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Parental Depressive Symptoms as a Predictor of Outcome in the Treatment of Child Internalizing and Externalizing Problems

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Abstract

Child internalizing and externalizing problems have been identified as high priority intervention targets by the World Health Organization. Parental depression is a risk factor for development of these childhood problems and may negatively influence intervention outcomes; however, studies have rarely assessed its influence on these outcomes. The present study assessed whether baseline parental depressive symptoms predicted psychotherapy outcomes among children treated for clinically significant internalizing and externalizing problems. The sample included 142 children (79 with primary internalizing problems, 63 with primary externalizing problems). Children were aged 7–13, 67.6% boys, and race included Caucasian (46.5%), African-American (9.9%), Latino (5.6%), Asian (1.4%), and multi-racial (32.4%). Analyses focused on child- and parent-reported weekly trajectories of change and post-treatment symptoms among children treated for internalizing and externalizing problems whose parents did ($N = 28$ and 25) and did not ($N = 51$ and 38) have elevated depressive symptoms. For children with internalizing problems, growth curve analyses showed markedly different trajectories, by child- and parent-report: children with less depressed parents showed significantly steeper symptom declines than did children with more depressed parents, who showed an increase in symptoms. ANCOVAs showed marginally lower post-treatment symptoms for children of less depressed versus more depressed parents ($p = 0.064$ by child-report). For children with externalizing problems, growth curve analyses showed trajectories in the opposite direction, by child- and parent-report; however, ANCOVAs showed no group differences at post-treatment. These findings suggest that it may be important to consider the impact of parental depressive symptoms when treating child internalizing and externalizing problems.

Keywords Children · Internalizing disorders · Externalizing disorders · Parent depression · Therapy

The World Health Organization has identified child internalizing (anxiety and depression) and externalizing (conduct) problems as high priority child mental health concerns (WHO 2003). Child anxiety and conduct problems represent some of the most common forms of pediatric psychopathology (AACAP 2007a, c), and child depression is considered one of the most impairing pediatric conditions (AACAP 2007b). While evidence-based treatments for these conditions have shown beneficial effects (Weisz and Kazdin 2017; Weisz et al. 2017) there is still need for improvement, and recommendations have emphasized the importance of multimodal approaches, including psychotherapy, medications, and combination of different interventions (AACAP 2007a, b, c; IOM 2015).

Children of depressed parents are more likely to develop internalizing and externalizing problems in comparison to children of nondepressed parents (Brennan et al. 2002; Lewinsohn et al. 2005; Lieb et al. 2002; Weissman et al. 2006b). While the influence of parental depression on the development of child symptoms has been well documented, few studies have focused on the influence of parental depression on youth intervention outcomes. The few studies that have examined this topic suggest that parental depression may be associated with less favorable intervention outcomes in offspring. Within the area of internalizing problems, there were several trials of youth anxiety interventions. One study compared individual and group cognitive behavioral therapy

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(CBT) in anxious children ages 8 to 15 and found that parent internalizing symptoms predicted poorer outcome, including diagnostic recovery and symptom improvement, both following treatment and 1 year later (Wergeland et al. 2016). One study found that parents' depressive symptoms predicted poorer outcome of CBT for anxiety disorders in children (6–11) but not adolescents (12–17; Berman et al. 2000). Another study found that maternal depressive symptoms predicted poor treatment response in their children (8–14) at 1-year follow-up (Southam-Gerow et al. 2001). Trials of youth depression interventions have mainly focused on adolescents ages 13–18. A prevention study found that current parental depression moderated outcomes following the intervention and at 33-month follow-up: CBT performed significantly better than usual care (UC) if the parent was not currently depressed, but there were no group differences when the parent was currently depressed (Beardslee et al. 2013; Garber et al. 2009). A treatment study found that CBT outperformed systemic-behavioral family therapy and nondirective supportive therapy when the mothers were not depressed but not when the mothers had depressive symptoms (Brent et al. 1998). However, the Treatment for Adolescents with Depression (TADS) did not find a relationship between parent depression and treatment outcome (Curry et al. 2006). The only depression prevention trial with younger children ages 9–15, who had a parent with current or past depression diagnosis, found exploratory results suggesting that family group CBT outperformed the control condition regardless of the parents' level of depression; however, there were no depression inclusion criteria for the children (Compas et al. 2015). To our knowledge, only one study to date, using the sample of children from the current study (masked) who received treatment for depression, has assessed the influence of parental depressive symptoms on treatment outcome of depressed children. This study found that children of parents with less severe depression showed steeper symptom declines over the course of treatment with lower post-treatment child symptoms versus children of parents with more severe depression.

Within the area of externalizing problems, a study with young children (3–8) assessed the influence of parental depressive symptoms on treatment outcome and found that maternal depression moderated treatment response: a treatment program that involved the parents for either parent training or as part of the child individual treatment led to more positive results than a treatment that targeted the teachers without parental involvement (Beauchaine et al. 2005). To our knowledge, no study to date has assessed the influence of parental depressive symptoms on treatment outcome of externalizing symptoms in older children. Also, no study has assessed the influence of parental depression on treatment outcome of internalizing and externalizing problems using the same sample of children.

The association between parental depression and child internalizing and externalizing problems is further emphasized by studies that assessed the association between improvement in parents' depression and children's condition. A review found that reduction or remission of parental depressive symptoms was associated with reduction in child emotional and behavioral problems with these effects being maintained in follow-up assessments (Gunlicks and Weissman 2008). A study conducted by Weissman et al. (2006a) found that remission of mothers' depression had a positive effect on their children's internalizing and externalizing symptoms with significant decrease in symptoms in comparison to children whose mothers' depression did not remit. On the other hand, children of mothers who remained depressed had increased rates of these symptoms. In the year following the remission of maternal depression, children of remitting mothers continued to have a significant decrease in internalizing and externalizing symptoms while children of non-remitting mothers had an increase in externalizing symptoms (Wickramaratne et al. 2011). The role of improvement in parental depression as a mediator in improvement of their children was assessed in pre-school children with externalizing problems and the results documented that maternal depression partially mediated the relationship between intervention and improvement in child behavior (Hutchings et al. 2012). Such information is crucial for the development of more effective treatments, as one component that can be added may be an intervention that targets parental depressive symptoms. An initial step in evaluating the addition of this component to treatment of child internalizing and externalizing problems is to assess the association of parental depressive symptoms with child treatment response.

To fully evaluate the relation between parental depression and treatment response, it is important that the children be participants in the same study, as this will allow for direct comparison of the conditions in relation to treatment outcomes. Thus, in the present study, we investigated whether levels of parental depressive symptoms might be relevant to response to treament for children's internalizing and externalizing problems. We used secondary analyses of data from a randomized controlled trial (RCT) in which children aged 7–13 were treated for internalizing and externalizing problems. We assessed whether parental depressive symptoms at baseline were associated with children's response to treatment, using both child- and parent-report of child symptoms. Specifically, we assessed whether baseline parental depressive symptoms significantly predicted children's pattern of symptom change over the course of treatment. We also explored whether children with parents who had elevated levels of depressive symptoms would have a different response to treatment than children of parents without elevated depressive symptoms. We predicted different trajectories of change in symptoms depending on parental depressive symptoms, with

steeper slopes of symptom reduction during treatment for children whose parents did not have elevated depressive symptoms than for children whose parents had elevated symptoms. We also predicted significant group differences at post-treatment between children whose parents had elevated versus non-elevated levels of depressive symptoms, with lower post-treatment symptom levels in children whose parents did not have elevated depressive symptoms. Since studies have found low parent-child agreement on child symptoms (e.g., De Los Reyes 2011), we assessed both child- and parent-report of child symptoms.

Method

Participants

The study included 142 participants, including children with internalizing ($n = 79$; Table 1) and externalizing ($n = 63$; Table 2) problems. Participants were ages 7 to 13 (mean age 10.30) and 32.4% were females. The ethnic composition of the sample included 46.5% White/Caucasian, 9.9% African-American/Black, 5.6% Hispanic/Latino, 1.4% Asian, 32.4% multi-racial, and 4.2% other. All study procedures were approved by the institutional review boards of Judge Baker Children's Center, Harvard Medical School, and the University of Hawaii at Manoa. Informed consent and assent were obtained from all participants.

Procedure

Children and their parents were participants in an RCT investigating the effectiveness of evidence-based treatment and UC for internalizing (depression and anxiety) and externalizing (disruptive conduct) problems (Weisz et al. 2012). Inclusion criteria for the parent study were: (a) 7 to 13 years of age, and (b) DSM–IV diagnosis or clinically elevated problem levels in the areas of anxiety, depression, and/or disruptive conduct. Exclusion criteria included (a) intellectual disability, (b) pervasive developmental disorder, (c) psychotic symptoms, (d) primary bipolar disorder, and (e) primary inattention or hyperactivity. A full account of all child diagnoses in the sample can be found in Weisz et al. (2012). The age range reflected, in part, the psychometrics of the study measures (e.g., some of the measures had not been validated for children younger than 7) and, in part, developmental requirements and constraints of the treatment manuals employed, which set the upper limit of the age range at 13. The treatment focus for each child was determined, as described in Weisz et al. (2012), using the following information available at baseline: (a) Diagnoses obtained via the Children's Interview for Psychiatric Syndromes (Weller et al. 1999a, b), (b) T-scores [≥ 65] on internalizing and externalizing scales of the Child Behavior Checklist and the Youth Self-Report (Achenbach and Rescorla 2001), and (c) the top problems (i.e., patient priorities) identified by the child and parent as needing attention in treatment (procedure described in Weisz et al. 2011).

The children in the current study represented a subset of the 178 participants in the original study. To be included in the current study, participants had to have both child- and parent-report of pre- and post-treatment child symptoms and parent-report of their own pre-treatment depressive symptoms ($n = 142$). Figure 1 shows the participant flow from the RCT to the current study. The mean treatment duration was 232.19 days ($SD = 112.26$) for children with internalizing problems and 212.27 ($SD = 138.37$) for children with externalizing problems.

Study Conditions

The RCT included the following treatments: (1) internalizing problems: *Coping Cat* (Kendall et al. 1990; Kendall 1994), an individual treatment protocol for anxiety, and *Primary and Secondary Control Enhancement Training* (PASCET; Weisz et al. 2005), an individual treatment protocol for depression, and (2) externalizing problems: *Defiant Children* (Barkley 1997), a behavioral parent training protocol. The RCT included three treatment conditions, two evidence-based treatment (EBT) groups and one UC group. In the EBT groups some of the clinicians were randomly assigned to deliver the therapeutic skills using the manuals (EBT1), while others delivered the same skills using a modular program that included additional treatment skills for additional problems if interference (problem impeding use of the treatment manual sequence) arose (EBT2; Chorpita and Weisz 2009). The UC group received treatment from clinicians who used their preferred treatment approaches, unconstrained by the study; the UC approaches varied widely across clinicians, encompassing an eclectic range of relationship-building and supportive procedures.

Measures

Child Internalizing and Externalizing Symptoms The Youth Self Report (YSR; Achenbach and Rescorla 2001) and the Child Behavior Checklist (CBCL; Achenbach and Rescorla 2001) are parallel 118-item self- and parent-report measures of child behavioral and emotional problems. Children and parents rate each item on a 3-point scale: 0 (*not true*), 1 (*somewhat or sometimes true*), and 2 (*very true or often true*), and higher scores indicate increased level of symptoms. Both measures generate a total problems scale, broadband internalizing and externalizing scales, and eight narrowband syndrome scales. Reliability and validity of the YSR with ages 7–10 have been supported in multiple studies, and YSRs completed by 7–10 year-olds have been found to be very similar to YSRs of older children in (a) internal consistency and test-retest

Table 1 Sample characteristics and group differences at baseline: internalizing problems ($N = 79$)

	Sample characteristics			Group comparison	
	Composite, *N* (%)	High BSI ($N = 28$), *N* (%)	Low BSI ($N = 51$), *N* (%)	*Exact p*	Statistic
Gender				1.00	0.00[b]
Boys	50 (63.3)	18 (64.3)	32 (62.7)		
Girls	29 (36.7)	10 (35.7)	19 (37.3)		
Age				0.911	-0.11[c]
Mean	10.11 (1.69) [a]	10.14 (1.76)[a]	10.10 (1.66)[a]		
Range	7–13	7–13	7–13		
Ethnicity				0.347	5.60[b]
Caucasian	41 (51.9)	13 (46.4)	28 (54.9)		
African-American	6 (7.6)	2 (7.1)	4 (7.8)		
Latino	4 (5.1)	3 (10.7)	1 (2.0)		
Asian	1 (1.3)	–	1 (2.0)		
Mixed	24 (30.4)	10 (35.7)	14 (27.5)		
Other	3 (3.8)	–	3 (5.9)		
Income				0.015	12.29[b]
Less than 40,000	38 (48.1)	20 (71.4)	18 (35.3)		
40,000–79,000	18 (22.8)	5 (17.9)	13 (25.5)		
80,000–119,000	12 (15.2)	–	12 (23.5)		
Over 120,000	7 (8.9)	2 (7.1)	5 (9.8)		
Missing	4 (5.1)	1 (3.6)	3 (5.9)		
Parents' marital status				0.349	5.58[b]
Married	33 (41.8)	7 (25.0)	26 (51.0)		
Divorced	17 (21.5)	8 (28.6)	9 (17.6)		
Never married	12 (15.2)	6 (21.4)	6 (11.8)		
Separated	7 (8.9)	3 (10.7)	4 (7.8)		
Widowed	5 (6.3)	2 (7.1)	3 (5.9)		
Living with a partner	4 (5.1)	2 (7.1)	2 (3.9)		
Missing	1 (1.3)	–	1 (2.0)		
Child internalizing symptoms					
Child report	58.01(10.49)	60.46 (9.59)	56.67 (10.80)	0.124	−1.55[c]
Parent report	68.91 (8.40)	70.68 (7.41)	67.94 (8.79)	0.166	−1.40[c]
Child externalizing symptoms					
Child report	47.25(9.83)	50.25 (8.98)	45.61 (9.97)	0.044	−2.50[c]
Parent report	58.65 (10.62)	62.93 (9.01)	56.29 (10.78)	0.007	−2.77[c]

[a] SD

[b] Chi Square

[c] T-Test

reliability of Internalizing, Externalizing, and Total Problems scores (Yeh and Weisz 2001); (b) parent-child and teacher-child agreement on Internalizing, Externalizing, and Total Problems (Kolko and Kazdin 1993); and (c) factor structure and strength of association of Internalizing, Externalizing, and Total Problems scores with multiple convergent and discriminant validity criteria (Ebesutani et al. 2011). For the purpose of this study we used the Internalizing scale for children who received treatment for internalizing problems and the Externalizing scale for children who received treatment for externalizing problems. The YSR demonstrated good internal consistency for the scales and sample in this study (baseline alphas were 0.87 and 0.86 for Internalizing and Externalizing, respectively). The CBCL also demonstrated good internal consistency for the scales and sample in this study (baseline alphas were 0.87 and 0.90 for Internalizing and Externalizing, respectively). The YSR and CBCL have also previously shown strong content, criterion-related, and construct validity (Achenbach and Rescorla 2001).

Table 2 Sample characteristics and group differences at baseline: externalizing problems ($N = 63$)

	Sample characteristics			Group comparison	
	Composite, *N* (%)	High BSI ($N = 25$), *N* (%)	Low BSI ($N = 38$), *N* (%)	*Exact p*	Statistic
Gender				0.662	0.19[b]
Boys	46 (73.0)	17 (68.0)	29 (76.3)		
Girls	17 (27.0)	8 (32.0)	9 (23.7)		
Age				0.647	0.46[c]
Mean	10.52 (1.72) [a]	10.40 (1.58)[a]	10.61 (1.82)[a]		
Range	7–13	7–13	7–13		
Missing	2 (3.2)	–	2 (5.3)		
Ethnicity				.815	2.24[b]
Caucasian	25 (39.7)	11 (44.0)	14 (36.8)		
African-American	8 (12.7)	3 (12.0)	5 (13.2)		
Latino	4 (6.3)	1 (4.0)	3 (7.9)		
Asian	1 (1.6)	–	1 (2.6)		
Mixed	22 (34.9)	8 (32.0)	14 (36.8)		
Other	3 (4.8)	2 (8.0)	1 (2.6)		
Income				0.687	2.27[b]
Less than 40,000	38 (60.3)	16 (64.0)	22 (57.9)		
40,000–79,000	12 (19.0)	5 (20.0)	7 (18.4)		
80,000–119,000	7 (11.1)	1 (4.0)	6 (15.8)		
Over 120,000	2 (3.2)	1 (4.0)	1 (2.6)		
Missing	4 (6.3)	2 (8.0)	2 (5.3)		
Parents' marital status				0.682	3.12[b]
Married	32 (50.8)	11 (44.0)	21 (55.3)		
Divorced	12 (19.0)	5 (20.0)	7 (18.4)		
Never married	6 (9.5)	3 (12.0)	3 (7.9)		
Separated	6 (9.5)	4 (16.0)	2 (5.3)		
Widowed	1 (1.6)	–	1 (2.6)		
Living with a partner	5 (7.9)	2 (8.0)	3 (7.9)		
Missing	1 (1.6)	–	1 (2.6)		
Child externalizing symptoms					
Child report	54.43 (13.37)	55.20 (13.13)	53.92 (13.67)	0.713	−0.37[c]
Parent report	69.11 (5.90)	71.28 (5.60)	67.68 (5.65)	0.017	−2.46[c]
Child internalizing symptoms					
Child report	54.54 (12.10)	55.92 (11.08)	53.63 (12.78)	0.467	−0.73[c]
Parent report	62.86 (10.06)	65.80 (5.36)	60.92 (11.89)	0.059	−1.92[c]

[a] SD

[b] Chi Square

[c] T-Test

Weekly Child Problem Reports The Brief Problem Checklist (BPC; Chorpita et al. 2010) – Child and Parent, are parallel 12-item self- and parent-report measures assessing internalizing (6 items [feeling too guilty; feeling worthless or inferior; being self-conscious or easily embarrassed; being too fearful or anxious; being unhappy, sad or depressed; and worrying a lot]; scores range from 0 to 12), externalizing (6 items [arguing a lot; destroying things belonging to others; disobeying parents or people at school; being stubborn; having a hot temper; and threatening to hurt people]; scores range from 0 to 12), and total problems (12 items; scores range from 0 to 24), with higher numbers indicating increased problem levels. The BPC was developed through application of item response theory and factor analysis to data from the YSR and CBCL, both previously described. Children and parents rate each item on a 3-point scale: 0 (*not true*), 1

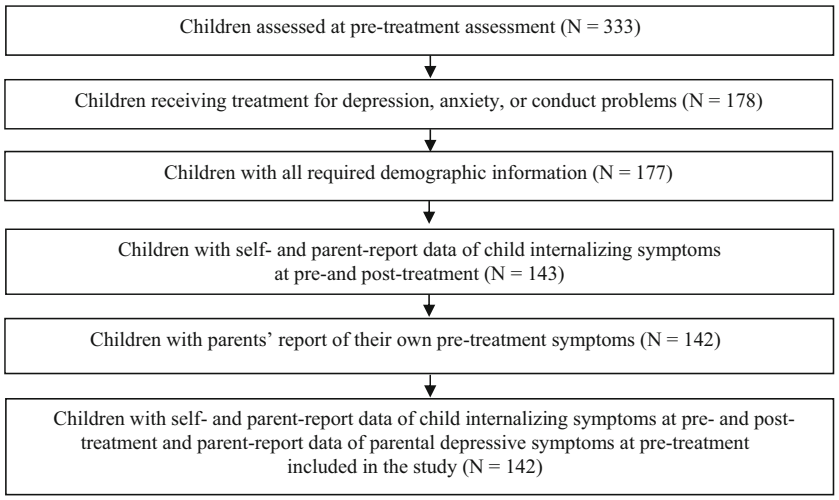

Fig. 1 Participant flow from enrollment for original RCT study to the current study

(*somewhat or sometimes true*), and 2 (*very true or often true*). In the RCT, the BPC was administered by telephone on a weekly basis to children and parents separately. In the present study, the BPC Internalizing scale (BPCI) was used to assess child- and parent-reported treatment trajectories of children who received treatment for internalizing problems and the Externalizing scale (BPCE) was used to assess child- and parent-reported treatment trajectories of children who received treatment for externalizing problems. Scores on the BPCI child-report are correlated with the YSR Internalizing scale (0.56) and scores on the BPCE child-report are correlated with the YSR Externalizing scale (0.50). Scores on the BPCI parent-report are correlated with the CBCL Internalizing scale (0.51) and scores on the BPCE parent-report are correlated with the CBCL Externalizing scale (0.62). The BPCI for the sample in this study demonstrated good internal consistency (baseline alphas were 0.72 and 0.80 for child and parent, respectively). The BPCE for the sample in this study demonstrated good internal consistency (baseline alphas were 0.71 and 0.83 for child and parent, respectively). The BPC have also previously shown good validity with significant correlations between each BPC interview scale and the corresponding scales on the YSR and CBCL.

Parental Depressive Symptoms Brief Symptom Inventory (BSI; Derogatis 1993). The BSI is a 52-item measure assessing parent psychopathology, including nine psychological symptom dimensions. Parents rate each item on a 5-point scale: 0 (*not at all*), 1 (*a little bit*), 2 (*moderately*), 3 (*quite a bit*) and 4 (*extremely*) for the previous week. For the purpose of this study we used the Depression Symptoms Dimension (BSI Depression), which reflects a representative range of indications of clinical depression. T scores of 60 or higher were selected as representing elevated levels of depressive symptoms, as they place an individual at or above the 84th percentile of the normative population. The BSI Depression Dimension demonstrated good internal consistency (baseline alpha was 0.89) for the sample in this study. The BSI Depression Dimension has also shown strong convergent, discriminant, and construct validity (Derogatis 1993).

Data Analyses

At baseline, the BSI depression variable was highly non-normally distributed in both groups. In the group of children with internalizing problems Shapiro Wilk's statistic = 0.80, $p < 0.0001$. Specifically, its distribution had a strong positive skew. Values for the continuous BSI-Depression variable ranged from 0 to 3.00; however, the median and modal scores were 0.33 and 0, respectively. In the group of children with externalizing problems Shapiro Wilk's statistic = 0.78, $p < 0.0001$. Specifically, its distribution had a strong positive skew. Values for the continuous BSI-Depression variable ranged from 0 to 3.33; however, the median and modal scores were 0.33 and 0, respectively. Due to non-normal distribution, interpretations of a continuous version of this variable would not be appropriate (Streiner 2002). Thus, we created a binary BSI-Depression variable (using a median split) to address the significant positive skewness of the continuous version of the variable and used the BSI as a categorical (i.e. dichotomous) variable with "elevated" and "non-elevated" groups. Baseline differences between children of parents with elevated versus non-elevated depressive symptoms were assessed using Chi Square for categorical variables and *t*-test for continuous outcomes. Baseline correlations were assessed using Pearson Correlation Coefficient for continuous variables and Point-Biserial Correlation for dichotomous and continuous variables.

We assessed whether parental depressive symptoms accounted for differences in children's pattern of symptom change across treatment by conducting growth curve modeling using hierarchical linear modeling (HLM; Raudenbush and Bryk 2002) in HLM 7.01 (Raudenbush et al. 2012). This type of test is best conceptualized as comprising two levels (Bryk and Raudenbush 1987; Singer and Willett 2003). The level 1 model, or the intra-individual change model, examines person-specific growth rates. The level 2 model, or the inter-individual change model, captures between-person variability in growth rates. At level 2, predictors may be added to the model to assess whether certain characteristics help explain differences in individuals' growth curves; in this study, we added parental depressive symptoms as a level 2 predictor. HLM is a popular technique for examining rates of treatment change (e.g., $n = 44$: Olatunji et al. 2012; and $n = 22$: White et al. 2015) and has significant flexibility in accounting for missing data. For instance, HLM can incorporate all subjects for whom data are provided at two or more time points (Raudenbush and Bryk 2002). Thus, despite variations in children's total number of weeks in treatment, all participating children were included in HLM analyses. (Note that the specific HLM models in which children were included varied by primary problem type).

Four HLM models were planned for this study. In the first and second models, child- and parent-reported child internalizing symptoms (based on the BPCI) were specified as the outcome variables, respectively. In these models, we included the children with internalizing problems ($N = 79$). Level 1 predictors were days into treatment (0 = 0 days into treatment, i.e. the first session; 100 = 100 days into treatment), child gender, child age, family income, and treatment condition. The Level 2 predictor was dichotomous baseline parental depressive symptoms (elevated or non-elevated symptoms), created based on BSI Depression subscale T scores (see description of measure above). In the third and fourth models, child- and parent-reported child externalizing symptoms (based on the BPCE) were specified as the outcome variables, respectively; all other aspects of these models were identical to those predicting youth internalizing symptoms. In the third and fourth models, we included the children with externalizing problems ($N = 63$). Across all four models, a significant effect of the dichotomous parental depressive symptoms variable would indicate that baseline level of parental depressive symptoms predicted differences in children's symptom trajectories across treatment.

Prior to running the growth models described above, we ran preliminary models to determine whether a linear ([Days into treatment]), quadratic ([Days into treatment]^2), or cubic ([Days into treatment]^3) pattern best fit parent- and child-reported internalizing and/or externalizing problem trajectories across treatment. These models followed the structure specified below (in the first model, child-reported symptoms was the outcome variable; in the second, parent-reported symptoms was the outcome variable):

$$\begin{aligned}\text{Youth-report (or parent-report) BPCI} = {} & \pi_0 + \pi_1(\text{Days into treatment}) \\ & + \pi_2\,(\text{Days into treatment})^2 \\ & + \pi_3\,(\text{Days into treatment})^3\end{aligned}$$

Any significant growth trajectory term(s) in these preliminary models, along with any lower-order terms, would be included in the final HLMs of interest.

Analyses of covariance (ANCOVAs) at pre- and post- (following treatment completion) treatment were used to evaluate whether there were significant post-treatment differences in child- and parent-report of child internalizing (for children with internalizing problems) and externalizing (for children with externalizing problems) symptoms between children whose parents had elevated versus non-elevated depressive symptoms, with pre-treatment child symptoms and family income as the covariates. The outcome measures used in these analyses were YSR and CBCL Internalizing symptoms for children with internalizing problems and YSR and CBCL Externalizing for children with externalizing problems.

Results

Preliminary Analyses

Of the 79 children whose treatment focus was internalizing problems, 28 (35.4%) children had parents with elevated depressive symptoms on BSI Depression (elevated BSI), and 51 (64.6%) children had parents without elevated depressive symptoms on BSI Depression (non-elevated BSI). Table 1 includes baseline characteristics and Table 3 includes baseline correlations. No statistically significant differences between the groups were found for gender, age, ethnicity, parents' marital status, or child's level of internalizing symptoms. There was a statistically significant difference between the groups on income and child and parent report of externalizing symptoms. There was no significant correlation between child report of internalizing symptoms on the YSR and parent report of symptoms on the CBCL (−0.19, $p = 0.103$). Of the 63 children whose treatment focus was externalizing problems, 25 (39.7%) children had parents with elevated BSI and 38 (60.3%) children had parents with non-elevated BSI. Table 2 includes baseline characteristics and Table 4 includes baseline correlations. No statistically significant differences between the groups were found for gender, age, ethnicity, income, parents' marital status, or child's report of externalizing symptoms. There was a statistically significant difference between the groups for parents' report of child externalizing symptoms with higher levels of symptoms reported by parents in the

Table 3 Baseline correlations for children with internalizing problems

		Correlations							
		1	2	3	4	5	6	7	8
1	YSR Internalizing Symptoms[a]	1							
2	CBCL Internalizing Symptoms[a]	−0.19	1						
3	BSI[ab]	0.14	0.08	1					
4	Gender[cd]	−0.19	0.02	−0.12	1				
5	Age[a]	0.11	0.00	0.08	−0.10	1			
6	Income[c]	−0.02	−0.07	−0.21	0.03	−0.09	1		
7	YSR Externalizing Symptoms[a]	0.68**	−0.31**	0.14	−0.08	0.24*	−0.05	1	
8	CBCL Externalizing Symptoms[a]	−0.06	0.44**	0.20	0.00	−0.03	−0.06	0.20	1

*$p < 0.05$. **$p < 0.01$

[a] Continuous variable

[b] *BSI* Brief Symptom Inventory

[c] Dichotomous variable

[d] Male = 1, Female = 2

elevated BSI group. There was no significant correlation between child report of externalizing symptoms on the YSR and parent report of symptoms on the CBCL (0.10, $p = 0.417$). No statistically significant differences between the groups of children with internalizing and externalizing problems were found for gender, age, ethnicity, income, or parents' marital status.

Parental Depressive Symptoms and Child Treatment Outcomes: I. Growth Curve Analyses

We first tested whether higher levels of baseline parental depressive symptoms might predict children's internalizing symptom trajectories across treatment among children with internalizing problems. Before running these models, we tested whether linear, quadratic, or cubic growth terms most parsimoniously described child internalizing problems. In the model predicting child-reported child internalizing symptoms, the linear growth term did not predict symptom trajectories, but both the quadratic (coefficient = 0.00, $t(2316.94) = 4.68$, $p < 0.001$) and cubic growth terms (coefficient = 0.00, $t(2315.19) = -3.98$, $p < 0.001$) did. The same pattern emerged for parent-reported child symptom trajectories: the linear growth term did not predict child internalizing symptom trajectories, but the quadratic (coefficient = 0.00, $t(2337.82) = 6.28$, $p < 0.001$) and cubic growth terms (coefficient = 0.00, $t(2336.55) = -5.22$, $p < 0.001$) did. Thus, all three growth

Table 4 Baseline correlations for children with externalizing problems

		Correlations							
		1	2	3	4	5	6	7	8
1	YSR Externalizing Symptoms[a]	1							
2	CBCL Externalizing Symptoms[a]	0.10	1						
3	BSI[ab]	−0.05	0.31*	1					
4	Gender[cd]	0.02	0.21	0.16	1				
5	Age[a]	0.39**	−0.23	−0.06	0.13	1			
6	Income[c]	−0.01	0.04	−0.08	−0.17	−0.10	1		
7	YSR Internalizing Symptoms[a]	0.58**	0.18	0.01	−0.19	−0.17	0.03	1	
8	CBCL Internalizing Symptoms[a]	−0.08	0.58**	0.26*	0.23	−0.19	−0.09	0.01	1

*$p < 0.05$. **$p < 0.01$

[a] Continuous variable

[b] BSI = Brief Symptom Inventory

[c] Dichotomous variable

[d] Male = 1, Female = 2

terms (linear, quadratic and cubic) were included in models predicting child- and parent-reported child internalizing problems.

Results of the model predicting child-reported child internalizing symptoms showed a significant effect of baseline parental depressive symptoms based on the linear growth term, indicating that parental depressive symptoms predicted differences in children's self-reported symptom trajectories across treatment on the BPCI-child report (see Table 5 and Fig. 2a). Specifically, children of parents with elevated levels of depressive symptoms reported gradual increases in internalizing symptoms across treatment, whereas children of parents without elevated levels of depressive symptoms reported declines in their internalizing symptoms.

The pattern emerged based on Model 2, which included parents' weekly reports of child symptoms on the BPCI-parent report. Results of this model also showed significant effects, in this case across all three interaction terms (linear, quadratic, and cubic; see Table 5). As illustrated in Fig. 2a, the combined effects of these significant interactions yielded a similar pattern of results as observed in Model 1. As in the child-report model, parental depressive symptoms predicted differences in parent-reported child symptom trajectories across treatment. Children of parents with elevated levels of depressive symptoms showed gradual increases in internalizing symptoms across treatment, whereas children of parents without elevated levels of depressive symptoms showed gradual declines. The relative increases in depression for children of parents with elevated depressive symptoms persisted over the course of treatment (per the linear interaction effect) while also growing significantly more pronounced as treatment progressed (per the quadratic and cubic interaction effects).

Next, we tested whether higher baseline parental depressive symptoms predicted externalizing symptoms trajectories among children with externalizing problems. Before running these models, we tested whether linear, quadratic, or cubic growth terms best described child-externalizing problem trajectories. In the model predicting child-reported child externalizing symptoms, neither linear nor the cubic growth terms predicted symptom trajectories; however, the quadratic term did (coefficient = 0.00, $t(1640.82) = 2.72$, $p < 0.001$). In the model predicting parent-reported child symptom trajectories, both the quadratic (coefficient = 0.00, $t(1687.79) = 4.17$, $p < 0.001$) and cubic (coefficient = 0.00, $t(1683.80) = -2.70$, $p = 0.007$) growth terms were significant predictors, but the linear growth term was not. Thus, only the linear and quadratic growth terms were included in the model predicting child-reported child externalizing problems, and all three growth terms (linear, quadratic, cubic) were included in the parent-report model.

Results of the model predicting child-reported child externalizing symptoms showed a significant effect of baseline parental depressive symptoms based on both the linear and quadratic interaction terms, indicating that parental depressive symptoms predicted differences in parent-reported child symptom trajectories across treatment (Table 6). However, this effect was in the opposite direction of those observed for child internalizing symptom trajectories (see Fig. 2b): higher baseline parent depressive symptoms predicted *steeper* declines in child externalizing symptoms over the course of treatment (reflecting the linear interaction effect), and this difference was grew less pronounced as treatment progressed (reflecting the quadratic interaction effect). A similar effect emerged based on parent-reported child externalizing symptoms—and in the same direction—albeit based on the linear interaction term only (see Fig. 2b). Baseline parent depressive symptoms did not predict quadratic or cubic change in child externalizing symptom trajectories during treatment. However, as illustrated in Fig. 2b, children of parents with elevated depressive symptoms showed higher baseline externalizing symptoms across informants, which may partially account for the steeper symptom declines across treatment for children with more depressed parents. By the end of treatment, children's externalizing symptoms decreased to comparable levels, on average, regardless of baseline parent depressive symptoms.

In summary, parent depressive symptoms predicted contrasting trajectories of change in their children's internalizing versus externalizing symptoms over the course of treatment. Children of parents with elevated depressive symptoms showed gradual *increases* in internalizing symptoms across treatment, whereas children of parents without elevated depressive symptoms showed relative decreases. However, effects in the opposite direction emerged for child externalizing symptom trajectories: across informants, children of parents with elevated depressive symptoms showed *larger* declines in externalizing symptoms across treatment than did children of parents without elevated depressive symptoms. Differences in externalizing symptom trajectories may be explained, in part, by baseline differences in child externalizing symptoms (higher among children of parents with elevated depressive symptoms).

Parental Depressive Symptoms and Child Treatment Outcomes: II. ANCOVAS

We examined post-treatment outcome measures, using ANCOVA to control for pre-treatment child symptoms and family income, with separate analyses conducted for children with internalizing and externalizing treatment focus, respectively. For children treated for internalizing problems, analysis of child-reported child internalizing symptoms on the YSR showed results in the predicted direction, with a marginal effect. Child internalizing symptom levels were lower at post-treatment for children of parents without elevated depressive

Table 5 Hierarchical linear modeling predicting child internalizing symptoms, using weekly symptom ratings from children (Model 1) and parents (Model 2) across treatment

Model 1: DV = Child-reported child internalizing problems					
Fixed effect	Coefficient	*SE*	*t*-ratio	*df.*	*p*-value
Intercept, π_0					
Intercept, β_{00}	3.27	1.37	2.39	74	0.02
Parental depressive symptoms, β_{01}	1.34	0.52	2.60	74	0.01
Days into treatment slope (linear), π_1					
Intercept, β_{10}	−0.01	>0.00	−4.42	74	<0.001
Parental depressive symptoms, β_{11}	0.01	>0.00	2.59	74	0.01
Days into treatment slope (quadratic), π_2					
Intercept, β_{20}	>0.00	>0.00	2.69	74	0.01
Parental depressive symptoms, β_{21}	>0.00	>0.00	0.65	74	0.52
Days into treatment slope (cubic), π_3					
Intercept, β_{30}	<0.00	>0.00	−2.48	74	0.01
Parental depressive symptoms, β_{31}	>0.00	>0.00	0.36	74	0.72
Child age slope, π_3					
Intercept, β_{40}	−0.02	0.12	−0.18	2484	0.86
Child gender slope, π_4					
Intercept, β_{50}	0.50	0.41	1.21	2484	0.23
Treatment condition slope (UC), π_5					
Intercept, β_{60}	>0.00	0.52	0.01	2484	0.99
Treatment condition slope (SMT), π_6					
Intercept, β_{70}	−0.37	0.45	−0.83	2484	0.41
Income slope, π_7					
Intercept, β_{80}	0.09	0.09	1.03	2484	0.31
Random Effect	Variance Component	*SE*	Wald Z	*df*	*p*-value
Intercept, r_{0i}	2.73	0.47	5.87	74	<0.001
Days Into Treatment slope, r_1	>0.00	>0.00	5.01	74	<0.001
Fixed effect	Coefficient	*SE*	*t*-ratio	*df.*	*p*-value
Model 2: DV = Parent-reported child internalizing problems					
Fixed Effect	Coefficient	*SE*	*t*-ratio	*df.*	*p*-value
Intercept, π_0					
Intercept, β_{00}	8.22	1.51	5.46	74	<0.001
Parental depressive symptoms, β_{01}	1.00	0.54	1.86	74	0.07
Days Into treatment slope (linear), π_1					
Intercept, β_{10}	<0.00	>0.00	−1.43	74	0.154
Parental depressive symptoms, β_{11}	0.02	>0.00	5.67	74	<0.001
Days into treatment slope (quadratic), π_2					
Intercept, β_{20}	<0.00	>0.00	1.15	74	0.25
Parental depressive symptoms, β_{21}	>0.00	>0.00	5.71	74	<0.001
Days into treatment slope (cubic), π_3					
Intercept, β_{30}	>0.00	>0.00	1.30	74	0.20
Parental depressive symptoms, β_{31}	>0.00	>0.00	5.07	74	<0.001
Child age slope, π_3					
Intercept, β_{40}	−0.19	0.13	−1.50	2484	0.14
Child gender slope, π_4					
Intercept, β_{50}	0.50	0.44	1.13	2484	0.26
Treatment condition slope (UC), π_5					
Intercept, β_{60}	0.30	0.56	0.53	2484	0.54
Treatment condition slope (SMT), π_6					
Intercept, β_{70}	−0.41	0.48	−0.87	2484	0.27
Income slope, π_7					
Intercept, β_{80}	−0.16	0.10	−1.72	2484	0.090
Random Effect	Variance Component	*SD*	Wald Z	*df*	*p*-value
Intercept, r_{0i}	4.33	0.75	5.74	74	<0.001
Days into treatment slope, r_1	>0.00	>0.00	4.5	74	<0.001

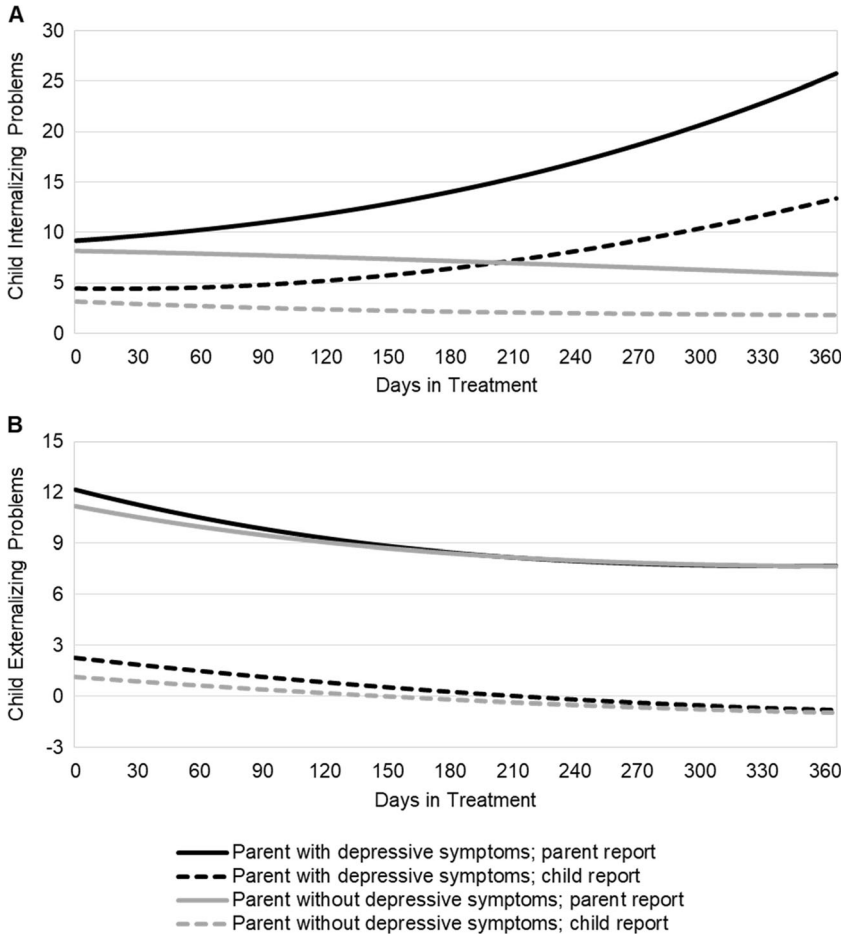

Fig. 2 Model-implied trajectories of child internalizing problems (Panel a) and externalizing problems (Panel b) by informant and parent depressive symptoms status. Models are those reported in Tables 5 and 6. Covariates were mean-centered and fixed effects of treatment averaged; thus, trajectories can be interpreted as representing the estimated outcomes for a hypothetical participant with average levels on all variables, controlling for sociodemographic and treatment covariates. Note that some participants were in treatment for longer than 1 year, while most completed treatment at approximately 222 days (internalizing $M = 232.19$, $SD = 112.26$; externalizing $M = 212.27$, $SD = 138.37$)

symptoms ($M = 46.24$, $SD = 10.92$) than children of parents who had elevated depressive symptoms ($M = 52.14$, $SD = 9.48$), $F(1,72) = 3.53$, $p = 0.064$). Analysis of parent-reported internalizing symptoms on the CBCL revealed no significant difference on child internalizing symptom levels at post-treatment between children of parents without elevated depressive symptoms ($M = 55.82$, $SD = 9.34$) and children of parents with elevated depressive symptoms ($M = 61.82$, $SD = 11.31$), $F(1,72) = 1.140$, $p = 0.289$), controlling for pre-treatment internalizing symptoms and family income. Of note, the post-treatment internalizing symptoms mean for children of parents with elevated depressive symptoms and whose family income was in the lowest income bracket (i.e., less than $40,000) was 65.20 ($SD = 9.70$), which is higher than for any of the other groups of parents with and without elevated depressive symptoms in the other income brackets. For children with externalizing problems, analyses of child- and parent-reported externalizing symptoms at post-treatment did not show a significant difference between children of parents with and without elevated depressive symptoms, controlling for pre-treatment child externalizing symptoms and family income (CBCL: $F(1,56) = 0.431$, $p = 0.514$; YSR: $F(1,56) = 1.42$, $p = 0.239$).

Discussion

Despite research indicating that parental depression is a powerful risk factor for development of internalizing and externalizing problems in children, only a few studies have assessed the relation of parental depression to child treatment outcome. Also, no study has assessed the effects of parental depression on child internalizing and externalizing treatment outcome among children drawn from the same sample, a procedure that permits more valid comparison of the differences between children with internalizing and externalizing problems. To our knowledge, the present study is the first to address these questions empirically. The findings showed that in a sample of clinic-referred children, parental depressive symptoms predicted child treatment response trajectories; however, the direction and rate of change differed between children with internalizing and externalizing problems. Children with internalizing problems whose parents had elevated levels of depressive symptoms fared worse in treatment than those whose parents did not have elevated depressive symptoms as reflected in the treatment trajectory. Also, children with internalizing symptoms who have parents with both elevated depressive symptoms and low family income appear to be

Table 6 Hierarchical linear modeling predicting child externalizing symptoms, using weekly symptom ratings from children (Model 1) and parents (Model 2) across treatment

Model 1: DV = Child-reported child externalizing problems					
Fixed effect	Coefficient	*SE*	*t*-ratio	*df.*	*p*-value
Intercept, π_0					
Intercept, β_{00}	1.07	1.30	0.82	58	0.41
Parental depressive symptoms, β_{01}	1.14	0.48	2.38	58	0.02
Days Into Treatment slope (linear), π_1					
Intercept, β_{10}	−0.01	>0.00	−6.68	58	<0.001
Parental depressive symptoms, β_{11}	<0.00	0.30	0.01	58	<0.01
Days Into Treatment slope (quadratic), π_2					
Intercept, β_{20}	>0.00	>0.00	4.77	58	<0.001
Parental depressive symptoms, β_{21}	>0.00	>0.00	2.79	58	0.01
Child Age slope, π_3					
Intercept, β_{30}	0.25	0.11	2.339	1756	0.02
Child Gender slope, π_4					
Intercept, β_{40}	0.41	0.41	1.029	1756	0.31
Treatment Condition slope (UC), π_5					
Intercept, β_{50}	0.05	0.41	0.112	1756	0.91
Treatment Condition slope (SMT), π_6					
Intercept, β_{60}	0.18	0.46	0.40	1756	0.69
Income slope, π_7					
Intercept, β_{80}	0.07	0.09	0.84	1756	0.40
Random Effect	Variance Component	*SE*	Wald Z	*df*	*p*-value
Intercept, r_{0i}	2.88	0.57	5.02	58	<0.001
Days Into Treatment slope, r_1	>0.00	>0.00	3.94	58	<0.001
Fixed effect	Coefficient	*SE*	*t*-ratio	*df.*	*p*-value
Model 2: DV = Parent-reported child externalizing problems					
Fixed Effect	Coefficient	*SE*	*t*-ratio	*df.*	*p*-value
Intercept, π_0					
Intercept, β_{00}	10.35	1.76	5.87	58	<0.001
Parental depressive symptoms, β_{01}	0.97	0.60	1.61	58	0.11
Days Into Treatment slope (linear), π_1					
Intercept, β_{10}	−0.02	>0.00	−6.36	58	<0.001
Parental depressive symptoms, β_{11}	−0.01	>0.00	−2.04	58	0.045
Days Into Treatment slope (quadratic), π_2					
Intercept, β_{20}	>0.00	>0.00	3.47	58	<0.001
Parental depressive symptoms, β_{21}	>0.00	>0.00	1.17	58	0.24
Days Into Treatment slope (cubic), π_3					
Intercept, β_{30}	<0.00	>0.00	−2.32	58	0.02
Parental depressive symptoms, β_{31}	<0.00	>0.00	−0.86	58	0.51
Child Age slope, π_4					
Intercept, β_{40}	−0.04	0.15	−0.26	1802	0.79
Child Gender slope, π_5					
Intercept, β_{50}	1.34	0.55	2.41	1802	0.02
Treatment Condition slope (UC), π_6					
Intercept, β_{60}	1.42	0.55	2.57	1802	0.01
Treatment Condition slope (SMT), π_7					
Intercept, β_{70}	1.09	0.63	1.76	1802	0.09
Income slope, π_7					
Intercept, β_{80}	−0.18	0.12	−1.51	1802	0.14
Random Effect	Variance Component	*SE*	Wald Z	*df*	*p*-value
Intercept, r_{0i}	4.03	0.84	4.81	58	<0.001
Days Into Treatment slope, r_1	<0.00	>0.00	3.81	58	<0.001

particularly at risk for worse treatment results. For children with externalizing problems, parental depression was significantly associated with faster rate of symptom reduction with children whose parents had elevated depressive symptoms showing a faster decrease in symptoms than children of parents without elevated symptoms; however, ANCOVA results suggested that there were no group differences in the overall magnitude of change following treatment. These findings suggest that it may be important to consider the impact of parental depressive symptoms when treating child internalizing and externalizing problems.

Compared to lower levels of parental depressive symptoms, elevated parental depressive symptoms predicted an increase in child symptom trajectories during treatment in children with primary internalizing problems. When combined with low family income, these children were at particularly higher risk at the end of treatment. These results raise important questions regarding the role of parents in the treatment of these children. The fact that parental depression predicted worse treatment response for children with internalizing problems might reflect (a) a depression-generated dampening of parents' ability to help the child practice the skills learned in therapy or to otherwise support their child's recovery from internalizing symptoms, (b) other parenting difficulties that impact the child, (c) a more genetically-based and treatment-resistant form of child internalizing problems, or (d) a range of additional explanations, like socioeconomic status, that warrant attention (Beardslee et al. 2013; Garber et al. 2009).

Our findings regarding treatment of externalizing problems showed a markedly different pattern. Although there was no difference in post-treatment outcome between children whose parents did and did not report elevated levels of depressive symptoms, the trajectories of change were different. Children of parents with elevated levels of depressive symptoms showed faster improvement than children of parents without elevated levels of depressive symptoms. Children's initial weekly externalizing scores were noticeably higher. However, children's scores towards the end of treatment converged at similar levels, regardless of baseline parent depressive symptom levels, indicating that parent depressive symptoms do not seem to interfere negatively with children's externalizing symptom trajectories or outcomes. The treatment approach used for externalizing problems in this study was behavioral parent training, in which therapists worked closely and directly with parents to enhance and guide their parenting behavior. It is possible that the therapists' attentiveness and direct involvement in parental skill-building significantly enhanced parent engagement, which could have marked an especially sharp improvement in parenting for parents who had higher levels of depression symptoms, stimulating especially steep trajectories of change in their children. This may have reduced post-treatment variability in how parents would relate to and interact with their children, thus reducing the impact of variations in parental depression on post-treatment outcome. Treatment of internalizing problems in this study, by contrast, emphasized individual intervention with the child, with relatively minimal parental involvement; it is possible that in this context, variations in levels of parental depression might have had relatively greater impact. Alternatively, the low rate of parental involvement and attention of depressed parents (Jaser et al. 2008), which follows behavioral parent training techniques of selective ignoring and decreased reinforcement of behaviors (Barkley 1997), could have led to the decrease in externalizing symptoms.

Our findings may carry treatment implications particularly for children with internalizing problems. Treatment for these children might benefit from efforts to mitigate the adverse impact of parental depression. One approach might be to work directly with parents on the skills provided through behavioral parent training, which may enhance parental engagement in treatment and provide the parents with skills that can help their children and enhance their own well-being. This possibility is suggested by evidence showing that parent training is associated with reduction in maternal depression following treatment (DeGarmo et al. 2004; Hutchings et al. 2002, 2004). To our knowledge, only two studies have assessed the influence of parent training on child internalizing problems, including a study with young children, ages 3 to 8 (Webster-Stratton and Herman 2008), and a study with older children, ages 8 to 13 (Eckshtain et al. 2017), and none of them has assessed the influence of parental depression on treatment outcome. Future work might follow up on the work of Thomas et al. (2015), which found that maternal depression moderated treatment outcome in children with ADHD, and suggested tailoring parent training to address these difficulties. Another way to address parental depression when children are treated for internalizing problems may be to supplement CBT for the child with treatment for the parent's depression symptoms, either prior to treating the child or as an adjunctive treatment. Studies that have targeted depression in mothers using medication have found that improvement in mothers' depression was associated with reduction in their children's psychopathology (Pilowsky et al. 2008; Weissman et al. 2006a, 2015; Wickramaratne et al. 2011).

Study limitations include the fact that we had information about parental depressive symptoms from only one parent. This is a common limitation in the clinical child psychology field. This produced a relatively conservative test of the association between parental depression and child outcome. Information from both parents would provide a more comprehensive perspective and would be valuable in future research. It would also be useful to assess parental depression throughout treatment to evaluate the impact of continuity and change in parent symptomatology. Also, parental depression may be associated with multiple other risk factors (e.g., stress, genetic risk, low family income), which might contribute to reduced

treatment success and would be useful to assess in future research. In addition, the use of self- and parent-report measures and the lack of clinician-rated measures is a limitation. Another limitation is our specific focus on parental depression; in future research it will be useful to examine other forms of parental psychopathology, such as anxiety. These limitations suggest strategies through which future research may sharpen the picture of the connection between parent depression and child treatment, and what may be done to improve child treatment outcomes.

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Compliance with Ethical Standards

Conflict of Interest John Weisz receives royalties for some of the work cited in this paper, including the MATCH-ADTC treatment manual used in the study. All other co-authors declare they have no conflict of interest.

Ethical Approval All study procedures were approved by the institutional review boards of Judge Baker Children's Center, Harvard Medical School, and the University of Hawaii at Manoa.

Informed Consent Informed consent and assent were obtained from all participants.

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