The Intersection of Depression, Partner Violence and Poverty during the Perinatal Period

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THE INTERSECTION OF DEPRESSION, PARTNER VIOLENCE AND POVERTY
DURING THE PERINATAL PERIOD

by

Catherine L. Kothari

A dissertation submitted to the Graduate College
in partial fulfillment of the requirements
for the degree of Doctor of Philosophy
Interdisciplinary Health Sciences
Western Michigan University
April 2014

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THE INTERSECTION OF DEPRESSION, PARTNER VIOLENCE AND POVERTY DURING THE PERINATAL PERIOD

Catherine L. Kothari, Ph.D.

Western Michigan University, 2014

Problem: Despite the wealth of research documenting the individual links between maternal depression, partner violence, and poverty, important gaps remain regarding their combined interactions, and their variation related to perinatal timing (pregnancy and postpartum). The current dissertation examined the interplay of these phenomena across perinatality.

Methods: This dissertation utilized secondary analysis of telephone survey data from a representative sample of women recruited during their postpartum hospital stay and interviewed four times over the subsequent 18 months. Linear regression was used for predictive modeling of fixed effects, and generalized estimating equation regression was used for multivariate analysis of temporal trends.

Findings: Depression and partner violence were strongly and directly related to each other regardless of maternal psychosocial condition, socioeconomic context, or time period. However, distinct trends associated with both perinatality and socioeconomic status were identified. Postpartum women displayed two peaks in depression, both marked by a history of partner violence compared to non-depressed women, but the early peak was characterized by greater depression severity and was more likely to occur among poor women compared to the later peak. Perinatality was found to be generally
protective against partner abuse for women at all income levels. However, among the 5.4% assaulted during the most recent pregnancy or postpartum, poor women were more likely to experience persistent abuse throughout the entire period, while higher income women were more likely to report one of the two abuse patterns: Prenatal-reprieve (cessation during pregnancy with resumption postpartum), or Prenatal-only (onset during pregnancy with cessation postpartum). Finally, partner abuse was directly tied to both poverty and postpartum depression, but the relationship of poverty and depression was indirect, and moderated by partner abuse: Only poor women who were abused had more depression than higher-income women, but poor women who were not abused had no higher depression risk than higher-income women.

Conclusions: Women with a history of partner violence have significantly elevated risk of postpartum depression throughout the 2 years after delivery. Although perinatality is protective against abuse, poor women are more likely to experience partner violence not just before pregnancy but throughout pregnancy and postpartum compared to higher-income women.
DEDICATION

This dissertation, and the hope and belief that it represents,
I dedicate to my daughter Kaitan Lee Kothari
ACKNOWLEDGMENTS

There are many who have lent a hand, arm, even a whole body, along the way. To begin with, I owe a special thanks to my dissertation committee, Dr. Jim Wiley, Dr. Angie Moe, and, in particular, my advisor, Dr. Amy B. Curtis, from whom I learned not only technical academic skills but the soul and passion behind the work. I must thank my Ph.D. cohort for their friendship, advice, and our many productive weekends together (even if some of them felt more like crisis-management at the time). I have been truly blessed with many professional colleagues who have become treasured friends: My NIJ family (Karin, Kate, Jim, and Melissa), my MMM partners (Mike, Shama, Phyllis, Remi, and Suzie), my HBHS friends (Carmen, Deb, Wendy, all of the case managers and educators), my MHRC buddy, Bob, and, most recently, my H-Dream group (Amy, Rajib, and Kathleen). I would like to thank Dr. Dave Overton, Dr. Beth Burns, and Dr. Jane Hanneken at WMed for their unflinching support, inside and outside administrative walls.

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Catherine L. Kothari
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CHAPTER I
INTRODUCTION
Perinatal Period

The perinatal period (pregnancy and postpartum) is one of increased sensitivity to the impact of psychosocial stressors, a sensitivity that extends to the fetus during pregnancy and the infant during postpartum (Centers for Disease Control and Prevention [CDC], 2008; Haas et al., 2005; Marcus et al., 2011). Intimate partner violence (IPV) and depression are two of the most well-documented psychosocial stressors faced by perinatal women, each presenting immediate as well as long-term consequences (Beydoun, Beydoun, Kaufman, & Zondeman, 2012; Wu, Chen, & Xu, 2012). Poverty (also referred to as “low-income” and, more generally, using the term “socioeconomic status”), common among perinatal women, is simultaneously associated with increased occurrence of IPV and depression and more limited access to the resources for combating them (Adams, Sullivan, Bybee, & Greeson, 2008; National Vital Statistics Report, 2012; World Health Organization, 2009; Wu et al., 2012). Despite the vulnerability of the perinatal period and the degree to which these psychosocial risks present harm and co-occur with each other, few studies have explicitly examined the intersection of IPV, depression and poverty during the perinatal timeframe and the degree to which these relationships may change during this period (Bonomi et al., 2009; Bybee & Sullivan, 2005; Gaynes et al., 2005; Kornfeld, Bair-Merritt, Frosch, & Solomon, 2012; Lyon,
Pregnancy and postpartum is a critical time, not just because of its health vulnerability, but also because of unprecedented exposure to the healthcare system—an exposure that presents a unique opportunity to deliver needed services and resources (Adams et al., 2008; Beydoun et al., 2012; Bonomi et al., 2009; Bybee & Sullivan, 2005; Gaynes et al., 2005; Haas et al., 2005; Herman, Harrison, Afifi, & Jenks, 2008; Kornfeld et al., 2012; Lyon, 2000; Marcus et al., 2011; Medicaid Program, 2005; National Vital Statistics Report, 2012; Pausell, Avellar, Martin, & DelGrosso, 2010; Silverman, Decker, Reed, & Raj, 2006; Sutherland et al., 1998; Taillieu & Brownridge, 2010; World Health Organization, 2000; Wu et al., 2012). Recognizing both the vulnerability of perinatality and the importance of support during this critical period, national public health programs have been developed that promote universal access to healthcare through expanded Medicaid access, to nutritious food through the Special Supplemental Nutrition Program for Women, Infants and Children (WIC) and to a wide array of community-based resources through maternal-infant home visiting programs (Adams et al., 2008; Beydoun et al., 2012; Bonomi et al., 2009; Bybee & Sullivan, 2005; Gaynes et al., 2005; Haas et al., 2005; Herman et al., 2008; Kornfeld et al., 2012; Lyon, 2000; Marcus et al., 2011; Medicaid Program, 2005; National Vital Statistics Report, 2012; Pausell et al., 2010; Silverman et al., 2006; Sutherland et al., 1998; Taillieu & Brownridge, 2010; World Health Organization, 2000; Wu et al., 2012). Furthermore, although largely separate from the health and public health systems, federal welfare programs specifically target poor families with infants and young children, often headed by single women (Besharov,
These programs regularly cite IPV and depression as consistent barriers to economic self-sufficiency and even to maintaining participation in the welfare program (Blank & Kovak, 2008; Trisi & Pavetti, 2012).

**IPV and Depression**

IPV and depression both pose substantial risk to maternal, fetal and infant health (Bonomi et al., 2006; CDC, 2008; Ji et al., 2011; Silverman et al., 2006). IPV-related injury is a leading contributor to maternal as well as fetal-infant morbidity and mortality (Coker, Sanderson, & Dong, 2004; El-Kady et al., 2004; Horon & Cheng, 2001; Poole et al., 1996; Silverman et al., 2006). IPV is associated with higher rates of sexually transmitted infection, inadequate prenatal healthcare, and maternal addiction (Ahmed, Koenig, & Stephenson, 2006; Bonomi et al., 2006; Martin, Mackie, Kupper, Buescher, & Moracco, 2001). Perinatal depression affects maternal health and self-care through associated behaviors including inadequate nutrition, sleep dysfunction, increased smoking, substance use, and non-compliance with medical care (Cripe, Frederick, Qiu, & Williams, 2011; Davis, Glynn, Waffarn, & Sandman, 2011; Ji et al., 2011; Turney & Carlson, 2011). Postpartum depression interrupts maternal-infant bonding and is associated with infant neglect, a condition that can then lead to long-term cognitive and behavioral dysfunction, lasting well into adolescence and adulthood (Felitti et al., 1998; S. H. Goodman & Gotlib, 1999; Turney & Carlson, 2011; Zuckerman, Amaro, Bauchner, & Cabral, 1989). Regardless of the time period, depression, once experienced, tends to be a recurring phenomenon, with women reporting an average of five episodes over the course of their lifetime, often lasting several months each time (CDC, 2008).
Onset During the Perinatal Period

IPV and depression are experienced by substantial numbers of women over the course of their lifetime, 35.6% for IPV and 17.1% for major depressive disorder; and the perinatal period has long been thought to be vulnerable to the onset of both (Black et al., 2011; Cox, Murray, & Chapman, 1993; Gazmararian et al., 1996; Kessler et al., 2007). However, studies have found mixed support for this. To date, the research regarding whether or not perinatality is a trigger for IPV has focused upon the prenatal period (Bacchus, Mezey, & Bewley, 2004; Covington, Hage, Hall, & Mathis, 2001; Curry, 1998; Dunn & Oths, 2004; Heaman, 2005; Silverman et al., 2011; Yost, Bloom, McIntire, & Leveno, 2005) and found that, compared to 5.6% prevalence among a national population of adult women, best estimates place prenatal violence at 3.9% to 8.3% prevalence (Black et al., 2011; Gazmararian et al., 1996; Taillieu & Brownridge, 2010). There is evidence that abused women have less control over their reproductive health, and are more likely to become pregnant, which would account for higher IPV rates among pregnant women (Kothari, Cerulli, Marcus, & Rhodes, 2009). Research tracking violence from the year prior and throughout pregnancy has illustrated that the majority of prenatal violence (at least 70%) represents a continuation of abuse rather than new onset (Martin et al., 2001; Saltzman, Johnson, Gilbert, & Goodwin, 2003). Further, two nationally representative studies tracing assaults before, during, and after pregnancy, found that most women experiencing postpartum violence have experienced it prior to this period, either during pregnancy or prior to pregnancy (Daoud et al., 2012; Martin et al., 2001). Although, as Martin et al. (2001) and Daoud et al. (2012) examined assaults
committed by any person rather than exclusively partner-related violence, the application to partner violence is uncertain.

While a multitude of studies have examined prenatal partner violence (Ahmed et al., 2006; Beydoun et al., 2012; Bonomi et al., 2006; Coker et al., 2004; El-Kady et al., 2004; Gazmararian et al., 1996; Horon & Cheng, 2001; Poole et al., 1996; Silverman et al., 2006; Taillieu & Brownridge, 2010; Wu et al., 2012), only a handful of studies have focused upon partner violence during the postpartum period (Cerulli, Talbot, Tang, & Chaudron, 2011; Charles & Perreira, 2007; Gielen, O'Campo, Faden, Kass, & Xue, 1994). The studies examining violence after delivery have documented widely varying postpartum prevalence rates, from 3.0% in the first postpartum month (Cerulli et al., 2011) to 19.3% in the first six months (Gielen et al., 1994) to 3.1% in the first postpartum year (Charles & Perreira, 2007). The two higher rate studies (Cerulli et al., 2011; Gielen et al., 1994) drew study samples from low-income clinic populations, while Charles and Perreira (2007) relied upon data from the Fragile Families study, a population-based phone survey of women from large metropolitan areas which assessed physical violence with a single survey item. Thus, the degree to which these findings are representative of perinatal women in general remains unknown.

**IPV Across Perinatal Periods**

Taken together, the studies tracking violence across perinatality consistently document prevalence rates that are highest in the period before pregnancy (4.9% to 8.5%), then decrease during pregnancy (3.6% to 4.1%) and that may resume to pre-pregnancy levels during the postpartum period (Cerulli et al., 2011; Charles & Perreira, 2007; Daoud et al., 2012; Gielen et al., 1994; Martin et al., 2001; Saltzman et al., 2003).
The issue of violence resurging post-delivery is a critical public health and safety issue, yet no study to date has followed how partner violence changes from before pregnancy, during pregnancy, and into the postpartum period. Further, there are indications that not only does physical violence change across perinatality, but other types of abuse may change as well. Martin et al. (2004), in a prospective study of low-income pregnant women, calculated monthly rates of abusive events, reporting increased psychological abuse (threats, insults, yelling, controlling behavior) during pregnancy compared to the year prior to pregnancy among both women screening positive for physical violence as well as women screening negative. In another prospective study of low-income pregnant women, Gielen et al. (1994) found that while physical violence was higher during a 6-month postpartum period (9.8% prenatal prevalence and 19.3% postpartum prevalence), verbal abuse was higher during pregnancy (33.5% prenatal prevalence and 21.8% postpartum prevalence). Charles and Perreira’s (2007) study of mixed-income urban women also found increased physical abuse in the year after delivery, but unlike Gielen et al., found higher prevalence of psychological abuse in the postpartum year as well (7.5% prenatal prevalence and 17.3% postpartum prevalence). Research into the health effects of different types of abuse have shown that psychological abuse can be as detrimental as physical abuse through its impact upon the body’s stress mechanisms which, in turn, can lead to physical and mental illness (Coker, Smith, Bethea, King, & McKeown, 2000; Geronimus, Hicken, Keene, & Bound, 2006; Korte, Koolhaas, Wingfield, & McEwen, 2005; McEwen, 1998). Cohen et al.’s (2002) study investigating the differential relationship of abuse type with postpartum depression, demonstrated a stronger relationship between psychological abuse and postpartum depression than
between physical/sexual abuse and postpartum depression (adjusted odds ratio 2.8) among a higher-income, predominantly white Canadian population. The variation of socioeconomic status among these study populations presents the possibility that income may be a mediating factor in abuse type and timing, but this relationship has yet to be confirmed.

**Depression Across Perinatal Periods**

Likewise, studies examining whether or not depression is more likely to be experienced during the perinatal period (either pregnancy or postpartum) have documented both positive and negative support for this association (Gaynes et al., 2005; Kessler, 2003; Kessler et al., 2007; Mota, Enns, & Sareen, 2011; Saurel-Cubizolles, Romito, & Lelong, 2007). A meta-analysis of perinatal depression identified 12.7% prenatal prevalence and 7.1% early postpartum prevalence (first 3 months postpartum), compared to 6.9% past-year prevalence among women in the general population (Gaynes et al., 2005; Kessler, 2003; Kessler et al., 2007). Studies comparing depression among postpartum women with non-postpartum women have also shown no discernible differences in period prevalence rates (Mota et al., 2011; Saurel-Cubizolles et al., 2007). What is striking about the early postpartum period, however, is the frequency of new episodes of depression, with rates of new onset up to three times higher than that of non-perinatal women (Cox et al., 1993), coupled with increased psychiatric hospitalization compared to non-postpartum women (Munk-Olsen et al., 2009). Thus, while pregnancy is notable for a higher prevalence of depression, early postpartum is vulnerable to the new onset of depression that can be severe enough to warrant hospitalization.
Unlike IPV studies, where the bulk of perinatal research has focused upon pregnancy, most perinatal depression studies concentrate on postpartum, particularly the early period, often defined as delivery through 2 to 3 months (Gaynes et al., 2005; J. H. Goodman, 2004; Milgrom et al., 2008). As noted above, the early postpartum period is known for increased incidence of depression, but little of the research into the later postpartum period (beyond the 3-month mark) has explicitly investigated onset. Instead, it has either reported period prevalence (those meeting depression criteria at some point during an extended postpartum study period) (Areias, Kumar, Barros, & Figueredo, 1996; Chaudron et al., 2010; Kornfeld et al., 2012), reported point prevalence (those depressed at a single point in time later in the postpartum year) (Brown & Lumley, 2000; Leathers, Kelley, & Richman, 1997; Mota et al., 2011), or reported the follow-up outcomes of those depressed at an earlier postpartum stage (Horowitz & Goodman, 2004). These studies have documented mixed results, with some finding depression levels that are just as high as earlier postpartum periods and some finding lower depression rates. A longitudinal study by Cooper, Campbell, Day, Kennerly, and Bond (1988) among partnered middle-class women in Britain utilized a two-stage sampling procedure that did not allow onset assessment of the full population, but results suggest depression may peak at multiple points across the first year. A more recent study by Banti et al. (2011) showed that a sample of middle-income Italian women developed new cases of depression throughout pregnancy and their first year postpartum, but differing samples makes these conclusions tentative. No such data exist for mixed-income women in the United States. Furthermore, little is known about how later-postpartum-onset depression compares to earlier onset, an important gap for screening and treatment resources.
Co-occurrence of IPV and Depression

Regardless of their onset, IPV and depression not only present significant independent risks to women, but they frequently co-occur, intensifying both the risk and the impact of each other (Bonomi et al., 2009; Golding, 1999; Kessler, 2003; Kessler et al., 2007). Depression among IPV victims is high (from 40% to 60%), with a severity that increases as abuse increases (Bonomi et al., 2009; Golding, 1999; Kessler, 2003; Kessler et al., 2007). Longitudinal studies of IPV and depression have demonstrated that depression typically follows IPV rather than preceding it, and has been found to dissipate as the violence ceases (Bonomi et al., 2009; Golding, 1999; Kessler, 2003; Kessler et al., 2007). During the perinatal period, partner support (emotional as well as physical) is particularly critical, associated with pregnancy and delivery outcomes as well as self-esteem and mental distress (Campbell & Cohn, 1997). The bulk of research on depression and IPV co-occurrence during perinatality has documented the strong and consistent relationship between prenatal abuse and postpartum depression (CDC, 2008; Kendall-Tackett, 2007; Kornfeld et al., 2012; Silverman et al., 2011). The only study to examine postpartum depression and postpartum IPV also found a strong relationship between partner abuse and postpartum depression (unadjusted odds ratio of depression was 3.4 for women experiencing past year emotional abuse compared to women who had not experienced abuse), but this study was based upon a Canadian sample of higher income, married women and did not identify whether the IPV occurred before, during, or after pregnancy (Charles & Perreira, 2007; Gielen et al., 1994). No studies were located that directly examined the relationship of depression and IPV during the postpartum
period among U.S. women, nor the degree to which income plays a role in this relationship.

**Poverty**

Poverty is another common psychosocial stressor among perinatal women; 41% of the births in 2010 were paid for by Medicaid insurance, a marker of low income (Center on Budget and Policy Priorities, 2013; National Vital Statistics Report, 2012). Conditions of poverty have been shown to exacerbate women’s vulnerability to both partner violence and depression through increased stress, diminished protective conditions, and reduced access to material and social resources (Bybee & Sullivan, 2005; Farmer & Tiefenthaler, 2003; L. A. Goodman & Epstein, 2008; L. A. Goodman, Smyth, Borges, & Singer, 2009; Lott & Bullock, 2007).

**Poverty and IPV**

Among prenatal women, a nationally representative study by Saltzman et al. (2003) found that two socioeconomic indicators, Medicaid-paid delivery and experiencing homelessness, were associated with 4.2 and 4.5 increased relative risk of prenatal physical abuse, respectively. Women living in extreme poverty and receiving welfare report up to 10 times higher rates of IPV compared to the general adult female population (Tjaden & Thoennes, 2000; U.S. General Accounting Office, 1998). IPV has been identified as both a cause and an effect of poverty; it creates financial instability through job sabotage by abusers, through controlling behaviors that limit access to money and to credit, and through destruction of property that can lead to eviction, loss of transportation, and financial cost (Adams et al., 2008; Bassuk, Dawson, & Huntington, 2006; Dichter & Rhodes, 2011). The conditions of poverty can lead to IPV through
violence that is triggered by socioeconomic stressors and through the financial
dependence that can keep violent couples together (Adams et al., 2008; Dichter &
Rhodes, 2011; Moe & Bell, 2004; Riger et al., 2002). The single study examining
socioeconomic predictors of IPV during the prenatal period separately from the
postpartum period reported that college graduates had lower violence during and after
pregnancy compared to less educated women, while those who were employed
experienced lower violence in the postpartum period, but not the prenatal period,
compared to women without employment (Charles & Perreira, 2007). Although Charles
and Perreira (2007) did not investigate whether other types of abuse (i.e., psychological
or sexual) varied by socioeconomic status, the fact that this mixed-income study sample
reported different abuse rates by type and by period compared to two studies with low-
income samples (Gielen et al., 1994; Martin et al., 2004) further points to a possible
interplay between socioeconomic status, IPV, and perinatal period.

**Poverty and Depression**

Large scale, national epidemiological studies have found depression rates to be
1.5 to 1.7 times higher among low socioeconomic groups compared to high
socioeconomic groups (Hasin, Goodwin, Stinson, & Grant, 2005; Kessler, 1994).
Likewise, low education and low income are leading risk factors for postpartum
depression (CDC, 2008). An evidence-based review by the World Health Organization
(2000) reported that the co-occurrence of depression and poverty was bi-directional: the
dysfunction of depressed individuals resulting in an inability to work or maintain social
relationships as protections against poverty, combined with adverse living conditions that
lead to psychological distress and depression. Just as poverty increases risk, it also serves
to limit access to treatment sources that are key defenses against these problems (L. A. Goodman et al., 2009). Depression, including perinatal depression, is particularly responsive to treatment, whether that treatment is pharmacological, psychological, or psychosocial in nature (Dennis, Ross, & Grigoriadis, 2007; Gaynes et al., 2005; L. A. Goodman et al., 2009; Miller & LaRusso, 2011; Yonkers et al., 2001). Access to care issues, which are influenced by personal finances, health insurance, and childcare/transportation logistics, often serve as the principal obstacles to treatment (L. A. Goodman et al., 2009; Mojtabai et al., 2010; Nicolaidis et al., 2010). These obstacles are amplified when there is a lack of depression-screening within primary care practices and when there is an inadequate supply of treatment resources within the community (Nicolaidis et al., 2010). The perinatal period, while vulnerable to the impact of depression, holds promise as a time when traditional obstacles to identification and treatment are removed, or at least reduced.

**IPV, Depression, and Poverty**

Despite the heightened rates and negative consequences of IPV, depression, and poverty among perinatal women as well as their well-documented co-occurrence, no studies to date have examined their interrelationship during pregnancy and postpartum. This is an important gap to address, not just to avoid potential harm among vulnerable individuals, but to take full advantage of the public and health resources targeting this period and these populations.

**Perinatal Services and Systems**

Currently, screening for psychosocial risk among perinatal women is lodged within obstetric clinics, which also serve as the primary conduit to community resources
and treatment (American Medical Association, 2007). This identification and linkage process is particularly important for low-income women who, through pregnancy-related Medicaid coverage and maternal public health programs, have access to services that are unavailable to them during non-perinatal periods (Adams et al., 2008; Beydoun et al., 2012; Bonomi et al., 2009; Bybee & Sullivan, 2005; Gaynes et al., 2005; Haas et al., 2005; Herman et al., 2008; Kornfeld et al., 2012; Lyon, 2000; Marcus et al., 2011; Medicaid Program, 2005; National Vital Statistics Report, 2012; Pausell et al., 2010; Silverman et al., 2006; Sutherland et al., 1998; Taillieu & Brownridge, 2010; World Health Organization, 2000; Wu et al., 2012). Currently, IPV screening is standard practice during pregnancy and at hospital delivery, and depression screening is recommended throughout pregnancy at the postpartum office visit (American College of Obstetricians and Gynecologists, 2010, 2012). However, if onset or recurrence of IPV and depression occurs beyond these points, there is currently no universal healthcare mechanism for identification and resource referral (Liberto, 2012; Olson et al., 2002; Place & Billings, 2011; World Health Organization, 2005, 2009; Wylie, Hollins Martin, Marland, Martin, & Rankin, 2011). Within pediatric clinics there is mounting recognition that an opportunity and a need exist for maternal psychosocial screening; however, there is no mandate, there is no infrastructure or training, and the mother is not the patient, which limits pediatricians’ ability to refer (Feinberg et al., 2006; Liberto, 2012). Finally, providing services to women identified beyond the early postpartum period faces multiple barriers: Low-income women lose their pregnancy-related health insurance at 6 weeks postpartum; wrap-around public health programs that are available within the first postpartum years, such as Early Head Start, Healthy Families, and Parents As Teachers
are not universally available; and postpartum enrollment in maternal public health programs such as Healthy Babies-Healthy Start, Maternal-Infant Health Program, and Nurse-Family Partnership is uncommon (Joyce, Racine, & Yunzal-Butler, 2008; Marchi et al., 2013; O'Brien et al., 2012; Rosenbach, O’Neil, Cook, Trebino, & Walker Klein, 2009; Yunzal-Butler, Joyce, & Racine, 2010). Thus, documenting the ebb and flow of such harmful conditions as IPV and depression throughout pregnancy and the extended postpartum period lays the foundation for establishing a coordinated response by healthcare, public health, and community agencies.

In sum, IPV and depression during the perinatal period have potential consequences for maternal, fetal, and infant health, not just during pregnancy and postpartum, but far into the future. Conditions of poverty have consistently been found to heighten vulnerability to IPV, to depression, and to their co-occurrence at the same time they inhibit the social, material, and treatment resources to address them. But much of the research into IPV and depression has focused upon low income populations. In order to understand the role played by socioeconomic status in IPV, in depression, and their interplay, research has to include individuals with a range of income levels. Exploring the degree to which IPV and depression may vary depending upon income and depending upon perinatal period has important implications for delivering current resources, developing new interventions and aligning policies with the problems they are designed to address. Understanding the intersection of IPV, depression, and poverty could inform the integration and delivery of existing mental health, safety-related, and economic resources to vulnerable women and infants.
Despite the wealth of research documenting the individual links between these phenomena, important gaps remain regarding their interrelationships with each other: While both IPV and poverty are known to be associated with prevalence and incidence of depression during pregnancy and the early postpartum period, no studies were found that examined depression onset during later months of postpartum and the early childhood stages. Furthermore, no studies were found that teased apart how IPV and poverty may interrelate with each other in their mutual association with postpartum depression. Finally, few studies exist investigating how the type (emotional, physical, sexual) of abuse may vary across perinatality, and the degree to which socioeconomic status may be associated with any variation. This dissertation will examine the interplay of IPV, depression, and socioeconomic status within the perinatal period among women from diverse socioeconomic backgrounds. Each of the three papers below examine a specific aspect of this constellation.

- Paper #1 (Chapter II) will examine the rates and characteristics of depression at four points in time over an extended postpartum period (2 weeks, 2 months, 6 months, and 18 months), and the risk factors associated with differential onset, including IPV and socioeconomic status.
- Paper #2 (Chapter III) will investigate the interrelationship of partner violence and poverty in their association with postpartum depression, testing them as independent confounders, as interacting variables, and as mediating variables.
- The third and final paper (Chapter IV) will examine the occurrence of partner abuse relative to the most recent pregnancy (whether before pregnancy, during pregnancy, during postpartum) and whether type of abuse (emotional,
physical, sexual) fluctuates across these time periods or varies based upon maternal socioeconomic status.

References


Bonomi, A. E., Anderson, M. L., Reid, R. J., Rivara, F. P., Carrell, D., & Thompson, R. S. (2009). Medical and psychosocial diagnoses in women with a history of intimate partner violence. *Archives of Internal Medicine, 169*(18), 1692.


CHAPTER II
POSTPARTUM DEPRESSION: EARLY- AND LATE-ONSET

Introduction

A strong body of evidence has documented increased incidence of depression during the early postpartum period, i.e., the first 3 months after delivery (Cox, Holden, & Sagovsky, 1987; Gaynes et al., 2005; O'Hara, Neunaber, & Zekoski, 1984; Yonkers et al., 2001), an incidence that stems from first-time episodes as well as recurrence among women with prior histories of depression (Banti et al., 2011). Compared to onset during other times, postpartum onset is associated with higher acuity and increased psychiatric hospitalization (Munk-Olsen et al., 2009). Less severe forms of depression during this period also present significant harm, interrupting maternal self-care, infant development and maternal-infant bonding (Beck, Morrow, & Lipscomb, 2002; Campbell & Cohn, 1997; Cohn & Tronick, 1989; J. H. Goodman, 2004). These consequences may reach far into the future, with adverse effects upon both mother and infant—for mother, the risk that depression will develop into a chronic condition and, for infant, the detrimental cognitive and behavioral effects of early neglect that can accompany maternal depression (Felitti et al., 1998; S. H. Goodman & Gotlib, 1999; Turney & Carlson, 2011; Zuckerman et al., 1989).

Addressing Postpartum Depression

Postpartum depression, once identified, has been shown to be particularly responsive to treatment, including psychotropic medication, counseling,
electroconvulsive therapy, and social support (Cohen et al., 2010; L. A. Goodman et al., 2009). The effectiveness of treatment, coupled with greater incidence during early postpartum and potential for long-term damage, has led to widespread depression screening in obstetric practices, public awareness campaigns and the development of treatment resources specific to the maternal population (Centers for Disease Control and Prevention [CDC], 2008; Gaynes et al., 2005; L. A. Goodman et al., 2009; Miller & LaRusso, 2011; Yonkers et al., 2009). Studies of screening within pediatric clinics have also shown promise, but have not been widely adopted due to limited resources, lack of training, and the confidence that maternal health is being addressed within the obstetric setting (Liberto, 2012; Olson et al., 2002; Wylie, Hollins Martin, Marland, Martin, & Rankin, 2011). This is indeed an efficacious approach if, in fact, postpartum depression emerges during the first weeks when women have their postpartum obstetric visits. But there is growing evidence to suggest that this may not always be the case (Areias, Kumar, Barros, & Figueredo, 1996; Banti et al., 2011; Brown & Lumley, 2000; Chaudron et al., 2010; Cooper, Campbell, Day, Kennerley, & Bond, 1988; Georgiopoulis, Bryan, Wollan, & Yawn, 2001; Horowitz & Goodman, 2004; Kornfeld, Bair-Merritt, Frosch, & Solomon, 2012; Leathers, Kelley, & Richman, 1997; Mota, Enns, & Sareen, 2011; Seguin, Potvin, St.-Denis, & Loiselle, 1999; Verkerk, Denollet, VanHeck, VanSon, & Pop, 2005).

A family-practice-clinic study with a socioeconomically diverse sample identified a small group of women (2.9%) who did not screen positive at their 6-week postpartum visit but were diagnosed with depression at later visits in the postpartum year; however, because only a subset of patients returned for these later visits, the accuracy of the late-
onset incidence is unknown (Georgiopoulos et al., 2001). Two other studies, one Italian and one Portuguese, identified new depressive episodes as late as 12 months postpartum; however, both had methodological limitations that precluded incidence calculations (Banti et al., 2011). The remaining late-postpartum depression studies either tracked already-depressed women or examined prevalence without identifying which women were experiencing new episodes of depression (Areias et al., 1996; Brown & Lumley, 2000; Chaudron et al., 2010; Cooper et al., 1988; Horowitz & Goodman, 2004; Kornfeld et al., 2012; Leathers et al., 1997; Mota et al., 2011; Seguin et al., 1999; Verkerk et al., 2005). Taken together, these findings suggest depression onset continues to occur well into the first postpartum year, but the conclusions are tentative and are missing important information regarding the nature of late-onset compared to early-onset depression.

**Postpartum Depression Compared to Depression Among Women in the General Population**

Aside from increased onset during early postpartum, there have been mixed findings regarding whether postpartum depression is different in other ways from non-perinatal depression (Affonso, Lovett, & Paul, 1990; Berle, Aarre, Mykletun, Dahl, & Holsten, 2003; Cox, Murray, & Chapman, 1993; Gavin, 2005; Matther, Barnett, & Howie, 2003; Miller & LaRusso, 2011; O'Hara, Zekoski, Philipps, & Wright, 1990). A meta-analysis by Gaynes et al. (2005) found that between 5.5% and 12.9% of women met criteria for major depressive disorder at various points in time over the early postpartum months, but that the combined period prevalence for this time, 7.1%, was not significantly different from the 6.9% annual period prevalence of women in the general population (Kessler, 2003; Kessler et al., 2007). No studies were found that reported on depression length during perinatality, but in light of the higher incidence amidst
comparable period-prevalence rates, it may be that depressive episodes are briefer during this period compared to other times; women in the general population report average duration of 23 weeks per depression episode (CDC, 2008; Hasin, Goodwin, Stinson, & Grant, 2005). It may also be that depression during the perinatal period is higher at the milder end of the spectrum: A case-control study comparing perinatal women with non-perinatal women found that, while prevalence rates are the same for major depression (that associated with a diagnosis of Major Depressive Disorder, MDD), when minor depression is included (depressive symptoms not reaching the level of MDD), rates are higher for postpartum women (Major only: 4.4% postpartum and 3.4% non; Major/Minor: 10.4% postpartum and 7.8% non) (O'Hara et al., 1990). Just as the course of depression during postpartum may have unique features, so may the risk factors.

Research into depression among women in general has identified several causal pathways, including biological (hormonal fluctuations, dysfunctional stress regulation), psychological (depression history, adverse childhood experiences), and life stressors (domestic violence, poverty, social isolation) (Corwin, Kohen, Jarrett, & Stafford, 2010; Felitti et al., 1998; S. H. Goodman & Gotlib, 1999; Miller & LaRusso, 2011; Wylie et al., 2011). National surveillance studies confirm these are risk factors for postpartum depression as well, and point to adolescence, poverty, prenatal physical abuse, and traumatic stress as important triggers (CDC, 2008). Low socioeconomic status, as indicated by Medicaid insurance, is thought to contribute to mental distress and depression through adverse living conditions such as unstable housing, food insecurity, intermittent employment, inadequate social support, and vulnerability to crime (Bybee & Sullivan, 2005; CDC, 2008; Farmer & Tiefenthaler, 2003; L. A. Goodman et al., 2009a;
Partner abuse and its attendant trauma, in addition to trauma associated with other serious life events, have been consistently tied to postpartum depression, associated with double and even triple the rates (Bonomi et al., 2009; Golding, 1999; Kessler, 2003; Kessler et al., 2007; Kornfeld et al., 2012).

While many of the same socioeconomic and psychosocial risk factors have been documented for postpartum depression as for depression among non-postpartum women, because the bulk of postpartum research has occurred during the first months after delivery, it is unknown whether the same is true of late-onset depression. A study by Verkerk et al. (2003), while not tied to onset per se, indicated that Dutch women depressed at 12 months postpartum had different personality traits and depression histories than women depressed at 3 months postpartum, suggesting the possibility of differential risk factors between early-onset and late-onset women.

In sum, while there is a strong body of evidence documenting increased incidence of depression during the early postpartum period, less is known about the onset of depression throughout the extended postpartum period, including whether there are differential risk factors associated with later onset. Given the far-reaching consequences of untreated postpartum depression and the availability of effective treatments, this is an important gap to address. This study will examine the onset and course of depression over an extended postpartum period (up through 18 months), and the risk factors associated with differential onset.
Research Questions

The research questions addressed in paper #1, *Postpartum Depression: Early- and Late-Onset*, will be:

1. In a community representative sample of postpartum women, what are the characteristics of depression (range of severity, anxiety sub-scale, suicidality, prevalence and incidence of minor and major depression) at four points in time over the first 18 months after delivery?

2. What are the depression characteristics distinguishing early-onset (first 2 months after delivery) from late-onset depression (6 to 18 months after delivery)?

   a. In a sub-analysis, what maternal demographic and psychosocial factors are associated with onset of depression, comparing three groups of women with each other: women with no depression at any point in the study, women with early-onset depression, and women with late-onset depression?

Materials and Methods

Design

The design was a secondary analysis of data that were originally collected in a prospective longitudinal telephone survey study of postpartum women spanning the 18 months after delivery, with supplemental demographic and maternal health information gathered from medical records. Three hundred and thirty-two women were recruited from the two delivery hospitals in Kalamazoo, Michigan, during their postpartum stay between October 2002 and May 2003. Women who met the following eligibility criteria
and were available during the late-morning hours that study researchers were on the floor were approached for study participation: (1) maternal residence in Kalamazoo County, (2) medical clearance by hospital nursing staff, (3) infant not being adopted, and (4) maternal fluency in either English or Spanish. Four hundred and ninety-one women were approached, and 340 were consented for study participation. Of the 340 consented participants, 8 withdrew from the study, citing lack of time, for a recruited sample of 332. Seventy-five women were subsequently lost to study follow-up, and 8 women had only a single completed survey, resulting in a final study sample of 249 women. The timing of the four phone survey interviews was:

- 2 weeks postpartum (Time 1),
- 2 months postpartum (Time 2),
- 6 months postpartum (Time 3), and
- 18 months postpartum (Time 4)

The 249 women completing at least one survey in the early period (Time 1 or Time 2) and one survey in the late period (Time 3 or Time 4) comprised the final study sample. However, within each of the surveys, not all women were reached during the targeted time frame. Eliminating the surveys outside of each time period resulted in 237 Time 1 surveys completed between 1 and 5 weeks postpartum, 237 Time 2 surveys completed between 1.5 and 5 months postpartum, 239 Time 3 surveys completed between 6 and 13 months postpartum, and 249 Time 4 surveys completed between 17 and 27 months postpartum.
Data Collection

Participants were screened for depression at each interview using the Edinburgh Postnatal Depression Scale (EPDS) (Cox et al., 1987), a widely validated screener that has been tested in diverse socioeconomic and cultural populations of women (Guedeney & Fermanian, 1998; Lawrie, Hofmeyr, de Jager, & Berk, 1998; Lee et al., 1998). The EPDS is a 10-item scale with 30 possible points, where higher scores indicate greater depression; a score of 12 or above is associated with Major Depressive Disorder, with a specificity of 76% and a sensitivity of 88%, and a score of 10 or above is associated with major or minor depression, with a specificity of 64% and a sensitivity of 80% (Gaynes et al., 2005).

The EPDS, a self-report instrument, was developed specifically to assess postpartum depression, and validated using Goldberg’s Standardized Psychiatric Interview (Cox et al., 1987); as such, it focuses more upon mood-related symptoms than upon somatic symptoms compared to other depression screeners (Gaynes et al., 2005). Each of the 10 items has four potential responses (scored 0 to 3) to capture increasing frequency of symptoms experienced over the prior 7 days. These items are then summed for a total score. Subsequent studies have identified an anxiety subscale within the EPDS, consisting of three items, including “I have blamed myself unnecessarily when things went wrong,” “I have been anxious or worried for no good reason,” and “I have felt scared or panicky for no very good reason” (Ross, Gilbert Evans, Sellers, & Romach, 2003). Additionally, the final item in the scale, “The thought of harming myself has occurred to me,” is consistently differentiated as a separate factor, one associated with suicidality and suicidal ideation (Ross et al., 2003).
Depression severity was represented by the total sum of the EPDS scale. Additionally, as shown in Table 2.1, the following proxy measures were developed to characterize depression: Anxiety was measured by summing each participant’s scores for the three anxiety-related items (“I have blamed myself unnecessarily when things went wrong,” “I have been anxious or worried for no good reason,” and “I have felt scared or panicky for no very good reason”) at each of the four survey points. Prevalence was calculated for each point in time (the percent of participants screening positive in that survey) and for each period (early postpartum [Time 1 and/or Time 2] and late postpartum [Time 3 and/or Time 4]) as well as over the entire study period. Prevalence was reported for both minor and major depression: Minor depression indicated by scores of 10 to 11, and major depression indicated by scores of 12 to 30. At each point in time incidence was operationalized as total incidence (percent of women who were not depressed at a prior survey but who are depressed at the current survey, using major depression criteria of 12+ score). This was further divided into two types: recurrence (percent of new incident women reporting a history of depression or screening depressed in a prior survey) and new onset (percent of new incident women reporting no prior history of depression and for whom this is the first score of the study indicating major depression). Prior history was based upon participants’ response to the survey item, “Have you ever previously suffered from a period of depression that lasted more than a couple of weeks?” Depression onset was determined by the first interview with an EPDS score of 12-plus, and was categorized into an ordinal-level variable representing “no depression onset,” “early depression onset (Time 1 or 2)” and “late depression onset (Time 3 or 4).” So, for example, a woman screening positive at Time 1 would be
considered early-onset and this occurrence would count toward Time 1 incidence. If she 
had no prior history of depression, this would be further categorized as “new incidence;” 
however’ if she had prior history, this would be coded as “recurrent incidence.” If her 
depression abated, as indicated by a negative screen (EPDS under 12) at a subsequent 
survey (Time 2 and/or Time 3), but then resumed (EPDS 12+ at Time 4), then the 
resumption would count toward Time 4 incidence and would be coded as “recurrent,” 
although she would still be considered an early-onset individual.

Table 2.1

*Summary of Depression Measures*

<table>
<thead>
<tr>
<th></th>
<th>Total Period</th>
<th>Early (T1/T2)</th>
<th>Late (T3/T4)</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SEVERITY:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depression (total EPDS score, 10 items)</td>
<td>N.A.</td>
<td>N.A.</td>
<td>N.A.</td>
<td>#</td>
<td>#</td>
<td>#</td>
<td>#</td>
</tr>
<tr>
<td>Anxiety sub-scale (3 items)</td>
<td>N.A.</td>
<td>N.A.</td>
<td>N.A.</td>
<td>#</td>
<td>#</td>
<td>#</td>
<td>#</td>
</tr>
<tr>
<td><strong>PREVALENCE:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minor Depression (% w/ EPDS score of 10-11)</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Major Depression (% w/ EPDS score of 12+)</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
</tbody>
</table>

*Note.* N.A.: Not calculated for this measure

Maternal demographic and psychosocial information was collected through two 
methods: survey responses and medical record abstraction. At the Time 3 survey (6 
months postpartum), participants were asked a variety of health-related questions 
including prenatal smoking, personal history of depression, social support, and 
experiencing trauma as an adult. In addition to the telephone surveys, the prenatal and 
delivery medical records of all participants were reviewed and the following information
abstracted: maternal and infant dates of birth, maternal race, marital status, insurance status, when prenatal care was initiated for current pregnancy, infant birthweight, and maternal psycho-social risk factors (history of substance abuse, history of sexual or physical abuse from a partner). Responses to the survey item regarding adult trauma and medical record notation of partner abuse were combined into a single dichotomous variable.

This study was conducted under the guidance and approval of the Institutional Review Boards of both participating hospitals, Borgess Medical Center and Bronson Methodist Hospital as well as Western Michigan University Human Subjects Institutional Review Board.

Analysis

To assess the representativeness of the study sample, the recruited sample \( (N = 332) \) was compared against the county maternal population on demographic, health, and birth outcome variables, using the Two Proportion test and \( t \) test to assess statistical significance. The 2002 county maternal figures were drawn from the Kalamazoo County Health and Community Services online Health Surveillance Data Book (Kalamazoo County Michigan Health and Community Services Department, 2007). The final study sample \( (N = 249) \) was compared against the 83 individuals with incomplete or no survey data to examine for any loss to follow-up bias.

To examine depression onset, the study sample was stratified into three depression-onset groups (no onset, early-onset, and late-onset) for descriptive analysis. Bivariate comparisons were completed using one-way ANOVA (with Bonferroni correction) for continuous variables and Pearson chi square (with Fisher’s Exact when
expected cell sizes were less than 5) for categorical variables. Bivariate analysis revealed that cell sizes were inadequate to support a multivariate analysis of the maternal demographic and psychosocial predictors of depression onset.

Changes over time were assessed using generalized estimating equation (GEE) regression, which is recommended for use with longitudinal data that may be non-normally correlated (Zeger & Liang, 1986). GEEs can be used to analyze continuous, ordinal or dichotomous outcomes, and is robust to unequal temporal spacing in longitudinal data, such as the structure of this study’s data (Ghisletta & Spini, 2004). Using GEE, temporal effects were estimated for depression scores using a linear model, for prevalence and incidence using a binary logistic model, and for item-specific responses using an ordinal logistic model. All statistical tests were conducted with two-tailed significance levels set at $p \leq .05$. Data analyses were completed using SPSS v21.0.

**Results**

**Study Sample**

As seen in Table 2.2, the recruited study sample reflected the county maternal population on the demographic factors of age, race, and marital status at time of delivery and on the health-related factors of prenatal care onset and prenatal smoking rate. However, compared to the county population, the study sample had significantly fewer Medicaid-paid births and low birthweight infants.
Table 2.2

Comparing Maternal and Birth Outcomes of Study Sample with Kalamazoo County, Michigan, 2002 Birth Population

<table>
<thead>
<tr>
<th></th>
<th>2002 County Maternal Population $^a$ (3,048)</th>
<th>Recruited Study Sample (332)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal Demographics</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Age = mean (stand. dev.)      | 27.5 (5.9)                                  | 28.0 (5.7)                    | .423  
| Race                          |                                             |                               | .383  
| White                         | 80.6%                                       | 78.6%                         |  
| Black                         | 16.1%                                       | 18.4%                         |  
| Other                         | 3.3%                                        | 3.0%                          |  
| Marital Status                |                                             |                               | .914  
| Married                       | 64.5%                                       | 64.8%                         |  
| Single                        | 35.5%                                       | 35.2%                         |  
| Medicaid-Paid Delivery        | 37.2%                                       | 30.1%                         | .011  
| Maternal Health Characteristics|                                             |                               |  
| Trimester Initiated Prenatal Care|                                           |                               |  
| 1$^{st}$ Trimester            | 86.9%                                       | 84.9%                         | .308  
| 2$^{nd}$ Trimester            | 10.8%                                       | 11.4%                         |  
| 3$^{rd}$ Trimester            | 1.3%                                        | 2.4%                          |  
| No Prenatal Care              | 1.0%                                        | 1.2%                          |  
| Prenatal Smoking              | 16.7%                                       | 16.6%                         | .963  
| Birth Outcome $^b$            |                                             |                               |  
| Adequate birthweight (2500 grms +) | 93.5%                                       | 96.4%                         | .038  
| Low birthweight (1500-2499 grms) | 5.5%                                        | 3.3%                          |  
| Very low birthweight (< 1500 grms) | 1.0%                                        | 0.3%                          |  

$^a$ Michigan Department of Community Health, Division for Vital Records and Health Data Development, Live Birth File and Death File.

$^b$ Single gestation only.

The 83 recruited individuals who were lost to follow-up between the time of recruitment and the fourth survey were significantly different from the final sample on several maternal demographic and health-related factors, including prenatal smoking.
(24.1% smoking among lost vs. 14.1% among final, \( p = .033 \)), age (mean age of 24.9 among lost vs. 29.0 among final, \( p < .001 \)), race (36.1% minority among lost vs. 16.5% among final, \( p = .002 \)), marital status (49.4% married among lost vs. 69.9% married among final, \( p = .001 \)), Medicaid-paid delivery (49.4% among lost vs. 23.7% among final, \( p < .001 \)), and prenatal care (71.1% first trimester onset among lost vs. 89.6% among final, \( p < .001 \)). The two groups were similar on infant birthweight.

**Depression Scores**

As shown in the boxplots and statistics of Figure 2.1, there was a trend for EPDS scores to be highest at Time 1 (2 weeks postpartum), lower at Times 2 and 3 (2 months and 6 months postpartum) and increasing at Time 4 (18 months postpartum). A GEE regression of this relationship, reported in Table 2.3, demonstrates the statistical significance of this temporal trend; the overall temporal effect has a Wald chi square of 33.976 (\( p < .001 \)). At each of the time periods, depression scores were non-normally distributed, with Komogorov-Smirnov statistics of Time 1 = .137 \( p < .001 \), Time 2 = .150 \( p < .001 \), Time 3 = .157 \( p < .001 \), and Time 4 = .161 \( p < .001 \). The positively skewed scores depicted large number of scores at the low end of the scale and scattered outliers at the high end. The outliers were consistent across time points, however, and none of them exerted undue influence on the regression model as measured by Cook’s distance statistic (for which the largest value was 0.04, far below the problem threshold of 1.0) (Cook & Weisberg, 1982).
### Depression Scores at Each Survey Time

<table>
<thead>
<tr>
<th>Time</th>
<th>Mean (SD)</th>
<th>Range</th>
<th>25%</th>
<th>50%</th>
<th>75%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1 (2 wks)</td>
<td>5.5 (4.2)</td>
<td>0.24</td>
<td>2.0</td>
<td>5.0</td>
<td>7.0</td>
</tr>
<tr>
<td>Time 2 (2 months)</td>
<td>4.3 (4.0)</td>
<td>0.26</td>
<td>1.0</td>
<td>4.0</td>
<td>6.0</td>
</tr>
<tr>
<td>Time 3 (6 months)</td>
<td>4.2 (4.2)</td>
<td>0.25</td>
<td>1.0</td>
<td>3.0</td>
<td>6.0</td>
</tr>
<tr>
<td>Time 4 (18 months)</td>
<td>4.9 (4.5)</td>
<td>0.27</td>
<td>2.0</td>
<td>4.0</td>
<td>7.0</td>
</tr>
</tbody>
</table>

---

**Figure 2.1.** EPDS depression scores.

**Table 2.3**

*Generalized Estimating Equation (GEE) Model of Depression Over Time*

<table>
<thead>
<tr>
<th></th>
<th>β</th>
<th>Lower</th>
<th>Upper</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>5.51</td>
<td>4.38</td>
<td>5.48</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Time 1, 2 weeks</td>
<td>0.58</td>
<td>0.04</td>
<td>1.11</td>
<td>.035</td>
</tr>
<tr>
<td>Time 2, 2 months</td>
<td>−0.60</td>
<td>−1.10</td>
<td>−0.10</td>
<td>.018</td>
</tr>
<tr>
<td>Time 3, 6 months</td>
<td>−0.69</td>
<td>−1.17</td>
<td>−0.21</td>
<td>.005</td>
</tr>
<tr>
<td>Time 4, 18 months</td>
<td>ref</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
An analysis of the anxiety subscale also revealed significant differences across the four surveys (Wald chi square 26.191, \( p < .001 \)) as well as between the early and late periods (Wald chi square 4.105, \( p = .043 \)), with heightened anxiety in the early period, particularly at the 2-week mark (average anxiety subscale scores at 2.7 Time 1, 2.1 at Time 2, 2.1 at Time 3, and 2.4 at Time 4).

**Depression Prevalence and Incidence**

As seen in Tables 2.4 and 2.5, while depression scores varied significantly across time, the prevalence rates of women screening above the depression thresholds did not (12+ points for major depression and 10-11 points for minor depression). Early and late prevalence figures for minor depression (8.0% and 4.4%, respectively) were not statistically significant \( (p = .063) \). Despite the lack of significant variation across time, the movement of individual women in and out of depression was substantial. Of the 37 women (14.9%) with major depression at any point in time, only a third (13 of 37, 35.1%) screened depressed during both the early and the late period, and only two (5.4% of 37) screened depressed at all four time periods.

This movement is illustrated in Tables 2.4 and 2.5, which show that new cases (incidence) of depression are similar between the early and late periods, with peaks at 2 weeks and 18 months postpartum (Time 1 and Time 4 surveys). Within the early period, the 2-week and 2-month incidence figures were statistically different from each other (6.8% and 2.6%; Wald chi square 4.246, \( p = .039 \)), while within the late period, differences between the 6-month and 18-month incidence rates were not statistically significant (2.7% and 6.0%; Wald chi square 2.859, \( p = .091 \)). Across the full study period, type of incidence was split equally between new onset and recurrence. The
variance of incidence type between the survey times or the early-late time periods did not reach statistical significance.

Table 2.4

Depression Characteristics at Each Survey and Time Period, and Across the Full Study

<table>
<thead>
<tr>
<th></th>
<th>Time 1 (2 wks)</th>
<th>Time 2 (2 mos)</th>
<th>Early Period a (n = 249)</th>
<th>Time 3 (6 mos)</th>
<th>Time 4 (18 mos)</th>
<th>Late Period a (n = 249)</th>
<th>Full Study Period a (n = 249)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevalence:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minor</td>
<td>5.5%</td>
<td>5.1%</td>
<td>8.0%</td>
<td>3.3%</td>
<td>4.0%</td>
<td>4.4%</td>
<td>9.2%</td>
</tr>
<tr>
<td>Major</td>
<td>6.8%</td>
<td>5.5%</td>
<td>8.8%</td>
<td>5.9%</td>
<td>8.4%</td>
<td>11.2%</td>
<td>14.9%</td>
</tr>
<tr>
<td>Minor &amp; Major</td>
<td>12.2%</td>
<td>10.5%</td>
<td>16.9%</td>
<td>9.2%</td>
<td>12.4%</td>
<td>15.7%</td>
<td>24.1%</td>
</tr>
<tr>
<td>Incidence–Major:b</td>
<td>(237)</td>
<td>(232)</td>
<td>(249)</td>
<td>(225)</td>
<td>(235)</td>
<td>(241)</td>
<td>(249)</td>
</tr>
<tr>
<td>Total</td>
<td>6.8% (16)</td>
<td>2.6% (6)</td>
<td>8.8% (22)</td>
<td>2.7% (6)</td>
<td>6.0% (14)</td>
<td>8.3% (20)</td>
<td>14.9% (37)</td>
</tr>
<tr>
<td>Recurrence</td>
<td>56.3% (9)</td>
<td>16.7% (1)</td>
<td>45.5% (10)</td>
<td>83.3% (5)</td>
<td>50.0% (7)</td>
<td>60.0% (12)</td>
<td>45.9% (17)</td>
</tr>
<tr>
<td>New Onset</td>
<td>43.8% (7)</td>
<td>83.3% (5)</td>
<td>54.5% (12)</td>
<td>16.7% (1)</td>
<td>50.0% (7)</td>
<td>40.0% (8)</td>
<td>54.1% (20)</td>
</tr>
</tbody>
</table>

a Prevalence and Incidence figures are cumulative; individuals are only counted once.
b Incidence is calculated at each period for those exposed.

Table 2.5

GEE Models of Depression Characteristics Over Time

<table>
<thead>
<tr>
<th></th>
<th>Time 1 to Time 4 (n = 237)</th>
<th>Early to Late Period (n = 249)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Wald chi square</td>
<td>df</td>
</tr>
<tr>
<td>Prevalence:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minor</td>
<td>1.93</td>
<td>3</td>
</tr>
<tr>
<td>Major</td>
<td>2.42</td>
<td>3</td>
</tr>
<tr>
<td>Minor &amp; Major</td>
<td>3.21</td>
<td>3</td>
</tr>
<tr>
<td>Incidence Major:</td>
<td>7.11</td>
<td>3</td>
</tr>
<tr>
<td>Type (recur./new)</td>
<td>4.43</td>
<td>3</td>
</tr>
</tbody>
</table>
Of the 249 final sample women, 29 (11.6%) had delivered another child over the course of the full study and 35 (14.1%) were pregnant at the time of the final survey. Neither having another child nor pregnancy was significantly associated with variations in depression scores or depression characteristics across the different time periods.

**EPDS Items**

The EPDS-item analysis in Table 2.6 further illustrates the over-time variation experienced by these postpartum women. In 9 of the 10 items (all except the self-harm item) responses varied statistically significantly across the four survey times. Time 1 (2 week) responses consistently revealed the highest levels of distress. From there, the most common pattern was for significant improvement between Time 1 and Time 2 (2 months) that then remained constant for Times 3 (6 months) and 4 (18 months). This pattern is seen for the following items:

- “I have been able to laugh and see the funny side of things”
- “I have looked forward with enjoyment to things”
- “I have been anxious or worried for no good reason”
- “I have felt scared or panicky for no very good reason”
- “Things have been getting on top of me”
- “I have been so unhappy that I have been crying”

The item “I have been so unhappy that I have had difficulty sleeping” had the same general pattern as above, except that significant improvement was not seen until Time 3 (6 months). Notable is that roughly 5% of women screened positive for the self-harm item at each survey. Just as women appear to be moving in and out of depression, they appear to be moving in and out of self-harm feelings, as different sets of women endorsed
Table 2.6

Responses for Each EPDS Item at Each Survey

<table>
<thead>
<tr>
<th>Item</th>
<th>Percent of Respondents</th>
<th>Time 1 (n = 237)</th>
<th>Time 2 (n = 237)</th>
<th>Time 3 (n = 239)</th>
<th>Time 4 (n = 249)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. + I have been able to laugh and see the funny side of things</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&lt;.001</td>
</tr>
<tr>
<td>(0) As much as I always could</td>
<td>77.6%</td>
<td>88.6%</td>
<td>91.6%</td>
<td>89.6%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1) Not quite so much now</td>
<td>18.6%</td>
<td>9.3%</td>
<td>6.7%</td>
<td>7.6%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) Definitely not so much now</td>
<td>3.4%</td>
<td>1.3%</td>
<td>1.3%</td>
<td>2.4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3) Not at all</td>
<td>0.4%</td>
<td>0.8%</td>
<td>0.4%</td>
<td>0.4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. + I have looked forward with enjoyment to things</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.003</td>
</tr>
<tr>
<td>(0) As much as I ever did</td>
<td>75.9%</td>
<td>83.1%</td>
<td>87.9%</td>
<td>85.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1) Rather less than I used to</td>
<td>21.9%</td>
<td>13.9%</td>
<td>9.2%</td>
<td>11.6%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) Definitely less than I used to</td>
<td>0.8%</td>
<td>2.1%</td>
<td>2.1%</td>
<td>1.2%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3) Hardly at all</td>
<td>1.3%</td>
<td>0.8%</td>
<td>0.8%</td>
<td>2.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. ^ I have blamed myself unnecessarily when things went wrong</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.021</td>
</tr>
<tr>
<td>(3) Yes, most of the time</td>
<td>3.0%</td>
<td>2.1%</td>
<td>3.8%</td>
<td>2.8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) Yes, some of the time</td>
<td>27.4%</td>
<td>21.9%</td>
<td>21.3%</td>
<td>20.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1) Not very often</td>
<td>41.8%</td>
<td>40.5%</td>
<td>41.8%</td>
<td>53.8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(0) No, never</td>
<td>27.8%</td>
<td>35.4%</td>
<td>33.1%</td>
<td>22.9%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. ^ I have been anxious or worried for no good reason</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&lt;.001</td>
</tr>
<tr>
<td>(0) No, not at all</td>
<td>32.5%</td>
<td>46.5%</td>
<td>51.0%</td>
<td>40.2%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1) Hardly ever</td>
<td>29.1%</td>
<td>24.5%</td>
<td>26.4%</td>
<td>30.9%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) Yes, sometimes</td>
<td>34.6%</td>
<td>26.2%</td>
<td>20.1%</td>
<td>24.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3) Yes, very often</td>
<td>3.8%</td>
<td>3.0%</td>
<td>2.5%</td>
<td>4.4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. ^ I have felt scared or panicky for no very good reason</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.042</td>
</tr>
<tr>
<td>(3) Yes, quite a lot</td>
<td>1.3%</td>
<td>0.8%</td>
<td>1.3%</td>
<td>1.2%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) Yes, sometimes</td>
<td>11.0%</td>
<td>6.3%</td>
<td>5.9%</td>
<td>8.4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1) No, not much</td>
<td>22.4%</td>
<td>19.0%</td>
<td>20.1%</td>
<td>17.7%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(0) No, not at all</td>
<td>65.4%</td>
<td>73.8%</td>
<td>72.8%</td>
<td>72.7%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 2.6—Continued

```
<table>
<thead>
<tr>
<th>Time 1 (2 weeks)</th>
<th>Time 2 (2 months)</th>
<th>Time 3 (6 months)</th>
<th>Time 4 (18 months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent of Respondents</td>
<td>(n = 237)</td>
<td>(n = 237)</td>
<td>(n = 239)</td>
</tr>
<tr>
<td>6. Things have been getting on top of me</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3) - Yes, most of the time I haven’t been able to cope at all</td>
<td>1.3%</td>
<td>2.1%</td>
<td>1.3%</td>
</tr>
<tr>
<td>(2) - Yes, sometimes I haven’t been coping as well as usual</td>
<td>13.9%</td>
<td>11.8%</td>
<td>10.9%</td>
</tr>
<tr>
<td>(1) - No, most of the time I have coped quite well</td>
<td>52.7%</td>
<td>43.5%</td>
<td>46.4%</td>
</tr>
<tr>
<td>(0) - No, I have been coping as well as ever</td>
<td>32.1%</td>
<td>42.6%</td>
<td>41.4%</td>
</tr>
<tr>
<td>7. I have been so unhappy that I have had difficulty sleeping</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3) - Yes, most of the time</td>
<td>2.1%</td>
<td>1.7%</td>
<td>3.3%</td>
</tr>
<tr>
<td>(2) - Yes, quite often</td>
<td>5.1%</td>
<td>4.2%</td>
<td>4.2%</td>
</tr>
<tr>
<td>(1) - Not very often</td>
<td>11.4%</td>
<td>11.4%</td>
<td>18.4%</td>
</tr>
<tr>
<td>(0) - No, not at all</td>
<td>81.4%</td>
<td>82.7%</td>
<td>74.1%</td>
</tr>
<tr>
<td>8. I have felt sad or miserable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3) - Yes, most of the time</td>
<td>2.1%</td>
<td>1.7%</td>
<td>1.3%</td>
</tr>
<tr>
<td>(2) - Yes, quite often</td>
<td>5.9%</td>
<td>4.6%</td>
<td>4.6%</td>
</tr>
<tr>
<td>(1) - Not very often</td>
<td>38.0%</td>
<td>29.1%</td>
<td>32.2%</td>
</tr>
<tr>
<td>(0) - No, not at all</td>
<td>54.0%</td>
<td>64.6%</td>
<td>61.9%</td>
</tr>
<tr>
<td>9. I have been so unhappy that I have been crying</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3) - Yes, most of the time</td>
<td>1.7%</td>
<td>0.4%</td>
<td>0.4%</td>
</tr>
<tr>
<td>(2) - Yes, quite often</td>
<td>3.0%</td>
<td>4.6%</td>
<td>2.1%</td>
</tr>
<tr>
<td>(1) - Only occasionally</td>
<td>48.9%</td>
<td>27.8%</td>
<td>27.6%</td>
</tr>
<tr>
<td>(0) - No, never</td>
<td>46.4%</td>
<td>67.1%</td>
<td>69.9%</td>
</tr>
<tr>
<td>10. The thought of harming myself has occurred to me</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3) - Yes, quite often</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>(2) - Sometimes</td>
<td>0.4%</td>
<td>1.3%</td>
<td>1.3%</td>
</tr>
<tr>
<td>(1) - Hardly ever</td>
<td>4.2%</td>
<td>3.4%</td>
<td>2.9%</td>
</tr>
<tr>
<td>(0) - Never</td>
<td>95.4%</td>
<td>95.4%</td>
<td>95.8%</td>
</tr>
</tbody>
</table>
```

+. indicates a positively worded item. (EPDS value)
^ An item in the Anxiety sub-scale
this item at different time periods. For instance, of the 11 women indicating that “The thought of harming my self has occurred to me in the last seven days” either “sometimes” or “hardly ever,” five continued to endorse this at Time 2, four at Time 3 and two at Time 4. At Time 2, in addition to the original five, six different women endorsed the self-harm item. In Time 3, four new women answered positively, and in Time 4 six new women answered positively.

Finally, in a temporal pattern reminiscent of the overall EPDS score and incidence patterns, the following two items illustrated high distress at Time 1 (2 weeks), followed by significantly lower distress in Times 2 (2 months) and Time 3 (6 months), with a return to high distress levels in Time 4 (18 months):

- “I have blamed myself unnecessarily when things went wrong”
- “I have felt sad or miserable”

Once again, the women contributing to the high levels at Time 4 are largely different from those at Time 1. Of the 58 women endorsing “blame” at Time 4, only 33 scored this positively at Time 1. Similarly, of the 19 women endorsing “sad” at Time 4, only 5 had positive scores at Time 1.

**Depression Onset**

As demonstrated in Figures 2.2 and 2.3 below, depression scores for the three onset groups vary significantly from each other overall ($F$ 214.423, $p < .001$); however, the difference between the early and late-onset group scores was not statistically significant. Considering each individual’s highest score across the four surveys, the early-onset group’s mean highest score was 17.4 compared to 15.1 in the late-onset group ($F$ 3.612, $p = .066$).
Note. These scores represent the highest score for each individual.

Figure 2.2. EPDS depression scores by onset category.

Figure 2.3 further illustrates the interaction between onset category and depression pattern. The early-onset group displays little fluctuation, with high depression scores at each point in time. By definition, the late-onset group has scores that are lower than the early-onset group during the first postpartum months. What is notable is that, during this early period, the late-onset group’s scores are indistinguishable from the no-depression group, and that once they cross the depression threshold at the later surveys, they rise to levels as high as the early-onset group (Wald chi square for interaction effect between onset group × time 92.437, $p < .001$). The no-depression group has mean scores
of 4.5, 3.3, 3.2, 3.7 compared to the early-onset group mean scores of 14.4, 13.2, 10.3, 10.7 and the late-onset mean scores of 6.5, 6.0, 10.2, 13.9.

**Figure 2.3.** Line chart of EPDS depression scores at each survey time by onset category.

Despite their depression score differences, women in the early and late-onset categories have similar histories of depression (45.5% previous depression among early-onset and 53.8% among late-onset, \( p = .631 \)) as well as similar levels on the anxiety subscale (highest mean anxiety subscale 6.3 for early-onset and 6.5 for late-onset, \( p = .757 \)).

Further GEE modeling of the predictor “time” upon depression score in a set of regression equations stratified by onset category demonstrated that the overall temporal pattern of EPDS score peaking at Time 1 and Time 4 was stable regardless of depression onset: Among the no-onset group, Wald chi square is 47.73, \( p < .001 \); among the early-
onset group, Wald chi square is 13.29, \( p = .004 \); among the late-onset group, Wald chi square is 40.984, \( p < .001 \).

**EPDS Items by Onset**

The model effects seen in Table 2.7 illustrate details underlying the pattern above. Keeping in mind that the very definition of the early and late-onset groups implies an onset-by-time interaction, closer examination of the three largest interaction effects reveals important differences between the two groups: At their respective heights, more of the early-onset women report pervasive sadness (e.g., responding “I have been so unhappy that I have crying . . . yes, most of the time”) than late-onset women (19.0% early vs. 6.7% late), while more of the late-onset women report “I have been anxious or worried for no good reason . . . yes, very often” (23.8% early vs. 53.3% late). Equally high numbers of early and late women reported “Things have been getting on top of me . . . yes, most of the time,” albeit at different time points (14.3% early and 15.4% late).

The significant main effect of survey-time for the “blame” item and the “difficulty sleeping” item indicate that early and late-onset depressed women alike experienced heightened distress regarding these two areas at similar points in time. The four items with significant main effects for onset demonstrate how these two onset groups were different from the beginning, with the early-onset group reporting greater degrees of sadness and self-blame.
Table 2.7

**GEE Models of EPDS Items by Onset Group and Survey Time**

<table>
<thead>
<tr>
<th></th>
<th>Wald Chi Square</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Main Effects</td>
</tr>
<tr>
<td></td>
<td>Early vs. Late Onset (df = 1)</td>
</tr>
<tr>
<td>I have been able to laugh and see the funny side of things</td>
<td>2.27</td>
</tr>
<tr>
<td>I have looked forward with enjoyment to things</td>
<td>0.38</td>
</tr>
<tr>
<td>I have blamed myself unnecessarily when things went wrong</td>
<td>5.88**</td>
</tr>
<tr>
<td>I have been anxious or worried for no good reason</td>
<td>0.13</td>
</tr>
<tr>
<td>I have felt scared or panicky for no very good reason</td>
<td>0.51</td>
</tr>
<tr>
<td>Things have been getting on top of me</td>
<td>0.26</td>
</tr>
<tr>
<td>I have been so unhappy that I have had difficulty sleeping</td>
<td>5.73**</td>
</tr>
<tr>
<td>I have felt sad or miserable</td>
<td>15.75***</td>
</tr>
<tr>
<td>I have been so unhappy that I have crying</td>
<td>6.42**</td>
</tr>
<tr>
<td>The thought of harming myself has occurred to me</td>
<td>Model did not converge</td>
</tr>
</tbody>
</table>

*p ≤ .10. **p ≤ .05. ***p ≤ .001

**Psychosocial Characteristics of Depression-Onset Groups**

Table 2.8 demonstrates significant differences between the no-depression-onset group and each of the two onset groups across all measured maternal demographic, psychosocial and health characteristics. Although bivariate comparisons show no
## Table 2.8

**Comparison of Depression Onset Groups by Demographic and Psychosocial Factors**

<table>
<thead>
<tr>
<th>Onset Category</th>
<th>No Onset (212)</th>
<th>Early Onset (22)</th>
<th>Late Onset (15)</th>
<th>$p$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Demographics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low SES (Medicaid-paid birth)</td>
<td>20.8%</td>
<td>45.5%</td>
<td>0.009</td>
<td>33.3%</td>
<td>0.326</td>
</tr>
<tr>
<td>Adolescent</td>
<td>3.3%</td>
<td>18.2%</td>
<td>0.013</td>
<td>0</td>
<td>1.00</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>87.7%</td>
<td>59.1%</td>
<td></td>
<td>60.0%</td>
<td>0.002</td>
</tr>
<tr>
<td>Black</td>
<td>10.8%</td>
<td>36.4%</td>
<td></td>
<td>20.0%</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>1.4%</td>
<td>4.5%</td>
<td></td>
<td>20.0%</td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>75.0%</td>
<td>36.4%</td>
<td>&lt;.001</td>
<td>46.7%</td>
<td>0.030</td>
</tr>
<tr>
<td><strong>Psychosocial</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Previous History of Depression</td>
<td>25.2%</td>
<td>45.5%</td>
<td>0.049</td>
<td>53.8%</td>
<td>0.046</td>
</tr>
<tr>
<td>Adult Trauma History</td>
<td>7.5%</td>
<td>27.3%</td>
<td>0.009</td>
<td>40.0%</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Supportive Family/Friends</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.00</td>
</tr>
<tr>
<td>Very/Somewhat Helpful</td>
<td>99.0%</td>
<td>81.8%</td>
<td></td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Not Very/Not at All Helpful</td>
<td>1.0%</td>
<td>18.2%</td>
<td></td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Supportive Partner</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.010</td>
</tr>
<tr>
<td>Very/Somewhat Helpful</td>
<td>89.8%</td>
<td>72.7%</td>
<td></td>
<td>38.5%</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Not Very/Not at All Helpful</td>
<td>0.5%</td>
<td>9.1%</td>
<td></td>
<td>15.4%</td>
<td></td>
</tr>
<tr>
<td>No Current Partner</td>
<td>9.7%</td>
<td>18.2%</td>
<td></td>
<td>46.2%</td>
<td></td>
</tr>
<tr>
<td>Housing Problems</td>
<td>2.4%</td>
<td>27.3%</td>
<td>&lt;.001</td>
<td>0</td>
<td>1.00</td>
</tr>
<tr>
<td><strong>Maternal Health</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prenatal smoking</td>
<td>4.3%</td>
<td>27.3%</td>
<td>0.001</td>
<td>20.0%</td>
<td>0.036</td>
</tr>
<tr>
<td>Prenatal drugs noted</td>
<td>0</td>
<td>13.6%</td>
<td>0.001</td>
<td>13.3%</td>
<td>0.004</td>
</tr>
<tr>
<td>Trimester Initiated Prenatal Care</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.003</td>
</tr>
<tr>
<td>1st Trimester</td>
<td>91.5%</td>
<td>72.7%</td>
<td></td>
<td>86.7%</td>
<td></td>
</tr>
<tr>
<td>2nd Trimester</td>
<td>8.0%</td>
<td>18.2%</td>
<td></td>
<td>6.7%</td>
<td></td>
</tr>
<tr>
<td>3rd Trimester</td>
<td>0.5%</td>
<td>0</td>
<td></td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>No Prenatal Care</td>
<td>0</td>
<td>9.1%</td>
<td></td>
<td>6.7%</td>
<td></td>
</tr>
<tr>
<td>Birthweight</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.100</td>
</tr>
<tr>
<td>Adequate birthwt (2500 grms +)</td>
<td>98.1%</td>
<td>90.9%</td>
<td></td>
<td>86.7%</td>
<td></td>
</tr>
<tr>
<td>Low birthweight (1500-2499 grms)</td>
<td>1.9%</td>
<td>9.1%</td>
<td></td>
<td>13.3%</td>
<td></td>
</tr>
</tbody>
</table>
significant differences between early and late onset groups, both of the two onset groups varied significantly from the no-depression group on race, marital status, previous history of depression, adult trauma history, having a supportive partner, prenatal smoking, and noted history of prenatal substance use. Additionally, compared to the no-depression group, the early onset group had unique differences regarding socioeconomic status, adolescence, less supportive family/friends, housing problems, and late entry into prenatal care. In contrast, the late-onset group was uniquely different from the no-depression group on a single characteristic, delivering low birthweight infants.

**Discussion**

**Late-Onset Depression**

One of the hallmarks of postpartum depression has been its increased onset during the early months (Cox et al., 1987; Gaynes et al., 2005; O'Hara et al., 1984; Yonkers et al., 2001). This study is the first to document a second onset peak much later, at 18 months postpartum, a peak that reflects the emergence of a new set of women experiencing onset of depression as well as a general trend of increased depression among all women at this point in time. Prior studies have documented high depression prevalence well into the toddler years, but as they were either cross-sectional studies or longitudinal studies that tracked only the women who had screened depressed earlier, they did not assess a general population of postpartum women over time (Chaudron et al., 2010; Horowitz & Goodman, 2004; Kornfeld et al., 2012; Mota et al., 2011; Zelkowitz & Milet, 2001). The current study’s findings that the sample as a whole experienced an increase at 18 months suggests that this may be part of the normal course of late postpartum life. While for most women, this increase was not substantial and did
not cross the depression threshold, this study also documented a group of late-onset women for whom the later postpartum period marked the beginning of a significant episode of depression. Among the study’s community representative sample, 6.8% screened positive for depression at 2 weeks postpartum, with only a few additional women screening positive until the 18-month survey, when nearly as many (6.0%) new women screened positive as during the 2-week postpartum survey. The low number of new women screening positive in between these peaks (2.7% at 6 months) is in line with the study by (Georgiopoulos et al., 2001) documenting 2.9% of women with depression onset between 2 months and 1 year postpartum. As one of the first studies to isolate depressive episodes that were new onset from those that were ongoing, this study informs the existing late-postpartum-depression literature (Chaudron et al., 2010; Horowitz & Goodman, 2004; Kornfeld et al., 2012; Mota et al., 2011; Zelkowitz & Milet, 2001). The finding that a different group of women experience late-onset depression, a group that is nearly as sizeable as the early-onset depression group, has important implications for the locus of maternal-depression screening and supports, providing compelling evidence for embedding maternal interventions within the pediatric setting and for the ongoing engagement of women in maternal-support public health programming well into the toddler years.

**Differences Between Early and Late Onset Groups**

In addition to the timing of onset, the two groups revealed very different depression trajectories. In addition to being depressed right from the start, the early-onset group stayed depressed longer and with indications of greater severity. As a group, their mean depression score stayed above the major-depression threshold for the first 2 months
(with mean scores of 14.4 and 13.2); even when it improved during the later period, it stayed in the mild-depression range (10.3 and 10.7), as opposed to the late-onset group who, until 6 months out were not statistically different from the no-depression group. Since the study ended at 18 months, the height of the late-onset group’s depression, it is unknown how long the scores of the late-onset group stayed high. It is also unknown whether depression became even more severe in the following months. Regardless, the significant main effects in the multivariate regression for the “miserable,” “unhappy,” and “self-blame” items illustrate the stability and acuteness of the early-onset group’s depression relative to the late-onset group over an extended postpartum period. Furthermore, it may be that anxiety plays a greater role in the depression of the late-onset group; at the height of their depression, more late-onset women endorsed the “anxiety” item than their early-onset counterparts. These variations may reflect different underlying contributors or resource disparities that play out in symptom severity or timing. The groups were similar to each other regarding their previous depression history and the degree to which they endorsed the self-harm item.

Alongside variations in the course of their depressive episodes, the two onset groups had differential risk profiles, with the late-onset group having fewer of the risk factors traditionally associated with depression in general, and postpartum depression in particular (CDC, 2008; Hasin et al., 2005; Kendall-Tackett, 2007; Kessler, 1994; Kornfeld et al., 2012; Silverman et al., 2011; World Health Organization, 2000). The late-onset group was more likely than the early-onset group to be adults rather than adolescents, they had higher socioeconomic status (as indicated by insurance and housing stability), were less likely to have a partner in their lives but more likely to have a strong
support network of family and friends, and they had better prenatal care, in terms of initiating care early and consistently. Perhaps these features play a protective role, responsible for the delay in depression onset (Banyard, Williams, & Siegel, 2003; Leahy-Warren, McCarthy, & Corcoran, 2011; Rafferty, Griffin, & Robokos, 2010; Renner, 2009). This has implications for the sort of support that may help the early-onset group, namely practical support in the way of housing, nutrition, child-care and employment and social support by connecting to peers, support groups and community agencies.

The only risk factor that was unique to the late-onset group, compared to the no-onset group, was that more of their infants were born with low birthweight, a risk factor that has been identified in other studies, although without regard to the timing of depression (Campbell & Cohn, 1997; Keller et al., 1986). The link between birthweight and early childhood cognitive and physical function is well-documented (Ni, Huang, & Guo, 2011; Zhang, Mahoney, & Pinto-Martin, 2013), as is the connection between child health and maternal depression (McLennon, Kotelchuck, & Cho, 2001; Phillips & O'Hara, 1991). This, then, could represent a tipping point for depression, explaining its late-onset among this higher functioning group.

**Characteristics Shared by the Early and Late Onset Groups**

The psychosocial attributes that were shared by the early and late-onset groups, of which there were several, expose common threads which may shed light on the mechanisms underlying maternal depression. Both sets of depressed women in this study were significantly different than non-depressed women regarding partner relationships, prior depression, prenatal substance use and race. Consistent with the large body of research documenting the link between depression and partner conflict, women in both
depression groups were more likely than non-depressed women to be single, to not have a supportive partner, and to report a history of partner violence/adult trauma (Bonomi et al., 2009; Golding, 1999; Kessler, 2003; Kessler et al., 2007). Partner relationships are known to be particularly influential during pregnancy and postpartum (Campbell & Cohn, 1997), in a dose-response relationship with depression (Bonomi et al., 2009; Golding, 1999; Kessler, 2003; Kessler et al., 2007). While speculative, one explanation could be that the lack of a partner that is characteristic of the late-onset group but not the early-onset group, may mean that the late-onset group has extricated themselves from a harmful relationship; perhaps the lower socioeconomic status of the early-onset group may indicate that they have not had the means to do likewise (Saltzman, Johnson, Gilbert, & Goodwin, 2003).

Given the recurring nature of depression, it is not surprising that women suffering postpartum depression were likely to have prior histories of depression (J. H. Goodman, 2004). But this does not explain why so many study women with a prior history did not develop postpartum depression. Perhaps part of the answer lies in the fact that the latter group, in addition to less adult-trauma, had less smoking and no reported drug use. Prenatal smoking has been identified as a red flag for prenatal substance use (Battjes, 1988; Marcenko, 1994), which, in turn, has a high co-occurrence with mood disorders and can exacerbate symptoms (Cherry, 2008; McGovern, Xie, Segal, Siembab, & Drake, 2006; Ziedonis & Brady, 1997). The constellation of partner conflict, mental health and addiction shared by depressed women in this study is well-documented in women in all life stages and from all walks of life (DeJonghe, Bogat, Levendosky, & von Eye, 2008; Dennis & Vigot, 2013; Griffin, Resick, & Yehuda, 2005; Horrigan, Schroeder, &
Schaffer, 2000; Inslicht et al., 2006). Of note is that these depictions do not include the experiences of women who were lost-to-follow-up; in addition to having greater risk factors, the lost-to-follow-up women may have had a different set of experiences than is captured in this analysis, and may have changed study conclusions.

The association of minority race with postpartum depression deserves special mention. Because small group sizes restricted multivariate analyses, it is unclear if race has an independent relationship with depression among the women in this study or if it is a byproduct of other factors such as poverty, adolescence or lack of supportive partner, all known to occur more commonly among minority women (CDC, 2011; Handler, Kennelly, & Peacock, 2010; Martin et al., 2012). What is known, though, is that being minority, specifically being black race, is directly linked to greater chronic stress and higher levels of depression (Dankwa-Mullan et al., 2010; Health Resources and Services Administration, 2006; Lu & Halfon, 2003; Mouton, 2010), and that black individuals experience additional barriers to mental health treatment, stemming from historical mistrust, cultural differences, and differential treatment within the mental health system (Brondolo, ver Halen, Pencille, Beatty, & Contrada, 2009; Nicolaidis et al., 2010; Nuru-Jeter et al., 2009; Pieterse, 2010; Smedley, Stith, & Nelson, 2003).

Increased Symptoms Common in Late Postpartum

As noted earlier, the temporal trend for elevated depression symptoms at 2 weeks and again at 18 months postpartum was significant for even the no-depression group; this held true for the total EPDS scores as well as the anxiety sub-scale scores. Heightened symptomology immediately after delivery is well-known, often called the baby blues, and is thought to be hormonally driven, tends to be relatively mild and to dissipate quickly.
(Jaeschke, Siwek, & Dudek, 2012). The raised box-plots and larger bottom-quartile EPDS scores in Figure 2.1 illustrate that this phenomenon occurred across the sample. This study found that the very same pattern appears for the 18-month scores. While this is the first study to identify new onset, other studies of depression among mothers of toddlers have documented prevalence rates that are just as high as early postpartum rates (Chaudron et al., 2010; J. H. Goodman, 2004; Kornfeld et al., 2012; McLennon et al., 2001; Phillips & O'Hara, 1991). A study by (Rutter, 1985) suggested that parenting older infants and toddlers drives up maternal stress levels. This link between child caretaking hassles and child behavior difficulties with parenting stress and maternal depression has since been confirmed (McLennon et al., 2001; Östberg, Hagekull, & Wettergren, 1997). This is the first study to show the degree to which these depression levels are due to new episodes, and to identify that greater distress during this time period may be the norm.

**Limitations**

The following study limitations should be considered when interpreting study findings: The final analytical sample, the 249 women with completed surveys in both the early and late postpartum periods, were significantly more advantaged than those lost-to-follow-up on multiple demographic, health and social measures, a factor which may have biased study results, as these characteristics are associated with depression (Bybee & Sullivan, 2005; CDC, 2008; Farmer & Tiefenthaler, 2003; Lott & Bullock, 2007; World Health Organization, 2000). Most notably, the loss of high-risk from the final study sample may have led to overestimations of the association between higher-income and late-onset. Further, the author conceptualized participants screening positive at the 2-week survey as “new onset,” although it is likely that some portion of these had ongoing
depression from the prenatal period. Finally, the study did not take into account depression treatment that women may have received and which may have influenced the course of their depression.

**Conclusions**

A community representative sample of postpartum women displayed dual peaks of depression: one early—at 2 weeks after delivery, and one late—at 18 months. These peaks appear to be the result of two processes: (1) elevated depression symptoms among the full sample that seems to typify women’s postpartum experience in general, and (2) onset of major depression by two sub-groups of women, one at each time period, having distinct depression and psychosocial characteristics. The early-onset group, with more severe depression, fit the traditional psychosocial risk profile for postpartum depression, while the late-onset group shared characteristics with both non-depressed women (higher socioeconomic status, family/friend support, healthcare access) as well as with early-onset depressed women (minority, lack of supportive partner, history of depression, prenatal smoking, and drug use).

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CHAPTER III
THE INTERRELATIONSHIP OF PARTNER VIOLENCE AND POVERTY UPON POSTPARTUM DEPRESSION

Introduction

Millions of women experience partner violence, poverty and depression every year in the United States (Beydoun, Beydoun, Kaufman, & Zondeman, 2012; Wu, Chen, & Xu, 2012), each exacting physical, social, and mental health burdens that can become lifelong (Black et al., 2011; World Health Organization, 2000). Evidence documenting the co-occurrence of partner violence and depression (Bonomi et al., 2009; Golding, 1999; Kessler, 2003; Kessler et al., 2007), and the co-occurrence of poverty and depression (Arber, 1997; Kaplan, 1987; Kessler, 1994; World Health Organization, 2000) continues to mount, but studies of how the three intersect remain sparse (Bybee & Sullivan, 2005; Farmer & Tiefenthaler, 2003; L. A. Goodman & Epstein, 2008; L. A. Goodman, Smyth, Borges, & Singer, 2009; Lott & Bullock, 2007). During the perinatal period, pregnancy and postpartum, women are particularly vulnerable to the onset and the effects of psychosocial difficulties (Gaynes et al., 2005; Gazmararian et al., 1996), and thus it offers a critical window within which to examine this interrelationship. The current study examines the intersection of poverty, partner violence and depression among a socio-economically diverse sample of postpartum women.

Intimate Partner Violence

Intimate partner violence (IPV or partner violence) is experienced by millions of women in the United States; approximately 35% suffer physical or sexual assault or
stalking by an intimate partner during the course of their adult lives, 5.9% in the previous year (Black et al., 2011). Thirty percent of all female homicide victims are killed by their male partners (Catalano, 2007). Psychological abuse, in the form of verbal abuse and controlling behaviors, is even more prevalent (48.8% lifetime) and frequently co-occurs with physical and sexual abuse (88% co-occurrence among those physically abused) (Coker, Smith, Bethea, King, & McKeown, 2000). Violence between partners is multifaceted, ranging from isolated assaults to systemic abuse (Holtzworth-Munroe, 2000; Johnson, 1995, 2006; MacMillan & Kruttschnitt, 2005; Tjaden & Thoennes, 2000). Moreover, the aggression may be one-sided or bi-directional, completely contained within the couple or extending onto children, family, and friends (Holtzworth-Munroe, 2000; Johnson, 1995, 2006; MacMillan & Kruttschnitt, 2005; Tjaden & Thoennes, 2000).

At the low end of the spectrum is violence characterized by minor severity, intermittent assaults, and mutuality, while violence at the severe end is marked by multiple forms of maltreatment, lethality, and high frequency (Holtzworth-Munroe, 2000; Johnson, 1995, 2006; MacMillan & Kruttschnitt, 2005; Tjaden & Thoennes, 2000).

Existing evidence regarding perinatal violence highlights the seriousness of IPV during this specific period. Rates of abuse may be as much as three times higher among pregnant women compared to their non-pregnant, age-matched counterparts (Gazmararian et al., 1996), due to a combination of higher rates of conception among abused women and an increase in abuse during pregnancy (Kothari, Cerulli, Marcus, & Rhodes, 2009). Although few studies have tracked violence across perinatal periods, Martin (S. L. Martin, Mackie, Kupper, Buescher, & Moracco, 2001) analyzed North Carolina’s PRAMS (Pregnancy Risk Assessment Monitoring System) data and found that
for the majority of pregnant victims, the physical violence predated the pregnancy (76.5%), and, for many, physical violence actually abated during pregnancy. PRAMS involves collection of data via phone surveys and mailed questionnaires to a representative sample of recently delivered women. A single, physical violence item constituted the IPV measure; with subject recall, violence was assessed for the year prior to pregnancy, the period during pregnancy, and the time since delivery (an average of 3.6 months). A prospective survey study by Gielen, O’Campo, Faden, Kass, and Xue (1994) conducted face-to-face interviews with low-income, black women during each trimester of their pregnancy with a phone interview at 6 months postpartum, using the validated Conflict Tactics Scale–Revised (Straus et al., 1996) to assess violence. It found less physical violence during pregnancy, but more prenatal psychological abuse, and a resumption of physical abuse in the postpartum phase. During the same time period that the nature of violence appears to be changing, women have unprecedented access to health and social services through maternal-infant programs such as WIC (Khanani, Elam, Hearn, Jones, & Maseru, 2010) and extended Medicaid coverage (Ranju, Salganicoff, Stewart, Cox, & Doamekpor, 2009). These two factors, the evolution of violence and the expanded resources, could present a unique window of opportunity for effective violence intervention, especially if targeted at the postpartum period when violence appears to resume.

**Health Consequences of Intimate Partner Violence**

Regardless of type or timing of abuse, partner violence exacts a high toll on victims’ physical and mental health (Bonomi et al., 2009; Coker et al., 2000; Tjaden & Thoennes, 2000). Studies have documented that the worse the abuse, the greater the toll,
with a dose-response relationship between severity of abuse and health-related consequences (MacMillan & Kruttschnitt, 2005).

**Depression**

The constellation of health impacts associated with partner violence is led by depression, experienced by 47.6% of victims, a rate three times higher than the general adult female population (Bonomi et al., 2009; Golding, 1999; Kessler, 2003; Kessler et al., 2007). As the primary cause of disability and premature death among 15-44 year olds (Insel, 2005; World Health Organization, 2000), depression presents its own health burden above and beyond that associated with partner violence. It tends to strike early in adulthood (average age of 30 for onset among women) (Hasin, Goodwin, Stinson, & Grant, 2005), is often quite severe (46.6% of depressed women “felt like dying” during their last depressive episode) (Michigan Department of Community Health, Injury and Violence Prevention Section, 2005), and is recurrent (an average of five lifetime episodes among women) (Hasin et al., 2005; Michigan Department of Community Health, Injury and Violence Prevention Section, 2005).

The psychologic mechanism linking partner aggression to depression is a belief of hopelessness of the situation (if chronic and recurring) and helplessness in avoiding the aggression without exiting the relationship and losing whatever positive benefits are perceived (e.g., he is the father of my baby, he provides shelter, food and financing for the family, I love him) (Clements & Sawhney, 2000; Mertin & Mohr, 2001; Walker, 2000; Warshaw, Brashler, & Gil, 2009). Likewise, the psychological mechanism linking partner aggression to anxiety is the constant vigilance for signs of erupting aggression
and worry about triggering it (i.e., waiting for the axe to fall, walking on eggs) (Mertin & Mohr, 2001; Warshaw et al., 2009).

The physiologic mechanism linking partner violence and depression is the body’s stress response. Neuroendocrine responses increase environmental vigilance and lay down emotion-charged memories that help predict danger in the future. While adaptive in the short term, these same responses, if triggered too often, or for too long, result in chronic stress (Geronimus, Hicken, Keene, & Bound, 2006; Korte, Koolhaas, Wingfield, & McEwen, 2005; McEwen, 1998). Changes in baseline stress thresholds can become permanent, putting a woman at greater risk of depression and anxiety (DeJonghe, Bogat, Levendosky, & von Eye, 2008; Griffin, Resick, & Yehuda, 2005; Inslicht et al., 2006).

Not only is the perinatal period one of greater sensitivity to physical health difficulties (Haas et al., 2005), it is a time of increased vulnerability to the physiological impact of environmental stressors as well (Silverman, Decker, Reed, & Raj, 2006), a vulnerability that extends to the fetus during pregnancy (Marcus et al., 2011; Silver et al., 2007) and the infant during postpartum (Field, 2011; S. H. Goodman & Gotlib, 1999). One outgrowth of this perinatal stress-response is onset of postpartum depression at rates three times above depression onset among non-perinatal women (Cox, Murray, & Chapman, 1993; Gaynes et al., 2005). Thus, the surge in partner violence experienced by postpartum women occurs at a time of heightened physiological sensitivity to environmental and physical stressors, and is frequently marked by a spike in depression.

**Poverty as a Comorbidity of IPV and Depression**

The confluence of partner violence and depression, heightened during the postpartum period, is often further complicated by conditions of poverty (i.e., living
below the federal poverty level) (Adams, Sullivan, Bybee, & Greeson, 2008; Bachman & Saltzman, 1995; Benson, Fox, DeMaris, & VanWyk, 2000; Beydoun, Beydoun, Kaufman, & Zondeman, 2012; Kessler, 1994; Wu et al., 2012). Poor women report five to six times higher IPV, with 20-30% reporting victimization in the past year (Bassuk, Dawson, & Huntington, 2006) compared to 5.9% among the general female population (Black et al., 2011). Poverty is thought to function as both a cause and an effect of partner violence, through economic exploitation by the abuser as well as interference with employment, restricting women’s options and keeping them in abusive situations (Adams et al., 2008; Moe & Bell, 2004; Riger, Raja, & Camacho, 2002).

Aside from partner violence, studies have found that poverty is one of the strongest predictors of depression in general, more than doubling depression risk across a wide range of cultures and populations (Arber, 1997; Kaplan, 1987; Kessler, 1994; World Health Organization, 2000). Poverty leads to depression through the stress of inadequate material resources (housing, food, transportation, health care, and childcare) and inadequate social resources (lack of confidants, poor social support, disadvantaged peers) at the same time that access and utilization of medical and therapeutic relief is often quite limited (Dennerstein, Astbury, & Morse, 1993; World Health Organization, 2000).

While the literature tends to focus upon the effect of poverty upon depression, it also has documented that depression, in turn, can function as a barrier to financial stability, inhibiting one’s ability to work, to attend school, and perform other daily living tasks (World Health Organization, 2000) as well as to strike out on one’s own to escape from the recurring abuse. Not only are economically disadvantaged individuals more likely to
experience an episode of depression, but their depression is more likely to become severe and to develop into a chronic condition (World Health Organization, 2000).

**Study Purpose**

While the constellation of partner violence, poverty, and depression has been well-documented, explicit examination of how violence and poverty intersect to influence depression has received relatively little attention (Beydoun et al., 2012). Given the importance of socioeconomic status to resilience and resources, key coping factors for both violence and depression, this is an important gap to address. The sensitivity of the postpartum period to the detrimental effects of violence and poverty makes this an ideal window through which to view how they, individually and together, contribute to depression. This study proposes to investigate the interrelationship of poverty and partner violence upon postpartum depression. Specifically, this study examined poverty and partner violence as (a) independent predictors of depression, after controlling for each other; (b) interacting with each other to affect depression; and (c) as mediators of each other upon depression in postpartum women.

**Materials and Methods**

**Design**

The study was a secondary analysis of data that were originally collected in a prospective cohort survey, the Mother’s Mind Matters (MMM) Maternal Depression Survey, to assess the outcomes from a community-wide maternal depression demonstration project (Liepman, Kothari, & Tareen, 2010). The MMM Maternal Depression Survey recruited 330 postpartum women from the two county delivery hospitals, January 2009 through May 2009 (Liepman et al., 2010). For the current study,
the survey data were supplemented by additional data from a subsequent study linking county birth record data to evaluate the generalizability of the MMM Maternal Depression Survey findings to the county birth population (Kothari, 2012).

**Setting and Participants**

The study was conducted in Kalamazoo County in southwest Michigan, containing two urban areas and many surrounding rural communities, and whose 2009 maternal-infant birth characteristics reflect the national profile on maternal race (76.3% births to white women [county] compared to 76.8% [national]), adolescence (9.6% births to adolescent women [county] compared to 10.0% [national]), and marital status (41.5% births to unmarried women [county] compared to 41.0% [national]) (J. A. Martin et al., 2011). Study participants met the following eligibility criteria: (1) maternal residence in Kalamazoo County, (2) medical clearance by hospital nursing staff, (3) infant not being adopted, and (4) maternal fluency in either English or Spanish.

**Data Collection Procedures for Original Survey**

After recruitment and consent, participants were contacted twice by telephone, at 2 weeks postpartum for a brief depression screening (using the Edinburgh Postnatal Depression Scale [EPDS]) (Cox, Holden, & Sagovsky, 1987), and at 2 months postpartum for a longer interview, which included depression screening, self-reported intimate partner violence (IPV) victimization, self-reported substance abuse (either alcohol or drug-related), housing stability, employment, whether current pregnancy was planned, and an open-ended question about other life stressors experienced. In addition to the survey interviews, prenatal and delivery medical records were reviewed and the following information abstracted: maternal demographics (age, race, ethnicity, marital
status, insurance status), obstetric history (age of first pregnancy, parity, prenatal care for current pregnancy), prenatal health characteristics (pre-pregnancy Body Mass Index [BMI], prenatal weight gain, smoking, alcohol use, drug use), birth outcomes (gestation, infant birthweight), and intent to breastfeed.

**Measures**

The analytic dataset constructed for this secondary analysis included the study variables of interest: poverty status indicator (yes-no), partner violence (yes-no), and postpartum depression score (0-30). Insurance status (Medicaid or private insurance) served as a proxy measure for poverty. The proxy, insurance status, has shown some convergent validity with maternal and paternal education (Spearman’s rho = .533 and rho = .513, respectively), traditional poverty, and socioeconomic indicators (Oakes & Rossi, 2003).

IPV was assessed using three questions for current or past emotional or physical abuse: “Have you ever felt afraid at home because of threats of violence?” “Have you ever had a partner or spouse who got very jealous or tried to control your life?” and “Have you ever had a partner that pushed, hit, kicked or otherwise physically hurt you?” These items align with IPV screeners commonly recommended for healthcare settings; two were adapted from the Computer-Based IPV Questionnaire (Rhodes, Lauderdale, He, Howes, & Levinson, 2002) and one was adapted from the Domestic Violence Initiative Screening Questions (Badile, Hettz, & Back, 2007). Partner violence was operationalized as a dichotomous variable, where a “yes” to one or more of the three IPV items was considered a positive response. All women who screened positive were given
a contact name and number at the local domestic assault program and were informed of the services available there.

Depression was measured using the Edinburgh Postnatal Depression Screener (EPDS), scores of which range from 0 to 30, with higher score indicating greater severity. Using a threshold score of 12 or higher to indicate depression, the EPDS has been found to have a sensitivity of 0.88 and a specificity of 0.76 when compared against a clinical diagnosis of major depression using Goldberg’s Clinical Interview Schedule (Cox, Chapman, Murray, & Cooper, 1996). The higher EPDS score from the 2-week and 2-month screenings was taken as the depression measure. The analytical dataset also contained the following survey study covariates: maternal demographics (age, race, and marital status), perinatal characteristics (adequacy of care, whether the pregnancy was planned), psychosocial characteristics (self-reported and medical record documentation of substance abuse history, work history, housing instability and life stressors [housing, health, financial, legal]), and birth outcomes (low birthweight, prematurity). Data for the generalizability comparison with the county birth population were based upon birth records data and included maternal age, race, marital status, education, insurance, number of pregnancies, number of live births, adequacy of prenatal care, maternal prenatal BMI, and birth outcomes (gestation and infant birthweight).

Analyses

Bivariate comparisons between the study sample and the 2009 county birth population were conducted using Pearson chi square for categorical variables and independent samples t test for the continuous variable, maternal age. Median and mean EPDS scores were calculated for each of the covariates; bivariate statistical significance
was tested using unadjusted linear regression. Prior to conducting the multivariate regression of IPV and poverty upon depression, the covariates were tested for inclusion in the regression model using multivariate regression. Covariates that were found to be independent predictors of depression were included.

Multivariate analyses were conducted using linear regression. Poverty and partner violence were separately examined as (a) independent confounders of depression, (b) interacting with each other upon depression, and (c) as potential mediators of each other. The criterion for confounding was, first, if poverty was significantly associated with depression, controlling for IPV, and, second, if IPV was significantly associated with depression, controlling for poverty. To test poverty and partner violence for moderation, a combined term was created (IPV × poverty) and included in the model along with the independent variables IPV and poverty. Statistical significance of the IPV × poverty term would indicate an interaction effect (Aguinis & Stone-Romero, 1997).

Both predictors, poverty and violence, were tested for mediation by applying regression results to Baron and Kenny’s (1986) four-step approach, where a predictor was found to be mediated if (1) predictor was significantly associated with outcome depression in a simple regression; (2) predictor was significantly associated with mediator in a simple regression; (3) mediator was significantly associated with outcome depression in a simple regression; and (4) mediator remained significantly associated with outcome depression, controlling for predictor in a multiple regression analysis. The methods and criteria for drawing causal inferences are controversial and vary by discipline (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). The Baron and Kenny method, considered a causal-steps approach, is the most commonly used strategy, in part due to its simplicity.
and in part because of its low Type I error (MacKinnon et al., 2002). The primary limitation to the causal-steps approach is a higher Type II error compared to other methods (MacKinnon, Fairchild, & Fritz, 2007). All statistical operations were two-tailed and conducted at the $p < .05$ significance level. The following assumptions for linear regression were tested: multicollinearity, non-zero variance, homoscedasticity, independent and normally distributed errors, and linearity of the outcome variable. SPSS v.21.0 (IBM Corporation) was used for all analyses.

**Results**

**Sample Characteristics**

Of the 330 recruited study participants, 301 completed both surveys, constituting the analytical sample. Four recruited participants withdrew prior to survey completion, citing lack of time as the reason. Twenty-five participants were lost to study follow-up. They were similar to the remaining 301 participants on age, race, marital status, and level of prenatal care, but were significantly different on having private insurance (40.0% and 67.8%, respectively, $\chi^2 (2) = 9.63, p = .008$), adequate birthweight (84.0% and 94.6%, respectively, $\chi^2 (2) = 7.25, p = .027$) and prematurity (88.0% and 93.7%, respectively, $\chi^2 (3) = 13.06, p = .005$).

As illustrated in Table 3.1, the study sample was similar to the 2009 Kalamazoo County maternal population regarding several demographic and health-related characteristics: maternal age, race, marital status, number of pregnancies, number of live births, prenatal BMI, and infant birthweight. However, recruited study participants were more likely than the county maternal population to have a college degree ($\chi^2 (2) = 9.91, p = .007$), to have private insurance ($\chi^2 (1) = 4.48, p = .034$), and to deliver a full-term
infant, at least 37 weeks gestation ($\chi^2 (1) = 5.03, p = .025$). Differences between the study sample and the county population approached significance on adequacy of prenatal care ($\chi^2 (3) = 7.61, p = .055$).

Table 3.1

Comparing Maternal and Birth Outcomes of Study Sample (Postpartum Residents of Kalamazoo County, Michigan, 2009) with Kalamazoo County, Michigan, 2009 Birth Population

<table>
<thead>
<tr>
<th></th>
<th>2009 County Maternal Population (2,674)</th>
<th>Study Sample (326)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Maternal Demographics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age = mean (stand. dev.)</td>
<td>27.3 (5.8)</td>
<td>27.3 (5.7)</td>
<td>.848</td>
</tr>
<tr>
<td>Adolescent</td>
<td>9.6%</td>
<td>10.7%</td>
<td>.553</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td>.250</td>
</tr>
<tr>
<td>White</td>
<td>76.3%</td>
<td>80.1%</td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>19.5%</td>
<td>17.2%</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>4.2%</td>
<td>2.8%</td>
<td></td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
<td>.637</td>
</tr>
<tr>
<td>Married</td>
<td>58.5%</td>
<td>59.8%</td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>41.5%</td>
<td>40.2%</td>
<td></td>
</tr>
<tr>
<td>Maternal Education</td>
<td></td>
<td></td>
<td>.007</td>
</tr>
<tr>
<td>Less than high school</td>
<td>12.6%</td>
<td>11.3%</td>
<td></td>
</tr>
<tr>
<td>High school grad or GED</td>
<td>53.8%</td>
<td>46.3%</td>
<td></td>
</tr>
<tr>
<td>Bachelor’s or postgraduate degree</td>
<td>33.6%</td>
<td>42.3%</td>
<td></td>
</tr>
<tr>
<td>Insurance Status</td>
<td></td>
<td></td>
<td>.032</td>
</tr>
<tr>
<td>Private</td>
<td>51.8%</td>
<td>58.6%</td>
<td></td>
</tr>
<tr>
<td>Medicaid</td>
<td>47.6%</td>
<td>41.4%</td>
<td></td>
</tr>
<tr>
<td>No insurance</td>
<td>0.6%</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Perinatal Characteristics</strong></td>
<td></td>
<td></td>
<td>.146</td>
</tr>
<tr>
<td>Gravidity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First pregnancy</td>
<td>30.9%</td>
<td>35.0%</td>
<td></td>
</tr>
<tr>
<td>Had previous pregnancy</td>
<td>69.1%</td>
<td>65.0%</td>
<td></td>
</tr>
<tr>
<td>Parity</td>
<td></td>
<td></td>
<td>.153</td>
</tr>
<tr>
<td>First live birth</td>
<td>40.9%</td>
<td>45.1%</td>
<td></td>
</tr>
<tr>
<td>Previous live births</td>
<td>59.1%</td>
<td>54.9%</td>
<td></td>
</tr>
<tr>
<td>Singleton</td>
<td>97.8%</td>
<td>97.9%</td>
<td>1.00</td>
</tr>
</tbody>
</table>
Table 3.1—Continued

<table>
<thead>
<tr>
<th></th>
<th>2009 County Maternal Population&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Study Sample (326)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prenatal Care (Kessner)</td>
<td></td>
<td></td>
<td>.055</td>
</tr>
<tr>
<td>Adequate</td>
<td>65.9%</td>
<td>66.3%</td>
<td></td>
</tr>
<tr>
<td>Intermediate</td>
<td>26.6%</td>
<td>28.2%</td>
<td></td>
</tr>
<tr>
<td>Inadequate</td>
<td>7.1%</td>
<td>4.3%</td>
<td></td>
</tr>
<tr>
<td>[missing values]</td>
<td>[0.4%]</td>
<td>[1.2%]</td>
<td></td>
</tr>
<tr>
<td>Prenatal BMI</td>
<td></td>
<td></td>
<td>.350</td>
</tr>
<tr>
<td>Underweight</td>
<td>3.6%</td>
<td>2.1%</td>
<td></td>
</tr>
<tr>
<td>Healthy weight</td>
<td>45.2%</td>
<td>44.8%</td>
<td></td>
</tr>
<tr>
<td>Overweight</td>
<td>25.3%</td>
<td>23.9%</td>
<td></td>
</tr>
<tr>
<td>Obese</td>
<td>25.9%</td>
<td>29.1%</td>
<td></td>
</tr>
<tr>
<td>Birth Outcome&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
<td></td>
<td>.021</td>
</tr>
<tr>
<td>Prematurity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;37 wks gestation</td>
<td>8.4%</td>
<td>4.7%</td>
<td></td>
</tr>
<tr>
<td>37+ wks gestation</td>
<td>91.6%</td>
<td>95.3%</td>
<td></td>
</tr>
</tbody>
</table>

Note. Statistical tests were Pearson chi square for categorical variables and independent samples t test for the continuous variable, maternal age.

<sup>a</sup> Michigan Department of Community Health, Division for Vital Records and Health Data Development, Live Birth File and Death File.

<sup>b</sup> Among single gestation.

**Depression with Comparison of IPV – Poverty Groups**

EPDS scores ranged from 0 to 28, with a mean of 5.1 (standard deviation 4.6), and a median of 4.0. The distribution of scores was positively skewed, with a significantly non-normal distribution (Kolmogorov-Smirnov .159, p < .001). Ten percent (n = 30 of 301) of study women met the screening threshold for depression (EPDS score of 12-plus or a positive answer to the suicidal ideation item).

One in five study participants (21.3%, n = 64) screened positive for emotional or physical abuse, and one in three participants (32.2%, n = 97) met study poverty criteria.
As seen in the four IPV-Poverty sub-group depression scores in Figure 3.1, IPV participants had significantly higher depression scores compared to non-IPV participants. Similarly, poverty participants had significantly higher depression scores as well as a broader range of scores than non-poverty participants. For both IPV-positive and poverty-positive participants, median depression values were substantially lower than the mean values, indicating a more skewed distribution (i.e., outliers at the high end) compared to non-IPV and non-poverty participants.

The boxplots and depression coefficients of the four IPV-Poverty sub-groups in Figure 3.1 align along the single dimension of IPV, with the two highest depression scores for the two IPV positive groups and the two lowest scores for the two IPV negative groups. This relationship is observed in the medians, the means, the crude betas and the tests of statistical significance. The lack of variation across all four groups suggests a lack of interaction between IPV and poverty upon depression. The long tail of the positively skewed distribution in each group ended in one to three outliers, only one of which was marked as an extreme outlier, and none represented more than 6% of the group.

Finally, separate from their relationship with depression, IPV and poverty were statistically significantly associated with each other; 33% of women living in poverty reported experiencing IPV as opposed to 15.7% among women not living in poverty ($\chi^2 (1) = 11.76, \ p < .001$).
IPV N – Poverty N | IPV N – Poverty Y | IPV Y – Poverty N | IPV Y – Poverty Y | Poverty | IPV
| N | Median | Interquartile Range | Mean | 95% Confidence Interval | N | Y | N | Y |
|---|---|---|---|---|---|---|---|---|---|
| 172 | 4.0 | 4.0 | 6.0 | 7.0 | 4.0 | 4.0 | 4.0 | 6.0 |
| 32 | 6.0 | 8.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 7.0 |
| 34 | 3.8, 9.0 | 5.7, 9.8 | 4.2, 5.2 | 4.8, 7.3 | 3.9, 5.0 | 6.3, 9.0 |

<table>
<thead>
<tr>
<th>Crude Beta</th>
<th>95% Confidence Interval</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ref)</td>
<td>-0.4, 2.2</td>
<td>.176</td>
</tr>
<tr>
<td>0.2, 4.5</td>
<td>.017</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

Note. EPDS scores range from 0, indicating the lowest level of depression to 30 indicated the highest level of depression.

Figure 3.1. Comparison of EPDS (Edinburgh Postnatal Depression Scale) scores for study sample (postpartum residents of Kalamazoo County, Michigan, 2009), stratifying by IPV and poverty.
Covariates

As demonstrated in Table 3.2, several psychosocial factors were significantly related to EPDS depression scores. Substance abuse (both self-reported and documented in the prenatal medical records) was associated significantly with increased depression scores, as was prenatal smoking, housing instability, stress related to family, unplanned pregnancy, financial issues, and health-related issues.

Table 3.2

Comparison of EPDS Scores by Demographic, Health and Psychosocial Covariates

<table>
<thead>
<tr>
<th></th>
<th>EPDS Scores (0-30)</th>
<th></th>
<th></th>
<th>Beta (p value)³</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% (n)</td>
<td>Median</td>
<td>Mean</td>
<td></td>
</tr>
<tr>
<td>Maternal Demographics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adolescence</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adolescent</td>
<td>11.0 (33)</td>
<td>2.0</td>
<td>4.0</td>
<td>–1.2 (.142)</td>
</tr>
<tr>
<td>Non-adolescent (ref)</td>
<td>89.0 (268)</td>
<td>4.0</td>
<td>5.3</td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
<td>–0.4 (.372)</td>
</tr>
<tr>
<td>White (ref)</td>
<td>78.1 (235)</td>
<td>4.0</td>
<td>5.2</td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>15.9 (48)</td>
<td>4.0</td>
<td>5.4</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>6.0 (18)</td>
<td>3.5</td>
<td>3.6</td>
<td></td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
<td></td>
<td>0.8 (.130)</td>
</tr>
<tr>
<td>Married</td>
<td>59.8 (180)</td>
<td>4.0</td>
<td>4.8</td>
<td></td>
</tr>
<tr>
<td>Single (ref)</td>
<td>40.2 (121)</td>
<td>4.0</td>
<td>5.5</td>
<td></td>
</tr>
<tr>
<td>Perinatal Characteristics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prenatal Care (Kessner)</td>
<td></td>
<td></td>
<td></td>
<td>–0.1 (.986)</td>
</tr>
<tr>
<td>Adequate (ref)</td>
<td>70.8 (204)</td>
<td>4.0</td>
<td>5.2</td>
<td></td>
</tr>
<tr>
<td>Intermediate or Inadequate</td>
<td>29.2 (84)</td>
<td>4.0</td>
<td>5.2</td>
<td></td>
</tr>
<tr>
<td>Current pregnancy was:</td>
<td></td>
<td></td>
<td></td>
<td>–1.6 (.002)</td>
</tr>
<tr>
<td>Planned</td>
<td>49.0 (145)</td>
<td>4.0</td>
<td>4.2</td>
<td></td>
</tr>
<tr>
<td>Not planned (ref)</td>
<td>51.0 (151)</td>
<td>4.0</td>
<td>5.9</td>
<td></td>
</tr>
</tbody>
</table>
Table 3.2—Continued

<table>
<thead>
<tr>
<th>EPDS Scores (0-30)</th>
<th>% (n)</th>
<th>Median</th>
<th>Mean</th>
<th>Beta (p value)</th>
</tr>
</thead>
</table>

Psychosocial Stressors: Self-reported

| Problem w/ either alcohol or drugs | 5.3 (16) | 10.0 | 9.8 | 4.9 (<.001) |
| No problem w/ either (ref)        | 94.7 (285) | 4.0 | 4.9 | |

| Housing                          | 3.4 (<.001) |
| Housing problem                  | 13.6 (41) | 5.0 | 8.1 |
| No housing problem (ref)         | 86.4 (260) | 4.0 | 4.7 |

Employment

| Works outside home | 59.5 (179) | 4.0 | 4.9 |
| Does not work outside home (ref) | 40.5 (122) | 4.0 | 5.6 |

| Other Stressors (open-ended response) | -0.7 (.192) |
| Parenting-related vs. not (ref) | 6.6 (20) | 5.5 | 6.0 |
| Childcare-related vs. not (ref)  | 1.3 (4) | 5.0 | 6.5 |
| Family-related vs. not (ref)    | 8.6 (26) | 5.5 | 7.7 |
| Financial-related vs. not (ref) | 17.3 (52) | 5.0 | 6.6 |
| Health-related vs. not (ref)    | 3.3 (10) | 8.0 | 9.4 |

From Medical Record Documentation

| Prenatal smoking | 14.0 (42) | 5.5 | 7.6 | 3.2 (<.001) |
| No smoking noted (ref) | 86.0 (259) | 4.0 | 4.7 |

| Prenatal alcohol | 7.5 (22) | 4.0 | 5.3 | 0.2 (.873) |
| No alcohol noted (ref) | 92.5 (271) | 4.0 | 5.2 |

| Prenatal drugs | 6.6 (18) | 10.0 | 8.5 | 3.5 (.002) |
| No drugs noted (ref) | 93.4 (256) | 4.0 | 5.0 |

| 1st pregnancy as adolescent | 24.9 (75) | 4.0 | 5.9 | 1.0 (.096) |
| 1st pregnancy, age 20+ (ref) | 75.1 (226) | 4.0 | 4.9 |

Birth Outcome b

| Prematurity | 0.8 (.207) |
| 37+ wks gestation | 93.7 (282) | 4.0 | 5.1 |
| <37 wks gestation (ref) | 6.3 (13) | 4.0 | 4.3 |

Note. EPDS scores range from 0, indicating the lowest level of depression to 30 indicated the highest level of depression.

a Unadjusted, unstandardized betas. Separate models conducted for each covariate.

b Among single gestation
Among the covariates, the two individual self-report substance abuse-related variables, alcohol problem and drug problem, were both highly positively correlated with the summary substance abuse variable \( (r = .741 \text{ and } r = .822, \text{ respectively}) \), and were dropped from the regression model for multicollinearity. When tested for mediation, none of the covariates met criteria for mediating the relationship between IPV and depression (i.e., IPV and depression were significantly related even when each covariate was controlled for). However, five of them (unplanned pregnancy, self-reported substance abuse, housing insecurity, prenatal smoking, and prenatal drug use) performed as mediators in the relationship between poverty and depression (i.e., poverty and depression were no longer significantly related when each covariate was controlled). The remaining covariates meeting criteria for confounding and, thus, entered into the final multivariate regression model were family stressor, financial stressor, and health stressor.

Covariates that were related to IPV and to poverty but not to depression were being a single mother \( (p < .001 \text{ for both IPV and poverty}) \) and being an adolescent \( (p = .024 \text{ for IPV and } p < .001 \text{ for poverty}) \). Finally, several covariates were related to poverty alone, including having a first pregnancy as an adolescent, even if subjects weren’t currently an adolescent \( (p < .001) \), being black \( (p < .001) \), not being employed outside the home \( (p < .001) \), and having inadequate prenatal care \( (p < .001) \); these variables were dropped from further analyses as they were unrelated to the study outcome variable.

**Regression Modeling of IPV and Poverty upon Depression**

As seen from the crude beta coefficients in Table 3.3, IPV and poverty were each significant predictors of depression in simple regression analyses. Furthermore, the
significance you would expect to see if there were an IPV-poverty interaction, with each of the four groups significantly different from the referent group, was absent. Instead, significance is related to being IPV positive or not, regardless of poverty. In other words, IPV’s relationship with depression does not vary by poverty status, and poverty’s relationship with depression does not vary by IPV status; thus, moderation was not indicated. The IPV-poverty interaction variable, then, was not included in the multiple regression model.

The adjusted beta coefficients in Table 3.3 illustrate that IPV had a significant relationship with depression when both poverty and IPV were included in the model, but that poverty’s relationship with depression disappeared when IPV was included. Experiencing IPV was associated with an increase of 3.1 points on the 30-point EPDS scale. Applying the four-step mediation test to regression results illustrated that IPV and poverty are both related to depression in a simple regression (steps 1 and 2); IPV and poverty were related to each other in a simple regression (step 3); and IPV was still significantly related to depression when poverty was controlled for, but poverty was not still significantly related to depression when controlling for IPV (step 4). Thus, IPV was shown to be an independent predictor of depression and to mediate the relationship of poverty to depression. The model accounted for 9.1% of the variance in depression scores ($R^2 = .091$).

Linear regression assumptions were largely met. The Durbin-Watson test statistic was 1.7, indicating the assumption of independent errors has been met. All of the model predictors displayed variance. There were several outliers; however, less than 5% of their standardized residuals had an absolute value greater than 1.96. An examination of
influential cases identified no single case that was exerting disproportionate impact on the model.

Table 3.3

*Multivariate Regression of IPV and Poverty upon EPDS Depression Score (0 [low]–30 [high])*

<table>
<thead>
<tr>
<th></th>
<th>Crude Beta (CI)</th>
<th>p (Crude Beta)</th>
<th>Adjusted Betaa (CI)</th>
<th>p (Adj Beta)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPV</td>
<td>3.2 (2.0, 4.5)</td>
<td>&lt;.001</td>
<td>3.1 (1.8, 4.3)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Poverty</td>
<td>1.3 (0.2, 2.4)</td>
<td>.017</td>
<td>0.8 (–0.3, 1.9)</td>
<td>.141</td>
</tr>
<tr>
<td>IPV × Poverty Interaction</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO Poverty &amp; NO IPV (ref)</td>
<td>ref</td>
<td>–</td>
<td></td>
<td>N.A.</td>
</tr>
<tr>
<td>Poverty &amp; NO IPV</td>
<td>0.9 (–0.4, 2.2)</td>
<td>.176</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO Poverty &amp; IPV</td>
<td>3.0 (1.3, 4.7)</td>
<td>&lt;.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poverty &amp; IPV</td>
<td>3.5 (1.9, 5.2)</td>
<td>&lt;.001</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*a Model adjusted for family stressor, financial stressor, and health stressor

**Discussion**

In a socioeconomically diverse sample of perinatal women, study findings demonstrate that IPV appears to have a strong direct relationship with postpartum depression, a relationship that did not change with poverty status. Experiencing IPV was associated with a 10% increase in postpartum depression scores, or 3 points on the 30-point EPDS scale. This is a magnitude consistent with prior studies of depression in general and postpartum depression specifically (Beydoun et al., 2012). Given that an EPDS score of 12 is a commonly used depression-threshold (Gaynes et al., 2005), an increase of 3 points is often clinically significant.
In contrast to IPV, poverty’s association with depression was not direct, appearing to operate through its relationship with IPV. Prior studies have found that, in addition to genetic and hormonal causes, environmental stressors are a primary pathway into depression (Corwin, Kohen, Jarrett, & Stafford, 2010; L. A. Goodman et al., 2009; Miller & LaRusso, 2011; Wylie, Hollins Martin, Marland, Martin, & Rankin, 2011). As environmental factors, IPV and poverty are thought to lead to depression through their net effect upon stress, low social support, and negative cognitions. In making sense of their differential association with postpartum depression and in light of the above studies, it may be that partner violence is more likely to affect all of these dimensions, while poverty, certainly producing a stressful environment, is more often mitigated by supportive social networks and a non-subjective interpretation of the hardship experienced. Among victims, social isolation from family and friends as well as psychological abuse targeting self-esteem and personal empowerment are well-known hallmarks of IPV (Black et al., 2011). Poverty, on the other hand, has been associated with fragmented social networks, but also with social integration through shared values of solidarity (to family, to a social group), collective rather than individual responsibility attributions, and negotiating resource sharing (Bohnke, 2008; Offer, Sambol, & Benjamin, 2010). Furthermore, being poor does not automatically carry the stigma and the self-blaming that so often accompanies IPV (Bohnke, 2008), social and personal attributions of blame that have been linked to psychological distress and subsequent coping styles (Arnell, 2006). Even among IPV victims, negative and self-blaming cognitive appraisal can be stronger predictors of depression than the actual frequency or severity of the abuse (Martinez-Torteya, Bogat, von Eye, Levendosky, & Davidson,
It also could be that the changing social roles, economic burdens, and emotional intensity of the postpartum period produce a unique response to experiences of IPV, poverty, and depression.

Studying IPV-poverty-depression within the perinatal context presents this interrelationship from a very specific lens, one colored by the distinctive demands and influences of pregnancy and postpartum. Physical, social, and emotional fluctuations are typical during this time (Haas et al., 2005). Certainly, the economic burden of increasing family size is well known. Further, movement in and out of depressive episodes is common (Cox et al., 1993; Gaynes et al., 2005). Finally, the nature of IPV can change throughout the perinatal period, lifting during pregnancy only to resume during the postpartum year (Gielen et al., 1994; S. L. Martin et al., 2001b). Women have reported finding it much harder to leave an abusive partner during the perinatal period for several reasons: increased social pressure to stay together, fear of being the sole parent and financial provider, and a natural inclination to reinvest in the relationship for the sake of the infant (Lutz, 2005). The degree to which being pregnant or postpartum changes the interrelationships of partner violence, poverty, and depression is unknown. However, the increased triggering of depression during postpartum suggests that this period is a sensitive one, heightening the depressive response to poverty and partner violence rather than dampening it, and making perinatality a revealing window through which to view the interplay of these phenomena.

The correlation of IPV and depression in this study was not just independent of poverty, but was independent of other psychosocial covariates, such as substance abuse, unplanned pregnancy, and housing instability. While the strength of the IPV-depression
relationship in the face of known depression contributors does not prove causality, other studies have found a stepwise pattern between violence and depression levels—the more severe the violence, the greater the depression (Lindhorst & Beadness, 2011; MacMillan & Kruttschnitt, 2005). Longitudinal studies have documented temporal precedence, whereby depression develops subsequent to partner violence, and decreases, although not completely, once the violence ceases (Campbell & Sullivan, 1994; Kernic, Holt, Stoner, Wolf, & Rivara, 2003; Lindhorst & Beadness, 2011). This study adds to the accumulating evidence that IPV may be a key environmental pathway to depression.

In contrast, poverty’s association with depression is indirect, perhaps by exposing individuals to high-risk situations such as IPV. Study findings show that IPV is over two times higher among those in poverty, and that IPV mediates the relationship between poverty and depression. Other research has shown that IPV and poverty not only co-occur at high levels, but they reciprocally magnify each other (L. A. Goodman et al., 2009). Over the course of emotional and physical victimization and deliberate sabotage by their abusive partners, women can lose their jobs and employability, their credit rating, acquire a criminal record, and alienate friends and family (Adams et al., 2008; Moe & Bell, 2004; Riger et al., 2002), all precipitating a slide into poverty. In turn, poverty places women at risk of IPV by increasing household stressors that trigger violence; by limiting their housing, transportation, and childcare options; and by reducing access to medical, legal, and mental health services (Fox & Benson, 2006; World Health Organization, 2000). This is borne out by studies finding that women victims express the greatest need for and the greatest benefit from employment, legal, housing, and welfare services that support their economic independence, and that financial concerns play a
large role in decisions of whether or not to leave an abusive relationship (Dichter & Rhodes, 2011). Long-term effects of staying in IPV relationship may include poor mother-child attachment and childhood abuse or neglect by mother who suffers from increased stress or depression (Levendosky, Bogat, & Huth-Bocks, 2011; Quinlivan & Evans, 2005).

The strengths of this study include the economic and violence-related diversity of the sample, which enabled the examination of these two predictors’ roles. Additionally, the primary study measures had good validity: Depression was based upon a validated screener, IPV was drawn from items widely-adopted across healthcare settings, and the poverty variable was correlated with other socio-economic measures, maternal and paternal education. The consistency of study depression and IPV prevalence figures with other population-based maternal studies (Cox et al., 1993; Gaynes et al., 2005; Gazmararian et al., 1996) further validates study measures. Another strength was the collection of key correlates of the primary study variables (such as substance use, homelessness, and age) for inclusion in the analysis. Finally, this study examined the complex dynamic of IPV-poverty-depression during the critical period of perinatality, addressing an existing gap in the literature.

As with any study, there are also limitations. A primary limitation is that the cross-sectional design restricted causal inferences about the temporal sequence and interactive paths of poverty, IPV, and depression. Thus, the authors were unable to exclude the alternate interpretation that an external, unmeasured factor accounts for both IPV and postpartum depression. Another limitation is that the study did not take into account the treatment of depression, a factor which may have resulted in an inaccurate
assessment of the primary study outcome. Depression has been shown to be responsive
to treatment, both psychotropic treatment and counseling. Treatment, in turn, can be
dependent upon income, making this an important confounder. A factor reducing the
confounding effect of treatment is that the perinatal period is one of universal insurance
coverage; all participants were insured and, thus, had increased access to depression
treatment throughout the study period. Also a potential limitation is the self-report nature
of the IPV variable as well as covariates such as drug or alcohol usage; such stigmatizing
problems tend to be underreported. Small sample sizes in the two IPV-positive groups
warrant caution interpreting study findings. Finally, the generalizability of study findings
is compromised by the lower recruitment of poor, uneducated women and the higher
drop-out rate of poor, high-risk subjects. It could be that the higher-risk attrition group
was different from the study group in ways that may bias study findings, including
overstating the effect of IPV or misrepresenting the IPV-poverty relationship.

Conclusion

In sum, study findings point to a direct connection between IPV and depression,
and between IPV and poverty. Partner violence is directly related to a 10% increase in
the severity of postpartum depression and a more than two-fold increase in odds of
poverty. Poverty’s relationship to depression appears to be indirect, through IPV, and to
be unassociated with the IPV-depression link.

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CHAPTER IV
THE VARIATION OF PARTNER VIOLENCE ACROSS PREGNANCY AND POSTPARTUM AND ITS ASSOCIATION WITH MATERNAL SOCIOECONOMIC STATUS

Introduction

Across the lifespan, women are most likely to experience intimate partner abuse (IPA) in their young adult years, ages 18-24, which coincide with peak childbearing (Black et al., 2011; Hamilton, Martin, Ventura, & Centers for Disease Control and Prevention (DHHS/PHS), 2012; Renner & Whitney, 2010; Thompson et al., 2006). IPA is known to contribute to unplanned pregnancies through sexual assault and coercion as well as birth control sabotage (Coker, Sanderson, & Dong, 2004; Gee, Mitra, Wan, Chavkin, & Long, 2009; Hathaway, Willis, Zimmer, & Silverman, 2005; Kothari, Cerulli, Marcus, & Rhodes, 2009; Miller et al., 2010). Early research showing higher rates of assault among pregnant women led to the conclusion that pregnancy itself was triggering violence onset (Gelles, 1975; Helton, McFarlane, & Anderson, 1987).

However, subsequent studies tracking violence from pre-conception through pregnancy demonstrated substantial reductions in prevalence of physical and sexual victimization during pregnancy, with 25% to 75% lower prenatal rates compared to the 12 months prior to pregnancy (Bacchus, Mezey, & Bewley, 2004; Charles & Perreira, 2007; Curry, 1998; Diaz-Olavarrieta et al., 2007; Dunn & Oths, 2004; Heaman, 2005; Leung, Leung, Lam, & Ho, 1999; Muhajarine & D'Arcy, 1999; Saltzman, Johnson, Gilbert, & Goodwin, 2003; Thananowan & Heidrich, 2008). Among a nationally representative sample of pregnant
women, partner violence was reported by an estimated 4.1% (Saltzman et al., 2003), somewhat below the 5.9% past-year prevalence found among a nationally representative sample of adult women in general (Black et al., 2011). Prenatal prevalence ranges from 0.9% to 30%, depending upon the population studied; similar to non-perinatal women, the highest rates occur among poor (Medicaid, unemployed, extremely low income) women (Bacchus, Mezey, & Bewley, 2006; Covington, Hage, Hall, & Mathis, 2001; Curry, 1998; Dunn & Oths, 2004; Gazmararian et al., 1995; Gazmararian et al., 1996; S. L. Martin, Mackie, Kupper, Buescher, & Moracco, 2001; McFarlane, Parker, & Soeken, 1997; Yost, Bloom, McIntire, & Leveno, 2005). However, no studies have examined whether socioeconomic status operates more strongly during this period.

**Nature of Violence During Pregnancy**

Prenatal onset of violence (physical or sexual assault) has been shown to occur, but only for a minority of women; roughly a quarter of assaulted pregnant women report that the physical abuse began during the pregnancy (Daoud et al., 2012; Guo, Wu, Qu, & Yan, 2004; S. L. Martin, English, Clark, Cilenti, & Kupper, 1996; Saltzman et al., 2003; Stewart & Cecutti, 1993). For the remaining three-quarters, prenatal violence represents a continuation of prior violence (Daoud et al., 2012; Guo et al., 2004; S. L. Martin et al., 1996; Saltzman et al., 2003; Stewart & Cecutti, 1993). Women experiencing ongoing assaults are split between those reporting that violence increased during pregnancy and those reporting that violence stayed the same or decreased (Bacchus et al., 2006; Campbell, 2004; Campbell, Oliver, & Bullock, 1993; Helton et al., 1987; Jasinski, 2004; S. L. Martin et al., 1996; Stewart & Cecutti, 1993). The strain resulting from pregnancy-related relationship changes, increased financial pressures, an unwanted pregnancy and/or
questions of paternity serve as additional violence triggers for these already high-risk couples (Bacchus et al., 2006; Edin, Hogberg, Dahlgren, & Lalos, 2009; Edin, Dahlgren, Lalos, & Hogberg, 2010; Jasinski, 2001; S. L. Martin et al., 2004; World Health Organization, 2005). Irrespective of whether prenatal abuse is new or ongoing, increasing or decreasing, prenatal partner violence is associated with greater abuse severity, morbidity and mortality overall, an acuity that exists independent of the pregnancy itself (Campbell, 2004; Campbell et al., 1993; Castro, Peek-Asa, & Ruiz, 2003; Edin et al., 2009; Jasinski, 2004). Finally, just as IPA in general is tied to strong cultural norms and thus varies widely across and within nations, violence against pregnant women has its own set of norms; cultures with high tolerance of IPA in general may or may not extend this to perinatal (pregnant or postpartum) women (Black et al., 2011; World Health Organization, 2005). Socio-cultural norms associated with partner violence include gender-attitudes, female mobility and autonomy, the level of socioeconomic equality between genders, and the degree to which partner abuse is considered a private matter (World Health Organization, 2005).

In addition to physical/sexual violence, the few studies that have directly examined patterns of emotional abuse during pregnancy have shown that increased emotional conflict during pregnancy is widespread, is often reciprocal, and has been identified among non-abusive couples, couples with a history of violence between them as well as prenatally-violent couples (Castro et al., 2003; Gielen, O'Campo, Faden, Kass, & Xue, 1994; S. L. Martin et al., 2004; Parker, McFarlane, Soeken, Torres, & Campbell, 1993). Regardless whether accompanied by assaults, emotional insults and controlling behaviors during pregnancy tend to revolve around the woman’s sexuality, her physical
appearance, and, particularly after birth, her fitness as a parent and her financial
independence (Bacchus et al., 2006; Campbell et al., 1993). While findings from one
study hint at a possible correlation between reduced physical abuse and increased
emotional abuse during pregnancy (Parker et al., 1993), it is unknown whether there are
differential increases in emotional abuse depending upon the prenatal pattern of abuse
(e.g., cessation, continuation or onset of violence) (Taillieu & Brownridge, 2010).

Postpartum Violence

In sharp contrast to the plethora of prenatal investigations, relatively little research
has focused upon violence in the postpartum period, and only a few studies have tracked
partner violence from pre-conception through pregnancy and on into postpartum
(Charles & Perreira, 2007; Curry, 1998; Jasinski, 2004; S. L. Martin, Arcara, & Pollock,
2012; S. L. Martin et al., 2001; Romito, Pomicino, Lucchetta, Scrimin, & Turan, 2009;
study, the only United States sample, was a population-based survey of North Carolina
women at 3.5 months postpartum. They estimated that 3.2% of women had been
physically assaulted in the time since delivery, primarily (76%) by their partner, for an
estimated 2.4% postpartum partner violence prevalence. Compared against their
estimates of 4.7% pre-pregnancy and 4.1% prenatal partner violence, this suggests a
pattern of lower violence levels postpartum. Although representing assaults from all
parties rather than exclusively by partners, Martin et al. also found that nearly two-thirds
(63.0%) of postpartum violence was ongoing from before and/or during pregnancy, that
14.1% was a resumption from before pregnancy, and that nearly a quarter (22.8%)
represented women abused for the first time during the postpartum period. This study
was limited by their assessment of violence using a single physical abuse item, a methodology that undercounts abuse (S. L. Martin et al., 2012; Petersen, Saltzman, Goodwin, & Spitz, 1998; Taillieu & Brownridge, 2010), and by combining partner with non-partner abuse in the estimates of abuse patterns. The two other studies examining assaults across perinatality document mixed results: Daoud et al.’s (2012) interview study of Canadian women at 6 months postpartum using nine physical abuse and one sexual abuse item also documented low prevalence postpartum, compared to prenatal and pre-pregnancy (2.2% postpartum, 3.3% prenatal, and 8.2% pre-pregnancy), but their Canadian sample was biased towards married/cohabiting (91.6%), higher income (62.6% with annual household incomes $50,000+ Canadian), urban (83.1%) women. Like the Martin et al. (2001) study, their initial estimates were for abuse by any perpetrator and, from there, specified the proportion of abuse committed by partners. Unlike the Martin et al. study, only 52% of abuse was perpetrated by partners; making it even more difficult to extract from these figures the partner violence prevalence and patterns across perinatality.

At the other end of the spectrum are the study results by Guo et al. (2004) of married, Chinese women interviewed at 11 months postpartum about partner violence, which used four physical-abuse items and five sexual-abuse items and found rates of 7.4% postpartum, 3.6% prenatal and 8.5% in the year before pregnancy. Missing from the literature is evidence regarding the emotional, physical, and sexual abuse (using multiple items to assess the specific dimensions of abuse) experienced by United States women, and delineated into the periods before, during, and after pregnancy.

Another small group of studies examined postpartum violence relative to prenatal but not pre-conception violence (Cerulli, Talbot, Tang, & Chaudron, 2011; Charles &
Perreira, 2007; Gielen et al., 1994). Among these investigations, the longer the postpartum period examined and the lower the socioeconomic status of the sample, the higher the postpartum abuse rates: Gielen et al. (1994) found 19.3% of low-income women experienced physical assaults within the first 6 postpartum months compared to 9.3% prenatally. Charles and Perreira (2007) found that 3.1% of a mixed-income, urban population of women reported physical assaults within the first 12 postpartum months compared to 1.7% prenatally. Cerulli et al. (2011) documented 3.0% physical violence in the first month after delivery compared to 8.6% during pregnancy among low-income minority women. The two studies that traced emotional abuse as well as physical violence reported conflicting findings: Charles and Perreira, in their nationally representative sample, found that emotional abuse increased from the prenatal to postpartum period (from 7.5% to 17.3%), similar to the increase in physical abuse (from 1.7% to 3.1%). However, Gielen et al., in their low income, minority population found that, while physical abuse increased during postpartum (from 9.8% to 19.3%), verbal-only abuse decreased (from 33.5% to 21.8%). In sum, while there has been much research on various aspects of perinatality and abuse, no studies have yet examined how perinatal status (non-perinatal, pregnancy, postpartum) is associated with changes in emotional, physical, and sexual abuse by partners.

**Socioeconomic Status and Perinatal Abuse**

Regardless of perinatality, low income women are at increased risk of IPA, with 20-30% victimized in the past year (Bassuk, Dawson, & Huntington, 2006; Tjaden & Thoennes, 2000b), compared to 5.9% among a nationally representative, socioeconomically diverse sample (Black et al., 2011). Up to 56% of extremely low
income women, those receiving welfare benefits, report experiencing IPA in the prior year (U.S. General Accounting Office, 1998). Partner violence itself may be quite varied from couple to couple, with abuse at the low end of the spectrum characterized by minor severity, intermittent assaults and mutuality, while systematic abuse at the severe end is marked by multiple forms (physical, psychological, sexual), lethality, and high frequency (Holtzworth-Munroe, 2000; Johnson, 1995, 2006; MacMillan & Kruttschnitt, 2005; Tjaden & Thoennes, 2000a). Low socioeconomic status, especially if coupled with unemployment, is a significant risk factor for systematic abuse (MacMillan & Kruttschnitt, 2005).

The relationship between low socioeconomic status and violence is thought to stem from a constellation of factors, including violence that is triggered by the stress of living in poverty, violence associated with substance abuse and addiction (which can precipitate the slide into poverty), and a lack of resources that keep women entrenched in abusive relationships (Hotaling & Sugarman, 1986; World Health Organization, 2000). Women with fewer stable economic resources are more likely to remain in abusive relationships and to continue to be victimized (Benson, Fox, DeMaris, & VanWyk, 2000; Bybee & Sullivan, 2005). In turn, partner violence can lead to victims’ financial instability through economic exploitation by the abuser as well as interference with employment (Adams, Sullivan, Bybee, & Greeson, 2008; Moe & Bell, 2004; Riger, Raja, & Camacho, 2002). Abusive tactics that lead to economic insecurity include theft, property destruction, credit fraud, controlling access to money, assaults immediately before job interviews, refusing childcare, tampering with transportation, and harassment while at school or work (Adams et al., 2008; Bachman & Saltzman, 1995; Benson et al.,
2000; Beydoun, Beydoun, Kaufman, & Zondeman et al., 2012; Kessler, 1994; Raphel, 1999). The international WHO domestic violence study identified the following socioeconomic factors as the most influential in partner violence: women’s educational level and financial autonomy, and men’s employment status (World Health Organization, 2005).

The majority of perinatal-IPA studies in the United States have been drawn from low-income clinic populations and, similar to non-perinatal studies, have consistently found elevated assault rates compared to national prevalence figures (Covington et al., 2001; Curry, 1998; Dunn & Oths, 2004). Similarly, studies of socioeconomically diverse prenatal populations report that lower socioeconomic status (less education, housing instability, and unemployment) presents a four-fold risk of assault (Saltzman et al., 2003). Suggesting that socioeconomic factors may play a different role in postpartum violence than they do in prenatal violence, Charles and Perreira’s (2007) mixed-income study documented that employment was associated with lower postpartum violence but not lower prenatal violence. However, no studies were identified that investigated whether socioeconomic status was related to fluctuations in IPA across perinatality.

In sum, while IPA varies widely across couples, it is consistently higher among those living in poverty and, although it varies widely by socioeconomic status, there appears to be a trending downward of violence during pregnancy. The bulk of research has concentrated on prenatal physical assaults, however, and little is known the ebb and flow of different types of violence (emotional, physical, sexual) from pre-pregnancy through the postpartum period, and the degree to which poverty interacts with this flow. Understanding the prevalence of various perinatal violence patterns (e.g., no abuse at all,
complete cessation with pregnancy, temporary cessation with postpartum resumption, first occurrence prenatally, or first occurrence postpartum) as well as the evolution of the abuse itself (type and severity) is essential to developing appropriate interventions both within and outside of healthcare settings.

**Research Questions**

The research questions addressed in this study are:

1. Are there identifiable patterns of perinatal assault, i.e., physical and sexual violence during pregnancy and postpartum, among United States women?
2. Do perinatal rates of abuse vary by type (emotional, physical, sexual)?
3. Do perinatal rates or patterns of abuse vary by maternal socioeconomic status?

**Materials and Methods**

**Design**

The study was a secondary analysis of data that were originally collected in a prospective cohort survey, the Mother’s Mind Matters (MMM) Maternal Depression Survey, to evaluate outcomes from a community-wide maternal depression demonstration project (Liepman, Kothari, & Tareen, 2010). The MMM Maternal Depression Survey recruited 330 postpartum women from the two county delivery hospitals, January 2009 through May 2009 (Liepman et al., 2010). For the current study, the survey data were supplemented by additional variables from county birth records to assess generalizability of the MMM Maternal Depression Survey findings to the county birth population (Kothari, 2012). The Institutional Review Boards of both participating hospitals approved the original survey study and provided human subjects’ protections oversight. Birth records data, and permission to use the data, were obtained from the Michigan
Department of Community Health’s Division for Vital Records and Health Data Development. The Western Michigan University Human Subjects Institutional Review Board approved the current secondary analysis.

**Setting and Participants**

The study was conducted in Kalamazoo County in southwest Michigan, containing two contiguous urban centers and several surrounding rural communities, whose 2009 maternal-infant birth characteristics reflect the national profile on maternal race (76.3% births to white women county compared to 76.8% national), adolescence (9.6% births to adolescent women county compared to 10.0% national), and marital status (41.5% births to unmarried women in the county compared to 41.0% nationally) (J. A. Martin et al., 2011). Study participants met the following eligibility criteria: (1) Kalamazoo County residence, (2) medical clearance by hospital nursing staff, (3) infant going home with mother, and (4) fluency in either English or Spanish.

**Data Collection Procedures for Original Survey**

After recruitment and consent, participants were contacted twice by telephone: at 2 weeks postpartum for a brief depression screening (using the Edinburgh Postnatal Depression Scale [EPDS]) (Cox, Holden, & Sagovsky, 1987) and at 2-months postpartum, for a longer interview which included depression screening, self-reported intimate partner abuse (IPA) victimization, self-reported substance abuse (either alcohol or drug-related), housing stability, employment, whether current pregnancy was planned, and an open-ended question about other life stressors experienced. In addition to the survey interviews, prenatal and delivery medical records were reviewed and the following information abstracted: maternal demographics (age, race, ethnicity, marital
status, insurance status), obstetric history (age of first pregnancy, parity, prenatal care for current pregnancy), prenatal health characteristics (pre-pregnancy Body Mass Index [BMI], prenatal weight gain, smoking, alcohol use, drug use), birth outcomes (gestation, infant birthweight) and intent to breastfeed.

**Measures**

The analytic dataset constructed for this secondary analysis included the study variables of interest: Insurance status (Medicaid or private insurance) served as a proxy measure for socioeconomic status, where Medicaid-paid birth was a marker of “low socioeconomic status” and private insurance-paid birth indicated “higher socioeconomic status.” The proxy, insurance status, had convergent validity with maternal and paternal education ($r = .517$ and $r = .499$, respectively), traditional poverty and socioeconomic indicators (Oakes & Rossi, 2003).

IPA was assessed in two stages: a screening stage and a detailed-description stage. In the first stage, IPA was considered positive if the respondent endorsed one or more of the three screening items: “Have you ever felt afraid at home because of threats of violence?” “Have you ever had a partner or spouse who got very jealous or tried to control your life?” and “Have you ever had a partner that pushed, hit, kicked or otherwise physically hurt you?” These items aligned with IPA screeners commonly recommended for healthcare settings; two were adapted from the Computer-Based IPA Questionnaire (Rhodes, Lauderdale, He, Howes, & Levinson, 2002) and one was adapted from the Domestic Violence Initiative Screening Questions (Badile, Hettz, & Back, 2007).

Women screening IPA positive were subsequently asked a series of questions detailing the nature and timing of the abuse relative to the most recent pregnancy.
Questions about the type of abuse included six items for emotional abuse, five items for physical abuse, and one item for sexual abuse. For each item, the respondent was asked if it had occurred prior to her recent pregnancy, during the pregnancy, or in the 2 months since her delivery. The format and content of items were modeled upon Cerulli et al.’s (2011) approach to asking participants’ experiences with specific abuse behaviors relative to their recent pregnancy. Study participants who reported any physical abuse were further asked about injuries that may have been inflicted and whether they had sought medical treatment for these injuries. Respondents were also asked if they were currently with an abusive partner, whether they had been coerced into the most recent pregnancy, and, finally, whether they had ever sought criminal or civil legal injunctions against their abusive partner. All women screening positive were given a contact name and number at the local domestic assault program and were informed of the services available there.

The emotional and physical abuse items were each then combined into two categories: a dichotomous-measure category where “yes” indicated that one or more items in the category had been endorsed by the study subject, and a continuous-measure category that was the sum total of items endorsed within the category. For the purposes of distinguishing between types of abusive behaviors, the term abuse will be used to reflect any partner-related abuse, whether emotional, financial, social, physical assaults, or sexual coercion. The terms violence and assaults will denote physical violence in the form of physical assaults and/or sexual coercion.

The analytical dataset also contained the following sample descriptors: maternal demographics (age, race [black, white or other]), marital status [married or single]), perinatal characteristics (Kessner Index of Prenatal Care, gravida, maternal Body Mass
Index category), birth outcomes (prematurity and birthweight), and maternal psychosocial factors, including substance use (self-reported alcohol/drug problem and medical record documentation of prenatal smoking, alcohol use, or drug use), depression (self-reported history of depression, screening positive for current depression using the Edinburgh Postnatal Depression Scale [Cox et al., 1987]), whether current pregnancy was planned and whether women’s first pregnancy was as an adolescent, and two socioeconomic indicators (whether participant works outside the home, and housing stability). Data for the generalizability comparison with the county birth population were based upon birth records and included maternal age, race, marital status, education, insurance, whether first pregnancy or not, whether first birth or not, adequacy of prenatal care, maternal prenatal BMI, and birth outcomes (gestation and infant birthweight).

**Analyses**

The following bivariate comparisons of independent samples were conducted using Pearson chi square for categorical variables and one-way ANOVA for continuous variables: (a) comparing the study sample with the 2009 county birth population; (b) comparing study subjects that were lost to follow-up with those contained in the final, analytical sample; (c) comparing women reporting current or history of abuse (based upon the screening questions) with women not experiencing abuse; and (d) comparing socioeconomic status across the three patterns. Where cell sizes were expected to drop below 5, Fisher’s Exact test was used.

Generalized estimating equation (GEE) regression was used for the bivariate comparison of related samples and the mixed-model multivariate analysis. GEE produces consistent and unbiased estimates for multivariate analysis of nested data when
the underlying correlation structure of the data is unknown or is potentially non-linear, as is the case with this dataset (Ghisletta & Spini, 2004; Zeger & Liang, 1986). Bivariate comparisons of perinatal period (the repeated variable: before, during, and after pregnancy) were conducted for each of the abuse items as well as the categorical abuse-type variables (both the dichotomous measure and the continuous measure). These comparisons between perinatal status and abuse behaviors were run four times, for (1) all women reporting any history of emotional, physical or sexual abuse, (2) the heightened-risk sub-group, defined as women who were still with an abusive partner at the 2-month postpartum survey or had been coerced into the most recent pregnancy or reported emotional abuse during pregnancy/postpartum, (3) the perinatal-violence sub-group, all women experiencing either physical or sexual assault during or after their most recent pregnancy, and (4) stratified by perinatal-violence pattern.

For the mixed-model multivariate analysis assessing the relative association between perinatal status (the repeated variable) and socioeconomic status (the fixed variable) upon abuse, three binary logistic models were run: (1) emotional abuse, (2) physical abuse, and (3) sexual abuse. Perinatal status and socioeconomic status were separately examined as (a) independent predictors of each abuse type, (b) interacting with each other upon abuse, and (c) as potential mediators of each other.

The criterion for confounding was, first, if socioeconomic status was significantly associated with abuse, controlling for perinatal status; and, second, if IPA was significantly associated with abuse, controlling for socioeconomic status. To test socioeconomic status and perinatal status for moderation, a combined term was created (perinatal status × SES) and included in the model along with the independent variables
perinatal status and poverty. Statistical significance of the perinatal status × SES term would indicate an interaction effect (Aguinis & Stone-Romero, 1997). Both predictors, socioeconomic status and perinatal status, were tested for mediation by applying regression results to Baron and Kenny’s (1986) four-step approach, where a predictor was found to be mediated if (1) predictor was significantly associated with outcome depression in a simple regression, (2) predictor was significantly associated with mediator in a simple regression, (3) mediator was significantly associated with outcome depression in a simple regression, and (4) mediator remained significantly associated with outcome depression, controlling for predictor in a multiple regression analysis.

The methods and criteria for drawing causal inferences are controversial and vary by discipline (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). The Baron and Kenny method, considered a causal-steps approach, is the most commonly used strategy, in part due to its simplicity and in part because of its low Type I error (MacKinnon et al., 2002). The primary limitation to the causal-steps approach is a higher Type II error compared to other methods (MacKinnon, Fairchild, & Fritz, 2007).

Tests were conducted with two-tailed significance levels set at $p \leq .05$. For analyses involving less than 20 subjects, significance levels were set at $p \leq .10$ in an effort to minimize Type II error. Data analyses were completed using SPSS v21.0.

**Results**

**Sample**

Of the 330 recruited study participants, 4 withdrew prior to survey completion, citing lack of time. As illustrated in Table 4.1, the remaining 326 participants were similar to the 2009 Kalamazoo County maternal population regarding several
demographic and health-related characteristics: maternal age, race, marital status, paragravida (first pregnancy or not), gravida (first birth or not), prenatal BMI, having a singleton birth, and infant birthweight. However, study participants were more likely than the county maternal population to have a college degree, to have private insurance, and to deliver a full-term infant, at least 37 weeks gestation.

Table 4.1

Comparing Maternal Characteristics and Birth Outcomes of Study Sample with Kalamazoo County, Michigan, 2009 Birth Population

<table>
<thead>
<tr>
<th>Maternal Demographics</th>
<th>2009 County Maternal Population</th>
<th>Study Sample</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% or mean, CI</td>
<td>% or mean, CI</td>
<td></td>
</tr>
<tr>
<td>Age = mean</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adolescent</td>
<td>27.3 (27.1, 27.5)</td>
<td>27.3 (26.7, 27.9)</td>
<td>.848</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>76.3% (74.7, 77.9)</td>
<td>80.1% (75.4, 84.0)</td>
<td>.250</td>
</tr>
<tr>
<td>Black</td>
<td>19.5% (18.1, 21.1)</td>
<td>17.2% (13.5, 21.6)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>4.2% (3.5, 5.0)</td>
<td>2.8% (1.5, 5.2)</td>
<td></td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>58.5% (56.6, 60.3)</td>
<td>59.8% (54.4, 65.0)</td>
<td>.637</td>
</tr>
<tr>
<td>Single</td>
<td>41.5% (39.7, 43.4)</td>
<td>40.2% (35.0, 45.6)</td>
<td></td>
</tr>
<tr>
<td>Maternal Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than high school</td>
<td>12.6% (11.4, 13.9)</td>
<td>11.3% (8.3, 15.3)</td>
<td>.007</td>
</tr>
<tr>
<td>High school grad or GED</td>
<td>53.8% (51.9, 55.7)</td>
<td>46.3% (41.0, 51.7)</td>
<td></td>
</tr>
<tr>
<td>Bachelor’s or postgraduate degree</td>
<td>55.7% (31.8, 35.4)</td>
<td>42.3% (37.1, 47.8)</td>
<td></td>
</tr>
<tr>
<td>Insurance Status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private</td>
<td>51.8% (49.9, 53.7)</td>
<td>58.6% (53.2, 63.8)</td>
<td>.032</td>
</tr>
<tr>
<td>Medicaid</td>
<td>47.6% (45.7, 49.5)</td>
<td>41.4% (36.2, 46.8)</td>
<td></td>
</tr>
<tr>
<td>No insurance</td>
<td>0.6% (0.4, 1.0)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Perinatal Characteristics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paragravida</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First pregnancy</td>
<td>30.9% (29.2, 32.7)</td>
<td>35.0% (30.0, 40.3)</td>
<td>.146</td>
</tr>
<tr>
<td>Had previous pregnancy</td>
<td>69.1% (67.3, 70.8)</td>
<td>65.0% (59.7, 70.0)</td>
<td></td>
</tr>
</tbody>
</table>
Table 4.1—Continued

<table>
<thead>
<tr>
<th></th>
<th>2009 County Maternal Population&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Study Sample&lt;sup&gt;b&lt;/sup&gt;</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% or mean, CI&lt;sup&gt;^&lt;/sup&gt;</td>
<td>% or mean, CI&lt;sup&gt;^&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td><strong>Gravidity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First live birth</td>
<td>40.9% (39.1, 42.8)</td>
<td>45.1% (39.8, 50.5)</td>
<td>.153</td>
</tr>
<tr>
<td>Previous live births</td>
<td>59.1% (57.2, 60.9)</td>
<td>54.9% (49.5, 60.2)</td>
<td></td>
</tr>
<tr>
<td><strong>Singleton</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>97.8% (97.2, 98.3)</td>
<td>97.9% (95.6, 99.0)</td>
<td>1.00</td>
</tr>
<tr>
<td><strong>Prenatal Care (Kessner Index)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adequate</td>
<td>65.9% (64.3, 67.9)</td>
<td>66.3% (61.8, 72.0)</td>
<td>.055</td>
</tr>
<tr>
<td>Intermediate</td>
<td>26.6% (25.1, 28.4)</td>
<td>28.2% (23.9, 33.7)</td>
<td></td>
</tr>
<tr>
<td>Inadequate</td>
<td>7.1% (6.3, 8.2)</td>
<td>4.3% (2.6, 7.2)</td>
<td></td>
</tr>
<tr>
<td><strong>Prenatal BMI</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underweight</td>
<td>3.6% (3.0, 4.4)</td>
<td>2.1% (1.0, 4.4)</td>
<td>.350</td>
</tr>
<tr>
<td>Healthy weight</td>
<td>45.2% (43.3, 47.1)</td>
<td>44.8% (39.5, 50.2)</td>
<td></td>
</tr>
<tr>
<td>Overweight</td>
<td>25.3% (23.7, 27.0)</td>
<td>23.9% (19.6, 28.8)</td>
<td></td>
</tr>
<tr>
<td>Obese</td>
<td>25.9% (24.2, 27.5)</td>
<td>29.1% (24.5, 34.3)</td>
<td></td>
</tr>
<tr>
<td><strong>Birth Outcome</strong>&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prematurity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;37 wks gestation</td>
<td>8.4% (7.4, 9.5)</td>
<td>4.7% (2.9, 7.6)</td>
<td>.021</td>
</tr>
<tr>
<td>37+ wks gestation</td>
<td>91.6% (90.5, 92.6)</td>
<td>95.3% (92.4, 97.1)</td>
<td></td>
</tr>
<tr>
<td>Birthweight</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adequate (2500+ grams)</td>
<td>92.8% (91.8, 93.8)</td>
<td>94.4% (91.3, 96.4)</td>
<td>.589</td>
</tr>
<tr>
<td>Low birthweight (1500–2499 grams)</td>
<td>6.0% (5.2, 7.0)</td>
<td>4.7% (2.9, 7.6)</td>
<td></td>
</tr>
<tr>
<td>Very low birthweight (&lt;1500 grams)</td>
<td>1.1% (0.8, 1.6)</td>
<td>0.9% (0.3, 2.7)</td>
<td></td>
</tr>
</tbody>
</table>

Note. ANOVA was used for continuous variables and Pearson chi square for categorical variables.

<sup>a</sup> 95% confidence interval.

<sup>b</sup> Michigan Department of Community Health, Division for Vital Records and Health Data Development, Live Birth File and Death File.

Twenty-five participants were lost to study follow-up. They were similar to the remaining 301 participants on age, race, marital status, and level of prenatal care, but were significantly different on having private insurance (40.0% and 67.8%, respectively, \( \chi^2 \) (2) = 9.63, \( p = .008 \)), adequate birthweight (84.0% and 94.6%, respectively, \( \chi^2 \) (2) = 7.25, \( p = .027 \)) and prematurity (88.0% and 93.7%, respectively, \( \chi^2 \) (3) = 13.06, \( p = .005 \)).
Characteristics of Abused Compared to Non-Abused Women

One-fifth (21.3%, \( n = 64 \)) of participants screened positive for current or previous partner abuse. This does not include three women who accepted the option to skip these survey items. Only a third of the women (33.9%) had ever sought legal or law enforcement help for the abusive relationship (police, restraining order, attorney). Among the 64 abused women, 10 (3.3% of 301, the total sample) reported that they were currently with the abusive partner, with half of them (5) feeling coerced into their current pregnancy. The remaining 54 women had experienced abuse with a previous partner.

As seen in Table 4.2, women with abuse histories were less likely than non-abused women to be adolescents currently, but were significantly more likely to have had their first pregnancy as an adolescent \( (p = .003) \). Additionally, abused women were more likely to be single \( (p < .001) \), less educated (without a college degree) \( (p < .001) \), and have public insurance \( (p < .001) \). Although the majority of women worked outside the home regardless of abuse history, abused women, consistent with their lower socioeconomic indicators above, were more likely to experience housing instability \( (p < .001) \). Study participants with Medicaid-paid births were nearly two-and-a-half times as likely to report partner abuse as higher-income participants (33.0% of women with Medicaid-paid deliveries every experienced abuse, compared to 13.8% of privately insured women, a ratio of 2.4 to 1). Finally, abused women reported substantially higher mental health and substance abuse morbidity, with current and previous depression rates twice as high as non-abused women, and self-reported substance abuse problems nine times higher. Despite these demographic and psychosocial differences, abused and non-abused women were similar regarding race, perinatal characteristics, and birth outcomes.
### Table 4.2

*Comparing Maternal Characteristics and Birth Outcomes by Abuse*

<table>
<thead>
<tr>
<th>Maternal Demographics</th>
<th>Never Experienced Abuse&lt;sup&gt;a&lt;/sup&gt; (233)&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Ever Experienced Any Abuse&lt;sup&gt;a&lt;/sup&gt; (63)&lt;sup&gt;b&lt;/sup&gt;</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age = mean</strong></td>
<td>% or mean, CI&lt;sup&gt;^&lt;/sup&gt;</td>
<td>% or mean, CI&lt;sup&gt;^&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Adolescent</td>
<td>27.6 (26.9, 28.4)</td>
<td>27.0 (25.7, 28.3)</td>
<td>.482</td>
</tr>
<tr>
<td></td>
<td>12.0% (8.4, 16.8)</td>
<td>3.2% (0.9, 10.9)</td>
<td>.039</td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>81.1% (75.6, 85.6)</td>
<td>76.2% (64.4, 85.0)</td>
<td>.358</td>
</tr>
<tr>
<td>Black</td>
<td>15.5% (11.4, 20.6)</td>
<td>22.2% (13.7, 33.9)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>3.4% (1.7, 6.6)</td>
<td>1.6% (0.3, 8.5)</td>
<td></td>
</tr>
<tr>
<td><strong>Marital Status: Single</strong></td>
<td>30.5% (24.9, 36.7)</td>
<td>68.3% (56.0, 78.4)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td><strong>Maternal Education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than high school</td>
<td>8.6% (5.6, 12.9)</td>
<td>12.7% (6.6, 23.1)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>High school grad or GED</td>
<td>41.2% (35.1, 47.6)</td>
<td>69.8% (57.6, 79.8)</td>
<td></td>
</tr>
<tr>
<td>Bachelor’s or post-graduate degree</td>
<td>50.2% (43.8, 56.6)</td>
<td>17.5% (10.0, 28.6)</td>
<td></td>
</tr>
<tr>
<td><strong>Medicaid insurance</strong></td>
<td>33.0% (27.3, 39.3)</td>
<td>60.3% (48.0, 71.5)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td><strong>Perinatal Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First pregnancy (current)</td>
<td>36.5% (30.6, 42.8)</td>
<td>27.0% (17.6, 39.0)</td>
<td>.159</td>
</tr>
<tr>
<td>First live birth (current)</td>
<td>47.6% (41.3, 54.0)</td>
<td>34.9% (24.3, 47.2)</td>
<td>.072</td>
</tr>
<tr>
<td>Singleton</td>
<td>97.0% (93.9, 98.5)</td>
<td>100% (94.3, 100)</td>
<td>.352</td>
</tr>
<tr>
<td>Prenatal Care (Kessner)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adequate</td>
<td>68.7% (61.6, 73.5)</td>
<td>64.5% (51.1, 74.3)</td>
<td>.778</td>
</tr>
<tr>
<td>Intermediate</td>
<td>27.8% (22.1, 33.5)</td>
<td>30.6% (20.2, 42.4)</td>
<td></td>
</tr>
<tr>
<td>Inadequate</td>
<td>3.5% (1.7, 6.6)</td>
<td>4.8% (1.6, 13.1)</td>
<td></td>
</tr>
<tr>
<td>Prenatal BMI</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underweight</td>
<td>2.1% (0.9, 4.9)</td>
<td>1.6% (0.3, 8.5)</td>
<td></td>
</tr>
<tr>
<td>Healthy weight</td>
<td>48.5% (42.2, 54.9)</td>
<td>31.7% (21.6, 44.0)</td>
<td>.098</td>
</tr>
<tr>
<td>Overweight</td>
<td>21.5% (16.7, 27.2)</td>
<td>31.7% (21.6, 44.0)</td>
<td></td>
</tr>
<tr>
<td>Obese</td>
<td>27.9% (22.5, 34.0)</td>
<td>34.9% (24.3, 47.2)</td>
<td></td>
</tr>
<tr>
<td><strong>Birth Outcome&lt;sup&gt;c&lt;/sup&gt;</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Premature (&lt;37 wks gestation)</td>
<td>3.9% (2.0, 7.2)</td>
<td>6.3% (2.5, 15.2)</td>
<td>.486</td>
</tr>
<tr>
<td>Birthweight</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adequate (2500+ grams)</td>
<td>93.1% (89.1, 95.7)</td>
<td>96.8% (89.1, 99.1)</td>
<td>.296</td>
</tr>
<tr>
<td>Low birthweight</td>
<td>5.2% (3.0, 8.8)</td>
<td>3.2% (0.9, 10.9)</td>
<td></td>
</tr>
<tr>
<td>(1500–2499 grams)</td>
<td></td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Very low birthweight</td>
<td>1.7% (0.7, 4.3)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 4.2—Continued

<table>
<thead>
<tr>
<th>Psychosocial Characteristics</th>
<th>Never Experienced Abuse $^a$ (233)$^b$</th>
<th>Ever Experienced Any Abuse $^a$ (63)$^b$</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Substance Use</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-reported alcohol or drug problem</td>
<td>1.7% (0.7, 4.3)</td>
<td>18.8% (11.1, 30.0)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Prenatal smoking</td>
<td>10.1% (6.9, 14.6)</td>
<td>9.5% (4.4, 19.0)</td>
<td>.588</td>
</tr>
<tr>
<td>Prenatal alcohol</td>
<td>7.0% (4.3, 11.0)</td>
<td>19.0% (10.9, 30.9)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Prenatal drug</td>
<td>3.2% (1.6, 6.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depression</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Previous depression</td>
<td>19.4% (14.9, 24.9)</td>
<td>45.3% (33.7, 57.4)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Current depression</td>
<td>7.6% (4.9, 11.7)</td>
<td>18.8% (11.1, 30.0)</td>
<td>.008</td>
</tr>
<tr>
<td>Pregnancies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First pregnancy as adolescent</td>
<td>21.1% (16.4, 26.7)</td>
<td>39.1% (28.1, 51.3)</td>
<td>.003</td>
</tr>
<tr>
<td>Current pregnancy planned</td>
<td>55.6% (49.2, 61.8)</td>
<td>24.2% (14.7, 35.1)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Socio-economic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Works outside home</td>
<td>59.9% (53.6, 65.9)</td>
<td>57.8% (45.6, 69.1)</td>
<td>.761</td>
</tr>
<tr>
<td>Housing instability</td>
<td>9.3% (6.2, 13.7)</td>
<td>29.7% (19.9, 41.8)</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

Note. Drugs = non, 0.4% (1) & dv, 15.6% (10). Alc = non, 0.4% (1) & dv, 12.5% (8). Drugs = non (mj), dv (2 Rx, 4 coke/meth, 4 mj).

$^a$ 95% confidence interval.

$^a$ Missing birth records data for 4 non-abuse and 1 abuse participant.

$^b$ Michigan Department of Community Health, Division for Vital Records and Health Data Development, Live Birth File and Death File.

$^c$ Among single gestation.

Patterns of Perinatal Abuse

By abuse category. Four of the 64 women screening positive for abuse chose to skip the detailed abuse questions, leaving 60 participants with responses regarding the timing and the details of the abuse.

As seen in Figure 4.1, all 60 of the victimized participants experienced abuse prior to the current pregnancy; none reported their first occurrence during either the prenatal or early postpartum period. Sixteen women (5.4% of the total sample and 26.7%...
of the women screening positive for abuse) were abused during perinatality. The co-occurrence of multiple types of abuse was high. All abused women reported some level of emotional abuse, and many also experienced physical (47, 78.3%) or sexual (24, 40.0%) assault. A minority of the women (8, 13.3%) reported just one type (emotional) of abuse. Nearly a third (19, 31.7%) was abused emotionally, physically, and sexually. The constellation of abuse types did not vary by whether the couple was currently together or not ($\chi^2 (1) = 0.016, p = .898$).

**Figure 4.1.** The timing and co-occurrence of abusive behaviors, relative to the current pregnancy.

**Rates of prenatal and postpartum physical/sexual violence.** An estimated 3.0% ($n = 9$) women experienced physical or sexual assault during pregnancy and 3.4% ($n = 10$) experienced physical or sexual assault during postpartum, for a total of 12 women (4.0%) assaulted during the perinatal period (see Figure 4.2 for prevalence of abuse type across perinatal status). Compared to women who were assaulted before but not during this period, perinatally assaulted women reported higher rates of injury ($\chi^2 (1)$
= 4.907, \( p = .046 \) Fisher’s Exact) and were more likely to have sought formal help from authorities (\( \chi^2 (1) = 14.706, p < .001 \) Fisher’s Exact). Co-occurring physical and sexual assault was more common during postpartum (4 of 10) than prenatal (2 of 9). Emotional abuse during postpartum was always a continuation of emotional abuse during pregnancy as well as prior to pregnancy.

![Figure 4.2](image)

*Note.* The same woman may appear in multiple abuse categories.

*Figure 4.2.* Prevalence by abuse type and by perinatal status.

**Socioeconomic status.** The ratio of 2.4:1 of poor women experiencing abuse compared to higher-income women reported earlier increased to ratios of 3.2:1 with pregnancy and to 3.7:1 during postpartum. Six of the 9 prenatally assaulted women were low-income (5.4% prevalence among poor women compared to 1.7% prevalence among higher-income women, a ratio of 3.2:1) and 7 of the 10 women physically or sexually
assaulted in the postpartum period were low-income (6.3% prevalence among poor women compared to 1.7% prevalence among higher-income women, a ratio of 3.7:1).

**Patterns of perinatal violence.** Three distinct patterns of perinatal violence emerged: (1) persistent violence, (2) prenatal reprieve followed by postpartum resumption of violence, and (3) prenatal only violence. Among the 12 women reporting physical or sexual assault during or after their most recent pregnancy, 7 (58.3%) reported continuous violence before, during, and after pregnancy (e.g., persistent pattern); 3 (25.0%) reported violence before and after pregnancy but not during (e.g., reprieve/resumption pattern), and 2 (16.7%) reported experiencing violence only during pregnancy (e.g., prenatal only pattern). Regardless of pattern, these women reported ongoing emotional abuse, even during times that physical and sexual assaults ceased. The one woman experiencing sexual assault for the first time during postpartum had previously experienced physical violence, which resumed postpartum.

**By specific abuse behaviors.** The most common type of emotionally abusive behavior, no matter when it occurred, was insults, as shown in Table 4.3. Nearly as frequent was social isolation, fear of conflict, threats, and financial control. The only emotion-abuse item that was experienced by a minority of women was threats to call law enforcement or social service authorities. Compared to emotionally abusive behaviors occurring prior to the recent pregnancy, those occurring perinatally were much more likely to co-occur with each other. Prior to pregnancy, only one set of behaviors (insulting and threatening) were significantly correlated ($r = .392, p \leq .01$). In contrast, during pregnancy all but one of the behaviors (threatening to call authorities) co-occurred at significant levels (from $p = .002$ to $p < .001$), and during postpartum all of the
Table 4.3

*Abuse Behaviors During Pregnancy and Postpartum Compared to Before Pregnancy (N = 60)*

<table>
<thead>
<tr>
<th></th>
<th>Before (n = 60) % (#)</th>
<th>Prenatal (n = 60) % (#)</th>
<th>Postpartum (n = 60) % (#)</th>
<th>All 3 Periods, p value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Emotional Abuse</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Did your partner or spouse ever say insulting things to you (like put you down…calling you fat, ugly, etc)?</td>
<td>100% (60)</td>
<td>26.7% (16)</td>
<td>26.7% (16)</td>
<td>no conv^</td>
</tr>
<tr>
<td>- Did your partner ever threaten to hurt you or other family members?</td>
<td>76.7% (46)</td>
<td>15.0% (9)</td>
<td>16.7% (10)</td>
<td>.001</td>
</tr>
<tr>
<td>- Did your partner ever threaten to call the police, social services, or any other authority on you?</td>
<td>56.7% (34)</td>
<td>11.7% (7)</td>
<td>15.0% (9)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>- Were you ever afraid to disagree with you partner?</td>
<td>65.0% (39)</td>
<td>10.0% (6)</td>
<td>10.0% (6)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>- Did your partner try to keep you away from your family or friends?</td>
<td>66.7% (40)</td>
<td>13.3% (8)</td>
<td>11.7% (7)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>- Did your partner control your money and spending in ways that were not fair you?</td>
<td>56.7% (34)</td>
<td>13.3% (8)</td>
<td>11.7% (7)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td><strong>Physical Abuse</strong></td>
<td>75.0% (45)</td>
<td>15.0% (9)</td>
<td>15.0% (9)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>- Did your partner ever hit, kick, push, shove, grab, pull your hair, or restrain you against your will?</td>
<td>68.3% (19)</td>
<td>15.0% (9)</td>
<td>15.0% (9)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>- Did your partner ever burn, cut or strike you with an object?</td>
<td>11.7% (7)</td>
<td>3.3% (2)</td>
<td>3.3% (2)</td>
<td>.115</td>
</tr>
<tr>
<td>- Did your partner ever use a knife, gun or other weapon on you?</td>
<td>11.7% (7)</td>
<td>1.7% (1)</td>
<td>3.3% (2)</td>
<td>.082</td>
</tr>
<tr>
<td>- Were any of these physical assaults aimed at your head or chest?</td>
<td>41.7% (25)</td>
<td>3.3% (2)</td>
<td>11.7% (7)*</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>- Were any of these physical assaults aimed at your belly?</td>
<td>13.3% (8)</td>
<td>1.7% (1)</td>
<td>6.7% (4)*</td>
<td>.061</td>
</tr>
<tr>
<td><strong>Sexual Abuse</strong></td>
<td>38.3% (23)</td>
<td>3.3% (2)</td>
<td>8.3% (5)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>- Did your partner ever manipulate, trick or force you into having sex when you didn’t want to?</td>
<td>38.3% (23)</td>
<td>3.3% (2)</td>
<td>8.3% (5)*</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

^ GEE regression model did not converge.

Sub-analysis comparing Postpartum to Prenatal: *p ≤ .10.
emotionally abusive behaviors, including threatening to call the authorities, were experienced together by abused women (from $p = .011$ to $p < .001$).

The most typical type of physically abusive behavior, again regardless of perinatal status, was relatively minor in nature (hitting, kicking, pushing, shoving, grabbing, etc.). The following assaultive behaviors appeared lowest during pregnancy, but were not statistically significantly different from the postpartum period: physical assaults aimed at the head or chest ($p = .070$), assaults aimed at the belly ($p = .103$) and sexual abuse ($p = .087$). Assaultive behaviors, in general, were more likely to co-occur than emotionally abusive behaviors, especially the more severely assaultive behaviors: Burning, cutting, striking with object, and using a weapon were perfectly correlated ($r = 1.00$, $p < .001$) during pregnancy and postpartum compared to the co-occurrence of the remaining physically assaultive behaviors (ranging from $r = .323$ $p = .012$ to $r = .865$, $p < .001$). In a pattern consistent with emotional abuse, assaults during pregnancy or postpartum were more likely than assaults prior to pregnancy to be of multiple types, crossing both physical and sexual categories and with statistically significant levels of co-occurrence across all behaviors. Prior to pregnancy, physical and sexual assault co-occurrence was non-significant ($p = .652$), while during both pregnancy and postpartum their co-occurrence was statistically significant at $p < .001$.

**Among heightened-risk women.** Among the sub-group of 25 women with heightened abuse exposure, specific abuse behaviors did not change as dramatically as they did among the larger sample across perinatal periods. Specifically, 6 of the 12 surveyed behaviors remained the same during pregnancy and postpartum compared to before: having a partner threaten to hurt her or her family members, threaten to call the
authorities, hit/kick/push/shove/grab/pull hair or restrain, burn/cut/strike with an object, use a weapon against her, or assault her belly. Reflecting the trend seen above with the total group of ever-abused women, the remaining six behaviors were significantly lessened during the pregnancy/postpartum period (with p values from $p = .002$ to $p = .043$). Also similar to the total trend, assaults aimed at the woman’s head/chest were lowest during pregnancy, although among this higher-risk group, they resumed to near pre-pregnancy levels during the early postpartum months (40.0% pre-pregnancy, 8.0% prenatal, 28.0% postpartum, $p = .043$).

**Among perinatally assaulted women.** Considering the subset of 12 women who disclosed physical or sexual assault during either pregnancy or postpartum, there was no change in the number of emotional-abuse or physical-abuse behaviors they experienced during pregnancy or postpartum compared to before, but, as a group, significantly fewer reported either sexual abuse or prenatal assaults aimed at the head or chest during pregnancy compared to either before conception or after delivery. Five, 41.7%, reported sexual abuse before and the same number reported sexual abuse after, while two, 16.7%, reported sexual abuse during pregnancy (GEE $p = .061$). Similarly, six, 50.0%, reported head/chest assaults before and five, 41.7%, reported head/chest assaults after; while two, 16.7%, reported these sorts of assaults during pregnancy (GEE $p = .096$).

**By perinatal-violence pattern.** Finally, examination of abuse items within each of the three identified perinatal-violence patterns (persistent violence, prenatal-reprieve with postpartum-resumption, and prenatal-only) revealed notable differences. Compared to women in the other two patterns, the seven women in the persistent pattern were the most likely to endorse multiple emotional abuse items, with no discernable change across
the three time frames (before, during and after pregnancy). Despite continuous violence through pregnancy, women in the persistent pattern cited a significant reduction in the number of physical assault items endorsed during pregnancy, compared to before and after (average number 2.1 before, 1.6 pregnancy, 2.7 postpartum of 5 items, GEE, \( p = .002 \)). The three women in the prenatal-reprieve/postpartum-resumption pattern were notable in that all three reported that their partner were financially controlling before, during, and after pregnancy. Neither this behavior nor any other emotional abuse item varied by perinatal period. The number of physical assault items endorsed postpartum was the same as was reported from before pregnancy. The two women in the prenatal-onset group had no statistically significant differences in emotional abuse items across the time periods, nor did they have distinct emotional-abuse characteristics compared to the two other patterns. It should be noted that these results are based upon small sample sizes.

**Relationship of Socioeconomic Status to Perinatal Abuse**

The line charts and multivariate regression results in Table 4.4 illustrate the general trend among perinatal women overall. Namely, perinatal status, rather than socioeconomic status, had a statistically significant main effect upon abuse. While the adjusted effect size of perinatal status upon emotional abuse could not be estimated due to non-convergence from multicollinearity, the reduction in physical and sexual assault during perinatality compared to before pregnancy was marked, even among women exposed to an abusive partner. In contrast, neither the unadjusted nor the adjusted effect size of socioeconomic status for either sample was significant. Finally, the bivariate relationship between abuse and socioeconomic status within each perinatal period was
Table 4.4

Multivariate Regression of Perinatality and Socioeconomic Status upon Abuse (N=60)

<table>
<thead>
<tr>
<th>Perinatal Status</th>
<th>Model 1: Emotional Abuse (n = 60)</th>
<th>Model 2: Physical Abuse (n = 60)</th>
<th>Model 3: Sexual Abuse (n = 60)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% (#) OR (CI^)</td>
<td>% (#) OR (CI^)</td>
<td>% (#) OR (CI^)</td>
</tr>
<tr>
<td>Before</td>
<td>96.7% (58)</td>
<td>NA: Didn’t</td>
<td>38.3% (23)</td>
</tr>
<tr>
<td>Prenatal</td>
<td>26.7% (16)</td>
<td>converge</td>
<td>57.4% (27)</td>
</tr>
<tr>
<td>Postpartum</td>
<td>26.7% (16)</td>
<td></td>
<td>8.3% (5)</td>
</tr>
<tr>
<td></td>
<td><strong>p &lt; .001</strong></td>
<td></td>
<td><strong>p &lt; .001</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Socioeconomic Status</th>
<th>Before (ref)</th>
<th>Prenatal (ref)</th>
<th>Postpartum (ref)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher SES (ref)</td>
<td>41.7% (25)</td>
<td>42.6% (20)</td>
<td>41.7% (10)</td>
</tr>
<tr>
<td>Low SES</td>
<td>58.3% (35)</td>
<td>57.4% (27)</td>
<td>58.3% (14)</td>
</tr>
</tbody>
</table>

^ 95% confidence interval. *p ≤ .01. **p ≤ .05. ***p ≤ .001.
non-significant, which excluded the possibility of a mediation effect, based upon Baron and Kenny’s (1986) method.

**SES by perinatal-violence pattern.** Stratification by the three perinatal-abuse patterns (persistent, reprieve/resumption, prenatal-only), however, revealed that among the 12 women who experienced perinatal violence, socioeconomic status was strongly associated with the pattern of violence experienced. Six of the seven (85.7%) persistent-pattern women had low socioeconomic status (confidence interval, 48.8% to 97.4%), while the remaining two patterns were more likely to occur among high-income women: 2 of 3, 66.7% (confidence interval, 20.8%, 93.9%) with reprieve/resumption-pattern and both, 100% (confidence interval, 34.2%, 100%) with prenatal-only pattern, had higher socioeconomic status ($\chi^2 (2) = 5.731, p = .057$). Additionally, although perinatal-violence pattern itself was not associated with whether currently together with partner or not ($\chi^2 (2) = 0.321, p = .852$), socioeconomic status was: higher-income women were more likely to still be with their partner at the time of the postpartum interview (3 of 4, 75.0%, of perinatally abused women currently with partner had higher socioeconomic status ($\chi^2 (1) = 2.743, p = .098$).

**Discussion**

**Perinatal-Violence Patterns Identified**

As one of the first United States studies tracking partner abuse from pre-conception through early postpartum, study results contribute to the literature by documenting that perinatal violence fell into three distinct patterns: (1) persistent violence, with ongoing physical/sexual assaults throughout; (2) prenatal-reprieve with postpartum resumption; and (3) prenatal-only violence. For the vast majority (95.6%,
285 of the 297 sample) of women, the perinatal period was protective against partner physical/sexual violence. However, among the few that were assaulted during this time, persistent violence, assaults that began prior to conception and continued on through both pregnancy and early postpartum, was the predominant pattern (7 of the 12 perinatal-abused women, 2.3% of the total). Less common were patterns at two ends of the spectrum: the prenatal-reprieve pattern, cessation of violence during pregnancy with resumption postpartum, experienced by 3 of the 12 perinatal-abused women (1.0% of the total); and the prenatal-only pattern, physical/sexual violence that emerged during pregnancy, experienced by 2 of the 12 (0.7% of the total), with desistance after delivery. Notably, none of the study participants reported that the first assault occurred postpartum, although for one woman physical violence escalated to include sexual violence during this time. That the chief pattern is one of persistent-violence extends what was already known from prenatal violence research (i.e., that it is largely a continuation of pre-conceptional violence) into the postpartum period (Daoud et al., 2012; Guo et al., 2004; S. L. Martin et al., 1996; Saltzman et al., 2003; Stewart & Cecutti, 1993). The current study presented a slightly different picture than that of Martin et al.’s (2001) study which, when asking about physical (but not sexual) violence from anyone over a postpartum period that was one-and-a-half times longer, documented two additional patterns (postpartum-only violence, 16.7%, and perinatal-continuous, both prenatal and postpartum, 6.3%), with lower persistent-violence (39.7% to this study’s 58.3%), lower prenatal-reprieve-violence (10.3% to our study’s 25.0%) and higher prenatal-only-violence (27.0% to our 16.7%). Given their larger sample size and longer postpartum period, it is possible that the Martin et al. study identified important perinatal assault
patterns that went undetected by the current study. It is also possible that, given the distinct importance of sexual assault by partners during postpartum, and the inclusion of assaults by non-partners in the Martin et al. study, that study findings here present a more accurate view of perinatal patterns of assault by partners. What is clear from both, however, is that neither pregnancy nor postpartum has a single, uniform effect upon partner violence, and that to ignore the different ways that abuse unfolds throughout perinatality is to misunderstand women’s risk, and to establish inadequate systems of assistance and support.

**Prevalence of Prenatal and Postpartum Violence**

Despite the study focus on detailed examination of perinatal abuse, study results did confirm the generally protective nature of perinatality. Only a quarter of women who screened positive for lifetime emotional, physical, or sexual abuse (16 of 60) reported any abuse during their most recent perinatal period. Further, prenatal-onset of violence was relatively rare and postpartum-onset virtually non-existent. Even those at heightened risk (by virtue of being coerced into the current pregnancy, experiencing perinatal emotional abuse, or currently with their abusive partner) cited reduced abuse during pregnancy and early postpartum for each category of abuse (emotional, physical, sexual) as well as for 6 of the 12 itemized behaviors, with none of the assaultive behaviors increasing during pregnancy. Among those actually experiencing perinatal violence, the number and severity of abuse behaviors was lowest during pregnancy. The finding of lower prenatal abuse is consistent with previous research documenting reduced abuse during pregnancy across varied study populations and study methodologies (Curry, 1998; Diaz-Olavarrieta et al., 2007; Dunn & Oths, 2004; Guo et al., 2004; Leung et al., 1999; Saltzman et al.,...
2003; Thananowan & Heidrich, 2008). The rate of 3.0% prenatal violence in this study is consistent with that of comparable mixed-income studies of partner assault, which have documented rates from 1.7% to 4.1% (Daoud et al., 2012; Guo et al., 2004; Saltzman et al., 2003). Likewise the new-onset rate of 0.7% found here is comparable to other studies’ findings of 0.7% to 1.1% prevalence of women who experience physical assault for the first time during pregnancy (Guo et al., 2004; S. L. Martin et al., 1996; S. L. Martin et al., 2001; Saltzman et al., 2003).

This study extends the above findings to include prevalence in the postpartum period, illustrating that for most women the prenatal protection continues. As noted earlier, just 3.4% of women reported physical or sexual assault during the first postpartum months, and neither violence nor emotional abuse emerged for the first time during this period. Compared to prior research, the study postpartum prevalence is closest to the 3.1% violence rate identified in the mixed-income, multiple item survey study by Charles and Perreira (2007), although they examined a much longer postpartum period, 12 months to this study’s 2 months. The study’s 3.4% postpartum violence rate is slightly higher than the 2.4% of the only other U.S. study of mixed-income women examined within a comparable postpartum timeframe (3.5 months), but whose single-item measure may have resulted in an underestimation. Otherwise, the study postpartum rate falls in between the high-income, multi-item Canadian estimate (2.2%, 11 months postpartum) and the low-income, multi-item U.S. estimate (19.3%, 6 months postpartum) (Daoud et al., 2012; Gielen et al., 1994). Across study methodologies, multi-item operationalization of violence has been consistently associated with detection of higher
violence rates (S. L. Martin et al., 2012; Petersen et al., 1998; Taillieu & Brownridge, 2010).

**Variation of Abuse Type by Perinatality**

By examining the nature of the abuse as well as the timing, the current study shows that perinatal abuse does not occur in a vacuum; it is always preceded by numerous forms of emotional abuse (insults, threats, social isolation, and financial abuse) as well as the co-occurrence of physical and sexual violence. In fact, women in this study who were assaulted during pregnancy and/or postpartum appear to be at greater risk overall, with higher injury rates, higher levels of co-occurring perinatal sexual assault, and greater likelihood of seeking legal assistance for the violence, a common indicator of severity (Klein, 2009; MacMillan & Kruttschnitt, 2005). That prenatal abuse is a marker for abuse acuity is well-supported in the literature (Edin et al., 2010; Gazmararian et al., 1995; Jasinski, 2004). Less well-known has been the degree to which pregnancy itself triggers various types of abuse (Burch & Gallup, 2004; Campbell et al., 1993; Edin et al., 2010; Jasinski, 2004). Study findings show an interaction between abuse type, perinatal-timing, and perinatal-pattern. Results point to the general stability of emotional abuse across perinatality. Not a single woman reported that emotional abuse began during pregnancy or postpartum. Even among women experiencing perinatal violence, neither the total number of emotion items nor the frequency of specific items varied during pregnancy or postpartum compared to the time before, which suggests that the underlying abuse dynamics remain in place. Nor did they vary by violence pattern. As the current study did not measure behavioral frequency, it may be that the acts themselves do not change but their rate of occurrence does, as described by S. L. Martin et al. (2004). It
may also be that the measure used by Martin et al., the CTS 2–Psychological Aggression subscale, had less specificity than the study measures and captured a broader range of negative communication that may or may not have constituted abuse (Ro & Lawrence, 2007).

In contrast, physical assault items, the total number endorsed as well as the frequency of specific items did vary by perinatal-violence pattern and across perinatal period: Clearly the prenatal-reprieve group experienced very different assaultive behavior during pregnancy compared to before and after, but even the persistent-violence group saw a significant reduction in assault-severity (weapon use, assaults aimed at the head or belly) during pregnancy. As indicated by its label, the prenatal-only group had the opposite experience, with pregnancy representing a time of increased rather than decreased violence. Highlighting the importance of stratification by pattern, when these groups were combined, the differences cancel each other out and it appears as if there is no variation in physical assaults before, during, or after pregnancy. Qualitative research has emphasized the destabilizing effect that pregnancy has within an abusive relationship: challenging an abuser’s sense of control over his partner’s body, of exposing their relationship to greater public scrutiny and its attendant social pressures, of increased financial responsibility, and of having to vie for her attention with, first the pregnancy, and then the infant (Bacchus et al., 2006; Campbell, Rose, Kub, & Nedd, 1998; Edin et al., 2009; Edin et al., 2010; Lutz, 2005). Perhaps explaining the various experiences recited by women in the current study, and apparent in the three abuse patterns identified, this qualitative research also reveals that women may respond by utilizing more strategies that involve placation and acquiescence during pregnancy than at other times in order to
thwart physical violence and protect the pregnancy (Bacchus et al., 2006; Campbell et al., 1998; Edin et al., 2009; Edin et al., 2010; Lutz, 2005). Further, while this dynamic may serve to forestall violence during pregnancy, women in these qualitative interviews report that the arrival of the infant often escalates the prenatal stressors, and, without the stigma that may have stayed their abuser’s hand during pregnancy, can lead to violence (Bacchus et al., 2006; Campbell et al., 1998; Edin et al., 2009; Edin et al., 2010; Lutz, 2005). In a study that investigated the evolution of abused women’s perspectives throughout the perinatal period, Lutz (2005) found that women are inclined towards family unity and investment into their partner relationship during pregnancy, but that with birth this investment shifts to their infant and is accompanied by growing disillusionment with their partner and greater resistance to his demands, especially if violence continues.

Finally, distinct from emotional or physical abuse, sexual assault reported by study participants displayed a strong perinatal trend that was constant across all three abuse patterns: lower during pregnancy, returning to pre-conception levels postpartum. The first two steps in this sequence have been well-documented: Sexual assault is common among violent couples (Coker et al., 2004; Gee et al., 2009; Hathaway et al., 2005; Kothari et al., 2009; Miller et al., 2010), and lowers during pregnancy (Bacchus et al., 2004; Cerulli et al., 2011; Diaz-Olavarrieta et al., 2007; Guo et al., 2004). That sexual assault rebounds to pre-pregnancy levels within the early postpartum, however, has been previously undocumented. That sexual tension exerts a strong force over perinatal violence is a central theme from previous research (qualitative, in-depth interviews); both in contributing to physical and sexual assaults but also in their cessation (Bacchus et al., 2006; Campbell et al., 1998; Edin et al., 2009; Edin et al., 2010; Lutz,
Often, this tension contributes to physical and sexual violence with women noting that questions of paternity and anger over the pregnancy frequently accompany assaults (Burch & Gallup, 2004; Campbell et al., 1993; Edin et al., 2010). But it may also explain the reduction in prenatal violence, as those reporting a cessation of violence have attributed it to a reduction in jealousy stemming directly from the fact of their pregnancy (Bacchus et al., 2006).

Maternal Socioeconomic Status and Perinatal Abuse

Study results showed that the perinatal period is protective for women at all income levels, but that socioeconomic status is strongly associated with pattern of perinatal violence and whether still together with abusive partner at the 2-month postpartum mark. Similar to women across the United States regardless of perinatal status, study participants who were poor were twice as likely to report partner abuse as higher-income participants (60.3% of abused women in study receive Medicaid compared to 33.0% of non-abused women) (Bacchus et al., 2006; Covington et al., 2001; Curry, 1998; Dunn & Oths, 2004; Gazmararian et al., 1995; S. L. Martin et al., 2001; McFarlane et al., 1997; Yost et al., 2005). However, once pregnant, poor women were just as likely to receive the protective benefits of the perinatal period as were middle and high income women. Even poor women at heightened risk had lower emotional, physical and sexual abuse during pregnancy and postpartum compared to before conception, with perinatal status outweighing socioeconomic status in predicting abuse. However, among the 12 perinatally abused women, socioeconomic status mattered.

Low-income women, even though they were less likely to stay with their abusive partner, were the ones experiencing ongoing violence throughout pregnancy and early
postpartum. Higher income women, on the other hand, were more likely to experience cessation of violence at some point, either during prenatal or during postpartum. Given that staying with the partner and perinatal-violence pattern were unrelated to each other, these findings suggest that the role played by financial and social resources, rather than uniformly protecting women from perinatal violence, may vary by socioeconomic status. The study finding that ongoing financial control was a universal problem for higher income women in the reprieve-resumption pattern, but not the other patterns, provides additional support for this. Whether women’s financial resources are obtained through their own employment, through public aid, or through their partner’s income, previous research has supplied evidence of exploitation by abusers: by interfering with employment or education, destroying property (affecting transportation, repair/replacement costs, housing), limiting access to money (confiscating employment or welfare checks, stealing cash or property), and ruining her credit by taking out loans in her name (Moe & Bell, 2004; Postmus, Severson, Berry, & Yoo, 2009).

Identifying what lies behind the socioeconomic differences in perinatal abuse is beyond the scope of the current investigation, but other research points to several possibilities. Perhaps abuse tactics are wielded differently by low and higher income abusers (Bacchus et al., 2006; Campbell et al., 1998; Edin et al., 2009; Edin et al., 2010; Lutz, 2005). Or it may be that women’s behavior is more conciliatory or more resistant, depending upon her economic independence (Benson et al., 2000; Bybee & Sullivan, 2005; Moe & Bell, 2004; Postmus et al., 2009; World Health Organization, 2005). The perinatal period could also precipitate significant changes in economic stability (leave of absence from employment, eligibility for public aid or other public programs) which, in
turn, may disrupt the power dynamic within the partner relationship (Medicaid Program, 2005; National Vital Statistics Report, 2012). Finally, it may be that social stigma and institutional practices constrain perinatal abuse differently depending upon socioeconomic context (World Health Organization, 2005).

Limitations

The following study limitations should be considered when interpreting study findings. A primary limitation was the small group sizes, especially the perinatal-violence group, which reduced statistical power and increased the possibility of a Type II error. In addition, the study did not include measures of abuse intensity (such as frequency or severity) which, rather than type of abuse, may be the abuse factor that most changes during pregnancy or postpartum. Also a measurement issue, the study did not temporally define the “before pregnancy” period to the year prior to pregnancy, which would have helped identify whether the woman was in an abusive relationship just prior to pregnancy. Also, asking whether abuse occurred during a prior perinatal period would have enabled stronger conclusions to be drawn about the relationship of abuse and perinatality. Finally, the generalizability of study findings was compromised by the lower recruitment and retention of poor, uneducated women. It could be that the higher-risk attrition group was different from the study group in ways that bias study findings, including the patterns of abuse across perinatality and the relationship of socioeconomic status to these patterns.

Conclusion

Study findings extend what was previously known about prenatal partner abuse into the early postpartum. While protective for most, violence during the perinatal period
unfolded in three distinct patterns for study women: (1) Persistent-violence (58%) stemmed from preconception, through pregnancy and into postpartum, (2) Prenatal-reprieve (25%), cessation during pregnancy with resumption postpartum, and (3) Prenatal-only (17%), onset during pregnancy with cessation postpartum. Emotional abuse was pervasive among abused women, and remained unchanged throughout perinatality. Sexual assault was lowest during pregnancy, but rebounded to pre-pregnancy levels during postpartum.

References


CHAPTER V
DISCUSSION

Using samples of postpartum women from across the socioeconomic spectrum, this dissertation addressed existing gaps in the literature regarding the interplay of three common and devastating problems encountered by pregnant and postpartum women: intimate partner violence (IPV), postpartum depression, and poverty. Dissertation findings confirmed certain relationships that had previously been examined during pregnancy or during postpartum but not both during periods in the same study, and extended these findings to examine their fluctuation over time and by income level. Study findings confirmed existing literature that poor women are consistently at heightened risk of partner abuse (Saltzman, Johnson, Gilbert, & Goodwin, 2003), and that IPV and depression are strongly, directly related regardless of income or perinatal period (pregnancy or postpartum) (Bonomi et al., 2006; Golding, 1999; Kessler, 2003; Kessler et al., 2007). In addition, dissertation findings expanded current evidence by identifying distinct trends in IPV and depression that were associated with perinatal period and with socioeconomic status. For one, perinatality was generally protective against partner assault for women of all income levels (Curry, 1998; Martin, Mackie, Kupper, Buescher, & Moracco, 2001; Thananowan & Heidrich, 2008), but among the small group of women experiencing violence during this time, poor women reported violence throughout, while higher-income women reported violence cessation either during pregnancy or during postpartum. In another trend, women with a history of
partner violence had significantly elevated likelihoods of experiencing postpartum depression; however, socioeconomic status was associated with the timing of depression, with low-income women experiencing depression early in the postpartum period and higher-income women later. Finally, two distinct peaks in depression were identified that cut across socioeconomic status and IPV history, one early (already known as the “baby blues”) and one later at roughly 18 months postpartum, perhaps to be known as the “toddler blues.”

**Poverty Heightens IPV Risk**

Dissertation results identified poverty as a key risk factor for IPV. Existing literature has long demonstrated that poverty exposes women to IPV and that IPV, in turn, exposes women to poverty (Adams, Sullivan, Bybee, & Greeson, 2008; Bassuk, Dawson, & Huntington, 2006; Dichter & Rhodes, 2011). The ratio 2.4:1 of poor women to higher-income study women reporting any history of physical assaults by a partner is similar to found in other studies (Breiding, Black, & Ryan, 2008; Curcio, 1999; Thompson et al., 2006). That the protective nature of pregnancy and postpartum is experienced by all women regardless of income, outweighing the effect of poverty upon IPV, confirms the strength of the perinatal effect (Curry, 1998; Martin et al., 2001a; Thananowan & Heidrich, 2008) and has important implications for where and when to locate IPV screening and intervention services. Finally, study findings hint at an interaction between socioeconomic status and pattern of abuse, with poor women significantly more likely to experience persistent violence throughout pregnancy and postpartum compared to higher-income women.
Perinatality Interacts with Partner Abuse

The protective nature of perinatality has been tied to a combination of factors, including social norms condemning assault against pregnant and newly-delivered women (Campbell, 1999; Campbell, Poland, Waller, & Ager, 1992; World Health Organization, 2005), the greater attention of family and friends as well as the greater exposure to systems of care (Campbell et al., 1992; World Health Organization, 2005), and changing dynamics within the relationship (Bacchus, Mezey, & Bewley, 2006; Campbell, Rose, Kub, & Nedd, 1998; Edin, Dahlgren, & Lalos, 2009; Edin, Dahlgren, Lalos, & Hogberg, 2010; Lutz, 2005). In large measure, however, clinical practice has developed from the premise that pregnancy is a time of greater violence, interpreting the higher rates of abuse among pregnant women and the qualitative reports that pregnancy led to assaults of greater ferocity as proof that pregnancy was a trigger for violence, when the evidence suggests a more complex picture, as seen in dissertation results: abused women have higher rates of pregnancy; those experiencing prenatal violence had greater abuse severity to begin with; that some women do, in fact, experience increased severity and a very few report onset of physical violence, but most women report violence decreased or was the same (Bacchus et al., 2006; Burch & Gallup, 2004; Campbell et al., 1998; Curry, 1998; Diaz-Olavarrieta et al., 2007; Edin et al., 2009; Edin et al., 2010; Fanslow, Silva, Robinson, & Whitehead, 2008; Gazmararian et al., 1996; Kothari, Cerulli, Marcus, & Rhodes, 2009; Lutz, 2005; Saltzman et al., 2003; Stewart & Cecutti, 1993; Taillieu & Brownridge, 2010; Thananowan & Heidrich, 2008).

Regardless of the variety of contributing influences, the end result is that a significant minority of perinatal women experience partner abuse, abuse that carries sharp
penalties to the fetus, to maternal physical and mental health, to infant-bonding, to social relationships and to economic stability (Ahmed, Koenig, & Stephenson, 2006; Bacchus et al., 2006; Bonomi et al., 2006; Centers for Disease Control and Prevention [CDC], 2008; Coker, Sanderson, & Dong, 2004; El-Kady et al., 2004; Horon & Cheng, 2001; Ji et al., 2011; Martin et al., 2001; Pallitto, Campbell, & O'Campo, 2005; Poole et al., 1996; Silverman, Decker, Reed, & Raj, 2006). And poor women figure disproportionately in this minority. Among other factors, financial dependence is a strong force in poor women’s greater IPV exposure (Noel & Yam, 1992; Pulido, 2001; Xu et al., 2005); having a baby can further magnify this dependence (Bacchus et al., 2006; Pallitto et al., 2005; Sales & Murphy, 2000), perhaps accounting for the increased disparity during this time. Dissertation findings highlight, though, that even when pregnancy brings protection rather than risk, any partner abuse (whether current or long ago, whether physical or “only” emotional), has a long arm, one reaching far into the postpartum period to affect women’s mental health.

**IPV and Depression Tightly Linked, Unfolding Differently for Low-, Higher-Income Women**

Regardless of socioeconomic status, postpartum depression may be largely a byproduct of IPV. This dissertation has documented the strong direct association of partner abuse, current or previous, with postpartum depression. Women screening positive to any type of partner abuse were significantly more likely than those with no IPV history to screen positive for depression over an extended, 18-month timeframe. The temporal precedence suggested by study findings, that previous as well as current IPV was associated with postpartum depression, has been explicitly documented in prior literature (Clements & Sawhney, 2000; Lindhorst & Beadness, 2011; MacMillan &
Kruttschnitt, 2005; Mertin & Mohr, 2001; Walker, 2000; Warshaw, Brashler, & Gil, 2009). Other studies have found that depression follows IPV rather than the reverse, and that the more severe the abuse, the more severe the depression (Campbell & Sullivan, 1994; Kernic, Holt, Stoner, Wolf, & Rivara, 2003; Lindhorst & Beadness, 2011; MacMillan & Kruttschnitt, 2005). This has implications for the relative importance of IPV-related education and services as preventive measures against postpartum depression. It also means that a positive depression screen should be a red flag for current or previous partner abuse.

Comparisons of early- and late-onset depressed women shed further light onto the potential of key protective factors, especially for women who have a common history of abuse. The depression delay observed among higher-income women may be an outcome of the shielding effect provided by greater financial resources (especially related to housing stability). It could also be a result of other identified differences: being an adult rather than an adolescent, and having strong networks of social support. These factors have previously been noted as contributing to resilience (Adams et al., 2008; Beydoun, Beydoun, Kaufman, & Zondeman, 2012; Bonomi et al., 2009; Bybee & Sullivan, 2005; Gaynes et al., 2005; Haas et al., 2005; Herman, Harrison, Afifi, & Jenks, 2008; Kornfeld, Bair-Merritt, Frosch, & Solomon, 2012; Lyon, 2000; Marcus et al., 2011; Medicaid Program, 2005; National Vital Statistics Report, 2012; Pausell, Avellar, Martin, & DelGrosso, 2010; Silverman et al., 2006; Sutherland, Bybee, & Sullivan, 1998; Taillieu & Brownridge, 2010; World Health Organization, 2000; Wu, Chen, & Xu, 2012); study results add to the literature by prioritizing their importance, but also perhaps identifying the point at which their protection fails. While these protections may have helped delay
depression, they obviously did not eliminate the risk. This speaks strongly to the need for ongoing screening well beyond the obstetric postpartum visit, and not just to identify women who experience significant depression, but for all women, especially given the mild increase that may be typical around the 18-month mark.

The trajectories of abused, depressed women challenge current practice regarding who, where, and when to target maternal-infant interventions. To begin with, dissertation findings document a consistent progression of abuse from emotional mistreatment (insults, threats, social isolation and financial abuse) to physical and sexual violence, a progression that is cumulative (i.e., abuse behaviors are additive rather than replace each other) and occurs to women across all income levels. That emotional abuse consistently precedes physical and sexual assault points to opportunities for early education and prevention during the early emotional abuse phase, before physical or sexual assault occurs. Also, the relative reprieve common to the prenatal period, even among those with ongoing assaults, can be cause for false hope among victims, and for missed opportunities by public health and healthcare providers who may prematurely dismiss “currently-negative” cases, and bypass safety planning or community referrals. Women with combined histories of IPV and depression should be prioritized for ongoing screening as well as preventive education and referrals, especially given that these problems may not resurge until months after birth.

**Clinical Barriers to Intervention**

Despite brief, effective screening tools and a variety of proven depression interventions available, few women are linked to treatment early in their depressive course (Hasin, Goodwin, Stinson, & Grant, 2005; Marcus, 2009). Once identified as
depressed, several treatment modalities have been shown effective, including counseling, medication, public health case management, and social support (Gaynes et al., 2005; Goodman, 2009; Health Resources and Services Administration, Maternal and Child Health Bureau, 2013; Miller & LaRusso, 2011; Ng, Hirata, Yeung, Haller, & Finley, 2010). Despite this, significant barriers preclude identification such as delayed perinatal care, inadequate screening (infrequent, informal, insensitive), lack of provider training regarding treatment availability (including psychotropic medications and community referrals) and attributing physical signs of depression (fatigue, sleeplessness, changes in appetite) to the perinatal condition (Gaynes et al., 2005; Goodman, 2009; Marcus, 2009; Mojtabai et al., 2010). For socioeconomically or culturally disenfranchised women, additional obstacles include logistics (childcare, transportation, lack of control over employment hours) and limited culturally or linguistically appropriate services (Goodman, 2009; Health Resources and Services Administration, 2013; Mojtabai et al., 2010; Nicolaidis et al., 2010).

Safety-related concerns, patient confidentiality and mandatory reporting requirements, in addition to the same barriers noted above, are just a few of the reasons that IPV identification is even more problematic (DeBoer, Kothari, Kothari, Koestner, & Rohs, 2013; Health Resources and Services Administration, 2013; Klevens & Saltzman, 2009; O'Campo, Kirst, Tsamis, Chambers, & Ahmad, 2011). Effective responses to IPV rely heavily upon service integration and collaboration across health, social, and legal systems (Davis, Weisburd, & Taylor, 2008; Nelson, Bougatsos, & Blazina, 2012; O'Campo et al., 2011; Ramsay et al., 2009). The complexity of IPV, its private nature and its variation across couples necessitates a sensitive, multi-system, multi-level response,
one that empowers the victim through psycho-educational counseling and social support (Bair-Merritt et al., 2010; El-Mohandes et al., 2008; Kiely, El-Mohandes, El-Khorazaty, Black, & Gantz, 2010; Miller & LaRusso, 2011), shores up her practical and financial resources (Blank & Kovak, 2008; Dichter & Rhodes, 2011), and leverages the arm of the law through criminal prosecution, restraining orders, and civil proceedings (Klein, 2009; Kothari et al., 2012).

Professional guidelines specify that IPV and depression screening occur throughout pregnancy and at the postpartum visit; however, in the face of practical, financial constraints and the clinical barriers above, most women are only screened at the beginning of their prenatal care in what is intended to be a comprehensive health and psychosocial risk assessment (American College of Obstetricians and Gynecologists, 2010, 2012; Health Resources and Services Administration, 2013; Nelson et al., 2012). After more than a decade of large-scale public awareness and public funding regarding postpartum depression, depression screening at the postpartum visit has become standard of care (Health Resources and Services Administration, 2013). The same is not true of IPV; the operational assumption that pregnancy is the period of greatest IPV risk has resulted in a misguided lack of attention to the danger inherent in the postpartum period (Mitchell & James, 2009). Just as violence is resuming for higher-income women and lower-income women are losing their pregnancy-related healthcare benefits, very few obstetric practices are actually screening for violence (Guillery, Benzies, Mannion, & Evans, 2012; Health Resources and Services Administration, 2013; Sprague et al., 2012). Finally, programs and clinicians within the perinatal system often assume a medical model diagnostic approach, treating only those who screen positive (American
College of Obstetricians and Gynecologists, 2010, 2012; Health Resources and Services Administration, 2013). Given the disadvantages that may be associated with a positive identification (stigma, mandatory reporting to police or Child Protective Services, retaliatory violence by abuser), a circular approach may be more effective: Provide some level of treatment (psycho-education) to those at risk, regardless of their screening disposition. This approach would enable information to be delivered and support to be communicated to all women, regardless if they disclose victimization to a clinician or not.

Implications for Policy and Practice

Align Response System to the Constellation of Problems

Given the potentially devastating impact that IPV, depression, and poverty carry, an impact that is intensified by their common co-occurrence and the many barriers to service, it makes sense for the response infrastructure to align itself to the constellation of these issues, particularly their ebb and flow before, during, and after perinatality, to the timing of their emergence, the ways in which they overlap, naturally protective conditions, and exacerbating factors. Many of the pieces are currently in place. The perinatal period is one of unprecedented access to health and health-supporting resources, a safety net for women and their infants that includes expanded Medicaid coverage, Title V maternal-infant health programming, Affordable Care Act-supported Maternal-Infant Early Childhood Home Visiting (MIECHV) networks, and Women, Infants and Children nutrition program (WIC) (Adams et al., 2008; Beydoun et al., 2012; Bonomi et al., 2009; Bybee & Sullivan, 2005; Gaynes et al., 2005; Haas et al., 2005; Herman et al., 2008; Kornfeld et al., 2012; Lyon, 2000; Marcus et al., 2011; Medicaid Program, 2005;
National Vital Statistics Report, 2012; Pausell et al., 2010; Silverman et al., 2006; Sutherland et al., 1998; Taillieu & Brownridge, 2010; World Health Organization, 2000; Wu et al., 2012). To stave off the worst of poverty among this most vulnerable group, public aid, in the form of TANF (Temporary Assistance for Needy Families), targets parenting women and young children for cash benefits (Besharov, 2002; Greenberg & Savner, 1999). Additionally, the practice of comprehensive psychosocial-health screening at the first prenatal visit is now widely accepted (if not well-executed), and obstetric offices form the hub from which these services flow (American College of Obstetricians and Gynecologists, 2010, 2012; Health Resources and Services Administration, 2013). These systems exist, but they are fragmented and difficult to navigate (Health Resources and Services Administration, 2013; SACIM [Secretary's Advisory Committee on Infant Mortality], 2013).

**Expand the Reach of Services Earlier and Later in Perinatality**

Even so, much of the above system isn’t activated until after a woman is pregnant and after her first obstetric appointment, both of which are costly delays, especially given that the presence of IPV, depression, and/or poverty increase the former and forestall the latter. Instead, health and social services need to be positioned in front of these problems, with preventive reproductive and health resources available preconceptionally, as early as adolescence, and through multiple doorways, such as school-based, community-based, and faith-based (Health Resources and Services Administration, 2013; Mitchell & Anglin, 2009; SACIM, 2013). Dissertations findings substantiate existing evidence that the accumulation of risk can begin early, underscoring the value of a life course approach
to health, with its emphasis on social determinants and the snowball effects of health risk and health benefit (Lu & Halfon, 2003).

Just as dissertation findings add to the weight of evidence for reaching backwards to provide early, preconceptional care, they also highlight the need for reaching forward with perinatal support, far beyond the standard postpartum clinic visit and well into the early childhood/toddler years. The postpartum resurgence of IPV and later onset depression occur at a time when the current system focus has shifted to the infant, leaving a limited clinical infrastructure around maternal aid (Feinberg et al., 2006; Health Resources and Services Administration, 2013).

The momentum within the healthcare system toward universal access to high quality healthcare that is prevention-oriented, patient-centered, and integrates behavioral, mental, and medical care will help address many of the existing perinatal gaps identified above (Health Resources and Services Administration, 2013; Paulsell et al., 2010; SACIM, 2013; USPSTF: U.S. Preventive Service Task Force, 2013). Of particular note are the growing investment in community health centers and Title X family planning services, as they are foundational for equitable, comprehensive health care among low income individuals and communities (SACIM, 2013). Through the combined forces of reimbursement procedures, administrative infrastructure, professional standards of care, and credentialing requirements (Longest, 2010), the policies suggested by dissertation results can be shaped into clinical practice through enhanced provider training on psychosocial ills that promotes skill development, administrative records systems that support service coordination and track referral dispositions within and across agencies, implementation of validated assessments and response protocols for psychosocial
problems as well as their co-occurrence, and a standardized system for checking the fidelity of such implementation. Finally, linking systems of care with those who are in greatest need often requires moving outside clinic walls into communities and homes; home visiting programs have shown their effectiveness at accomplishing just this, especially among perinatal families (Paulsell et al., 2010).

**Embed Interdisciplinary, Community-Based Programming**

Maternal-infant-early-childhood home visiting, case management, and agency care coordination programs have proven success identifying and intervening with IPV and maternal depression, as well as addressing other complex, chronic care needs (Bair-Merritt et al., 2010; Curry, Durhan, Bullock, & Davis, 2006; Health Resources and Services Administration, 2013; Mitchell & Anglin, 2009). Maternal-infant home visiting health programs, in particular, are designed to target high-risk/low-resourced individuals and communities (Mitchell & Anglin, 2009; SACIM, 2013), squarely positioning them to serve the low-income women who have been shown to be at particular risk for IPV, depression, and their sequelae, especially during perinatality. Service delivery take place in private comfortable settings, the provider-client relationship has more time to build trust, and the service goals are explicitly dedicated to identifying psychosocial problems, providing social support and linking families to resources (Bair-Merritt et al., 2010; Curry et al., 2006; Health Resources and Services Administration, 2013; Mitchell & Anglin, 2009). While poverty is unlikely to be eliminated, the disadvantages that can accrue within impoverished conditions can be moderated through equitable public resources, including stable housing, public transportation, access to nutritious food and high quality healthcare, safe neighborhoods, quality education, and safe, affordable
childcare (Geronimus, 2000; Harvey, 2009; MacIntyre & Ellaway, 2003). These resources, and their fair distribution, have been shown to enhance resilience and social networks, and to mitigate the chronic stress and daily hassles that take such a toll upon those living in poverty (Blank & Kovak, 2008; Brenner, Zimmerman, Bauermeister, & Caldwell, 2013).

**Conclusion**

In conclusion, this investigation documented the ebb and flow of IPV and depression across perinatality, as well as the differential association that poverty has with these fluctuations and their intersection. Poverty more than doubles the likelihood of IPV, but low- and higher-income women alike benefit from the protective nature of pregnancy and postpartum. IPV, regardless of when it occurs, is directly related to postpartum depression. Socioeconomic status may mediate the IPV-depression relationship, to the degree that poor women with victimization history were more likely to experience depression *early* in postpartum, while higher-income women in this study with the same history reported later depression onset. While resources to address these issues are most plentiful during pregnancy and postpartum, the perinatal system needs to extend its reach across time (from preconception to early childhood) and across discipline (mental health, healthcare, social services, legal, education) to provide multiple doorways into service that is responsive and coordinated.

**References**


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Health and Human Services, Office of Planning, Research and Evaluation, Administration for Children and Families.


Appendix A

Family Linking Study Postpartum Depression Survey
FAMILY LINKING POSTPARTUM DEPRESSION STUDY: 6-month Survey

-Hi, I’m (...) from the hospital and I’m calling for the Family Linking Study. We spoke a couple of months ago.
-Ask if this is a good time to talk.
-[If not a good time] When can I call back?

Healthcare

1. Has your baby had the first set of immunizations? ........................................... € €
   IF NO
   a. What’s gotten in the way of getting those immunizations? What else has gotten in the way?
      You said (...), can you tell me more about that?

2. Have you had your follow-up postpartum visit with your obstetrician? ...................... € €
   IF NO
   a. Could you tell me why not? Any other reasons? You said (...), can you tell me more about that?

3. Do you have a family planning method? YES NO

   IF BREASTFEEDING AT 2nd SURVEY CONTACT

4. Are you still breastfeeding? ................................................................. € €
   IF YES
   a. Do you also give your baby a bottle? .................................................. € €
   b. When did you stop breastfeeding? (record age of baby)
   c. Why did you stop breastfeeding? Any other reasons? You said (...), can you tell me more about that?
FAMILY LINKING POSTPARTUM DEPRESSION STUDY: 6-month Survey

5. We're wondering about your baby's sleep environment.
   a. Does your baby sleep alone in the crib "always," "sometimes," or never?" ALWAYS ☐
      SOMETIMES ☐
      NEVER ☐

   b. Do you have any pillows, stuffed animals or anything else in the crib? YES ☐ NO ☐

   c. Do you cover your baby with blankets? ☐

   d. Do you put your baby down to sleep on its back, its side, or its stomach? BACK ☐
      SIDE ☐
      STOM ☐

(Check all that apply)

*IF BOXES "a," "b," OR "d" CHECKED, copy top survey page & put in folder to receive pamphlet on safe sleep.

6. Can you tell me if housing has been a problem for you and your family? If so, how has it been a problem? Any other ways? You said (...), can you tell me more about that?
FAMILY LINKING POSTPARTUM DEPRESSION STUDY: 6-month Survey

7. These next questions are about how you are feeling and can help identify postpartum depression. For each statement, please tell me which answer comes closest to how you have felt in the past 7 days, not just today:

a. I have been able to laugh and see the funny side of things. As much as I always could €0
   - Not quite so much now €1
   - Definitely not so much now €2
   OR Not at all €3

b. I have looked forward with enjoyment to things. As much as I ever did €0
   - Rather less than I used to €1
   - Definitely less than I used to €2
   ORHardly at all €3

c. I have blamed myself unnecessarily when things went wrong. Yes, most of the time €3
   - Yes, some of the time €2
   - Not very often €1
   ORNo, never €0

d. I have been anxious or worried for no good reason. No, not at all €0
   - Hardly ever €1
   - Yes, sometimes €2
   ORYes, very often €3

e. I have felt scared or panicky for no very good reason. Yes, quite a lot €3
   - Yes, sometimes €2
   - No, not much €1
   ORNo, not at all €0

f. Things have been getting on top of me. Yes, most of the time I haven’t been able to cope at all €3
   - Yes, sometimes I haven’t been coping as well as usual €2
   - No, most of the time I have coped quite well €1
   ORNo, I have been coping as well as ever €0

* Adapted from the Edinburgh Postnatal Depression Scale (EPDS)
FAMILY LINKING POSTPARTUM DEPRESSION STUDY: 6-month Survey

<table>
<thead>
<tr>
<th>Question</th>
<th>Response Options</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>g. I have been so unhappy that I have had difficulty sleeping.</td>
<td>Yes, most of the time</td>
<td>€3</td>
</tr>
<tr>
<td></td>
<td>Yes, sometimes</td>
<td>€2</td>
</tr>
<tr>
<td></td>
<td>Not very often</td>
<td>€1</td>
</tr>
<tr>
<td>OR</td>
<td>No, not at all</td>
<td>€0</td>
</tr>
<tr>
<td>h. I have felt sad or miserable.</td>
<td>Yes, most of the time</td>
<td>€3</td>
</tr>
<tr>
<td></td>
<td>Yes, quite often</td>
<td>€2</td>
</tr>
<tr>
<td></td>
<td>Not very often</td>
<td>€1</td>
</tr>
<tr>
<td>OR</td>
<td>No, not at all</td>
<td>€0</td>
</tr>
<tr>
<td>i. I have been so unhappy that I have been crying.</td>
<td>Yes, most of the time</td>
<td>€3</td>
</tr>
<tr>
<td></td>
<td>Yes, quite often</td>
<td>€2</td>
</tr>
<tr>
<td></td>
<td>Only occasionally</td>
<td>€1</td>
</tr>
<tr>
<td>OR</td>
<td>No, never</td>
<td>€0</td>
</tr>
<tr>
<td>* j. The thought of harming myself has occurred to me.</td>
<td>Yes, quite often</td>
<td>€3</td>
</tr>
<tr>
<td></td>
<td>Sometimes</td>
<td>€2</td>
</tr>
<tr>
<td></td>
<td>Hardly ever</td>
<td>€1</td>
</tr>
<tr>
<td>OR</td>
<td>Never</td>
<td>€0</td>
</tr>
</tbody>
</table>

...Just one moment, please... SUM THE ITEMS & WRITE THE TOTAL BELOW

TOTAL SCORE = <12 & "J" IS NEGATIVE:
You don’t appear to be experiencing symptoms of postpartum depression, but if you find yourself feeling unusually sad or anxious for several days at a time, please contact your OB or family doctor.
FAMILY LINKING POSTPARTUM DEPRESSION STUDY: 6-month Survey

IF TOTAL SCORE HAS EVER BEEN 12+, OR “J” HAS BEEN “Sometimes” or “Yes, quite often”......

8. You may be experiencing postpartum depression. Have you sought any help?........... YES NO
   IF YES
   a. Who have you talked to for help? Anybody else?

   b. What have they done for you? Anything else? You said (...), can you tell me more about that?

   c. Has this worked to help your depression? YES NO
   d. What has worked to help you feel better? Anything else? You said (...), can you tell me more about that?

   IF NO at Q.8, & SCORE =12-23...
   e. You should contact your OB or family doctor for further assessment and possible treatment.

   IF NO at Q.8, & SCORE=24+ OR “J” IS “Sometimes” or “Yes, quite often”......
   f. I’m really concerned that you are feeling so bad. I am going to have a healthcare provider follow up with you. COMPLETE THE SURVEY, THEN CALL & INFORM THE PRINCIPAL INVESTIGATOR IMMEDIATELY.

   Thoroughly document relevant statements made by respondent, all steps taken and known outcomes.

9. Has anyone in your family ever struggled with a period of depression that lasted more than a couple of weeks? YES NO
   a. IF SO, Could you tell me who? Anyone else? (check all that apply):
      Spouse/Partner...... □
      Father.................. □
      Mother............... □
      Brother.............. □
      Sister............... □
      Grandparent........ □
      Aunt/Uncle.......... □
      Cousin............... □
      Other............... □
FAMILY LINKING POSTPARTUM DEPRESSION STUDY: 6-month Survey

10. Have you ever previously suffered from a period of depression that lasted more than a couple of weeks?  
    YES  NO

11. Have you ever had a problem with premenstrual syndrome (PMS)?  YES  NO

My next few questions are about your personal experiences.

12. If you were to describe how helpful your family and friends are to you, would you say they were...

    Very Helpful.................. ☐
    Somewhat Helpful........... ☐
    Not Very Helpful........... ☐
    Not At All Helpful........... ☐

13. Do you have a partner to help you?  YES  NO

    IF YES, PARTNER
    a. If you were to describe how helpful your partner is to you, would you say he was...

    Very Helpful.................. ☐
    Somewhat Helpful........... ☐
    Not Very Helpful........... ☐
    Not At All Helpful........... ☐

14. Thinking back to your childhood and adolescence, could you tell me if you suffered from emotional trauma or abuse as a child or adolescent?  YES  NO

15. Have you experienced emotional trauma or abuse as an adult?  YES  NO

THANK YOU FOR YOUR TIME. YOUR HELP IN THIS STUDY HAS BEEN VERY VALUABLE.
Appendix B

Maternal Depression Survey
Hi, this is ________ from the Maternal Health Study. It's been a couple of months since we spoke, and we are checking in with you to see how you are doing, and ask some more questions.

After completing this survey, to thank you for the time you've given us, we will be sending you a $10 gift certificate for Meijer. You will receive this, even if you decide to skip over some of the questions today. This interview will take about 10-15 minutes. Is now a good time to talk?

If not, when is a good time to talk? __________________________

Is this the best number to reach you? __________________________

[Callback, if necessary & resume with...Hi, this is ________ from the Maternal Health Study. We made arrangements to talk at this time; is this still a good time to talk?]

Before we go on, then, I'd like to get your mailing address:

________________________________________________________________________

________________________________________________________________________
Maternal Depression Survey Study: 2 Months Postpartum

To begin with, could you tell me if...

1. Your baby has had (his / her) first set of immunizations?  Yes □  No □
2. You, yourself, have had your follow-up postpartum visit with your doctor? Yes □  No □
3. So often, women are caught by surprise when they become pregnant. Could you tell me if this most recent pregnancy was a planned one? Yes □  No □

Now, looking at your work situation...

4. How many hours a week, on average, do you work outside the home? ________ hrs
   a. Does your employer provide paid sick leave or maternity leave? Yes □  No □
      i. If yes, how many of these days have you used since the beginning of your pregnancy? ________ days
   b. Not including paid leave, could you estimate the number of work days you have lost since the beginning of your pregnancy? ________ days

5. Since the beginning of your pregnancy, has anyone else (your partner, family member or friend) lost days of work in order to help you out? Yes □  No □
   a. How many days would you say they lost in total? ________ days

DEPRESSION

You might remember that when we’ve talked before, you answered some questions about how you were feeling. I’d like to ask you these questions again. As we’ve mentioned before, women can experience depression at various times during and after pregnancy. These next questions can help identify symptoms of depression.
Maternal Depression Survey Study: 2 Months Postpartum

For each statement, please tell me which answer comes closest to how you have been feeling in the past 7 days, not just today:

<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
<th>Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. I have been able to laugh and see the funny side of things:</td>
<td>-As much as I always could</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>-Not quite as much now</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>-Definitely not so much now</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>-Not at all</td>
<td>3</td>
</tr>
<tr>
<td>11. Things have been getting on top of me:</td>
<td>-Yes, most of the time I haven’t been able to cope at all</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>-Yes, sometimes I haven’t been coping as well as usual</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>-No, most of the time I have coped quite well</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>-No, I have been coping as well as ever</td>
<td>0</td>
</tr>
<tr>
<td>7. I have looked forward with enjoyment to things:</td>
<td>-As much as I ever did</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>- Rather less than I used to</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>-Definitely less than I used to</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>-Hardly at all</td>
<td>3</td>
</tr>
<tr>
<td>12. I have been so unhappy that I have had difficulty sleeping</td>
<td>-Yes, most of the time</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>-Yes, sometimes</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>-Not very often</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>-No, not at all</td>
<td>0</td>
</tr>
<tr>
<td>8. I have blamed myself unnecessarily when things went wrong:</td>
<td>-Yes, most of the time</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>-Yes, some of the time</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>-Not very often</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>-No, never</td>
<td>0</td>
</tr>
<tr>
<td>13. I have felt sad or miserable:</td>
<td>-Yes, most of the time</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>-Yes, quite often</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>-Not very often</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>-No, not at all</td>
<td>0</td>
</tr>
<tr>
<td>9. I have felt worried and anxious for no very good reason:</td>
<td>-No, not at all</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>-Hardly ever</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>-Yes, sometimes</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>-Yes, very often</td>
<td>3</td>
</tr>
<tr>
<td>14. I have been so unhappy that I have been crying:</td>
<td>-Yes, most of the time</td>
<td>3</td>
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<td></td>
<td>-Yes, quite often</td>
<td>2</td>
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<td></td>
<td>-Only occasionally</td>
<td>1</td>
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<td></td>
<td>-No, never</td>
<td>0</td>
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<tr>
<td>10. I have felt scared and panicky for not a very good reason:</td>
<td>-Yes, quite a lot</td>
<td>3</td>
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<td></td>
<td>-Yes, sometimes</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>-No, not much</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>-No, not at all</td>
<td>0</td>
</tr>
<tr>
<td>15. The thought of harming myself has occurred to me:</td>
<td>-Yes, quite often</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>-Sometimes</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>-Hardly ever</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>-Never</td>
<td>0</td>
</tr>
</tbody>
</table>

...Just one moment, please....SUM THE ITEMS & WRITE THE TOTAL BELOW
Maternal Depression Survey Study: 2 Months Postpartum

- NO previous depression AND
- Current Score = <12 & "15" IS NEGATIVE:
  NEVER DEPRESSED
  "You don't appear to be experiencing symptoms of depression, but if you find yourself feeling unusually sad or anxious for several days at a time, please contact your doctor."

  OR

- Previous depression AND
- Current Score = <12 & "15" IS NEGATIVE:
  PREVIOUSLY DEPRESSED, BUT NOT NOW
  "You don't appear to be experiencing symptoms of depression now, but if you find yourself feeling unusually sad or anxious for several days at a time, please contact your doctor."

  OR

- >12 OR "15" is positive:
  DEPRESSED
  "You may be experiencing depression. Were you aware that you might be depressed?"

  YES
  GO TO Q.18

  NO
  GO TO REFERRAL, Page 7
Maternal Depression Survey Study: 2 Months Postpartum

16. Last time we talked, your survey showed that you may have had symptoms of depression. Have you gotten any help for your depression?  

   YES  NO

17a. What help have you gotten? Anything else? (mark all that apply)
   - Spoke to Healthcare provider .................................................. □
   - Spoke to Mental Health provider (circle whether psychiatrist, counselor, support group) .................................................. □
     i. How many visits did you have with (...)? ______ visits
   - Spoke to family, friends .................................................................. □
   - Took anti-depressant/other medication (specify: ______) .............. □
     ii. How many months did you take this medication? ______ mos
   - Health stressor improvement (more sleep, feel physically better, etc) .................. □
   - Psychosocial stressor improvement (FOB relationship, housing, finances) .... □
   - Other (Specify: ____________________________________________)

17b. Can you tell me why you have not gotten any help? Any other reasons? (mark all that apply)

   Didn’t think I needed ................................................................. □
   Practical Considerations (no childcare, no money, insurance coverage)... □
   Other (Specify: ____________________________________________)

17c. Has anything helped you feel better? Anything else? (mark all that apply)

   Spoke to Healthcare provider .................................................. □
   Spoke to Mental Health provider/Rec’d counseling .................. □
   Spoke to family, friends .......................................................... □
   Took anti-depressant ............................................................. □
   Health stressor improvement (more sleep, feel physically better, etc) .................. □
   Psychosocial stressor improvement (FOB relationship, housing, finances) .... □
   Other (Specify: ____________________________________________)

5 of 13

Version 4-14-09
Maternal Depression Survey Study: 2 Months Postpartum

18. Have you gotten any help for your depression?  YES  NO

19a. What help have you gotten? Anything else? (mark all that apply)
- Spoke to Healthcare provider
- Spoke to Mental Health provider (circle whether psychiatrist, counselor, support group)
  i. How many visits did you have with (…)? ______ visits
  ii. How many months did you take this medication? ______ mos
- Spoke to family, friends
- Took anti-depressant/other medication (specify:__________)
- Health stressor improvement (more sleep, feel physically better, etc)
- Psychosocial stressor improvement (FOB relationship, housing, finances)
- Other (Specify:__________________________)

19b. Can you tell me why you have not gotten any help? Any other reasons? (mark all that apply)

Didn't think I needed
Practical Considerations (no childcare, no money, insurance coverage)
Other (Specify:__________________________)

19c. Has anything helped you feel better? Anything else? (mark all that apply)

Spoke to Healthcare provider
Spoke to Mental Health provider/Rece’d counseling
Spoke to family, friends
Took anti-depressant
Health stressor improvement (more sleep, feel physically better, etc)
Psychosocial stressor improvement (FOB relationship, housing, finances)
Other (Specify:__________________________)

6of13  Version 4-14-09
Maternal Depression Survey Study: 2 Months Postpartum

**REFERRAL**

**IF TOTAL SCORE = 12-23 & 15 is NEGATIVE**

Since you are having some symptoms of depression, make sure you tell your doctor. If you begin to feel really bad, you should call your doctor’s office right away and tell them.

I also want to tell you about another place that can help you. It is a program specifically for mothers with depression. Can I have your permission to give them your name and number so they can follow-up with you?

YE **S**  Someone from the Mothers’ Mind Matters project will be calling you.

NO

**IF TOTAL SCORE = 24+ & 15 is NEGATIVE**

I'm really concerned that you are feeling so bad. I'm going to call your doctor's office and let them know. You should also call them and ask for some help. If you ever feel like you may hurt yourself or your baby, you should call 211, the Gryphon Crisis Line, or go to the emergency room, and they will help you.

I also want to tell you about another place that can help you. It is a program specifically for mothers with depression. Can I have your permission to give them your name and number so they can follow-up with you?

YE **S**  Someone from the Mothers’ Mind Matters project will be calling you.

NO

COMPLETE THE SURVEY, THEN CALL & INFORM Cathy Kothari, PI

501-4149
Maternal Depression Survey Study: 2 Months Postpartum

**REFERRAL (cont'd)**

15 is POSITIVE **SUICIDAL**

I'm really concerned that you are feeling so bad. You said that you have felt like hurting yourself in the last week. When you think of hurting yourself, are you thinking of suicide or are you thinking of hurting yourself but not so badly that you would die? (CIRCLE)

How do you feel right now? Do you feel unsafe or that you might harm yourself right now or anytime today?

**RIGHT NOW/TODAY**

I'd like you to stay on the line while I call someone from Gryphon Crisis Line who can help you. Do I have your permission to call them for you?

- [ ] YES
- [ ] NO

**KEEP ON LINE & INITIATE 3-WAY CONFERENCE CALL (SEE INSTRUCTIONS)**

"Hello, (211 staff), I have (study participant's name) on the line with me and she is feeling suicidal. I'd like you to talk to her. (study participant's name), can I stay on the line while you and (211 staff) talk?

**LISTEN, RECORD CONVERSATION & ACTIONS.**

After, CALL & INFORM Cathy Kothari, PI 501-4149

I'm going to call your doctor's office and let them know. You should also call them and ask for some help. If you ever feel like you may hurt yourself or your baby, you should call 211, the Gryphon Crisis Line, or go to the emergency room, and they will help you.

I also want to tell you about another place that can help you. It is a program specifically for mothers with depression. Can I have your permission to give them your name and number so they can follow-up with you?

- [ ] YES
- [ ] NO

Someone from the Mothers' Mind Matters project will be calling you.

COMPLETE THE SURVEY, THEN:

1) CALL & INFORM Cathy Kothari, PI (501-4149)
2) COMPLETE & SUBMIT A CPS FORM, if appropriate (follow instructions on form)

CONTINUE...
Maternal Depression Survey Study: 2 Months Postpartum

20. Has anyone ever specifically asked you about any feelings of depression or anxiety?  YES  NO
   a. Who? Anyone else?  (mark all that apply)
      Healthcare provider..................................................□
      Mental Health provider...............................................□
      Family, friends..........................................................□
      Other (Specify: ____________________________________________)

21. Have you heard of any programs here in Kalamazoo specifically for maternal prenatal or postpartum depression?  YES  NO
   a. What have you heard of?  (mark all that apply)
      Mother's Mind Matters..................................................□
      Family & Children Services.........................................□
      Caring Network..........................................................□
      Other (Specify: ____________________________________________)

   b. Where did you learn of this?  (mark all that apply)
      Healthcare Provider..................................................□
      Mental Health Provider...............................................□
      Social Worker..........................................................□
      Family/ friends..........................................................□
      Advertising (Specify ________________________________)...□
      Other (Specify: ____________________________________________)

22. If you felt like you might be depressed and need some help, how worried would you be about what people might think of you?
   Very Worried.............................................................□
   Somewhat Worried.......................................................□
   Not Very Worried........................................................□
   Not Worried At All......................................................□
Maternal Depression Survey Study: 2 Months Postpartum

This next set of questions will help us understand the stressors in your life. We know that so many women have experienced violence in their lives and it can affect how they felt after having a baby. We want to understand this more so we can better help women.

-The next questions are about any violence you may have experienced in your adult life. You do not have to answer any of them at all...just say “skip” and we’ll go right on. (pause) We’re halfway through the interview; is this still a good time to talk?

IF NOT...when should I call you back? ______________________
....should I call you at this number? ______________________

WHEN CALL BACK... This is (research assistant name) from The Maternal Health Study calling back. Is now a good time?

-To pick up where we left off, the next questions are about any violence you may have experienced in your adult life. You do not have to answer any of them at all...just say “skip” and we’ll go right on.

23. Have you ever felt afraid at home because of threats of violence? __Yes __No
24. Have you ever had a partner or spouse who got very jealous or tried to control your life? __Yes __No
25. Have you ever had a partner that pushed, hit, kicked or otherwise physically hurt you? __Yes __No

**IF “NO” TO ALL OF THE DOMESTIC VIOLENCE QUESTIONS (#23, #24, #25) ...**

↓

**SKIP TO QUESTION 27**
Maternal Depression Survey Study: 2 Months Postpartum

26. For each question, I will ask you if this happened BEFORE your pregnancy with (baby name), DURING your pregnancy, and AFTER your pregnancy; since (baby name) was born.

<table>
<thead>
<tr>
<th></th>
<th>(Circle if YES, Cross out if NO)</th>
<th>How about during your pregnancy?</th>
<th>Since (baby) was born?</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>Before your pregnancy with (baby), did your partner or spouse ever say insulting things to you (like put down...calling you fat, ugly, etc)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b</td>
<td>Before your pregnancy, did your partner ever threaten to hurt you or other family members?</td>
<td>During your pregnancy?</td>
<td>Since (baby) was born?</td>
</tr>
<tr>
<td>c</td>
<td>Before your pregnancy, did your partner ever threaten to call the police, social services, or any other authority on you?</td>
<td>During your pregnancy?</td>
<td>Since (baby) was born?</td>
</tr>
<tr>
<td>d</td>
<td>Before your pregnancy, were you ever afraid to disagree with your partner?</td>
<td>During your pregnancy?</td>
<td>Since (baby) was born?</td>
</tr>
<tr>
<td>e</td>
<td>Before your pregnancy, did your partner try to keep you away from your family or friends?</td>
<td>During your pregnancy?</td>
<td>Since (baby) was born?</td>
</tr>
<tr>
<td>f</td>
<td>Before your pregnancy, did your partner control your money and spending in ways that were not fair to you?</td>
<td>During your pregnancy?</td>
<td>Since (baby) was born?</td>
</tr>
<tr>
<td>g</td>
<td>Before your pregnancy, did your partner ever hit, kick, push, shove, grab, pull your hair, or restrain you against your will?</td>
<td>During your pregnancy?</td>
<td>Since (baby) was born?</td>
</tr>
<tr>
<td>h</td>
<td>Before your pregnancy, did your partner ever burn, cut or strike you with an object?</td>
<td>During your pregnancy?</td>
<td>Since (baby) was born?</td>
</tr>
<tr>
<td>i</td>
<td>Before your pregnancy, did your partner ever use a knife, gun or other weapon on you?</td>
<td>During your pregnancy?</td>
<td>Since (baby) was born?</td>
</tr>
<tr>
<td>j</td>
<td>Before your pregnancy, were any of these physical assaults aimed at your head or chest?</td>
<td>During your pregnancy?</td>
<td>Since (baby) was born?</td>
</tr>
<tr>
<td>k</td>
<td>Before your pregnancy, were any of these physical assaults aimed at your belly?</td>
<td>During your pregnancy?</td>
<td>Since (baby) was born?</td>
</tr>
<tr>
<td>l</td>
<td>Before your pregnancy, did your partner ever manipulate, trick or force you into having sex when you didn’t want to?</td>
<td>During your pregnancy?</td>
<td>Since (baby) was born?</td>
</tr>
</tbody>
</table>
Maternal Depression Survey Study: 2 Months Postpartum

IF "YES" TO g, h, i, k or l,

26m. At any time, did you ever receive any of the following injuries by your partner…

- Minor bruises, cuts or abrasions to the skin? □
- Serious bruises, cuts, or abrasions to the skin? □
- Broken bones, broken teeth, injuries to the eyes, ears or nose? □
- Internal injuries, concussion or loss of consciousness? □
- Miscarriage or injury to your baby? □
- Any other injuries? □

26n. Did you ever go to a doctor, clinic or hospital for treatment for these injuries? YES NO

26o. Do you feel like your partner coerced you into this pregnancy in any way? YES NO

26p. Did you ever call the police, consult an attorney, apply for a protective order or make any other legal moves to help with any of the things I’ve asked you about today? YES NO

26q. Are you still with this partner? YES NO

REFERRAL:
These are all the questions I have about violence. However, I am concerned for you. It sounds like you have experienced some abuse by your partner or spouse and that it might be helpful to have someone to talk to further about it. In Kalamazoo, the YWCA has a program for women who have ever had any emotional or physical trauma from their partner. They offer support groups, counseling, legal advise, safety planning and, if necessary, a place to stay. Can I give you their phone number? 385-2869 (YWCA Domestic Assault Program, ask for Sherry Brockway)

CONSENT TO CONTACT:
If you are willing, a member of our research team, Dr. Angie Moe, would like to talk to you further about what you have experienced. She is a researcher, not a counselor or doctor, so this would only be as a follow-up to this study. As I mentioned, we are very concerned about violence that occurs around the time of pregnancy and we want to understand it better so that we can help women. This next interview would be more open-ended, like a normal discussion, where you would be asked to talk about some of the situations that caused you to answer "yes" to some of the questions I just asked. This would be a one-on-one interview (between just you and Dr. Moe). It would take about 1-1.5 hours to complete and could occur either at your home or in a private office. We would reimburse your time and effort with $50. It may be a couple of months before you were called. If you are interested, what would be the best way for us to contact you?
Maternal Depression Survey Study: 2 Months Postpartum

The last set of questions has to do with other stressors in your life...

27. Can you tell me if housing has been a problem for you and your family? 

YES NO

If so, how has it been a problem? Any other ways? (mark all that apply)
- Unstable housing
- Crowded housing situation
- Subsidized housing not available
- Other (Specify: __________________________)

28. We know that so many people struggle with alcohol or drugs. Has your use of alcohol/drugs ever gotten out of control enough that you or others have been worried? Drugs, here, includes street drugs to get high and prescription drugs.

YES NO

If yes to alcohol, check (✓) here:______________________________
If yes to other drugs, list drugs: ________________________________

FOR ANYONE WHO EVER EXPERIENCED PROBLEMS WITH ALCOHOL OR DRUGS... "YES" TO Q.28...
In Kalamazoo, there are several places that help people with alcohol or drug use problems. Can I give you their phone number?
-343-1651 (Elizabeth Upjohn Community Healing Center—work specifically with parenting women)
-382-9822 (Jim Gilmore Jr. Community Healing Center)
-211 (crisis line)

29. Finally, are there any other major stressors in your life?

YES NO

If so, could you tell me what they are? Any others? (mark all that apply)
- Parenting issues
- Childcare issues
- Family-related issues
- Financial / Employment issues
- Legal (criminal or civil) issues
- Health / Medical / Dental issues
- Financial / Employment issues
- Other (Specify: __________________________)

FOR QUESTIONS ABOUT COMMUNITY RESOURCES, THEY CAN CALL 211, OR YOU CAN REFER TO THE "Healthy Babies-Reach for the Stars" Kalamazoo Resource Booklet...

THANK YOU FOR YOUR TIME. YOUR HELP IN THIS STUDY CONTINUES TO BE OF GREAT VALUE. YOU SHOULD RECEIVE YOUR GIFT CERTIFICATE WITHIN THE NEXT FEW WEEKS.
Appendix C

Medical Record Abstraction Form
### ABSTRACTION FORM

#### Demographics

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</thead>
<tbody>
<tr>
<td>Mom's Age @ baby's birth</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marital Status</td>
<td>Married</td>
<td></td>
<td>Not Married</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td>White</td>
<td>Black</td>
<td></td>
<td></td>
<td>Other</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>Hispanic</td>
<td>Non-Hispanic</td>
<td></td>
<td></td>
<td>(Note: leave blank if not specifically stated in records)</td>
</tr>
<tr>
<td>Insurance</td>
<td>Private</td>
<td>Medicaid</td>
<td>None</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### OB History

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Age @ 1st pregnancy</td>
<td></td>
</tr>
<tr>
<td>Gravida</td>
<td>#</td>
</tr>
<tr>
<td>Paragravida</td>
<td></td>
</tr>
<tr>
<td>Miscarriages/Abort</td>
<td></td>
</tr>
<tr>
<td>Fetal Death/Stillbirth</td>
<td></td>
</tr>
<tr>
<td>Infant Death</td>
<td></td>
</tr>
<tr>
<td>Prev VLBW/LBW</td>
<td></td>
</tr>
<tr>
<td>Prev Premature (&lt;37 wks)</td>
<td>#</td>
</tr>
</tbody>
</table>

#### Pregnancy / Birth Outcomes

<table>
<thead>
<tr>
<th>Planned pregnancy</th>
<th>Yes</th>
<th>No</th>
<th>Not Mentioned</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Trim Initiated Care</td>
<td>1st</td>
<td>2nd</td>
<td>3rd</td>
<td>No prenatal care</td>
</tr>
<tr>
<td>(0-12 wks) (13-26 wks) (27+ wks)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th># Prenatal Visits</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Intent to Breastfeed</td>
<td>Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maternal &quot;Pre&quot; wt*</th>
<th>lbs</th>
<th>(wks gest)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal last wt</td>
<td>lbs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal height</td>
<td># feet</td>
<td># inches</td>
<td></td>
</tr>
<tr>
<td>Infant Birthweight</td>
<td>(grams)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wks Gestation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plurality</td>
<td>Single</td>
<td>Plural</td>
<td></td>
</tr>
</tbody>
</table>

*If no pre-pregnancy wt available, write in the first wt measure & wks gestation when recorded

### PSYCHOSOCIAL

#### Screened*

<table>
<thead>
<tr>
<th>Smoking-NOW</th>
<th>Yes</th>
<th>No</th>
<th>Pos</th>
<th>Neg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking-HX only</td>
<td>Yes</td>
<td>No</td>
<td>Pos</td>
<td>Neg</td>
</tr>
<tr>
<td>Alcohol-NOW</td>
<td>Yes</td>
<td>No</td>
<td>Pos</td>
<td>Neg</td>
</tr>
<tr>
<td>Alcohol-HX only</td>
<td>Yes</td>
<td>No</td>
<td>Pos</td>
<td>Neg</td>
</tr>
<tr>
<td>Drugs-NOW</td>
<td>Yes</td>
<td>No</td>
<td>Pos</td>
<td>Neg</td>
</tr>
<tr>
<td>Drugs-HX only</td>
<td>Yes</td>
<td>No</td>
<td>Pos</td>
<td>Neg</td>
</tr>
<tr>
<td>Abused as Child</td>
<td>Yes</td>
<td>No</td>
<td>Pos</td>
<td>Neg</td>
</tr>
<tr>
<td>CPS as parent</td>
<td>Yes</td>
<td>No</td>
<td>Pos</td>
<td>Neg</td>
</tr>
<tr>
<td>Domestic Violence-NOW</td>
<td>Yes</td>
<td>No</td>
<td>Pos</td>
<td>Neg</td>
</tr>
<tr>
<td>Domestic Violence-HX only</td>
<td>Yes</td>
<td>No</td>
<td>Pos</td>
<td>Neg</td>
</tr>
</tbody>
</table>

*Because so many offices only the result is positive, if any evidence that other items on screening page were marked, then assume screening for above, even if not marked.

Version: 3-16-09
ABSTRACTION FORM

SCREENING: Was patient screened?...

<table>
<thead>
<tr>
<th></th>
<th>ONLY for Problems before this pregnancy</th>
<th>OR</th>
<th>Problems ANYTIME during this pregnancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any Personal Mental Health Problems (including depression, anxiety, any other MH problem)</td>
<td>□ Yes, documented □ U</td>
<td>□ Yes, documented □ U</td>
<td>□ No evidence of screening</td>
</tr>
<tr>
<td>Personal Mental Health Problem- specifically DEPRESSION</td>
<td>□ Yes, documented □ U</td>
<td>□ Yes, documented □ U</td>
<td>□ No evidence of screening</td>
</tr>
<tr>
<td>Personal Mental Health Problem- specifically PPD</td>
<td>□ Yes, documented □ U</td>
<td>□ Yes, documented □ U</td>
<td>□ No evidence of screening</td>
</tr>
</tbody>
</table>

*If not clear whether screening for previous or current, code as current and check □ U.
NOTE: Each category is a sub-set of the one above; so, if “Yes” for PPD, then should be “Yes for both Depression & Any Mental Health Problems

RESULTS: If Screened, did patient have a positive result?...

<table>
<thead>
<tr>
<th></th>
<th>ONLY for Problems before this pregnancy</th>
<th>OR</th>
<th>Problems ANYTIME during this pregnancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANY Personal Mental Health Problems (including depression, anxiety, any other MH problem)</td>
<td>□ Yes, documented □ U</td>
<td>□ Yes, documented □ U</td>
<td>□ No evidence of problem</td>
</tr>
<tr>
<td>Personal Mental Health Problem- Depression</td>
<td>□ Yes, documented □ U</td>
<td>□ Yes, documented □ U</td>
<td>□ No evidence of problem</td>
</tr>
<tr>
<td>Personal Mental Health Problem- PPD</td>
<td>□ Yes, documented □ U</td>
<td>□ Yes, documented □ U</td>
<td>□ No evidence of problem</td>
</tr>
</tbody>
</table>

*If not clear whether screening for previous or current, code as current and check □ U.
NOTE: If “Yes” for screened, then should be either “Yes” or “No” for corresponding Problem Box

TREATMENT: If positive result, did pt receive treatment?...

<table>
<thead>
<tr>
<th></th>
<th>ONLY for Problems before this pregnancy</th>
<th>OR</th>
<th>Problems ANYTIME during this pregnancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>RECEIVED Medication</td>
<td>□ Yes, documented** □ U</td>
<td>□ Yes, documented** □ U</td>
<td>□ No evidence of meds</td>
</tr>
<tr>
<td>REFERRED for WBHC / Counseling / Support Group for Mood Disorders (depression, anxiety)</td>
<td>□ Yes, documented*** □ U</td>
<td>□ Yes, documented*** □ U</td>
<td>□ No evidence of referral</td>
</tr>
<tr>
<td>RECEIVED WBHC / Counseling / Support Group for Mood Disorders (depression, anxiety)</td>
<td>□ Yes, documented*** □ U</td>
<td>□ Yes, documented*** □ U</td>
<td>□ No evidence of treatment</td>
</tr>
</tbody>
</table>

NOTE: If “Yes” for problem, then should be either “Yes” or “No” for corresponding Treatment Box
If “U” is marked please make notes in the margin why it is unknown (e.g. Chart missing, ambiguous note, etc.)
**Describe the actual medication used
***Note which one: WBHC, Counselor (name if noted), Support Group (which one, if noted)
Version: 3-16-09
Appendix D

Approval Letters from Borgess Medical Center Institutional Review Board
June 24, 2013

Cathy Kothari
WMU School of Medicine
1000 Oakland Drive, D60
Kalamazoo MI 49008

Protocol: Temporal Patterns of Depression During the First Two Years Postpartum
BMC IRB Reference No. 2013-0968
Informed Consent: exempt per IRB SOP 6.10

Dear Ms. Kothari,

As Acting Chair of the Institutional Review Board (IRB) of Borgess Medical Center, I have received and reviewed the above-named protocol. According to Borgess Medical Center IRB Standard Operating Procedures (SOPs), Section 6.15, this protocol meets the qualifications for Expedited Review. The protocol meets our standards of research and I have approved the study for use in this institution.

As you conduct your research, you are responsible for complying with all policies and procedures of the FDA, OHRP, HIPAA, Borgess Medical Center, and the Borgess Institutional Review Board. Per the Borgess Health policy “Research Approval Process” (BH.303), protocols must go through all appropriate research oversight committees (Research Financial Conflict of Interest, Research Billing Committee, etc.).

The approval is granted with the understanding that any changes in the protocol are promptly reported to the Committee; that changes in the approved protocol cannot be initiated without Committee review and approval unless there are immediate hazards to human subjects; and that all unanticipated or serious problems involving risks to human subjects are also promptly reported to the Committee.

Approval for this protocol is granted for a period of one year and will expire on May 20, 2014. The FDA and this Committee, require you submit in writing a Continuation Review Application by April 1, 2014. The protocol cannot continue after May 20, 2014 until re-approved by the Borgess IRB even if closed to patient enrollment. You must complete a Close Out Report if your protocol has been completed, terminated or if you are not renewing the protocol. We will determine if the research was carried out as planned, and that patient benefit outweighed the risk.

If you have any questions in this regard, please feel free to contact me.

Sincerely,

Elaine Van Doren, PhD
Elaine Van Doren, PhD, RN, Acting Chair
Institutional Review Board

cc: WMU School of Medicine - Research, D30
December 17, 2013

Cathy Kothari, MA
WMed School of Medicine
1000 Oakland Drive
Kalamazoo MI 49048

Protocol: Maternal Depression Survey (Mother’s Mind Matters Project)
BMC IRB Reference No. 2008-8383

Dear Ms. Kothari,

The Institutional Review Board of Borgess Medical Center reviewed the Continuation Review Application you submitted for the protocol named above at the meeting today, December 17, 2013. The protocol continues to meet our standards of research. The IRB approved the study for continuation for the period of one year.

The approval is granted with the understanding that any changes in the protocol are promptly reported to the Committee; that changes in the approved protocol cannot be initiated without Committee review and approval unless there are immediate hazards to human subjects; and that all unanticipated problems involving risks to human subjects are also promptly reported to the Committee.

Approval for this protocol is granted for a period of one year and will expire on December 16, 2014. Please submit a summary of the research activity by November 4, 2014 if you would like to continue this project. The protocol cannot continue after December 16, 2014 until re-approved by the Borgess IRB even if closed to patient enrollment. You must complete a Close Out Report if your protocol has been completed, terminated or if you are not renewing the protocol. We will determine if the research was carried out as planned, and that patient benefit outweighed the risk.

Sincerely,

Stephen Jefferson, MD
Stephen Jefferson, MD, Chair
Institutional Review Board

cc: WMU School of Medicine – Research Dept.
Appendix E

Approval Letters from Bronson Methodist Hospital Institutional Review Board
May 23, 2013

Catherine Kothari, MA
WMed Emergency Medicine
1000 Oakland Drive
Kalamazoo, MI 49008

Dear Ms. Kothari:

Subject: Protocol Certificate of Approval ( Expedited Review )

Reference: BMH-2013-0657 "Temporal Patterns of Depression During the First Two Years Postpartum"

This is your official notice that the referenced protocol has IRB approval; attached is the certificate of expedited approval signed by James W. Carter, MD, FACP, Chairman of the Bronson Methodist Hospital Institutional Review Board (IRB).

You are reminded that any unanticipated problems and adverse events should be reported to the IRB within 48 hours of becoming aware of the event. It is also your responsibility to apply for continuing approval before the expiration date.

The IRB has determined the Degree of Risk to be Minimal.

The review period for this protocol will be no more than 365 days and IRB approval will expire May 22, 2014.

Should you have any questions or concerns, please do not hesitate to contact the IRB office.

Thank you,

Lisa Beverwyk, BS
IRB Coordinator
Bronson Methodist Hospital

Telephone: (269) 341-7898
E-mail: beverwyk@bronsonhg.org
FAX: (269) 341-8675

enc.

cc: IRB File
CERTIFICATE OF APPROVAL
NEW PROTOCOL (EXPEDITED REVIEW)

DATE OF APPROVAL:      May 23, 2013
PROTOCOL NUMBER:       BMH-2013-0657
PROTOCOL TITLE:        "Temporal Patterns of Depression During the First Two Years Postpartum"
PROTOCOL DATE/VERSION: Catherine Kothari, MA

James W. Carter, MD, FACP, Chair of the Bronson Methodist Hospital Institutional Review Board (IRB) has approved the above referenced protocol through Expedited Review and determined the continuing review interval for this study to be set at:

☐ 1 month  ☐ 2 months  ☐ 3 months  ☐ 6 months  ☒ 12 months

The IRB determined the Degree of Risk to be Minimal.

Protocol was approved for no more than 365 days and will expire on May 22, 2014

The primary investigator must comply with the following:

➢ To conduct research in accordance with the approved protocol.
➢ To use only the approved dated Consent Form, signed by the IRB Chair, and as appropriate that each study participant should receive a copy of the consent document once all signatures have been obtained.
➢ To obtain pre-approval from the IRB for any changes in the approved protocol activity, (except when necessary to protect human subjects), and immediately report to the IRB any such emergency changes for the protection of human subjects.
➢ To report any unanticipated problems, serious adverse events, or serious medical events to the IRB within 48 hours of the investigator becoming aware of the event.
➢ To report to the IRB prior to enrolling any vulnerable populations (such as wards of the state or prisoners).
➢ Report any new information that may adversely affect the safety of the subjects or the conduct of the trial.
➢ Provide reports to the IRB concerning the progress of the research, when requested.

Assurance: FWA00002688 (IRB00002511)

James W. Carter, MD, FACP
Chairman
Bronson Methodist Hospital
Institutional Review Board

Dated: MAY 23, 2013
May 9, 2013

Catherine Kothari, MA
WMed Research
1000 Oakland Drive
Kalamazoo, MI 49008

Dear Ms. Kothari:

Subject: Amendment 8

Reference: BMH-2008-0330 “Maternal Depression Survey”

The amendment(s) for the referenced protocol have been received and reviewed by Bronson Methodist Hospital Institutional Review Board (IRB). Enclosed is the Certificate of Approval signed by James W. Carter, Chairman of the IRB.

The original IRB approval period is not affected by this amendment and remains valid through May 8, 2014.

Should you have any questions or concerns, please do not hesitate to contact the IRB office.

Thank you,

Lisa Beverylyk, BS
IRB Coordinator
Bronson Methodist Hospital

Telephone: (269) 341-7898
E-mail: beverylyk@bronsonhg.org
FAX: (269) 341-8675

enc.
cc: IRB File
BRONSON
BRONSON METHODIST HOSPITAL
INSTITUTIONAL REVIEW BOARD (IRB)

CERTIFICATE OF APPROVAL
AMENDMENT OF PROTOCOL

DATE OF APPROVAL: May 9, 2013
PROTOCOL: BMH-2008-0330 “Maternal Depression Survey”
AMENDMENT NUMBER: 8
AMENDMENT: Revised research team
PRINCIPAL INVESTIGATOR: Catherine Kothari, MA

At the May 9, 2013 meeting of the Bronson Methodist Hospital Institutional Review Board, the documents submitted for Amendment 8 were reviewed and Accepted as Submitted.

The IRB determined the Degree of Risk to be Minimal

The current IRB approval period is not affected by this change and is valid through May 8, 2014

The primary investigator must comply with the following:

- To conduct research in accordance with the approved protocol.
- To use only the approved dated Consent Form, signed by the IRB Chair, and as appropriate that each study participant should receive a copy of the consent document once all signatures have been obtained.
- To obtain pre-approval from the IRB for any changes in the approved protocol activity, (except when necessary to protect human subjects), and immediately report to the IRB any such emergency changes for the protection of human subjects.
- To report any unanticipated problems, serious adverse events, or serious medical events to the IRB within 48 hours of the investigator becoming aware of the event.
- To report to the IRB prior to enrolling any vulnerable populations (such as wards of the state or prisoners).
- Report any new information that may adversely affect the safety of the subjects or the conduct of the trial.
- Provide reports to the IRB concerning the progress of the research, when requested.

Assurance: FWA0002688 (IRB00002511)

James W. Carter, MD, FACP
Chairman
Bronson Methodist Hospital
Institutional Review Board

Dated: MAY 9 2013
Appendix F

Approval Letters from Western Michigan University
Human Subjects Institutional Review Board
Date: November 17, 2011

To: Amy Curtis, Principal Investigator  
    Catherine Kothari, Student Investigator

From: Victoria Janson, Interim Chair

Re: HSIRB Project Number 11-11-19

This letter will serve as confirmation that your research project titled “The Impact of Economic Disadvantage upon the Relationship between Partner Violence and Depression” has been approved under the exempt category of review by the Human Subjects Institutional Review Board. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the application.

Please note that you may only conduct this research exactly in the form it was approved. You must seek specific board approval for any changes in this project. You must also seek reapproval if the project extends beyond the termination date noted below. In addition if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: November 17, 2012
Date: June 6, 2013

To: Amy Curtis, Principal Investigator
   Angela Moe, Co-Principal Investigator
   Catherine Kothari, Student Investigator for dissertation

From: Amy Naugle, Ph.D., Chair

Re: HSIRB Project Number 13-06-06

This letter will serve as confirmation that your research project titled “Temporal Patterns of Depression During the First Two Years Postpartum” has been approved under the exempt category of review by the Human Subjects Institutional Review Board. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the application.

Please note: This research may only be conducted exactly in the form it was approved. You must seek specific board approval for any changes in this project (e.g., you must request a post approval change to enroll subjects beyond the number stated in your application under “Number of subjects you want to complete the study”). Failure to obtain approval for changes will result in a protocol deviation. In addition, if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

Reapproval of the project is required if it extends beyond the termination date stated below.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: June 6, 2014
WESTERN MICHIGAN UNIVERSITY
Human Subjects Institutional Review Board
WMU Mail Stop: 5456 Phone: (269) 387-8233

APPLICATION FOR CONTINUING REVIEW or FINAL REPORT FORM

In compliance with Western Michigan University's policy that "the HSIRB's review of research will be conducted at appropriate intervals but not less than once per year," the HSIRB requests the following information:

PROJECT INFORMATION

PROJECT TITLE: IPV and Maternal Health In-Depth Interview Study: Secondary Data Analysis
HSIRB Project Number: 11-01-38 Date of Last Approval (Initial or Continuing Review): 01/28/14
Previous level of review: ☐ Full Board Review ☐ Expedited Review ☑ Administrative (Exempt) Review

INVESTIGATOR INFORMATION

PRINCIPAL INVESTIGATOR OR ADVISOR
Name: Angela Moe
Department: SOCIOl Mail Stop: Electronic Mail Address: angie.moe@wmich.edu

CO-PRINCIPAL OR STUDENT INVESTIGATOR
Name: Catherine Kothari
Department: IHS Mail Stop: catherine.kothari@wmich.edu

CURRENT STATUS OF RESEARCH PROJECT

Please answer questions 1-5 to determine if this project requires continuing review by the HSIRB.

1. Has subject recruitment begun? If no, please provide an explanation ☑Yes ☐ No

2. Is the project closed to recruitment of new subjects? ☐ Yes (Date of last enrollment: 5-09) ☐ No (Project must be reviewed for renewal)

3. Have all subjects completed research related interventions? ☐ Yes ☐ Not Applicable

4. Has long-term follow-up of subjects been completed? ☐ Yes ☐ Not Applicable

5. Has analysis of data been completed? ☐ Yes ☐ No (Project must be reviewed for renewal)

- If you have answered "No" to ANY of the questions above, you must apply for Continuing Review.
- If you need to make changes in your protocol, please submit a separate memo detailing the changes that you are requesting.
- If you have answered "Yes" or "Not Applicable" to ALL of the above questions, the project may be closed. If the project is closed please use this form for the "Final Report."

☐ Application for Continuing Review ☐ Final Report

Revised 06/2013 WMU HSIRB (all other copies obsolete).
HSIRB Project Number: 11-01-38

6. Are there any changes in study personnel (add or remove investigators) not previously reported to the HSIRB? □Yes □No
   If you need to add an investigator, provide details on an "Additional Investigator(s) Form" (available at http://www.wmich.edu/research/forms/compliance/forms.html). To remove an investigator submit a memo to the HSIRB detailing the change.

7. Since the last approval (initial or continuing review) has there been any modifications or additions to the protocol, not previously reported to the HSIRB to with respect to the following?
   a. Procedures □Yes □No
   b. Subjects □Yes □No
   c. Design □Yes □No
   d. Data collection □Yes □No

8. Has any instrumentation been modified or added to the protocol that has not already been approved by the HSIRB? □Yes □No
   If yes, attach new instrumentation and a memo indicating the modifications made.

9. Are there changes to the consent/assent form not previously reported to the HSIRB? □Yes □No
   If yes, attach new consent/assent form and a memo indicating changes made.

Verification of Consent Procedure: Provide copies of the whole consent documents signed by the last two subjects enrolled in the project. Cover the signature in such a way that the name is not clear but there is evidence of signature. If subjects are not required to sign the consent document, provide a copy of the most current consent document being used.

SUMMARY OF THE RESEARCH

10. Have there been any adverse events, unexpected or unanticipated study-related problems which have not previously been reported to HSIRB? If yes, provide details on an attached sheet. □Yes □No

11. Is there new risk or benefit information not previously reported to the IRB? □Yes □No
   If yes, attach a memo indicating the risk or benefit information.

12. Summarize progress of the research using non-technical language that can be easily understood by a reviewer outside the discipline. Please use complete sentences to briefly summarize the research since the last review (initial or continuing). We have completed preliminary coding/memoing of transcripts and are in the process of data interpretation.

13. List and describe any complaints about the research study since the last HSIRB review (initial or continuing review). Include action taken to resolve the complaints (If not applicable, type NA). none

14. List any voluntary withdrawals by participants from the study since the last HSIRB review (initial or continuing review). Include action taken as a result of the withdrawals. (If not applicable, type NA). none

Revised 06/2013 WMU HSIRB (all other copies obsolete).