baby was born). In our study, these additional questions might have added valuable information and altered the story on outcomes of relationships like those between IPV and breastfeeding duration or pursuing well-checks. It would also be beneficial to investigate other, potentially more important health behaviors related to infant care that were not available in this data set, such as mother-infant bonding (Muzik et al., 2013).

Additionally, instead of looking at aims two and three through the lens of participants experiencing "any violence" there might be more to the story if researchers keep the pre-pregnancy and during pregnancy violence variables separate. This can help with identifying the period of time that more women might experience IPV or a period of time that can be crucial for IPV interventions to occur. Lastly, the findings in aim two could be built upon in research by tying in the Transactional Model of Stress and Coping to see if mothers who experience IPV around pregnancy and are married have healthier coping strategies than their nonmarried counterparts, leading to higher breastfeeding initiation rates. Research looking into this could help identify important demographic factors for tailoring interventions.

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APPENDIX

Study Aims Paired with PRAMS Questions

1. Explore the prevalence of participants experience with physical IPV (e.g., push, hit, slap, kick, choke, or physically hurt) during pregnancy among those who both did and did not experience violence before pregnancy

Experiencing IPV Questions

Survey Item	Survey Questions	Response Options
C-28	In the 12 months before you got pregnant with your new baby, did any of the following people push, hit, slap, kick, choke, or physically hurt you in any other way? For each person, check No if they did not hurt you during this time or Yes if they did.	a. My husband or partner b. My ex-husband or ex-partner c. State option (Another family member) d. State option (Someone else)
C-29	During your most recent pregnancy, did any of the following people push, hit, slap, kick, choke, or physically hurt you in any other way? For each person, check No if they did	a. My husband or partner b. My ex-husband or ex-partner c. State option (Another family member)

	not hurt you during this time or Yes if they did.	d. State option (Someone else)

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2. Explore the relationship between maternal experience of physical IPV (pre-conception and/or during pregnancy) and infant care behaviors.

Breastfeeding Questions

Survey Item	Survey Questions	Response Options
C-35	(**Initiation**) Did you ever breastfeed or pump breast milk to feed your new baby, even for a short period of time?	No Yes
C-36	(**Duration**) Are you currently breastfeeding or feeding pumped milk to your new baby?	No Yes
C-37	(**Duration**) How many weeks or months did you breastfeed or feed pumped milk to your baby?	Less than 1 week [BOX] Weeks OR [BOX] Months
S-B4	(**Intention**) During your most recent pregnancy, what did you think	I knew I wanted to breastfeed I thought I might

	about breastfeeding your new baby? Check ONE answer	breastfeed I knew I would not breastfeed I didn't know what to do about breastfeeding

Immunizations Questions

Survey Item	Survey Questions	Response Options
S-X3	Did your new baby have any well-baby shots or vaccinations before he or she was 3 months old? Do not count shots or vaccinations given in the hospital right after birth.	No Yes My child has not had any well-baby shots, but he or she is not 3 months old yet

Well-Checks Questions

Survey Item	Survey Questions	Response Options
S-X1	Has your new baby gone as many times as you wanted for a well-baby checkup?	No Yes
S-X9	Has your new baby had a well-baby checkup? A well-baby checkup is a regular health visit for your baby usually at 1, 2, 4, and 6 months of age	No Yes

3. Identify the role, if any, postpartum maternal mental health plays in the relationship between maternal experience of physical IPV (pre-conception or during pregnancy) and infant care behaviors (i.e., breastfeeding, well-child visits, immunizations).

Maternal Mental Health Questions

Survey Item	Survey Questions	Response Options
C-48	Since your new baby was born, how often have you felt down, depressed, or hopeless?	Always Often Sometimes Rarely Never
C-49	Since your new baby was born, how often have you had little interest or little pleasure in doing things you usually enjoyed?	Always Often Sometimes Rarely Never