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Maternal Depressive Symptoms in Pediatric Major Depressive Disorder: Relationship to Acute Treatment Outcome

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Abstract

Objective—In the present study, we assess maternal depressive symptoms at the beginning and end of treatment to investigate the possible reciprocal relationship of maternal illness with the child's depressive illness and treatment.

Method—We present data on 146 children and their mothers who were participating in a pediatric acute treatment study of fluoxetine. Patients were assessed with the Children's Depression Rating Scale-Revised at baseline and at each treatment visit. Mothers completed the Quick Inventory of Depressive Symptomatology-Self Report at baseline and end of acute treatment.

Results—Thirty percent of mothers had moderate to severe levels of depressive symptoms at the child's baseline assessment. Overall, mothers reported improvement in maternal depressive symptoms at the end of their child's acute treatment, although maternal depression was not specifically targeted for intervention. Furthermore, mother's depressive symptoms appear to be associated with the child's depression severity both at the beginning and end of treatment. Mothers with higher levels of depressive symptoms had children with higher levels of depression severity at baseline and over the course of treatment. However, maternal depressive symptoms at baseline had no association with the rate of improvement of child depression severity.

Conclusions—This study indicates a positive relationship between the depression severity of mothers and their children. These findings highlight potential areas of intervention in the acute treatment of childhood depression.

Keywords

maternal depressive symptoms; pediatric depression; acute treatment of pediatric depression

Numerous studies have shown that children of depressed parents are at a significantly increased risk for developing depression compared to the children of nondepressed parents,^{1–3} with the children of depressed parents having a 40% chance of experiencing a major depressive episode by age 20 years² and a 60% chance by age 25.⁴ As longitudinal studies have shown, children of depressed parents continue to experience difficulty into adulthood, exhibiting higher rates

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of recurrent depression, other psychopathology (notably anxiety disorders and alcohol and substance dependence), and general psychosocial impairment.^{5,6}

Despite the generally recognized associations between parental affective illness and childhood depression, surprisingly little work has focused on the utility of these factors as predictors of course of illness and treatment outcome. In the Sequential Treatment Alternatives for Resistant Depression (STAR*D) study, mothers and their children (ages 7–17) were evaluated during the mothers' treatment for depression. Children showed an improvement in overall functioning and depressive symptoms, despite not directly receiving treatment themselves.⁷ However, less is known specifically about the impact of maternal depression on children who are also diagnosed with major depressive disorder (MDD). Brent and colleagues⁸ found evidence of a differential response to treatment based on the presence of maternal depressive symptoms, with those children receiving cognitive-behavioral therapy having a better outcome in the absence of maternal self-reported depression. Also, Verdelli and colleagues⁹ provided treatment to depressed mothers ($N = 9$) with depressed children. Improvement in maternal depression was associated with improvement in functioning in the children, but not in depressive symptoms.

We present data from a secondary analysis of the database on the acute phase of a randomized controlled trial¹⁰ to determine the effect of continuation treatment on relapse rates in pediatric depression. Specifically our aims were to determine whether mother's depressive symptoms improved with the acute treatment of the child and whether mother's depressive symptoms were predictive of the child's treatment outcome and to compare remission rates of the children who had mothers whose symptoms improved at the end of treatment to those whose mothers did not improve. Similar to the results of STAR*D, we hypothesized that the mother's depressive symptoms would improve with the treatment of the child. In addition, we hypothesized that those children who had mothers with greater depressive symptoms at baseline would have a poorer response to treatment than those children whose mothers had no or few symptoms at baseline. Finally, we hypothesized that those mothers with moderate to severe depressive symptoms who improved at the end of treatment would have children with higher remission rates than those mothers who did not improve.

METHOD

Study Participants

The data presented here are from the acute-phase treatment of single-site continuation study comparing fluoxetine and placebo to prevent relapse. The acute phase consisted of 12 weeks of open-label treatment with fluoxetine. The study was approved by the University of Texas Southwestern Medical Center at Dallas Institutional Review Board. All of the participants and their parents provided written informed consent and assent.

A total of 168 participants were enrolled in the open acute treatment study with fluoxetine. Of these, 146 had mothers who completed a self-rating of depression (the remainder had either fathers or other caregivers who completed this form and are not reported on here). The decision was made to analyze only the mothers' self-report data to evaluate a more homogeneous sample. In addition, the literature suggests a relation between mother's depression and the child's outcome.^{6,8}

Inclusion criteria for the acute study have been described previously.¹⁰ In general, participants were 7 to 18 years of age, had a primary *DSM-IV* diagnosis of MDD for at least 4 weeks with a Clinical Global Impressions-Severity (CGI-S)¹¹ score of 4 and a Children's Depression Rating Scale-Revised (CDRS-R)¹² score of 40. Participants were in good general medical health and of normal or above-normal intelligence. Participants with comorbid disorders were not excluded if MDD was the primary cause of dysfunction, with the exception of psychotic

disorder, bipolar I or II disorder, alcohol or substance abuse or dependence, anorexia nervosa, or bulimia, which were exclusionary.

Procedures

At the initial screening, participants and their parents were interviewed by trained bachelor's and master's degree-level evaluators using the Schedule for Affective Disorders and Schizophrenia for School-Age Children-Present and Lifetime Version.¹³ One week later, a second interview using the Schedule for Affective Disorders and Schizophrenia for School-Age Children-Present and Lifetime Version Affective Supplement was administered by a child and adolescent psychiatrist or psychologist to confirm the MDD diagnosis. Severity of depressive symptoms was assessed by the evaluator using the CDRS-R at baseline.

In addition, mothers completed the Quick Inventory of Depressive Symptomatology-Self-Report (QIDS-SR₁₆)¹⁴ about their own depressive symptoms. During the evaluation, psychiatric history for first-degree relatives was obtained using the Family History-Research Diagnostic Criteria.¹⁵ A diagnosis was captured only if family members had received a diagnosis and/or treatment from a health care provider. Thus, this measure resulted in a conservative estimate of family psychiatric history.

Following the evaluation visits, eligible participants began a 12-week course of open treatment with fluoxetine. The dose began at 10 mg and was increased to 20 mg at week 2. For participants showing insufficient response at week 6, the dose could be increased to 40 mg for the remainder of the treatment course. Participants were seen by a child and adolescent psychiatrist once weekly for the first 4 weeks and biweekly for the remainder of treatment. At each visit, the psychiatrist interviewed the child and mother separately about the child's depressive symptom severity and improvement and completed a CDRS-R. A parent, usually the mother, was present at all of the treatment visits. However, at some visits, the father may have been present to provide information. In these cases, if there was additional information needed from the mother, the child and adolescent psychiatrist could contact the mother via telephone to obtain the information.

Outcome Measures

The primary outcome measure of the child's depression was the CDRS-R,¹² a 17-item clinician rated measure of depression severity, with each item rated on a scale of 1 to 5 or 1 to 7. At each visit, the treating child and adolescent psychiatrist interviewed the child and parent separately (child first) on symptoms of depression. The CDRS-R was then completed using the treating child and adolescent psychiatrists' synthesis of all of the available information. CDRS-R scales were completed at each visit. Remission was defined as a CDRS-R ≤ 28 . Maternal depressive symptoms were assessed with the QIDS-SR₁₆¹⁴ at baseline and end of acute treatment (or exit from the study if the participant withdrew before 12 weeks). The QIDS-SR₁₆ is a 16-item rating scale with items that correspond to the nine *DSM-IV* symptoms of depression. Total scores range from 0 to 27. The following severity thresholds apply to this scale: ≤ 5 = no depression, 6 to 10 = mild depression, 11 to 15 = moderate depression, 16 to 20 = severe depression, and ≥ 21 = very severe depression. The QIDS-SR₁₆ has been shown to be comparable to many of the more commonly used rating scales for depression, such as the Hamilton Depression Rating Scale-24.¹⁶ This measure includes the core *DSM-IV* symptoms of MDD, unlike some other commonly used depression rating scales.¹⁷ The QIDS-SR₁₆ has demonstrated high internal consistency (Cronbach $\alpha = .86$).^{18,19}

Statistical Analyses

Paired *t* tests were conducted between baseline and end of treatment scores on the CDRS-R and QIDS-SR₁₆. A random regression model was constructed to investigate whether maternal

depression was able to predict the child's acute treatment depression outcome, controlling for child's baseline depression severity, age, and sex. The effect of baseline maternal depression on CDRS-R scores over time was examined using a random-regression model. The model included terms for baseline maternal depression, log of visit week, and the interaction between them. The log of visit week was used to obtain a more linear relationship between CDRS-R and time. The child's age, sex, and baseline CDRS-R (baseline severity score) were also included in the model as covariates. A logistic regression analysis was used to examine child remission rates between mothers whose depression improved over treatment and those who did not after controlling for child's baseline depression severity, age, and sex.

RESULTS

Sample Characteristics

Sample characteristics of the children and their families ($N = 146$) and scores on study measures are presented in Table 1. The children ranged in age from 7 to 18 years, with an overall baseline rating of depression severity of 57.6 ± 7.5 on the CDRS-R, suggesting moderate to severe depression. Mothers' depression severity at baseline using the QIDS-SR₁₆ scores indicated that 49 (33.6%) of the mothers had no depression, 54 (37%) had mild depression, 30 (20.5%) had moderate depression, and 13 (8.9%) had severe or very severe depression. Regarding self-reported maternal psychiatric history, 61.6% had a history of depression, 7.5% had a history of an anxiety disorder, and 1.4% had a history of substance abuse. Psychiatric history information was obtained on other children of these mothers. Seventeen mothers (11.6%) reported having other children with depressive illnesses, three (2.1%) had other children with a history of anxiety disorder, and no siblings had a history of substance abuse.

Improvement in Maternal and Child Depression After the Child's Acute Treatment

The child's depression severity significantly improved after acute treatment, using paired t tests ($t = 29.30$, $df = 145$; $p < .0001$), with a mean exit CDRS-R total score of 28.1 ± 10.9 . The rate of remission in this sample ($N = 146$) using a categorical measure of remission (CDRS-R < 28) was 67.8% (99 remitters, 47 nonremitters).

Of the 146 mothers who completed baseline measures, 130 completed these measures at the end of acute treatment. Of the 16 mothers who failed to complete end of acute treatment QIDS-SR₁₆, all dropped or discontinued the study early due to adverse events, patient/parent decision, or moved/lost to follow-up.

The 130 mothers who completed both baseline and exit measures on the QIDS-SR₁₆ and the 16 who completed only baseline measures were compared using t tests. These tests revealed no differences in baseline maternal or child depression severity scores. Paired t tests were conducted between baseline and end of treatment scores on the QIDS-SR₁₆. Mothers reported significant improvement in depressive symptoms at the end of the child's acute treatment ($t = 5.29$, $df = 129$; $p < .0001$). At the end of treatment, the QIDS-SR₁₆ scores indicated that 67 (51.5%) of the mothers had no depression, 40 (30.8%) had mild depression, 16 (12.3%) had moderate depression, and 7 (5.4%) had severe or very severe depression.

Relationship of Maternal Depressive Symptoms and Child's Treatment Outcome

The effect of baseline maternal depressive symptoms on CDRS-R scores over time was examined using a random-regression model. Baseline maternal depressive symptoms were significantly associated with the child CDRS-R scores ($F_{1,161} = 4.67$; $p < .03$), with higher baseline symptom scores associated with higher child depression severity at baseline and throughout treatment. However, baseline maternal depressive symptoms were not related to the rate of improvement ($F_{1,135} = 0.23$, $p < .63$). Figure 1 shows the change over time in CDRS-

R total score for a child whose mother had a baseline QIDS-SR₁₆ of 12 (75th percentile), 7.5 (median value), and 4 (25th percentile).

In addition, we explored the outcomes of children who had mothers with self-reported depression at baseline (baseline QIDS-SR₁₆ ≥ 11 , $n = 43$). Thirty-six mothers completed the QIDS-SR₁₆ at baseline and end of acute treatment. Of these, 58.3% ($n = 21$) reported improvement to mild or no depressive symptoms at the end of the child's acute treatment, and 41.7% ($n = 15$) reported continued or worsening depressive symptoms. Remission rates (CDRS-R < 28) of the children were compared between these two groups (improved mothers versus not improved mothers). Of those mothers who had improved at the end of the child's acute treatment, the remission rates were 76.2%, whereas the remission rates of the children of unimproved mothers were 46.7% ($\chi^2 = 3.31$, $df = 1$; $p < .07$). After adjustment for child's baseline CDRS-R, age, and sex using logistic regression the remission rate was 84% for children whose mothers had improved and 48% for children whose mothers had not improved ($\chi^2 = 4.03$, $df = 1$; $p < .04$). It is noteworthy that the children of the mothers who did not improve at the end of treatment had a lower remission rate (48%) than the children of mothers who improved (84%), and a lower remission rate than the overall study remission rate (68%).

DISCUSSION

This is the first study to report on the association between the treatment of pediatric depression and a reduction in maternal depressive symptoms. Similar to the STAR*D study, which found improvement in children's psychopathology with the treatment of maternal depression, this report demonstrated improvement in maternal depressive symptoms despite no provision of treatment specific to the parent. High rates of concurrent psychopathology between mothers and their children, including depression, were found in the STAR*D sample.²⁰ In this report, approximately two thirds of the mothers of children with MDD had mild to severe levels of depression at baseline based on a maternal self-report of depressive symptoms, with 30% reporting moderate to severe depression. However, only 17% had moderate to severe levels of symptoms at the end of acute treatment. Mothers with self-reported depression who seek treatment for their children may also benefit from the child's acute treatment.

In our study, maternal depressive symptoms seemed to have a positioning effect on the child's level of depression, with children with higher levels of depression severity having mothers who had higher levels of depression. Although the children of the more depressed mothers improved at the same rate as children with less depressed mothers, they ended treatment with higher levels of depressive symptoms than those children who had less depressed mothers. Thus, the child's depression severity, at both baseline and end of acute treatment, appears to be related to the mother's baseline depression severity. Furthermore, children whose mothers' depression improved by the end of the child's acute treatment had similar or higher remission rates as those with nondepressed mothers.

There are several limitations to the generalizability of these findings. Maternal depressive symptoms were assessed only through self-report; thus, it is unclear whether these mothers would meet criteria for clinically significant depression. However, in one study of pediatric depression, self-reported depressive symptoms in mothers were found to affect treatment outcome, whereas a *DSM-III* diagnosis of depression did not relate to treatment outcome.⁸ In addition, treatment for the mother's depression was not assessed, and it is possible that mothers were receiving treatment during the study. It is also possible that the mothers' depressive symptoms may have spontaneously remitted in that 3-month period. Another interpretation of these findings is that a third unassessed variable, such as changes in the family environment, may have accounted for this improvement. Maternal depressive symptoms were assessed only at the beginning and end of treatment, so the relation between the timing of the child and

mother's improvement is unknown. The end of treatment data were not available on all of the mothers who were participating at baseline. Finally, the assessment of the child's depression severity was based on interviews with the child and the mother. It is possible that the mother's report of the child's symptoms was influenced by her depressed mood, which could account for the relationship between child's depression scores and maternal depressive symptoms. However, the CDRS-R ratings were based on clinical judgment of an experienced child and adolescent psychiatrist following separate interviews with the child and the parent. Thus, although the mother's depressive symptoms may have influenced her report of the child, the child and adolescent psychiatrist used all of the available information to determine the final ratings.

Despite these limitations, the study makes some important contributions to the literature, including clinical implications in the treatment of pediatric depression. As found in other studies, children with depression tend to have mothers who are also depressed. Identifying these mothers at the beginning of treatment is an important consideration because their children tend to have higher levels of depression both at the beginning and at the end of treatment. Our data suggest that persistent depression in the mother is associated with lower rates of remission in the child. Targeting maternal depressive symptoms during acute treatment may enhance treatment response. More studies are needed that assess treatment outcome as a function of more broad-based interventions that target parent psychopathology.

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Fig. 1.

Baseline maternal depression (Quick Inventory of Depressive Symptomatology-Self-Report [QIDS-SR₁₆]) predicting child depression severity (Children's Depression Rating Scale-Revised [CDRS-R]), $N = 146$.

TABLE 1
Demographic and Symptom-Level Characteristics of the Sample

	Sample (N = 146)
Child's characteristics	
Sex	
Males	81 (55.5%)
Females	65 (44.5%)
Age, y	
Range	7–18
Mean $\pm$ SD	11.78 $\pm$ 2.8
Ethnicity	
African American	16 (11.0%)
White	109 (74.7%)
Hispanic	17 (11.6%)
Other	4 (2.7%)
Child Depression Severity	
CDRS-R at baseline (mean $\pm$ SD)	57.57 $\pm$ 7.47
CDRS-R at exit (mean $\pm$ SD)	28.12 $\pm$ 10.85
Family characteristics	
Child's current living situation	
Biological parents, married	57 (39.0%)
Biological mother, single	49 (33.6%)
Biological mother and stepfather	30 (20.5%)
Biological father, single	0 (0.0%)
Biological father and stepmother	0 (0.0%)
Adoptive parents	4 (2.7%)
Other relatives	5 (3.4%)
Missing information	1 (0.7%)
Maternal education	
Less than high school	8 (5.5%)
High school graduate	37 (25.3%)
Partial college or specialized training	36 (24.7%)
College graduate	37 (25.3%)
Graduate professional training	17 (11.6%)
Missing information	11 (7.5%)
Maternal depression	
QIDS-SR ₁₆ at baseline (mean $\pm$ SD)	8.27 $\pm$ 4.79
QIDS-SR ₁₆ at exit (mean $\pm$ SD)	6.28 $\pm$ 4.83

Note: QIDS-SR₁₆ = Quick Inventory of Depressive Symptomatology-Self Report.