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Maternal Depressive Symptoms, Maternal Behavior, and Toddler Internalizing Outcomes: A Moderated Mediation Model

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Abstract

Maternal depression relates to child internalizing outcomes, but one missing aspect of this association is how variation in depressive symptoms, including mild and moderate symptoms, relates to young children's outcomes. The current study examined a moderated mediation model to investigate how maternal behaviors may mediate this association in the context of child temperament and gender. Mothers and toddlers completed a free-play/clean-up task in the laboratory. Mothers rated their depressive symptoms and their toddlers' temperament and internalizing behaviors. Results indicated a significant indirect of maternal warmth on the relation between maternal depressive symptoms and toddler internalizing outcomes for boys with low negative emotionality. Toddler gender and temperament moderated the relation between maternal intrusiveness and toddler internalizing outcomes, but mediation was not supported. Results highlight the important interaction between child and maternal variables in predicting child outcomes, and suggest mechanisms by and conditions under which mild maternal depressive symptomatology can be a risk factor for toddler internalizing outcomes.

Keywords

maternal depression; internalizing behaviors; toddlerhood; parenting; temperament; gender

It is estimated that 17–24% of mothers of young children experience at least some depressive symptomatology [1]. Maternal depressive symptomatology is linked to adverse cognitions that may affect the quality of the mother's parenting experience, including her feelings of competence as a mother, her enjoyment of her parental role, and her perceptions of her child [2]. Such negativity may hinder the degree to which depressed mothers can effectively parent, which may in turn lead to negative outcomes for the child. However, little research to date has examined how parenting behavior may help explain negative child outcomes associated with maternal depression. There is a particular lack of research focused on toddlerhood, and few investigations have examined whether a dimensional measure of depressive symptoms relates to adverse outcomes. Understanding the environmental mechanisms underlying these effects is important in helping identify at-risk children. Further, because the literature is increasingly finding that transactional relations between parents and children affect child outcomes [3–4], it is important to investigate child

characteristics that help determine when depressive symptoms influence maternal behavior and subsequent child outcomes. The purpose of the present study was to investigate associations among mild to moderate maternal depressive symptoms, maternal behavior, and toddler internalizing outcomes, as well as child characteristics (i.e., temperament, gender) that may moderate these associations (for conceptual model, see Figure 1).

Effects of Maternal Depressive Symptoms on Child Internalizing Outcomes

Internalizing problems have a broad impact on children's development, including decreased social competence and peer acceptance [5, 6]. Although higher rates of internalizing behavior has been one of the most studied child outcomes related to maternal depression, the literature has largely focused on older children and adolescents [e.g., 7], neglecting these outcomes in toddlers. Studying the effects of maternal depressive symptoms during children's early development is particularly important because toddlerhood is characterized by rapid changes in cognitive, emotional, and neurobiological growth, and these changes influence emotional experiences as children become aware of their abilities to regulate arousal and expression of their emotions [8]. Because parents provide important support and modeling as toddlers attempt to master normative age-related tasks [9,10], this age group seems particularly vulnerable to the adverse effects of parental psychopathology. Indeed, a recent meta-analysis reported that the effects of maternal depression on child internalizing difficulties are greater when exposure occurs at younger ages [11].

Results from research using methodologies such as the Still Face paradigm, during which caregivers maintain a neutral face while interacting with their infants [12], suggest that even in infancy, children can recognize their mothers' moods and react to them, and that depressive symptoms may limit mothers' abilities to evoke positive infant states [13]. Available studies focusing on toddlerhood tend to utilize more natural interactions [e.g., 14, 15] to provide observational indexes of more complex exchanges between mothers and their toddlers. Such research has found that exposure to maternal depression during toddlerhood is related to higher rates of internalizing behaviors [14], increased difficulty regulating affective expression [16], and increased inhibition to unfamiliar people and situations [15]. However, the literature has largely neglected the lower end of the depressive symptoms continuum, which is more common among mothers than clinical depression [1]. As an exception, West and Newman [17] illustrated that even mild depression relates to increased internalizing behavior in young children. Because the effects of maternal depression can emerge in young children and have a long-lasting impact, it is important to better understand the specific mechanisms through which this occurs. The current study examines maternal behavior as one such mechanism.

Depressive Symptoms and Maternal Behavior

Though the literature supports that maternal depressive symptomatology has negative implications for children's emotional development, it remains unclear exactly how maternal depressive symptoms promote these outcomes. Outside of the contribution of heritable vulnerabilities [e.g. 18], research has indicated that environmental factors have a unique influence [19]. As part of a larger system of risk factors, Goodman and Gotlib [20] theorized

that because depression is associated with negative cognitions, behaviors, and affect, the parent is unable to meet the child's social and emotional needs and engages in non-optimal parenting, thereby increasing the child's risk for the development of similar negative outcomes.

In accordance with this theory, empirical research suggests that, broadly, maternal depression is associated with negative parenting behaviors, including unresponsiveness, inattentiveness, and intrusiveness [16]. One of the most prevalent behaviors that has emerged is disengagement, which is often conceptualized as emotional unavailability and withdrawal, or a lack of warmth and sensitivity to the child's needs [21] that can manifest in a variety of behaviors, such as decreased responsiveness, decreased verbal (e.g., laughing) and physical affection (e.g., hugging), and fewer positive facial expressions (e.g., smiling) [2, 6, 22]. Depressive symptoms may interfere with mothers' abilities to display appropriate warmth and use affective signals thought to be important in children's emotional development.

Conversely, depressed mothers may also become over-involved in an intrusive manner. Intrusive mothers tend to respond to their children in a controlling manner [21], such as overwhelming the child with stimulation, changing the focus of play without considering the child's current interest, using assertive verbal directives, or physically manipulating the child's actions [23]. These intrusive behaviors can emerge with children as early as infancy [24], but less research has examined these behaviors in the toddler years. Such behaviors may prevent the child from engaging in necessary self-initiated coping techniques, as intrusive mothers may take control of situations in which they expect their children may experience anxiety [22, 25]. However, this research has been conducted primarily with clinically depressed mothers, so it is unclear whether this applies to mothers across the depression spectrum.

Maternal Behavior and Child Internalizing Outcomes

The concurrent relation between depressive symptoms and negative parenting behaviors warrants further study into how behaviors link maternal depressive symptoms with child internalizing outcomes. For example, excesses in maternal involvement have been connected to increased child anxiety and depression [22, 25]. Similarly, when depressed mothers exhibit more intrusiveness and less warmth, children respond with reduced activity, dysphoria, and social withdrawal [24]. The little research that has examined how depressed mothers' behaviors explain child outcomes has focused on older child populations. For instance, Elgar and colleagues [7] found that low warmth and high rejection mediated the relation between parental depression and internalizing and externalizing problems in 10–15 year olds. These results support the notion that both the presence of negative behaviors and the absence of positive behaviors may help explain the relation between maternal depressive symptoms and child maladjustment. The present study uses a similar model to examine low warmth and intrusiveness as explaining the association between maternal depressive symptoms and toddlers' internalizing behaviors.

Child Characteristics as Moderating Variables

The literature on maternal depression has highlighted the need to examine transactional models for understanding both mechanisms and moderators explaining the transmission of risk for children of depressed mothers [11]. Empirical evidence for transactional models of parent-child interactions suggests that children's characteristics not only affect how mothers with depressive symptoms behave with their children [3, 4], but also influence how maternal behaviors relate to child outcomes [19, 26]. Thus, child characteristics attenuate or strengthen the interrelations among maternal depressive symptoms, maternal behaviors, and child outcomes. The current study investigates the potential moderating roles of toddler gender and temperament.

Gender

Research regarding gender differences in the relation between maternal depressive symptoms and child outcomes has been mixed, but a recent meta-analysis reported that, overall, maternal depression is more strongly associated with internalizing problems in girls than in boys [11]. Previous research also suggests that maternal dysphoria is related to internalizing outcomes in girls but not boys [27]. Less attention has been paid to how gender functions when considering the mechanisms by which depressive symptoms relate to child outcomes, and existing research has yielded mixed results. Some researchers have hypothesized that boys and girls are adversely impacted by maternal depression through different environmental processes, with boys more vulnerable through family discord and girls through more direct interactions with their mothers [28]. Other researchers have postulated that girls are more sensitive to maternal depression through environmental processes, whereas boys' risk is the product of genetic vulnerability [19]. There is also some evidence that there may be parenting styles associated with depression that are either used more often with girls or to which girls may be more sensitive than boys, such as less warmth or more aversive behavior [11]. Thus, it appears that the literature supports gender differences in child outcomes related to maternal depression to some degree, but more research is needed to clarify both how gender influences the behavior of mothers with depressive symptoms, and how gender influences the relation between maternal behaviors and child outcomes.

Temperament

The mixed results in the gender literature may be due to other moderating child characteristics, such as temperament, that have important influences on the child's interaction with the environment and subsequent outcomes. Of interest to the current study is the temperamental construct of *negative emotionality (NE)*, which refers to the propensity to experience and express negative emotions, including fear/withdrawal in novel situations, strong arousal and reactivity, and anger and sadness expressions [26]. Previous research suggests that NE may moderate the effect of maternal depressive symptoms on child outcomes, such that higher NE interacts with higher depressive symptoms to predict increased behavior problems [29]. With regards to how NE affects parenting behavior, young children with high NE may be more likely to experience suboptimal relationships with their mothers [30], and mothers of children more susceptible to distress tend to display

less warmth [31]. Thus, it seems reasonable that this would be true for mothers with depressive symptoms, whose behavior may be particularly affected by their child's negativity [20] (thus influencing the "A" path in Figure 1). Gender may also influence mothers' responses to their children's NE; for example, some research suggests that NE in boys may be more distressing to mothers than in girls [32]. Thus, further study is warranted regarding how NE, in the context of gender, affects mechanisms of influence from maternal depressive symptoms to child outcomes.

Research has also investigated how child NE may influence the link between maternal behaviors and child outcomes. Belsky's [33] differential susceptibility hypothesis posits that children vary in their vulnerability to parenting, and perhaps to environmental influences more generally, due to underlying biological characteristics inherent to the child (i.e., temperament). Thus, NE may interact with environmental factors like parenting to create negative outcomes [26], such that children with high NE are most susceptible to both positive and negative environmental influences [34]. This research suggests that NE may moderate the pathway from maternal behavior to child outcomes, such that children higher in NE are at greater risk. Conversely, there is research to suggest that mild intrusiveness may be beneficial for children who need additional practice coping with disruption (i.e., children high in NE), whereas for children who do not need this (i.e., children low in NE), intrusiveness may be detrimental [35]. However, few studies have investigated these associations in mothers with depressive symptoms, and despite previous research indicating the need to study individual differences in interactional processes related to gender and temperament [28], it is unclear how gender and NE may concomitantly affect outcomes.

Current Study

The current study aims to contribute to the literature by studying how parenting behaviors help explain the relation between maternal depressive symptoms and child outcomes in a younger, putatively more vulnerable population. We examine toddler gender and NE conjointly as moderators of associations among maternal depressive symptoms, maternal behavior, and child outcomes (Figure 1) among mothers ranging from no symptoms to mild to moderate depression symptoms. Based on existing research, the current study holds several hypotheses: (1) As mothers' depressive symptoms increase, they will exhibit more negative parenting behaviors (i.e., lower warmth, higher intrusiveness); (2) longitudinally, toddlers of mothers with higher levels of depressive symptoms will have higher levels of internalizing symptoms relative to toddlers of mothers with lower symptoms; (3) negative maternal behaviors (i.e., low warmth, intrusiveness) will mediate this relation; and (4) gender and NE will conjointly (i.e., within a three-way interaction) moderate the associations found among maternal depression, maternal behavior, and toddler outcomes. More specifically, it is hypothesized that the relation between maternal depressive symptoms and negative maternal behaviors (A path) and the relation between negative maternal behavior and child internalizing outcomes (B path) will be strongest for girls with higher NE.

Methods

Participants

As part of a larger study, 91 (37 female, 54 male) toddlers and their mothers participated in a laboratory visit and questionnaire completion when toddlers were approximately 24 months old ($M = 23.93$ months, $SD = .70$ months). Mothers were recruited through the mail according to local published birth records ($n = 82$) and in person at local meetings of the Woman, Infants, and Children (WIC) program ($n = 9$). Eighty-eight mothers (97%) reported that the child lived with both their biological mother and father; the remaining three reported the child as living primarily with their biological mother only. Children were 85% European American, 5% African American, 8% Asian American, 1% biracial, and 1% “other.” Socioeconomic status (SES) was measured using the Hollingshead’s four factor index (Hollingshead, 1975), which is a composite of weighted scale scores of the occupation and educational level of both parents, if available. Scores can range from 8 to 66, with higher scores indicating higher SES. In general, mothers had a college education, and ranged in years of education from 11 to 20+ years ($M = 16.35$ years, $SD = 2.36$ years). Families’ gross annual income ranged from less than \$16,000 to more than \$60,000, with the majority reporting at least \$41,000. Of the 91 mothers, 70 (77%) completed a follow-up questionnaire packet when children were approximately 36 months old.

Procedure

Mothers who expressed interest in joining the study (either via a postcard returned through mail or by signing up at a WIC meeting) were contacted by a laboratory staff member and mailed a packet containing a consent form and questionnaires. At the laboratory, the experimenter told the mother that she and her toddler would be participating in a free-play and clean-up task (among other activities not included in the current study). These visits were videotaped for observational coding by trained coders. When children were 36 months old, mothers were mailed a follow-up questionnaire packet to complete and mail back.

At the 24 month visit, the experimenter led the mother and child into a large room with several age-appropriate toys. She stated to them, “These toys are here for both of you to play with. You can play with them however you like, and I will be back in a few minutes.” She left the room and allowed the mother and child to play for 3 minutes. After that time, the experimenter knocked and entered the room with a large tub. She stated, “(Mother’s name), you can do whatever you would normally do to help (child’s name) clean up. I’ll let you both work on that and I’ll be back in a few minutes.” The clean-up portion lasted until the toys were cleaned up, or a maximum of 5 minutes.

Trained coders rated appropriate behaviors and expressions from each of these episodes. Coders received 15–20 hours of training by a master coder (E. Kiel) with whom they established minimum reliability (interclass correlation [ICC] or kappa = .80) and were required to maintain reliability throughout coding. The coders and master coder reconciled discrepancies by watching episodes together and determining appropriate scores.

Measures

Maternal depressive symptomatology—Mothers reported on their depressive symptoms using the Center for Epidemiological Studies-Depression scale (CES-D) [36]. This 20-item measure assesses depressive symptoms in the general population. Mothers rated how often they experienced various symptoms of depression (e.g., “I felt sad”) using a 4-point scale ranging from 0 (*rarely to none of the time*) to 3 (*most or all of the time*). Previous studies have determined this instrument has acceptable internal consistency, and validity has been supported by associations with similar measures of depression [36]. A sum of the 20 items ($\alpha = .80$) yielded an overall depressive symptom score. Because the CES-D is a continuous measure, mothers both with and without depressive symptoms were present in the sample.

Toddler internalizing behavior—Mothers completed the Infant-Toddler Social and Emotional Assessment (ITSEA) [37], a 168-item questionnaire measure designed to assess social-emotional and behavioral problems in toddlers 12 to 36 months of age. Mothers complete items using a 3-point scale ranging from 0 (*not true/rarely*) to 2 (*very true/often*). Previous research has evaluated test-retest reliability of this measure, with coefficients ranging from .82 to .90 for the different subscales, and validity has been supported by associations with similar measures of child behavior problems [37]. Of relevance to the current study was the Internalizing domain (32 items; $\alpha = .79$ at 24 months and .75 at 36 months), which included depression/withdrawal items (e.g., “looks unhappy or sad without any reason”) and anxiety items (e.g., “seems nervous, tense, or fearful”).

Toddler temperament—Mothers completed a revised version of the Toddler Behavior Assessment Questionnaire (TBAQ) [38], a 110-item questionnaire assessing temperament-related behavior in children 16 to 36 months of age. Previous research has established acceptable internal consistency (as $> .80$ for each scale), and validity of this measure has been supported by associations with other temperament questionnaires [38]. The TBAQ contains 11 scales, each of which contains 10 items. The current study used the Sadness (e.g., “When told to do something s/he did not want to do, how often did __ become tearful?”), Anger (e.g., “When you removed something __ should not have been playing with, how often did s/he protest (scream or grab objects back)?”), Object Fear (e.g., “When a dog or other large animal approached __, how often did s/he cling fearfully to you?”), and Social Fear (e.g., “When one of the parents’ friends who did not have daily contact with __ visited the home, how often did __ talk much less than usual?”) scales. For the purposes of this study, a negative emotionality composite (NE) was created using scores from these subscales ($\alpha = .89$).

Maternal behavior—For the free-play and clean-up tasks, maternal behavior was coded during 10-second epochs according to procedures from Gaertner, Spinrad, and Eisenberg [23]. Warmth (e.g., closeness, friendliness, encouragement, physical affection) was coded on a 5-point scale, from 1 (*none, parent ignores child most of the time*) to 5 (*parent is engaged with child most of the time/highly affectionate*). Intrusiveness (e.g., offering a barrage of stimulation or toys, not allowing child to influence pace or focus of play, taking away objects the child is still interested in, physical manipulations) was rated on a 4-point scale,

from 1 (*none observed*) to 4 (*high, mother is extremely intrusive or over-controlling*). Previous studies have found that ratings of these behaviors correlate with similar constructs, such as observed positive affect and controlling behavior in different tasks [23]. Inter-rater reliability was computed between coders and a master coder on approximately 20% of cases throughout coding, which was found to be adequate for both warmth ($ICC = .84$) and intrusiveness ($ICC = .77$).

Results

Missing Data

Twenty-one mothers did not complete the ITSEA for the 36-month assessment. Independent-samples *t*-tests revealed that these mothers differed from mothers who did complete the ITSEA at 36 months on depressive symptoms, mother's age, and recruitment method ($ps < .05$). A significant Little's MCAR test ($\chi^2[9] = 15.68, p = .02$) suggested that missing data were systematically related to patterns of variables in the data set. Because of this, these variables were included in the missing data analyses and as covariates in all subsequent analyses, as has been recommended for imputing data that is not missing completely at random [39].

Multiple imputation is the suggested approach for a moderate amount of missing data (particularly when data are not missing completely at random) because restricting longitudinal investigations to participants with complete data may bias parameter estimates [39]. Therefore, missing values of 36-month internalizing scores were imputed across 20 imputations. The algorithm included 24-month internalizing scores, toddler gender, toddler age, mother age, recruitment method, SES, maternal depressive symptoms, and existing values of 36-month internalizing scores. Remaining analyses use this imputed data ($N = 91$).¹

Preliminary Analyses

Descriptive statistics and bivariate relations are presented in Table 1. Primary variables showed reasonable adherence to normality ($skew < 1.0$). Given that the current study utilized a community sample, we were interested in whether the range was restricted for child internalizing outcomes. Scores for the 36-month internalizing domain ranged to a *t*-score of 70, suggesting that children with extreme scores (i.e., 2 SDs above the average of the reference group) were represented. Internalizing outcomes were moderately correlated between 24 and 36 months ($r = 0.41, p < .01$). Because this was only a moderate relation, it is likely that additional variables beyond the stability of internalizing behaviors could explain 36-month outcomes. Additionally, although there was a significant relation between temperament and internalizing outcomes ($r = .31, p < .01$), there is still a good amount of unique variance between these variables. Moreover, these variables are conceptually distinct, as temperament was comprised of anger in addition to fear and sadness. Interestingly, maternal depressive symptoms only marginally related to 24-month

¹Overall, results using the original data were relatively consistent with those using the imputed data. Interaction effects remained significant in the same direction. The indirect effect remained significant (indirect effect = .005, $SE = .001$, 95% CI [0.0003, .001]).

internalizing behaviors ($r = .20, p < .10$) and were not significantly related to 36-month outcomes ($r = .15, ns$). A regression analysis indicated that maternal depressive symptoms did not significantly predict 36-month internalizing outcomes while controlling for 24-month scores ($b = .05, t[90] = 1.40, ns$). However, this does not preclude the possibility that moderators may be involved in the indirect relation through parenting behaviors, and recent researchers have proposed that the total effect of the predictor on the outcome does not need to be significant in order to assess an indirect effect [e.g., 40].

Moderated Mediation Models

Primary analyses investigated the indirect effect from maternal depressive symptoms to child internalizing outcomes through maternal warmth and intrusiveness in the context of child gender and temperament. Regression analyses were conducted by examining the three-way interaction among maternal depressive symptoms, toddler gender, and toddler NE in relation to a maternal behavior (Path A) and then among maternal behavior, toddler gender, and toddler NE in relation to toddler internalizing behaviors, above and beyond depressive symptoms and relevant Path A interactions (Path B). Maternal age, 24-month internalizing behaviors, SES, and recruitment method were included in analyses as covariates. A priori power analyses for multiple regression models suggested adequate power ($>.80$) for this number of variables, given effect sizes in the medium to large range ($f^2 >.20$). Continuous variables were centered at their means prior to analyses in order to aid in interpretation and to reduce multicollinearity, and gender was dummy coded (with males = 0). Significant interactions were probed for simple effects by recentering temperament at standard values (± 1 SD in addition to means) and by changing the reference group of the gender variable, as well as by examining regions of significance using an online tool. The indirect effect was examined using the PROCESS macro [41], which uses bootstrapping to estimate a confidence interval around the indirect effect. Because the tool for regions of significance and the PROCESS macro are not designed to work with multiple imputation files, the 20 imputations were averaged to create a 36-month internalizing variable for these analyses only. Squared semi-partial coefficients (sr^2) are indicated as effect sizes.

Warmth—Regression analyses are presented in Table 2. For the A path of the model (examining the relation between maternal depressive symptoms and maternal warmth), the three-way interaction among maternal depressive symptoms, toddler gender, and toddler NE was significant ($b = -0.11, t[90] = -2.18, p < .05, sr^2 = .05$). Probing this interaction by recoding/recentering gender and NE revealed that the two-way interaction between maternal depressive symptoms and NE was marginally significant for boys ($b = 0.06, t[90] = 1.93, p < .10, sr^2 = .04$) but not significant for girls ($b = -0.05, t[90] = -1.25, ns$). For boys (Figure 2), maternal depressive symptoms were marginally significant at -1 SD of NE ($b = -0.06, t[90] = -1.94, p < .10, sr^2 = .04$), but were not significant either at the mean ($b = -0.02, t[90] = -0.98, ns$) or at $+1$ SD of NE ($b = 0.02, t[90] = 0.57, ns$). The region of significance of this interaction revealed that the relation between maternal depressive symptoms and maternal warmth for boys shifted from non-significance to significance when NE decreased to a value of 2.50 (1.17 SD below the mean). There were no significant associations for girls. Thus, for boys, temperament moderated the extent to which maternal depressive symptoms related to

maternal warmth. At lower NE, increasing maternal depressive symptoms related to lower warmth.

For the B path of this model, the three-way interaction among maternal warmth, toddler gender, and toddler NE in relation to age 3 internalizing problems was not significant. When this interaction was removed, none of the two-way interactions emerged as significant. However, there was a significant main effect of maternal warmth above and beyond the three-way interaction and lower-order interactions from path A ($b = -0.06$, $t[90] = -2.44$, $p < .05$, $sr^2 = .09$).

We next investigated the indirect effect of maternal depressive symptoms on age 3 internalizing behaviors through maternal warmth, with NE and gender moderating the A path. Although the effect was small, the indirect effect of maternal depressive symptoms on toddler internalizing behaviors through maternal warmth was found to be significant for boys when NE was low (indirect effect = .003, $SE = .002$, 95% CI [.0001, .0083]). Thus, maternal depressive symptoms related to toddler internalizing behaviors through low warmth for boys with lower NE.

Intrusiveness—Regression analyses are presented in Table 3. For the A path of this model, the three-way interaction among maternal depressive symptoms, toddler gender, and toddler temperament was not significant. When the three-way interaction was removed, none of the two-way interactions emerged as significant. Similarly, when the two-way interactions were removed, there were no significant main effects. Thus, maternal depressive symptoms did not relate to intrusiveness under any conditions.

However, for path B of this model, the three-way interaction among maternal intrusiveness, toddler gender, and toddler temperament in relation to toddler internalizing behaviors was significant ($b = -0.74$, $t[90] = -2.53$, $p = .01$, $sr^2 = .06$). Probing revealed that there were no significant associations for boys (Figure 3). However, for girls, maternal intrusiveness displayed a significant positive association at $-1SD$ of toddler NE ($b = 0.43$, $t[90] = 2.03$, $p = .04$, $sr^2 = .04$), no significant association with child internalizing outcomes at the mean ($b = 0.04$, $t[90] = 0.34$, ns), and a marginally significant negative association at $+1SD$ of toddler NE ($b = -0.34$, $t[90] = -1.92$, $p = .06$, $sr^2 = .03$). The region of significance of this interaction revealed that the relation between maternal intrusive behavior and toddler internalizing outcomes for girls shifted from non-significance to significance when NE decreased to a value of 2.86 (0.61 SD below the mean) or increased to a value of 3.80 (0.84 SD above mean). Recall that an average variable from the 20 imputations was used when calculating the region of significance. This may explain why the region of significance indicated that the relation reached significance at a value 0.84 SD above the mean, while probing indicated only marginal significance at $+1SD$ above the mean. Of note, when using the average variable in the regression, there is a significant negative association at $+1SD$ of toddler NE ($b = -0.34$, $t[90] = 2.23$, $p < .05$). Thus, for girls, at low levels of NE, maternal intrusiveness was positively related to internalizing outcomes, whereas at high levels of NE, maternal intrusiveness was negatively related to internalizing outcomes. Given the non-significant A path, the indirect effect of intrusiveness was not examined.

Discussion

Previous research has consistently reported an association between maternal depression and child internalizing outcomes [2]; however, few studies have investigated the mechanisms through which these outcomes arise, particularly in toddlerhood and with mothers across the lower range of the depressive continuum. Previous trends in the literature emphasize the need for transactional, integrative models for understanding mechanisms and moderators that may underlie the transmission of risk in children of depressed mothers [e.g., 20]. In line with this, the current study examined a moderated mediation model, in which maternal behaviors (warmth and intrusiveness) were tested as mediators, conditioned upon toddler gender and temperament.

Results partially supported the notion that maternal depressive symptoms relate to toddler internalizing outcomes through maternal behavior. Although the effect was small, it was found that maternal warmth acted as a significant indirect means by which maternal depressive symptoms predicted internalizing behaviors for boys low in NE. Thus, for boys low in NE, increasing maternal depressive symptoms related to lower warmth, which in turn related to higher internalizing symptoms. Although the current study hypothesized moderation in the opposite direction, mothers with higher depressive symptoms exhibited little variation in warmth across levels of their boys' NE (Figure 2). It is possible that this decreased variation according to boys' NE speaks to an inability to change behavior for mothers with higher depressive symptoms, perhaps suggesting more general withdrawal. Thus, it is possible that mothers with depressive symptoms are responding less contingently to their boys, exacerbating risk for internalizing problems for boys who are not already at increased temperamental risk.

The hypothesized mediation from maternal depressive symptoms to toddler internalizing outcomes through maternal intrusiveness was not supported, but interesting effects were still observed. Results indicated that for girls with low NE, high maternal intrusiveness related to higher internalizing outcomes, whereas for girls with high NE, high maternal intrusiveness marginally related to lower internalizing outcomes. Previous research has suggested that individuals have "differential susceptibility" to environmental factors such that toddlers high, not low, in NE are more susceptible to both positive and negative variations in parenting [34]. A few explanations for the contradictory results of the current study are possible. First, because children high in NE are already at higher risk for internalizing problems [42], it is possible that maternal behavior does not create additional risk. Further, although some research has suggested that intrusive mothers prevent children from developing appropriate coping techniques [25], there is also evidence that these mothers may set limits in a way that actually forces initially inhibited children to cope, leading to discontinuity in inhibition, an aspect of NE [35]. Moreover, this research suggests that for children who need additional practice coping with disruption (i.e., children high in NE), mild intrusiveness may be beneficial, whereas for children who do not need this (i.e., children low in NE), intrusiveness may be detrimental. Therefore, consistent with Belsky's [34] hypothesis that high NE children are more susceptible to positive parenting, girls high in NE may be more likely to benefit from intrusiveness that fosters independent coping skills. Finally, although intrusiveness was coded using previously developed procedures

[23], it is possible that the free play episode elicited behavior better conceptualized as involvement, as there was little variance in intrusive behavior.

The results of the current study suggest that the pathway to internalizing problems was different for boys and girls. More specifically, it was found that mothers' depressive symptoms influenced their own behavior based on boys' NE, but the effect of maternal intrusive behavior on toddler internalizing outcomes was significant for girls. This finding is in line with previous research finding that boys and girls are adversely impacted by maternal depression through different processes [28]. These findings are also consistent with research indicating that girls are more sensitive to the negative impact of maternal depressive symptoms through environmental processes [19], and that girls may be more sensitive to parenting (in this case, intrusiveness) associated with depression [11]. Additionally, consistent with previous findings that mothers may be more distressed by NE in their boys and change their behavior to alleviate that distress [32], we found that mother lower in depressive symptoms differed in warmth according to their boys' NE. Conversely, mothers with higher symptoms did not change their behavior, suggesting that they may be more withdrawn with their boys.

Limitations and Future Directions

Results of this study should be considered in the context of several limitations. First, the sample consisted primarily of middle-class, European American mothers and children, potentially limiting the ability to generalize the results to the population at large, as parenting goals and behavior sometimes differ between eastern and western cultures and across SES [e.g., 43]. In the current sample, bivariate analyses indicated a negative association between depressive symptoms and SES, such that lower SES mothers tended to exhibit higher depressive symptoms. Thus, examining the current model in more diverse populations would elucidate the influence of cultural and socioeconomic factors. Relatedly, the current study utilized a community sample with limited variability in depressive symptoms in order to investigate how mild to moderate depressive symptomatology influences child outcomes. However, examining this model in a clinical sample could elucidate the specificity of these relations to this range of symptoms.

Another potential limitation of the current study was its reliance on maternal report of toddler internalizing behaviors and temperament. It is possible that shared method variance accounted for relations among maternal depressive symptoms, toddler internalizing behaviors, and toddler temperament, but this seems unlikely given that depressive symptoms related to temperament but not to internalizing outcomes. Additionally, although temperament and internalizing outcomes were positively related, the simple effect was significant at low, not high, NE. Some previous research posits that depressed mothers tend to perceive their children more negatively [e.g., 44]. However, maternal perceptions have important implications for maternal behavior and the quality of mother-child interactions [45], so utilizing maternal perceptions of toddler temperament and internalizing behavior may be just as important as using objective measures of these constructs. Nonetheless, future research could investigate the current model using observational measures of toddler temperament and behavior. This could allow for interesting comparisons between subjective

(i.e., maternal report) and objective (i.e., laboratory observation) measures of toddler temperament and behavior, providing an indication as to what drives maternal behavior to create risk for toddler internalizing behaviors.

That the predictors and the mediators were measured at the same time point is another potential limitation. Ideally, parenting behaviors would have been observed at a time between 24 and 36 months to establish temporal order among the predictors, mediators, and outcome. Future research should be geared toward examining these effects in larger longitudinal models. Another limitation of the current study is its relatively small sample size. Although effect sizes of multiple regression models were for the most part in the large range ($f^2 > .85$), the “A” path of the warmth model was smaller than expected. Additionally, given the relatively small indirect effect found in the current study, there are likely other influences on these relations. For example, previous research suggests that secure attachment can help buffer the negative outcomes of maternal depression [e.g., 46]. Thus, investigating additional moderators like attachment in the current model may help clarify risk and protective factors in the relationship between maternal depressive symptoms and toddler internalizing outcomes.

Results of the current study also begin to identify specific areas of intervention for mothers experiencing depressive symptoms to help prevent negative child outcomes. Given the important influence of parental behaviors on children’s behaviors and outcomes, parent training is a central component of many psychological interventions for children with both internalizing and externalizing behavior problems [47]. However, evidence suggests that maternal psychopathology may contribute to less effective outcomes in parent training interventions [47]. Thus, a greater understanding of how specific parenting challenges related to psychopathology interact with child characteristics to influence child outcomes can better inform intervention. Specifically, targeting warmth in mothers of boys with low NE, while increasing maternal involvement for girls with high NE and decreasing maternal intrusiveness for girls with low NE, may help reduce the likelihood of these children developing internalizing disorders. Future research could be geared toward investigating these associations within treatment contexts.

Future research should also aim to extend the scope of the current findings. For example, adding a measure of maternal anxiety would elucidate the effects of more global maternal internalizing symptoms on child internalizing outcomes, as previous research has illustrated interesting effects of maternal anxiety on mother-child relationships and child outcomes [e.g., 48]. Additionally, the role of fathers is largely understudied in this area, but existing research has found that child gender moderates outcomes differently for maternal and paternal depressive symptoms [28], and that higher paternal, but not maternal, autonomy granting related to more child anxiety/depression [22]. This research highlights that fathers have an important and unique influence, and future research should be aimed toward clarifying how paternal psychopathology and father-child relationships may contribute to child outcomes.

Summary

The current study examined maternal behavior (warmth, intrusiveness) as mediators of the relation between mild to moderate maternal depressive symptoms and toddler internalizing outcomes, and toddler gender and temperament as moderators of the mediated relation. Results indicated that maternal warmth acted as a significant indirect means by which maternal depressive symptoms predicted internalizing behaviors for boys low in NE. Additionally, toddler gender and temperament moderated the relation between maternal intrusiveness and toddler internalizing outcomes. These results suggest that for certain children, even mild maternal depressive symptoms may be a risk factor for the development of internalizing problems, warranting support for these mothers. The current study also highlights the important interaction between child and maternal variables in predicting child outcomes.

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Figure 1.

Conceptual model of moderated mediation. It is hypothesized that maternal behavior will mediate the association between maternal depressive symptoms and toddler internalizing outcomes, and that toddler temperament and gender will moderate the mediated relation.

Figure 2.

Three-way interaction among maternal depressive symptoms, toddler gender, and toddler temperament. The simple slope was marginally significant at -1SD of toddler negative emotionality for boys. This slope shifted to significant at 1.17 SD below the mean. The simple slope was not significant for girls at any level of toddler negative emotionality.

† $p < .10$

Figure 3.

Three-way interaction among toddler negative emotionality, maternal intrusive behavior, and toddler gender. The simple slope was not significant at any level of toddler negative emotionality for boys. For girls, the simple was significant at -1SD of toddler negative emotionality, and marginally significant at +1SD of toddler negative emotionality.

$^{\dagger}p < .10$, $*p < .05$

Table 1

Descriptive Statistics and Bivariate Relations

	1	2	3	4	5	6	7	8	9	10
1. 36-month Internalizing	--	.41**	.15	-.14	.06	.31**	.15	.04	-.31*	.23*
2. 24-month Internalizing		--	.20 [†]	.05	.00	.61**	-.02	-.27*	.21*	-.03
3. Maternal Depressive Symptoms			--	-.05	.12	.24*	-.28**	-.27*	.21*	.08
4. Maternal Warmth				--	-.01	-.06	-.13	-.02	-.09	.19
5. Maternal Intrusiveness					--	.06	.10	-.07	-.01	.01
6. Child Negative Emotionality						--	.05	-.12	.15	.07
7. Mother's Age							--	.39**	-.40**	.03
8. Hollingshead Index (SES)								--	-.46**	.07
9. Recruitment Method									--	-.12
10. Child Gender										--
Mean (SD)	.47(.21)	.53(.22)	9.28(6.02)	3.38(.58)	1.33(.22)	3.26(.65)	32.81 (4.85)	51.02	--	--
Range	0-.97	0-1	0-27	1.88-4.56	1.00-1.94	1.81-4.77	20.29-46.09	17-66	0-1	0-1

Note. Bivariate relations were computed after imputation of missing values. Gender was dummy coded with males = 0. Recruitment Method was dummy coded with non-WIC = 0.

[†] $p < .10$,

* $p < .05$,

** $p < .01$

Table 2
Summary of Multiple Regression Analyses for the Moderated Mediation Model With Warmth as the Mediator

Variable	Maternal Warmth $R^2 = 0.14$			36-Month Toddler Internalizing Outcomes $R^2 = 0.48$		
	<i>b</i>	SE	<i>t</i>	<i>b</i> (SE)	SE	<i>t</i>
Mother's Age	-0.05	0.02	-0.25	-0.00	0.01	-0.19
Recruitment Method	-0.27	0.37	-0.71	-0.31	0.10	-3.22*
SES	0.01	0.01	0.72	0.00	0.00	0.15
24-Month Internalizing	0.80	0.56	1.43	0.47	0.12	3.78**
Maternal depressive symptoms	-0.02	0.02	-0.98	0.00	0.01	0.73
Toddler gender (GEN)	0.20	0.20	1.02	0.10	0.04	2.18*
Toddler negative emotionality	-0.05	0.24	-0.21	0.03	0.05	0.60
DEP x GEN	0.05	0.04	1.27	0.00	0.01	0.32
DEP x NE	0.06	0.03	1.93 [†]	0.01	0.01	1.09
GEN x NE	-0.05	0.32	-0.15	-0.20	0.07	-0.30
DEP x GEN x NE	-0.11	0.05	-2.18*	-0.01	0.01	-1.29
Maternal Warmth	--	--	--	-0.06	0.02	-2.44*

Note. Continuous variables were centered at their mean. Gender was dummy coded with males = 0. Recruitment method was dummy coded with non-WIC = 0. Although coefficients in the 36 month model represent pooled estimates across imputed data sets, R^2 for this model was derived from the original data.

[†]
 $p < .10$,

*
 $p < .05$,

 $p < .001$.

Table 3
Summary of Multiple Regression Analyses for the Moderated Mediation Model With Intrusiveness as the Mediator

Variable	Maternal Intrusiveness $R^2 = 0.08$			36-Month Toddler Internalizing Outcomes $R^2 = 0.47$		
	<i>b</i>	SE	<i>t</i>	<i>b</i>	SE	<i>t</i>
Mother's Age	0.01	0.01	1.73 [†]	0.00	0.01	0.22
Recruitment Method	0.01	0.09	0.08	-0.29	0.09	-3.07*
SES	-0.00	0.00	-1.01	0.00	0.00	0.11
24-Month Internalizing	-0.09	0.14	-0.63	0.46	0.12	3.72**
Maternal depressive symptoms (DEP)	0.00	0.01	0.70	0.01	0.01	0.99
Toddler gender (GEN)	0.01	0.05	0.11	0.08	0.04	1.77 [†]
Toddler negative emotionality (NE)	0.07	0.06	1.23	0.02	0.05	0.44
DEP x GEN	0.01	0.01	0.59	-0.01	0.01	-0.63
DEP x NE	0.00	0.01	0.41	0.00	0.01	0.53
GEN x NE	-0.13	0.08	-1.56	-0.02	0.07	-0.21
DEP x GEN x NE	-0.02	0.01	-1.22	-0.00	0.01	-0.12
Maternal Intrusiveness (IN)	--	--	--	0.04	0.13	0.33
IN x GEN	--	--	--	0.02	0.18	0.09
IN x NE	--	--	--	0.11	0.18	0.64
IN x GEN x NE	--	--	--	-0.74	0.29	-2.53*

Note. Continuous variables were centered at their mean. Gender was dummy coded with males = 0. Recruitment method was dummy coded with non-WIC = 0. Although coefficients in the 36 month model represent pooled estimates across imputed data sets, R^2 for this model was derived from the original data.

[†]
 $p < .10$,

*
 $p < .05$,

**
 $p < .001$.