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Impact of Depression and Childhood Trauma in Mothers Receiving Home Visitation

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Abstract

Research has documented the deleterious effects of maternal depression and childhood trauma on parenting and child development. There are high rates of both depression and childhood trauma in new mothers participating in home visitation programs, a prevention approach designed to optimize mother and child outcomes. Little is known about the impacts of maternal depression and childhood trauma on parenting in the context of home visitation. This study contrasted depressed and non-depressed mothers enrolled in the first year of a home visitation program on parenting stress, quality of home environment, social network, and psychiatric symptoms. Mothers were young, low income, and predominantly unmarried. Results indicated that depressed mothers displayed impairments in parenting, smaller and less robust social networks, and increased psychiatric symptoms relative to their non-depressed counterparts. Path analyses for the full sample revealed a path linking childhood trauma, depression, and parenting stress. Path analyses by group revealed several differential relationships between dimensions of social network and parenting. Number of embedded networks, namely the number of different domains in which the mother is actively interacting with others, was associated with lowered parenting stress among non-depressed mothers and increased parenting stress in their depressed counterparts with childhood trauma histories. In depressed mothers, social network size was associated with lower levels of parenting stress but decreased quality of the home environment, whereas number of embedded networks was positively related to quality of the home environment. Implications of findings for home visitation programs are discussed.

Keywords

maternal depression; trauma; parenting; home visitation

Introduction

Depression in new mothers is a significant public health problem (National Research Council and Institute of Medicine, 2009). About 13% of mothers suffer from Major Depressive Disorder (MDD) during pregnancy or in the first year postpartum (O'Hara & Swain, 1996), and this rate is doubled among those living in poverty or with other vulnerabilities (Segre, O'Hara, Arndt, & Stuart, 2007). Elevated depressive symptoms in the absence of confirmed diagnosis are also common during this important period, sometimes having a persistent course throughout the child's early development (Campbell, Morgan-Lopez, Cox, & McLoyd, 2009). For example, Mayberry et al. (2007) found that between

17.1%–23.1% of new mothers reported moderate-to severe levels of depressive symptoms over four time points spanning two years. Risk factors for the development of maternal depression include low income, low educational achievement, unwanted baby, crowded living conditions, African American race, unmarried status, and childhood trauma history (Howell, Mora, Horowitz, & Leventhal, 2005; Klier et al., 2008; Segre & Losch, 2006; Smith, Poschman, Cavaleri, Howell, & Yonkers, 2006).

Childhood trauma experiences, comprising physical abuse, sexual abuse, emotional abuse, witnessing violence, and/or neglect are indeed prevalent in new mothers. For example, Smith et al. (2006) found that 29.3% of pregnant women reported lifetime exposure to trauma, including childhood maltreatment. In a recent meta-analysis, Noll, Shenk and Putnam (2009) found that exposure to child maltreatment, specifically child sexual abuse, was associated a 2.21-fold risk for becoming pregnant during adolescence. Children born to mothers with childhood trauma histories are at increased risk for a host of developmental adversities partially due to the psychological and emotional sequelae (including depression) associated with their early abuse experiences (Noll, Trickett, Harris, & Putnam, 2009). Some mothers experience multiple forms of maltreatment across development, contributing to the emergence of a complex clinical presentation that includes significant impairments in emotional and behavioral regulation (Briere, Kaltman, & Green, 2008). Premorbid characteristics and environmental influences moderate the impact of childhood trauma on later functioning. Social support, in particular, may mitigate the negative influences of trauma (Schnurr, Lunney, & Sengupta, 2004).

The impairing features of depression and childhood trauma are particularly relevant to mothers receiving home visitation, a child abuse prevention approach. Home visitation focuses on optimizing child development and maternal life course through education, training, and case management. Home visitation typically targets young mothers with demographic risks (e.g., unmarried, low income). Home visitors provide services in the home setting starting before or shortly after birth and extending through the first years of life. There has been a sizable investment in home visitation as reflected by the fact that such programs are found in at least 40 states and serve up to 500,000 children (Astuto & Allen, 2009). Because these programs seek to enhance parenting competence and promote healthy child development, both of which are potentially undermined by maternal depression and childhood trauma, there is a pressing need to understand how these experiences impact the acquisition and expression of parenting skills in high risk populations they serve (Ammerman, Putnam, Bosse, Teeters, & Van Ginkel, 2010). Through such an understanding, home visitation programs can be improved and refined to meet the clinical needs of their participants.

Depression and Parenting

Depression can have profound negative impacts on parenting and child adjustment. When compared with non-depressed mothers, depressed mothers are more disengaged from their children (Radke-Yarrow, Nottelmann, Belmont, & Welsh, 1993), less sensitive to child cues and emotional states (Field, 2002), more negative and less positive during interactions (Pelaez, Field, Pickens, & Hart, 2008), less able to regulate affect or behavior during interactions with their children (Field et al., 2007), and talk less to their children (The NICHD Early Child Care Research Network, 2005). Additionally, depressed mothers are less likely to engage in functional and symbolic play (Bigatti, Cronan, & Anaya, 2001), read less frequently to their children (Kavanaugh et al., 2006), and are less attentive to health and prevention requirements (Minkovitz et al., 2005). Furthermore, offspring of mothers with MDD have been shown to exhibit numerous developmental and adjustment problems, including insecure attachment, delays in cognitive development, and emotional and behavioral dysregulation (Hay, Pawlby, Waters, Perra, & Sharp, 2010).

The mechanisms by which depression interferes with parenting have been the focus of a considerable amount of research (Lovejoy, Graczyk, O'Hare, & Neuman, 2000). Symptoms of depression, such as fatigue, distractibility, and preoccupation with negative emotional states, are incompatible with effective and nurturing parenting and impinge on efforts to meet the challenging demands of caring for young children. Dysphoric affect and subsequent disruptions in social perception and communication can undermine formation of a secure attachment relationship with offspring (Lyons-Ruth, Wolfe, & Lyubchik, 2000). Low self-esteem and distorted cognitive appraisals lead to misattributions about children's behaviors and emotional states, further contributing to ineffective parenting (Bugental & Schwartz, 2009).

Depression can interfere with the development of parenting competence in inexperienced parents or suppress previously learned skills. Indeed, deficits in parenting have been observed even when depressive episodes remit and mothers are minimally symptomatic (Seifer, Dickstein, Sameroff, Magee, & Hayden, 2001). Following treatment, Forman et al. (2007) found that parenting impairments were evident even after remission from postpartum depression. In contrast, a strong and supportive social network is a robust protective factor that mitigates the relationship between maternal depression and poor child outcomes (Goodman & Gotlib, 1999).

Childhood Trauma and Parenting

A number of studies have established a link between childhood experiences of abuse and violence and subsequent impairments in parenting one's own children (Kim, Trickett, & Putnam, 2010). Synthesis of this literature is complicated by different definitions and measures of childhood trauma, reliance on retrospective reports, different ages of mothers and children, varied degrees of parenting experience, and consideration of other variables that may affect parenting behaviors or interact with childhood trauma. Despite these caveats, there is a convergence of findings that point towards a disruptive role for childhood trauma in the subsequent development and expression of healthy and nurturant parenting behaviors.

Mothers traumatized in childhood, particularly those who are sexually abused, are more likely to report less satisfaction with and competency in the parenting role relative to their non-abused counterparts (Douglas, 2000). Research has also documented that mothers with trauma histories parent differently than non-traumatized mothers. Cohen et al. (2008) found that cumulative trauma experiences in a sample of 176 mothers were associated with more punitive parenting behaviors, increased psychological aggression, and greater reliance on physical discipline strategies. These relationships were maintained in multivariate analyses controlling for demographics and concurrent substance use disorders and depressive disorders. In a sample of psychiatric outpatients who had experienced sexual abuse in childhood, Ruscio (2001) found that survivors reported more permissive parenting practices. This association was amplified by maternal dissatisfaction with their social networks.

Trauma experiences also impact maternal behaviors essential to the formation of healthy attachment relationships with their children. Barrett (2010) found that sexually abused mothers displayed lower levels of maternal warmth, a pathway mediated by depressive symptoms. Kwako, Noll, Putnam and Trickett (2010) reported that children born to mothers who were sexually abused were more likely to have extreme strategies of attachment typified by anxious attachment styles. Lyons-Ruth and colleagues (2003, 2005) examined the relationship between maternal trauma experiences and subsequent interpersonal adjustment and parenting. They found that mothers who had been sexually abused in childhood were more likely to parent in a way that reflected a hostile/helpless state of mind, which in turn predicted infant disorganization at 18 months of age.

The mechanisms by which early experiences of trauma lead to disruptions in parenting are not fully understood, although research suggests several possibilities. Trauma in childhood—particularly if it is severe, occurs at critical stages of social and emotional development, and persists over time—disrupts the acquisition of cognitive, emotional, and behavioral capacities essential for healthy and nurturant parenting. Emotional and behavioral dysregulation (Beck, Grant, Clapp, & Palyo, 2009), failure to identify and read emotional cues (Gibb, Schofield, & Coles, 2009), and impaired attachment styles (Lyons-Ruth et al., 2003) have been found in adults who have been maltreated in childhood and have profound implications for competent parenting.

Additionally, childhood trauma is strongly associated with increased risk for developing psychiatric disorders, particularly depression, in adulthood. In a systematic review, Maniglio (2010) concluded that there was a consistent relationship between childhood sexual abuse and adult depression. A review by Weich, Patterson, Shaw, and Stewart-Brown (2009) found that early childhood adversity, including experiences of abuse and violence, was related to subsequent development of depression, anxiety, and post-traumatic stress disorder. Thus, impaired parenting may also be attributed to the disrupting symptoms of these disorders, the trauma experiences directly, or an additive or synergistic combination of the two. As with depression, disruptions in parenting skills may be offset by protective factors (e.g., social support) that lessen the negative impacts of these experiences (Heim, Newport, Mletzko, Miller, & Hemeroff, 2008).

Depression and Childhood Trauma in Home Visitation

A number of studies have documented the prevalence of depression among mothers in home visitation. Although these reports vary in terms of measure used, timing of assessment, and frequency of administration, there are consistent findings revealing that between 40%–60% of mothers in home visitation have clinically elevated levels of depression (Ammerman, Putnam, Bosse, et al., 2010). For example, using the Beck Depression Inventory-II (Beck, Steer, & Brown, 1996), Ammerman et al. (2009) found that 45.3% of new mothers had elevated levels of symptoms in the first year of service. Similarly high rates have been found in Healthy Families New York (Mitchell-Herzfeld, Izzo, Greene, Lee, & Lowenfels, 2005), Healthy Families Alaska (Duggan et al., 2007), and Early Head Start (Chazan-Cohen et al., 2007). Moreover, a sizable subgroup of mothers exhibits persistent elevation over the course of service (Jacobs & Easterbrooks, 2005). Depression poses a particular challenge to home visitors who are often inadequately trained to deal with this problem and who implement curricula that only minimally address clinical problems in mothers (Lecroy & Whitaker, 2005).

It has long been recognized that trauma experiences are commonly reported by mothers in home visitation (Margie & Phillips, 1999). Stevens et al. (2002) found that 70.7% of 123 mothers reported experiencing interpersonal trauma prior to joining the program. Ammerman et al. (2009) reported that 74.1% of 806 mothers had directly experienced or witnessed physical or sexual violence prior to enrollment in home visitation. Trauma and depression are strongly associated in this high risk population. For example, Ammerman et al. found that trauma history predicted a persistent or worsening course of depression over the first year of service. Likewise, Jacobs and Easterbrooks (Jacobs & Easterbrooks, 2005) reported a moderate correlation between depression and a history of child abuse or neglect in their evaluation of Healthy Families Massachusetts. In another study, Ammerman et al. (2011) found that 37.6% of mothers in home visitation who met criteria for major depressive disorder also obtained comorbid diagnoses of posttraumatic stress disorder, reflective of the high levels of trauma experienced in this sample.

Despite the fact that depression and childhood trauma are common in home visitation and likely to have important implications for service delivery and outcomes, relatively few studies have examined their impact on domains important to the intervention. Depression is viewed by many home visitors as challenging and interfering with attainment of desired outcomes, but has infrequently been the focus of empirical study. Several investigations have found that depression may moderate program outcomes. The Early Head Start Research and Evaluation Project (Administration on Children Youth and Families, 2002) contrasted mothers in both the intervention and control groups with and without elevated levels of depression at the start of the program on a variety of measures when the child reached age 3 years. A mixed array of findings emerged, suggesting that children of depressed mothers exhibited several strengths (e.g., sustained attention during play and challenge tasks) and impairments (e.g., receptive language deficits, increased parent-child dysfunctional interactions).

Duggan, Berlin, Cassidy, Burrell, and Tandon (2009) reported that baseline measurements of depression in the Healthy Families Alaska evaluation were correlated with maternal relationship impairments (i.e., attachment anxiety and avoidant attachment). Depression and these relationship features interacted in complex ways, moderating outcomes in the home visitation service. For example, depressed mothers with low to moderate levels of attachment anxiety receiving home visitation, exhibited improved sensitivity to child cues at 2 years of age. Mothers with lower levels of avoidant attachment were less depressed at follow up, had decreased intimate partner violence, and higher scores on the HOME Inventory (Caldwell & Bradley, 1984), a measure of the quality of the home environment. Yet, mothers with higher levels of avoidant attachment reported increased depression at follow up. Depressed mothers in home visitation with both high levels of attachment anxiety and avoidant attachment had an increased likelihood of substantiated child maltreatment. Thus, depression may alter program outcomes, albeit in ways that are complex and multidimensional.

Taken together, despite the prevalence of depression and childhood trauma in new mothers receiving home visitation, relatively little is known about the impact of these experiences on parenting in the context of receiving services. The larger literature on maternal depression and childhood trauma suggest that competent parenting is impaired in these groups, and therefore may pose considerable challenges for home visitation. Yet, research in this area infrequently utilizes multivariate approaches to examine complex relationships among variables that strengthen or mitigate the links between childhood trauma, depression, and parenting. Understanding the effects of maternal depression and childhood trauma on parenting in this population, with particular attention focused on potential moderating influences, holds the promise of informing revisions to home visiting strategies that benefit mothers and their children.

Overview of Study

The purpose of this study was to examine the impact of depression on parenting and elucidate pathways between trauma and depression in depressed and non-depressed mothers in the first year of home visitation. One-hundred and eighty depressed and non-depressed young, low income mothers of infants were recruited from a regional home visitation program and contrasted on measures of childhood trauma, other psychiatric symptoms, social network, parenting stress, and home environment. It was hypothesized that depressed mothers would have higher levels of childhood trauma, increased other psychiatric symptoms, smaller and less robust social networks, increased parenting stress, and lower quality of home environment relative to their non-depressed counterparts. Path models were tested to examine the hypothesized linkage between trauma, depression, and parenting

outcomes, and the relative contributions of social network and other psychiatric symptoms to parenting outcomes.

Method

Subjects

Subjects consisted of 180 mothers aged 16 years or older who were enrolled in a home visitation program between 2006–2009. Subjects were divided equally between depressed (D+) and non-depressed (D–) groups using procedures described below. Subjects were recruited from Every Child Succeeds, a community-based home visitation program for new mothers and their children. This program used two models of home visitation: Healthy Families America (HFA; Daro & Harding, 1999) and Nurse-Family Partnership (NFP; Olds, 2002). Eligibility criteria for program participation were mothers having at least one of four risk characteristics: unmarried; low income (<300% of poverty, or Medicaid recipient); 17 years of age or younger; and inadequate prenatal care. Mothers were enrolled prior to 28 weeks gestation in the NFP, and from 20 weeks gestation through the child reaching three months of age for Healthy Families America as per model parameters. Mothers were referred to the program from prenatal clinics, hospitals, social service agencies, and community physicians. At the time of assessment in the study, mothers had been in the program an average of 197.6 days ($SD = 104.4$) and had received an average of 15.1 home visits ($SD = 8.7$).

Table 1 presents demographic and program characteristics of total sample and for D+ ($n = 90$) and D– ($n = 90$) mothers separately. The sample was young (mean = 21.9, $SD = 4.4$, range 16–43 years) and primarily Caucasian (70.0%; African American = 26.7%, Biracial = 2.2%, Asian American = 0.6%). Elevated risk status was reflected by the high proportion of unmarried (88.9%) and low household income (70.5% \$20,000 annual income) mothers. The majority of the sample had a high school degree (60.0%) or less (34.4%), while 3.9% had an Associate's degree and 1.7% had a Bachelor's degree. At the time of assessment, children were an average of 158.9 days old ($SD = 78.1$). In terms of program features, 67.8% were enrolled prenatally and 32.2% were postnatal. For home visitation model, 122 (67.8%) of mothers were in Healthy Families America and 58 (32.2%) were in the Nurse-Family Partnership. Comparisons between samples revealed that D+ mothers were more likely to receive the Healthy Families America model, less likely to be of Appalachian ethnicity, and had lower household incomes ($p = .053$) than D– mothers.

Procedures

The D+ and D– groups were recruited as part of two separate and non-overlapping studies that yielded samples amenable to comparison. D+ mothers were drawn from a study of a depression treatment for mothers participating in home visitation. These mothers were first identified based on a depression screen at three months postpartum and then received a subsequent diagnosis of Major Depressive Disorder using the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I, January 2007 version, Spitzer, 1992; kappa = .90). Data for the current study were obtained from the baseline assessment.

D– mothers were selected from a longitudinal study of program adherence. Data for the current study were drawn from an assessment conducted nine months post-enrollment. Mothers were approached for participation in the study at enrollment in home visitation. To create a comparison group of non-depressed mothers, 90 were selected for the current study based on obtaining scores of <14 on the Beck Depression Inventory-II (Beck et al., 1996). The D+ and D– groups were contrasted on the BDI-II to ensure divergence on this variable.

Results indicated sizable group differences between D+ ($M = 33.7$, $SD = 10.1$) and D- ($M = 6.5$, $SD = 3.7$) mothers ($t(179) = 24.1$, $p < .001$).

Although there were differences in recruitment and certain characteristics (e.g., household income) between these two samples, there were also common elements that warranted subsequent group comparisons. All mothers met criteria for participation in the home visiting program, overarching program management was applied to all mothers regardless of model or depression status, and all resided in the same region and were recruited over the same time period. Mothers were similar on important demographic characteristics (e.g., race, child age). Furthermore, analyses were conducted covarying those factors that differentiated the two groups in order to control for potential confounding.

Measures

Maternal Depression and Other Psychiatric Symptoms

Beck Depression Inventory-II (BDI-II; Beck et al., 1996): The BDI-II is one of the most widely used self-report screens of depressive symptomatology, with strong reliability and validity properties. It consists of 21 items in which mothers indicate presence and severity of depressive symptoms by endorsing one of four statements reflecting degree of severity.

Brief Symptom Inventory (BSI; Derogatis, 1993): The BSI is a brief version of the widely used Symptom Checklist-90 (SCL-90), a measure of psychological maladjustment. The BSI consists of 53 items endorsed using a 5 point scale reflecting level of distress of each symptom. Standardized scores are yielded for three global and nine clinical scales. As the Global Symptom Index (GSI) is considered the most reliable indicator of overall distress (Derogatis & Spencer, 1989), analyses were restricted in the current study to this scale with depressive items removed (referred to as GSI-O). To control for any potential relationships between overall distress and hypothesized risks and outcomes, GSI-O scores were assessed for use as a potential covariate.

Social Network Index (SNI; Cohen, Doyle, Skoner, Rabin, & Gwaltney, 1997): The SNI consists of 13 items that document the size and structure of social networks. The SNI yields three summary scores: Network Diversity (ND), Network Size (NS), and Embedded Networks (EN). The SNI-ND is the number of social roles (up to a maximum of 12) in which there are regular contacts (at least once every two weeks) with at least one person, such as close relative or student. The SNI-NS is the total number of people with whom the respondent has regular contact (at least once every two weeks). The SNI-EN reflects the number of different network domains in which the respondent is active (i.e., has 4 or more regular contact individuals). There are 8 domains: family, friends, church, school, work, neighbors, volunteers, other groups.

Child Maltreatment History

Childhood Trauma Questionnaire (CTQ; Bernstein et al., 2003): The CTQ is a 28-item version of the larger CTQ. Items describe maltreatment experiences in childhood and are endorsed on a 5-item Likert scale reflecting how true they are. Scores reflect physical abuse, sexual abuse, emotional abuse, physical neglect, and emotional neglect. The CTQ has excellent internal reliability ($\alpha = .61$ to $.94$ in both clinical and community samples) and correlates highly with clinician determinations of maltreatment (Bernstein et al., 2003). Although the CTQ was analyzed using the total raw score, a categorical scoring method is also available. For the sample as a whole, the percentage of mothers reporting having experienced each type of child maltreatment was: physical abuse = 44.9%, sexual abuse = 40.4%, emotional abuse = 61.8%, physical neglect = 38.2%, and emotional neglect = 52.8%.

Parenting

HOME Inventory (HOME; Caldwell & Bradley, 1984): The HOME is a standardized observational measure of features in the home consistent with a stimulating, nurturing, and safe environment. Internal ($\alpha = .84$) and test-retest ($r = .62-.74$) reliabilities are strong, and the measure correlates moderately with measures of IQ and developmental status (Bradley, Corwyn, McAdoo, & Coll, 2001). In this study, the Total Score was analyzed.

Parenting Stress Index-Short-Form (PSI-SF; Abidin, 1995): The PSI-SF is a 36-item parent report measure of child and parent functioning/coping. This widely used measure yields a standardized score on Total Stress. The PSI-SF has excellent psychometric properties and is widely used in parenting research (Abidin).

Overview of Analyses

Initial analyses involved conducting correlations between risk factors and outcomes for both the D+ and D- groups. Next, groups were contrasted on risk factors and outcomes using multivariate analyses of covariance to examine differential levels of functioning. Next, path analyses were conducted on the full sample to test the hypothesized relationships between maternal trauma history, maternal depression, and indices of parenting and the home environment. Group moderation was then examined to determine if significant paths differed between D+ and D- groups. In the path analyses, other psychiatric symptoms (as measured by the Global Severity Index of the Brief Symptom Inventory with Depression subscale removed (GSI-O)) was handled as a covariate in order to isolate the influence of maternal depression.

Results

Data Screening and Correlations

Data were screened for between-group differences on key demographic variables in order to identify potential covariates for subsequent analyses. Based on group comparisons, household income was retained in subsequent analyses as a covariate. Bivariate relationships between risk factors and outcomes were also assessed to illustrate relationships between risk factors and outcomes while identifying additional covariates. Table 2 shows the correlations among risk factors and outcomes for both the D+ and D- groups separately. Results indicate moderate relationships between the CTQ and BDI-II and the BDI-II and PSI-SF for both groups. Income was moderately associated with the indices of social network for both groups, and was negatively related to the CTQ in the D+ group only. The PSI-SF was moderately correlated with social network indices in the D- group, but not in the D+ group. The GSI-O was significantly related to the CTQ, BDI-II and PSI-SF. In order to for the association of overall distress with hypothesized risk factors and outcomes, the GSI-O, along with Income, was also included as a covariate in subsequent analyses.

Group Comparisons

A multivariate analysis of covariance (MANCOVA) assessed differences between the D+ and D- groups on risk factors and outcomes while controlling for household income. Overall, results from the MANCOVA indicated that the D+ and D- groups differed significantly on the combined dependent variable, $F(7,152) = 7.30, p < .001$, Wilks' $\lambda = .75$. Serial univariate analyses of covariance (ANCOVA) were then conducted to assess the post-hoc differences between groups on each dependent variable. A Bonferroni correction of $\alpha = .05/7 = .007$ was applied to the ANCOVA results to control for inflated Type I error rates. As shown in Table 3, results from each ANCOVA achieved statistical significance after applying the Bonferroni correction. Effect sizes are also presented to illustrate magnitude

differences between the D+ and D- groups on each variable assessed. Overall, mothers in the D+ group reported higher levels of childhood maltreatment experiences, and demonstrated impaired functioning in social network, other psychiatric symptoms, and parenting relative to their D- counterparts.

Multivariate Assessment of Pathways - Total Sample

Hypothesized relationships between risk factors and outcomes were assessed using multivariate path analysis. Path analysis is an appropriate method for analyzing simultaneously the complex relationships among observed variables in a multivariate system. It is particularly useful in assessing the unique contributions of individual risk factors while controlling for the relationships of other variables including covariates. Using LISREL 8.54, a multivariate path analysis was conducted to test the indirect relationships between risk factors, such as CTQ, BDI-II, and each of the SNI subscales, and outcomes, such as PSI-SF and HOME, while controlling for household income and GSI-O scores. All directional relationships between each risk factor and outcome were estimated and freely correlated in the model. Similarly, the non-directional relationships among risk factors as well as outcome variables were also estimated in the model. Overall, results indicated the hypothesized model provided a satisfactory fit to the data, $\chi^2(9) = 22.51$, Goodness of Fit Index (GFI) = .97, Standardized Root Mean Square Residual (SRMR) = .08. The direct relationships between CTQ and PSI-SF and HOME scores were not significant when estimating the contribution of all other variables, illustrating the appropriateness of the indirect approach.

As shown in Figure 1, CTQ scores were significantly related to BDI-II scores which, in turn, were also significantly related to PSI-SF scores. This result suggests that depression may be an indirect pathway to parenting stress for those mothers who have experienced childhood maltreatment. However, the relationship between BDI-II scores and HOME ratings was not significant, indicating that the BDI-II may have a unique, indirect relationship with parenting stress and not observed parent behaviors. Although CTQ scores were significantly related to the BDI-II, SNI-EN, SNI-ND, and SNI-NN, these indirect variables were not related to either the PSI-SF or HOME scores. This suggests that when examined in a combined sample of D+ and D- participants, only the relationships between CTQ, BDI-II, and PSI-SF appear useful in establishing indirect risk for outcomes.

Multivariate Assessment of Pathways – Group Moderation

Path analysis is also useful to detect group moderation of pathways of interest for risk and outcome variables included in the model (Loehlin, 2004). To test for group moderation within the path analysis framework, a base model estimating the relationships between each risk and outcome variable for each group is performed. Then, using serial one degree of freedom, nested χ^2 difference tests, the parameter estimates for pathways of interest are constrained and the model is then re-analyzed to compare the degradation in model fit. The null hypothesis in this case is that the magnitude difference in parameter estimates between D+ and D- groups does not differ significantly. Alternatively, if the nested model produces a significant increase in χ^2 fit it can be interpreted as group status moderating the relationship between two variables in the path analysis. As such, each direct pathway in Figure 1 was subjected to a one degree of freedom, nested χ^2 difference test to determine if the relationship under examination varied depending upon D+ or D- status.

The base model produced a good fit to the data, $\chi^2(18) = 8.10$, GFI = .99, SRMR = .04. Parameter estimates for the D+ and D- groups are presented in Figure 2. Significant relationships between the CTQ, BDI-II and SNI-NN were maintained in the moderation analysis, although mainly for the D+ group. However, one degree of freedom, nested χ^2

difference tests did not indicate a significant degradation in model fit when equality constraints were placed on each of the respective pathways for these variables. This suggests that although there are significant relationships between the CTQ, BDI-II, and SNI-NN, these relationships did not vary based on group membership. A significant indirect relationship was again observed for the BDI-II where, for both groups, there were significant relationships between CTQ and BDI-II and BDI-II and PSI-SF scores.

Several group moderation findings emerged when examining the SNI subscales in relation to the PSI-SF and HOME, as indicated by the bold pathways presented in Figure 2. Specifically, the pathways between the SNI-EN subscale and PSI-SF and HOME scores were moderated by group membership. One degree of freedom, nested χ^2 difference tests for the pathway between SNI-EN and PSI-SF resulted in a significant degradation of model fit, $\chi^2(1)\Delta = 9.86, p < .01$, indicating that the magnitude difference in parameter estimates for this pathway was significantly different for the D+ and D- groups. Interpreting the parameter estimates indicates that higher scores on the SNI-EN were significantly related to higher scores on the PSI-SF for the D+ group. Conversely, higher scores on the SNI-EN were significantly related to lower scores on the PSI-SF for the D- group. In addition, the pathway between SNI-EN and HOME scores also resulted in a significant degradation of model fit, $\chi^2(1)\Delta = 5.06, p < .05$, again illustrating a moderating effect for group on this pathway. Although there was not a significant relationship between SNI-EN and HOME scores for the D- group, there was a strong positive relationship for the D+ group indicating that higher scores on the SNI-EN was associated with higher home ratings. Finally, group moderation was also observed for the pathway between SNI-NN and PSI-SF scores, $\chi^2(1)\Delta = 3.87, p < .05$. The parameter estimates show that for the D+ group, higher scores on the SNI-NN was associated with lower scores on the PSI-II. For the D- group, this relationship was largely non-existent.

Descriptive Analyses of Embedded Networks

Given the findings that emerged in the path analyses involving the SNI-EN variable, this was explored further in follow up analyses. Of the 8 potential network domains, for the sample as a whole, family was the most endorsed (84.6%). This was followed by work (23.9%), friends (15.1%), and school (13.9%). Group comparisons revealed that D- mothers reported more contact than D+ mothers in family (92.2% vs. 75.0%, $\chi^2 = 9.1, p < .01$), work (37.8% vs. 10.0%, $\chi^2 = 19.1, p < .01$), friends (24.4% vs. 5.6%, $\chi^2 = 12.4, p < .01$), and other group (13.3% vs. 2.2%, $\chi^2 = 7.7, p < .01$) domains.

Discussion

Results from this study confirm that depressed mothers in home visitation have deficits in multiple areas of functioning relative to their non-depressed counterparts. Depressed mothers, relative to their non-depressed counterparts, had smaller and less robust social networks, increased parenting stress, and decreased quality of the home environment. These impairments were evident in the first year of home visitation, following a substantial length of time in the program and a sizable number of home visits. At least at this point in the service, depressed mothers are having problems in areas that are important to home visiting and functioning at a lower level than mothers without depression. These findings are consistent with qualitative data showing that home visitors view depression as a significant barrier in service delivery and that depressed mothers benefit less from the preventive service than those without depression. New mothers in home visitation are relatively inexperienced and putatively less knowledgeable about children and parenting. Consequently, depression may be particularly problematic in that it interferes with the acquisition of important skills at an important stage of the child's development.

As expected, depressed mothers reported more childhood trauma experiences than non-depressed mothers, and depression and trauma severity were correlated in both groups. Likewise, depression was moderately correlated with parenting stress in both depressed and non-depressed mothers. For the combined sample, path analysis revealed significant relationships between childhood trauma and depression and all three parameters of social network while controlling for household income and other psychiatric symptoms. An indirect pathway from childhood trauma through depression to parenting stress was observed while simultaneously controlling for household income and general psychiatric distress, replicating similar findings with different aspects of parenting in other samples of depressed mothers of older children (e.g., Barrett, 2010). In addition, this is consistent with theoretical formulations linking childhood trauma to adult depression and subsequent impairment of parenting behaviors. This pathway did not emerge for quality of the parenting environment as measured by the HOME Inventory which is primarily an observational and interview measure that includes parental behavior (e.g., harsh punishment) and structural characteristics of the home environment (e.g., available toys). At this early stage of the child's life, it is possible that parenting behaviors captured by the HOME Inventory were less susceptible than parenting stress to the influences of childhood trauma and depression. It is possible that these parenting behaviors were less influenced by trauma and depression at this early stage of the child's life than parenting stress. Home visitation, in particular, may have a more immediate impact on the physical environment, such as encouraging availability and use of toys, books, and creating a safe place for child play and interaction. This potential program impact may, in turn, mitigate the impact of depression on those features of parenting.

Comparison between the D+ and D- groups on differential path models yielded three relationships that were moderated by group, all involving aspects of social network. Number of embedded networks, namely the number of different domains in which the mother is actively interacting with others, was associated with lowered parenting stress among non-depressed mothers and increased parenting stress in their depressed counterparts. The pattern of domains that were most endorsed by each group was identical, although D- mothers reported more contact within each network relative to D+ mothers. It is possible that the increased number of domains provides a sense of well-being and belongingness in non-depressed mothers, while overwhelming depressed mothers with excessive demands and responsibilities. Alternatively, the quality of these domains may differ in depressed and non-depressed mothers in this sample. Domains for depressed mothers may be comparatively unsupportive and stressful, whereas those for non-depressed mothers may be more supportive and engaging. In contrast, the number of embedded networks had a positive impact on quality of home environment in depressed mothers as measured by the HOME Inventory. The increased number of domains may have benefited the physical environment measured by the HOME, including such things as availability of toys and books and other stimulating features. This relationship was not significant for non-depressed mothers who may have been less reliant on this aspect of social network for providing a nurturing and stimulating home environment. These findings have important implications for home visitation, in that efforts to increase size and richness of social networks in home visiting programs may have differential impacts depending on maternal depression. They underscore the need for home visitors to be flexible in their focus of service depending on maternal psychiatric and social presentation (Tandon, Parillo, Jenkins, & Duggan, 2005).

The size of social network showed an inverse relationship with parenting stress in depressed mothers, while these variables were unrelated in non-depressed mothers. Increased contact with others may lower parenting stress and decrease a sense of being overwhelmed by meeting tangible and emotional needs (Ghate & Hazel, 2002). Although not modified by group membership, there was an inverse relationship between network size and the HOME

Inventory in depressed mothers with trauma histories. Larger social networks disrupted quality of the home environment in this path, perhaps by overwhelming depressed mothers or by distracting them from providing consistent nurturing care to their children. Thus, dimensions of social network had differential and complicated associations with parenting depending upon maternal depression. Home visiting curricula and training would benefit from helping home visitors to recognize depression in mothers, and to adjust the intervention in response to most effectively address the acute needs of mothers and families.

The study had several strengths. The sample was sizeable, particularly for research in home visitation. The D+ group was identified by both self-reported depression and diagnosis of MDD using a standardized psychiatric interview. In contrast, much of the research on maternal depression in general and depression in home visitation in particular relies exclusively on self-reported symptoms. A multi-method approach was used to collect data, including maternal report, clinical interview, and observation. Social network was characterized in a multidimensional way, encompassing both network size and roles. The home visitation program from which the sample was ascertained is typical of most home visitation programs and populations, thus supporting generalizability of findings to other programs and populations. Finally, the use of path analyses allows for simultaneous consideration of interrelationships among multiple variables.

The study also has several limitations that warrant caution in interpreting findings. First, the D- group was identified using self-reported depressive symptoms and were not administered a structured psychiatric interview to rule out MDD. However, given the low cutoff to select this group, it is unlikely that more than a few if any mothers met diagnostic criteria for MDD. It is notable that the mean BDI-II score in this group is well below that found in adults with MDD (Steer, Brown, Beck, & Sanderson, 2001), further suggesting that this limitation is of minor concern. Second, the cross-sectional design precludes establishing causal relationships. Although the cross-sectional nature of the data prohibits strong causal inferences, the testing of indirect pathways is one approach to parsing out variability according to sound theory. The indirect pathways reported should not be interpreted as temporally ordered mediation. The model tested does, however, provide a means by which a theoretically plausible representation of a multivariate system of interrelationships and pathways can be examined simultaneously and allowing variability to be parsed in meaningful ways that are not possible when such variables are examined in isolation. A longitudinal study is necessary to determine if the relationships between trauma, depression, and parenting represent a causal pathway. Third, recent experiences of trauma were not measured. Intimate partner violence or other forms of trauma may have been experienced in both groups and might have influenced associations among variables. Fourth, it is possible that reports of childhood trauma may have been biased by depressive symptoms such that depressed mothers may have inaccurately recalled or exaggerated reports of traumatic experiences, thereby inflating the relationship between trauma and self-reported depression. This is a common concern in studies that rely on retrospective reporting of trauma, and are only resolvable through independent verification of trauma or prospective following of children following identification. Fifth, findings are not necessarily generalizable to mothers assessed at other points in home visitation or the child's development or in home visitation programs that use other models. However, the demographic characteristics of the sample mirror those typically found in home visiting programs, and suggest that generalizability is cautiously warranted. And sixth, both groups had a restricted range of variability in depression by design. The D+ group was identified based on elevated scores on a depression screen, and the D- group was formed using a maximum cutoff on the BDI-II. While this approach permitted formation of homogeneous groups for comparison, relationships among variables within groups may have been less robust given the narrower variability.

These findings have significant implications for home visitation practice and future research on childhood trauma and depression. It is clear that depressed mothers show impairments in areas targeted by home visitation. In terms of practice, these areas may require increased attention, modifications in materials to facilitate learning, and repetition to increase the likelihood that depressed mothers benefit from the service. Increasing the size and range of social networks, an area targeted by most home visiting programs, may be beneficial to depressed mothers. However, there is a corresponding cost in terms of increased parenting stress (embedded networks) and providing a nurturing home environment (network size). Accordingly, findings from this study suggest that the timing of intervention elements may be important. Providing treatment for depressed mothers (e.g., Ammerman et al., 2010) may be an essential first step prior to focusing on social support and networks. Trauma was related to multiple aspects of maternal functioning and was the first step in a pathway to depression and increased parenting stress. As trauma is very common in home visiting populations, greater attention to the clinical needs of participating mothers is warranted (Bugental & Schwartz, 2009). In terms of research, examining the moderating effects of depression in home visiting outcomes should be incorporated into future studies. There are relatively few examples of this in the literature (e.g., Duggan et al., 2009), yet the accumulating evidence from the field (Ammerman, Putnam, Bosse, et al., 2010) suggests that measuring and examining the impact of depression on mothers and children in home visitation should be standard in future research.

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Figure 1.

Multivariate path model for D+ and D- groups. Model fit: $\chi^2(9) = 22.51$, Goodness of Fit Index = .97, Standardized Root Mean Square Residual = .08. * = $p < .05$. Household income and GSI-O (Global Severity Index of the Brief Symptom Inventory with Depression subscale removed) included as covariates but not presented. CTQ=Childhood Trauma Questionnaire; SNI-EN=Social Network Index-Number of Embedded Networks; SNI-ND=Social Network Index-Net Diversity; SNI-NN=Social Network Index-Number of People in Social Network; PSI-SF=Parenting Stress Index-Short Form; HOME=Home Observation for the Measurement of the Environment Inventory.

Figure 2.

Detection of group moderation in multivariate path analysis. Parameter estimates for the D+ group are listed above estimates for the D- group. Base model fit: $\chi^2(18) = 8.10$, Goodness of Fit Index = .99, Standardized Root Mean Square Residual = .04. * = $p < .05$. Household income and GSI-O (Global Severity Index of the Brief Symptom Inventory with Depression subscale removed) included as covariates but not presented. Bolded paths indicate group moderation. SNI-EN and PSI-SF Pathway: $\chi^2(1)\Delta = 9.86$, $p < .01$, SNI-EN and HOME Pathway: $\chi^2(1)\Delta = 5.03$, $p < .05$, and SNI-NN and PSI-SF Pathway: $\chi^2(1)\Delta = 3.87$, $p < .05$. Group moderation effects for social network. CTQ=Childhood Trauma Questionnaire; SNI-EN=Social Network Index-Number of Embedded Networks; SNI-ND=Social Network Index-Net Diversity; SNI-NN=Social Network Index-Number of People in Social Network; PSI-SF=Parenting Stress Index-Short Form; HOME=Home Observation for the Measurement of the Environment Inventory.

Table 1

Demographic characteristics of mothers in the D+ (n = 90) and D- (n = 90) groups.

Variable	D+ Group	D- Group	t or χ^2	p-value
	M (SD) or N (%)	M (SD) or N (%)		
Mother age	22.0 (4.6)	21.9 (4.2)	-0.2	ns
Mother Race				
Caucasian	56 (62.2%)	70 (77.8%)	8.6	ns
African American	31 (34.4%)	17 (18.9%)		
Native American	1 (1.1%)	0 (0.0%)		
Asian American	1 (1.1%)	0 (0.0%)		
Bi-Racial	1 (1.1%)	3 (3.3%)		
Mother Ethnicity				
Appalachian	3 (3.3%)	11 (12.2%)	7.3	<.05
Hispanic	5 (5.6%)	1 (1.1%)		
None	82 (91.1%)	78 (86.7%)		
Marital Status				
Married	12 (13.3%)	11 (12.2%)	3.1	ns
Single	77 (85.6%)	75 (83.3%)		
Divorced	0 (0.0%)	3 (3.3%)		
Separated	1 (1.1%)	1 (1.1%)		
Highest Degree				
No degree	33 (36.7%)	29 (32.2%)	3.6	ns
HS or GED	54 (60.0%)	54 (60.0%)		
Associate's	2 (2.2%)	5 (5.6%)		
Bachelor's	1 (1.1%)	2 (2.2%)		
Household Income				
\$ 0–10,000	49 (54.4%)	35 (39.8%)	9.4	.053
\$10,001–20,000	21 (23.3%)	22 (25.0%)		
\$20,001–30,000	14 (15.6%)	12 (13.6%)		
\$30,001–40,000	2 (2.2%)	8 (9.1%)		
>\$40,001	4 (4.4%)	11 (12.5%)		
Child's age (days)	154.6 (74.6)	163.1 (81.7)	0.7	ns
Model				
HFA	78 (86.7%)	44 (48.9%)	29.4	<.05
NFP	12 (13.3%)	46 (51.1%)		
Home Visits (per month)	2.5 (1.0)	2.5 (1.0)	0.0	ns

Table 2

Zero-order correlations by group (D+ and D-) for variables included in path analysis.

Variable	1	2	3	4	5	6	7	8	9
1. CTQ	-	.37***	-.18§	-.21§	-.20§	.30**	.07	-.11	-.22*
2. BDI-II	.30**	-	-.18§	-.16	-.16	.59***	.38***	-.16	-.16
3. SNI-EN	-.16	-.05	-	.61***	.88***	-.11	.09	.17	.38***
4. SNI-ND	.02	-.03	.33**	-	.66***	-.07	.08	.06	.36***
5. SNI-NN	-.12	-.16	.61***	.70***	-	-.12	.05	.06	.47***
6. GSI-O	.29**	.56***	-.05	-.09	-.17	-	.22*	.02	.03
7. PSI-SF	.17	.46***	-.30**	-.24*	-.27**	.24*	-	-.18§	-.06
8. HOME	-.10	-.02	.13	.36***	.21*	.06	-.21§	-	.16
9. Income	-.07	-.01	.15	.35***	.28**	-.08	-.07	.25*	-

Note.

p .001;

**
p .01;

*
p .05;

§
p .10.

Correlations for the D+ group are presented in top half of correlation matrix. Correlations for the D- group presented in lower half of matrix.

CTQ=Childhood Trauma Questionnaire; BDI-II=Beck Depression Inventory; SNI-EN=Social Network Index-Number of Embedded Networks; SNI-ND=Social Network Index-Net Diversity; SNI-NN=Social Network Index-Number of People in Social Network; GSI-O=Global Severity Index of the Brief Symptom Inventory with Depression subscale removed; PSI-SF=Parenting Stress Index-Short Form; HOME=Home Observation for the Measurement of the Environment Inventory.

Table 3

Means, standard deviations, and univariate analyses of covariance showing contrasts between D+ and D- groups on risk and outcome variables.¹

Variable	D+ (Mean ± SD)	D- (Mean ± SD)	F	df	<i>f</i> ²
CTQ	58.51 ± 22.49	38.89 ± 16.62	23.61 *	2, 173	.27
BDI-II	33.67 ± 10.06	6.48 ± 3.68	284.20 *	2, 175	3.25
SNI-EN	1.12 ± 0.91	2.17 ± 1.46	21.09 *	2, 175	.24
SNI-ND	5.39 ± 1.52	6.34 ± 1.57	20.75 *	2, 175	.24
SNI-NN	9.28 ± 5.40	16.90 ± 8.63	36.34 *	2, 175	.42
GSI-O	70.87 ± 5.50	50.76 ± 5.81	273.79 *	2, 173	3.17
PSI-SF	85.88 ± 19.52	63.69 ± 17.20	32.85 *	2, 171	.38
HOME	31.43 ± 5.99	37.79 ± 5.08	33.04 *	2, 165	.40

Note

* $p < .001$.

Statistical significance level with correction for multiple comparisons is ($\alpha = .05/8 = .006$).

¹ = All analyses conducted while controlling for income.

CTQ=Childhood Trauma Questionnaire; SNI-EN=Social Network Index-Number of Embedded Networks; SNI-ND=Social Network Index-Net Diversity; SNI-NN=Social Network Index-Number of People in Social Network; GSI-O=Global Severity Index of the Brief Symptom Inventory with Depression subscale removed; PSI-SF=Parenting Stress Index-Short Form; HOME=Home Observation for the Measurement of the Environment Inventory.