

Low-level Depressive Symptoms Reduce Maternal Support for Child Cognitive Development

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Abstract and Introduction

Abstract

Objective: The objective of this study was to examine the relationship between low-level depressive symptoms in mothers and their support for child cognitive development.

Methods: Participants included 913 low-income mothers of preschool-age children who were screened for maternal depression and interviewed about support for learning in the child's home environment.

Results: Of the 770 mothers in the analysis, 21.5% reported low-level depressive symptoms (*below* the cutoff on the screening tool indicating clinically elevated symptoms). Logistic regression analyses revealed that children of mothers with low-level depressive symptoms were significantly less likely to experience six of seven types of support for learning compared with children of mothers with no depressive symptoms.

Conclusions: Results suggest that children whose mothers experience even low-level depressive symptoms are less likely to receive important supports for cognitive development and school readiness, pointing to the need for screening and interventions to address maternal depression at all levels of severity.

Introduction

It has been well documented that maternal depression has a negative impact on children's health and development (Cummings et al., 2005, Downey and Coyne, 1990, Goodman and Gotlib, 1999), especially during early childhood, when rapid brain growth and maximum dependence on caregivers coincide. In the United States, it is estimated that 1 in 10 children experience maternal depression in any given year (Ertel, Rich-Edwards, & Koenen, 2011), and in fact maternal depression is considered a worldwide public health problem (World Health Organization–U.N. Fund for Population Activities [WHO-UNFPA], 2007). Despite the recognized prevalence of maternal depression, the connection is often not made between a mother's positive screening for depression and the risk to a child's well-being. Conversely, a link often is not made between developmental delays in children and possible depression or another mental health disorder of the parent.

Although the existing research is clear that depression negatively affects parenting and child outcomes, the severity of depressive symptoms needed to create these negative impacts remains unclear. Specifically, we are unaware of any research that has examined whether low-level maternal depressive symptoms negatively affect parenting practices or child outcomes. The purpose of this article is to examine whether mothers with low-level depressive symptoms (*i.e.*, symptoms *below* the cutoff point on a standard screening tool) are less likely to engage in activities that support their child's healthy cognitive development and school readiness, compared with mothers who have no depressive symptoms.

Impact of Depression on Children

Children of depressed parents have been found to have more behavior problems, fewer positive social behaviors, and lower scores on early academic performance measures (Galler et al., 2000, Salt et al., 1988) than do children of parents who are not depressed. More specifically, children of depressed mothers display more negative affect, more behavior problems, and poorer self-regulation, social skills, and cognitive and language functioning (Carter et al., 2001, Zahn-Waxler et al., 2002). Authors of a longitudinal prospective study (NICHD Early Child Care Research Network, 1999) found that children of mothers who reported more chronic depressive symptoms had poorer scores on tests of school readiness and expressive language and higher ratings of externalizing behaviors compared with children of mothers who were not depressed mothers or mothers who had intermittent symptoms.

Impact on Parenting Practices

Children of depressed mothers have poorer outcomes in part because of the negative impact of depression on maternal sensitivity, responsiveness, and other aspects of parenting (Hwa-Froelich et al., 2008, Jacob and Johnson, 1997, Paulson et al., 2006). Optimal caregiving behaviors include sensitive responsive caregiving, provision of resources such as books and

toys that support learning, and parent-child verbal and stimulating interactions such as shared reading, telling stories, singing songs, playing counting or alphabet games, visiting new places, and doing daily activities together (Rodriguez and Tamis-LeMonda, 2011, Tamis-LeMonda et al., 2001, Tomopoulos et al., 2006). Research suggests that depressed mothers are less likely to engage in these activities with their children that support their healthy cognitive development and contribute to school readiness.

The pathway from depression to less sensitive maternal behavior and lower levels of maternal sensitivity was found to partly explain children's poorer school readiness, verbal comprehension, and expressive language and higher rates of problem behavior (NICHD Early Child Care Research Network., 1999, Paulson et al., 2009). The research of Hart & Risley (1995) and Hoff (2003) provides compelling documentation of the value of providing children with more labels for objects, responding contingently to children's speech, making efforts to elicit conversation from children, sustaining conversations with children, and just talking to them more often. Depressed mothers have been found to use longer utterances (i.e., they do not shorten utterances for children of younger ages), less repetition, more negative affect, fewer explanations, suggestions, and questions, and fewer references to their infants' behavior (Herrera et al., 2004, Kaplan et al., 1999). Maternal depression is also associated with fewer reading activities (Kiernan and Huerta, 2008, Paulson et al., 2009).

Intervention

The harm to children as a result of maternal depression is a compelling reason for programs that serve young children and their families to screen for the presence of maternal depressive symptoms. The need for increased, sustained efforts to not only treat adults but to prevent problems in children has been identified by international and national organizations, including the National Research Council and Institute of Medicine of the National Academies (2009), which recommended development and implementation of identification, treatment, and prevention strategies for depressed parents and their children. Additionally, the World Health Organization (WHO-UNFPA, 2007) called for reducing the factors that lead to maternal depression and promoting the health and development of mothers and children.

The National Center for Children in Poverty recommends that communities address maternal depression as a barrier to healthy development and school readiness with specific strategies: (a) brief screening and follow-up of pregnant women and parents of infants and young children; (b) evidence-based, family-focused practices addressing maternal depression; (c) early childhood mental health consultation; (d) cross-training of staff in primary care, mental health, and early care settings; (e) public awareness campaigns; (f) psychosocial interventions that alleviate environmental stressors, increase social support, and enhance mother-infant interactions; and (g) medication treatment for women who do not respond to interventions (Knitzer, Theberge, & Johnson, 2008).

Pediatric and family health care providers have a particular opportunity to screen for maternal depression and its impact on children, along with the presence of risk factors that may exacerbate its effects or factors that may be protective. These providers are uniquely positioned to provide resources, education, and treatment or make referrals for mental health and other services.

The Continuum of Depressive Symptoms

It is important that we fully understand how the severity of depressive symptoms relates to impairments in parenting to ensure that our screening processes are adequate to identify mothers at risk for problems in parenting. Unfortunately, existing studies do not provide sufficient information regarding this point. Many studies of the impact of maternal depression are based on standard depression screening tools. In these studies, the researchers either treat depression as a continuous variable (the full range of symptoms) or they group together mothers with and without clinically elevated depressive symptoms based on the screening tool predetermined cutoff point designed to reflect a high probability of major depression. These types of studies clearly show the impact of depressive symptoms on parenting and children (Chung et al., 2004, McLearn et al., 2006, McLennan and Kotelchuck, 2000). Although the cutoff points on our screening tool are designed to reflect a high likelihood of meeting diagnostic criteria, some researchers suggest that depression may be thought of as a continuum of symptoms rather than just a discrete diagnosis. This possibility has been explored in studies of "subclinical" or "sub-threshold" depression, which are often defined as having elevated symptom scores (above cutoff points) but failing to meet all of the additional diagnostic criteria for major depression. A number of studies have demonstrated that sub-threshold depression has negative effects on home and work functioning (Judd, Paulus, Wells, & Rapaport; 1996). These findings give rise to additional questions related to symptom severity and effects on parenting and child outcomes. If sub-threshold depressive symptoms have a negative impact on functioning, at what point on the severity continuum do symptoms of depression begin to affect parenting functions and ultimately child outcomes? Are the cutoff points on the screening tools that we use to predict major depression also sufficient to identify risks in parenting, or might even lower level symptoms impair parenting functions?

The purpose of our study was to identify differences in support for cognitive development and school readiness among

low-income mothers with no depressive symptoms and low-level depressive symptoms (*below* the cutoff score designed to suggest a high probability of depression), as measured by a brief screening instrument, the Patient Health Questionnaire–2 (PHQ-2) (Kroenke, Spitzer, & Williams, 2003). Our study advances our understanding of depression by examining low-level symptoms of depression and their impact on a wide range of activities that support cognitive development and school readiness.

Methods

Data collection occurred during home visits to mothers whose children were enrolled in Head Start programs in a Southern state. Head Start is a federally funded, two-generational program serving low-income (100% of poverty or below) families and children ages 3 to 5 years in preschool settings. Head Start agencies are mandated to reduce the impact of risks to healthy child development through the use of educational services, supportive interventions, and referrals to community services. To this end, Head Start performance standards require home visits during the school year, during which staff identify family goals related to the welfare of the child and family.

Instrument: The Family Map

The primary data collection tool was The Family Map, a semi-structured interview developed to assess key aspects of the family and home environment associated with well-being in children ages 3 to 5 years (Whiteside-Mansell, Bradley, Conners, & Bokony, 2007). The Family Map systematically identifies areas of concern and strength so providers can design interventions to reduce risk conditions or enhance conditions associated with healthy development. The measure was designed for compatibility with Head Start home visits, but it is also appropriate for use with any family that has children ages 3 to 5 years.

The Family Map is organized into modules that target components of family life that research indicates are critical for healthy child development, such as academic stimulation and availability of stimulating materials. Each module assesses multiple aspects of risks associated with child outcomes (described in). Risk areas are usually assessed with three or fewer items. They have good reliability and are usually based on well-known instruments. Each item or scale representing a possible risk area is coded (risk = 1, no risk = 0). Information about validity, test-retest reliability, and internal consistency support the Family Map 5 (Whiteside-Mansell et al., 2007).

Table 1. Adjusted odds ratios for risks in the learning environment when comparing mothers with low depressive symptoms to mothers with no depressive symptoms^a

| Child risk | Definition of risk | Adjusted OR low-level symptoms (95% CI) |
|--|---|---|
| Few stimulating materials | Fewer than two toys for putting things together (e.g., blocks, puzzles, or Legos) or fewer than two toys for learning (e.g., matching games) or fewer than three art supplies (e.g., crayon, markers) or fewer than 10 children's books available | 1.55* (1.05–2.30) |
| Infrequent reading | Child is read to less than three times per week by any adult in the home | 1.55* (1.02–2.37) |
| Infrequent play/interacting with child | Engaging in two out of four types of play activities (e.g., playing with toys, arts, or crafts) less than three times per week | 1.25 (.74–2.09) |
| Little academic stimulation | Working on numbers or colors or letters or shapes fewer than three times per week | 2.32*** (1.58–3.41) |
| Little variety of experience | Two or fewer visits in the past year to places like the library, zoo, museum, or community events | 1.75* (1.02–2.99) |
| Unpredictable daily activities | Deviating from two of four daily routines (e.g., bed time, dinner time) more than two times per week | 1.73** (1.19–2.53) |
| Inappropriate television | Child watches PG-13/TV-14 or R-rated/TV mature television programs | 1.46* (1.02–2.12) |

OR, odds ratio; CI, confidence interval.

* $p < .05$.

**p < .01.

***p < .001.

^aAdjusted for maternal race/ethnicity, employment status, number of children in the home, level of education, presence of another adult in the home, and child gender.

Maternal Depression Screening in the Family Map. The Family Map includes the PHQ-2 screen for depression. PHQ-2 items are taken from the longer PHQ-9. The PHQ-2 includes questions about the frequency of depressed mood ("feeling down, depressed, or hopeless") and anhedonia ("little interest or pleasure in doing things") during the past 2 weeks. Each question is scored from 0 ("not at all") to 3 ("nearly every day"), with total scores ranging from 0 to 6. It was initially validated in a sample of 6000 patients in eight primary care clinics and seven obstetrics-gynecology clinics. With a cutoff score of 3, it has a sensitivity of 83% and a specificity of 92% for major depression (Kroenke et al., 2003). The cutoff of 3 is designed to best predict major depression, and the developers note that scores are more variable for patients with other (nonmajor) depressive disorders. In the initial validation study, half (50.8%) of patients with nonmajor depression diagnoses scored below the cutoff of 3. The PHQ-2 is one of the screening tools recommended by the U.S. Preventive Services Task Force as being efficient and well-validated (Pignone et al., 2002).

Procedures

The Family Map was implemented in a Southern state, in 20 Head Start centers (53 classrooms) located in a metropolitan area and in six centers (17 classrooms) serving families living in a micropolitan area (population < 50,000). A teacher conducted a Family Map interview with a child's primary caregiver, usually the mother, during a home visit designed to occur in the fall about 2 months after the child began attending Head Start. Interviews were completed during home visits over a 6-week period. The Family Map developers trained teachers to conduct interviews through video examples and discussions of each item emphasizing nonjudgmental interview techniques, the impact of the home and parenting environment on children, and how to use the identified risks to suggest family goals. The teachers were trained as part of a larger study of the implementation of The Family Map in Head Start settings, with the goal that The Family Map would become a part of their routine home visit protocol and continue after the end of the study. The Family Map data collected by the teachers were obtained through a review of program records in the collaborating programs and with the permission of the program administrators. The study was approved by the University of Arkansas for Medical Sciences Institutional Review Board.

Analysis Plan

Analyses using SPSS compared mothers who had no depressive symptoms with those who had low-level depressive symptoms (a score of 1 or 2 on the PHQ-2) to identify differences in the learning environment for the child. Mothers with clinically elevated depressive symptoms (i.e., a score of 3 or more on the PHQ-2) were excluded from these analyses, because they were not the focus of our research question, as the impact of clinically elevated symptoms has been well established. Specifically, in the first set of analyses we used chi-square tests to investigate the degree to which low-level maternal depressive symptoms are associated with an increased likelihood of risk for the child at the bivariate level. To control for family demographics, in the second set of analyses we used a series of logistic regression models to investigate the differences in risk for children of mothers with no symptoms compared with mothers with low-level symptoms. Control variables included maternal race/ethnicity, employment status, number of children in the home, level of maternal education, the presence of another adult in the home, and the child's gender.

Results

Sample

A total of 913 female primary caregivers participated in The Family Map interview. Because the participant was the child's biological mother in 94.0% of the cases, we use the term "mothers" to describe participants, although the sample included grandparents, stepparents, and other mother figures as well. We compare the demographics of families of participants who reported no symptoms and low symptoms of depression. Demographically, the groups were statistically similar for all variables assessed.

Table 2. Demographic comparison of mothers with no symptoms of depression compared with low-level symptoms of depression (N = 770)

| | Depression risk | |
|--|---------------------------------|----------------------------------|
| | No-symptom mothers, % (n = 594) | Low-symptom mothers, % (n = 176) |
| | | |

| | | |
|---|-------------|-------------|
| Ethnicity | | |
| White | 20.5 | 22.7 |
| Black | 59.8 | 50.0 |
| Hispanic | 13.0 | 18.8 |
| Other | 6.7 | 8.5 |
| Primary caregiver employed | 70.5 | 64.9 |
| No other adult in the home | 38.8 | 35.3 |
| Has partner/married | 56.4 | 61.6 |
| Education | | |
| No high school diploma/no GED | 11.4 | 15.3 |
| High school graduate/GED | 36.3 | 35.8 |
| Some postsecondary education | 52.2 | 48.9 |
| Target child is male | 50.9 | 57.7 |
| Mean No. of children living in the home (<i>SD</i>) | 2.17 (1.08) | 2.34 (1.20) |

GED, General educational development.

Depression Screening Results

Complete data on the depression screening items were available for 817 of the 913 interviews. We were unable to classify the remaining interviews because of missing data, and they were excluded from subsequent analysis. Overall, 47 mothers (5.8%) were identified as being at risk for depression based on the traditional PHQ-2 cutoff point of 3 or more, and these mothers were excluded from further analysis, because our research question focuses on mothers with low-level symptoms who would not traditionally be treated for depression based on their screening results. Thus for analysis purposes our sample includes 770 mothers, of whom 176 (21.5%) had scores of 1 or 2. We will refer to these mothers as having "low-level" symptoms.

Comparison of Risks for Learning for Maternal Depression Groups (No Symptoms vs. Low-level Symptoms)

The Figure shows the result of the first set of analyses and indicates that children whose mothers had low-level symptoms of depression were more likely to experience risks in the learning environment than were children whose mothers had no symptoms of depression. In these bivariate analyses, significant group differences were found in all seven specific learning risk areas. For example, 37.9% of children whose mothers had no symptoms of depression had received infrequent support in academic stimulation (e.g., working with the child on numbers, and colors) compared with 62.4% of children whose mothers had low-level depressive symptoms ($\chi^2 = (1, 767) = 30.40, p < .001$). Other differences were smaller but still significant. For example, 22.6% of children whose mothers reported no symptoms of depression were infrequently read to by an adult in the home, compared with 31.3% of children of low-symptom mothers.

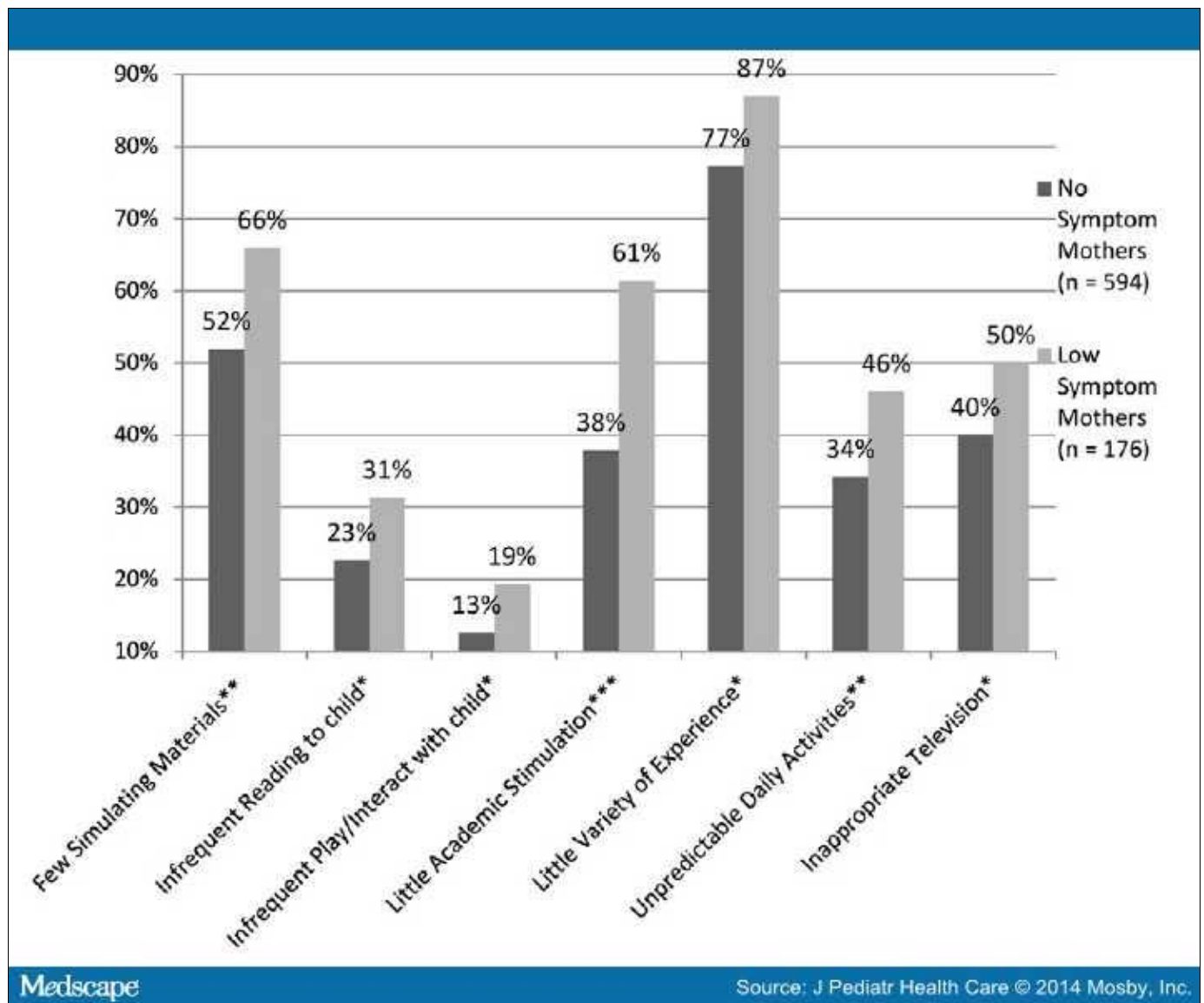


Figure.

Percent of children at risk for inadequate support for learning in mothers with no symptoms of depression compared with low-level symptoms of depression.

Next we used a series of logistic regression models to investigate differences in risk for children of mothers with no or low-level symptoms of depression, while controlling for family demographics. The resulting odds ratios (ORs) in show significantly increased risk in six of seven risk areas associated with both low-level symptoms of maternal depression. When mothers had low-level symptoms of depression, children were generally at a little less than twice the risk for experiencing infrequent or inadequate support for learning compared with children of mothers with no symptoms. The difference between the groups was most striking for academic stimulation, such as working with the child on colors or numbers (OR = 2.32, confidence interval [CI] [1.58, 3.41], $p < .001$). The context for learning was also affected; mothers with low-level depressive symptoms were less likely to provide a stable and predictable daily routine needed for learning (OR = 1.73, CI [1.19, 2.53], $p = .004$) and were more likely to allow their child to view television content inappropriate for children based on the rating (OR = 1.46, CI [1.02, 2.12], $p = .04$).

Table 1. Adjusted odds ratios for risks in the learning environment when comparing mothers with low depressive symptoms to mothers with no depressive symptoms^a

| Child risk | Definition of risk | Adjusted OR low-level symptoms (95% CI) |
|------------|--------------------|---|
|------------|--------------------|---|

| | | |
|--|---|---------------------|
| Few stimulating materials | Fewer than two toys for putting things together (e.g., blocks, puzzles, or Legos) or fewer than two toys for learning (e.g., matching games) or fewer than three art supplies (e.g., crayon, markers) or fewer than 10 children's books available | 1.55* (1.05–2.30) |
| Infrequent reading | Child is read to less than three times per week by any adult in the home | 1.55* (1.02–2.37) |
| Infrequent play/interacting with child | Engaging in two out of four types of play activities (e.g., playing with toys, arts, or crafts) less than three times per week | 1.25 (.74–2.09) |
| Little academic stimulation | Working on numbers or colors or letters or shapes fewer than three times per week | 2.32*** (1.58–3.41) |
| Little variety of experience | Two or fewer visits in the past year to places like the library, zoo, museum, or community events | 1.75* (1.02–2.99) |
| Unpredictable daily activities | Deviating from two of four daily routines (e.g., bed time, dinner time) more than two times per week | 1.73** (1.19–2.53) |
| Inappropriate television | Child watches PG-13/TV-14 or R-rated/TV mature television programs | 1.46* (1.02–2.12) |

OR, odds ratio; CI, confidence interval.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

^aAdjusted for maternal race/ethnicity, employment status, number of children in the home, level of education, presence of another adult in the home, and child gender.

Discussion

We found that about one fifth of mothers (21.5%) reported low-level depressive symptoms. This finding is similar to results reported by Olson and colleagues from screening implemented at pediatric well-child visits, in which 6% of mothers scored at risk for major depression and 17% had one symptom (Olson, Dietrich, Prazar, & Hurley, 2006). We should note that we used an interview format, which could have resulted in fewer positive screenings, because prior studies have shown that the written format produces more positive screening results (Olson et al., 2005).

The key finding of our study is that even low-level depressive symptoms (*below* the recommended cutoff point on the PHQ-2) appear to have a negative impact on parenting capacities. Consistent with past studies of more severe depressive symptoms (Rodríguez and Tamis-LeMonda, 2011, Tamis-LeMonda et al., 2001, Tomopoulos et al., 2006), we found that mothers' depressive symptoms had a negative impact on the support for learning and school readiness they offered their preschool-aged children, such as reading to the child and working with them on their colors and numbers. In an extension of prior studies, we also found that mothers with depressive symptoms were less likely to provide an environment that is conducive to learning, with less predictable daily routines and an increased access to television that is inappropriate for children based on age guidelines. It is also an extension of prior work to demonstrate that even low-level symptoms can have these negative impacts on parenting.

Our finding related to the impact of low-level symptoms on parenting suggests that although the cutoff point of 3 may provide the ideal balance of sensitivity and specificity in identifying major depression, the presence of any symptoms may be a concern from a parenting perspective. Research on "minor," "sub-syndromal," or "sub-threshold" depression may help put our findings into context (we will use the term "sub-threshold"). These depressive spectrum disorders are typically defined by the presence of elevated symptoms (above the cutoff point on a screener) but falling short of meeting full diagnostic criteria (Rowe & Rapaport, 2006). Past research suggests that sub-threshold depression can be associated with substantial impairment in work and life functioning (Solomon, Haaga, & Arnow, 2001). These symptoms may also be associated with a history of depression that is improving or indicate a progression toward major depression. In a review of 23 studies that prospectively followed participants and evaluated depressive symptoms, Cuijpers and Smit (2004) found that the presence of sub-threshold symptoms was significantly associated with the future development of major depressive episodes. Thus some researchers argue for a greater recognition of the full continuum of depressive disorders (Rowe & Rapaport, 2006).

Our findings are similar in nature to studies that report the impact of sub-threshold depression on life functioning, although we have taken that one step further by demonstrating that even *non*-clinically elevated symptoms can impair function. Our findings further emphasize the point that the relationship between depressive symptoms and child risk may be linear in nature, with increases in depressive symptoms associated with increases in problems with parenting, *beginning even when symptoms are very low level*.

Based on current screening and referral recommendations that focus on persons who score above clinical cutoff points, mothers with these low-level symptoms would be unlikely to receive any education, counseling, or other treatment related to their depressive symptoms. Although their symptoms may not warrant traditional treatment approaches, our results suggest that they may be impairing parenting functions and should not be ignored. Looking again to the literature on sub-threshold depression, studies (Judd et al., 2004) have shown a benefit of pharmacotherapy in the treatment of sub-threshold depression, whereas others suggest that offering therapy resources may be beneficial (Wells et al., 2005). It may be appropriate for health care providers to take a proactive approach to symptoms of maternal depression as is often done at the very earliest signs of other chronic medical conditions (e.g., prediabetes and prehypertension). Patient education and dietary and lifestyle changes are recommended for these precursor illnesses. Similar interventions for mothers with low-level symptoms of depression may be beneficial to both mother and child.

Our findings highlight the importance of screening for maternal depression beyond the postpartum period. A great deal of attention has been directed at postpartum screening, but our results are consistent with past research in suggesting that screening should continue beyond the postpartum period (McLearn et al., 2006). A number of valid screening options exist, including the two-item brief screening option (Kroenke et al., 2003, Whooley et al., 1997), which may be useful to nurses and physicians with time constraints who are interested in incorporating screening into their practice. Olson and colleagues (2006) have demonstrated the feasibility of implementing the brief screening option during well-child care visits in pediatric clinics. The American Psychological Association Web site provides information about various versions of the PHQ and links to free screening forms in multiple languages.

In recent years, nurses, pediatricians, and family practice physicians have increasingly viewed enhancing support for learning and healthy child development in the home as within their scope of practice. As an example of a pediatric intervention to support learning, the successful Reach Out and Read program is now being implemented in more than 4,000 practices in all 50 states (Zuckerman, 2009). Reach Out and Read physicians give books to their patients at each visit between 6 months and 5 years, and they emphasize to parents the importance of reading to their children. Reach Out and Read has demonstrated a positive impact on parenting behaviors around literacy, as well as on child language outcomes. It may be important for health professionals engaged in such programs to understand the impact of even low-level depressive symptoms on a parents' likelihood of engaging in activities to promote learning, such as reading to their child.

Our study is not without limitations. Although the screening tool we used in our study is particularly useful because it is widely used in clinic settings, it is a very brief measure of depressive symptoms. Also, we have no objective measures of mothers' support for child learning. It is possible that mothers with depressive symptoms may view their own parenting more negatively, and thus the relationship we found between depressive symptoms and support for learning could be inflated. Finally, our study is focused on low-income preschool-aged children and their mothers. The generalizability of our findings to other samples should be explored.

In summary, the high rates of low-level depressive symptoms and of mothers' reports that these symptoms affect the way that they care for their children indicate that resources to screen for and address depressive symptoms in mothers should receive high priority in pediatric health care settings. Screening and interventions are needed to ensure that children affected by maternal depression receive the support they need to enter school well-equipped for success. Future studies should examine this issue from a longitudinal perspective to help us more fully understand depressive symptoms at all levels of severity and their long-term impact on child outcomes.

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Conflicts of interest

None to report.

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