

Examining Postpartum Depression from a Stress-Process Perspective

ABSTRACT

A substantial literature has developed surrounding the stress process, providing a guiding framework in linking stress exposure to variations in mental health outcomes. There is reason to believe that stress exposure plays a substantial role in the risk for postpartum depression (PPD) as well. While PPD research has primarily explored the association between PPD risk and proximate stressors, little is known about distal and/or cumulative stress effects. Moreover, the importance of the timing, type, magnitude and severity of stressors is unknown. In the current study, I draw on the stress process framework to determine if variations in stress exposure influence a woman's risk for postpartum depression. Using data from the Fragile Families and Child Well-being Study, I address the following questions: (1) are variations in exposure to stress one manner through which social conditions act to increase or decrease a woman's risk for postpartum depression? and (2) if so, which distinct types of stress are most salient for this outcome? I find that life stress is positively associated with postpartum depression and that stressful life events that occur earlier in a woman's lifecourse impact PPD net of more proximate chronic stressors that occur in the postpartum period. Further, different types of stress (major events, chronic) across multiple domains (parenting, relationship, neighborhood) affect PPD independently of one another. Overall, findings suggest the importance of rooting future PPD research in the stress process framework and the need for healthcare providers to incorporate more comprehensive stress checklists into PPD screening instruments.

INTRODUCTION

Postpartum depression, or PPD, is a severe condition that affects 10 to 20% of new mothers in the United States (Horowitz and Goodman 2005). Onset of postpartum depression can begin at any time during the first year following childbirth, a critical time for both mother and infant (Horowitz and Goodman 2005; Blabley et al. 2009). Symptoms characteristic of PPD are similar to those of major depression, including sadness, despair, anxiety, compulsive thoughts, and appetite and sleep disturbances. Furthermore, a new mother may have thoughts of harming herself and/or her infant (Taylor 1996; Centers for Disease Control and Prevention 2010). In addition to directly affecting a new mother's mental health, PPD can interfere with a mother's ability to recognize and respond to the needs of her infant, increasing the risk for infant delays in development and behavioral problems in childhood (Horowitz and Goodman 2005). Consequently, PPD is considered a major form of depression that requires medical treatment and identifying women who may be at an increased risk for developing postpartum depression is crucial. However, the ability to assess a woman's risk of developing postpartum depression remains a significant challenge. Though predictive studies have suggested that various social conditions may influence the risk of a postpartum depressive episode (Boyce et al. 2001; Webster et al. 2003), the evidence indicating the manner in which these conditions exert their influence is sparse.

Drawing on the stress-process model, the current study seeks to determine how stress exposure shapes a woman's risk for PPD. I seek to answer the following questions: Are variations in exposure to stress one manner through which social conditions act to increase or decrease a woman's risk for postpartum depression? If so, which distinct types of stress are most

salient for this outcome? To my knowledge, no prior research has used the stress-process model to examine social risk factors for postpartum depression. This suggests that the type, timing, and influence of stressors have not been thoroughly examined, in contrast to studies of major depression and other mental health outcomes informed by the stress-process model. Furthermore, predictive studies of PPD generally treat individual stressors as overall risk factors working alongside sociodemographic and social support factors in their impact. These studies rarely consider how stress exposure may be part of a causal model of disadvantage that is cumulative over time. Findings from this study may be able to expand on the current research of postpartum depression, aid in the establishment of a reliable, valid postpartum depression screening instrument for use in clinical settings, and reduce negative maternal-infant health outcomes.

BACKGROUND

The stress-process model has become a prominent theoretical perspective for investigating variations in the risk(s) of mental health outcomes (see Turner, Lloyd and Wheaton 1995). The underlying assumption of the stress-process model is that stress exposure, and the protective resources capable of mediating stress, arise from the social context of people's lives (Pearlin et al. 1981). The stress-process model recognizes two distinct types of stress: life events and chronic strains (Perlin et al. 1981). Life events are free-standing, discrete major life changes, such as the death of a spouse, that typically have long lasting harmful effects on health (Perlin 1989). While the stress-process model recognizes that these events can occur at any point during an individual's lifetime, most PPD risk factor instruments do not consider past experiences of women. Chronic strains, on the other hand, are enduring problems, conflicts, and threats that may be encountered on a day-to-day basis (Perlin 1989). Chronic strains are more likely to be cumulative in nature (e.g. financial difficulties, relationship stress, or living in an unsafe

neighborhood) and are generally only harmful during their duration (Perlin 1989). Most often, stress measures used to predict PPD resemble chronic strains.

In addition to distinguishing between types of stressors, the stress-process model recognizes protective resources which may mediate the harmful effects of stress on mental health. Coping and social support have received the most attention as mediators in stress research. These resources are assumed to directly mediate the detrimental effects of stress by diffusing the intensity and number of stressors (Perlin 1989). Coping resources may be positive personal attributes, such as self-esteem, or negative coping behaviors like substance abuse. Social support includes the perceived availability of support from members within an individual's social network (e.g. a romantic partner, family or friends) as well as support that is actually received. Interestingly, most PPD research treats these resources, or the lack of them, as risk factors rather than mediating mechanisms, assuming they work similarly to stress exposure.

Without regard to postpartum depression, a large and distinct body of literature has developed from the stress-process perspective, linking different types of life stressors to major depression. This literature lends theoretical support for a link between accumulated life stressors and depression following childbirth. As Beck (2001) noted, "research is necessary to establish the influence that stressors, particularly life event stressors, have on postpartum depression." In keeping with this view, there is substantial reason to believe that certain types of eventful life stressors occurring throughout a woman's life course prior to birth are risk factors for postpartum depression (Swendsen and Mazure 2000, Beck 2001).

Indeed, empirical literature on postpartum depression illustrates the significance of life stressors, though not in a stress-process context. In a 2000 review piece, Swendsen and Mazure found that general stressors, and stressors specific to motherhood (e.g. childcare stress, difficult

infant temperament), are strongly connected to postpartum depression. It should be noted that the authors did not describe the nature of the stressors in detail and possible reporting biases may be at work. Additional research links stressors specific to current romantic relationships, including intimate partner abuse, high levels of conflict, and a controlling partner, to a diagnosis of postpartum depression (Dennis and Ross 2006, Blabey et al. 2009). Despite the significance of these findings, there are several important limitations. First, the timing of stressful events relative to pregnancy is not established. The timing in which stressful events are encountered in a woman's life may impact onset of depression. Moreover, the magnitude and severity of stressors and the importance of acute versus chronic stressors are not examined.

Empirical literature has also identified certain psychosocial variables that appear to play a role in stress reactivity and postpartum depression vulnerability. A prior history of mood disorders is one of the most salient predictors. Women with a personal and/or family history of depression (see Horowitz and Goodman 2005; McCoy et al. 2006; CDC 2010) or anxiety (see Beck 2001; Matthey et al. 2003, Austin, Tully and Parker 2007) are more vulnerable to stress reactivity and PPD. Another predictor that is often examined is social support. Although much of the research treats social support as a risk factor, a few studies have considered social support to be separate from stress exposure, finding that support buffers stress and reduces depressive symptoms (Swendsen and Mazure 2000, Dennis and Ross 2006). Unfortunately this literature is narrow in scope, having only focused on support provided by a woman's romantic partner. Nevertheless, social support has generally been assumed to directly impact a woman's vulnerability, when it may in fact act as a mediator, diminishing the effects of other causal mechanisms.

Various sociodemographic characteristics that shape stress exposure have been investigated in the postpartum depression literature as well, including age, marital status, race, and socioeconomic status (SES). Symptoms of PPD are exacerbated in mothers 15-19 years of age (Hudson, Elek and Grossman 2000), and prevalence rates of PPD among mothers in this age group are substantially higher relative to older women (Deal and Holt 1998), suggesting that adolescent mothers are at an increased risk for postpartum depression (see McCoy et al. 2006, Reid and Meadows-Oliver 2007, McGuinness and Anderson 2008). Marital status is also impactful, with unmarried mothers more likely to suffer from depressive symptoms following childbirth than their married counterparts (Beck 2001). There is some research to suggest that minority women, especially African Americans (see Segre, Losche, and O'Hara 2006), are more likely to suffer from postpartum depression (Howell et al. 2005; Howell, Mora and Leventhal 2006). However, investigators caution that additional research is needed to parse out the effects of race from SES. A major argument for racial differences in health outcomes focuses on socioeconomic status (Farmer and Ferraro 2005). Alone, SES has a uniformly small effect size on postpartum depression (Beck 2001), which may partially explain observed racial differences (Farmer and Ferraro 2005). Overall, a more comprehensive investigation of postpartum depression from a stress-process framework would allow a clearer estimate of which factors are the most salient predictors of PPD, as well as which factors serve to exacerbate or alleviate the effects of life stress on a woman's risk of PPD.

RESEARCH HYPOTHESES

Drawing on the stress-process and PPD literature, I make several hypotheses. First, I expect life stress to be related to PPD while controlling for demographic and socioeconomic variables and to at least partially explain the relationship between these variables and PPD (*H1*).

Further, I expect chronic stressors like neighborhood safety and relationship strain to be predictive of postpartum depression (Boyce et al. 2001; Webster et al. 2003) (*H2*), however major life stress will also be predictive, independent of chronic stress (Turner, Lloyd and Wheaton 1995) (*H3*). I also expect that major life stressors will accumulate for some women over the life course and have a cumulative effect on postpartum depression, such that with each major stressor, the risk of postpartum depression will increase (*H4*). Lastly, I expect recent life stressors to have a larger impact on PPD since pregnancy and the postpartum period are an important and potentially vulnerable time in a woman's life (*H5a*). Nevertheless, I believe that recent stressors will not completely mediate the independent effects of major life stressors occurring earlier in the life course, since these traumas are thought to have lasting, independent effects (*H5b*).

METHODS

Data

Data for this study come from the Fragile Families and Child Well-being Study, an NIH funded longitudinal sample of approximately 4,900 births in 75 hospitals across 20 U.S. cities. The Fragile Families Study follows a new cohort of mostly unwed (3,600 unwed, 1,300 married) parents and their children and focuses on the topics of conditions, capabilities, and relationships of parents, the role of fathers in child rearing, the role of environmental factors in parent's lives, and child outcomes related to these topics. Subsequently, the Fragile Families contains rich information relevant to the stress-process model and postpartum depression. Data are derived from in-person interviews with parents in the hospital shortly following childbirth. Follow-up interviews were conducted either in-person or by telephone one year after the birth of the focal child and again when the child was 3 and 5 years of age. Information on the child's health at

birth and the mother's health history, including information on the focal pregnancy and delivery, is also available via medical record data extracted by Fragile Families from the birth hospitalization record (accessible with a restricted use data agreement). Although the Fragile Families is not nationally representative of mothers in the United States at risk of PPD, the benefit of this data set come from its large sample size. Much of the research on PPD has relied on small, clinical samples. Furthermore, these data oversample those women with the highest risk of PPD since the women sampled are mainly young, economically disadvantaged, and have reduced social resources and support.

For the purposes of this analysis, I use data from mothers interviews at baseline and the one year follow-up. The onset of postpartum depression typically begins within a year following childbirth, thus data that establish events prior to birth, and in the year immediately following birth, are of the utmost importance. The original sample size consisted of 4,898 women. Of these, 534 women (10.9%) did not participate in the one year follow-up. Because there is no measure for postpartum depression at baseline, the linked, de-identified medical records available from Fragile Families are used to establish a history of depression. As a result, analysis is restricted to those women who have medical record data (24.8% of the original sample were missing medical record data). This reduced the analytic sample to 3,684 women. The use of listwise deletion for variable missingness resulted in a final sample size of 2,697. The variables most responsible for missingness are the stress indices (<1% to 8.9%), however analysis of missingness reveals that no key stressor or life domain is responsible. Rather the missingness arose from summing items with small amounts of missingness (<7.5%) from multiple parts of the survey into each index. Although the final sample size (2,697) is roughly 55% of the original sample, the descriptive statistics of the final sample are similar to those of the original sample

(See Table 1). Unweighted data are used for analyses because weighting decreases the analytic sample by 30%. However, the variables used for sample selection (partner status, socioeconomic status, age, etc.) were included as controls in models, suggesting that the results should be unbiased, consistent, and robust (Winship and Radbill 1994).

Measures

Postpartum Depression. The dependent variable of interest is a self-reported, dichotomous measure of postpartum depression taken at the one-year follow up. The PPD question is derived from the Composite International Diagnostic Interview - Short Form (CIDI-SF), Section A (Kessler et al. 1998). The CIDI is a standardized instrument for assessment of mental disorders and is consistent with the Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition (DSM-IV; APA 1994). Questions in Section A of the CIDI-SF are used to classify a major depressive episode. Specifically, women were asked “During the past 12 months, have you ever been depressed, sad, or blue for two or more weeks in a row?” Women who answered “yes” to this question are coded as a *1*, all others were coded as a *0*.

History of depression. Because history of depression is one of the greatest predictors of PPD (Horowitz and Goodman 2005; Beck 2001), I include a dichotomous indicator of history of depression in my analysis. History of depression is taken from the medical records matched to the baseline survey, and is coded such that *1* = *yes* (history of depression) and *0* = *no* (no history of depression). Women who did not seek medical attention for depression, were misdiagnosed, or whose healthcare provider did not record a diagnosis of depression on the medical record file will not be captured by the medical record data. Thus data are likely to reflect an underreporting of history of depression.

Stressors. In accordance with the stress-process model, three dimensions of stress are considered — major life stress, recent life stress, and chronic stress. Major life stress is a count variable, ranging from 0 to 11, and measures negative events occurring at any point within a woman’s lifetime. Eleven “yes/no” items taken from the baseline and one-year follow up interviews are used to measure major life stress (See Appendix A). Women received a value of 1 for each negative event they reported experiencing within their lifetime and a value of 0 if they did not report experiencing such an event. Recent life stress is also a count variable, ranging from 0 to 5. In contrast to major life stress, recent life stress measures negative events occurring within the twelve month period following the birth of the focal child. Thus five “yes/no” items from the one-year follow up are used to measure recent life stress (See Appendix A). As with major life stress, women received a value of 1 for each negative event they reported experiencing within the past 12 months and a value of 0 if they did not report experiencing such an event.

Chronic stress is broken down into five domains — neighborhood safety, child-related stress, parenting-related stress, relationship strain, and having a controlling partner. Neighborhood safety is measured using the baseline question “how safe are the streets around your home at night?” Responses range from 0 (very safe) to 3 (very unsafe). Child-related stress is a summed index of 7-items from the one-year follow up (See Appendix A), measuring the impact of the child’s temperament on the risk for postpartum depression (Cronbach’s alpha = 0.49). Parenting-related stress captures the stressors associated with raising a family. This variable is measured using an index of 4 items from the one-year follow up (Cronbach’s alpha = 0.69; See Appendix A). Relationship strain indicates whether or not a woman’s relationship with the child’s father is marked by disagreement and/or conflict. This variable is a summed index of 6 items from the baseline survey (Cronbach’s alpha = 0.62). Women were asked how often they

had disagreed with the child's father about: (a) "money" (b) "spending time together" (c) "sex" (d) "the focal pregnancy" (e) "alcohol/drug use" and (f) "being faithful." Women who indicated they were not currently romantically involved with the child's father were asked to report how often these disagreements had taken place in the last month of their relationship. Likewise, women who indicated they were in an "on again/off again" romantic relationship with the child's father were asked to report how often these disagreements occur when they are together. Responses range from 0 (never) to 2 (often). In addition, whether or not the child's father is controlling is measured. To measure control, four items from the one-year follow up are used (Cronbach's alpha = 0.60). Women were asked how often the child's father had done any of the following: (a) "insult or criticize you" (b) "try to isolate you from friends and family" (c) "try to prevent you from going to school or work" and (d) "withhold or try to control your money." These items were asked of women regardless of whether or not they were currently romantically involved with the child's father, as long as they reported the father had seen the child since the child's birth. As with relationship strain, responses range from 0 (never) to 2 (often). For each of the stress indexes, higher values are equivalent to greater levels of stress.

Domestic violence. Although domestic violence could be considered a part of relationship stress, I argue that it may work both as a major life event (Kessler and Magee 1994; Turner 2003) or an ongoing stressor. In addition, domestic violence tends to be particularly impactful on depression overall (Campbell 2002) and often escalates around the time of pregnancy and birth (Mezey and Bewley 1997; Campbell 2002), suggesting that it should be examined separately from general relationship stress. Therefore, I include a separate indicator of history of domestic violence with the child's father. History of domestic violence is a dichotomous measure, based on a series of questions asked at baseline and the one-year follow up. At baseline, women who

reported they were no longer with the child's father, were not currently living with him, or were not married to him were asked if (a) "the relationship ended because of violence or abuse?" (b) "they were not living together/have no plan on living together because of violence or abuse?" and if (c) "they were not married/have no plan to marry because of violence or abuse?" Women who reported they were currently with the child's father were asked (a) "how often does the father hit or slap you when he is angry?" At the one-year follow up, women who reported they were no longer with the child's father were asked if (a) "the relationship ended because of violence or abuse?" (b) "during the last month of the relationship the father slapped or kicked you?" and (c) "during the last month of the relationship the father hit you with fist or dangerous object?" Women who reported they were currently with the child's father were asked (a) "how often does the father slap or kick you?" and (b) "how often does the father hit you with fist or dangerous object?" Women who gave an affirmative answer ("yes," "sometimes," "often") to any of these questions were coded as a 1. All others were coded as a 0.

Controls. Race/ethnicity is measured with a series of dummy variables, including non-Hispanic white, non-Hispanic black, Hispanic and other. Non-Hispanic white is used as the reference category. Household income (thousands of dollars) is a continuous measure, taken from the mother's baseline response to the question "what was your total household income before taxes in the past 12 months?" Due to low levels of reporting, missing values on income were imputed by regressing household income on respondent's age, race/ethnicity, education, marital status, poverty level, and presence of other biological children. Age is measured in years. Four dummy variables are used to measure education — less than high school, high school, some college, and college degree or above — with less than high school used as the reference category. Resident partner indicates if a woman is married or cohabiting at the time of the one-

year interview, and is coded such that $I = yes$ (married/cohabiting) and $0 = no$ (not married/cohabiting). A dichotomous indicator of whether or not a woman has other biological children is also included ($I = yes$).

In preliminary sensitivity analyses not reported here, I controlled for women's poverty status, immigrant status, whether or not the focal child lives with her full time, and whether or not she gave birth to twins at baseline. The inclusion of these variables did not change my results, therefore they were dropped from analysis. In addition, I entered numerous health indicators into the model, including an indicator for the focal infant's health status (i.e. born preterm and/or low birth weight), whether or not women had a history of substance use (alcohol, smoking, and/or drug use), experienced labor/delivery complications, or had physical health conditions. These indicators had no significant impact on the outcome of interest and did not change my overall results. Thus, these too were dropped from analysis.

Analytic Strategy

I begin my analyses by computing descriptive statistics for all variables of interest, including frequencies and percentages for categorical variables and means and standard deviations for continuous variables. I then run a series of binary logistic regression models to estimate the effects of stress on the odds of having postpartum depression. In Model 1, I test whether major life stress is associated with the odds of having postpartum depression, net of sociodemographic and control variables. In Model 2, I test the independent effects of recent life stress on postpartum depression. In the remaining models, I add domestic violence, chronic stressors related to romantic partnership and neighborhood context (Model 3), and chronic stressors related to child temperament and parenting (Model 4), to further explain the association between stress and postpartum depression. All analyses are conducted using Stata version 11.

RESULTS

Descriptive Statistics

-- Table 1 about here --

Table 1 presents descriptive statistics for the original sample and the analytical sample. In terms of racial/ethnic composition, the majority of the women in the analytical sample are Non-Hispanic black (47.3%), followed by Hispanic (27.8%), Non-Hispanic white (21%), and other (3.8%). Women ranged from 15 - 43 years of age, with an average age of approximately 25 years. Most women report having less than a high school education (34.2%), but a substantial percentage completed high school (30%) or some college (24.9%). A smaller percent have completed college/or more education (10.9%). The average woman reports a household income of 29.2 thousand dollars. A majority of women are cohabiting or married (67.5%) and more than half report that they have other biological children (62.1%).

Table 1 also indicates that approximately 20% of women in the analytical sample meet the criteria for postpartum depression, consistent with national prevalence rates of PPD. A small percentage of women (8.9%) have a documented history of depression. Although this is likely biased in terms of capturing all women with a history of depression (findings from the National Health and Nutrition Survey III estimate the prevalence rate among women to be about 12.6%; Riolo et al. 2005), I argue it is likely to capture those most at risk, since diagnosed cases of major depression are usually more severe while undiagnosed cases tend to be mild and are associated with higher functioning (Coyne, Schwenk, and Fechner-Bates 1995). With regard to stressors, the average woman has experienced few major life and recent life stressors. Chronic stressors vary, with women reporting low levels of stress associated with relationship strains, having a controlling partner, and neighborhood safety but moderate levels of child-related stress and

parenting-related stress. In terms of domestic violence, 6.9% of women report a history of domestic violence with the focal child's father.

Multivariate Analysis

-- Table 2 about here --

Table 2 presents the series of binary logistic regression models predicting the effects of stress on the risk of postpartum depression. Consistent with my expectations, Model 1 indicates that major life stress is predictive of PPD, net of sociodemographic and control variables. According to Model 1, major life stressors accumulate for women over the life course and have a cumulative effect on postpartum depression, such that with each major life stressor a woman experiences, her odds of postpartum depression increase by 22%. Contrary to my expectations, however, the addition of recent life stress in Model 2 does not have a significant, independent effect on PPD. Moreover, the addition of recent life stress does not change the magnitude or significance of major life stress from Model 1. Thus, recent life stress does not appear to mediate the effects of major life stressors occurring earlier in the life course. This is somewhat surprising since pregnancy and the postpartum period are a seemingly sensitive time in a woman's life when she may be more likely to be exposed to certain stressors and/or more susceptible to the effects of stress. Nevertheless, results from Model 2 suggests that major life stressors have important, lasting, and independent effects.

In Model 3, I introduce domestic violence and chronic stressors related to romantic partnership and neighborhood context. With the inclusion of these variables, the effect of major life stress is reduced slightly from Model 1, but remains substantial in both magnitude and significance. In addition, the results from Model 3 indicate that neighborhood safety and having a controlling partner significantly impact the risk of PPD. Each unit increase in the stress

associated with living in an unsafe neighborhood and having a partner who attempts to isolate and/or exert control increases a woman's odds of reporting postpartum depression by 31% and 29% respectively. Relationship strain, however, is not statistically significant. The results for Model 3 also indicate that a history of domestic violence has a large and significant impact on the the risk of postpartum depression, with women who report a history of domestic violence with the focal child's father having odds that are two times higher than that of their counterparts. This finding suggests that the stress associated with domestic violence is more in line with a major life stressor in its overall impact and influences postpartum depression in a manner similar to that of general depression.

Much of the research on PPD focuses on children and parenting, therefore I add chronic stressors related to child temperament and parenting in Model 4. These results indicate that parenting-related stress is significantly associated with the risk of PPD, such that each unit increase in the stress associated with raising a family increases a woman's odds of reporting postpartum depression by 11%. However, child-related stress has no significant impact, suggesting that a child's temperament plays a minimal role in a woman's stress reactivity and risk for postpartum depression. With the addition of these chronic stressors to the regression equation, the effects of neighborhood safety and having a controlling partner from Model 3 remain statistically significant. Moreover, the effect of major life stress is only moderately decreased (compared to Model 3), with each major life stressor a woman experiences increasing her odds of postpartum depression by 12%. Notably, incorporating a control for history of depression across all four regression models does not mediate any of the links between the different stressors and PPD, despite the fact that the women in this analysis who have a history of depression have a twofold risk of developing PPD. This finding emphasizes the importance of

stress exposure in the risk for postpartum depression, given that a prior history of depression is one of the most salient, established predictors of PPD in the existing literature.

In terms of sociodemographic characteristics, age is a non-significant net predictor of PPD. Thus, the risk for postpartum depression does not vary by age. Likewise, the risk for postpartum depression does not generally increase by racial/ethnic minority status. However, Non-Hispanic black women have a 28% decreased odds of postpartum depression compared to whites. This finding is similar to findings elsewhere in the mental health literature, which report that blacks have lower current and lifetime prevalence rates of major depression than do whites (Williams 2010). Education and income are also not significant predictors of postpartum depression. In addition, the presence of other biological children is a non-significant predictor. However, women who are married or cohabiting at the time of the one-year interview have a significantly lower odds of postpartum depression (38% lower odds), suggesting that having a partner is a protective social resource.

DISCUSSION

A substantial literature has developed surrounding the stress-process model, providing a guiding framework in linking stress exposure to variations in mental health outcomes. Findings from the current study suggest that the stress-process model is useful in understanding women's risk for postpartum depression as well. Analysis reveals that exposure to certain life events and chronic strains significantly impact a woman's odds of postpartum depression. In line with previous research (Boyce et al. 2001; Webster et al. 2003), chronic, enduring stressors that arise from living in an unsafe neighborhood, raising a family, and having a controlling intimate partner increase the risk for PPD. Interestingly, recent life stressors in this analysis are not significantly associated with PPD risk. However, major life stressors are predictive and have a

long-lasting, cumulative effect on a woman's risk for PPD. This departs from previous literature in that it extends beyond the postpartum period and examines stressful life events that have occurred prior to childbirth. In addition, women with a history of domestic violence have a twofold increase in the risk for postpartum depression, mirroring research that suggests that domestic violence acts in a similar manner to major life stressors (Kessler and Magee 1994; Turner 2003). Even when controlling for a history of depression, the most salient predictor of PPD, each of these associations had strong, independent effects on the risk for PPD.

Of the sociodemographic characteristics included in the model, few had significant effects on the risk for PPD. In contrast to previous literature, this study finds no evidence to suggest that adolescent or minority women are at an increased risk for postpartum depression. Rather, Non-Hispanic black women in this sample have a decreased risk for postpartum depression. Socioeconomic indicators (education and household income) also had no significant association with PPD risk. I do however find support for having a resident partner (i.e. being married or cohabiting). Consistent with previous research (Beck 2001), married or cohabiting women are at a lesser risk for PPD compared to their single counterparts. Although I did not directly examine social support in this analysis, this finding suggests that support from individuals within a woman's social network may indeed be a protective factor that acts to buffer stress and diminish the risk for PPD.

Taken together, the importance of the type, timing, and influence of stressors in this analysis lends itself to research and clinical implications. First and foremost, the stress-process model is useful for understanding postpartum depression both in terms of its risk factors and in terms of how it compares to major depression. With regard to risk factors, the stress-process model posits that stress exposure is cumulative over time and is part of a causal pathway to

postpartum depression. When comparing PPD to major depression, the stress-process model can explicate the ways in which the impact of stress is similar to that of major depression elsewhere in the lifecourse and the ways in which the impact of stress is unique to the postpartum period in particular. Much of the extant literature treats PPD as similar to, but distinct from, major depression. Moreover, this literature assumes that biological and social factors surrounding childbirth and parenting are the most influential. However, I find that life events occurring in the postpartum period (i.e. recent life stressors) are not predictive. Rather, chronic stressors occurring in the postpartum period, alongside domestic violence and life events that occurred prior to birth (i.e. major life stressors) mattered most. Thus it may be that chronic strains override major life stressors that occur in this specific period of a woman's life, providing one example of how PPD may differ from major depression.

With regard to clinical implications, healthcare providers responsible for PPD screening should incorporate a broader view of stress exposure in clinical practice — one that is more in line with the stress-process model. The importance of major life stressors in this analysis underscores the need for screening instruments that account for life events that are not related to pregnancy and birth. This includes life events that span back across a woman's lifecourse, since these likely produce a chain or cascade of disadvantage that impacts adult well-being and parenting practices. Life events checklists, similar to those used in stress-process research, can be useful for capturing such risks. In addition, PPD screening is conducted by a myriad of healthcare providers including general practitioners, obstetric-gynecologic practitioners, and pediatricians (Earls 2010). Consequently, screening for independent risk indicators may become fragmented across care settings. Thus a standard, comprehensive screening instrument informed

by the stress-process model should be established and made accessible across healthcare providers.

Although the current study has important implications, I would like to acknowledge several limitations of the current study. The first limitation is my measurement of postpartum depression. This measure is somewhat retrospective, as it was taken from one time point in the data. In addition, this measure is based on self-reports. Even though the prevalence of PPD in this sample was similar to national prevalence rates, the fact that the women in this sample are predominately at-risk women suggests that the prevalence should be somewhat higher. As such, the present analysis may underestimate the prevalence of PPD. Second, the Fragile Families lacks a retrospective self-report measure for depression at baseline. History of depression is a primary predictor in analyses that examine mental health outcomes. Thus to establish history of depression, I rely on medical record data. Due to imperfections in medical record data and care access and geographic biases (e.g. women in the same regions likely got diagnosed in the same care setting, city, etc.) this measure likely underestimates the history of depression among women in the sample.

Another limitation of the data centers around the stress indexes. These indexes are not taken directly from the stress-process model but were created from multiple self-report indicators throughout the Fragile Families survey and were designed to resemble stress-process checklists. Although these indexes are imperfect instruments, their creation was necessary to address the research questions posed here. The findings presented warrant further research using better, comprehensive survey instruments similar to those found in stress-process checklists. Finally, the Fragile Families is a uniquely “fragile” data source. Although this is a highly appropriate data set

for the current research, I caution generalizing findings to the entire population, as these women are disproportionately disadvantaged.

Nevertheless, findings from the current study provide valuable directions for future research. A more thorough examination of which stressors or life domains may be driving the effects I observe is warranted. For example, I test domestic violence as a distinct stressor in my analysis, separate from major life stressors. However, I index other life events as per the stress-process model. It may be that certain stressors are more impactful than others, and as such should be tested individually. In addition, future research should examine the protective resources which may mediate the harmful effects of stress on mental health, including coping mechanisms and social support. Although most PPD research assumes these resources work in the same way that stress exposure does, I find evidence to suggest that resources may act to buffer stress and diminish the risk for PPD. Continued research should also split analyses by racial/ethnic group to determine why Non-Hispanic blacks exhibit a pattern of risk that differs from other racial/ethnic groups.

CONCLUSION

Postpartum depression is a debilitating condition that can adversely affect the health of new moms and their infants, yet identifying women who may be at an increased risk for developing postpartum depression has remained a significant challenge. Drawing on the stress-process model, I examine the role that stress exposure plays in the risk for postpartum depression. With the findings presented here, I show that stress exposure significantly increases a woman's risk of postpartum depression. Moreover, I demonstrate that the timing, magnitude and severity of stressors are of the utmost importance in assessing PPD risk. To my knowledge, this is the first study to use the stress-process model to examine social risk factors for postpartum

depression. I conclude that that it is a useful framework for researchers and healthcare providers alike to understand which factors are the most salient predictors of PPD, and which factors serve to exacerbate or alleviate the effects of life stress on a woman's risk of PPD.

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Table 1. Frequencies (%) and Means (SD) of Original Sample and Analytic Sample

	Original Sample	N	Final Sample (N = 2,697)
Postpartum Depression	20.20%	4357	19.87%
History of Depression	10.37%	3684	8.97%
Background Characteristics			
Age	25.27 (6.03)	4894	25.02 (6.00)
Non-Hispanic white	21.08%	4886	21.06%
Non-Hispanic black	47.61%	4886	47.31%
Hispanic	27.34%	4886	27.77%
Other	3.97%	4886	3.86%
Less Than High School	34.73%	4892	34.19%
High School	30.25%	4892	30%
Some College	24.30%	4892	24.95%
College or Grad School	10.71%	4892	10.86%
Household Income (thousands)	28.71 (21.28)	4862	29.20 (21.28)
Resident Partner	58.78%	4898	67.52%
Other Biological Children	61.71%	4881	62.11%
Major Life Stress	2.13 (1.38)	2994	2.07 (1.36)
Recent Life Stress	0.75 (0.77)	4019	0.77 (0.77)
Chronic Stressors			
Neighborhood Safety	0.95 (0.71)	4877	0.94 (0.71)
Child Related Stress	11.28 (3.99)	4315	11.35 (4.00)
Parenting Related Stress	3.64 (3.08)	4898	4.25 (2.96)
Relationship Strain	2.58 (2.34)	4765	2.55 (2.25)
Controlling Partner	0.52 (1.06)	4342	0.54 (1.08)
Domestic Violence	7.20%	4898	6.93%

Table 2. Logistic Regression Models of Stressors on Postpartum Depression (N = 2,697)

	<u>Model 1</u>	<u>Model 2</u>	<u>Model 3</u>	<u>Model 4</u>
	Odds Ratio (S.E.)	Odds Ratio (S.E.)	Odds Ratio (S.E.)	Odds Ratio (S.E.)
History of Depression	2.12 (0.32)***	2.11 (0.32)***	2.05 (0.32)***	2.04 (0.32)***
Background Characteristics				
Age	1.00 (0.01)	1.00 (0.01)	1.00 (0.01)	1.00 (0.01)
Non-Hispanic black	0.77 (0.11)	0.77 (0.11)	0.76 (0.11)	0.72 (0.10)*
Hispanic	0.92 (0.14)	0.92 (0.14)	0.83 (0.13)	0.86 (0.13)
Other	1.02 (0.29)	1.03 (0.29)	0.94 (0.27)	0.93 (0.26)
High School	0.70 (0.09)**	0.70 (0.09)**	0.75 (0.10)*	0.78 (0.10)
Some College	0.88 (0.12)	0.89 (0.12)	0.95 (0.14)	1.03 (0.15)
College or More Education	0.59 (0.14)**	0.59 (0.14)*	0.68 (0.16)	0.72 (0.17)
Household Income (thousands)	0.99 (0.00)	0.99 (0.00)	1.00 (0.00)	1.00 (0.00)
Resident Partner	0.73 (0.08)**	0.73 (0.08)**	0.65 (0.08)***	0.68 (0.08)**
Other Biological Children	1.06 (0.12)	1.06 (0.12)	1.01 (0.12)	0.99 (0.12)
Major Life Stress	1.22 (0.05)***	1.22 (0.05)***	1.15 (0.05)***	1.12 (0.05)**
Recent Life Stress	---	1.05 (0.07)	1.02 (0.07)	1.02 (0.07)
Neighborhood Safety	---	---	1.31 (0.10)***	1.31 (0.10)***
Relationship Strain	---	---	1.03 (0.02)	1.02 (0.02)
Controlling Partner	---	---	1.29 (0.06)***	1.27 (0.06)***
Domestic Violence	---	---	2.00 (0.34)***	2.03 (0.35)***
Parenting Related Stress	---	---	---	1.11 (0.02)***
Child Related Stress	---	---	---	1.02 (0.13)

	<u>Model 1</u>	<u>Model 2</u>	<u>Model 3</u>	<u>Model 4</u>
Pseudo R-squared	0.041	0.041	0.070.	0.086

p < 0.05; **p < 0.01; *p < 0.001*

APPENDIX A: Construction of Stress Variables

Major life stress (11 items)

Taken from baseline and one-year follow up: Responses range from 0 (no) to 1 (yes)

1. Did you feel ready to go home after childbirth, or want to stay at hospital longer?
2. Did you think about aborting this pregnancy (proxy for undesired pregnancy)?
3. Did focal child's father want you to abort this pregnancy?
4. Were you living with both your parents as a child (proxy for parental divorce/separation)?
5. Focal child's father has died
6. Have you been separated from focal child for a week or more since birth?
7. Have you ever had a miscarriage or abortion?
8. Have you ever had a stillbirth?
9. Has focal child's father ever been in jail?
10. Has your current partner ever been in jail?
11. Have you ever been forced into having sex?

Recent life stress (5 items)

Taken from one-year follow up: Responses range from 0 (no) to 1 (yes)

1. Have you moved since child was born?
2. Since focal child's birth, have you had another pregnancy/are you pregnant now?
3. Focal child's father jailed since baseline interview
4. Since focal child's birth, have you had any miscarriages, abortions, stillbirths?
5. Divorced or separated from focal child's father since focal child's birth

Child-related stressors (7 items): Cronbach's alpha = 0.49

Taken from one-year follow up: Responses range from 0 (not at all) to 4 (very much)

1. Child often fusses and cries
2. Child gets upset easily
3. Child reacts strongly when upset
4. Child is sociable [*Reverse coded*]
5. Child is friendly with strangers [*Reverse coded*]
6. Child is shy [*Reverse coded*]
7. Have you had to spank child in past month? [*Responses range from 0 (no) to 1 (yes)*]

Parenting-related stressors (4 items): Cronbach's alpha = 0.69

Taken from one-year follow up: Responses range from 0 (strongly disagree) to 3 (strongly agree)

1. Being a parent is harder than I thought
2. I often feel trapped by parental responsibilities
3. Taking care of children is more work than pleasure
4. I often feel tired and worn out from parenting