MATERNAL DEPRESSION AND TRAJECTORIES OF YOUTH DEPRESSION
DURING ADOLESCENCE: MODERATION BY YOUTH RESPONSES TO
INTERPERSONAL STRESS


BY

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DISSERTATION

Submitted in partial fulfillment of the requirements
for the degree of Doctor of Philosophy in Psychology
in the Graduate College of the
University of Illinois at Urbana-Champaign, 2015


Urbana, Illinois


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Abstract

This study examined the independent and interactive contributions of maternal depression and youth responses to interpersonal stress with peers to trajectories of youth depression in adolescence. Youth ($n = 167$, $M$ age = 12.41, $SD$ = 1.19) and their maternal caregivers participated in a four-year longitudinal study. Mothers and youth were administered diagnostic interviews assessing depression and youth provided reports of their responses to peer stress. Results revealed that adaptive responses to stress (high effortful engagement and low involuntary disengagement) buffered the effect of maternal depression on initial levels and trajectories of youth depression, with gender differences emerging. Maternal depression and maladaptive responses to stress (high effortful disengagement and involuntary engagement) contributed additive risks such that youth displayed the highest levels of depression when they were exposed to maternal depression and showed maladaptive responses. This research provides novel evidence of the contribution of maternal depression to trajectories of adolescent depression and indicates that responses to stress contribute to individual differences in depression among offspring of depressed mothers. The results of this study suggest that responses to stress are a potential target for applied efforts to promote resilience in youth.

# Table of Contents

## Introduction

Substantial research indicates that offspring of depressed mothers are at increased risk for psychological and social maladjustment (Goodman et al., 2011; Connell & Goodman, 2002; for reviews, see Beardslee, Versage, & Gladstone, 1998; Goodman & Gotlib, 1999). Notably, the intergenerational transmission of depression from mothers to their children has consistently been demonstrated. However, there is variability in the extent to which maternal depression predicts depression among children and adolescents, with some youth exposed to maternal depression developing clinical levels of depression, and others demonstrating resilience by maintaining healthy functioning. Given these individual differences, a key endeavor is to elucidate youth characteristics that may heighten or dampen vulnerability to the effects of maternal depression. Because interpersonal stress has been implicated in the intergenerational transmission of depression (Hammen, Brennan, Kennan-Miller, 2008; Hammen, Shih, Altman, & Brennan, 2003), youth's responses to interpersonal stress may influence their vulnerability to the effects of maternal depression. Specifically, adaptive responses to interpersonal stress may dampen risk for depression, whereas maladaptive responses to interpersonal stress may heighten risk for depression. This research examined the contribution of maternal depression to youth depression as youth progress through adolescence, focusing on the potential moderating role of responses to peer stress.

### Risk for Depression in Children of Depressed Mothers

Offspring of depressed mothers are at increased risk for internalizing symptoms throughout development. Newborns of depressed mothers display physiological profiles characterized by elevated levels of cortisol and dampened levels of dopamine and

serotonin, similar to the physiological profiles of depressed adults (for a review, see Field, Diego, & Hernandez-Reif, 2006). During infancy, maternal depression is associated with heightened negative affect and stress reactivity, and poor regulatory abilities in offspring (Brennan et al., 2008; Feldman et al., 2009). Exposure to maternal depression in the first years of life predicts higher levels of internalizing problems among children in the preschool to elementary school years (Bagner, Pettit, Lewinsohn, & Seeley, 2010; Barker, Jaffee, Uher, & Maughen, 2011; Gravener et al., 2012). Furthermore, the onset of depression prior to puberty and in early adolescence is more common among youth whose mothers have a history of depression (Weissman et al., 1987). During adolescence, maternal depression has been linked with greater concurrent levels of youth depression (Brenning, Soenens, Braet, & Bal, 2012) as well as increasing levels of depression across time among girls (Gershon et al., 2011; Jenkins & Curwen, 2008). Maternal depression also has been implicated in the maintenance of depression over time during adolescence. Youth with depressed mothers continue to display heightened internalizing symptoms after mothers have recovered from depression (Lee & Gotlib, 1991), and maternal depression predicts greater chronicity and severity of depression among youth with a history of depression (Rhode, Lewinsohn, Klein, & Seely, 2005). Indeed, meta-analytic reviews of the vast number of studies exploring the effect of maternal depression on offspring psychopathology indicate that maternal depression has a significant effect on youth internalizing symptoms (Connell & Goodman, 2002; Goodman et al., 2011).

Although numerous studies have demonstrated longitudinal effects of maternal depression on youth depression, the contribution of maternal depression to trajectories of

depression across adolescence remains relatively uninvestigated. During adolescence, depressed youth tend to experience recurrent episodes of depression; however, there are significant fluctuations in depression during this time. For example, DuBois and colleagues (1995) found that over a 2-year period, 22% of adolescents shifted in diagnostic status (e.g., from depressed to nondepressed). Thus, elucidating the contribution of maternal depression to within-person changes in youth depression over time could provide a more complete understanding of the risk presented by maternal depression. In one study addressing this issue, Garber and colleagues (2002) tested history of maternal depression as a predictor of trajectories of depression during adolescence (i.e., 6th – 11th grade) and provided evidence that maternal depression history contributed to initial levels of youth depressive symptoms, but not to changes in symptoms over time. However, in light of longitudinal research demonstrating associations between maternal depression and the onset and maintenance of depression during adolescence (Gershon et al., 2011; Jenkins & Curwen, 2008; Rhode et al., 2005), additional investigation of the contribution of maternal depression to trajectories of depression during adolescence is needed. To extend prior research, this study examined the contribution of maternal depression to trajectories of depression during adolescence, and explored the potential moderating role of youth responses to peer stress.

**Individual Differences in Risk for Depression**

Despite the risk maternal depression presents for youth, there are individual differences in the extent to which offspring of depressed mothers develop depression. Surprisingly, research exploring factors that moderate the contribution of maternal depression to youth depression is limited, particularly considering the vast body of

research that focuses on risk for psychopathology among offspring of depressed mothers. Several youth characteristics have been identified as factors that may promote resilience or exacerbate risk for depression among offspring of depressed mothers. For example, high IQ predicts resilience to depression among adolescents of depressed mothers (Pargas, Brennan, Hammen, & LaBrocque, 2010). Indices of children's emotion regulatory capacities also play a role in determining risk. In 4-7-year olds, positive reward anticipation during a delayed reward task is associated with fewer internalizing problems among children of depressed mothers (Silk, Shaw, Forbes, Lane, & Kovacs, 2006). During late childhood (i.e., from age 8-10), children's respiratory sinus arrhythmia (RSA), a component of parasympathetic nervous system functioning, moderates the contribution of maternal depression to trajectories of internalizing symptoms, such that by age 10 girls of depressed mothers with low RSA and boys of depressed mothers with high RSA experience the highest levels of internalizing symptoms (Wetter & El-Sheikh, 2012).

In addition to individual characteristics, youth's social functioning and social relationships have been investigated as factors that may buffer offspring of depressed mothers against depression, with the majority of this research focusing on family relationships. Indeed, maintaining positive family relationships plays a protective role for offspring of depressed mothers. Positive perceptions of family relationships have been linked with better functioning, including the absence of clinical diagnoses, among children of depressed mothers (Garber & Little, 1999; Frampton, Jenkins, & Dunn, 2010). Furthermore, mother-child relationships characterized by low psychological control and high warmth predict resilience to internalizing problems among offspring of

depressed mothers during adolescence and early adulthood (Brennan, LeBrocque, & Hammen, 2003; Pargas et al., 2010). Less research has focused on the moderating role of social relationships and social functioning outside of the family. In one study, Conrad and Hammen (1993) demonstrated that youth's social competence, including participation in activities, social relationships, and school functioning, serves as a protective factor for offspring of mothers with unipolar depression, buffering these youth against depression. Pargas and colleagues (2010) provided evidence that better social functioning within the peer domain during adolescence predicts lower levels of depression during early adulthood among offspring of depressed, as well as nondepressed, mothers.

Prior investigations of individual differences in risk for depression among offspring of depressed mothers are limited in two key respects. To our knowledge, only one study to date (Wetter & El-Sheikh, 2012) has examined youth characteristics that may contribute to individual differences in the effect of maternal depression on trajectories of youth depression, and this issue has yet to be examined during adolescence. Furthermore, the role of youth's social functioning outside of family relationships in determining risk for depression among offspring of depressed mothers remains largely unexplored (for exceptions, see Conrad & Hammen, 1993; Pargas et al., 2010). To address these gaps, the current research examined whether youth responses to interpersonal stress moderate the contribution of maternal depression to trajectories of depression during adolescence.

**Responses to Interpersonal Stress as a Moderator of Maternal Depression**

Youth responses to interpersonal stress may play an important role in determining the extent to which maternal depression contributes to offspring depression during

adolescence. To conceptualize youth responses to interpersonal stress, we drew from a well-validated framework put forth by Compas and colleagues (Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001; Connor-Smith, Compas, Wadsworth, Thomsen, & Saltzman, 2000). This framework conceptualizes responses to stress along two orthogonal dimensions: effortful versus involuntary responses, and engagement versus disengagement responses. Effortful responses are voluntary, purposeful attempts to deal with stress, whereas involuntary responses are automatic or uncontrolled emotional or behavioral reactions. Engagement responses are directed toward the source of stress and stress-related emotions, whereas disengagement responses are directed away from stress and stress-related emotions. These two dimensions yield four types of responses to stress: effortful engagement, effortful disengagement, involuntary engagement, and involuntary disengagement. Effortful engagement includes controlled coping responses such as problem solving, emotion regulation and expression, cognitive restructuring, and positive thinking. Effortful disengagement includes coping responses that attempt to avoid the stress, such as denial, avoidance, or wishful thinking. Involuntary engagement includes responses to stress characterized by intrusive thoughts or emotions, such as rumination and physiological or emotional arousal. Involuntary disengagement involves uncontrolled avoidance of the source of stress or stress-related emotions, such as unregulated escape behaviors and emotional numbing.

Effortful engagement responses to stress are considered effective responses to stress and stress-related emotions, and are associated with better adjustment following stress. In contrast, effortful disengagement, involuntary engagement, and involuntary disengagement responses are considered maladaptive responses to stress, and are

6

associated with maladjustment (Connor-Smith et al., 2000; Connor-Smith & Compas, 2004; Flynn & Rudolph, 2007; Jaser et al., 2005; for a review, see Compas et al., 2001).

Responses to interpersonal stress may contribute to risk or resilience in offspring of depressed mothers because offspring of depressed mothers experience heightened levels of interpersonal stress (Hammen et al., 2008). Children and adolescents of depressed mothers generate more interpersonal stress (Hammen & Brennan, 2001; Shih, Abela, & Starrs, 2009), have poorer peer relationships, and experience more peer conflict and chronic peer stress (Adrian & Hammen, 1993; Gershon et al., 2011; Goodman, Brogan, Lynch, & Fielding, 1993) than children and adolescents of nondepressed mothers. Notably, this heightened interpersonal stress does not appear to be due to a higher prevalence of depression among offspring of depressed versus nondepressed mothers as depressed youth of depressed mothers generate more interpersonal stress and conflict and report more negative cognitions about their friendships than do depressed youth of nondepressed mothers (Hammen & Brennan, 2001). Not only do youth of depressed mothers experience higher levels of interpersonal stress, but they also are especially reactive to interpersonal stress.  For example, affective responses to social stress are predictive of more physiological reactivity (i.e., heightened cortisol reactivity and poor heart rate recovery) among daughters of depressed versus nondepressed mothers (Waugh, Muhtadie, Thompson, Joorman, & Gotlib, 2012). Daughters of depressed mothers also display heightened emotional sensitivity within their friendships, which is associated with greater depressive symptoms (Murray, Halligan, Adams, Patterson, & Goodyer, 2006).

Interpersonal stress plays a key role in the onset and maintenance of depression in youth. Interpersonal stress has been implicated in the first onset of depression (Carter & Garber, 2011), and during adolescence interpersonal stress and depression are characterized by bi-directional relationships (Hammen, Hazel, Brennan, & Najman, 2012; Rudolph, Flynn, Abaied, Groot, & Thompson, 2009). Interpersonal stress may be particularly important in the development and maintenance of depression among offspring of depressed mothers. Indeed, poor social functioning is more predictive of depression in adolescents of depressed mothers than adolescents of nondepressed mothers (Hamman et al., 2003). Moreover, interpersonal stress is associated with the first onset of psychiatric disorders among adolescents of depressed mothers (Gershon et al., 2011), and heightened interpersonal stress serves as a key mechanism by which maternal depression contributes to higher risk for depression among adolescent girls (Hammen et al., 2008).

Interpersonal stress taking place within peer relationships may be especially consequential for offspring of depressed mothers. These youth may be in need of supportive relationships outside of the family, such as high quality peer relationships, to compensate for the lack of resources present in the mother-child relationship. Maintaining supportive peer relationships may be protective for children at risk due to stressful mother-child relationships (Lovejoy, Graczyk, O'Hare, & Neuman, 2000; Silk et al., 2011; for a review, see Cummings & Davies, 1994). Indeed, supportive peer relationships during adolescence buffer youth from depression (Vaughan, Foshee, & Ennett, 2010), particularly when youth perceive low levels of support from their family (Barrera & Garrison-Jones, 1992). In contrast, difficulties within peer relationships may

exacerbate risk among offspring of depressed mothers who often lack supportive mother-child relationships.

Given the heightened levels of interpersonal stress exposure, generation, and reactivity displayed among offspring of depressed mothers, as well as the important consequences of interpersonal stress and peer relationships for their well-being, responses to peer stress may influence vulnerability to depression among offspring of depressed mothers. Managing peer stress effectively through effortful engagement may mitigate the effect of maternal depression on youth depression. Using effortful engagement responses to peer stress (e.g., problem solving, emotion regulation, positive thinking) may allow offspring of depressed mothers to resolve peer stress, regulate their emotional responses, and regulate their behavior during peer interactions, thereby attenuating risk for depression. In contrast, managing peer stress ineffectively through effortful disengagement, involuntary engagement, or involuntary disengagement may exacerbate the effect of maternal depression on youth depression. When youth respond to peer stress through denial or avoidance (i.e., effortful disengagement), or through involuntary emotional numbing or inaction (i.e., involuntary disengagement), they may fail to resolve peer stress, and experience dysregulated emotional responses. When youth respond to peer stress through uncontrolled engagement, such as overarousal or rumination (i.e., involuntary engagement), they may not only fail to resolve peer stress, but they may also intensify their emotional responses, thereby heightening risk for depression. Thus, effortful engagement responses may attenuate risk for depression among offspring of depressed mothers, whereas effortful disengagement, involuntary engagement, and involuntary disengagement responses may exacerbate risk for depression.

In support of these hypotheses, during adolescence, effortful engagement responses to stress are associated with less depression, whereas effortful disengagement, involuntary engagement and involuntary disengagement responses are associated with more depression both concurrently and over time (Connor-Smith et al., 2000; Flynn & Rudolph, 2007, 2010). Furthermore, low levels of effortful engagement responses to stress, and high levels of involuntary engagement and disengagement responses contribute to greater interpersonal stress over time during adolescence (Flynn & Rudolph, 2011). Little research has explored responses to stress as a moderator of the contribution of maternal depression to youth depression. In one notable exception, Garber and Little (1999) demonstrated that children of depressed mothers who generally use more positive coping strategies and less denial maintain high levels of functioning, including an absence of psychopathology, over time. In addition, several studies have examined associations between adolescents' responses to parental depression and adolescent depression. Among adolescents with a depressed parent, effortful engagement responses to parental depression are correlated with less depression whereas involuntary engagement and involuntary disengagement responses are correlated with more depression (Jaser et al., 2005; Langrock, Compas, Keller, Merchant, & Copeland, 2002).

**Moderating Effect of Gender**

Gender also may moderate the independent and interactive effects of maternal depression and youth responses to stress on youth depression. Gender differences in depression during adolescence are well established. During adolescence, rates of depression increase to a greater extent among girls than boys such that girls have higher rates of depression compared to boys by mid-adolescence (Hankin et al., 1998; Wade,

Cairney, & Pevalin, 2002; for reviews, see Hankin & Abramson, 1999; Nolen-Hoeksema & Girgus, 1994). Within-person increases in depression during adolescence also are observed more commonly among girls than boys (Jenkins & Curwen, 2008; Diamantopoulou, Verhulst, & van der Ende, 2011). Beyond these main effects of gender on depression, gender may have implications for the contribution of maternal depression to youth depression. There is evidence that girls may be particularly vulnerable to the effects of maternal depression. A meta-analysis by Goodman and colleagues (2011) revealed that the association between maternal depression and youth depression, collapsing across stages of development, was significantly larger for girls than boys (cf. Garber et al., 2002; Hammen et al., 2008). Thus, we anticipated that the contribution of maternal depression to initial levels and trajectories of adolescent depression would be stronger among girls than boys.

Responses to stress also may be especially influential for girls' psychological well-being. During adolescence, girls experience and generate more interpersonal stress than boys (Hammen et al., 2012), including higher levels of stress within friendships (Rudolph, 2002), and within the broader peer group (Hankin, Mermelstein, & Roesch, 2007). At this time, girls are also more concerned with social connections and approval (for a review, see Rose & Rudolph, 2006) and experience more internalizing symptoms following peer stress than do boys (Hankin et al., 2007; Rudolph, 2002; Rudolph et al., 2009). Because girls face heightened levels of peer stress and are especially reactive to it, responses to peer stress may be particularly meaningful for girls' well-being. Indeed, responses to peer stress predict subsequent depression to a greater extent among girls than boys (Agoston & Rudolph, 2011). Thus, we anticipated that the interactive effects of

11

maternal depression and responses to stress on initial levels and trajectories of youth depression would be stronger among girls than boys.

**Moderating Effect of Age**

The proposed research will examine trajectories of depression across adolescence; during this developmental period, youth age may moderate the contribution of maternal depression to youth depression. Prevalence rates of depression are higher among adolescents than children (Kessler, Avenevoli, & Merikangas, 2001), and the average age of first onset of depression has been estimated to fall in early to mid-adolescence (for a review, see Avenevoli, Knight, Kessler, & Merikangas, 2008). It is possible that the contribution of maternal depression to youth depression is heightened during this stage of vulnerability. Thus, we anticipated that maternal depression would be associated with higher initial levels of depression among older youth who have already entered into adolescence, but with greater increases in depression over time among younger youth who are just entering this phase of development. It should be noted that a meta-analysis by Goodman and colleagues (2011) revealed that the strength of the effect of maternal depression on youth depression was stronger for samples with a younger mean age, seemingly in contrast to this prediction. However, this meta-analysis captured ages ranging from infancy through early adulthood and may not have implications for more restricted age ranges. Furthermore, Weissman and colleagues (1987) found that although the mean age of depression onset for children of depressed mothers (12-13 years) was younger than that of children of nondepressed mothers (16-17 years), the mean age of depression onset still fell within early adolescence.

Youth age may also have implications for the interactive effects of maternal depression and responses to stress on youth depression. The transition into adolescence is a time during which youth become increasingly focused on peer relationships, and integrate peer experiences into their self-concepts (Hergovich, Sirsch, & Felinger, 2002; Steinberg & Silverberg, 1986). Also at this time, youth demonstrate greater coping and emotion regulation capabilities (for reviews, see Compas et al., 2001; Zeman, Cassano, Perry-Parrish, & Stegall, 2006). Thus, during adolescence, youth responses to peer stress may be especially influential in determining risk for depression. We therefore anticipated that the interactive effects of maternal depression and responses to stress on initial levels and trajectories of youth depression would be stronger among older youth than younger youth.

**Study Overview**

This research sought to elucidate the contribution of maternal depression to youth depression during adolescence, and to explore whether youth responses to peer stress mitigate or exacerbate this effect. Data for this study were drawn from a sample of adolescents and their mothers participating in a four-year longitudinal study. At the initial wave of the study, diagnostic interviews assessing depression were conducted with youth and their mothers, and youth provided reports of their responses to peer stress. Three annual follow-up interviews assessing youth depression were conducted to capture depression over the course of adolescence. To examine the independent and interactive contributions of maternal depression and responses to peer stress to youth depression, maternal depression and responses to stress at the first wave of the study were tested as predictors of youth's initial levels of depression at the first wave of the study and

13

trajectories of depression across the four waves of the study. The potential moderating effects of youth gender and age were explored. In addition, supplemental analyses were conducted to examine whether the effects of maternal depression and youth responses to stress (a) are accounted for by the amount of peer stress that youth experience, and (b) are better explained by the chronicity of maternal depression.

## Goals and Hypotheses

The primary goals of this research were:

A: To examine the effect of maternal depression on youth depression during the transition through adolescence.

B: To examine whether youth responses to interpersonal stress moderate the effect of maternal depression on youth depression.

C: To examine whether youth gender moderates the effect of maternal depression on youth depression and the interaction between maternal depression and youth responses to stress.

D: To examine whether youth age moderates the effect of maternal depression on youth depression and the interaction between maternal depression and youth responses to stress.

To address these goals, the following hypotheses were tested:

1. Maternal depression will predict higher initial levels of youth depression, particularly in girls (1a) and in older youth (1b), and increasing trajectories of youth depression during the transition through adolescence, particularly in girls (1a) and younger youth (1c).

2. The contribution of maternal depression to initial levels and trajectories of youth depression will be mitigated by effortful engagement responses to stress, particularly in girls (2a) and in older youth (2b).

3. The contribution of maternal depression to initial levels and trajectories of youth depression will be amplified by effortful disengagement, involuntary engagement, and involuntary disengagement responses to stress, particularly in girls (3a) and in older youth (3b).

**Method**

**Participants and Procedures**

Participants were drawn from a sample of youth and their female caregivers who participated in a longitudinal study of depression. Youth participants at Wave 1 ($W_1$) included 167 (86 girls, 81 boys) fourth-eighth graders ($M$ age = 12.41, $SD$ = 1.19). The majority of youth participants were white (77.8%; 12.6% African American; 4.2% biracial; 2.4% Asian; 3% other). Female caregivers included 148 (88.6%) biological mothers, 3 (1.8%) stepmothers, 7 (4.2%) adoptive mothers, and 9 (5.4%) other caregivers. Participants were recruited from several towns in the Champaign-Urbana area and represented a range of family income levels (16.7% below $30,000; 48.7% $30-59,999; 21.6% $60-89,999; 13% over $90,000) and maternal education levels (37.6% earned a high school degree, 49.7% earned a college or university degree, and 12.7% earned an advanced degree).

Youth were selected for this study based on school wide screenings with the Children's Depression Inventory (CDI; Kovacs, 1981). Participants with a range of CDI scores were recruited, oversampling slightly for youth with severe symptoms (15.8% of the screening sample, 20.3% of targeted youth, and 24.1% of recruited youth had scores > 18). In addition to CDI scores, recruitment was based on having an English-speaking maternal caregiver in the home and proximity to the university. Families were recruited through phone calls to the maternal caregivers. Caregivers provided written informed consent, and youth provided written assent. Youth whose families consented to participate did not differ from those who did not consent in sex, $\chi^2(1) = .39$, $p = .54$, race (white vs. minority), $\chi^2(1) = .02$, $p = .88$, or CDI scores, $t(429) = 1.31$, $p = .19$. However,

participants ($M = 12.41$, $SD = 1.19$) were slightly younger than non-participants ($M = 12.65$, $SD = 0.89$), $t(454) = -2.45$, $p = .01$.

Participating families completed a 3- to 4-hr assessment during which youth and their caregivers were interviewed separately and completed questionnaires. Three annual follow-up interviews were completed. At each assessment, caregivers were provided with monetary reimbursement and youth were given a gift certificate as compensation for their time. Of the original $W_1$ sample, 150 (89.8%) youth had depression data available for all three follow-up assessments. Youth with depression data available for all four assessments did not differ from youth missing one or more follow-up depression assessments in sex, $\chi^2(1) = 1.99$, $p = .16$, race (white vs. minority), $\chi^2(1) = 1.89$, $p = .17$, or $W_1$ depression, $t(165) = -.13$, $p = .90$. Mothers of youth with depression data available for all four assessments had marginally higher levels of depression than mothers of youth missing one or more follow-up depression assessments, $t(165) = 1.70$, $p = .09$.

**Measures**

Table 1 presents descriptive statistics.

**Youth depression**. To assess youth depression, interviewers administered the Schedule for Affective Disorders and Schizophrenia for School-Age Children-Epidemiologic Version-5 (K-SDADS-E; Orvaschel, 1995) to youth and their caregivers at $W_1$-$W_4$. Consensual diagnoses were assigned using a best-estimate approach (Klein et al., 1994) to integrate information across youth and caregiver reports. Interviewers used the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR; American Psychiatric Association, 2000) criteria to assign ratings of depression on a 5-point scale (0 = no symptoms, 1 = mild symptoms, 2 = moderate symptoms, 3 = diagnosis with mild

to moderate impairment, 4 = diagnosis with severe impairment). These ratings are based on the number, severity, frequency, duration, and resulting impairment of reported symptoms. Separate ratings were assigned for each type of depression. Continuous depression scores were computed by summing the ratings occurring within the past month at each wave. Higher scores thus reflected more severe symptoms within a single period and/or multiple types of depression (for similar rating approaches see, Conley & Rudolph, 2009; Hammen, Shih, & Brennan, 2004; Hammen et al., 2003; Rudolph et al., 2000; Rudolph et al., 2009), and included indices of several different markers of depression severity. The use of continuous scores of depression is in line with taxometric analyses suggesting that depression is best conceptualized as a dimensional continuum rather than a discrete category (Fergusson, Horwood, Ridder, & Beautrais, 2005; Hankin, Fraley, Lahey, & Waldman, 2005; Shih et al., 2006). Strong interrater reliability was found (one-way random-effects intraclass correlation coefficient [ICC] = .97), and scores on this measure were significantly associated with children's self-reports of depression on several measures, including the Child Depression Inventory (Kovacs, 1992), Youth Depression Inventory (Rudolph, 2002), and Mood and Anxiety Symptoms Questionnaire anhedonia subcale (Watson et al., 1995) ($r$s = .39 - .60, $p$s < .001).

At $W_1$, 11.4% met diagnostic criteria for clinical depression (a rating of 3 or 4 for at least one type of depression), and 13.2% experienced subclinical depressive symptoms (a rating of 1 or 2 for at least one type of depression). Of the participants with data available at subsequent waves[1], at $W_2$, 8.8% met diagnostic criteria for clinical depression and 18.2% experienced subclinical symptoms. At $W_3$, 6.3% met diagnostic criteria for clinical depression and 17.1% experienced subclinical symptoms. At $W_4$,

7.2% met diagnostic criteria for clinical depression and 16.4% experienced subclinical symptoms.

**Maternal depression.** To assess maternal depression, interviewers administered the nonpatient version of the Structured Clinical Interview for the DSM (SCID; First, Spitzer, Gibbon, & Williams, 1996) to female caregivers at $W_1$. Each type of depression was coded using the same procedures as used for the K-SADS. Continuous depression scores were computed by summing the ratings occurring within the past month of the $W_1$ assessment. Strong interrater reliability was found for these ratings (one-way random-effects ICC = .94). The depression summary scores significantly correlate with self-report measures of depressive symptoms, including the Beck Depression Inventory (Beck, Rush, Shaw, & Emery, 1979) and Mood and Anxiety Symptoms Questionnaire anhedonic depression subscale (Watson et al., 1995) ($r$s = .35 - .37, $p < .001$). Of the 167 maternal caregivers, 14.4% met diagnostic criteria for clinical depression and 13.2% experienced subclinical depressive symptoms at $W_1$.

For the purpose of supplemental analyses, three indices of maternal depression chronicity were computed using mothers' reports of their lifetime history of depression (i.e., symptoms occurring prior to and including the $W_1$ assessment). *Maternal lifetime duration* was computed by summing the number of weeks that each mother experienced depressive symptoms during her lifetime. *Child lifetime duration* was computed by summing the number of weeks each mother experienced depressive symptoms during her child's lifetime. To account for differences in opportunities for exposure to maternal depression due to child age, *proportion of child's life* was computed by dividing the

19

number of weeks the mother experienced depressive symptoms during her child's lifetime by the child's age in weeks.

**Responses to stress**. To assess responses to interpersonal stress, youth completed the peer version of the Responses to Stress Questionnaire (Connor-Smith, Compas, Wadsworth, Thomsen, & Saltzman, 2000) at $W_1$. This measure distinguishes between voluntary and involuntary responses to stress, and between engagement with and disengagement from stressors. The measure thus includes four subscales: effortful engagement (21 items; e.g., problem solving, cognitive restructuring), effortful disengagement (9 items; e.g. denial, avoidance), involuntary engagement (15 items, e.g., rumination, physiological arousal), and involuntary disengagement (12 items; e.g., emotional numbing) Youth were prompted to think about interpersonal stressors with peers (e.g., having problems with a friend, fighting with other kids, being left out or rejected) and rated how often they engaged in each response to these stressors by checking a box on a 4-point scale (*Not at All* to *Very Much*). Confirmatory factor analyses support the distinctions between voluntary engagement and disengagement and involuntary engagement and disengagement reflected in the subscales. Moreover, convergent validity and test-retest reliability have been established for the subscales (Connor-Smith et al., 2000). To correct for base-rate differences in the endorsement of responses to stress (Compas et al., 2001), proportion scores were computed by dividing the total score for each subscale by the total score on the measure. Higher scores reflect higher levels of each type of response to stress.

**Peer stress.** For the purpose of supplemental analyses, peer stress was assessed through the Youth Life Stress Interview (Rudolph & Flynn, 2007), an adaptation of the

Child Episodic Life Stress Interview (Rudolph & Hammen, 1999). The interview was administered separately to youth and their mothers. This semi-structured interview uses the contextual threat method (Brown & Harris, 1978) to assess the type and severity of episodic stress experienced by youth. The present focus was on episodic stress experienced with peers within the year prior to the $W_1$ assessment. Interviewers began with a general open-ended question about the occurrence of stressful events with peers, and then prompted youth regarding specific types of events (e.g., argument with a friend, problems with classmates or other children). Follow-up questions were used to elicit detailed information about each event, the timing and duration of the event, and the objective consequences of the event. Interviewers compiled this information into a narrative summary of each event, which was then presented to a team of coders with no knowledge of the youth's diagnostic status or subjective response to the event.

Integrating information from youth and caregivers, the coding team provided a rating of the stressfulness or negative impact associated with the event for a typical youth in those circumstances, from 1 (no negative stress) to 5 (severe negative stress). If only one informant provided information about an event, this information was used for the ratings. A rating of peer stress was calculated by summing the objective stress ratings for each peer event with a stress rating above 1 ($M = 3.81$, $SD = 4.00$). To assess reliability, 160 life events (14% of the total reported events) were coded by two independent teams. High reliability was found for ratings of objective stress (ICC = .90) and for the categorization of events (Cohen's κ = .92).

**Results**

**Intercorrelations**

Table 2 presents intercorrelations among the variables separately in girls and boys. Significant correlations were in the hypothesized direction. Among girls, associations between $W_1$ maternal depression and youth depression did not reach significance. $W_1$ effortful engagement was significantly associated with lower youth depression at $W_1$-$W_4$. $W_1$ effortful disengagement was significantly associated with higher $W_2$ depression. $W_1$ involuntary engagement was significantly associated with higher youth depression at $W_1$-$W_3$. $W_1$ involuntary disengagement was significantly associated with higher youth depression at $W_1$-$W_4$. $W_1$ maternal depression was significantly associated with lower $W_1$ effortful disengagement. Among boys, $W_1$ maternal depression was significantly associated with higher youth depression at $W_1$-$W_4$. $W_1$ effortful engagement was significantly associated with lower youth depression at $W_1$-$W_4$. $W_1$ effortful disengagement was not associated with youth depression. $W_1$ involuntary engagement was significantly associated with higher youth depression at $W_1$, $W_2$, and $W_4$. $W_1$ involuntary disengagement was significantly associated with higher youth depression at $W_4$. $W_1$ maternal depression was not associated with $W_1$ youth responses to stress.

**Predicting Trajectories of Youth Depression**

Hierarchical linear modeling analyses were conducted with HLM 7 (Raudenbush & Bryk, 2002). Using these analyses, initial levels of youth depression, as well as trajectories of youth depression across time were estimated for each participant. Youth depression was examined across four waves, with depression centered at Wave 1 ($W_1$).

Thus, the intercept reflected initial levels of depression and the slope reflected changes in youth depression from $W_1$ through Wave 4 ($W_4$). Because HLM can accommodate an unbalanced number of measurement occasions across participants, participants missing one or more follow-up depression assessments were included in analyses. Missing data at $W_1$ were handled using listwise deletion. Thus, all participants were included in analyses examining associations between maternal depression and youth depression, but because two participants were missing responses to stress data at $W_1$, they were excluded from analyses that included responses to stress.

**Preliminary Model**

An unconditional model was examined to determine if there was adequate between-person variability in initial levels and trajectories of youth depression to warrant examination of between-person predictors. This model indicated that there was significant variation for the intercept and slope of child depression (Table 3). Thus, hypotheses were examined by adding between-person (Level 2) predictors to the model.

**Contribution of Maternal Depression to Youth Depression**

The effect of maternal depression on initial levels and trajectories of youth depression was examined by adding $W_1$ maternal depression as a predictor of the intercept and slope of youth depression. This model revealed that maternal depression significantly predicted initial levels of youth depression (Table 4).

To examine whether the effect of maternal depression on youth depression was moderated by gender, $W_1$ maternal depression, gender (-1 = boys, 1 = girls), and the maternal depression x gender interaction were entered simultaneously as predictors of the intercept and slope of youth depression. This model revealed nonsignificant effects of

23

gender and the maternal depression x gender interaction for the intercept (for gender, b = .00, SE = .10, $p$ = .97; for the interaction, b = -.14, SE = .13, $p$ = .27) and slope (for gender, b = .03, SE = .04, $p$ = .42; for the interaction, b = .03, SE = .06, $p$ = .64).

To examine whether the effect of maternal depression on youth depression was moderated by youth age, $W_1$ maternal depression, age, and the maternal depression x age interaction were entered simultaneously as predictors of the intercept and slope of youth depression. This model revealed nonsignificant effects of age and the maternal depression x age interaction for the intercept (for age, b = -.06, SE = .09, $p$ = .48; for the interaction, b = .03, SE = .11, $p$ = .78) and slope (for age, b = -.00, SE = .03, $p$ = .96; for the interaction, b = -.03, SE = .03, $p$ = .27). To examine whether gender and age together moderated the effect of maternal depression on youth depression, $W_1$ maternal depression, gender, age, the two-way interactions (maternal depression x gender, maternal depression x age, gender x age) and the three-way interaction (maternal depression x gender x age) were entered simultaneously as predictors of the intercept and slope of youth depression. This model revealed a nonsignificant gender x age interaction for the intercept (b = .08, SE = .08, $p$ = .32) and slope (b = .01, SE = .03, $p$ = .70), and a nonsignificant maternal depression x gender x age interaction for the intercept (b = .06, SE = .10, $p$ = .56) and slope (b = .02, SE = .03, $p$ = .51).

In sum, analyses examining the contribution of maternal depression to youth depression indicated that maternal depression predicted higher initial levels of youth depression. The effect of maternal depression was not moderated by gender, age, or the interaction between gender and age.

**Contribution of Maternal Depression and Responses to Stress to Youth Depression**

To examine the independent and interactive effects of maternal depression and youth responses to stress on initial levels and trajectories of youth depression, $W_1$ maternal depression, $W_1$ youth responses to stress, and the maternal depression x responses to stress interaction were entered simultaneously as predictors of the intercept and slope. The maternal depression and responses to stress variables were mean-centered by standardizing them, and the interaction was computed as the product of the standardized maternal depression and responses to stress variables. Separate models were examined for each dimension of responses to stress. For each model, moderation by gender and age was explored in separate analyses. Moderation by gender was examined by adding gender (-1 = boys, 1 = girls), the two-way interactions with gender (maternal depression x gender, responses to stress x gender), and the three-way interaction with gender (maternal depression x responses to stress x gender) to the model. Moderation by age was examined by adding age, the two-way interactions with age (maternal depression x age, responses to stress x age), and the three-way interaction with age (maternal depression x responses to stress x age) to the model. When three-way interactions with gender were significant, maternal depression x responses to stress interactions were examined in girls and boys by re-running the model with gender centered at values corresponding to girls or boys. When three-way interactions with age were significant, maternal depression x responses to stress interactions were examined in older and younger youth by re-running the model with age centered at 1 SD above or below the mean.

Tables 5 and 6 present the results of the HLM models. When three-way interactions with gender were significant, results are presented from the models with

25

gender centered at values corresponding to girls or boys (see Table 5). As described below, analyses did not reveal meaningful moderation by age and so results are not presented by age. In cases where there was not moderation by gender or age, these variables and the associated interactions were removed from the model and results from the simplified model are presented (see Table 6).

To decompose significant maternal depression x responses to stress interactions, the HLM models were re-run with maternal depression and responses to stress centered at values of interest. Specifically, significant interactions were probed at scores reflecting exposure to maternal depression (i.e., maternal depression scores 1 SD above the mean, corresponding to moderate to diagnosable symptoms) or no exposure to maternal depression (i.e., no depressive symptoms), and at high (i.e., 1 SD above the mean) and low (i.e., 1 SD below the mean) levels of responses to stress.

**Effortful engagement.** The first analysis examined the independent and interactive contributions of $W_1$ maternal depression, $W_1$ effortful engagement, and gender to initial levels and trajectories of youth depression. For the intercept, this model revealed significant effects of maternal depression ($b = .45$, $SE = .11$, $p = .00$), effortful engagement ($b = -.51$, $SE = .10$, $p = .00$), and a significant maternal depression x effortful engagement x gender interaction ($b = -.26$, $SE = .10$, $p = .01$). For the slope, this model revealed a significant effect of effortful engagement ($b = .06$, $SE = .03$, $p = .04$) and a significant maternal depression x effortful engagement x gender interaction ($b = .10$, $SE = .04$, $p = .02$). Thus, the maternal depression x effortful engagement interaction was examined in girls and boys by re-centering gender (see Table 5).

In girls, there was a significant positive effect of maternal depression, a significant negative effect of effortful engagement, and a significant maternal depression x effortful engagement interaction predicting the intercept, as well as a significant, positive effect of effortful engagement predicting the slope (Figure 1a). Decomposition of the interaction indicated that maternal depression predicted higher initial levels of depression when girls used low effortful engagement (b = .67, SE = .25, $p$ = .01), but not when girls used high effortful engagement (b = .10, SE = .09, $p$ = .24). In contrast to hypotheses, effortful engagement predicted increases in depression over time. Thus, a post hoc analysis was conducted to examine whether effortful engagement continued to moderate the effect of maternal depression at the final wave of the study. The maternal depression x effortful engagement interaction was examined, re-centering time so the intercept reflected depression at $W_4$. This analysis revealed a significant maternal depression x effortful engagement interaction predicting $W_4$ depression (b = -.23, SE = .10, $p$ = .03). Decomposition of the interaction revealed that, as for $W_1$ depression, maternal depression predicted higher $W_4$ depression when girls used low effortful engagement (b = .49, SE = .21, $p$ = .02) but not when girls used high effortful engagement (b = .04, SE = .07, $p$ = .57), suggesting that the moderating effect of effortful engagement was maintained over time.

In boys, there was a significant positive effect of maternal depression and a significant negative effect of effortful engagement on the intercept. There was a significant maternal depression x effortful engagement interaction predicting the slope (Figure 1b). Decomposition of the interaction revealed that although boys exposed to maternal depression showed higher initial levels of depression than those not exposed to

27

maternal depression, boys exposed to maternal depression who used high effortful engagement decreased in depression over time (b = -.27, SE = .11, $p$ = .02), whereas those who used low effortful engagement maintained elevated depression over time (b = .04, SE = .21, $p$ = .85). Boys not exposed to maternal depression who used low effortful engagement had elevated initial levels of depression but declined in depression over time (b = -.17, SE = .08, $p$ = .03). Boys not exposed to maternal depression who used high effortful engagement maintained particularly low levels of depression over time (b = .08, SE = .05, $p$ = .11).

The second analysis examined the independent and interactive contributions of $W_1$ maternal depression, $W_1$ effortful engagement, and age to initial levels and trajectories of youth depression. For the intercept, this model revealed nonsignificant maternal depression x age (b = .02, SE = .09, $p$ = .85), effortful engagement x age (b = -.01, SE = .07, $p$ = .83), and maternal depression x effortful engagement x age (b = .04, SE = .07, $p$ = .52) interactions. For the slope, the model similarly revealed nonsignificant maternal depression x age (b = -.03, SE = .03, $p$ = .34), effortful engagement x age (b = .02, SE = .02, $p$ = .38), and maternal depression x effortful engagement x age (b = -.01, SE = .02, $p$ = .79) interactions. Thus, no further analyses were conducted involving age.

In sum, analyses examining the contribution of maternal depression and effortful engagement to youth depression revealed that effortful engagement moderated the effect of maternal depression. In girls, high effortful engagement mitigated the association between maternal depression and initial levels of depression. In boys, high effortful engagement buffered the effect of maternal depression on trajectories of depression. There was no evidence of moderation by age.

**Effortful disengagement.** The first analysis examined the independent and interactive contributions of $W_1$ maternal depression, $W_1$ effortful disengagement, and gender to initial levels and trajectories of youth depression. For the intercept, this model revealed nonsignificant maternal depression x gender (b = .01, SE = .15, $p$ = .96), effortful disengagement x gender (b = .11, SE = .09, $p$ = .24), and maternal depression x effortful disengagement x gender (b = .23, SE = .12, $p$ = .07) interactions. For the slope, the model similarly revealed nonsignificant maternal depression x gender (b = .00, SE = .06, $p$ = .95), effortful disengagement x gender (b = .00, SE = .03, $p$ = .95), and maternal depression x effortful disengagement x gender (b = -.06, SE = .04, $p$ = .20) interactions. Thus, no further analyses were conducted involving gender.

The second analysis examined the independent and interactive contributions of $W_1$ maternal depression, $W_1$ effortful disengagement, and age to initial levels and trajectories of youth depression. For the intercept, this model revealed nonsignificant maternal depression x age (b = .07, SE = .10, $p$ = .47), effortful disengagement x age (b = .06, SE = .07, $p$ = .35), and maternal depression x effortful disengagement x age (b = -.03, SE = .06, $p$ = .64) interactions. For the slope, the model similarly revealed nonsignificant maternal depression x age (b = -.04, SE = .03, $p$ = .14), effortful disengagement x age (b = -.04, SE = .02, $p$ = .08), and maternal depression x effortful disengagement x age (b = -.01, SE = .02, $p$ = .69) interactions. Thus, no further analyses were conducted involving age.

Because there was no evidence for moderation by gender or age, these variables and the associated interactions were removed from the model and the independent and interactive contributions of $W_1$ maternal depression and $W_1$ effortful disengagement to

initial levels and trajectories of youth depression were examined (see Table 6). This model revealed significant positive effects of maternal depression and effortful disengagement predicting the intercept, suggesting additive rather than interactive effects on youth depression (Figure 2). Youth exposed to maternal depression had higher initial depression than youth not exposed to maternal depression, and youth who used high effortful disengagement had higher initial depression than youth who used low effortful disengagement. This model revealed nonsignificant effects of maternal depression, effortful disengagement, and the maternal depression x effortful disengagement interaction predicting the slope.

In sum, analyses examining the contribution of maternal depression and effortful disengagement to youth depression revealed additive contributions of the risk factors to initial levels of depression, such that youth with dual risk (i.e., maternal depression and high effortful disengagement) had the highest initial depression and youth with no risk had the lowest initial depression whereas youth with one risk (i.e., maternal depression or high effortful disengagement) had intermediate levels of depression. There were no significant predictors of the slope, suggesting that initial levels of depression were maintained over time. There was no evidence of moderation by gender or age.

**Involuntary engagement.** The first analysis examined the independent and interactive contributions of $W_1$ maternal depression, $W_1$ involuntary engagement, and gender to initial levels and trajectories of youth depression. For the intercept, this model revealed nonsignificant maternal depression x gender (b = -.14, SE = .12, $p$ = .23), involuntary engagement x gender (b = .06, SE = .11, $p$ = .58), and maternal depression x involuntary engagement x gender (b = .09, SE = .13, $p$ = .50) interactions. For the slope,

this model similarly revealed nonsignificant maternal depression x gender (b = .01, SE = .05, $p$ = .81), involuntary engagement x gender (b = -.04, SE = .03, $p$ = .28), and maternal depression x involuntary engagement x gender (b = -.07, SE = .05, $p$ = .15) interactions. Thus, no further analyses were conducted involving gender.

The second analysis examined the independent and interactive contributions of $W_1$ maternal depression, $W_1$ involuntary engagement, and age to initial levels and trajectories of youth depression. For the intercept, this model revealed a significant maternal depression x involuntary engagement x age interaction (b = -.15, SE = .07, $p$ = .03). For the slope, this model revealed nonsignificant maternal depression x age (b = -.03, SE = .03, $p$ = .23), involuntary engagement x age (b = -.02, SE = .03, $p$ = .56), and maternal depression x involuntary engagement x age (b = .03, SE = .02, $p$ = .28) interactions. Thus, the maternal depression x involuntary engagement interaction for the intercept was examined for youth 1 SD below the mean sample age and youth 1 SD above the mean age. The maternal depression x involuntary engagement interaction was not significant for younger (b = .15, SE = .10, $p$ = .15) or older (b = -.21, SE = .15, $p$ = .16) youth. Thus, no further analyses were conducted involving age.

Because there was no evidence for moderation by gender or meaningful moderation by age, these variables and the associated interactions were removed from the model and the independent and interactive contributions of $W_1$ maternal depression and $W_1$ involuntary engagement to initial levels and trajectories of youth depression were examined (see Table 6). For the intercept, this model revealed significant positive effects of maternal depression and involuntary engagement, suggesting additive effects. For the slope, this model revealed a significant maternal depression x involuntary engagement

interaction (Figure 3). The additive effects for the intercept and decomposition of the interaction for the slope together revealed that among youth exposed to maternal depression, those who showed high involuntary engagement had higher initial levels of depression than those who showed low involuntary engagement and both groups maintained these levels over time (b = -.09, SE = .10, $p$ = .36 and b = -.13, SE = .08, $p$ = .14, respectively). Among youth not exposed to maternal depression, those who showed high involuntary engagement had higher initial levels of depression than those who showed low involuntary engagement but they declined in depression over time (b = -.15, SE = .06, $p$ = .01); those who showed low involuntary engagement maintained very low levels of depression over time (b = .07, SE = .04, $p$ = .12).

In sum, analyses examining the contribution of maternal depression and involuntary engagement to youth depression revealed additive contributions of the risk factors to initial levels of depression, such that youth with dual risk had the highest initial depression and youth with no risk had the lowest initial depression whereas youth with one risk had intermediate levels of depression. Initial levels of depression were maintained over time, with the exception that youth not exposed to maternal depression who showed high involuntary engagement did not maintain elevated depression. There was no evidence of moderation by gender or meaningful moderation by age.

**Involuntary disengagement.** The first analysis examined the independent and interactive contributions of $W_1$ maternal depression, $W_1$ involuntary disengagement, and gender to initial levels and trajectories of youth depression. For the intercept, this model revealed significant effects of maternal depression (b = .45, SE = .10, $p$ = .00) and involuntary disengagement (b = .38, SE = .11, $p$ = .00), a significant involuntary

disengagement x gender interaction (b = .23, SE = .11, $p$ = .04), and a significant

maternal depression x involuntary disengagement x gender interaction (b = .33, SE = .13,

$p$ = .01). For the slope, this model revealed a significant involuntary disengagement x

gender interaction (b = -.08, SE = .04, $p$ = .03) and a significant maternal depression x

involuntary disengagement x gender interaction (b = -.17, SE = .06, $p$ = .01). Thus, the

maternal depression x involuntary disengagement interaction was examined in girls and

boys by re-centering gender (see Table 5).

 In girls, there were significant positive effects of maternal depression and

involuntary disengagement and a significant maternal depression x involuntary

disengagement interaction predicting the intercept. There was a significant negative

effect of involuntary disengagement predicting the slope (Figure 4a). Decomposition of

the interaction revealed that maternal depression predicted higher initial levels of

depression when girls showed high involuntary disengagement (b = .80, SE = .25, $p$ =

.00), but not when girls showed low involuntary disengagement (b = .00, SE = .09, $p$ =

.99). In contrast to hypotheses, involuntary disengagement predicted decreases in

depression over time. Thus, a post hoc analysis was conducted to examine whether

involuntary disengagement continued to moderate the effect of maternal depression at the

final wave of the study.  The maternal depression x involuntary disengagement

interaction was examined, re-centering time so the intercept reflected depression at $W_4$.

This analysis revealed a significant maternal depression x involuntary disengagement

interaction predicting $W_4$ depression (b = .18, SE = .09, $p$ = .04). Decomposition of the

interaction revealed that, as for $W_1$ depression, maternal depression predicted higher $W_4$

depression when girls showed high involuntary disengagement (b = .43, SE = .19, $p$ =

.03) but not when girls showed low involuntary disengagement (b = .06, SE = .07, $p$ = .42), suggesting that the moderating effect of involuntary disengagement was maintained over time.

In boys, there was a significant positive effect of maternal depression on the intercept, and a significant maternal depression x involuntary disengagement interaction predicting the slope (Figure 4b). Decomposition of the interaction revealed that although boys exposed to maternal depression showed higher initial levels of depression than those not exposed to maternal depression, those who showed high involuntary disengagement maintained elevated depression over time (b = .25, SE = .29, $p$ = .40), whereas those who showed low involuntary disengagement declined in depression over time (b = -.45, SE = .12, $p$ = .00). Among boys not exposed to maternal depression, those who showed high involuntary disengagement had higher initial levels of depression than those who showed low levels of involuntary disengagement and both groups maintained these initial levels over time (b = -.11, SE = .07, $p$ = .09 and b = .01, SE = .05, $p$ = .90, respectively).

The second analysis examined the independent and interactive contributions of $W_1$ maternal depression, $W_1$ involuntary disengagement, and age to initial levels and trajectories of youth depression. For the intercept, this model revealed nonsignificant maternal depression x age (b = .03, SE = .09, $p$ = .78), involuntary disengagement x age (b = .04, SE = .08, $p$ = .65), and maternal depression x involuntary disengagement x age (b = .03, SE = .07, $p$ = .65) interactions. For the slope, the model similarly revealed nonsignificant maternal depression x age (b = -.03, SE = .03, $p$ = .32), involuntary disengagement x age (b = .00, SE = .02, $p$ = .82), and maternal depression x involuntary

34

disengagement x age (b = -.02, SE = .02, $p$ = .40) interactions. Thus, no further analyses were conducted involving age.

In sum, analyses examining the contribution of maternal depression and involuntary disengagement to youth depression revealed that involuntary disengagement moderated the effect of maternal depression. In girls, low involuntary disengagement mitigated the association between maternal depression and initial levels of depression. In boys, low involuntary disengagement buffered the effect of maternal depression on trajectories of depression. There was no evidence of moderation by age.

**Supplemental Analyses**

**Peer stress.** To examine whether the results of the central analyses were accounted for by the amount of peer stress youth experienced, the central analyses were repeated adjusting for peer stress. Because the central analyses did not reveal significant moderation by age, analyses examining age were not repeated. Across the models, peer stress significantly predicted higher initial levels of depression (bs = .08 - .11, SEs = .03, $p$s < .01) but declining trajectories of depression (bs = -.02 - -.03, SEs = .01, $p$s < .05). As detailed below, these analyses yielded the same independent and interactive effects of maternal depression, responses to stress, and gender as the central analyses.

*Effortful engagement.* Parallel to the central analyses, the model examining the independent and interactive effects of maternal depression, effortful engagement, and gender on youth depression revealed a significant maternal depression x effortful engagement x gender interaction predicting the intercept (b = -.26, SE = .10, $p$ = .01) and slope (b = .10, SE = .04, $p$ = .01). As in the central analyses, examination of the maternal depression x effortful engagement interaction in girls and boys revealed a significant

35

maternal depression x effortful engagement interaction predicting the intercept (b = -.25, SE = .11, $p$ = .02) in girls and a significant maternal depression x effortful engagement interaction predicting the slope (b = -.19, SE = .07, $p$ = .01) in boys.

*Effortful disengagement.* Parallel to the central analyses, the model examining the independent and interactive effects of maternal depression and effortful disengagement revealed significant, positive effects of maternal depression (b = .40, SE = .13, $p$ = .00) and effortful disengagement (b = .22, SE = .09, $p$ = .01) predicting the intercept. As in the central analyses, there was no evidence of interactive effects between maternal depression and effortful disengagement or moderation by gender.

*Involuntary engagement.* Parallel to the central analyses, the model examining the independent and interactive effects of maternal depression and involuntary engagement revealed significant, positive effects of maternal depression (b = .32, SE = .13, $p$ = .01) and involuntary engagement (b = .26, SE = .10, $p$ = .01) predicting the intercept, and a significant maternal depression x involuntary engagement interaction predicting the slope (b = .08, SE = .04, $p$ = .03). As in the central analyses, there was no evidence of moderation by gender.

*Involuntary disengagement.* Parallel to the central analyses, the model examining the independent and interactive effects of maternal depression, involuntary disengagement, and gender on youth depression revealed a significant maternal depression x involuntary disengagement x gender interaction predicting the intercept (b = .35, SE = .12, $p$ = .01) and slope (b = -.17, SE = .06, $p$ = .01). As in the central analyses, examination of the maternal depression x involuntary disengagement interaction in girls and boys revealed a significant maternal depression x involuntary disengagement

36

interaction predicting the intercept (b = .36, SE = .13, $p$ = .01) in girls and a significant

maternal depression x involuntary disengagement interaction predicting the slope (b =

.28, SE = .11, $p$ = .01) in boys.

**Maternal depression chronicity.** To examine whether the effects of $W_1$ maternal

depression revealed in the central analyses were better explained by the chronicity of

maternal depression, supplemental analyses examining the independent and interactive

effects of maternal depression chronicity and youth responses to stress on initial levels

and trajectories of youth depression were conducted. The central analyses were repeated,

replacing $W_1$ maternal depression with maternal depression chronicity. A separate set of

analyses was conducted for each of the three indices of maternal depression chronicity

(maternal lifetime duration, child lifetime duration, and proportion of child's life).

Moderation by gender was examined, but because one index of chronicity (the proportion

of children's lives that mothers experienced depressive symptoms) was computed based

on children's age, moderation by age was not tested. As detailed below, the analyses

examining maternal depression chronicity generally revealed nonsignificant effects of

chronicity and little evidence of interactive effects with responses to stress or gender.

*Contribution of maternal depression chronicity to youth depression.* The effect

of maternal depression chronicity on initial levels and trajectories of youth depression

was examined. Across the three models examining each index of maternal depression

chronicity, there were no significant effects of maternal depression chronicity for the

intercept (bs = .05 - .07, SEs = .08, $ps \geq .42$) or slope (bs = .01, SEs = .03, $ps \geq .66$). To

examine whether the effect of maternal depression chronicity on youth depression was

moderated by gender, gender and the maternal depression chronicity x gender interaction

37

were added to the models. The three models examining each index of maternal

depression chronicity yielded the same results: there was a significant maternal

depression chronicity x gender interaction (bs = .06, SEs = .03, $ps \leq .05$) predicting the

slope. Thus, the effect of each index of maternal depression chronicity was examined in

girls and boys by re-centering gender. Although the effect of maternal depression

chronicity on the slope was positive for girls and negative for boys, neither slope was

significant (for girls, bs = .05, SEs = .04, $ps \geq .15$; for boys, bs = -.06 - -.07, SEs = .04, $ps$

$\geq .09$).

     *Effortful engagement.* The independent and interactive effects of maternal

depression chronicity, $W_1$ effortful engagement, and gender on initial levels and

trajectories of youth depression were examined. Across the models examining each index

of maternal depression chronicity, there were no significant maternal depression

chronicity x effortful engagement interactions (for the intercept, bs = .02 - .06, SEs = .08

- .09, $ps \geq .50$; for the slope, bs = -.04 - -.05, SEs = .03, $ps \geq .14$) or maternal depression

chronicity x effortful engagement x gender interactions (for the intercept, bs = -.07 - -.11,

SEs = .08 - .09, $ps \geq .17$; for the slope, bs = .00 - .01, SEs = .03, $ps \geq .78$).

     *Effortful disengagement.* The independent and interactive effects of maternal

depression chronicity, $W_1$ effortful disengagement, and gender on initial levels and

trajectories of youth depression were examined. Across the models examining each index

of maternal depression chronicity, there were no significant maternal depression

chronicity x effortful disengagement interactions (for the intercept, bs = -.03 - .02, SEs =

.13 - .14, $ps \geq .86$; for the slope, bs = .01 - .02, SEs = .05, $ps \geq .71$) or maternal

depression chronicity x effortful disengagement x gender interactions (for the intercept, bs = .03 - .06, SEs = .13 - .14, $ps \geq .65$; for the slope, bs = -.02 - .02, SEs = .05, $ps \geq .70$).

*Involuntary engagement.* The independent and interactive effects of maternal depression chronicity, $W_1$ involuntary engagement, and gender on initial levels and trajectories of youth depression were examined. Across the three models examining each index of maternal depression chronicity, there were no significant maternal depression chronicity x involuntary engagement interactions (for the intercept, bs = -.02 - -.05, SEs = .08 - .09, $ps \geq .61$; for the slope, bs = .03 - .04, SEs = .03 - .04, $ps \geq .25$) or maternal depression chronicity x involuntary engagement x gender interactions (for the intercept, bs = -.03 - .01, SEs = .08 - .09, $ps \geq .72$; for the slope, bs = .01 - .02, SEs = .03 - .04, $ps \geq .60$).

*Involuntary disengagement.* The independent and interactive effects of maternal depression chronicity, $W_1$ involuntary disengagement, and gender on initial levels and trajectories of youth depression were examined. The models examining child lifetime duration and proportion of the child's life both revealed nonsignificant maternal depression chronicity x involuntary disengagement interactions (for the intercept, bs = .01, SEs = .09, $ps \geq .91$; for the slope, bs = .03 - .04, SEs = .03, $ps \geq .26$) and nonsignificant maternal depression chronicity x involuntary disengagement x gender interactions (for the intercept, bs = .13 - .16, SEs = .09, $ps \geq .10$; for the slope, bs = -.03 - -.04, SEs = .03, $ps \geq .24$). The model examining maternal lifetime duration revealed a significant maternal depression chronicity x involuntary disengagement x gender interaction (b = .19, SE = .07, $p = .01$) predicting the intercept. Thus, the maternal

depression chronicity x involuntary disengagement interaction was examined in girls and boys by re-centering gender.

In girls, the maternal depression chronicity x involuntary disengagement interaction was not significant for the intercept (b = .15, SE = .09, *p* = .10) or slope (b = .03, SE = .05, *p* = .54). In boys, there was a significant maternal depression chronicity x involuntary disengagement interaction (b = -.22, SE = .10, *p* = .03) predicting the intercept. For the slope, there was a significant negative effect of maternal depression chronicity (b = -.06, SE = .03, *p* = .05) and a significant maternal depression chronicity x involuntary disengagement interaction (b = .07, SE = .03, *p* = .03). Youth of mothers with high depression chronicity (i.e., 1 SD above the mean) had mildly elevated initial levels of depression; of these youth, those who also used high involuntary disengagement maintained this level over time (b = -.03, SE = .06, *p* = .60) whereas those who used low involuntary disengagement declined in depression over time (b = -.28, SE = .10, *p* = .01). Youth of mothers with low depression chronicity (i.e., 1 SD below the mean) who used high involuntary disengagement had mildly elevated initial levels of depression, and maintained this level over time (b = -.06, SE = .10, *p* = .56). Youth of mothers with low depression chronicity who used low involuntary disengagement had very low initial levels of depression that were maintained over time (b = -.02, SE = .08, *p* = .85).

**Discussion**

This research sought to examine the contribution of maternal depression to trajectories of youth depression during adolescence, and to elucidate youth characteristics that may contribute to risk or resilience. Based on prior research implicating interpersonal stress and impairment in the intergenerational transmission of depression (Hammen et al., 2003, 2004, 2008), this study examined whether responses to interpersonal stress with peers mitigate or exacerbate the effect of maternal depression on youth depression. Maternal depression and youth responses to stress made independent and interactive contributions to youth depression. In some cases, adaptive responses to stress buffered the effect of maternal depression on initial levels and trajectories of youth depression, with the timing of this moderating role differing for girls and boys. In other cases, maternal depression and youth responses to stress contributed additive risks such that youth were at greatest risk for depression when they were exposed to maternal depression and used maladaptive responses to stress.

**Effects of Effortful Engagement and Involuntary Disengagement**

The contribution of maternal depression to youth depression was moderated by youth effortful engagement and involuntary disengagement responses to stress, and the timing of these associations differed for girls and boys. Among girls, adaptive responses to peer stress (i.e., high effortful engagement, low involuntary disengagement) dampened the association between maternal depression and initial levels of depression. Girls of depressed mothers who used few active coping strategies aimed at resolving problems or emotions or who showed many dysregulated withdrawal responses displayed moderate depressive symptoms whereas those who showed adaptive responses displayed

41

essentially no initial depressive symptoms. The buffering role of adaptive responses to stress was maintained as girls progressed through adolescence.

Among boys, these same adaptive responses to peer stress buffered the effect of maternal depression on trajectories of youth depression. Boys of depressed mothers displayed initial levels of depression corresponding to mild symptoms. Those who used active coping strategies directed toward resolving stress and emotions or who showed few dysregulated withdrawal responses declined in depression as they progressed through adolescence. In contrast, those who used maladaptive responses maintained mild depressive symptoms over time.

Prior research suggests that offspring of depressed mothers experience heightened interpersonal stress, including peer stress (Hammen et al., 2008; Adrian & Hammen, 1993; Gershon et al., 2011), which increases risk for depression (Gershon et al., 2011; Hammen et al., 2008). Effortful engagement responses to stress encompass addressing the source of stress (e.g., problem solving), regulating emotional responses to stress, and reframing thoughts about stress (e.g., positive thinking). When offspring of depressed mothers respond to peer stress with these strategies, they may directly ameliorate peer stress and effectively regulate their emotional and cognitive responses to stress, thereby mitigating their vulnerability to depression. In contrast, involuntary disengagement responses to stress involve dysregulated emotional and cognitive withdrawal (e.g., mind going blank, feeling disconnected, emotional numbing) as well as automatic escape and avoidance behaviors (e.g., experiencing an uncontrolled impulse to get away, freezing). When youth of depressed mothers experience these responses, they may fail to resolve peer stress and perhaps intensify peer stress by behaving in an uncontrolled manner. They

42

also may fail to manage ensuing negative emotions, potentially exacerbating the impact of stress on their emotional well-being. Thus, youth of depressed mothers may be especially vulnerable to depression when they respond to peer stress with involuntary disengagement but be protected against depression when they do not respond to peer stress in these maladaptive ways.

These results also suggest that effortful engagement responses may be particularly meaningful for youth of depressed mothers. Boys who used low effortful engagement initially displayed mild depressive symptoms regardless of exposure to maternal depression, but only boys who were exposed to maternal depression maintained mild depression over time. Similarly, effortful engagement was more predictive of depression among girls exposed to maternal depression than those not exposed to maternal depression. It may be that because exposure to interpersonal stress and poor social functioning is particularly characteristic of depression among offspring of depressed mothers (Hammen & Brennan, 2001; Hammen et al., 2003), failing to use adaptive responses to social stress is especially detrimental to these youth's emotional well-being.

**Effects of Effortful Disengagement and Involuntary Engagement**

Effortful disengagement and involuntary engagement responses to peer stress were each independently and positively associated with initial levels of youth depression. Rather than moderating the effect of maternal depression, these maladaptive responses to stress presented additive risks. Youth with dual risk (i.e., maternal depression and maladaptive responses to stress) had the highest initial levels of depression, displaying symptoms of mild to moderate severity. Youth who had one risk factor (i.e., maternal depression or maladaptive responses to stress) had mild initial depressive symptoms.

43

Youth with neither risk factor had the lowest initial levels of depression, displaying essentially no depressive symptoms.

These results suggest that when youth are exposed to maternal depression, using avoidance-oriented coping or experiencing overarousal in response to peer stress may confer additional risk that can contribute to meaningful individual differences in depressive symptoms. Responding to peer stress with cognitive and behavioral avoidance (i.e., effortful disengagement) may prevent youth from resolving stress or regulating their emotional responses to stress, thereby contributing to depressive symptoms. Experiencing physiological arousal or intrusive thoughts and emotions (i.e., involuntary engagement) following peer stress may heighten negative emotions and directly contribute to depressive symptoms. In line with prior research linking effortful disengagement and involuntary engagement with greater internalizing symptoms (Connor-Smith et al., 2000), the results of this study also suggest that these responses to stress may be detrimental to the emotional well-being of youth both exposed and not exposed to maternal depression.

The additive contributions of maternal depression and effortful disengagement to initial levels of depression were maintained over time, as there were no independent or interactive effects on trajectories of youth depression. However, maternal depression and involuntary engagement made interactive contributions to trajectories of youth depression. Although youth who experienced physiological arousal and intrusive thoughts and emotions following stress had elevated initial levels of depression, youth who were exposed to maternal depression maintained these elevated levels over time, whereas youth not exposed to maternal depression did not. Because maternal depression

44

predicts more chronicity of depression in youth (Rhode et al., 2005), this result may

reflect greater difficulty among offspring of depressed mothers in recovering from

depressive symptoms over time. It is also possible that overarousal following

interpersonal stress has more enduring negative effects for offspring of depressed

mothers because depressed mothers are less available or effective in helping youth

manage this arousal compared to nondepressed mothers (Monti, Rudolph, & Abaied,

2014; Silk et al., 2011)

**Moderation by Gender**

The interactive contributions of maternal depression and effortful engagement and

involuntary disengagement responses to stress differed for girls and boys. For girls, high

effortful engagement and low involuntary disengagement mitigated the association

between maternal depression and initial levels of depression. For boys, high effortful

engagement and low involuntary disengagement mitigated the effect of maternal

depression on trajectories of depression.

Compared to boys, girls are more focused on peer relationships (for a review, see

Rose & Rudolph, 2006) and are more reactive to peer stress (Hankin et al., 2007;

Rudolph, 2002; Rudolph et al., 2009). Furthermore, girls' friendships are characterized

by more closeness, self-disclosure, and nurturance (for a review, see Rose & Rudolph,

2006). Managing peer stress effectively may immediately benefit girls' emotional well-

being because they are highly attuned to peer relationships and may receive emotional

support on an everyday basis through their friendships. Compared to girls, boys

experience less closeness and nurturance in friendships; they are less focused on social

connections and more concerned with social dominance and status (for a review, see

Rose & Rudolph, 2006). Managing peer stress effectively may not impact the emotional support boys receive through their friendships on an everyday basis, but instead may contribute over time to their acceptance by peers and the quality of the social relationships they maintain. Thus, the benefits of using adaptive responses to peer stress may accrue more slowly over time. In addition, there is some evidence that boys' coping efforts are more effective in buffering the negative effects of stress during adolescence than preadolescence (Hoffman et al., 1992). Thus, the mitigating effect of adaptive responses to stress for boys' trajectories of depression may be due to boys' continuing use of adaptive responses across a period when coping efforts are becoming increasingly effective and regulated responses to interpersonal stress are becoming more normative among peers.

Additional sex differences emerged in the severity of youth's initial depressive symptoms. Although girls and boys did not differ on average in their initial levels of depression, the most at-risk girls showed higher levels of depression than the most at-risk boys. Specifically, girls exposed to maternal depression who used low effortful engagement or high involuntary disengagement displayed moderate depressive symptoms, whereas boys exposed to maternal depression who showed comparable responses to stress displayed mild depressive symptoms. Because both maternal depression (Goodman et al., 2011) and responses to interpersonal stress (Agoston & Rudolph, 2011) have a greater effect on girls' depression, girls also may be especially vulnerable to the interactive effects of exposure to maternal depression and poor responses to interpersonal stress. This may be particularly true for the immediate effects of these risk factors as sex differences were most apparent for initial levels of depression.

**Moderation by Age**

Based on research indicating that adolescence is a time during which prevalence rates of depression increase (Kessler, Avenevoli, & Merikangas, 2001), as well as a time when youth are increasingly focused on peer relationships (Hergovich, Sirsch, & Felinger, 2002; Steinberg & Silverberg, 1986) and capable of engaging in complex coping efforts (for reviews, see Compas et al., 2001; Zeman, Cassano, Perry-Parrish, & Stegall, 2006), we hypothesized that maternal depression and youth responses to stress would contribute to initial levels of depression in older youth and trajectories of depression in younger youth. However, we did not find support for these hypotheses. Moreover, we did not find evidence that the effect of maternal depression on youth depression was moderated by age differentially for girls and boys. Previous research on this sample suggests that pubertal development, including pubertal status and pubertal timing relative to peers, may be more important than chronological age in contributing to the development of depression during adolescence and the gender differences in depression that emerge during this time (Conley & Rudolph, 2009). Furthermore, associations between pubertal development and subsequent depression are stronger in the context of maternal depression (Rudolph & Troop-Gordon, 2010) and peer stress (Conley & Rudolph, 2009), as well as in the context of maladaptive responses to stress for girls (Rudolph & Troop-Gordon, 2010). Thus, it may be that the contributions of maternal depression and youth responses to peer stress to youth depression are stronger at stages of pubertal development when youth are particularly vulnerable to peer stress and depression.

**Implications for Theory and Research**

This study is one of a very limited number of studies to examine trajectories of depression among adolescent offspring of depressed mothers. Replicating Garber and colleagues' (2002) results, maternal depression independently predicted higher initial levels of depression, but not trajectories of depression during adolescence. The current results extend and clarify this prior research by demonstrating that maternal depression has implications for both initial levels and trajectories of depression, but its effects are moderated by youth responses to stress and gender.

This study builds on Hammen and colleagues' (2004) interpersonal stress model of the intergenerational transmission of depression, which posits that interpersonal impairment and interpersonal stress play a key role in the transmission of depression from mothers to their offspring. Prior research indicates that offspring of depressed mothers experience more interpersonal stress (Hammen et al., 2009) and that interpersonal stress is particularly characteristic of depression among offspring of depressed mothers compared to offspring of nondepressed mothers (Hammen & Brennan, 2001). Extending research indicating that youth exposed to depressed mothers may be at greater risk for depression due to interpersonal stress (Hammen et al., 2004; Hammen et al., 2012), the current results demonstrate that adaptive responses to interpersonal stress (i.e., high levels of effortful engagement, low levels of involuntary disengagement) mitigate risk. The results of this study also suggest that maternal depression and responses to interpersonal stress (effortful disengagement, involuntary engagement) can confer additive risks, such that responses to stress explain variability in depressive symptoms among youth exposed to maternal depression, as well as youth not exposed to maternal depression. This finding parallels research by Pargas and colleagues (2010),

which demonstrated that healthy social functioning is protective against psychopathology among youth of depressed and non-depressed mothers. Notably, supplemental analyses indicate that the effects of youth responses to stress in this study were not accounted for by their exposure to peer stress, suggesting that understanding the intergenerational transmission of depression and individual differences in depression among offspring of depressed mothers requires consideration not only of the amount of interpersonal stress that youth face, but also how youth respond to this stress.

**Limitations & Future Directions**

This study focused on youth responses to stress in the peer domain as a moderator of the effect of maternal depression on youth depression. Because offspring of depressed mothers often lack supportive family relationships (Lovejoy, Graczyk, O'Hare & Neuman, 2000), peer relationships may serve as a critical source of social support. Thus, managing or failing to manage stress in this domain may be impactful for youth well-being. However, in this study we cannot determine whether the results are driven specifically by responses to peer stress. It may be that youth's reports of their responses to peer stress reflect their responses to a range of interpersonal stressors (e.g., family conflict), which also moderate the effect of maternal depression on youth depression. Not surprisingly, among families with a depressed parent, youth responses to stressors associated with parental depression (parental withdrawal, parental intrusiveness, marital conflict) are correlated with youth anxiety and depression (Langrock et al., 2002). Thus, it would be beneficial for future research to examine whether youth responses to family stress also moderate the effect of maternal depression on youth depression.

This study examined the contribution of initial levels of maternal depression to trajectories of youth depression across a four-year period. Although this approach is useful because it supports the prospective effect of maternal depressive symptoms for youth, it is limited in that it does not capture the effects of maternal depression occurring prior to or following the initial wave. Given prior research suggesting that youth of depressed mothers continue to display heightened internalizing symptoms after mothers have recovered from depression (Lee & Gotlib, 1991), it will be important for future research to examine whether past maternal depression that has desisted also contributes to trajectories of depression during adolescence. Supplemental analyses revealed that the chronicity of maternal depression did not contribute to youth depression, suggesting that the length of time youth have been exposed to depression may be less important to understanding the effects of maternal depression than the severity of recent maternal depression. However, in future research, it may be useful to examine whether changes in maternal depression (e.g., a new onset, fluctuations in severity) during adolescence contribute to trajectories of youth depression. In the same vein, this study examined initial responses to stress as a moderator of maternal depression. It is not clear whether the effects of responses to stress are due to the enduring impact of the responses over time or to the stability of youth's responses. Examining time-varying effects could elucidate the enduring or transitory effects of responses to stress on youth depression.

This research relied on youth's self-reports of their cognitive, behavioral, and physiological responses to peer stress. This approach is advantageous in that it provides insight into cognitive and emotional responses (e.g., denial, rumination, emotional numbing) that may be otherwise unobservable. However, there may be additional

components of youth stress responses outside the scope of self-reports that are important to consider. For example, although youth reported on their physiological arousal, the parasympathetic nervous system (PNS), which is responsible for physiological regulatory processes, may also play an important role in determining risk for depression. PNS activation has been proposed to reduce physiological arousal following stress and enable adaptive responses to stress (Porges, 2007). There is some evidence that maternal depression interacts with gender and youth respiratory sinus arrhythmia (a component of PNS functioning) to predict trajectories of depression among children (Wetter & El-Sheikh, 2002). It would be beneficial for future research to consider not only whether PNS activation directly moderates the effect of maternal depression, but also whether PNS activation operates in conjunction with involuntary engagement (e.g., physiological arousal) responses to influence depression in youth.

**Implications for Intervention and Prevention**

The results of this study have important implications for applied efforts to promote resilience in offspring of depressed mothers. The current results suggest that youth responses to peer stress are a potential target for intervention and prevention. Teaching youth of depressed mothers to cope with peer stress using effortful engagement responses (e.g., problem solving, emotion regulation, cognitive restructuring, positive thinking) may reduce risk for depression. It is promising that in this study, youth responses to stress were generally unrelated to maternal depression. Thus, youth of depressed mothers may not differ from youth of nondepressed mothers in their capacity to engage in adaptive responses to stress such as effortful engagement. Moreover, Compas and colleagues (2010) have demonstrated that effortful coping behaviors can be effectively targeted

51

through a cognitive-behavioral intervention program for families with a depressed parent. In the intervention, children who were taught strategies for coping with the stress of parental depression increased in their use of secondary control coping (a component of effortful engagement; e.g., cognitive restructuring, positive thinking), which in turn reduced youth internalizing symptoms. Thus, youth effortful coping strategies appear to be a feasible point of intervention. It will be important for future intervention work to address not only youth coping responses to parental depression, but also youth responses to peer stress.

In addition to teaching effortful engagement coping, it may be important to reduce effortful disengagement, involuntary disengagement, and involuntary engagement responses. Although it may seem difficult to deter youth from involuntary responses, prior research indicates that the coping suggestions that mothers make to their children when they face peer stress (i.e., encouraging effortful engagement) can contribute to decreases in youth involuntary engagement and disengagement responses over time (Abaied & Rudolph, 2011), suggesting that involuntary responses also may be a malleable target for intervention. Thus, it would be beneficial for intervention and prevention efforts to target reductions in youth's involuntary stress responses in addition to promoting effortful engagement coping.

# References

Adrian, C., & Hammen, C. (1993). Stress exposure and stress generation in children of depressed mothers. *Journal of Consulting and Clinical Psychology, 61*, 354-359.

Agoston, A. M., & Rudolph, K. D. (2011). Transactional associations between youths' responses to peer stress and depression: The moderating roles of stress and stress exposure. *Journal of Abnormal Child Psychology, 39*, 159-171.

American Psychiatric Association. (2000). Diagnostic and statistical manual of mental disorders (4th ed., text revision). Washington, DC: Author.

Avenvoli, S., Knight, E., Kessler, R. C., & Merikangas, K. R. (2008). Epidemiology of depression in children and adolescents.  In J. R. Z. Abela & B. L. Hankin (Eds.), *Handbook of Depression in Children and Adolescents* (pp. 6-32). New York, NY: Guilford Press.

Bagner, D. M., Pettit, J. W., Lewinsohn, P. M., & Seeley, J. R. (2010). Effect of maternal depression on child behavior: A sensitive period? *Journal of the American Academy of Child & Adolescent Psychiatry, 49*, 699-707.

Barker, E. D., Jaffee, S. R., Uher, R., & Maughan, B. (2011). The contribution of prenatal and postnatal maternal anxiety and depression to child maladjustment. *Depression and Anxiety, 28*, 696-702.

Barrera, M. & Garrison-Jones, C. (1992). Family and peer social support as specific correlates of adolescent depressive symptoms. *Journal of Abnormal Child Psychology, 20*, 1-16.

Beardslee, W. R., Versage, E. M., & Gladstone, T. G. G. (1998). Children of affectiely ill

    parents: A review of the past 10 years. *Journal of the American Academy of Child*

    *and Adolescent Psychiatry, 37,* 1134-1141.

Beck, A.T., Rush, A. J., Shaw, B. F., & Emery, G. (1979). Cognitive therapy of

    depression: New York: Guilford.

Brennan, P. A., LeBrocque, R., & Hammen, C. (2003). Maternal depression, parent-child

    relationships, and resilient outcomes in adolescence. *Journal of the American*

    *Academy of Child and Adolescent Psychiatry, 42,* 1469-1477.

Brennan, P. A., Pargas, R., Walker, E. F., Green, P., Newport, D. J., & Stowe, Z. (2008)

    Maternal depression and infant cortisol: Influences of timing, comorbidity, and

    treatment. *The Journal of Child Psychology and Psychiatry, 49,* 1099-1107.

Brenning, K., Soenens, B., Braet, C., & Bal., B. (2012). The role of parenting and

    mother-adolescent attachment in the intergenerational similarity of internalizing

    symptoms. *Journal of Youth and Adolescence, 41*, 802-816.

Brown, G. W., & Harris, T. (1978). Social origins of depression: A study of

    psychiatric disorders in women. New York: Free Press.

Carter, J. S., & Garber, J. (2011). Predictors of the first onset of a major depressive

    episode and changes in depressive symptoms across adolescence: Stress and

    negative cognitions. *Journal of Abnormal Psychology, 120*, 779-796.

Compas, B. E., Champion, J. E., Forehand, R., Cole, D. A., Reeslund, K. L., Fear, J.,

    …Roberts, L. (2010). Coping and parenting: Mediators of 12-month outcomes of

    a family group cognitive-behavioral preventive intervention with families of

    depressed parents. *Journal of Consulting and Clinical Psychology, 79*, 623-634.

Compas, B. E., Connor-Smith, J. K., Saltzman, H., Thomsen, A. H., & Wadsworth, M. E. (2001). Coping with stress during childhood and adolescence: Problems, progress, and potential in theory and research. *Psychological Bulletin, 127,* 87-127.

Conley, C. S., & Rudolph, K. D. (2009). The emerging sex difference in adolescent depression: Interacting contributions of puberty and peer stress. *Development and Psychopathology, 21*, 593–620.

Connell, A. M., & Goodman, S. H. (2002). Association between psychopathology in fathers versus mothers and children's internalizing and externalizing behavior problems: A meta-analysis. *Psychological Bulletin, 128*, 746-773.

Connor-Smith, J. K., & Compas, B. E. (2004). Coping as a moderator of relations between reactivity to interpersonal stress, health status, and internalizing problems. *Cognitive Therapy and Research, 28*, 347-368.

Connor-Smith, J. K., Compas, B. E., Wadsworth, M. E.,Thomsen, A. H., & Saltzman, H. (2000). Responses to stress in adolescence: Measurement of coping and involuntary stress responses. *Journal of Consulting and Clinical Psychology, 68*, 976–992.

Conrad, M., & Hammen, C. (1993). Protective and resource factors in high- and low-risk children: A comparison of children with unipolar, bipolar, medically ill, and normal mothers. *Development and Psychopathology*, 5, 593-607.

Cummings, E. M., & Davies, P. T. (1994). Maternal depression and child development. *Journal of Child Psychology and Psychiatry, 35*, 73-112.

Diamantopoulou, S., Verhulst, F. C., & van der Ende, J. (2011). Gender differences in the

    development and adult outcome of co-occurring depression and delinquency in

    adolescence, *Jounral of Abnormal Psychology, 120*, 644-655.

DuBois, D. L., Felner, R. D., Bartels, C. L., & Silverman, M. M. (1995). Stability of self-

    reported depressive symptoms in a community sample of children and

    adolescents. *Journal of Clincial Child Psychology, 24*, 386-396.

Feldman, R., Granat, A., Pariente, C., Kanety, H., Kuint, J., & Gilboa-Schechtman, E.

    (2009). Maternal depression and axiety across the postpartum year and infant

    social engagement, fear regulation, and stress reactivity. *Journal of the American*

    *Academy of Child and Adolescent Psychiatry, 48,* 919-927.

Fergusson, D. M., Horwood, L. J., Ridder, E. M., & Beautrais, A. L. (2005).

    Subthreshold deprssion in adolescence and mental health outcomes in adulthood.

    *Archives of General Psychiatry, 62*, 66-72.

Field, T., Diego, M., & Hernandez-Reif, M. (2006). Prenatal depression effects on the

    fetus and newborn: a review. *Infant Behavior & Development, 29*, 445-455.

First, M. B., Spitzer, R.L., Gibbon, M., & Williams, J. (1996). Structured Clinical

    Interview for the DSM-IV Axis I Disorders—Non-patient edition (SCID-IV/NP

    Version 2.0). New York: New York State Psychiatric Institute, Biometrics

    Research Department.

Flynn, M., & Rudolph, K. D. (2007). Perceptual asymmetry and youths' responses to

    stress: Understanding vulnerability to depression. *Cognition and Emotion, 21*,

    773-788.

Flynn, M., & Rudolph, K. D. (2010). The contribution of deficits in emotional clarity to

    stress responses and depression. *Journal of Applied Developmental Psychology,*

    *31*, 291-297.

Flynn, M., & Rudolph, K. D. (2011). Stress generation and adolescent depression:

    Contribution of interpersonal stress responses, *Journal of Abnormal Child*

    *Psychology, 39*, 1187-1198.

Frampton, K. L., Jenkins, J. M., & Dunn, J. (2010). Within-family differences in

    internalizing behaviors: The role of children's perspectives of the mother-child

    relationship. *Journal of Abnormal Child Psychology, 38*, 557-568.

Garber, J., Keiley, M. K., & Martin, N. C. (2002). Developmental trajectories of

    adolescents' depressive symptoms: Predictors of change. *Journal of Consulting*

    *and Clinical Psychology, 70*, 79-95.

Garber, J., & Little, S. (1999). Predictors of competence among offspring of depressed

    mothers. *Journal of Adolescent Research, 14*, 44-71.

Gershon, A., Schraedley-Desmond, P., Rudolph, K. D., Booster, G. D., & Gotlib, I. H.

    (2011). Life stress and first onset of psychiatric disorders in daughters of

    depressed mothers. *Journal of Psychiatric Research, 45*, 855-862.

Goodman, S. H., Brogan, D., Lynch, M. E., & Fielding, B. (1993). Social and emotional

    competence in children of depressed mothers. *Child Development, 64*, 516-531.

Goodman, S. H., & Gotlib, I. H. (1999). Risk for psychopathology in the children of

    depressed mothers: A developmental model for understanding mechanisms of

    transmission. *Psychological Review, 106*, 458-490.

Goodman, S. H., Rouse, M. H., Connell, A. M. Broth, M. B., Hall, C. M., & Heyward, D. (2011). Maternal depression and child psychopathology: a meta-analytic review. *Clinical Child and Family Psychology Review, 14*, 1-27.

Gravener, J. A., Rogosh, F. A., Oshri, A., Narayan, A. J., Cicchetti, D., & Toth, S. L. (2012). The relations among maternal depressive disorder, maternal expressed emotion, and toddler behavior problems and attachment. *Journal of Abnormal Child Psychology, 40*, 803-813.

Hammen, C., & Brennan, P. A. (2001). Adolescents of depressed and nondepressed mothers: Tests of an interpersonal impairment hypothesis. *Journal of Consulting and Clinical Psychology, 69*. 284-294.

Hammen, C., Brennan, P. A., & Keenan-Miller, D. (2008). Patterns of adolescent depression to age 20: The role of maternal depression and youth interpersonal dysfunction. *Journal of Abnormal Child Psychology, 36*, 1189-1198.

Hammem, C., Hazel, N. A., Brennan, P. A., & Najman, J. (2012). Intergenerational transmission and continuity of stress and depression: depressed women and their offspring in 20 years of follow-up. *Psychological Medicine, 42*, 931-942.

Hammen, C., Shih, J., Altman, T., & Brennan, P. A. (2003). Interpersonal impairment and the prediction of depressive symptoms in adolescent children of depressed and nondepressed mothers. *Journal of the American Academy of Child and Adolescent Psychiatry, 42*, 571–577.

Hammen, C., Shih, J. H., & Brennan, P. A. (2004). Intergenerational transmission of depression: Test of an interpersonal stress model in a community sample. *Journal of Consulting and Clinical Psychology, 72*, 511–522.

Hankin, B. L., & Abramson, L. Y. (1999). Development of gender differences in

    depression: Description and possible explanations. *Annals of Medicine, 31,* 372-

    379.

Hankin, B. L., Abramson, L. Y., Moffitt, T. E., McGee, R., Silva, P. A., & Angell, K. E.

    (1998). Development of depression from preadolescence to young adulthood:

    Emerging gender differences in a 10-year longitudinal study. *Journal of*

    *Abnormal Psychology, 10*7, 128-140.

Hankin, B. L., Fraley, R. C., Lahey, B. B., & Waldman, I. D. (2005). Is depression best

    viewed as a continuum or discrete category? A taxometric analysis of childhood

    and adolescent depression in a population-based sample. *Journal of Abnormal*

    *Psychology, 114*, 96-111.

Hankin, B. L., Mermelstein, R., & Roesch, L. (2007). Sex differences in adolescent

    depression: Stress exposure and reactivity. *Child Development, 78*, 279-295.

Hergovich, A., Sirsch, U., & Felinger, M. (2002). Self-apprasals, actual appraisals, and

    reflected appraisals of preadolescent children. *Social Behavior and Personality,*

    *30,* 603-612.

Hoffman, M. A., Levy-Shiff, R., Sohlberg, S. C., & Zarizki, J. (1992). The impact of

    stress and coping: Developmental changes in the transition to adolescence.

    Journal of Youth and Adolescence, 21, 451-469.

Jaser, S. S., Langrock, A. M., Keller, G., Merchang, M. J., Benson, M. A., Reeslund, K.,

    Champion, J. E., & Compas, B. E. (2005). Coping with the stress of parental

    depression II: Adolescent and parent reports of coping and adjustment. *Journal of*

    *Clinical Child and Adolescent Psychology, 34*, 193-205.

Jenkins, J. M., & Curwen, T. (2008). Change in adolescents' internalizing symptomology as a function of sex and the timing of maternal depression symptomology. *Journal of the American Academy of Child and Adolescent Psychiatry, 47,* 399-405.

Kessler, R. C., Avenevoli, S., & Merikangas, R. (2001). Mood disorders in children and adolescents: An epidemiologic perspective. *Biological Psychiatry, 49*, 1002-1014.

Klein, D. N., Ouimette, P. C., Kelly, H. S., Ferro, T., & Riso, L. P. (1994). Test–retest reliability of team consensus best-estimate diagnoses of Axis I and II disorders in a family study. *American Journal of Psychiatry, 151*, 1043–1047.

Kovacs, M. (1992). *The Children's Depression Inventory (CDI) manual*. New York, NY: Multi-Health Systems Inc.

Langrock, A. M., Compas, B. E., Keller, G., Merchant, M. J., & Copeland, M. E. (2002). Coping with the stress of parental depression: Parents' reports of children's coping, emtional, and behavioral problems. *Journal of Clinical Child and Adolescent Psychology, 31*, 312-324.

Lee, C. M., & Gotlib, I. H. (1991). Children of depressed mothers: A 10-month follow-up. *Journal of Abnormal Psychology, 100*, 473-477.

Lovejoy, C., Graczyk, P. A., O'Hare, E., & Neuman, G. (2000). Maternal depression and parenting behavior: A meta-analytic review. *Clinical Psychology Review, 20,* 561-592.

Monti, J. D., Rudolph, K. D., & Abaied, J. L. (2014). Contributions of maternal emotional functioning to socialization of coping. *Journal of Social and Personal Relationships, 31*, 247-269.

Murray, L., Halligan, S. L., Adams, G., Patterson, P. & Goodyer, I. M. (2006).
Socioemtional development in adolescents at risk for depression: The role of
maternal depression and attachment style. *Development and Psychopathology, 18*,
489-516.

Nolen-Hoeksema, S., & Girgus, J. S. (1994). The emergence of gender differences in
depression during adolescence. *Psychological Bulletin, 115*, 424-443.

Orvaschel, H. (1995). Schedule of Affective Disorders and Schizophrenia for School-Age
Children— Epidemiologic version (5th ed.). Ft. Lauderdale, FL: Nova
Southeastern University.

Pargas. R. C. M., Brennan, P. A., Hammen, C., & LaBrocque, R. (2010). Reslilience to
maternal depression in young adulthood. *Developmental Psychology, 46,* 805-
814.

Porges, S. W. (2007). The polyvagal perspective. *Biological Psychology, 74*, 116–143.

Preacher, K. J., Curran, P. J., & Bauer, D. J. (2006). Computational tools for probing
interactions in multiple linear regression, multilevel modeling, and latent curve
analysis. *Journal of Educational and Behavioral Statistics, 31*, 437-448.

Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and
data analysis methods*. Thousand Oaks, CA: Sage.

Rhode, P., Lewinsohn, P. M., Klein, D. N., & Seeley, J. R. (2005). Association of
parental depression with psychiatric course from adolescence to youth adulthood
among formerly depressed individuals. *Journal of Abnormal Psychology, 114*,
409-420.

Rose, A. J., & Rudolph, K. D. (2006). A review of sex differences in peer relationship

processes: Trade-offs for the emotional and behavioral development of girls and boys. *Psychological Bulletin, 132*, 98-131.

Rudolph, K. D. (2002). Gender differences in emotional responses to interpersonal stress during adolescence. *Journal of Adolescent Health, 30*, 3-13.

Rudolph, K. D., & Flynn, M. (2007). Childhood adversity and youth depression: Influence of gender and pubertal status. *Development and Psychopathology, 19*, 497–521.

Rudolph, K. D., Flynn, M., Abaied, J. L., Groot, A., & Thompson, R. (2009). Why is past depression the best predictor of future depression? Stress generation as a mechanism of depression continuity in girls. *Jounral of Clinical Child and Adolescent Psychology, 38*, 473-485.

Rudolph, K. K., & Hammen, C. (1999). Age and gender as determinants of stress exposure, genderation, and reactions in youngsters: A transactional perspective. *Child Development, 70*, 660-677.

Rudolph, K. D., Hammen, C., Burge, D., Lindberg, N., Herzberg, D., & Daley, S. (2000). Toward an interpersonal life-stress model of depression: The developmental context of stress generation. *Development and Psychopathology, 12*, 215–234.

Rudolph, K. D., & Troop-Gordon, W. (2010). Personal-accentuation and contextual-amplification models of pubertal timing: Predicting youth depression. *Development and Psychopathology, 22*, 433-451.

Shih, J. H., Abela, J. R. Z., Starrs, C. (2009). Cognitive and interpersonal predictors of stress generation in children of affectively ill parents. *Journal of Abnormal Child Psychology, 37*, 195-208.

Shih, J. H., Eberhart, N. K., Hammen, C. L., & Brennan, P.A. (2006). Differential

    exposure and reactivity to interpersonal stress predict sex differences in

    adolescent depression. *Journal of Clinical Child and Adolescent Psychology, 35*,

    103–115.

Silk, J. S., Shaw, D. S., Forbes, E. E., Lane, T. L., & Kovacs, M. (2006). Maternal

    depression and child internalizing: The moderating role of child emotion

    regulation. *Journal of Clinical Child and Adolescent Psychology, 35*, 116-126.

Silk, J., Shaw, D. S., Prout, J. T., O'Rourke, F., Lane, T. J., & Kovacs, M. (2011).

    Socialization of emotion and offspring internalizing symptoms in mothers with

    childhood-onset depression. *Journal of Applied Developmental Psychology, 32*,

    127-136.

Steinberg, L., & Silverberg, S. B. (1986). The vicissitudes of autonomy in early

    adolescence. *Child Development, 57*, 841-851.

Vaughan, C. A., Foshee, V. A., & Ennett, S. T. (2010). Protective effects of maternal and

    peer support on depressive symptoms during adolescence. *Journal of Abnormal*

    *Child Psychology, 38*, 261-272.

Wade, T. J., Cairney, J., & Pevalin, D. J. (2002). Emergence of gender differences in

    depression during adolescence: National panel results from three countries.

    *Journal of the American Academy of Child and Adolescent Psychiatry, 41,* 190-

    198.

Watson, D., Clark, L. A., Weber, K., Assenheimer, J. S., Strauss, M. E., & McCormick,

    R. A. (1995). Testing a tripartite model: II. Exploring the symptom structure of

anxiety and depression in student, adult, and patient samples. *Journal of Abnormal Psychology, 104*, 15–25.

Waugh, C. E., Muhtadie, L., Thompson, R. J., Joorman, J., & Gotlib, I. (2012). Affective and physiological responses to stress in girls at risk for depression. *Development and Psychopathology, 24*, 661-675.

Weissman, M. M., Gammon, G. D., John, K., Merikangas, K. R., Warner, B., Prusoff, B. A., & Sholomskas, D. (1987). Children of depressed parents: Increased psychopathology and early onset of major depression. *Archives of General Psychiatry, 44*, 847-853.

Wetter, E. K., & El-Sheikh, M. (2012). Trajectories of children's internalizing symptoms: The role of maternal internalizing symtpoms, respiratory sinus arrhythmia and child sex. *The Journal of Child Psychology and Psychiatry, 53*, 168-177.

Zeman, J., Cassano, M., Perry-Parrish, C., & Stegall, S. (2006). Emotion regulation in children and adolescents. *Developmental and Behavioral Pediatrics, 27*, 155-168.

**Footnote**

[1]Of the 167 youth participants, at $W_2$, 8.4% met diagnostic criteria for clinical depression and 17.4% experienced subclinical symptoms. At $W_3$, 6.0% met diagnostic criteria for clinical depression and 16.2% experienced subclinical symptoms. At $W_4$, 6.6% met diagnostic criteria for clinical depression and 15.0% experienced subclinical symptoms.

**Tables**

Table 1

*Descriptive Statistics (N = 71-86)*

| Measure | Total Sample | | | Girls | | | Boys | | |
|---|---|---|---|---|---|---|---|---|---|
| | *M* | *SD* | α | *M* | *SD* | α | *M* | *SD* | α |
| $W_1$ Current maternal depression | .77 | 1.37 | | .88 | 1.46 | | .64 | 1.27 | |
| $W_1$ Youth effortful engagement | .47 | .08 | .88 | .48 | .08 | .80 | .46 | .07 | .91 |
| $W_1$ Youth effortful disengagement | .14 | .03 | .81 | .14 | .02 | .82 | .15 | .03 | .80 |
| $W_1$ Youth involuntary engagement | .23 | .04 | .90 | .23 | .05 | .90 | .23 | .04 | .90 |
| $W_1$ Youth involuntary disengagement | .16 | .03 | .89 | .16 | .04 | .91 | .17 | .03 | .86 |
| $W_1$ Current youth depression | .66 | 1.37 | | .67 | 1.41 | | .65 | 1.32 | |
| $W_2$ Current youth depression | .60 | 1.21 | | .70 | 1.39 | | .51 | .98 | |
| $W_3$ Current youth depression | .51 | 1.10 | | .52 | 1.16 | | .49 | 1.05 | |
| $W_4$ Current youth depression | .49 | 1.08 | | .58 | 1.01 | | .39 | 1.15 | |

Table 2

*Intercorrelations (N = 70-86)*

| Measure | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. |
|---|---|---|---|---|---|---|---|---|---|
| 1. $W_1$ Current maternal depression | - | .08 | -.25* | .03 | -.05 | .19 | .18 | .20 | .19 |
| 2. $W_1$ Youth effortful engagement | .13 | - | -.62*** | -.79*** | -.84*** | -.41*** | -.52*** | -.45*** | -.32** |
| 3. $W_1$ Youth effortful disengagement | -.07 | -.44*** | - | .13 | .57*** | .17 | .25* | .21 | .17 |
| 4. $W_1$ Youth involuntary engagement | -.06 | -.83*** | .02 | - | .42*** | .31** | .31** | .33** | .20 |
| 5. $W_1$ Youth involuntary disengagement | -.15 | -.78*** | .07 | .54*** | - | .41*** | .61*** | .45*** | .36** |
| 6. $W_1$ Current youth depression | .42*** | -.23* | .16 | .23* | .08 | - | .74*** | .61*** | .46*** |
| 7. $W_2$ Current youth depression | .29* | -.26* | .04 | .28* | .20 | .60*** | - | .82*** | .57*** |
| 8. $W_3$ Current youth depression | .37** | -.23* | .14 | .20 | .15 | .54*** | .81*** | - | .67*** |
| 9. $W_4$ Current youth depression | .26* | -.30* | .06 | .31** | .25* | .24* | .68*** | .83*** | - |

*Note*. Intercorrelations presented above the diagonal are for girls; intercorrelations presented below the diagonal are for boys. *$p < .05$. **$p < .01$.

***$p < .001$.

Table 3

*Unconditional Growth Curve Model for Child Depression*

|  | Fixed Effects | Random Effects |
|  | Coef(SE) | SD |
|---|---|---|
| Intercept | .73(.13)*** | 1.51*** |
| Slope | -.06(.04) | 0.38*** |

*Note. *p* < .05. **p* < .01. ***p* < .001.

Table 4

*Hierarchical Linear Model Predicting Youth Depression*

|  | Coef(SE) |
| --- | --- |
| Intercept | |
|    Intercept | .67(.10)*** |
|    Maternal Depression | .36(.14)* |
| Slope | |
|    Intercept | -.07(.04) |
|    Maternal Depression | -.05(.05) |

*Note.* *p < .05. **p < .01. ***p < .001.

Table 5

*Hierarchical Linear Models Predicting Youth Depression: Effortful Engagement and Involuntary Disengagement*

| | Girls[a] | Boys[b] |
|---|---|---|
| | Coef(SE) | Coef(SE) |
| Effortful Engagement | | |
| Intercept | | |
|   Intercept | .78(.14)*** | .59(.11)*** |
|   Gender | .19(.18) | .19(.18) |
|   Maternal Depression | .38(.15)* | .52(.16)** |
|   Effortful Engagement | -.62(.12)*** | -.40(.15)** |
|   Maternal Depression x Gender | -.14(.22) | -.14(.22) |
|   Effortful Engagement x Gender | -.22(.19) | -.22(.19) |
|   Maternal Depression x Effortful Engagement | -.28(.11)* | .24(.18) |
|   Maternal Depression x Effortful Engagement x Gender | -.52(.21)* | -.52(.21)* |
| Slope | | |
|   Intercept | -.05(.05) | -.07(.06) |
|   Gender | .02(.07) | .02(.07) |
|   Maternal Depression | -.04(.06) | -.04(.10) |
|   Effortful Engagement | .09(.04)* | .03(.04) |
|   Maternal Depression x Gender | .01(.11) | .01(.11) |
|   Effortful Engagement x Gender | .06(.06) | .06(.06) |
|   Maternal Depression x Effortful Engagement | .02(.05) | -.18(.07)* |
|   Maternal Depression x Effortful Engagement x Gender | .20(.08)* | .20(.08)* |
| Involuntary Disengagement | | |
| Intercept | | |
|   Intercept | .80(.14)*** | .61(.12)*** |
|   Gender | .18(.18) | .18(.18) |
|   Maternal Depression | .40(.13)** | .51(.16)** |
|   Involuntary Disengagement | .62(.15)*** | .15(.17) |
|   Maternal Depression x Gender | -.11(.21) | -.11(.21) |
|   Involuntary Disengagement x Gender | .47(.22)* | .47(.22)* |
|   Maternal Depression x Involuntary Disengagement | .40(.13)** | -.27(.23) |
|   Maternal Depression x Involuntary Disengagement x Gender | .67(.27)* | .67(.27)* |
| Slope | | |
|   Intercept | -.05(.05) | -.07(.06) |
|   Gender | .01(.07) | .01(.07) |
|   Maternal Depression | -.05(.05) | -.03(.09) |
|   Involuntary Disengagement | -.08(.04)* | .09(.07) |
|   Maternal Depression x Gender | -.02(.11) | -.02(.11) |
|   Involuntary Disengagement x Gender | -.17(.08)* | -.17(.08)* |
|   Maternal Depression x Involuntary Disengagement | -.07(.05) | .26(.12)* |
|   Maternal Depression x Involuntary Disengagement x Gender | -.33(.13)* | -.33(.13)* |

*Note.* [a]Gender was centered as girls = 0 in the models. [b]Gender was centered as boys = 0 in the models. *p < .05.

**p < .01. ***p < .001.

Table 6

*Hierarchical Linear Models Predicting Youth Depression: Effortful Disengagement and Involuntary*

*Engagement*

|  | Coef(SE) |
| --- | --- |
| Effortful Disengagement |  |
|   Intercept |  |
|     Intercept | $.69(.10)^{***}$ |
|     Maternal Depression | $.45(.14)^{**}$ |
|     Effortful Disengagement | $.29(.08)^{**}$ |
|     Maternal Depression x Effortful Disengagement | .11(.13) |
|   Slope |  |
|     Intercept | -.06(.04) |
|     Maternal Depression | -.05(.06) |
|     Effortful Disengagement | -.05(.03) |
|     Maternal Depression x Effortful Disengagement | .00(.05) |
| Involuntary Engagement |  |
|   Intercept |  |
|     Intercept | $.67(.09)^{***}$ |
|     Maternal Depression | $.35(.14)^{*}$ |
|     Involuntary Engagement | $.40(.10)^{***}$ |
|     Maternal Depression x Involuntary Engagement | -.05(.11) |
|   Slope |  |
|     Intercept | -.07(.03) |
|     Maternal Depression | -.04(.05) |
|     Involuntary Engagement | -.06(.03) |
|     Maternal Depression x Involuntary Engagement | $.08(.04)^{*}$ |

*Note.* $*p < .05.$ $**p < .01.$ $***p < .001$

**Figures**

**Girls**



*Figure 1a.* Independent and interactive contributions of maternal depression and effortful engagement to depression in girls.
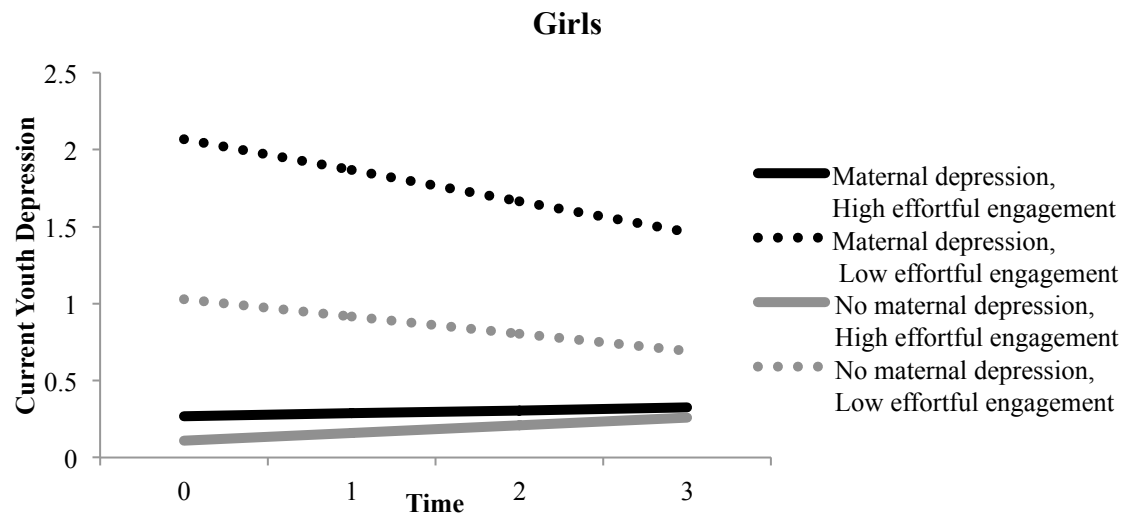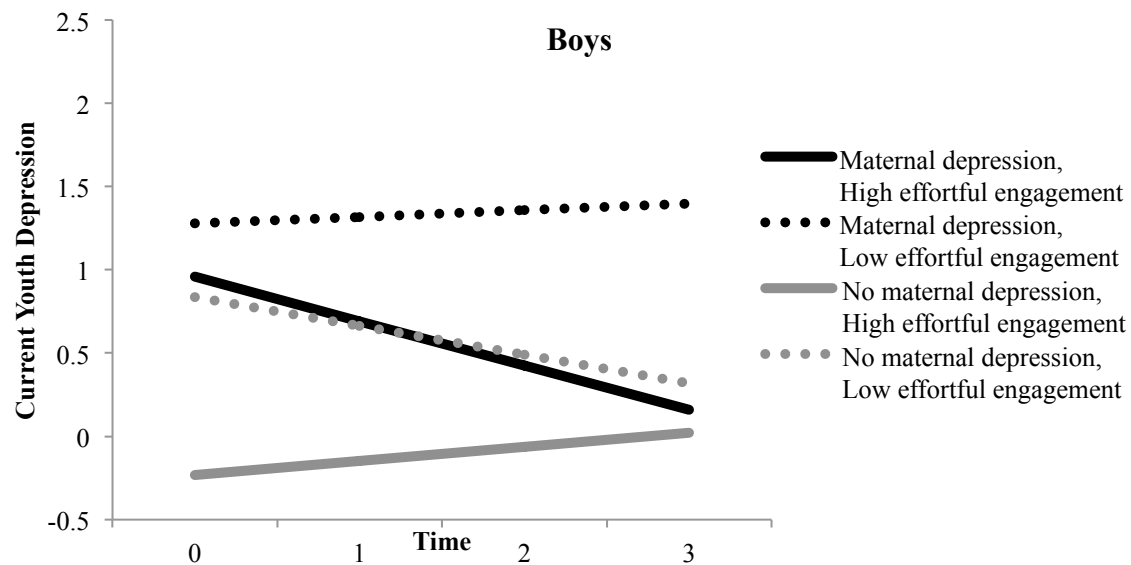
**Boys**



*Figure 1b.* Independent and interactive contributions of maternal depression and effortful engagement to depression in boys.
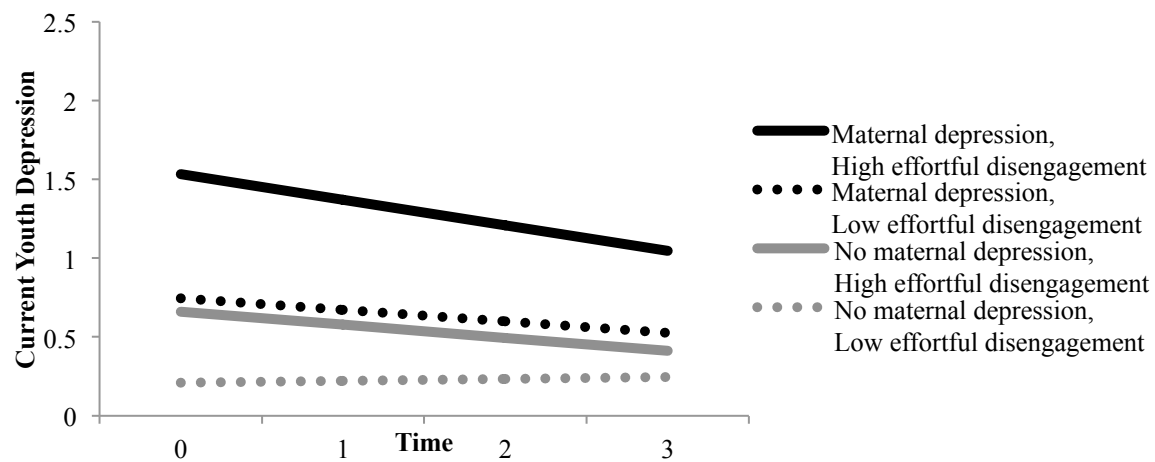
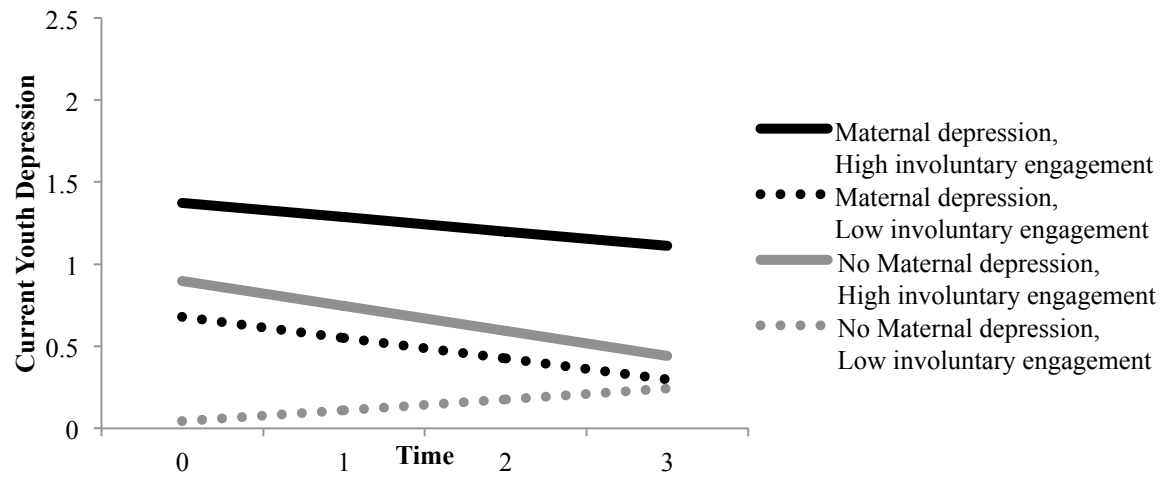*Figure 2.* Independent contributions of maternal depression and effortful disengagement to youth depression.

*Figure 3*. Independent and interactive contributions of maternal depression and involuntary engagement to youth depression.
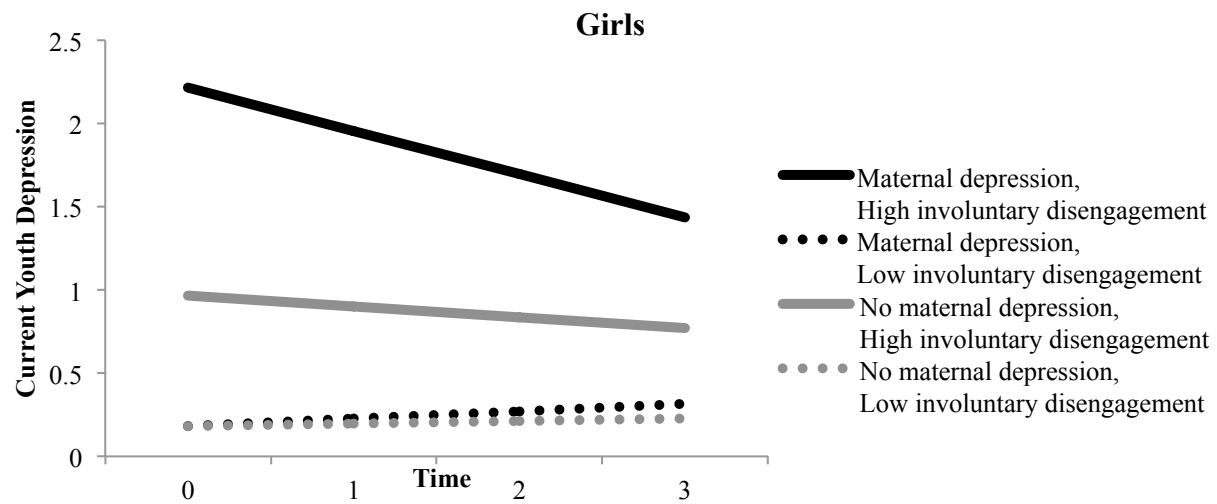
*Figure 4a.* Independent and interactive contributions of maternal depression and involuntary disengagement to depression in girls.
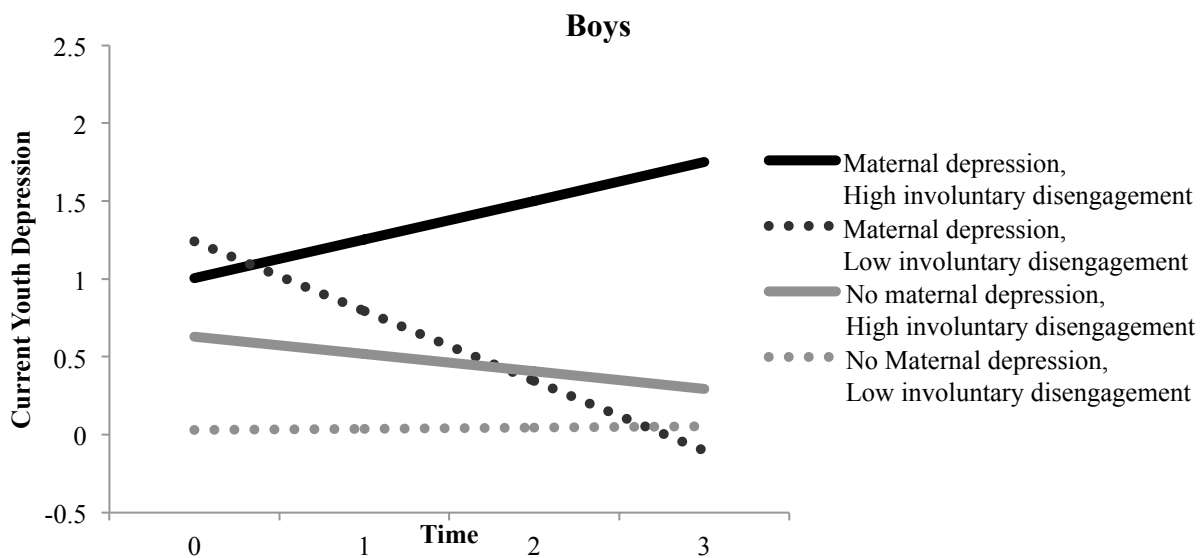


*Figure 4b.* Independent and interactive contributions of maternal depression and involuntary disengagement to depression in boys.