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INTIMATE PARTNER VIOLENCE DURING PREGNANCY AND 1-YEAR POST-PARTUM

ABSTRACT

Using data on a nationally representative cohort of pregnant women in U.S. cities, this study examines the prevalence and correlates of interpersonal violence (IPV) – physical, emotional, and coercion-control -- during pregnancy and one year after birth. Overall, 33% of mothers and 40% of fathers experience some form of IPV during or after pregnancy. Hispanic women, women of other race-ethnicities, and those no longer romantically involved with their children's fathers were most likely to experience IPV during pregnancy. Less educated women, women who reported that they or their spouses used substances (i.e. alcohol or illicit drugs), and women who reported that their pregnancy was unwanted were at high risk of IPV both during and after their pregnancy. Violence during pregnancy strongly predicted violence after pregnancy. U.S.-born women who were employed during their pregnancy were the most likely to have left an abusive relationship one-year post-partum.

Key Words: pregnancy, physical violence, emotional violence, coercion-control violence

INTRODUCTION

Intimate partner violence (IPV) during and after pregnancy is associated with harmful maternal, fetal, and neonatal outcomes (Kady, Gilbert, Xing, & Smith, 2005) and is a leading cause of pregnancy-related death (Chang, Berg, Saltzman, & Herndon, 2005). For pregnant women, partner violence can also result in inadequate prenatal care (Curry, Perrin, & Wall, 1998; Dietz et al., 1997; Goodwin et al., 2000), maternal trauma and labor complications (Cokkinides, Coker, Sanderson, Addy, & Bethea, 1999; Kady et al., 2005), and psychological problems such as emotional distress, depression, anxiety, and low self-efficacy (Carlson, McNutt, & Choi, 2003; Curry & Harvey, 1998). As a consequence, partner violence during and after pregnancy can negatively affect the health of a fetus and the socio-emotional development of infants (Edelson, 1999; Jouriles, Norwood, McDonald, & Vincent, 1996; Kitzman, Gaylord, Holt, & Kenny, 2003; Rachana, Suraiya, Hisham, Abdulaziz, & Hai, 2002).

Despite the potential consequences, we know little about the prevalence of IPV during and after pregnancy or its associated risk and protective factors. The best available national estimates indicate that between 2.1% (Main and Utah) and 6.3% (New Mexico) of women experience physical abuse (defined as pushing, hitting, slapping, kicking or physically hurting the mother in any way) by a husband or partner during their pregnancy (Beck et al., 2003). But these data are limited to reports of physical violence before and during pregnancy. They do not provide information on violence post-partum nor do they provide information on other forms of intimate partner violence such as emotional or coercion-control violence. Finally, these data are limited to maternal reports of IPV by a husband or partner. Thus, they do not capture the overall level of violence in a family. Violence perpetrated by mothers can also signal an unstable family environment that may harm the development of a fetus or infant. Moreover, maternal violence

perpetrated against a child's father can signal that an infant or child will be at risk of child abuse (Ross, 1996; Smith Slep & O'Leary, 2005).

This study seeks to extend the body of literature on violence and pregnancy in three ways. First, we evaluate the prevalence of IPV at the family level by considering violence perpetrated by both mothers and their partners during pregnancy and one-year after birth. Although most research focuses on violence toward women, studies from the family violence literature (Martin et al., 2004; Straus, 2005; Straus & Gelles, 1990) and a meta-analysis on gender differences in aggression by Archer (2000) found at least equal, if not higher levels of female to male perpetrated violence. While the context of violence towards men is often argued to be very different for women in that it represents defensive or retaliatory behavior (Browne, 1987; Follingstad, Wright, Lloyd, & Sebastian, 1991; Saunders, 1986), violence common to both partners can nonetheless result in a more stressful and dangerous living environment for children (Fantuzzo, Boruch, Beriama, Atkins, & Marcus, 1997). Furthermore, children's exposure to family-level violence can not only increase a child's risk for poor outcomes, but can model behavior that relies on aggression and harm to address family problems (Straus, 2005).

Second, we compare the prevalence of three forms of aggression – physical violence, coercion and control, and emotional abuse. Previous research overemphasizes physical violence and downplays the importance of non-physical forms of violence (Johnson, 1995). Our focus on both physical and non-physical forms of violence is based on the recommendations of two national agencies and the Duluth Domestic Abuse Intervention Project. The National Institute of Justice recommends that violence be categorized into five components including physical abuse, sexual violence, threats of physical or sexual violence, stalking, and psychological/emotional abuse (Centers for Disease Contol and Prevention, 2000). The National Center on Injury and

Prevention and Control recommends that definitions of violence be inclusive of physical, sexual, emotional/psychological, and economic abuse and that they "address the use of power, intimidation, threats, and violence to gain control in relationships" (Osattin & Short, 1998, p. 8). The Duluth project emphasizes four forms of non-physical violence including isolation (e.g., controlling what a woman does, who she sees and talks to, where she goes), economic abuse (e.g., making her ask for money, taking her money, preventing her from getting a job), emotional abuse (e.g., putting her down and making her feel badly about herself), and coercion and threats (e.g., making her do illegal things, making and/or carrying out threats to cause harm) (Pence & Paymar, 1993).

Third, we model risk and protective factors for IPV not only during pregnancy but also one-year post-partum. The period following birth is particularly understudied (see Martin et al., 2001 for an exception) but it is developmentally critical for the newborn child (Rochat, 2001). It is a time when many parents experience high levels of happiness, but stress, conflict, and maladaptive behavior can also arise and threaten a child's well-being (Cowan & Cowan, 1995). Previous research on IPV before and during pregnancy suggests that IPV declines when women become pregnant (Martin, Mackie, Kupper, Buescher, & Maracco, 2001; Saltzman, Johnson, Gilbert, & Goodwin, 2003). However, this may simply be a temporary lull rather than a permanent decline and others argue that pregnancy is a stimulus for IPV (Burch & Gallup, 2004).

Previous demographic research on IPV during pregnancy suggests that the risk of violence is highest for younger mothers and in some samples for non-whites (Gazmararian et al., 1995; Goodwin et al., 2000). Discrepancies exist however, about the role of race and ethnicity in violence with some researchers finding no difference among racial groups (Wiemann, Agurcia,

Berenson, Volk, & Rickert, 2000) and others finding that White women experience higher rates of violence than minority women (McFarlane, Parker, & Soeken, 1996). Researchers have also found that low-income and less-educated women who are not married or are cohabiting are more at risk of physical abuse by their partners during pregnancy (Saltzman et al., 2003). Finally, substance use and maternal stress (e.g., first child and unwanted pregnancy) have been associated with interpersonal violence (Amaro, Fried, Cabral, & Zuckerman, 1990; Goodwin et al., 2000; McCoy, Messiah, & Yu, 2001). We expect these same factors to be associated with violence after pregnancy. In addition, violence between partners before and during pregnancy is likely to be a strong predictor of future partner violence (Martin, et al., 2001).

Using nationally representative data from the Fragile Families study, this paper offers the fullest accounting to date of intimate partner violence during and after pregnancy. We report the prevalence of physical, emotional, and coercion-control violence during pregnancy and one-year post-partum. Furthermore, we distinguish between violence perpetrated by fathers and mothers. We then evaluate the relative importance of socioeconomic status, social support, paternal and maternal substance use, and maternal stress in determining the risk of violence during pregnancy and its continuation one-year post-partum.

METHODS

Sample

The Fragile Families study is a stratified random sample of hospital births in 20 large U.S. cities (Center for Research on Child Wellbeing, 2003). To allow for a greater focus on births to vulnerable populations, unwed mothers were over-sampled. When weighted, the data are representative of births in U.S. cities with populations over 200,000 in 1999. For the majority of births, both new mothers and fathers were interviewed for this study within three

days of delivery. Response rates were 87% for unmarried mothers, 82% for married mothers, 76% for unmarried fathers, and 89% for married fathers. The baseline dataset included 4,898 completed mother and 3,830 completed father interviews. About 89% (4,365) of the mothers and 93% (3,124) of the fathers were re-interviewed when the child was one year old. An additional 7% (243) fathers were interviewed for the first time when the child was one year old.

We limit our analysis to the 4,365 women with completed interviews at both the baseline and one-year post-partum. Due to missing values (primarily on father-reported domestic violence at the one-year follow-up), our analytic sample was reduced to 3,212 mothers. Due to missing weights, the analytic sample is reduced to 2,310 mothers when the data are weighted. To ensure generalizability, prevalence estimates are reported using the weighted sample. To improve the power of our analysis, the unweighted sample is used in logit analyses. To account for sample design effects, we calculate robust standard errors and adjust estimates for clustering.

Dependent Variables

Designers of the Fragile Families study used well-validated questions from three sources to identify intimate partner violence (Lloyd, 1997; Straus, 1990; Winefield, Winefield, & Tiggermann, 2000).

Intimate Partner Violence During Pregnancy is measured as the presence of either physical violence or emotional abuse. To measure physical violence, both parents reported how frequently (often, sometimes, or never) they had been hit or slapped during their relationship. Because even sometimes hitting or slapping a partner is significant, we dichotomized this variable to indicate any (i.e., often or sometimes) physical violence. To measure emotional violence, both parents reported how frequently (often=3, sometimes=2, or never=0) their partners: (1) were fair and willing to compromise during a disagreement (2) expressed affection

or love for them (3) insulted or criticized them or their ideas (reverse coded), and (4) encouraged or helped them. With scores ranging from 12-0, this 4-item emotional violence scale had a Cronbach's alpha of .64 in our sample. We identified the presence of emotional violence if the sum of these items was at least three. The items, which are similar to questions from the "Reasoning" and "Verbal Aggression" scales of the Conflict Tactics Scale (Straus, 1979), were scored according to the method used by Lloyd (1997). She includes any experience of emotional violence (sometimes, often, or very often) as an indicator of its occurrence (Lloyd, 1997).

Intimate Partner Violence 1-year Post-Partum is measured as the presence of either physical, emotional, or coercion-control violence. Our measures of physical and emotional violence at one-year post-partum are nearly identical to our measures during pregnancy. However, father reports of physical violence are not available one-year post-partum. In addition, mother's reports pertain to either the father of the child or the mother's new partner if she is no longer in a relationship with the father.

At one-year post-partum, a 3-item scale to measure coercion-control violence was added to the questionnaire for both women and their partners (Lloyd, 1997). As with emotional violence, each item was measured on a 3-point Likert scale (never=0… often=3) and summed to create a score ranging from 0-9. We identified presence of coercion-control violence in the family when either the mother or her partner reported ever (often or sometimes) being: (1) kept from seeing or talking with friends or family, (2) prevented from going to work or school, or (3) prevented from keeping their own money or obtaining access to the family's money. In our sample, this 3-item scale for coercion-control violence had a Cronbach's alpha of .63.

To evaluate whether emotional and coercion-control violence reflected distinct dimensions of intimate partner violence in both women and men, we conducted a factor analysis

of all the items (analysis available upon request). As expected, we identified a 2-factor solution with the 4 emotional violence items loading most strongly on one factor and the 3 coercion-control items loading most strongly on the second factor. Although not measured among fathers after pregnancy, among mothers our one-item measure of physical violence loaded weakly on the coercion-control scale when it was included.

Independent Variables

With the exception of paternal substance use, all independent variables were measured using the baseline survey from mothers' interviews.

Demographic Variables. Mothers self-reported race and ethnicity data were combined to create four groups -- Non-Hispanic White, Non-Hispanic Black, Hispanic, and other (7.4% Asian). Immigrant status was determined by whether mothers were born in the mainland United States (i.e., U.S. born) or born in a U.S. territory (e.g., Puerto Rico) or to non-U.S. citizens in a foreign country (i.e., foreign born/migrant). We also differentiated between immigrants who arrived in the U.S. within the past 5 years (recent arrivals) and those who arrived 5 or more years ago (late arrivals). Because of the high correlation between maternal and paternal nativity (r = .69), and maternal and paternal ethnicity (r = .74), only maternal values were used in the analysis. Finally, we control for mother's age at the time of delivery.

Socioeconomic Variables. Maternal education (<12 years, 12 years, some college, and college graduate) and welfare status (yes/no) were used to measure socioeconomic status. While mothers also reported income, we excluded it from this analysis due to concern about biased self-reports and missing values. Analyses of correlations between education and welfare status indicated that being a high school dropout (<12 years of education) was only modestly correlated with welfare receipt (r =.25)

Family Structure & Social Support Variables. We considered family structure and both family and non-family social support in our models. Family structure is determined by the mother's relationship status with the father of her newborn (married, cohabiting, romantically involved but not cohabiting, or single/uninvolved). Because of their association with intimate partner violence more generally (Coker, Smith, McKeown, & King, 2000), two additional couple characteristics (≤ 1 year in the relationship and father-mother age difference of 10+ years) were also included in our analyses.

Family support is measured by whether the mother could count on someone in her family for financial or in-kind assistance (i.e., kin support). Non-family support is determined by whether the mother worked while pregnant; whether she attended church at least several times each month (i.e., religious); and whether she had lived in her current community for less than a year. Women who live in a community for a longer period of time are expected to have more social connections to rely on for assistance. Among these variables, only the correlation between single/uninvolved marital status and unwanted pregnancy was significant (r=.20).

Maternal & Paternal Substance Use. Mothers were asked (1) "During your pregnancy, how often did you drink alcoholic beverages (nearly every day, several times a week, several times a month, less than once a month, never)?" and (2) "During your pregnancy, how often did you use drugs such as marijuana, crack cocaine, or heroine (Nearly every day, several times a week, several times a month, once a month, or never)"? Fathers were asked the same questions regarding drug and alcohol use but with reference to the previous three months rather than the course of the pregnancy. We dichotomized the responses to indicate any paternal alcohol use, any paternal drug use, any maternal alcohol use, and any maternal drug use. Correlations between measures of maternal and paternal substance use ranged from .00 to .15.

Maternal Stress. Using mother's self reports, we created three indicators of stress associated with her pregnancy. First, a pregnancy was categorized as unwanted if the mother reported having considered an abortion, having been asked by the father to consider an abortion, or having developed a worsening relationship with the father due to the pregnancy. Second, a mother was identified as experiencing additional stress if she lived in a neighborhood where she felt unsafe. Third, we identified whether this was the mother's first birth. Correlations on these three variables ranged from -.07 to .11.

[INSERT TABLE 1 HERE]

Descriptive Statistics. Table 1 provides the means and proportions for all independent variables included in this analysis. The sample was fairly evenly distributed between white (37%), black (25%), and Hispanic (31%) mothers. The mean age of mothers at the time of delivery was 26; 33% of the mothers had less than a high school education and 20% had a college degree. Approximately 40% of the mothers were not married to the father of their baby and about one-fifth of them had been in a relationship with the father for less than one year. Most (73%) of the mothers worked in the year prior to the birth of their baby, less than half were religious, and slightly more than two-thirds had lived in their neighborhood more than 12 months. About 64% of fathers and 10% of mothers used alcohol prior to the birth of their child's birth; 8% and 2% respectively used drugs. Finally, more than 22% of the mothers had an unwanted pregnancy and over 35% were having their first child.

Analysis

To ensure generalizability, we used the weighted data to estimate the prevalence of intimate partner violence during and after pregnancy and evaluated differences in these

prevalence rates by race-ethnicity and nativity. Calculations of standard errors took the sampling design into effect and adjusted for clustering within cities.

We then estimated three logit models using covariates measured at the baseline. In the first model, we evaluated risk factors for any intimate partner violence *during pregnancy*. We report the odds ratios and 95% confidence intervals after adjusting for all 5 sets of covariates including (1) maternal demographics, (2) socioeconomic factors, (3) family structure, as well as family and non-family social support, (4) maternal and paternal health and behavior, and (5) maternal stress. In the second model, we evaluated the same set of 5 risk factors for any intimate partner violence *one-year post-partum*. This allows for a comparison of risk factors across the two periods. In the third, we added controls for violence during pregnancy. As a result, the final model identifies which factors are associated with continuing in a violent relationship after the birth of a child.

We use STATA 8.0 (State Corporation, College Station, TX) for all analyses. To maximize the power of the logit analyses, we use the unweighted data but calculate robust standard errors that have been adjusted for the sample design. All logit analyses using the unweighted data were recalculated using the weighted data. There were no substantial differences in adjusted odds ratios when the weighted data were used but the results were less precise.

RESULTS

Prevalence During Pregnancy

Approximately 19.8% of all mothers and their partners reported experiencing either physical (9.6%) or emotional (13.1%) violence during pregnancy (Table 2). Mothers' partners reported a higher prevalence of physical violence than the mothers themselves (8.2% vs. 1.7%)

but reported similar rates of emotional abuse (7.0% vs. 7.5%). Hispanic and black women and their partners reported no significant differences in physical and emotional violence rates within their families but both groups experienced significantly higher rates of physical and emotional violence than families headed by white mothers. We found no significant differences in interpersonal violence by maternal nativity.

[INSERT TABLE 2 HERE]

Prevalence 1-Year Post-Partum

One year after their child's birth, 51.7% of mothers and their partners reported experiencing either physical (3.1%), emotional (27.0%) or coercion-control violence (41.0%). While mothers clearly reported more physical violence one year after the child's birth, data on partners' reports were not available one year later. However, emotional violence measures were equivalent at the baseline and one-year follow-up interviews; and these rates nearly doubled. Finally, the inclusion of coercion-control violence (not available at the baseline interview) resulted in a substantial increase in the total prevalence of interpersonal violence in the family unit one year later.

As they did during pregnancy, black and Hispanic families experienced significantly more emotional violence that families headed by white women. They also experienced significantly higher rates of coercion-control violence as did families headed by mothers of other race-ethnicities. Based on mothers' reports only, blacks and Hispanics did not experience higher physical violence rates than white women at one-year post-partum. Finally, we found significantly lower rates of emotional violence in families headed by U.S.-born women than in families headed by recent immigrants (i.e., $\leq$ 5 years in U.S.).

Correlates of Intimate Partner Violence

To better understand the risk for interpersonal violence during pregnancy and one-year post-partum, we turn to our logit estimates (Table 3). In Model 1, we report the odds of either partner experiencing physical or emotional violence during pregnancy. In Model 2, we report the odds of either partner experiencing physical, emotional, or coercion-control violence one-year post-partum. In Model 3, we add controls for violence during pregnancy to Model 2 and report the odds of continuing in a violent relationship with the child's father or new partner.

History of Violence. As found in previous analysis (Martin et al., 2001), a history of violence during pregnancy was a significant risk factor for continued IPV one year later. IPV was 70%-80% more likely to occur in families where at least one parent reported experiencing violence during pregnancy. In families where both partners reported violence, the odds of IPV continuing after the child's birth was 3.5 times higher than in families where neither parent report experiencing violence during pregnancy.

[INSERT TABLE 3 HERE]

Maternal Demographic Characteristics. Relative to white mothers, Hispanic and other mothers were more likely to experience or perpetrate violence during pregnancy (Model 1). However, one year later only other mothers were significantly more likely than white mothers to continue in these violent relationships (Model 3). Though they were not at higher risk than their U.S. counterparts during pregnancy, recent ($\leq$ 5 years in U.S.) immigrants were more likely to continue in violent relationships post-partum. Many (3.56%) of these recent immigrants also happen to be Hispanic.

Socioeconomic Characteristics. We found that mothers with some college or less were at significantly greater risk of being in a violent relationship during pregnancy than college

graduates (Model 1). Moreover, these less educated women were at greater risk of staying in abusive relationships once their child was born (Model 3).

Family Structure & Social Support Variables. Social support factors had little influence on the risk of interpersonal violence during or after pregnancy. But, family structure was strongly associated with interpersonal violence. Women who were single or uninvolved with their previous partner at the time of their child's birth were 4-times more likely to have been involved in a violent relationship during pregnancy (Model 1). Though it did not achieve significance, these women were 40 percent less likely to continue in a violent relationship one-year post-partum.

Non-Family Social Support Variables. Several indicators of social support outside of the family approached significance. Most interestingly, employment was not associated with interpersonal violence during pregnancy. However, it was significantly associated with a reduced risk of interpersonal violence after pregnancy.

Paternal and Maternal Substance Use. Women in relationships with partners who used illicit drugs or frequently drank alcohol were more at risk of IPV both during and after pregnancy. Any alcohol use by the mother during pregnancy was also associated with violence during pregnancy but not in the year following birth.

Maternal Stress. Both an unwanted pregnancy and feeling unsafe in one's neighborhood were associated with a higher risk of IPV prior to (Model 1) and after (Model 2) birth. But neighborhood safety was not associated with staying in a violent relationship (Model 3). We observed no association between IPV and having a baby for the first time.

DISCUSSION

Few studies have examined violent behavior perpetrated by both members of a couple during and after pregnancy. Most research focuses on female victimization and on physical forms of violence only. Other aspects of couple aggression such as psychological or emotional abuse, sexual abuse, and coercion and control have received less attention. This study adds to the family and domestic violence literature by examining (1) violence operating at the family level and perpetrated by either partner in a relationship, (2) the prevalence of three different forms of interpersonal violence, and (3) risk factors associated with both violence during pregnancy and the continuation of violent interpersonal relationships after the birth of a child.

We found that both men and women report similar rates of physical, emotional, and coercion-control violence. But, in two cases -- physical violence toward her partner during pregnancy and coercion and control one-year after birth -- female perpetrated aggression was higher. These findings are consistent with previous family violence research which has found equally high levels of male and female physical violence, and in some cases even higher female perpetrated abuse (Archer, 2000; Magdol, Moffitt, Caspi, & Newman, 1997; Straus & Gelles, 1990). High rates of female perpetrated aggression are common in large-scale randomized studies, like Fragile Families, that include a population not explicitly sampled for their involvement in violent behavior (Johnson, 1995). Small community or shelter-based samples tend to be biased towards selecting women who have been victims of abuse (Archer, 2000).

Compared to previous research, the rates of physical violence among partners are quite similar to those reported by other national studies. The prevalence rate of physical violence among pregnant women (1.7%) in the Fragile Families study is somewhat lower than the rates (2-6%) reported from the 1999 Pregnancy Risk Assessment and Monitoring System (PRAMS) (Beck et al., 2003). One-year post-partum, the rates (3%) for these women is slightly higher than

the annual prevalence rates for women obtained from the National Violence against Women (NVAW) survey (1.5%) (Tjaden & Thoennes, 2000). However, the rate of physical violence reported by men in our sample is substantially larger (8% vs. 1%) than the 12-month prevalence rates among men reported by the NVAW (Tjaden & Thoennes, 2000). It is more similar to lifetime prevalence rates among men (7.4%).

Although much less research has been conducted on the prevalence of emotional abuse or coercion-control violence, our results are congruent with Martin's (2004) study of predominantly low-income women receiving prenatal care in clinics in North Carolina. She finds that psychological abuse of women outstrips physical violence before and during pregnancy. Additional clinic-based studies of women (regardless of pregnancy) also show that psychological forms of violence are more commonly experienced than physical violence (Magdol et al., 1997; Shumway et al., 1999; Yost, Bloom, McIntire, & Leveno, 2005). For example, Shumway and associates (1999) found that 36% of their clinic-based prenatal sample experienced verbal aggression while only 14-16% experienced moderate to severe physical violence.

Studies that include male victims also show higher rates of psychological abuse compared to physical violence (Cloutier et al., 2002; Magdol et al., 1997). A longitudinal birth cohort study of men and women by Magdol and colleagues (1997) reported much higher victimization rates of psychological aggression (89.7%) among men compared to minor (31.8%) and severe (21.2%) forms of physical violence. Higher rates of psychological violence around the time of pregnancy may be the result of increased levels of stress and arguing associated with significant life changes that come with having a baby. Argumentative and verbally abusive interactions between couples may not, however, necessarily translate into physical forms of violence (Martin et al., 2004).

Our results comparing interpersonal violence rates during and *after* pregnancy also echo the results of studies that examine IPV *before* and during pregnancy (Martin et al., 2001; Muhajarine & D'Arcy, 1999; Saltzman et al., 2003). Male partner aggression towards women subsides during the pregnancy period but after a child's birth the risk of IPV increases. Thus, the lull during pregnancy should not be mistaken for a permanent decline in IPV.

Our logit estimates suggest that Hispanic and other women who are not married or are cohabiting with their partners, have less than a college education, and whose partners have a history of drug or alcohol use are most at risk of being in a violent relationship during pregnancy. Moreover, women who have experienced or perpetrated violence during pregnancy are likely to continue in a violent relationship after the birth of their child. Additionally, women who only recently immigrated to the U.S. and women who were not employed during their pregnancy are at high risk of continuing in a violent relationship one-year post-partum. Leaving a violent relationship may be especially hard for those without financial independence or instrumental ties to their communities.

While our nationally representative study has several strengths, it has three primary limitations. First, we rely on a single measure (slap or hit) of physical abuse and may therefore underestimate the prevalence of physical violence during and after pregnancy. However, this form of physical aggression is most common according to the NVAW and other forms of physical aggression typically occur in conjunction with rather than in addition to slapping or hitting. Second, we are not able to observe physical violence among men post-partum or coercion-control violence during the pregnancy period. As a result, our total IPV prevalence rates are not entirely comparable before and after pregnancy. Nevertheless, our prevalence rates for physical and emotional violence experienced by women during and after pregnancy are

comparable. In addition, our analysis of risk and protective factors of family-level IPV yields important insights not identified in previous research. Finally, our study relies on a hospital-based sample of women living in large U.S. cities. Women living in rural areas or who do not give birth in a hospital may have different IPV experiences. To the extent that IPV rates vary throughout the pregnancy, we are also not able to observe this variation.

Despite these limitations, our results have important implications for health care providers, social workers, and others who work with fragile families at risk of IPV. For example, screenings for IPV during pregnancy should focus on the family unit and include both mothers and fathers. In addition, screenings should include not only physical violence but also emotional and coercive-control violence. Each of these reflects instability in the family unit which will likely continue post-partum and can ultimately harm the socio-emotional development of the newborn child.

Future research can expand on these findings by including additional time points before, during, and after pregnancy. In addition, future research should aim to follow children born into families with a history of IPV. Such studies would allow social service providers and health care practitioners to better understand the developmental consequences of exposure to IPV and the extent to which interpersonal violence between partners is associated with child neglect and abuse. This information will help ensure that current and future programs successfully support and strengthen whole families and couple relationships, while protecting women and children at risk of family violence.

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Table 1. Means and Proportions of Independent Variables During Pregancy (N=2,310)

	During Pregnancy	
	n	**%/mean**
Maternal Demographic Variables		
Race-Ethnicty		
White	612	36.6
Black	918	25.2
Hispanic	686	30.8
Other	94	7.4
Place of birth		
U.S.-born	1,928	80.0
Foreign-born (> 5 yrs in U.S.)	382	20.0
Foreign-born (≤ 5 years in U.S.)	120	5.7
Age at delivery, years (mean)	---	26.8
Socioeconomic Variables		
Maternal Education		
<12 years	860	32.7
12 years	564	25.4
Some College	578	22.3
College	308	19.6
Welfare recipient	774	25.6
Family Structure & Social Support Variables		
Relationship status		
Married	627	59.5
Cohabitating	1,008	24.5
Romantically Involved	522	12.6
Single/Uninvolved	153	3.4
Kin Support	1,410	51.3
Father ≥10 years older/younger	217	8.5
≤ 1 year in relationship w/ father	638	20.6
Non Family Social Support		
Worked in previous year	1,708	72.5
Attends religious services frequently	897	42.8
< 1 year at current neighborhood	740	30.5
Paternal Health and Behavior		
Drinks (during last 3 months)	1,413	63.5
Used drugs last month	263	8.4
Maternal Health and Behavior		
Drinks (during pregnancy)	229	10.0
Used drugs last month	90	2.4
Maternal Stress		
Unwanted pregnancy	714	21.7
Feels unsafe in neighborhood	325	9.8
First child	899	35.6

Note: Unweighted frequencies and weighted percentages.

Table 2. Prevalence (%) of Intimate Partner Violence During Pregnancy and One Year Post-Partum (N=2,310)

	Physical		Emotional		Coercion/Control		Total	
	During	**After**	**During**	**After**	**During**	**After**	**During**	**After**
Total Sample	9.6	3.1	13.1	27.0	---	41.0	19.8	51.7
Reports [a]								
Partner reports of violence (n=2,310)	8.2	---	7.0	13.3	---	27.7	13.4	34.1
Mother reports of violence (n=2,310)	1.7	3.1	7.5	17.3	---	21.4	8.5	30.0
Maternal Race-Ethnicity								
Black (n=918)	13.6 [b]	4.0	16.7 [b]	32.2 [b]	---	43.0 [b]	11.9 [b, c]	34.1 [b]
Hispanic (n=686)	12.5 [b]	3.8	16.3 [b]	32.9 [b]	---	43.9 [b]	11.6 [b, c]	38.2 [b]
White (n=612)	5.1	2.2	8.5	17.8	---	34.0	4.5	21.1
Other (n=94)	6.2	1.2	10.6	26.9	---	52.9 [b]	3.9	24.2
Maternal Nativity								
U.S. born (n=1,928)	10.2	3.1	12.5	25.5	---	40.1	7.9	27.4
Foreign-born > 5 yrs in U.S. (n=382)	7.9	3.0	15.4	32.0	---	44.1	11.7	36.8 [d]
Foreign-born ≤ 5 yrs in U.S. (n=120)	6.4	3.1	15.5	41.0 [d]	---	44.6	9.1	44.4 [d]

Note: Frequencies are unweighted. Percentages are weighted to reflect the U.S. population in large cities.

Intimate partner violence questions during pregnancy do not contain coercion-control questions. Therefore, only physical and emotional violence during pregnancy could be assessed. After pregnancy, only mothers were asked about physical violence by their partners. Therefore, for partners, only emotional and coercion/control violence could be assessed.

[a] During pregnancy, both partners reported physical violence in .31% of cases and emotional violence in 1.4% of cases. After pregnancy, both partners reported emotional violence in 3.6% of cases and coercion-control violence in 8.1% of cases.

[b] Difference from white is significant ($p < .05$).

[c] Difference from other is significant ($p < .05$)

[d] Difference from U.S. born is significant ($p < .05$).

Table 3. Logit Model of Intimate Partner Violence During Pregancy and 1-year Post-Partum

	(1) Physical / Emotional Violence During Pregnancy		(2) Physical / Coercive / Emotional Violence 1 yr. Post-Partum		(3) Physical / Coercive / Emotional Violence 1 yr. Post-Partum	
	Odds Ratio	(95% CI)	Odds Ratio	(95% CI)	Odds Ratio	(95% CI)
History of Violence						
Partner reports violence perpetrated by mother	---	--- ---	---	--- ---	1.8 ***	(1.4 , 2.3)
Mother reports violence perpetrated by partner	---	--- ---	---	--- ---	1.7 ***	(1.4 , 2.1)
Maternal Demographic Variables						
Race-Ethnicty						
White	---	--- ---	---	--- ---	---	--- ---
Black	1.3	(1.0 , 1.7)	1.0	(0.9 , 1.2)	1.0	(0.9 , 1.2)
Hispanic	1.4 *	(1.0 , 2.0)	1.2	(0.9 , 1.5)	1.1	(0.9 , 1.4)
Other	1.6 *	(1.0 , 2.6)	1.8 **	(1.3 , 2.4)	1.7 **	(1.2 , 2.3)
Place of birth						
U.S.-born	---	--- ---	---	--- ---	---	--- ---
Foreign-born (> 5 yrs in U.S.)	1.1	(0.9 , 1.3)	1.1	(1.0 , 2.4)	1.1	(0.9 , 1.4)
Foreign-born (≤ 5 yrs in U.S.)	1.3	(0.8 , 2.0)	1.6 *	(1.0 , 2.4)	1.5 *	(1.0 , 2.3)
Age at delivery, years	1.0	(1.0 , 1.0)	1.0	(1.0 , 1.0)	1.0	(1.0 , 1.0)
Socioeconomic Variables						
Maternal Education						
<12 years	2.3 ***	(1.7 , 3.1)	2.9 ***	(2.2 , 3.9)	2.8 ***	(2.1 , 3.6)
12 years	1.7 **	(1.2 , 2.3)	2.0 ***	(1.5 , 2.5)	1.9 ***	(1.5 , 2.4)
Some College	1.5 **	(1.1 , 2.0)	1.7 ***	(1.4 , 2.1)	1.7 ***	(1.4 , 2.1)
College	---	--- ---	---	--- ---	---	--- ---
Welfare recipient	1.1	(1.0 , 1.3)	1.1	(0.9 , 1.3)	1.1	(0.9 , 1.3)
Family Structure & Social Support Variables						
Relationship status						
Married	---	--- ---	---	--- ---	---	--- ---
Cohabitating	1.1	(0.8 , 1.6)	1.1	(0.9 , 1.5)	1.1	(0.9 , 1.5)
Romantically Involved	1.5 *	(1.1 , 2.2)	1.2	(0.9 , 1.6)	1.2	(0.9 , 1.6)
Single/Uninvolved	4.0 ***	(2.1 , 7.8)	0.8	(0.4 , 1.4)	0.6	(0.4 , 1.1)
Kin Support	0.9	(0.8 , 1.1)	0.9	(0.8 , 1.1)	1.0	(0.8 , 1.1)
Father ≥ 10 years older/younger	1.2 *	(1.0 , 1.4)	1.0	(0.8 , 1.3)	1.0	(0.7 , 1.3)
≤ 1 year in relationship w/ father	1.1	(0.8 , 1.4)	1.2	(0.9 , 1.5)	1.2	(1.0 , 1.4)
Non Family Social Support						
Worked in previous year	1.0	(0.8 , 1.3)	0.8 *	(0.7 , 1.0)	0.8 *	(0.6 , 1.0)
Attends religious services frequently	0.9	(0.7 , 1.0)	1.0	(0.8 , 1.2)	1.0	(0.9 , 1.2)
< 1 year at current neighborhood	1.0	(0.8 , 1.2)	1.1	(1.0 , 1.2)	1.1 *	(1.0 , 1.2)
Paternal Health and Behavior						
Any alcohol use during last 3 months	0.9	(0.7 , 1.2)	1.2 *	(1.0 , 1.3)	1.2 **	(1.0 , 1.3)
Used drugs last month	1.8 ***	(1.4 , 2.2)	1.3 **	(1.1 , 1.5)	1.2 *	(1.0 , 1.4)
Maternal Health and Behavior						
Any alcohol use during pregnancy	1.3 *	(1.0 , 1.8)	1.2	(0.9 , 1.5)	1.1	(0.9 , 1.5)
Used drugs last month	1.2	(0.7 , 1.8)	1.0	(0.7 , 1.7)	1.0	(0.6 , 1.7)
Maternal Stress						
Unwanted pregnancy	1.7 ***	(1.3 , 2.1)	1.3 **	(1.1 , 1.6)	1.2 *	(1.0 , 1.5)
Feels unsafe in neighborhood	1.4 **	(1.2 , 1.8)	1.2 *	(1.0 , 1.6)	1.2	(1.0 , 1.6)
First child	1.0	(0.8 , 1.2)	0.9	(0.8 , 1.1)	0.9	(0.8 , 1.1)
N	3212		3212		3212	
Pseudo R2	0.08		0.06		0.07	
Log Likelihood	-1689		-2093		-2066	

Note: Unweighted sample used to improve precison. To account for sample design effect, logit models are estimated with robust standard errors and adjusted for clustering.

*$p \leq .05$, **$p \leq .01$, ***$p \leq .001$

Appendix A

(Not intended for publication. Available upon request)

Table A1. Correlation matrix for unweighted sample (N=3,212)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)
Maternal Demographic Variables																														
(1) White	1.0																													
(2) Black	-0.5	1.0																												
(3) Hispanic	-0.3	-0.6	1.0																											
(4) Other	-0.1	-0.2	-0.1	1.0																										
(5) U.S. Born	**0.2**	**0.3**	**-0.4**	**-0.3**	1.0																									
(6) Foreign Born (>5 yrs in U.S.)	-0.1	**-0.2**	**0.3**	**0.3**	-0.8	1.0																								
(7) Foreign-born (≤ 5 yrs in U.S.)	-0.1	**-0.2**	**0.2**	0.1	-0.5	-0.1	1.0																							
(8) Age	**0.2**	-0.1	-0.1	0.1	-0.1	0.1	0.0	1.0																						
Socioeconomic Variables																														
(9) <12 years	**-0.2**	0.0	**0.2**	-0.1	-0.1	0.0	0.1	**-0.3**	1.0																					
(10) 12 years	-0.1	0.1	-0.1	0.0	0.1	-0.1	-0.1	-0.1	-0.5	1.0																				
(11) Some College	0.0	0.0	-0.1	0.0	0.1	0.0	0.0	0.1	-0.4	-0.3	1.0																			
(12) College	**0.3**	**-0.2**	**-0.2**	**0.2**	0.0	0.1	0.0	**0.4**	-0.3	-0.2	-0.2	1.0																		
(13) Welfare recipient	-0.1	**0.2**	0.0	-0.1	**0.2**	-0.1	-0.1	**-0.2**	**0.3**	0.0	-0.1	**-0.2**	1.0																	
Family Social Support Variables																														
(14) Married	**0.3**	**-0.2**	-0.1	0.1	-0.1	0.1	0.1	**0.4**	**-0.3**	-0.1	0.1	**0.5**	**-0.3**	1.0																
(15) Cohabitating	-0.1	0.0	**0.2**	-0.1	0.0	0.0	0.0	**-0.2**	0.1	0.0	0.0	**-0.2**	0.1	-0.5	1.0															
(16) Romantically Involved	**-0.2**	**0.3**	-0.1	-0.1	0.1	-0.1	-0.1	**-0.2**	0.1	0.1	0.0	**-0.2**	**0.2**	-0.3	-0.5	1.0														
(17) Single/Uninvolved	-0.1	0.1	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	0.0	-0.1	-0.1	0.1	-0.2	-0.2	-0.1	1.0													
(18) Kin Support	-0.1	0.1	0.0	-0.1	0.1	-0.1	-0.1	**-0.3**	0.1	0.1	-0.1	**-0.2**	**0.3**	**-0.3**	0.0	**0.2**	0.1	1.0												
(19) Father ≥ 10 years older/younger	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0											
(20) ≤ 1 year in relationship w/ father	-0.1	0.0	0.1	0.0	0.0	0.0	0.0	**-0.2**	0.1	0.0	0.0	-0.1	0.1	**-0.3**	0.1	0.1	0.1	0.1	0.1	1.0										
Non Family Social Support																														
(21) Worked in previous year	0.1	0.1	-0.1	0.0	0.1	-0.1	-0.1	0.0	**-0.3**	0.1	0.1	0.1	-0.1	0.0	0.0	-0.1	0.0	0.0	-0.1	0.0	1.0									
(22) Religious	-0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	-0.1	0.0	0.1	0.1	-0.1	**0.2**	-0.1	0.0	0.0	-0.1	0.0	-0.1	0.0	1.0								
(23) < 1 year at current residence	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	**-0.2**	0.1	0.0	0.0	-0.1	0.1	-0.1	0.1	-0.1	0.0	0.1	0.0	0.1	0.0	-0.1	1.0							
Paternal Substance Use																														
(24) Drank during last 3 months	0.1	-0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	-0.1	**-0.2**	0.0	0.0	0.0	0.1	-0.1	0.0	1.0						
(25) Used drugs last month	-0.1	0.1	0.0	0.0	0.1	-0.1	-0.1	-0.1	0.1	0.0	-0.1	-0.1	0.1	-0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	-0.1	0.0	**0.2**	1.0					
Maternal Substance Use																														
(26) Drank during pregnancy	0.1	0.0	-0.1	0.0	0.1	0.0	-0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	-0.1	0.0	0.1	0.0	1.0				
(27) Used drugs last month	0.0	0.1	-0.1	0.0	0.1	-0.1	-0.1	0.0	0.1	0.0	-0.1	-0.1	0.1	-0.1	0.0	0.1	0.1	0.1	0.1	0.0	-0.1	-0.1	0.0	0.0	0.1	**0.3**	1.0			
Maternal Stress																														
(28) Unwanted Pregnancy	**-0.2**	**0.2**	-0.1	0.0	0.1	-0.1	-0.1	-0.1	0.1	0.0	0.0	**-0.2**	**0.2**	**-0.3**	0.0	**0.2**	**0.2**	**0.2**	0.0	0.1	0.0	-0.1	0.0	0.0	0.1	0.1	0.1	1.0		
(29) Feels unsafe in neighborhood	-0.1	0.1	0.0	0.0	0.0	0.0	0.0	-0.1	**0.2**	0.0	-0.1	-0.1	0.1	-0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.1	0.1	1.0	
(30) First child	0.1	-0.1	0.0	0.0	-0.1	0.0	0.1	**-0.3**	-0.1	0.0	0.0	0.1	**-0.2**	0.0	0.0	0.1	0.0	0.0	-0.1	**0.2**	0.1	0.0	0.1	0.0	0.0	-0.1	0.0	-0.1	-0.1	1.0

Note: Correlations >.1 are bolded except when part of a set of dummy variables (e.g., education categories).