Psychopathology and Functioning and among Children of Treated Depressed Fathers and Mothers

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Abstract

Objective—Recent findings suggest that remissions of maternal depression are associated with decreases in offspring psychopathology. Little is known about the offspring effects of decreases in paternal depression.

Method—The offspring of married fathers and married mothers were compared. The analysis was restricted to married parents to control for the confounding effect of single parenthood which was more prevalent among depressed mothers. At baseline all parents met criteria for major depressive disorder (MDD), and participated in a 3 month randomized controlled trial to treat depression with a 6 month follow-up. Married parents (N=43) and their children aged 7-17 years (N=78) were assessed independently through direct interviews of children and parents at baseline and followed for 9 months. Child assessors were blind to the clinical status of parents and uninvolved in their treatment.

Results—At baseline, children of depressed fathers, compared to children of depressed mothers, had significantly fewer psychiatric disorders (11% vs. 37%; p=0.012) and less impairment as measured by the Columbia Impairment Scale (6.5 vs. 11.6; p=0.009). Over time, with treatment of

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parental depression, the prevalence of most child symptoms decreased among children of depressed mothers, but changed little among children of depressed fathers.

Limitations—The main limitation of the study is the small number of fathers and their offspring included in the study.

Conclusion—Maternal as compared to paternal depression had a greater impact on children. With treatment of parental depression the differential prevalence of child symptoms by parental gender narrowed over time. The clinical implication is that children may benefit from treatment of their depressed parents.

Keywords

Depressed fathers; Depressed mothers; Children of depressed parents; Major depressive disorder

Introduction

Numerous studies have shown that children of depressed as compared to non-depressed parents have increased rates of depressive, anxiety and behavioral disorders (Beardslee et al., 2011; Weissman et al., 2006). Children of depressed fathers have increased rates of parent-child conflict and elevated rates of externalizing disorders (Ramchandani et al., 2005; Weitzman et al., 2011) similar to children of depressed mothers (Connell and Goodman, 2002). However, compared to paternal depression, the offspring of depressed mothers may be at greater risk of developing internalizing disorders (Beardslee et al., 2003; Kane and Garber, 2004; Klein et al., 2005).

Remissions of parental depression are associated with decreases in offspring psychopathology (Garber et al., 2011; Pilowsky et al., 2008). However, the remission studies have usually focused on depressed mothers. This report focuses on psychopathology and functioning among children of treatment-seeking depressed fathers and mothers as the parents recover from depression.

Methods

Ethics Approval

This study was approved by the New York State Psychiatric Institute Institutional Review Board.

Sample

The overall sample consisted of 93 index parents (82 mothers and 11 fathers) who entered a clinical trial ("Adult Study") and their 168 children aged 7-17 years (Batten et al., 2012). We previously reported on outcomes among children of depressed mothers (Weissman et al., submitted). This report focuses on children of depressed fathers at baseline and during the 9 month follow-up interval. Adult Study participants were outpatients aged 18-65, with non-psychotic MDD recruited in New York City or Ottawa, Canada. They were randomized to one of three treatments (bupropion, escitalopram, or both). After completion of the three month randomized clinical trial patients and their children were followed for an additional 6

months. We restricted the analysis to a sample of married depressed parents to prevent confounding by marital status since most single parents were female and maternal depression affects children of single and married or cohabitating mothers differently (Talati et al., 2007). None of the parents participating in the study were married to each other. The restricted sample included 9 fathers of 19 children and 34 mothers of 59 children. Overall there were 78 children.

Child assessments were conducted by independent assessors who knew that participating parents were depressed at baseline but did not have access to the parents' assessments. Parents and their children were assessed at baseline (i.e. at the onset of treatment of parental depression) and 1, 2, 3, 6 and 9 months after (Batten et al., 2012).

Parental Assessments

Hamilton Rating Scale for Depression (HAMD$_{17}$)—The HAMD$_{17}$ is a clinician-rated scale used to assess severity and changes in depressive symptoms (Endicott et al., 1981; Hamilton, 1960, 1967; Kearns et al., 1982). The 17-item scale ranks symptoms from 0 (not present) to 4 (severe). A score of 7 or less was considered indicative of remission and response was defined as a 50% reduction of the baseline score.

Child Assessments—Children were the responders for the Children's Depression Inventory (CDI), the Multidimensional Anxiety Scale for Children (MASC), and the Columbia Impairment Scale (CIS). Both children and parents were respondents for the K-SADS-PL. The children's Global Assessment Scale (C-GAS) was completed by the assessor considering all data from the K-SADS-PL and all other assessments.

KSADS-PL: The Kiddie-Schedule for Affective Disorders and Schizophrenia, Present and Lifetime version (KSADS-PL) was used to assess affective, anxiety, disruptive, and substance use Axis I DSM-IV disorders (Kaufman et al., 1997). Children and parents were interviewed separately.

Child Global Assessment Scale (C-GAS): The C-GAS a clinician-rated measure of global functioning, provides an estimate of overall severity of disturbance (range, 0-100), with scores above 90 indicating superior functioning, and scores below 70 indicating impaired global functioning (Shaffer et al., 1983).

Children's Depression inventory (CDI): The CDI is a self-report measure of depressive symptoms for use with children and adolescents aged 7-17 years (Kovacs, 1981, 1992). Higher scores indicate more depressive symptoms.

Columbia Impairment Scale (CIS)—The CIS, a measure of impairment, taps four domains: interpersonal relations, psychopathology, job or school work, and use of leisure time in children (Bird et al., 1996; Bird et al., 1993).

Multidimensional Anxiety Scale for Children (MASC)—The MASC assesses four domains of anxiety in children and adolescents: physical symptoms, social anxiety, harm

avoidance and separation/panic (March, 1997; March et al., 1997; March and Parker, 1999). Higher total and sub-scale scores indicate more anxiety symptoms

Data Analysis

All analyses were performed using SAS software, version 9.3. Differences in means of continuous variables for baseline characteristics of parents were determined using t tests, while differences in the distribution of categorical variables were analyzed using contingency table analyses and associated Chi-square tests or Fisher's Exact Tests when counts were low. Differences in baseline psychopathology and functioning in children by parent gender were analyzed using linear mixed models for continuous outcomes and logistic regression (for binary outcomes) and Poisson regression (for outcomes that are counts) used in the framework of generalized estimating equations to adjust for correlation between siblings.

Differences in rates of parental response (defined as a 50% reduction of the baseline $HAMD_{17}$ score) during the study period (9 months) were determined using logistic regression analysis with maternal/paternal response status as the binary outcome variable, gender of parent as the independent variable and including age of parents as a covariate. Differential effects of gender on change in parent's depressive symptoms were analyzed using linear mixed effects regression model analyses, which account for the nesting of time within person, to test linear and curvilinear (quadratic) trends over time.

Differential effects by parental gender on changes in child outcomes over the 9 month study period were investigated as follows: When the child outcome was a continuous variable, linear mixed effects regression models were fitted to the data with the child outcome variable as the dependent variable, parental gender and time (study week) as independent variables as well as an interaction term representing parental gender x time. In addition, age and sex of child and site were included as covariates. A statistically significant interaction term indicates a differential effect of parent gender. Correlations between related measures over time as well as non-independence of observations in siblings were handled by including nested random effects in the model within subject nested within family (Betensky et al., 2000). When child outcomes were either binary variables (child diagnoses) or count variables (child symptoms) logistic regression (for binary outcomes) and Poisson regression (for outcomes that are counts) were used in the framework of generalized estimating equations to determine differential effects of parent gender on these outcomes. Repeated measures over time and non-independence of siblings were accounted for by using an independence correlation matrix, since the clusters are perfectly nested (repeated measures over time within siblings) (Singer, 1998). Potential confounding variables were handled as described for continuous outcomes.

Results

There were no statistically significant differences in educational level, employment status, mean number of children per family, or household income between depressed married mothers (N=34) and married fathers (N=9) participating in the study. Although not statistically significant, the sample included more Hispanic mothers than fathers (1[11.1%]

and 12 [35.3%] Hispanic fathers and mothers, respectively; T=9.73; p<0.10; data not shown). The average age of the 9 fathers was 43.6 years compared to 41.2 for the 34 mothers (p=0.86); 44.4% and 58.8% of fathers and mothers, respectively, were white (p=0.6). Baseline clinical characteristics were also similar with baseline mean $HAMD_{17}$ scores of 22.7 and 21.8, for fathers and mothers, respectively (p=0.24). The mean age of the children (N=78) was 11.3 years and over half (53.8%) were in grades 1-6. There were no statistically significant differences in gender (χ^2 = 1.73, df=1, p=0.19) or age (t = 0.94, df=76, p =0.348) between children of participating fathers and mothers. The mean age of children of participating mothers was 11.08 (SD=3.27), and of participating fathers was 11.89 (SD = 3.21).

At baseline none of the children were receiving mental health treatment. At week 12 a mother (2.9%) and no fathers reported that one of their children had been treated for emotional or behavioral problems. At week 24 two mothers (5.9%) and no fathers, and at week 36 one father (11.1%) and 2 mothers (5.9%) reported that one of their children had been treated.

The $HAMD_{17}$ scores of fathers and mothers decreased between baseline and 6 month and leveled off thereafter (data not shown). A Linear regression model fitted to the data showed a negative linear component (beta = -1.09, t=-15.31; p<0.0001) and a positive quadratic component (beta = 0.02, t=11.61; p<0.001), suggesting that the HAM-D 17 scores decreased and then leveled off after 6 months. There were no significant differences in changes of $HAMD_{17}$ scores over time between mothers and fathers (F-value = 0.93; DF = 1,434; p= 0.3366).

At baseline (Table 1), children of depressed married fathers, as compared to mothers, were less likely to have a psychiatric disorder (11% vs. 37%; p=0.012), had a lower prevalence of K-SADS symptoms, by child (0.2 vs. 1.2 symptoms; p=0.063) and parental report (0.6 vs. 2.0 symptoms; p=0.075), and were less impaired (CIS of 6.5 vs. 11.6; p=0.009). Anxiety symptoms, as reflected in MASC total scores, did not differ significantly.

Over the nine month follow-up interval there was a clear pattern, i.e. the prevalence of most child symptoms decreased (significantly or at the trend level) among children of treated depressed mothers, but not among children of depressed fathers (Table 2). The group by time interaction was significant only for CDI scores. Anxiety symptoms (see MASC total scores, Table 2) did not follow this pattern, i.e. symptoms decreased regardless of parental gender. By the end of the 9 month follow-up interval differences in the prevalence of psychopathological symptoms by parental gender narrowed.

Remission of Parental Depression and Child Outcomes

At the end of the 9 month follow up 5 of 9 fathers (55.6%) and 25 of 34 mothers (73.5%) had remitted. We compared outcomes in children of remitting fathers and mothers over time while controlling for child age, gender, site (New York City/Ottawa), and within family correlation (data not shown). All p values provided here refer to the significance of the beta coefficient for the time trend over the 9 month follow-up. During this interval children of remitting mothers experienced a statistically significant decrease of depressive symptoms as

reflected in CDI scores (p<0.001), of parent-reported K-SADS symptoms (p=0.002), MASC-social anxiety (p=0.004), MASC-physical symptoms (p=0.044) and MASC-Total (p=0.001), as well as improved functioning as measured by the CIS (p<0.001). They also experienced marginally significant changes of the MASC-separation/panic score (p=0.053), and child reported K-SADS symptoms (p=0.076). Over the same interval children of remitting fathers experienced only two statistically significant changes, i.e. MASC-Physical symptoms (p=0.008), and MASC- total (p=0.006), and a marginally significant change, i.e. child-reported K-SADS symptoms (p=0.067). These changes were in the expected direction (less psychopathology or better functioning). There were no significant changes in C-GAS scores among children of remitting fathers or mothers. We compared the effect of remission between children of remitting fathers and remitting mothers (as estimated by examining the significance of the group by time interaction coefficients). There were no statistically significant differences for any of the child outcomes under consideration. In sum, over the nine months follow up there were several significant changes in the expected direction among children of remitting mothers, and few significant changes among children of remitting fathers, but the effect of remission did not differ significantly between children of remitting fathers and remitting mothers.

We also examined changes in children's outcomes among children of non-remitting fathers and non-remitting mothers. The only statistically significant change was a decrease of MASC total scores among children of non-remitting mothers (p=0.049). The effect of non-remission did not differ significantly among children of non-remitting fathers and non-remitting mothers (p values were not statistically significant for group by time interactions for any of the child outcome examined). These results should be viewed cautiously given the small number of remitting and non-remitting fathers.

Discussion

Depression among treatment-seeking currently depressed fathers was associated with a lower prevalence of offspring psychiatric symptoms when compared to the offspring of currently depressed mothers. This finding concurs with the results of a recent study indicating that children of fathers with depressive symptoms had substantially lower emotional and behavioral problems than children of mothers with these symptoms (Weitzman et al., 2011). Weitzman et al.'s study has limitations, i.e. child status was assessed using parental report alone, and parental depression was assessed using a two-question instrument. In spite of these limitations it has the advantage of having a large sample (N=21,993). Thus, a large sample study with limited child and parent assessments, and the present study, with multiple reliable instruments and direct child interviews but a small sample of fathers, converge to show that paternal depression, compared to maternal depression, is associated with fewer offspring psychopathological symptoms and less impaired functioning. Fathers are difficult to recruit for this type of study (Garber et al., 2011), at least in part because the prevalence of depression is lower in men and they are less likely to seek treatment (Accortt et al., 2008; Kessler et al., 2003). The differential impact of parental depression, noted at baseline, is likely related to the greater amount of time children spend with their mothers (Cowan et al., 2009; Pleck and Masciadrelli, 2004), although this was not measured in this study.

Over time, with treatment of parental depression, psychiatric symptoms did not decrease significantly among children of depressed fathers, except for anxiety symptoms which decreased in all children regardless of parental gender. In contrast, symptoms of depression (CDI) and anxiety (MASC), as well as overall symptoms (K-SADS-PL), decreased among children of depressed mothers. Although the absence of significant change among children of treated fathers may have resulted from limited statistical power, the data suggest a pattern wherein children of depressed fathers changed little and children of depressed mothers became less symptomatic. These children came a long way towards catching up with children of treated depressed fathers nine months after the initiation of treatment of parental depression. It is noteworthy that a higher percentage of mothers (73.5%) than fathers (55.6%) experienced a remission of their depression during the 9-month follow up interval.

Significant limitations are noteworthy. We do not have information about the amount of time mothers and fathers spent with their children. The apparently modest impact of paternal depression on child outcomes may be due to fathers spending less time with their children compared to mothers. The number of fathers we were able to recruit was small and we do not know whether they are representative of depressed fathers in the cities where the study was done. Other investigators have experienced similar difficulties recruiting depressed fathers to participate in offspring-focused treatment studies as discussed elsewhere (Garber et al., 2011) and therefore findings about children of depressed fathers are noteworthy. Thus, estimates of outcomes in these children are unstable and statistical power to examine differences in outcomes between children of depressed fathers and mothers was limited. While statistically significant differences are meaningful, the absence of differences between mothers and fathers and their children may simply reflect limited statistical power to detect these differences. Furthermore, a floor effect may explain the lack of appreciable changes among children of depressed fathers over time. We know little about the spouses of index parents. Having two depressed parents, compared to one, may have a greater child impact (Beardslee et al., 1998). A noteworthy strength of this study is the direct interview of children, thus overcoming the potential shared informant bias that arises when depressed parents report about themselves and about their children.

Acknowledgments

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Table 1

Baseline Psychopathology and Global Functioning among Children of Married Depressed Mothers and Fathers[a,b]

	Children of Fathers N=19	Children of Mothers N=59	Test statistic[c]	P value
Child's Current Diagnoses	N(%)	N (%)		
Disorders				
Mood[d,e]	0(0%)	7 (12%)	3.98	**0.046**
Anxiety	1(5%)	11(19%)	2.00	0.158
Behavioral[f]	1(5%)	13 (22%)	3.68	0.055
Substance Use[e]	0(0%)	1 (2%)	1.37	0.242
Any Disorder	2(11%)	22 (37%)	6.29	**0.012**
Number of K-SADS symptoms, mean (SD)				
Child report	0.2(0.5)	1.2(1.8)	-1.92	0.063
(range)	(0-2)	(0-8)		
Parent report	0.6(1.2)	2.0(3)	-1.84	0.075
(range)	(0-4)	(0-14)		
Symptoms and Impairment, mean (SD)				
C-GAS score	81.1(8.8)	76.7(12.6)	1.11	0.275
CDI score	5.6(4.8)	8.3(6.1)	-1.27	0.213
CIS score	6.5(4.2)	11.6(7.7)	-2.79	**0.009**
MASC scores, mean (SD)				
Total	44.1(17)	46.7(13.8)	0.38	0.709

[a]Nine fathers and their 19 children; 34 mothers and their 59 children

[b]Unadjusted rates and means reported. Models were adjusted for child age and gender, site, and within family correlation

[c]Chi-square or Fisher's exact test for percent comparisons and t statistic for comparisons of means

[d]Includes major depressive disorder, dysthymic disorder, and depressive disorder not otherwise specified (there were no children receiving bipolar diagnoses)

[e]Models did not converge due to low cell counts and they were not adjusted for covariates.

[f]Includes ADHD, oppositional-defiant disorder, and conduct disorder

Table 2

Child Psychopathology and Functioning among Children of Treated Depressed Parents[a,b]

Child Outcome	Baseline	MONTH 1	2	3	6	9	β	p
Any Diagnosis	N(%)	N(%)	N(%)	N(%)	N(%)	N(%)		
Fathers[c]	2(10.5)	0(0)	0(0)	0(0)	0(0)	0(0)	.	.
Mothers[c]	22(37.3)	13(22)	15(25.4)	12(20.3)	9(15.3)	11(18.6)	.	.
Group-by-time								.
KSADS Symptoms- Child report			Mean at each time point (month)				Time Trend	
Fathers	0.21	0	0.19	0.08	0	0.27	0.013	0.741
Mothers	1.2	0.96	1.26	0.9	0.61	0.92	-0.012	0.083
Group-by-time								0.572
KSADS Symptoms- Parent report								
Fathers	0.58	0.06	0.19	0	0	0.18	-0.06	0.422
Mothers	1.97	1.51	1.76	1.16	0.94	1.06	-0.02	0.001
Group-by-time								0.539
CGAS								
Fathers	81.11	85.63	86.5	88.69	88.69	85.55	0.077	0.381
Mothers	76.69	78.33	77.44	78.94	79.27	78.17	0.002	0.960
Group-by-time								0.445
CDI								
Fathers	5.61	5.25	5	6	4.85	8.09	0.032	0.421
Mothers	8.34	6.58	5.98	5.4	4.88	5.04	-0.065	0.001
Group-by-time								**0.027**
CIS								
Fathers	6.47	5.69	6.81	6.92	5.38	6.27	-0.017	0.681
Mothers	11.64	9.84	9.04	7.46	7.62	8.67	-0.066	0.003
Group-by-time								0.308
MASC- Total								
Fathers	44.05	39.44	34.69	38.62	31.23	30.09	-0.272	0.011

Child Outcome	Baseline	MONTH					β	p
		1	2	3	6	9		
Mothers	46.71	42.55	39.78	38.58	36.78	38.13	-0.198	<0.001
Group-by-time								0.529

[a]Unadjusted rates and means reported. All models were adjusted for child age, gender, site, and within family correlation

[b]Nine fathers and their 19 children; 34 mothers and their 59 children

[c]Models did not converge. Thus, betas and group by time interactions could not be estimated