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Maternal Depression and Youth Internalizing and Externalizing Symptomatology: Severity and Chronicity of Past Maternal Depression and Current Maternal Depressive Symptoms

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Abstract

Maternal depression is a well-documented risk factor for youth depression, and taking into account its severity and chronicity may provide important insight into the degree of risk conferred. This study explored the degree to which the severity/chronicity of maternal depression history explained variance in youth internalizing and externalizing symptoms above and beyond current maternal depressive symptoms among 171 youth (58% male) ages 8 to 12 over a span of three years. Severity and chronicity of past maternal depression and current maternal depressive symptoms were examined as predictors of parent-reported youth internalizing and externalizing symptomatology, as well as youth self-reported depressive symptoms. Severity and chronicity of past maternal depression did not account for additional variance in youth internalizing and externalizing symptoms at Time 1 beyond what was accounted for by maternal depressive symptoms at Time 1. Longitudinal growth curve modeling indicated that prior severity/chronicity of maternal depression predicted levels of youth internalizing and externalizing symptoms at each time point when controlling for current maternal depressive symptoms at each time point. Chronicity of maternal depression, apart from severity, also predicted rate of change in youth externalizing symptoms over time. These findings highlight the importance of screening and assessing for current maternal depressive symptoms, as well as the nature of past depressive episodes. Possible mechanisms underlying the association between severity/chronicity of maternal depression and youth outcomes, such as residual effects from depressive history on mother–child interactions, are discussed.

Keywords

Maternal depression; internalizing; externalizing; youth depression

Depression is one of the most common and debilitating mental disorders and many adults experiencing depression are parents (England & Sim, 2009). According to an Institute of

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Medicine Report, almost 15 million children are living with a depressed parent (England & Sim, 2009). Parental depression is one of the strongest risk factors for developing depression; offspring of depressed parents are four times more likely to develop depression than offspring of nondepressed parents (Beardslee, Gladstone, & O'Connor, 2011). Offspring of depressed parents are not only at risk for developing depressive disorders, but also other psychopathology such as anxiety disorders, as well as social and emotional impairment (England & Sim, 2009; Weissman, Warner, Wickramaratne, Moreau, & Olfson, 1997). Parental depression may have a direct impact on development of child psychopathology through the transmission of genetic risk. In addition, having a parent who is depressed can affect a child through its impact on parenting style, family relationships and parent-child interactions (Beardslee et al., 2011; Frye & Garber, 2005; Lovejoy, Graczyk, O'Hare, & Neuman, 2000; Tompson et al., 2010). Families in which a parent is depressed tend to be less cohesive, less organized and more conflictual than families in which no parent is depressed (Avenevoli & Merikangas, 2006; England & Sim, 2009).

Maternal Depression Severity/Chronicity

To date, most studies looking at maternal depression have focused primarily on a categorical distinction between depressed versus non-depressed mothers, despite the fact that severity and chronicity of maternal depression have been found to contribute to an increased risk for adverse outcomes in offspring (Frye & Garber, 2005; Hammen & Brennan, 2003). Specifically, studies have found that more chronic and severe maternal depression is associated with higher levels of externalizing symptoms, internalizing symptoms, and less positive maternal-child interactions (Fihrer, McMahon, & Taylor, 2009; Foster, Garber, & Durlak, 2008; Frye & Garber, 2005; Hammen & Brennan, 2003; Mars et al., 2012).

Several studies have used sophisticated longitudinal analyses in an attempt to better capture the impact of the course of maternal depression on offspring outcomes. A large study (N=1,357) using latent class analysis charted the course of self-reported maternal depression over the first 12 years of a child's life to predict adolescent outcomes at age 15 (Campbell, Morgan-Lopez, Cox, & McLoyd, 2009). The results showed that in general, chronic maternal depression symptoms over the first 12 years of a child's life, even at subclinical levels, predicted higher levels of adolescent internalizing and externalizing symptoms compared to adolescents whose mothers never reported elevated depression symptoms (Campbell et al., 2009). Despite the large sample size and number of time points, this study did not take into account changes in child functioning over time or maternal depression status at the time of adolescent self-report, and only utilized one self-report measure of maternal depression. Therefore, the independent contributions of course of maternal depression and current maternal depression at each time point to offspring outcomes require further clarification.

Ashman and colleagues (2008) utilized latent growth mixture modeling to capture the varying levels of risk conferred to offspring by course of maternal depression (Ashman, Dawson, & Panagiotides, 2008). Maternal depression (N=159) was assessed over a 7-year period, from offspring infancy to age 6.5 years. Children of chronically depressed mothers had the highest rates of externalizing symptoms, behavior disorder diagnoses, and the lowest

social competence (based on both mother and teacher report) compared to mothers with a decreasing course of depression or stable subclinical depression. However, no differences were found in child internalizing behaviors based on maternal depression group (Ashman et al., 2008). However, the number of months of maternal depression was correlated, albeit only modestly, to parent-reported child internalizing symptoms. The authors suggest that the weak association between maternal course of depression and child internalizing symptoms may be a function of the low levels of internalizing symptoms in young children compared to older children and adolescents (Ashman et al., 2008). Although these results indicated that chronically depressed mothers had the highest rates of depression at each time point, it is still unclear whether the chronicity of depression or the higher current depressive symptoms at a given point in time contributed to worse child outcomes.

The fact that the longitudinal studies described above did not take into account the impact of current maternal functioning is problematic given that mothers who experience more severe and recurrent depression may be more likely to have high levels of current depressive symptoms or experience residual effects of chronic depression that affect parent-child interactions (Lovejoy et al., 2000). Hammen and Brennan (2003) found that children appear to be more at risk for developing psychopathology if they are exposed to either a brief major maternal depressive episode or longer maternal episode of mild depression compared to children of never depressed mothers (Hammen & Brennan, 2003). Moreover, they found that maternal depression chronicity was associated with youth nondepressive disorders while severity of depression was not, theorizing that perhaps depression impacts maternal ability to function over longer periods of time in terms of parenting and the resulting parent-child relationship.

Several studies have attempted to explore the unique contribution of severity and chronicity of past maternal depression and current maternal depression and functioning on offspring. Foster and colleagues (2008) found that mothers who experienced more recurrent or chronic courses of depression were more likely to experience higher levels of current depressive symptom. Their results also showed that current maternal depression and past severity and chronicity of depression were related to lower levels of maternal positive behavior, while only current maternal depression was related to maternal negativity in mother-child interactions (Foster et al., 2008). Maternal interaction behaviors were in turn found to relate to child externalizing symptoms, though not to internalizing symptoms. Moreover, maternal current depressive symptoms accounted for a larger portion of the variance in mother-child interactions than did past severity/chronicity of maternal depression (Foster et al., 2008).

Another study explored the contributions of past severity of maternal depressive episodes and recent depressive episodes on child and adolescent outcomes (Mars et al., 2012). Strengths of this study include structured diagnostic interviews with both youth (ages 9–17) and parents and two time points. However, this study did not examine the impact of the chronicity of maternal depression on youth. Moreover, the authors defined severe episodes of parental depression as those parents demonstrating severe impairment (GAF scores less than 30) or requiring hospitalization, thus capturing a greater level of severity than other studies. Perhaps this is why this study found that history of maternal severe episodes was significantly associated with child depression symptoms, despite other studies failing to find

a relation between maternal depression severity and youth internalizing symptoms (Ashman et al., 2008; Foster et al., 2008). Their results also indicated that a recent parental depressive episode (an episode having occurred in the past month) conferred twice the risk for child psychiatric disorder compared to children of parents who had not experienced a recent depressive episode (Mars et al., 2012). When examined concurrently, recent parental depression was significantly associated with child depression, while past parent depression severity was only marginally associated. Additionally, recent parental depression and past depression severity were independently associated with child-rated depression symptoms, although there was no interaction between presence of a severe depressive episode and recent depressive episode.

Taken together, the studies that attempt to concurrently examine the course of maternal depression (severity and/or chronicity) and recent or current maternal depression suggest that both variables may have an impact on parent-child interactions and on rates of psychopathology in youth (Foster et al., 2008; Mars et al., 2012). However, these studies are not without limitations. First, the studies that assessed the contributions of past characteristics of maternal depression and current maternal functioning on youth functioning only did so cross-sectionally, and therefore how these constructs independently predict youth functioning over time has yet to be adequately addressed. Second, studies including longitudinal models (Campbell et al., 2009) do not examine maternal and child functioning concurrently, making it difficult to disentangle whether current maternal functioning is driving some of the child outcomes. Third, Mars and colleagues (2012) included a large age range (9–17 years), but this may have obscured important findings relevant to the emergence of risk over specific periods of youth development. Fourth, it is difficult to make comparisons across studies because some studies examine maternal depression severity and chronicity separately (Hammen & Brennan, 2003), while others combine severity and chronicity into one construct (Foster et al., 2008). As a result, it is not clear whether severity and chronicity are best examined jointly or as separate variables as no study to date has compared these two measurement strategies within one sample. Relatedly, for studies utilizing a combined severity and chronicity construct, it is unclear the differential impact of severity or chronicity on the reported outcomes.

Current Study

The current study aimed to address several of these limitations by exploring the relationship between current maternal depressive symptoms, severity/chronicity of past maternal depression history, and pre- and early adolescent functioning measured over a 3 year period. First, we included current maternal depressive symptoms in order to parse out the relationship between current maternal symptoms and severity/chronicity of past depressive episodes. Second, we employed longitudinal modeling to better capture the change in youth functioning over time. Third, we included youth 8–12 years old and followed them for 3 years in order to capture a period of development in which youth become increasingly at-risk for internalizing symptomatology. Lastly, we looked at severity and chronicity separately, as well as in a comprehensive index using a coding scheme employed by several other studies (Foster et al., 2008; Frye & Garber, 2005) in order to facilitate comparison across studies.

We hypothesized that maternal current depressive symptoms and past maternal depression severity/chronicity, while being highly related, would make independent contributions to current and future youth internalizing and externalizing symptoms. We also hypothesized that examining severity separately from chronicity would be equivalent to combining severity and chronicity as one construct. Using multivariate regression analyses, we tested the hypothesis that both the severity and chronicity of past maternal depression, as well as current depressive symptoms would account for variance in youth Time 1 internalizing and externalizing symptoms. Using latent growth modeling, we tested whether severity and chronicity of maternal depression during the youth's lifetime would also account for change over time in offspring internalizing and externalizing symptoms, beyond what was accounted for by current maternal depression at each time point.

Method

Procedure

Data were drawn from a larger study focused on psychosocial factors associated with the development of psychopathology in children of mothers with and without depression (Tompson et al., 2010). The current analyses include data from all three waves of yearly evaluations (Time 1-Time 3).

Mothers were recruited via three sources, with the intent of enlisting a high-risk sample with approximately half of the women having a history of depression. First, 25 mothers were identified through a Veterans Administration research study focusing on normative aging in men (Bell, Rose, & Damon, 1972). Veterans were identified by age as possibly having grandchildren within the study's age range, and permission was requested to contact their offspring. Second, 35 mothers who were participating in a study of depression in the peri-menopausal years (Harlow, Cohen, Otto, Spiegelman, & Cramer, 2004) and met study criteria were identified and contacted. Third, 111 women were identified through a mass-mailing procedure. Publicly available census data were obtained for multiple ethnically diverse suburbs of Boston, and letters were sent to all women in these suburbs who were within the age range for potentially having children ages 8 to 12 (for additional details on recruitment, see Tompson et al., 2010).

Although the three recruitment sources did not differ with regard to presence/absence of maternal depression history, they did differ with regard to maternal age, marital status, ethnicity, and receipt of public assistance. Mothers recruited through the peri-menopausal study were older than mothers recruited through the other sources. There was a trend for mothers recruited through the peri-menopausal study and the mass-mailing to be separated, divorced, widowed or never married compared to mothers recruited through the VA study. Mothers recruited through the mass-mailings were more likely to be part of an ethnic minority group and receive public assistance compared to mothers recruited through the two other sources. The recruitment sources did not differ with regard to study outcome variables.

Inclusion criteria for families included: (1) mother and child had to be living together for at least 1 year before enrollment in the study; (2) child was between the ages of 8 and 12; (3) mother and child were biologically related; (4) both mother and child spoke English; (5)

mother had no history of psychosis (including depression with psychotic features), bipolar disorder or brain injury; (6) child had no history of psychosis, brain injury, or major medical condition (chronic or life-threatening illness) and had no history of autism or other developmental disability.

Eligible families were invited to participate and be interviewed at either their homes or a research laboratory at Boston University. Prior to data collection, mothers signed Institutional Review Board (IRB) approved informed consents, and youth signed IRB approved assents. Pairs of trained interviewers (licensed clinicians, doctoral students in clinical psychology, and a B.A. – level research assistant) administered a series of semi-structured interviews, self-report measures, and a videotaped interaction task. The assessment battery was split between assessors, with the person conducting the assessment blind to maternal diagnostic status.

Participants

The full sample included 171 mother-child (ages 8–12) dyads living in Boston and its surrounding suburbs. Eleven of the 171 dyads enrolled in the first wave of data collection did not participate in the second wave. Of those participating in the second wave, 12 families did not participate in the third wave. Three families participated in the first and third waves only. Of the 171 youth included in the current analyses, 99 were boys (58%). At Time 1, youth included ranged in age from 8 to 12 (M=10.13, SD=1.36). Of the total youth sample, 116 (68%) identified as White, 22 (13%) were African American, 3 (2%) were Asian, 11 (6%) were Hispanic, and 19 (11%) were Multi-Racial.

Mothers ranged from 29 to 55 years old (M=43.42, SD=5.90) at Time 1. One hundred twenty-four (73%) mothers self-identified as White, 19 (11%) as African American, 3 (2%) as Asian, 7 (4%) as Hispanic, and 7 (4%) as Multi-Racial. Mothers had an average of 2.41 children (SD=1.15). Out of this sample, 45 mothers (28%) were single (divorced, separated, or never married), and 115 (72%) mothers were currently married or living with their partners. The average level of years of mothers' education was 15.61 (SD=2.59), which is consistent with the education estimates for the region (U.S. Bureau of the Census 2007). The median family income was $80,000, also consistent with the census estimates of the region (U.S. Bureau of the Census, 2007). Seventeen percent of families (30 families) were at or below federal poverty level for a family of four. Fifty-one families (29%) had at some point in time received public assistance, such as food stamps, supplemental nutrition assistance, and Medicaid.

At Time 1, of the 171 mother-child dyads, 69 (40%) mothers had a depression-spectrum disorder during the youth's lifetime. Among mothers with a depression-spectrum disorder, 51 (74%) had Major Depressive Disorder (MDD), one (1.5%) had Dysthymic Disorder (DD), one (1.5%) had Adjustment Disorder with Depressed Mood (AdjDep), and 16 (23%) had Depressive Disorder Not Otherwise Specified (DDNos). At Time 1, 7 youth (4.1%) had a current depressive disorder, while 15 youth (8.8%) had a past depressive disorder. By including syndromal and subsyndromal depressive disorders we were able to examine a fuller range of depression severity and chronicity.

Measures

Maternal Depression—Current maternal depressive symptoms were evaluated at each time point using the total score (range 0–63) on the 21-item Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961). The BDI has acceptable internal consistency and test-retest reliability (Bumberry, Oliver, & McClure, 1978). The internal consistency in this sample at Time 1 was high (α=.89). Higher scores on the BDI indicate greater severity of depression (Beck, Steer, & Garbin, 1988).

A diagnostic measure, the Structured Clinical Interview for the DSM-IV (SCID; First & Gibbon, 2004), was administered to each mother to assess her history of depression diagnosis and other forms of psychopathology. Mothers were divided into two groups based on their responses to the depression section of the interview (the measure generates DSM-IV diagnoses covering most common disorders): those with a history of depression within their child's lifetime, and those with no history of depression within their child's lifetime. Maternal depression status was assessed at each of the three time points. For the purposes of establishing inter-rater reliability, co-ratings were collected on 40 randomly selected interviews; inter-rater agreement was high for maternal depression spectrum disorder diagnoses (98%; kappa = .95).

Course of maternal depression was measured using a severity/chronicity index devised by Frye and Garber (2005). The severity/chronicity index was as follows: out of the mothers with a history of depression in their child's lifetime, mothers were assigned a mild rating, a moderate rating, or a severe rating. The index was coded on a 0–3 scale, with 0 corresponding to no history of depression, 1 corresponding to mild history, etc. A mild rating was given if the mother had no more than two depressive episodes and a total duration of no more than one year of depression (within their child's lifetime). Mothers in this group did not have any history of suicidality, psychiatric hospitalization or psychotic features. Moderate ratings were given to mothers with one to three depressive episodes and one to four years total duration of depression within their child's lifetime. Additionally, mothers were also assigned a moderate rating if they had a depressive episode that lasted less than a year, but had a history of hospitalization, suicide attempt or psychotic features within their child's lifetime. A severe rating was assigned to mothers with four or more episodes of depression and/or four or more years of depression during their child's lifetime. The inter-rater agreement was excellent for the maternal depression severity/chronicity index (kappa = 1.00). Whenever reporting results using this coding scheme, we will use the term severity/chronicity index.

Severity and chronicity were examined separately following Hammen and Brennan's (2003) methodology. Severity of maternal depression was separately coded using a three level coding scheme: mothers with no history of depression were assigned a 0 rating, mothers were assigned a mild rating (1) if they had a history (within their child's lifetime) of dysthymic disorder, minor depressive episodes, or significant subsyndromal depression, mothers were assigned a moderate rating (2) if they had a history of major depressive episodes, and severe ratings (3) were assigned to mothers who had depression requiring hospitalization or including psychotic features, suicidality, or severe impairment. Inter-rater

agreement was excellent for the coding of maternal depression severity (kappa=1.00). Chronicity was operationalized as the total duration (in weeks) across any separate periods of depressive disorder within the child's lifetime. The inter-rater agreement was also very high for maternal depression chronicity (kappa = .99).

Severity and chronicity of maternal depression as of Time 1 was utilized in analyses due to the fact that maternal depression course remained relatively stable across the three time points and that past maternal depression was defined as depressive episodes prior to Time 1.

Maternal Overall Functioning—Maternal overall impairment and functioning was assessed using the Global Assessment of Functioning (GAF) scale (American Psychiatric Association, 2000). The GAF is a numerical scale (0–100) used to rate levels of social, occupational and psychological functioning. Higher scores reflect better current functioning. The inter-rater reliability for GAF in this sample was adequate (ICC = .88).

Youth Internalizing and Externalizing Symptoms—The 118-item Achenbach Child Behavior Checklist (CBCL; Achenbach, 1991) was used to assess current levels of internalizing (anxious and depressive symptoms) and externalizing youth symptoms as reported by mothers at all three time points. The CBCL demonstrates good convergent and discriminant validity (Clarke, Lewinsohn, Hops, & Seeley, 1992) and has excellent test-retest reliability and good interparental agreement (McConaughy, 1993). CBCL T-scores were used in all analyses. Youth completed the 27-item self-report Child Depression Inventory (CDI) to measure current depressive symptoms (Kovacs, 1981). The item response scores range from 0 (*not a lot*) to 2 (*a lot*) and total scores range from 0–54. Validity and test-retest reliability have been demonstrated (Smucker, Craighead, Craighead, & Green, 1986). In this sample the internal consistency was moderate (α=.78). From this point forward, youth internalizing symptoms will refer to CBCL internalizing scale scores and youth depressive symptoms will refer to CDI scores.

Results

Analytic Plan

Descriptive statistics for study variables are in Table 1. In order to examine the concurrent relationships between past severity and chronicity of maternal depression, maternal current depressive symptoms, and current youth internalizing[1] and externalizing symptoms, cross-sectional multivariate regression analyses were used. Time 1 maternal depressive symptoms were positively skewed, and therefore a square root transformation was applied for all cross-sectional regression analyses. Given the nature of the sample, chronicity of maternal depression was also significantly positively skewed and therefore a square root transformation was applied in all analyses. For ease of interpretation, whenever possible, non-transformed means and correlations are presented. In order to account for the skew of maternal BDI in the longitudinal growth models, MLR was used as an estimator as MLR

[1]The CBCL internalizing scale is comprised of two subscales: Anxious Depressed and Withdrawn Depressed. The internalizing scale was included in the analyses in order to capture a broader range of psychopathology that may predate depressive symptoms in youth. In order to make sure the results were not driven by anxious symptoms specifically, all analyses were run using the two subscales in place of the internalizing scale. The internalizing scale and the subscale results did not differ.

does not assume normality (Wolf & Brown, 2013). Due to the fact that chronicity was skewed to a much greater extent than BDI scores, the transformed variable was retained in the longitudinal analyses.

In order to examine the association between maternal current depressive symptoms and the severity and chronicity of past maternal depression history and rate of change in youth internalizing and externalizing symptoms over time, latent growth analyses were conducted. Raw data were analyzed using Mplus 6.0 (Muthén & Muthén, 1998–2013). Maximum likelihood estimation was used to account for missing data, although there was very little missing data in our sample. The range of percentage of missing data (full sample) for outcome variables at each wave was as follows: Time 1 (0–4%), Time 2 (8–9%) and Time 3 (14–15%). In order to determine model fit, goodness of fit statistics were employed as outlined in Wolf and Brown (2013). Model fit is evaluated using root mean square error of approximation (RMSEA), the Tucker Lewis Index (TLI), the comparative fit index (CFI) and the standardized root mean square residual (SRMR). As outlined in Wolf and Brown (2013), acceptable model fit is defined by RMSEA values close to .06 or below, CFI and TLI values close to .95 or above, and SRMR values close to .08 or below.

Preliminary Analyses

A multivariate regression analysis was conducted in order to determine the relative contributions of severity and chronicity of maternal depression history and current maternal depressive symptoms to variability in Time 1 youth internalizing, depressive and externalizing symptoms. The means (and standard deviations) or percentages for youth and mother Time 1 variables included in the regression analyses are reported for each maternal depression severity/chronicity index level in Table 2. The distribution of the severity/chronicity index was as follows: 102 (59.6%) with no history, 32 (18.7%) with a mild history, 19 (11%) with a moderate history, and 18 (10.5%) with a severe history. The distribution of severity (chronicity not included) was as follows: 102 (59.6%) with no history, 20 (11.7%) with a mild history, 40 (23.4%) with a moderate history, and 9 (5.3%) with a severe history. The range of chronicity (weeks) in the full sample was highly skewed and ranged from 0–624 weeks ($M = 52.54$, $SD = 131.33$). The bivariate correlations of variables included in the regression analyses are presented in Table 3.

A multivariate regression analysis was conducted in which youth gender and age, maternal current depressive symptoms and severity/chronicity index of maternal depression were added as independent variables, while mother-reported youth internalizing and externalizing symptoms and child-reported depressive symptoms were added as outcome variables. Youth-reported depressive symptoms were included as an outcome variable because maternal report of youth behavior may be influenced by maternal depression. Current maternal depressive symptoms accounted for significant variance for youth internalizing ($\beta = 0.37$, $p < .001$) and externalizing symptoms ($\beta = 0.35$, $p < .001$), but not for youth-reported depressive symptoms ($\beta = 0.19$, $p = .10$). No other independent variables contributed significant variance to any outcome variables. Including chronicity and severity as separate variables mirrored results found when including the severity/chronicity index. Additionally, we looked at maternal GAF as a clinician-rated measure to see if the pattern of results was

similar to the BDI. Maternal BDI and maternal GAF were highly correlated at Time 1, $r(160) = -.66$, $p < .001$, and the cross-sectional results were similar when GAF was used instead of BDI, with the exception that GAF at Time 1 accounted for significant variance in youth-reported CDI scores.

Individual and Mean-Level Change in Youth Internalizing and Externalizing Symptoms

In order to evaluate the suitability of internalizing and externalizing scores as outcomes in subsequent latent growth models, we fitted a linear growth model for youth externalizing and internalizing subscale scores across time. CBCL internalizing scores were fit to a linear growth model as opposed to child CDI scores due to the fact that CBCL internalizing scores were more normal in distribution and represent a wider range of psychopathology. The linear baseline model fit the CBCL externalizing data well: (RMSEA= 0.00, TLI=1.01, CFI=1.00, and SRMR=0.00). In this model, the mean of the intercept and slope factors were 47.66 (SE=0.73, $p < .001$) and −0.74 (SE=0.31, $p = .02$), respectively. The variance of the intercept and slope factors were 89.11 (SE=12.62, $p < .001$) and 12.71 (SE=3.83, $p < .001$), respectively. This indicates that there were significant individual differences in levels of youth externalizing symptoms over time, as well as significant differences in rate of change in youth externalizing symptoms over time. The intercept and linear slope factors were not significantly related as indicated by a covariance of −10.74, (E=5.36, $p = .05$), but there was a trend towards significance, indicating that youth with greater externalizing symptoms at Time 1 evidenced greater reductions in externalizing symptoms over time.

The linear baseline model fit the CBCL internalizing data well: RMSEA=0.06, TLI=0.99, CFI=0.998, and SRMR=0.02. In this model, the mean of the intercept and slope factors were 49.24 (SE=0.78, $p < .001$) and −1.31 (SE=0.31, $p < .001$), respectively. The variance of the intercept and slope factors were 84.28 (SE=11.83, $p < .001$) and 3.62 (SE=4.17, $p = .39$), respectively. This indicates that there were significant individual differences in levels of youth internalizing symptoms at Time 1, 2 and 3, but no significant differences in individual rates of change of youth internalizing symptoms over time. The intercept and linear slope factors were not significantly related as indicated by a covariance of −4.27 (SE=5.08, $p = .40$). Although there was a lack of significant variability in rates of change in youth internalizing symptoms over time, growth curve modeling was conducted to evaluate levels of symptoms at each time point.

Individual and Mean-Level Change in Maternal Depressive Symptoms

In order to examine effects of current maternal depressive symptoms at each time point for inclusion in subsequent models, we fitted a linear growth model for maternal BDI (total score) across time. A linear baseline model fit the maternal BDI (total score) data well: (RMSEA= 0.00, TLI=1.02, CFI=1.00, and SRMR=0.01). The mean of the intercept and slope factors were 6.08 (SE=0.56, $p < .001$) and −0.69 (SE=0.20, $p = .04$), respectively. The variance of the intercept and slope factors were 44.11 (SE=10.49, $p < .001$) and 2.71 (SE=2.57, $p = .29$), respectively. This indicates that there were significant individual differences in levels of maternal depressive symptoms at each time point, but no significant differences across participants in rate of change in maternal depressive symptoms over time. The intercept and linear slope factors were significantly related as indicated by a covariance

of −7.23 (*SE*=3.49, p =.04), suggesting that mothers with more depressive symptoms at Time 1 evidenced greater reductions in depressive symptoms over time.

Severity/Chronicity of Maternal Depression and Maternal Current Depressive Symptoms as Predictors of Youth Internalizing and Externalizing Symptoms

In order to assess the independent contributions of the maternal depression severity/chronicity index and Time 1 maternal depressive symptoms to youth externalizing and internalizing symptoms over time, we specified separate conditional latent growth models in which severity/chronicity of past maternal depression and Time 1 maternal current depressive symptoms were included separately. In order to examine whether separating severity and chronicity provided different information from the severity/chronicity index, we also specified conditional latent growth models in which severity and chronicity were included separately. Findings were similar for most analyses including severity and chronicity separately versus including the severity/chronicity index. When findings differed, we also present the model results of severity and chronicity in addition to model results based on the severity/chronicity index. Child age was not a significant predictor in cross-sectional analyses and therefore it was not included as a covariate in the conditional models to keep the models parsimonious.

The conditional latent growth models in which the maternal depression chronicity/severity index (as assessed at Time 1) was examined as a predictor of individual differences in change in youth internalizing (RMSEA: 0.00, CFI=1.00, TLI= 1.00, and SRMS=0.02.) and externalizing symptoms (RMSEA=0.00, CFI=1.00, TLI=1.02, and SRMR=0.002) over time both provided good fits to the data. Results indicated that the severity/chronicity index of maternal depression independently predicted youth externalizing symptoms at Time 1 and subsequent time points (β =0.23, p = .003), but did not affect the rate of change of youth externalizing symptoms (β =0.05, p = .50). Similarly, the severity/chronicity index of maternal depression predicted youth internalizing symptoms at Time 1 and subsequent time points (β =0.23, p = 0.01), but did not affect the rate of change of internalizing symptoms (β =0.13, p = .49), which was expected due to the lack of variability in rate of change in the unconditional model.

When severity and chronicity were included individually in separate models predicting youth internalizing and externalizing symptoms, results mirrored those of the severity/chronicity index. However, in addition to chronicity predicting the level of youth externalizing symptoms at each time point (β=0.29, p < .001), chronicity also affected the rate of change of youth externalizing symptoms (β=0.19, p = .04).

The conditional latent growth models in which the level of Time 1 maternal current depressive symptoms was examined as a predictor of individual differences in change in youth internalizing and externalizing symptoms over time both provided a good fit to the data (RMSEA=0.05, CFI=1.00, TLI=0.99, and SRMR=0.03) and (RMSEA=0.00, CFI=1.00, TLI=1.02, and SRMR=0.01), respectively. Results indicated that Time 1 maternal depressive symptoms predicted youth externalizing symptoms (β =0.37, p < .001), but did not predict the rate of change in youth externalizing symptoms over time (β =0.11, p = .25). Similarly, Time 1 maternal depressive symptoms predicted levels of youth internalizing symptoms (β

=0.414, $p < .001$), but did not predict the rate of change in youth internalizing symptoms across the three time points (β =0.04, $p = .90$).

In order to then look at the relative contributions of the severity/chronicity index of maternal depression and maternal current depressive symptoms at each time point to both youth internalizing and externalizing symptoms, separate growth models were specified that each included two parallel processes (maternal BDI and youth symptoms) and the maternal depression severity/chronicity index at Time 1 as a predictor. Although there were no significant differences in rate of change in maternal depressive symptoms across time, we included maternal depressive symptoms in the models in order to take into account the variability in youth symptoms explained by the level of maternal depressive symptoms at each time point. The models provided a good fit to the youth internalizing and externalizing data: RMSEA=0.04, CFI=1.00, TLI=0.99, SRMR=0.03, and RMSEA=0.00, CFI=1.00, TLI=1.02, SRMR=0.02, respectively. The results from the model including youth externalizing symptoms suggest that the maternal depression severity/chronicity index predicted maternal depressive symptoms at each time point (β =0.66, $p < .001$). The severity/chronicity index of past maternal depression also predicted youth externalizing symptoms across time points (β =0.23, $p = .003$), suggesting that the severity/chronicity index of past maternal depressive episodes contributed to levels of youth externalizing symptoms beyond that contributed by current maternal depression symptoms. The maternal depression severity/chronicity index did not predict rate of change of youth externalizing symptoms or maternal depressive symptoms over time ($p = .50$ and $p = .68$, respectively). The results from the model that included youth internalizing symptoms mirrored the results found for youth externalizing symptoms; the maternal depression severity/chronicity index predicted youth internalizing symptoms across time (β =0.23, $p = .01$) after taking into account maternal depressive symptoms across time.

Severity and chronicity were included in two separate growth models, each including two parallel processes (maternal BDI and youth symptoms) and maternal depression severity or chronicity at Time 1 as a predictor. Maternal depression severity and maternal depression chronicity each predicted levels of internalizing and externalizing symptoms at each time point, mirroring the results of the severity/chronicity index. Also similar to the severity/chronicity index, maternal depression severity did not predict rate of change in youth internalizing or externalizing symptoms. However, maternal depression chronicity predicted the rate of change in youth externalizing symptoms (β =0.16, $p = .03$), although not internalizing symptoms (β =0.18, $p = .36$), after taking into account maternal depressive symptoms across time.

Discussion

Overall, the results partially supported our hypotheses and underscore the complexity of the relationship between youth outcomes and maternal depression severity and chronicity. Although an index of past maternal depression severity/chronicity and Time 1 maternal depressive symptoms were highly correlated ($r_s = .44$, $p < .001$), we wanted to examine the relative contribution of each of these variables to youth internalizing and externalizing symptoms. In previous studies using this sample, a dichotomous variable of maternal

depression history was associated with youth symptoms, as was current maternal depression (Tompson et al., 2010). This study expanded on these findings by comparing maternal current depression symptoms to the severity and chronicity of the maternal depression history, both cross-sectionally and longitudinally.

Taken together, our results suggest that at a given point in time, a mother's current depressive symptoms may tell us more about a child's current functioning than does the severity/chronicity of a mother's history of depression. Other findings have shown that treating maternal depression results in reduced youth symptoms (Weissman et al., 2006). Therefore, it may be that even in the presence of a severe depressive history, fewer current maternal depressive symptoms may attenuate the impact of maternal depression on youth. However, when predicting youth future functioning, our results indicated that knowing the nature of past maternal depression may provide additional information beyond maternal current depressive symptoms.

Specifically, mothers with a more significant course of depression, defined either by combining severity and chronicity or examining them separately, predicted higher levels of youth internalizing and externalizing at each time point, even after taking into account current maternal depression across time. Therefore, results from past studies examining effects of maternal depression severity and chronicity may not solely be driven by the fact that mothers with a more severe and chronic course of depression are more likely to have higher levels of depression at the time of the assessment. Moreover, our results suggest that for the most part, creating a severity composite index that combines impairment and chronicity may be a parsimonious way of assessing the course of past maternal depression, especially given that collecting information on the duration of each depressive episode may not be feasible in a number of settings.

However, when examining severity and chronicity separately, chronicity predicted not only level of youth externalizing symptoms at each time point, but also predicted rate of change of externalizing symptoms, while severity did not predict rate of change, suggesting that youth whose mothers have a more chronic course of depression experience a faster rate of change (increase) in externalizing symptoms than youth whose mothers have shorter episodes of depression. Therefore, our results, along with findings by Hammen and Brennan (2003), indicate that chronicity of maternal depression, as opposed to severity of depression, may be particularly important in youth risk for nondepressive disorders. Perhaps more chronic depression may be associated with externalizing symptoms through its particularly pernicious, ongoing, and undermining effects on parenting behavior (Gruhn et al., 2016), whereas briefer episodes may have less of a deleterious impact on the parent-child relationship.

It should be noted that severity and chronicity were highly correlated (r = .94) in the full sample. This is not unexpected given that a proportion of the mothers in our sample had no history of depression and therefore had ratings of 0 for both severity and chronicity. However, when examining the correlation only among mothers with a history of depression, severity and chronicity were not significantly correlated (r_s = .17, p = .17). This may indicate that severity and chronicity may tell us potentially different things, with chronicity

potentially being slightly more problematic given its impact on mothers' social and emotional functioning over time.

When interpreting the results, it should also be noted that our cross sectional analyses at Time 1 suggested that information on the severity/chronicity of past maternal depression did not provide additional information about current youth functioning at a given point in time, over and above that provided by current maternal depressive symptoms. However, this was not the case in the longitudinal growth models, such that both current maternal depression symptoms and past severity and chronicity did predict youth symptoms at each time point. We believe that these seemingly discrepant results most likely stem from the fact that the three time points together may be more sensitive to more moderate associations compared to what would be needed to reach statistical significance in a cross-sectional analysis.

Our models of rates of change of internalizing and externalizing symptoms across middle childhood suggest that though youth vary in levels of internalizing symptoms, these symptoms remain relatively stable over this time period. Rates of depression tend to be lower in this developmental period compared to adolescence, and internalizing symptoms tend to be stable across this period (Feng, Shaw, & Silk, 2008). Had we followed these youth into adolescence, we may have seen greater individual change. In contrast, in this sample, youth varied on levels of externalizing symptoms, as well as rates of change over time. In general, externalizing symptoms decreased over time, with youth with higher levels of externalizing symptoms at Time 1 evidencing greater decreases over time. This trend may represent regression to the mean or it may represent developmental changes occurring during middle childhood as youth increase in self-regulatory skills. Externalizing symptoms have been found to decrease across this time period, although this trend may depend on the symptom informant (Keiley, Bates, Dodge, & Pettit, 2000).

There may be many pathways through which maternal early history of depression impacts youth functioning. Maternal behavior may mediate the relationship between maternal depression and youth functioning, such that early maternal depression may have lasting impacts on the parent-child relationship. For instance, mothers with more chronic and severe histories of depression have been found to show less sensitivity in their interactions with their young children (Campbell et al., 2009). Foster and colleagues' work (Foster et al., 2008; Foster et al., 2008) also suggests that past depression may impact how mothers interact with their children, such that mothers with more severe histories of depression engaged less positively with their children compared to mothers with more mild depression histories. More severe/chronic early maternal depression may relate to a less positive mother-child relationship and youth symptoms via poorer family functioning or modeling of ineffective coping strategies. Moreover, mothers who are depressed tend to be less effective in their discipline practices with their children (Elgar, McGrath, Waschbusch, Stewart, & Curtis, 2004; Lovejoy et al., 2000), such that depression may decrease maternal parenting efficacy (Elgar et al., 2004).

Clinically, these findings suggest that interventions for at-risk youth should include a focus on parenting, especially with youth whose mothers have more chronic and severe histories of depression. When conducting assessments and inquiring about family history, it will be

important to not only note whether mothers have a history of depression, but the length of time of the depressive episode(s) and the severity of the depression (e.g. impairment, hospitalizations). Additionally, in the context of intervention, attention should be paid to the parent-child relationship when a mother has a history of depression (past or current), especially if the course is more chronic. Increasing positive and decreasing negative parent-child interactions may be especially helpful for this population, and may serve to decrease current youth symptomatology and protect youth from developing future psychopathology.

Although this study provides a further look at the impact that severity and chronicity of maternal depression history has in predicting child functioning, both cross-sectionally and longitudinally, several limitations should be noted. First, given that the outcome variables used in the longitudinal analyses were a mother-report of child symptoms, it may be that mothers who were lower in functioning when making child ratings were biased in their ratings due to their own psychopathology. Relatedly, only youth completed the CDI, therefore limiting the ability to examine bias in this measure. Therefore, future studies should examine these processes using multiple informant measures of anxious, depressive and externalizing symptomatology. Second, maternal depressive symptoms were measured using a self-report assessment tool, possibly leading to bias in ratings. However, in order to account for this, we ran all cross-sectional analyses using maternal Global Assessment of Functioning (GAF), which is a clinician rating of current maternal functioning, in place of BDI scores. Results were comparable when using maternal GAF scores, with the exception of maternal GAF accounting for significant variance in youth reported CDI scores, making the possibility of biased outcomes less likely. Third, we only used two measures of child psychological functioning and future studies should look at additional measures that capture multiple aspects of a child's functioning, such as academic and social functioning, and should include both parent and child report. Fourth, our sample was recruited to look at the emergence of risk in a pre-adolescent sample, but given that rates of depression do not often emerge until adolescence, the level of depressive, internalizing and externalizing symptoms above a clinical threshold was relatively low in the sample. This resulted in reduced variability in outcome measures, potentially limiting the ability to detect modest effects. Fifth, given that over half of the mothers in the sample did not have a history of depression, the chronicity variable was significantly negatively skewed. Although a square root transformation was applied, the chronicity results should be interpreted with caution. Finally, while the impact of maternal depression early in a child's development may be one pathway through which youth depression develops, our sample did not allow for the examination of the effects of maternal depression on discrete periods of child development. Therefore, we were unable to look at the effects of exposure to maternal depression in early childhood compared to later childhood.

Future studies should continue to examine the effects of parental depression severity, as results continue to be mixed as to how the course of parental depression affects offspring outcomes. For instance, recent work in the psychophysiological field has indicated that severity of maternal depression history was associated with greater blunting of offspring abnormal reward processing (Kujawa, Proudfit, & Klein, 2014). More work needs to be done looking at course of parental depression, both maternal and paternal, and transmission of

risk to offspring using multi-modal assessment, taking advantage of psychophysiological and scanning methodologies.

In conclusion, results of this study suggest first that current maternal depressive symptoms contribute to the association with offspring internalizing and externalizing symptoms to a greater degree than does the severity/chronicity of maternal depression history, at a given point in time, as was found in a previous study (Foster et al., 2008), although they only found significant effects for youth externalizing symptoms. Second, youth with mothers who have more severe histories of depression are more likely to have higher levels of internalizing and externalizing symptoms, even after taking into account maternal current depressive symptoms. Third, chronicity, compared to severity of maternal depression, may have particular importance in the development and/or maintenance of youth externalizing symptoms. Fourth, while severity and chronicity of maternal depression are highly correlated and can be conceptualized as a combined marker of severity, there are some methodological merits to examining them as separate constructs, especially in the context of youth nondepressive disorders. Taken together, when assessing offspring of mothers with current and/or past depression, both current maternal depressive symptoms and the length and severity of past maternal depressive episodes should be taken into account in order to capture current and future youth functioning.

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Table 1

Descriptive Statistics of the Primary and Predictor Measures (N=171)

Variable	N	M (SD)	Range
BDI Time 1	164	5.81 (7.01)	0–38
BDI Time 2	159	5.17 (6.35)	0–33
BDI Time 3	148	4.70 (5.64)	0–27
CBCL Internalizing Time 1	170	49.42 (10.15)	33–74
% in Borderline/Clinical Range	9.4%		
CBCL Internalizing Time 2	157	47.59 (10.35)	33–74
% in Borderline/Clinical Range	8.9%		
CBCL Internalizing Time 3	147	47.23 (10.29)	33–72
% in Borderline/Clinical Range	8.2%		
CBCL Externalizing Time 1	170	47.71 (9.60)	33–80
% in Borderline/Clinical Range	4.1%		
CBCL Externalizing Time 2	157	46.75 (10.18)	33–77
% in Borderline/Clinical Range	5.7%		
CBCL Externalizing Time 3	147	46.19 (10.15)	33–79
% in Borderline/Clinical Range	6.8%		
CDI Time 1	171	5.19 (4.53)	0–26
CDI Time 2	157	4.36 (4.03)	0–17
CDI Time 3	146	4.62 (4.71)	0–30
Maternal GAF Time 1	168	79.38 (12.02)	38–97
Maternal GAF Time 2	159	79.87 (11.04)	45–98
Maternal GAF Time 3	149	81.61 (10.10)	52–98

Note. BDI = Beck Depression Inventory; CBCL = Child Behavior Checklist; CDI = Child Depression Inventory; GAF = Global Assessment of Functioning.

Table 2

Maternal Depression Severity/Chronicity and Mother and Child Characteristics

	CDI Total Mean (SD)	CBCL Int Mean (SD)	CBCL Ext Mean (SD)	Wave 1 Maternal BDI Mean (SD)	Child Depression Diagnosis at Time 1 n (%)	Child Past Depression Diagnosis at Time 1 n (%)
No History of Maternal Depression (n=102)	5.17 (3.94)	46.08 (8.98)	46.08 (8.98)	3.40 (3.78)	2 (2%)	3 (2.9%)
Mild History of Maternal Depression (n=32)	5.25 (6.47)	51.13 (10.92)	49.31 (10.43)	5.81 (5.94)	2 (6.3%)	5 (15.6%)
Moderate-Severe History of Maternal Depression (n=37)	5.22 (4.13)	52.46 (10.41)	50.78 (9.77)	12.82 (10.00)	3 (8.1)	7 (18.9)
Total Sample (n=171)	5.19 (4.53)	49.42 (10.15)	47.71 (9.60)	5.81 (7.01)	7 (4.1)	15 (8.8)

Table 3

Bivariate Correlations of Variables Included in Cross-Sectional Analyses

	Sev/Chr	Severity	Chronicity (Weeks)	BDI	CDI	CBCLInt	CBCLExt
Sev/Chr	1.00	0.97**	0.97**	0.44**	−0.02	0.21**	0.23**
Severity		1.00	0.94**	0.42**	0.01	0.24**	0.22**
Chronicity (Weeks)			1.00	0.44**	−0.02	0.22**	0.27**
BDI				1.00	0.14	0.35**	0.36**
CDI					1.00	0.26**	0.29**
CBCLInt						1.00	0.57**
CBCLExt							1.00

** Correlation is significant at the 0.01 level (2-tailed) Spearman's rho reported for correlations involving severity/chronicity index and severity level; Pearson's *r* reported for all other correlations.