Maternal Depression History Moderates the Association Between Criticism (but not Praise) and Depressive Symptoms in Youth

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Abstract

Children of mothers with past depression are at increased risk for developing the disorder themselves; however, the specific factors that increase their risk are unclear. Aberrant reactivity to social experiences may be one characteristic that increases risk for depression in offspring. This study investigates whether mothers' depression history is associated with increased reactivity to criticism and decreased reactivity to praise in offspring by examining 72 youths (ages 8–15). Every evening for 21 days, youths reported their depressive symptoms and whether they were criticized and/or praised by their mothers, fathers, siblings, and friends, resulting in 1,382 data entries across participants. Mothers reported their own depression history and current depressive symptoms. Maternal depression history moderated offspring's response to criticism. Although all youths reacted to perceived criticism from family members with transient increases of depressive symptoms, only children of mothers with higher (vs. lower) levels of past depression exhibited cumulative, person-level associations between perceived criticism and their own depressive symptoms. Additionally, only children of depressed mothers exhibited increases in depressive symptoms on days in which they were criticized by friends. Perceived parental praise was associated with lower levels of depression in youths regardless of maternal depression. Youth depressive symptoms were more strongly related to their parents' (vs. siblings or friends) criticism and praise, highlighting parents' more central role in youth depression risk. Taken together, our results reveal that maternal depression history is associated with increased reactivity to perceived criticism across relational contexts potentially contributing to youths' risk for developing depression.

Depression is a highly prevalent mental health disorder with grave consequences to the individual and to society (Greenberg et al., 2015). Rates of depression are increasing, particularly among adolescents and young adults (Substance Abuse and Mental Health Services Administration, 2014). Consistently, preventative efforts are increasingly recognized as an important path towards alleviating the burden of depression (Gotlib et al., 2020). Such prevention requires identifying at-risk populations as well as modifiable risk factors, which can then be targeted in treatment. To isolate these risk factors most effectively, it is imperative to study individuals before the onset of depression (Gonçalves et al., 2019). Since depression typically begins during adolescence (Costello et al., 2011), research should focus on pinpointing risk factors in children and adolescents (hereinafter referred to as "youths").

One of the most salient risk factors for depression is having a mother with a history of depression (Goodman et al., 2011; Weissman et al., 2016). However, despite much research on the consequences of maternal depression, the specific characteristics that increase depression risk in offspring remain largely unclear (Gotlib et al., 2020). Transmission of depression across generations is likely explained by both genetic and environmental factors (Lau & Eley, 2008; Rice, 2010). Given the need to identify modifiable risk factors of depressive disorders, a significant body of research has focused on parenting practices in general and specifically on maternal criticism (e.g., Brennan et al., 2003; Gibb et al., 2009; Mellick et al., 2015).

Many studies have consistently found that both observed and perceived maternal criticism confer heightened risk for child depression (Burkhouse et al., 2012; Frye & Garber, 2005; Nelemans et al., 2014; Nelson et al., 2003; Tompson et al., 2010). Although maternal criticism is associated with child depression in general, this relationship is particularly strong among children of depressed mothers, which implies that children of depressed mothers may be particularly reactive to criticism (e.g., Mellick et al., 2015; Tompson et al., 2010). Additionally, maternal depression history is often associated with higher levels of maternal criticism (e.g., Nelson et al., 2003; Tompson et al., 2010; cf., Gibb et al., 2009). Indeed, some studies have argued that maternal criticism is a mechanism through which depression is transmitted inter-generationally (e.g., Brennan et al., 2003). Neuroimaging evidence further support this claim by showing that youths with current depression exhibit increased neural reactivity to maternal criticism (Silk et al., 2017).

Nevertheless, research on youths has emphasized the need to study multiple aspects of the social context simultaneously, grounded in ecological systems theory (Bronfenbrenner & Morris, 2007) and family system theory (Cox & Paley, 1997; Minuchin, 1985). Indeed, recent studies examining youth depression show that – in addition to mothers – fathers, siblings, and friends all significantly influence the development of depression in youths (e.g., Finan et al., 2018; Harper et al., 2016). For example, research on fathers shows that

higher levels of paternal criticism are associated with higher levels of depressive symptoms in youths (Dooley et al., 2015), while lower levels are related to greater resilience in youths (Brennan et al., 2003). Similarly, negative interactions with siblings have been linked to higher levels of depressive symptoms (Buist et al., 2014; Kim et al., 2007; Padilla-Walker et al., 2010). Longitudinally, sibling hostility predicts adolescent depressive symptoms (Harper et al., 2016; Kim et al., 2007), even after controlling for parental and peer relationship factors (e.g., Padilla-Walker et al., 2010; Finan.et al., 2018). Finally, peer relationships also impact the development of depression in youths. For instance, negative interactions with peers (e.g., peer victimization or isolation) contribute to adolescent depression (Burke et al., 2017; Christ et al., 2017; Côté et al., 2018; Herres & Kobak, 2015). Considering the importance of these social contexts, the present study examines how perceived criticism from four relational contexts – mothers, fathers, siblings, and friends – are associated with youths' depression. Importantly, if children of depressed mothers are characterized by increased reactivity to criticism, this increased reactivity would be evident across social contexts, and not solely in their responses to maternal criticism.

Focusing on criticism alone, while informative, offers only a partial picture of the social context of depression. Indeed, studies have shown that positive interactions and relational characteristics (e.g., support, warmth, communication) with parents, siblings, and friends are associated with youth depression (Alto et al., 2018; Burke et al., 2017; Finan et al., 2018; Kim et al., 2007; Nilsen et al., 2013). Moreover, recent findings suggest that decreased ability to enjoy positive social evaluation also contributes to depression risk (Reichenberger et al., 2017). Similarly, a neuroimaging study that examined responses to praise (in addition to responses to criticism) revealed that adolescents with current depression show less reactivity to maternal praise (Silk et al., 2017). Thus, exploring positive forms of social evaluation, in addition to criticism, is essential in providing a more holistic view of depression.

Another gap in the literature that the present study addresses is the a methodological one. Despite the established role of criticism in depression risk, no studies (to the best of our knowledge) have examined the effects of criticism or praise on child depressive symptoms using daily assessments. Structured daily measurement techniques, such as daily-diaries, are empirically-validated to examine social-emotional processes among youths (aan het Rot, 2012; Russel & Gajos, 2020). Daily diaries reduce retrospective reporting bias and sampling noise by utilizing multiple assessment points (Trull & Ebner-Priemer, 2020). More importantly, they allow for uncovering fine-grained daily processes that contribute to psychopathology (Baltasar-Tello et al., 2018; Russel & Gajos, 2020; Sequeira et al., 2020; Trull & Ebner-Priemer, 2020) by tracking, as in the present study, daily fluctuations of perceived criticism and depressive symptoms. Among other possibilities, these designs are useful for investigating which sources of perceived criticism have effects on daily depressive symptoms, and which have long-lasting effects that accumulate across an entire measurement period (Zilcha-Mano, 2017). The latter point is particularly important because prior work has shown that criticism's cumulative effects are particularly important to understanding youth depression (Burkhouse et al., 2012).

Although no studies to date have examined the impact of criticism on depressive symptoms using daily diaries, other social interactions were examined using intensive longitudinal designs. These studies found that that adolescents' daily depressed mood increases following perceived negative events with parents and peers, or when spending time alone (Herres et al., 2016; Silk et al., 2011; Starr et al., 2019). Additionally, these studies indicate that, under some background conditions related to increased risk for psychopathology (e.g., more behavior problems), reactivity to social events is increased. Moreover, increased reactivity to social situations in everyday life predicted increases in depressive symptoms at a 2-year follow-up (Herres et al., 2016). The current study extends these previous studies by examining the specific impact of criticism and praise and investigating whether these effects are moderated by maternal history of depression.

The Present Study

The present study examines whether maternal depression history moderates youths' reactivity to criticism and praise. The study extends previous research in three important ways. First, the vast majority of studies on children of mothers with depression focus solely on maternal criticism; the present study examines multiple social contexts simultaneously, including peers and other family members. Second, most of the studies on the impact of criticism focused only on this negative forms of social evaluation; the present study also examines a positive form of social evaluation, namely, praise. Third, previous longitudinal studies have examined processes that unfold across years; the current study utilizes an intensive longitudinal design to examine processes occurring over days and weeks. Specifically, we assess perceived criticism, praise, and child depressive symptoms over 21 days using a daily-diary. Hypotheses include:

1. Maternal depression will moderate youths' reactivity to perceived criticism. Specifically, the association between perceived criticism and depression will be stronger for children of mothers with higher (vs. lower) levels of past depression. We will examine this hypothesis regarding all four relational contexts, and at both the person and day levels.

2. Maternal depression will moderate youths' responses to perceived praise. Specifically, the association between perceived praise and depression will be weaker for children of mothers with higher (vs. lower) levels of past depression. We will examine this hypothesis with respect to all four sources of praise, and at both person and day levels.

Method

All procedures have been approved by the Yale University Institutional Review Board.

Participants

One-hundred and forty-eight children and adolescents (i.e., youths) were recruited via flyers posted in the New Haven county area, on Craigslist, and on social media. Advertisements invited youths 9–15 years old to participate in a daily-diary study about emotions and social experiences. We included three eight-year-old participants who would turn nine-years old

during the study period. Participants 8–15 years old were included if they confirmed having daily access to a device connected to the internet. Participating youths received $40 if they completed   60% of surveys (13 surveys) and $60 if they completed   90% (19 surveys). Those who completed fewer than 60% or opted not to participate after the initial lab session received $10. One-hundred and thirty-eight youths completed at least 60% of the surveys (93% of sample). Overall, participants completed a mean of 19.19 diary entries ($SD = 2.19$).

After youth completed 21 daily diaries, we contacted their mothers via email and invited them to complete online questionnaires; mothers were paid $10 for their participation. Of the 96 mothers contacted, 55 (56%) completed the research questionnaires; one mother did not complete the current depression questionnaire and therefore was not included in the analyses. Thirty-four of our participants (48.5%) were siblings of other participating youths: therefore, we had 72 mother–child dyads, resulting in 1,382 data entries collected across the final sample. We examined differences in child depressive symptoms and frequencies of criticism and praise between youths whose mothers did (vs. did not) complete the questionnaires. There were no differences between those groups across the research variables (all ps   0.12), or demographic variables (all ps   0.07). Table S1 presents mothers and youths' gender, age, and race/ethnicity. Youths' mean age was 11.57 ($SD = 2.10$) and approximately half (48.6%) were girls. A majority of mothers were educated (74.07% had professional or college degree), married (80%), and White (72.7%). These demographic characteristics are representative of the county in which data were collected.

Power Analysis—Sample size was determined for another research question; thus, the current sample size is based on the number of mothers of youths from the original sample who agreed to complete the questionnaires.

Procedure

Youths—Participants, accompanied by a parent, came to the lab for an initial visit. The visit began with an explanation of the study procedures. If the youth expressed interest in participating in the study, they signed assent forms and their parents signed consent forms. Then, participants completed a demographics questionnaire on a lab computer. They also reviewed the daily-diary questionnaire to ensure that all questions and procedures were understood. Finally, participants received an explanation about compensation. Participants provided an email address to which the survey questionnaire was sent and chose a date to start the daily-diary: typically, the next day following the lab visit. Every evening during the daily-diary period, participants received a link to the survey. The survey was then completed on a secure website (Qualtrics). Participants were instructed to complete the survey before going to bed each night. The link expired after 14 h. To enhance compliance, participants received a weekly phone call from a research assistant to check whether they had technical difficulties, and a weekly email with information about their completion rate and anticipated compensation. Additionally, participants were contacted if they missed entries for more than two consecutive days. We did not explicitly ask participants whether they have siblings or if they are in contact with their fathers. To deduce this information, we examined whether participants reported any interactions with fathers or with siblings throughout the diary period; if they reported no such interactions, these participants were removed from relevant

analyses. Ten participants (14%) did not report any interaction with their father and nine participants (12%) reported no interactions with siblings.

Mothers—If a participant completed at least 60% of the diary entries during the daily-diary period, a research assistant sent an email asking the youth's mother to complete a single online assessment which included 45–60 min of research questionnaires (detailed below). Importantly, we did not require maternal participation as a condition for inclusion of the child; rather, mothers were approached and asked to participate as an "add-on" portion once their child completed the diary portion.

Child Measures

The present study is part of a larger investigation on emotions and social experiences in youth. Only relevant measures are described here.

Daily Criticism—To assess criticism, we asked participants whether they had felt criticized between the previous and current diary entry. Using a checkbox, youths indicated the source of the perceived criticism: mother, father, sibling, friend, boyfriend/girlfriend, or no one ("not relevant"). We used this information to create five dichotomous variables coded "1" if the participant checked a box, and "0" if they did not.

Daily Praise—To assess praise, we asked participants whether they had been complimented/praised between the previous and current diary entry. Using a checkbox, youths indicated the source of the perceived praise: mother, father, sibling, friend, boyfriend/girlfriend, or no one ("not relevant"). We used this information to create five dichotomous variables coded "1" if the participant checked a box, and "0" if they did not.

Due to participants' young age and the fact that only a few reported experiences with romantic partners, we combined the "friends" and "boyfriend/girlfriend" categories.

Daily Depressive Symptoms—To assess depressive symptoms, we used the Children's Depression Inventory – short version (CDI-S; Kovacs, 1985). The CDI-S is a self-report measure consisting of 10 items used to assess severity of depressive symptoms. The short form is similar to the full measure in its specificity and sensitivity in screening for pediatric depression (Allgaier et al., 2012). Each item consists of three response choices representing different degrees of symptom severity (from 0 to 2), from which the participant chose the ones which best described them. For example, one group of response choices consisted of the sentences "I am sad once in a while", "I am sad many times," and "I am sad all the time". Instructions were adapted for use in the daily-diary by asking participants to choose from each group of sentences the one that best captured their feelings at the time of answering the survey. We calculated the between- and within-participant reliabilities using procedures outlined in Shrout and Lane (2012). For a given measure, the between-subject reliability coefficient is the expected between-subject reliability estimate for a single typical day. The within-subject reliability coefficient is the expected within-subject reliability of change within individuals over the daily-diary entries. The between-person and within-person reliabilities were 0.91 and 0.75. These reliabilities are considered very good for within-individual measures (Nezlek, 2017; Shrout, 1998). For each participants, we then

computed an average score across the entire diary period. Across all participants, the average of average scores across the entire diary was 2.48 ($SD = 2.87$, range 0–14.94). Relying on a score of 3 (equal or higher than three) as the clinical cutoff, 33.3% of our participants' average score across the diary period met this criterion. Within our sample, we found a small but significant correlation between participants' age and depressive symptoms ($r_{(72)} = 0.26$, $p = 0.024$), indicating that older (vs. younger) participants experienced higher levels of depressive symptoms. Additionally, girls in our sample had higher levels of depressive symptoms as compared to boys ($M = 3.72$, $SD = 3.50$ for girls, $M = 1.31$, $SD = 1.32$ for boys; $t_{(70)} = 3.90$, $p < 0.0001$). These gender and age differences are in line with prior research (e.g., Salk et al., 2016).

Mother Measures

Depression History—The Inventory to Diagnose Depression-Lifetime (IDD-L; Zimmerman & Coryell, 1987) was used to assess depression history. The IDD-L is a self-report measure, which assesses lifetime history of depressive symptoms. The IDD-L uses 22 items to tap the symptoms required for a DSM-IV diagnosis of major depression. Each item received a severity score ranging from 0 to 4. Following endorsement of a symptom, participants were asked to indicate whether the symptom lasted for at least two weeks. In the present sample, the internal consistency of the IDD-L was excellent ($\alpha = 0.92$). The symptoms were then summed to provide an index of severity; however, there are no established norms for the IDD-L sum score ranging from 0 to 88. Previous studies used a cutoff score of 25 as indicative of history of clinical depression (Gadassi & Mor, 2016; Rude & McCarthy, 2003). In the current sample, sum scores ranged from 0–67, with a mean sum score of 25.87 ($SD = 16.47$); 29 mothers (53.7%) had a sum score of 25 or higher.

Current Depression—The Beck Depression Inventory-II (BDI-II; Beck et al., 1996) was used to assess current depression. The BDI-II is a 21-item self-report questionnaire, which assesses depressive symptoms rated on a scale of 0 to 3, where higher scores indicate more severe depression. The BDI-II has demonstrated excellent internal consistency ($\alpha = 0.91$; Dozois et al., 1998), and test–retest reliability ($\alpha = 0.95$; Beck et al., 1996). In the present sample, the internal consistency of the BDI-II was excellent ($\alpha = 0.95$). Sum scores ranged from 0–55, with a mean sum score of 11.13 ($SD = 11.84$). Thirty-eight mothers (70.4%) endorsed no or minimal depression symptoms (0–13 range; Beck et al., 1996), seven endorsed mild depression (14–19), six endorsed moderate depression (20–28), and three (5.6%) endorsed severe depression (29–63). Since the IDD-L assesses lifetime depression whereas the BDI-II assesses current depression, it is reasonable to have higher depression severity in the IDD-L versus the BSI-II. Importantly, the correlation between past and current depression (i.e., the IDD-L and the BDI-II) in the present sample was positive and high ($r_{(54)} = 0.62$, $p < 0.001$).

Data Analytic Plan—The outcome variable is youths' depressive symptoms. The data were hierarchically nested: days within individuals to account for the non-independence of day-level data, and to prevent inflation of effects (Krull & MacKinnon, 2001). Data were analyzed using the nlme package (Pinheiro et al., 2014) of the statistical programming software R Studio (R Core Team, 2013). Level 1 was the day level and Level 2 was the

individual level. Further, we entered covariates into the analyses: (1) the lagged mean-centered outcome score (i.e., the previous day's outcome variable, entered as a deviation from the mean) and (2) the person's mean outcome score (averaged across the entire diary period). Thus, the outcome becomes a residualized change score. For example, in the first model predicting child depressive symptoms from maternal criticism, we entered yesterday's depressive symptoms into the model, along with the child's mean level of depressive symptoms. Including lagged depressive symptoms means that whatever effect we find for criticism would not include variance due to yesterday's depressive symptoms and its effects on criticism or on today's depressive symptoms. We also entered (3) the person's mean score of the predictors (in the same example, this was the individual's mean frequency of maternal criticism). Including the person-mean variables allows for estimation of both person-level and day-level effects (Bolger & Laurenceau, 2013), and also allows for ruling out static spurious "third variables" as alternative explanations. Since some of our participants were siblings, we entered a variable identifying family members to the model's random statement. This method enabled us to account for inter-family effects while maximizing power by allowing for a larger sample size (Brown & Prescott, 2014). Conducting analyses with only one child per family did not alter the results (see Tables S4 and S5 in the Supplementary Materials). To reduce risk of confound between maternal current and past depression, all analyses adjusted for mean-centered current depression.

Assessing Moderation and Simple Slopes Analyses—To assess whether maternal depression history moderated responses to criticism and praise, we entered maternal depression history (IDD-L scores) and its interactions with frequency of criticism/praise into the models. To ease interpretation and decrease risk of multicollinearity, we centered variables in the person-level models as well as in the day-level models. Investigation of significant moderation (i.e., cases in which the interaction with maternal depression history was significant) was done using the reghelper package in R (Hughes & Team, 2017).

The model used to assess person-level results was as follows[1]:

$$
\begin{aligned}
Y_{ij} &(\text{Mean Depressive symptoms for person } j \text{ in family } i) = \\
&\beta_0 + \beta_1 (\text{frequency of maternal criticism}) + \beta_2 (\text{maternal depression of history}) + \beta_3 * (\text{frequency of maternal criticism*maternal depression history}) + \beta_4 (\text{maternal current depression}) + b_i(\text{random effect for family}) + r_{ij}
\end{aligned}
$$

The model used to assess day-level results was a mixed-level model as follows:

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[1] β denotes fixed effects; b denotes random effects.

Y_{ijk} (Depressive symptoms on day k for person j in family

i) = $(\beta_0 + b_{0jj})$ +

$\beta_1 *$ (lagged depressive symptoms [day k-1])+

$(\beta_2 + b_{2ij}) *$ (maternal criticism on day k) +

$\beta_3 *$ (maternal depression history) +

$\beta_4 *$ (maternal criticism on day k* maternal depression history)+

$\beta_5 *$(mean depressive symptoms) +

$\beta_6 *$ (frequency of maternal criticism) +

$\beta_7 *$ (maternal current depression) +

b_i(random effect for family) + ε_{ijk}

Finally, since previous studies found that offspring gender and age may moderate responses to social evaluation, and since these variables were significantly associated with our outcome (youth depressive symptoms) we repeated all analyses controlling for these variables. We report these analyses only when this resulted in a significant change to the results.

Results

Frequency of Criticism and Praise

Before conducting the primary analyses, we assessed the frequency of reported criticism and praise and any differences between sources of feedback.[2] We therefore conducted a 2-way repeated measures ANOVA with valence of feedback (criticism vs. praise) and source of feedback (mother, father, sibling, or friend). As can be seen in Table 1, praise was significantly more prevalent than criticism ($F_{(1,55)} = 62.73$, $p < 0.001$, $\eta^2 = 0.53$). Participants reported praise on approximately one-third of the diary days and criticism on fewer than 5% of the diary days. There were also significant differences in sources of feedback ($F_{(3,165)} = 9.51$, $p < 0.001$, $\eta^2 = 0.15$). Specifically, siblings' criticism was the most prevalent, and significantly more prevalent than paternal criticism ($t_{(56)} = 1.98$, $p = 0.053$), maternal criticism ($t_{(62)} = 2.28$, $p = 0.026$) and friends' criticism ($t_{(62)} = 2.10$, $p = 0.039$; all other ps 0.526). Mothers' praise was reported most frequently; it was significantly more prevalent compared to fathers' praise ($t_{(61)} = 3.64$, $p = 0.001$) and siblings' ($t_{(62)} = 6.38$, $p < 0.001$), but not compared to friends' praise ($t_{(69)} = 0.67$, $p = 0.505$). Friends and fathers provided more praise than siblings ($t_{(62)} = 5.15$, $p < 0.001$, difference between friends and siblings; $t_{(55)} = 4.97$, $p < 0.001$, differences between fathers and siblings); all other comparisons were not significant (ps 0.232). These results held when controlling for child age and gender. Including maternal past and current depression in the model neither altered the results. Table S6 in the Supplementary Materials shows zero-order correlations between all study variables.

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[2]ANOVA was conducted only on participants who had all four sources of criticism and praise; however, frequencies in Table 1 are presented for all participants.

Does Maternal Depression Moderate Responses to Perceived Criticism and Praise?

Person-level Analyses

Maternal Criticism: As presented in Table 2a, perceived maternal criticism was positively associated with child depressive symptoms. Moreover, as predicted, the interaction term between maternal criticism and maternal depression history was significant, indicating a significant moderation. Simple slopes analysis showed that, as presented in Fig. 1, the association between maternal criticism and child depressive symptoms was not significant for children of mothers with low levels of past depression ($\beta = 8.98$, $SE = 5.42$, t = 1.66, $p = 0.102$). However, this association was significant for children of mothers with high levels of past depression, such that greater maternal criticism predicted higher levels of youths' depressive symptoms ($\beta = 37.49$, $SE = 6.97$, t = 5.38, $p < 0.0001$). These results remained unchanged when controlling for child age and gender.

Paternal Criticism: As presented in Table 2b, perceived paternal criticism was also positively associated with child depressive symptoms. Moreover, as predicted, maternal depression history marginally moderated this association ($p = 0.054$). Simple slopes analysis showed that, as shown in Fig. 2, the association between paternal criticism and child depressive symptoms was not significant for children of mothers with low levels of past depression ($\beta = 12.76$, $SE = 6.79$, t = 1.88, $p = 0.065$). However, this association was significant for children of mothers with high levels of past depression, such that paternal criticism predicted higher levels of youths' depressive symptoms ($\beta = 34.95$, $SE = 8.81$, $t = 3.92$, $p < 0.0021$). When child gender and age were added to the model, the paternal criticism by maternal depression moderation became significant (with gender in the model: $B = 0.68$, $SE = 0.31$, $t = 2.20$, $p = 0.032$; with child age in the model: $B = 0.66$, $SE = 0.33$, $t = 2.03$, $p = 0.048$).

Sibling Criticism: As presented in Table 2c, perceived sibling criticism was also associated with higher levels of child depressive symptoms. Moreover, as predicted, maternal depression history marginally moderated this association ($p = 0.069$). Simple slopes analysis revealed that, as shown in Fig. 3, the association between sibling criticism and child depressive symptoms was not significant for children of mothers with low levels of past depression ($\beta = 2.49$, $SE = 4.34$, $t = 0.57$, $p = 0.568$). However, this association was significant for children of mothers with high past depression, such that sibling criticism predicted higher levels of youths' depressive symptoms ($\beta = 14.47$, $SE = 5.44$, $t = 2.64$, $p = 0.010$). The interaction between maternal depression history and sibling criticism held when controlling for current maternal depression and youths' age but was no longer significant when controlling for child gender ($\beta = 0.21$, $SE = 0.22$, $t = 0.93$, $p = 0.357$).

Friend Criticism: As presented in Table 2d, perceived friend criticism was marginally associated with child depressive symptoms ($p = 0.089$): however, this effect became non-significant when controlling for child gender and age ($ps > 0.173$). Maternal depression history and its interaction with friend criticism was not significant.

Maternal Praise: As shown in Table 3a, perceived maternal praise was negatively associated with child depressive symptoms. However, maternal depression history did not

moderate this association. These results remained significant when controlling for child age: however, when controlling for child gender, the effect of maternal praise became marginal ($B = -1.81$, $SE = 0.99$, $p = 0.071$).

Sibling Praise: As presented in Table 3c, perceived praise from siblings was negatively and marginally ($p = 0.082$) associated with child depressive symptoms. However, when controlling for child age and gender, this marginal association was no longer significant (ps > 0.111).

Paternal and Friend Praise: As shown in Tables 3b, d, perceived praise from fathers and friends was not associated with child depressive symptoms, and there was no moderation by maternal depression history. These results remained unchanged when controlling for child age and gender.

Does Maternal Depression Moderate Associations Between Youth Depression and Perceived Criticism and Praise?

Person-level Analyse

Maternal, Paternal, and Sibling Criticism: As can be seen in Tables S2a–c, the days on which youths perceived criticism from their mother ($\beta = 1.90$, $SE = 0.46$, $t = 4.14$, $p < 0.001$), father ($\beta = 1.86$, $SE = 0.61$, $t = 3.06$, $p < 0.01$), or sibling ($\beta = 1.06$, $SE = 0.36$, $t = 2.93$, $p < 0.01$), were days on which they experienced increases in depressive symptoms (relative to the prior day). These effects were not moderated by maternal depression history. These results remained unchanged when controlling for youth age and gender.

Friend Criticism: As shown in Table S2d, youths were marginally more depressed on days in which they perceived criticism from friends ($p = 0.054$). Importantly, as expected, the day-level effect of criticism was moderated by maternal depression ($\beta = 0.04$, $SE = 0.02$, $t = 2.79$, $p < 0.01$). As presented in Fig. 4, simple slopes analysis revealed no daily effect of friends' criticism on youths whose mothers had low levels of past depression ($\beta = -0.36$, $SE = 0.37$, $t = -0.96$, $p = 0.334$). However, this effect was significant for youths whose mothers had high levels of past depression. Their offspring exhibited day-level increases in depressive symptoms when they perceived criticism from friends ($\beta = 0.90$, $SE = 0.32$, $t = 3.12$, $p = 0.002$). These results remained unchanged when controlling for youths' age and gender.

Maternal and Paternal Praise: As shown in Tables S3a, b, on days in which youths perceived praise from their mother ($\beta = -0.36$, $SE = 0.15$, $t = -2.46$, $p < 0.05$) or father ($\beta = -0.48$, $SE = 0.20$, $t = -2.40$, $p < 0.05$), they experienced decreases in depressive symptoms. Maternal depression history did not moderate this association. These effects remained significant when controlling for youth age and gender.

Sibling and Friend Praise: As can be seen in Tables S3c, d, there were no effects for daily perceived praise from siblings or friends on youths' depressive symptoms. Maternal depression history did not moderate these associations and controlling for age or gender did not alter these findings.

Discussion

Using a daily-diary design, we examined if the associations between youths' depressive symptoms and everyday perceived criticism and praise was moderated by maternal depression history. The results largely support our hypotheses: the association between perceived criticism and youth depressive symptoms was stronger for children of mothers with higher (vs. lower) past depressive symptoms. The increased reactivity to criticism from multiple relational contexts (mothers, fathers, siblings, and friends) suggests that increased reactivity to perceived criticism may be a characteristic of offspring of depressed mothers that increases their risk for depression. Conversely, parental praise was associated with lower levels of depressive symptoms, suggesting that parental praise may be a pathway for resilience. Importantly, the effects of praise were not moderated by maternal depression history.

The results are in line with prior studies suggesting that perceived criticism and praise are related to youths' depression (Silk et al., 2017). The current findings extend previous research in several important ways. First, in addition to focusing on maternal criticism (Burkhouse et al., 2012; Frye & Garber, 2005; Nelemans et al., 2014; Nelson et al., 2003; Tompson et al., 2010), we examined additional relational contexts – fathers, siblings, and friends. Our results suggest that criticism from any family member – mothers, fathers, and – plays a role in youths' depression and are especially consequential in the case of maternal depression history. Specifically, we found that the association between criticism from any family member and youths' depression was significant for offspring of mothers with a high (vs. low) level of past depression.

Compared with the robust impact of familial criticism, perceived criticism from friends showed weaker associations with youth depressive symptoms. In fact, only high-risk youths experienced daily increases in their own depressive symptoms on days on which they felt criticized by a friend. No persistent, person-level effects of friend criticism emerged for low or high-risk youths. We were surprised to find such limited effects of friends' perceived criticism. It is plausible that this result is related to participants' relatively young age. If so, perhaps youths at high risk for depression might "transfer" their higher criticism-reactivity from family members to other relationships in time. Indeed, previous studies on older children of depressed mothers suggest that this is indeed the case (Katz et al., 2013). However, within the current sample, the limited effect of friends' criticism was unchanged when controlling for youths' age. Thus, another potential explanation is that only severe negative interactions with peers are associated with youth depression, as in cases of peer victimization (Burke et al., 2017) and isolation (Christ et al., 2017). The current results suggest that less severe (but more prevalent) negative interactions, in the form of criticism, negatively influence only high-risk youth in the long term.

Thus, our results are in line with prior studies showing an association between maternal criticism and youths' depression (Burkhouse et al., 2012; Nelemans et al., 2014; Silk et al., 2017). Our findings that fathers' and siblings' criticism were also consequential adds to the literature by emphasizing the importance of youths' relationships with siblings and fathers (Buist et al., 2014; Compton et al., 2003; Dirks et al., 2015; Finan et al., 2018; Harper et al.,

2016; Kim et al., 2007; Padilla-Walker et al., 2010). Moreover, this study is among the first to focus on relationships with fathers and siblings in the context of maternal depression (though see Brennan et al., 2003). Nevertheless, we note that the effect of sibling criticism, as well as its moderation by maternal depression history, was less robust compared to the impact of parental criticism. Future studies should investigate potential moderators of sibling criticism. Overall, our findings support larger theories that highlight the importance of simultaneously examining multiple relationships in youths' lives (Bronfenbrenner & Morris, 2007).

The finding that children of depressed mothers reacted to criticism from different relational contexts with steeper increases in depression suggests that children of depressed mothers are more "sensitive" to criticism. This interpretation is consistent with the Social Affective Neuroscience Model of risk and resilience for depression (Forbes et al., 2021). This model suggests that proximal risk factors, such as social experiences (e.g., criticism in the present study), may interact with distal risk factors (e.g., maternal depression in the present study) to increase depression risk in adolescence. More broadly, this interpretation is also consistent with diathesis-stress models of depression (Ingram & Luxton, 2005; Tompson et al., 2010); in the present study, maternal depression history would be considered a general diathesis, and perceived criticism would be a specific stressor. Importantly, criticism is particularly salient in this age group due to youths' increased sensitivity to social evaluation (van de Bos et al., 2014; Somerville et al., 2013).

A second way in which the current study expands on previous research is its implementation of a daily-diary design. The present study is the first to examine the association of perceived criticism and praise with depressive symptoms using daily diaries in an intensive longitudinal design. This methodology allows for better understanding of the associations between social evaluation and depression by distinguishing momentary (state-related, day-level) aspects of phenomena from more stable and cumulative (trait-related, person-level) aspects (Zilcha-Mano, 2017). For example, we found that youths experienced increases in depressive symptoms, regardless of maternal depression history, on days on which they perceived being criticized by any family member (mother, father, or sibling). At the person-level, maternal depression history moderated the effects of both maternal, paternal, and sibling criticism, such that for children of mothers with high (vs. low) depressive symptoms, perceived criticism and depression symptoms were significantly associated. These day-level versus person-level differences highlight an important insight. Although all youths reacted to perceived criticism from family members with transient increases of depressive symptoms, only youths at high risk for depression suffered the cumulative impacts of criticism as evidenced by higher levels of depressive symptoms.

The present study is one of the first to document rates of daily criticism and praise in the lives of youths. Although the topic of criticism has been widely explored in this age group, it appears that only a few studies have directly compared the impacts of criticism and praise, using neuroimaging (e.g., Lee et al., 2015; Silk et al., 2017). The current study informs us about the relative frequency of criticism and praise in youth's daily life. We found that criticism was significantly less prevalent compared to praise, a finding that held across relational contexts. Indeed, praise was 2.5–8 times more prevalent than criticism, which is

consistent with prior work on typical romantic and parent–child relationships, showing that positive interactions are five times more prevalent than negative interactions (Armstrong & Field, 2012; Gottman & Levenson, 1992). Interestingly, although we found low rates of criticism, we also found robust and persistent effects of criticism across analytic levels (i.e., person and day levels) and across contexts (i.e., mothers, fathers, etc.) consistent with the notion that criticism is a powerful interpersonal event, even when it is rare.

A third way in which the current study extends previous research is that we examined both perceived criticism and its positive equivalent, perceived praise. Our results partly support our hypotheses. As predicted, on days in which youth felt praised by their mother or father, they experienced decreases in depressive symptoms. Person-level analyses revealed an association between youth depressive symptoms and maternal praise only, suggesting that the effects of paternal praise are less robust as they do not cumulatively influence youths' depressive symptoms. Contrary to our hypotheses and neuroimaging findings on depressed youth (Silk et al., 2017), the effect of praise was not moderated by maternal depression history. This lack of moderation is in line with a prior meta-analysis, which demonstrated that the association between maternal depression and negative parenting behaviors is weak, whereas the association between maternal depression and negative behaviors is stronger (Lovejoy et al., 2000). In addition, praise from neither friends nor siblings had any association with youth depression. Thus, it appears that criticism, as compared to praise, has a more salient role in the development of depression in general. Nevertheless, since reactivity to social evaluation increases throughout adolescence (e.g., van den Bos et al., 2014; Somerville et al., 2013) and our sample was relatively young (Mean age = 11.5), it is also possible that the effects of criticism merely precede the effects of praise. Studies comparing children with older adolescents and adults are needed to examine this question.

The current study did not reveal associations between maternal depression and maternal criticism or praise. It should be noted that although some studies have shown that maternal depression history is positively associated with maternal criticism (e.g., Foster et al., 2008; Nelson et al., 2003; Tompson et al., 2010), others have failed to find such associations (e.g., Burkhouse et al., 2012; Gibb et al., 2009; Mellick et al., 2015) and, in general, the association between maternal depression and negative parenting behaviors is stronger amid mothers with current depression (vs. past; Lovejoy et al., 2000; also see Burkhouse et al., 2012; Mellick et al., 2015). Moreover, meta-analyses on the associations between maternal depression and child outcomes have often found that the effects of maternal depression are small and are moderated by many confounding factors (e.g., SES; Goodman et al., 2011; Pelham et al., 2020). Thus, it is possible that the association between maternal depression and maternal behaviors (such as criticism and praise) are also moderated. Future studies are needed to examine under which conditions the direct impact of maternal depression on maternal behaviors is more (or less) pronounced.

Limitations and Future Research

The current study has several limitations that should be acknowledged. First, we used a community sample to study depression symptoms. Nevertheless, rates of maternal depression history were considerable; the mean sum-score of the questionnaire assessing

past depression was over 25, the cutoff used to detect past depression in other studies (Gadassi & Mor, 2016; Rude & McCarthy, 2003). Moreover, rates of depression scores in the youths included in this study were also higher than expected in a community sample (over 30% of the sample scored above the clinical cutoff). However, the high rates of psychopathology do not preclude the need for future studies relying on clinical assessment of maternal and child psychopathology. Similarly, the sample size, spread across a relatively wide age-range, limits our ability to generalize the study's conclusions and examine age-related interactions, especially considering that a significant number of our participants were siblings. Future studies using larger samples are needed to replicate our results and examine developmental effects. A second limitation is that criticism and praise were assessed using youth's self-report via a yes/no checkbox. Though previous studies show that the effect of criticism reported by parents is mediated by child-perceived criticism (Nelemans et al., 2014), future studies relying on more objective measures of criticism and praise would be helpful, as well as using a more nuanced assessment of the intensity and target of the social evaluative feedback. Finally, although we assessed different relational contexts simultaneously, we certainly did not examine all factors in youths' ecosystems. Indeed, it may be informative to examine peers who are *not* friends, and other adults (e.g., teachers, grandparents) who may play important roles in youths' depression (e.g., Herres et al., 2016).

Clinical Implications

Results of the current study have several clinically relevant implications. Importantly, the current study suggests that children of depressed mothers are particularly reactive to criticism from different relational contexts. This finding pinpoint a potential modifiable risk factor for childhood depression – repeated exposure to criticism (Burkhouse et al., 2012). Treatments focusing on helping youth reframe critical remarks, or better regulate their negative emotions after receiving a critical feedback, can help counteract the effect of perceived criticism. The finding that social feedback not only from mothers but also from fathers and siblings were associated with youth depression emphasizes the need to look at the family as a whole instead of solely focusing on the mother. This finding lends further support to family-based therapies aimed at reducing familial criticism, which are effective in treating adolescent depression (Ibrahim et al., 2017). Furthermore, our findings suggest that youth's perception of criticism may be a prime target for prevention programs targeting high-risk youth. Conversely, the current study showed that perceived parental praise was associated with lower levels of youth depression, an effect that was not moderated by maternal depression history. This suggests that enhancing positive evaluative feedback from parents can contribute to youth resilience regardless of risk group membership.

Summary

The present study is an innovative exploration of daily experiences of perceived criticism and praise from family members and friends and their associations with youths' depressive symptoms. Our results reveal that all youths react to criticism with transient (daily) increases in depressive symptoms. However, familial criticism was associated with higher depressive symptoms over time only in offspring of depressed mothers, implying that increased reactivity to criticism may be a risk factor for depression. Parental praise, however, was associated with lower depressive symptoms regardless of maternal depression history,

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suggesting that enhancing positive feedback might be a promising point-of-entry for intervention.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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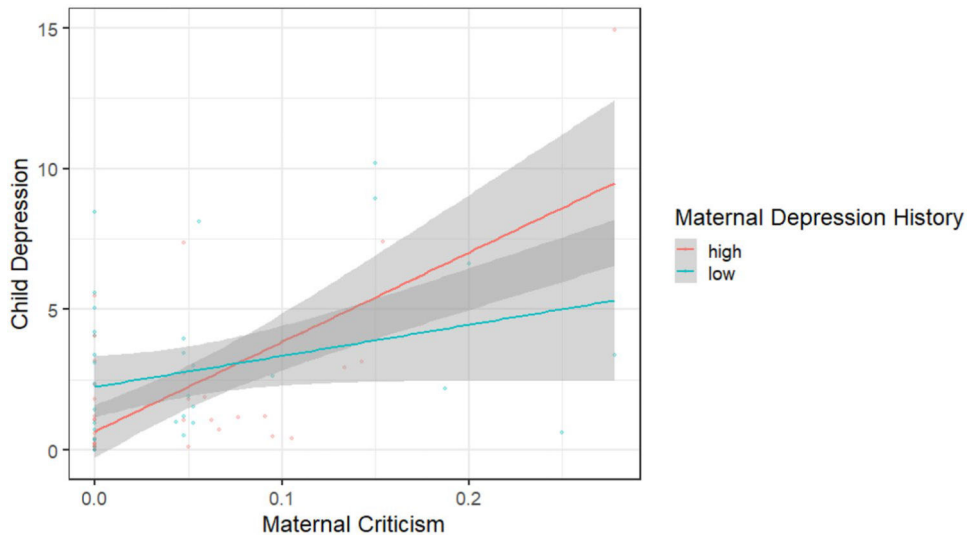
Fig. 1.
Person-level moderation of the association between maternal criticism and child depressive
symptoms by maternal depression

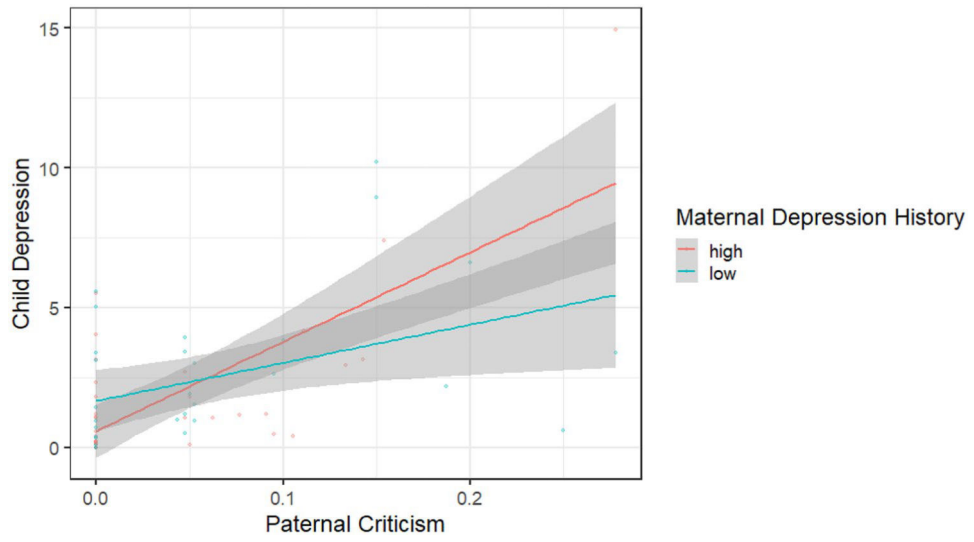**Fig. 2.**
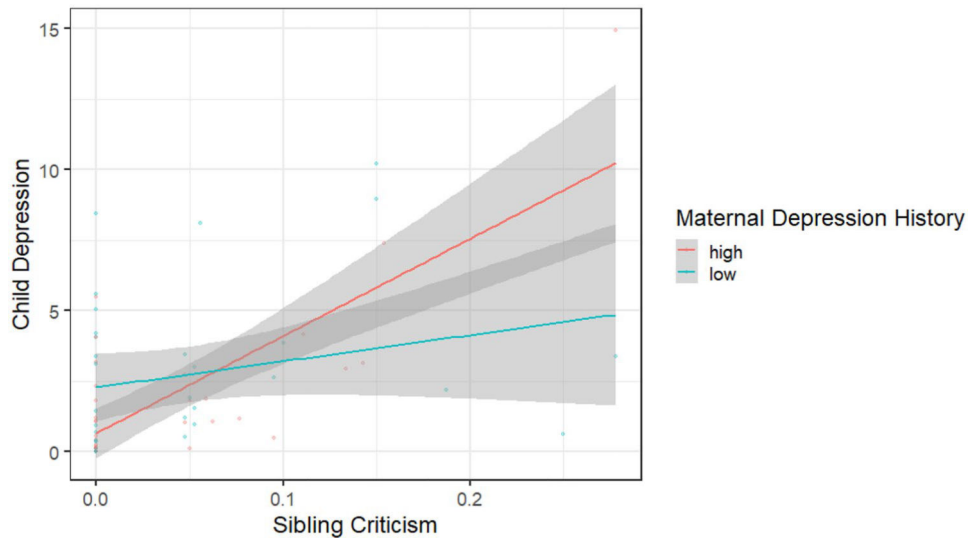Person-level moderation of the association between paternal criticism and child depressive symptoms by maternal depression

Fig. 3.
Person-level moderation of the association between sibling criticism and child depressive symptoms by maternal depression
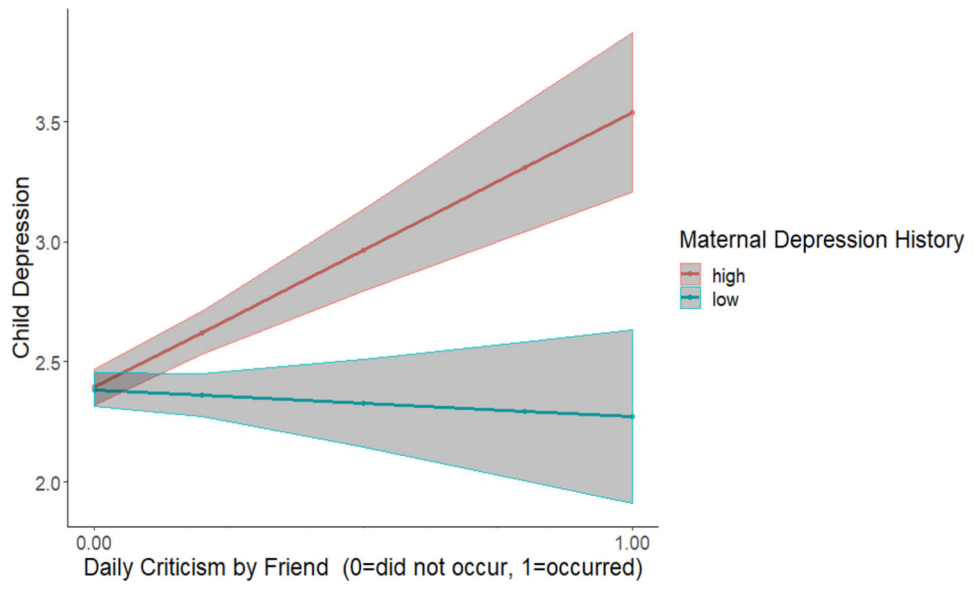
Fig. 4.
Day-level moderation of the association between friend criticism and child depressive symptoms by maternal depression

Table 1

Percentage of days in which participants perceived criticism and praise, delineated by source, along with their correlations with child depression symptoms ($N = 72$)

	Praise			Criticism		
	Mean %	SD	Range	Mean %	SD	Range
Mother	38.90	34.52	0–100	5.90	7.00	0–27.77
Father [a]	32.77	31.84	0–100	5.06	6.61	0–25.00
Sibling [b]	19.59	27.15	0–100	7.54	10.43	0–40.00
Friend	35.77	29.97	0–100	4.46	7.64	0–38.46

[a] Ten participants who reported no positive or negative interactions with their father were excluded from analysis

[b] Nine participants who reported no positive or negative interactions with their siblings were excluded from analysis

Table 2

The moderation of the perceived criticism–child depression association by maternal depression history: Person-level analyses

	Child Depression	β	SE	df	t	95% CI
(a)	Intercept	2.58	0.29	66	8.89***	2.00, 3.17
	Maternal Depression History	−0.01	0.02	66	−0.39	−0.06, 0.04
	Maternal Criticism	23.78	4.41	66	5.39***	14.97, 32.58
	Maternal Depression History*Maternal Criticism	0.91	0.28	66	3.19**	0.34, 1.48
	Maternal Depression—Current	0.06	0.04	66	1.56	−0.02, 0.06
(b)	Intercept	2.49	0.33	56	7.52***	1.83, 3.16
	Maternal Depression History	0.02	0.02	56	0.72	−0.03, 0.06
	Paternal Criticism	24.04	5.62	56	4.28***	12.78, 35.30
	Maternal Depression History *Paternal Criticism	0.65	0.33	56	1.97^a	−0.01, 1.31
	Maternal Depression—Current	0.02	0.04	56	0.58	−0.05, 0.09
(c)	Intercept	2.53	0.36	57	6.96***	1.80, 3.26
	Maternal Depression History	−0.004	0.03	57	−0.14	−0.07, 0.06
	Sibling Criticism	8.91	3.72	57	2.40*	1.46, 16.37
	Maternal Depression History* Sibling Criticism	0.41	0.22	57	1.85^a	−0.03, 0.12
	Maternal Depression—Current	0.02	0.05	57	0.50	−0.07, 0.12
(d)	Intercept	2.42	0.34	66	7.04***	1.73, 3.10
	Maternal Depression History	−0.01	0.03	66	−0.50	−0.07, 0.04
	Friend Criticism	8.33	4.83	66	1.72^a	−1.31, 17.98
	Maternal Depression History* Friend Criticism	0.23	0.32	66	0.72	−0.40, 0.86
	Maternal Depression—Current	0.02	0.04	66	0.50	−0.06, 0.10

*
$p < 0.05$

**
$p < 0.01$

***
$p < 0.001$

[a]
$p < 0.05$ one tailed

Table 3

The moderation of the praise–child depression association by maternal depression history: Person-level analyses

	Child Depression	β	SE	df	t	95% CI
(a)	Intercept	2.46	0.33	66	7.36***	1.79, 3.12
	Maternal Depression History	0.002	0.03	66	0.06	−0.05, 0.05
	Maternal Praise	−2.84	0.99	66	−2.86**	−4.82, −0.86
	Maternal Depression History*Maternal Praise	−0.01	0.06	66	−0.21	−0.14, 0.11
	Maternal Depression-current	−0.02	0.06	66	−0.21	−0.10, 0.06
(b)	Intercept	2.26	0.36	56	6.20***	1.53, 2.98
	Maternal Depression History	0.01	0.03	56	0.39	−0.04, 0.06
	Paternal Praise	−1.53	1.16	56	−1.32	−3.85, 0.78
	Maternal Depression History *Paternal Praise	−0.002	0.04	56	−0.62	−0.14, 0.14
	Maternal Depression-current	−0.02	0.04	56	−0.62	−0.10, 0.06
(c)	Intercept	2.44	0.37	57	6.55***	1.69, 3.19
	Maternal Depression History	0.01	0.03	57	0.44	−0.05, 0.08
	Sibling Praise	−2.45	1.38	57	−1.77[a]	−5.22, 0.32
	Maternal Depression History * Sibling Praise	−0.06	0.08	57	−0.68	−0.23, 0.11
	Maternal Depression-current	−0.01	0.05	57	−0.27	−0.10, 0.08
(d)	Intercept	2.48	0.36	66	6.90***	1.76, 3.20
	Maternal Depression History	0.01	0.03	66	0.33	−0.05, 0.07
	Friend Praise	−1.08	1.27	66	−0.85	−3.61, 1.45
	Maternal Depression History * Friend Praise	−0.01	0.08	66	−0.13	−0.18, 0.16
	Maternal Depression-current	−0.02	0.04	66	−0.40	−0.10, 0.07

*
$p < 0.05$

**
$p < 0.01$

***
$p < 0.001$