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Maternal Sadness and Adolescents' Responses to Stress in Offspring of Mothers with and without a History of Depression

Sarah S. Jaser¹, Jessica M. Fear², Kristen L. Reeslund², Jennifer E. Champion², Michelle M. Reising², and Bruce E. Compas²

¹*Yale University School of Nursing*

²*Vanderbilt University Department of Psychology & Human Development*

Abstract

This study examined maternal sadness and adolescents' responses to stress in the offspring ($n = 72$) of mothers with and without a history of depression. Mothers with a history of depression reported higher levels of current depressive symptoms and exhibited greater sadness during interactions with their adolescent children than mothers without a history of depression. Similarly, adolescent children of mothers with a history of depression experienced higher rates of internalizing and externalizing symptoms than adolescents of mothers without a history of depression. Regression analyses indicated that adolescents' use of secondary control coping mediated the relationship between observed maternal sadness and adolescents' internalizing and externalizing symptoms, in that higher levels of secondary control coping (e.g., cognitive reframing) were related to fewer symptoms. Results have implications for preventive interventions with children of mothers with a history of depression.

It is well established that children of depressed mothers are at risk for developing psychopathology, including both internalizing and externalizing disorders (Beardslee, Versage, & Gladstone, 1998; Goodman & Gotlib, 1999). Researchers have focused on several mechanisms through which maternal depression affects children and adolescents, including exposure to a stressful environment within the family (Goodman & Gotlib, 1999). It is likely that disruptions and impairment in parenting related to maternal symptoms of depression (e.g., sadness, irritability) contribute to a stressful family environment (Hammen, 2003). For example, observational studies indicate that depressed mothers exhibit more negative affect toward their children than non-depressed mothers (Lovejoy, Graczyk, O'Hare, & Neuman, 2000), and exposure to persistent maternal negative affect constitutes a chronic source of stress for children (Hammen, Shih, & Brennan, 2004). Thus, it is important to determine how children and adolescents respond to this chronic family stress and which responses to stress are most adaptive for living with a depressed mother.

The ways in which children and adolescents respond to and cope with stress are related to emotional and behavioral problems, including the development of depressive and other internalizing and externalizing symptoms (Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001). The current study is guided by a model of stress responses that includes both controlled/voluntary and automatic/involuntary responses to stress. These responses involve either engagement with or disengagement from a stressor and one's emotional reactions to that stressor (Compas et al., 2001; Connor-Smith, Compas, Wadsworth, Thomsen, & Saltzman, 2000). Confirmatory factor analytic studies have supported a model of coping in adolescence that includes primary control engagement coping, or attempts to directly change the situation or one's emotional reaction (e.g., problem solving, emotional expression), secondary control engagement coping, or attempts to adapt to the situation by regulating attention and cognition (e.g., acceptance, cognitive restructuring, positive thinking, distraction), and disengagement coping (e.g., avoidance, denial, wishful thinking). This model

also includes two categories of involuntary responses to stress: involuntary engagement, or stress reactivity (e.g., emotional and physiological arousal, intrusive thoughts) and involuntary disengagement (e.g., numbing) (Connor-Smith, Compas, Wadsworth, Thomsen, & Saltzman, 2000). The current study uses this framework to consider both controlled (voluntary) and automatic (involuntary) responses to stress to determine their relation to adjustment in adolescents.

Prior studies of adolescent children of depressed parents indicate that greater use of secondary control coping in response to the stress of living with a depressed parent is associated with fewer symptoms of depression/anxiety and aggression and, conversely, higher self-reported stress reactivity is associated with more symptoms (Jaser et al., 2005; Langrock, Compas, Keller, & Merchant, 2002). However, these studies were limited in their sole reliance on questionnaires to assess parental behavior and affect related to depression. Moreover, these earlier studies focused only on how these processes function in families with a depressed parent. One study that compared coping among adolescents of mothers with and without a history of depression or bipolar disorder reported similar coping strategies in both groups related to maternal negative affect (Klimes-Dougan & Bolger, 1998); however, this study did not examine the association of adolescents' coping with emotional and behavioral problems. There is a need to examine responses to stress in adolescents from families with and without a history of depression to determine if coping and stress reactivity and their associations with adolescents' adjustment are unique to this population.

High levels of stress may also tax children's and adolescents' personal resources, which may then interfere with their ability to use effective coping strategies (Davies & Cummings, 1994). For example, children (of non-depressed parents) who experience high levels of stress report lower levels of constructive coping, such as problem solving and cognitive restructuring (similar to primary and secondary control coping in our model) (Valiente, Fabes, Eisenberg, & Spinrad, 2004). This may be particularly true for children and adolescents of mothers with a history of depression, as depressed mothers are less likely to model adaptive responses to stress (Hammen, Shih et al., 2004). Among adolescent offspring of depressed parents, researchers have shown that stress related to parental withdrawal and intrusiveness was correlated with higher self-reported stress reactivity and less use of secondary control coping (Jaser et al., 2005; Langrock et al., 2002). However, there is still a need to examine how stress reactivity may differ in the adolescent children of mothers with and without a history of depression.

Using multiple methods (direct observation, parent reports, adolescent reports), the current study compares mothers with and without a history of depression and their early adolescent children (ages 11-14) on maternal mood, adolescents' responses to stress, and adolescents' internalizing and externalizing symptoms. Mothers and their children participated in a positive and a negative interaction task which were analyzed with a global coding system. The current study extends previous research in two important ways. First, it compares adolescent children of mothers with and without a history of depression on responses to stress to determine whether the previous findings regarding adolescents' coping with family stress are specific to adolescent children of depressed parents. Second, it includes observational measures of maternal depressed mood, which may provide a better approximation of the family stress to which these children are exposed.

We hypothesized that the adolescent children of mothers with a history of depression would report higher levels of stress reactivity and lower levels of secondary control coping than the adolescent children of mothers without a history of depression. Further, we expected that greater exposure to maternal negative affect (observed maternal sadness) would be related to greater symptoms of depression and other internalizing and externalizing problems in

adolescents. Finally, we expected that adolescents' responses to stress would mediate the relationship between observed maternal sadness and adolescents' symptoms, in that greater use of secondary control coping and less self-reported stress reactivity in response to mothers' displays of sadness would be related to fewer internalizing and externalizing symptoms in adolescents.

Method

Participants

The sample consists of 72 mothers with and without a history of depression and their adolescent children (36 girls and 36 boys; mean age 12.2; $SD = 1.07$) from a large Southern metropolitan area (1.5 million residents). Mothers with a history of depression ($n = 34$) were recruited from the roster of a completed depression treatment study and through an email advertisement of the study at the medical center of a large university. Mothers without a history of depression ($n = 38$) were recruited through the same medical center email advertisement. Attempts were made to achieve group-level matching for mothers with and without a history of depression in terms of age and gender of child, and preliminary analyses indicated that there were no significant differences between groups on child age ($F = .00, p = .995$) or gender ($F = .88, p = .352$). Children ages 11-14 were included in the proposed research because this developmental period is associated with increasing rates for depression, as well as increasingly stressful parent-child interactions (Hankin & Abramson, 2001; Laursen, Coy, & Collins, 1998). Using Lerner and Steinberg's (2004) definition, children in the second decade of life (ages 10-19) are considered adolescents. When mothers had multiple children in the desired age range, one child was randomly selected by the researcher to participate. Families were provided \$50 compensation for their time.

Of the 115 women who were screened, 7 women were not eligible because they were currently experiencing an episode of major depression, and 6 women were not eligible because they had another principal *DSM-IV* diagnosis (5 reported primary anxiety disorders and 1 reported an eating disorder). In addition, 16 of the eligible families failed to show for scheduled appointments, and 7 families who were eligible were not interested in participating. Seventy-nine families participated in the study; however, 6 families were excluded from the current sample due to substantial missing data (they either did not complete the questionnaires or they failed to complete both interaction tasks), and one family was excluded when it became evident that the child did not live with his mother. Thus, the current sample includes 72 mother-child dyads. There were no significant differences on any demographic variables between the participants who were excluded and those in the final sample.

Mothers' mean age was 41.7 years ($SD = 5.13$), median mothers' education was 16 years (4 year college degree), and median occupation level on the Hollingshead scale (Hollingshead, 1975) was 6 (e.g., technicians, office managers). The sample was 82% Caucasian, 14% African American, 3% Asian-American, and 1% other, which is representative of the region in which the study was conducted. Of the mothers in the study, 68% were married, 28% were divorced, and 4% were single. Mothers did not differ by group on age, race, education, occupational level, or marital status. Of the mothers with a history of depression, time since last episode ranged from 2 to 120 months with a mean of 30.3 ($SD = 33.7$) and a median of 18 months, suggesting the majority of the mothers experienced an episode in the last two years. Bivariate correlations were conducted to determine whether there was a relationship between length of time since last episode and parent and child variables, and none were significant. The number of *DSM-IV* depressive symptoms endorsed for the last depressive episode experienced ranged from 5 to 9, with a mean of 6.9 ($SD = 1.2$) symptoms.

Procedure

All potential participating mothers were screened with a diagnostic phone interview to assess symptoms of Major Depressive Disorder (MDD) and Dysthymia (DYS) using the MDD section of the Structured Clinical Diagnostic Interview (SCID, First, Spitzer, Gibbon, & Williams, 2001) to assess for history of MDD, including at least one major depressive episode during the lifetime of the child. This was followed by SCID-based screening questions to rule out other disorders. Women who met the criteria for depression were screened out if they were currently experiencing an episode of depression because we were interested in examining enduring effects on parent behavior related to a history of maternal depression, rather than the acute stress associated with an episode of maternal depression. In addition, women were screened for bipolar disorder, psychotic symptoms, and any other primary Axis I disorder the women considered more serious than depression. Women without a history of depression were excluded if they reported any Axis I disorder during the lifetime of the child. Eligible mothers and children were asked to come into the laboratory, where the study was explained in detail. Mothers and children gave informed consent (assent) to complete questionnaires and participate in videotaped interactions in compliance with the university's Internal Review Board.

Families completed the questionnaires in the laboratory prior to the videotaped interactions. Parents and adolescents participated in two 15-minute interactions, the amount of time for which the coding system was designed (Melby & Conger, 2001; Melby et al., 1998), in a private laboratory space. The first interaction gave the mother and adolescent an opportunity to discuss a recent positive experience, and the second interaction was related to family stress. A positive and negative task were included to elicit both positive/warm behaviors and negative/hostile behaviors (Donenberg & Weisz, 1997).

For the first interaction, the dyad was instructed to spend 15 minutes discussing a recent pleasant activity in which they participated and both reported to find enjoyable (e.g., a family outing or holiday). A cue card with stems for standardized prompting questions was given to the family to guide the interaction (e.g., What happened when we [went camping]? How could we do more pleasant activities?). These questions were chosen to generate positive affect and behavior and to give the interaction a problem-solving component, which has been included in the majority of research using the IFIRS system (Melby et al., 1998). After providing these instructions, the experimenter started the video camera and left the room. The experimenter returned after 15 minutes, stopped the camera, and began the second interaction.

The topic for the second interaction was determined by mothers' and adolescents' responses to the 12 stressor items on the parental depression version of the Responses to Stress Questionnaire (Connor-Smith et al., 2000, described below). These items are tailored to reflect areas of parent behavior previous research has shown to be affected by parental depression: parental withdrawal, parental intrusiveness, and marital conflict (Cummings & Davies, 1994; Gelfand & Teti, 1990; Hammen, Brennan, & Shih, 2004). An example of an item for parental withdrawal is, "My child wishes that I would spend more time with her;" for parental intrusiveness, "My child thinks I worry about bad things happening to him" and for marital conflict, "My parents say mean things to each other." Respondents were asked to report on the recent (i.e., past 6 months) occurrence of each of the stressors on a five-point Likert scale (0 = never, 1 = hardly ever, 2 = sometimes, 3 = quite often, and 4 = all the time), and to rank the top three stressors. Parallel versions of the stressors related to parent behaviors have been developed for the adolescents' self-report and parents' report of their adolescents' responses (e.g., My mom does not listen to me, or pay attention to events in my life/My child thinks I do not listen or pay attention to events in her life). Although these items were chosen to reflect stressors associated with living with a depressed parent, many of them generalize to families

without depression. Mothers and adolescents were also asked to rank the top three items that were “most stressful for me.”

The experimenter determined a common stressor by comparing the top three stressors ranked by the mother and child. In the event that the mother and child did not agree on a common source of stress, the experimenter summed the mother's and child's scores on each of the 12 stressor items and chose the stressor that had the highest combined total. The dyad was given a second cue card with standardized questions to prompt discussion on this topic (e.g., What happened the last time [Mom was upset or tense]? What can we do to reduce this stress?). After the second 15-minute interaction, the experimenter returned, turned off the camera, and debriefed the participants.

Measures

Demographics—Demographic information was obtained from the mother in a questionnaire asking for her birth date and the birth date of her child, parents' levels of education, parents' occupation, ethnicity, and marital/partner status.

Maternal Diagnostic History—Maternal diagnosis was determined by the screening interview, which was used to assess symptoms of Major Depressive Disorder (MDD) and Dysthymia (DYS) using rules for deriving diagnoses based on the MDD and DYS sections of the Structured Clinical Diagnostic Interview (SCID, First et al., 2001). This screening interview was used regardless of the source/method of recruitment, allowing us to determine which women met the criteria of Major Depressive Disorder during the lifetime of the child and to rule out women who were currently in episode, who met the criteria for bipolar disorder or psychotic symptoms, or who reported another primary Axis I disorder that they considered more serious than their depression.

Maternal Depressive Symptoms—The Beck Depression Inventory II (BDI-II, Beck, Steer, & Brown, 1996) was completed by all mothers to assess current depressive symptoms. The BDI-II has been widely used to assess current depressive symptoms and has been shown to have excellent reliability, with internal consistency of $\alpha = .91$ and test-retest reliability of $r = .93$ (Beck, Steer, Ball, & Ranieri, 1996). In the current sample, internal consistency was $\alpha = .94$. A total score of less than 13 is considered minimal depression, a score of 14-19 is considered indicative of mild depression, a score of 20-28 is considered indicative of moderate depression and a score of 29 or higher is considered indicative of severe depression (Beck, Steer, & Brown, 1996).

Children's Emotional and Behavioral Problems—The Child Behavior Checklist (CBCL, Achenbach & Rescorla, 2001) was given to mothers for their perceptions of the adolescent's internalizing and externalizing problems over the past six months. Adolescents completed the Youth Self Report (YSR, Achenbach & Rescorla, 2001) to provide their own perceptions of their functioning. The Achenbach System of Empirically Based Assessment has strong test-retest reliability (.79-.95), and criterion-related validity has been established, as referred young adults consistently score significantly higher than non-referred young adults on problem scales (Achenbach & Rescorla, 2001). The scales are based on factor analyses of data from 4,994 clinically referred children and were normed on 1,753 children from a nationally representative sample. Normalized *T* scores allow an individual's data to be compared to norms for the same age and sex in the general population. In the current study, we used the DSM-Oriented scales of affective problems and oppositional defiant problems. Given the increased risk for depressive disorders (Beardslee et al., 1998), we chose to analyze the affective problems scale, which includes symptoms of depression. Considering the age

range of the current sample, we chose to analyze oppositional defiant problems, rather than conduct problems, as the best measure of externalizing behaviors.

Child Depressive Symptoms—Adolescents completed the Child Depression Inventory (CDI, Kovacs, 1980) as a measure of current depressive symptoms. The CDI has been widely used in studies of clinically referred and non-referred children and adolescents. Internal consistency is adequate (e.g., $\alpha = .80$) and meets criteria for test-retest reliability and stability over time (Smucker, Craighead, Craighead, & Green, 1986). In the current sample, internal consistency was $\alpha = .90$.

Adolescents' Responses to Stress—The parental depression version of the Responses to Stress Questionnaire (Connor-Smith et al., 2000; Langrock et al., 2002) was used to assess how adolescents responded to stress related to parent behaviors. The parental depression version of the RSQ includes 12 questions to reflect three areas of stressful parent-child interactions that previous research has shown to be related to parental depression (see above for description). Although these 12 items were chosen to reflect stressors associated with living with a depressed parent, many of them generalize to families without depression. The following 57 items ask about how adolescents respond to the stressful parent-child interactions described above. Items cover 5 factors of coping and stress responses: primary control engagement coping (e.g., problem solving, emotional expression, emotional modulation), secondary control engagement coping (e.g., positive thinking, cognitive restructuring, acceptance, distraction), disengagement coping (e.g., avoidance, denial, wishful thinking), involuntary engagement/stress reactivity (e.g., physiological arousal, rumination), and involuntary disengagement (e.g., emotional numbing) (Connor-Smith et al., 2000). Adolescents were asked to rate each item on a Likert scale (1 = not at all; 2 = a little; 3 = some; 4 = a lot) to assess the degree to which or frequency with which the adolescent responded to the identified stressors.

The RSQ has demonstrated internal consistency and test-retest reliability ranging from adequate to excellent (Connor-Smith et al., 2000). Moreover, discriminant and convergent validity were established by examining correlations with subscales from the COPE (Carver, Scheier, & Weintraub, 1989), a widely used measure of coping, and a laboratory measures of stress reactivity (Connor-Smith et al., 2000) and in latent variable analyses of adolescent and parent reports (Compas et al., 2007). To control for response bias and individual differences in base rates of item endorsement (e.g., gender differences in response rates), proportion scores were calculated by dividing the total score for each factor by the total score for the entire RSQ (see Connor-Smith et al., 2000; Osowiecki & Compas, 1998; Vitaliano, Maiuro, Russo, & Becker, 1987).

Based on previous studies of responses to stress in adolescents of depressed parents (e.g., Langrock et al., 2002; Jaser et al., 2005), two factors were used for the current analyses: secondary control coping (e.g., acceptance, reframing, distraction) and self-reported stress reactivity (e.g., physiological arousal, rumination). In this sample, the internal consistency (Cronbach's alphas) for secondary control coping (12 items) was $\alpha = .78$ for child report and $\alpha = .75$ for parent report, and for self-reported stress reactivity (15 items) was $\alpha = .89$ for child report and $\alpha = .88$ for parent report.

Observed Behaviors—The Iowa Family Interaction Rating Scales (IFIRS, Melby et al., 1998), a global, macrolevel system designed to measure behavioral and emotional characteristics of individuals and dyads was used to code the observational data. The validity of the IFIRS system has been established against reports from parents and children using correlational and confirmatory factor analyses (Melby & Conger, 2001) and has been used across ethnically diverse samples (e.g., Melby, Hoyt, & Bryant, 2003).

Frequency of behaviors, context and affect, as well as intensity and proportion are all considered in the IFIRS when scoring each participant on the level of “characteristicness” of each scale. Individual and dyadic scales are scored on from 1-9, with 1 being “not at all characteristic” of the subject during the 15-minute interaction, and 9 being “mainly characteristic.” Several individual and dyadic scales were coded for mothers and adolescents (see Jaser, Reeslund, Champion, Reising, & Compas, 2007 for a full list of the codes used). The current study focuses on the code for mothers' Sadness, which includes both verbal (e.g., statements of regret) and nonverbal (e.g., tearfulness) indicators of sadness. Each interaction was coded by the first author (who received training in the IFIRS from the staff at the Ames Institute for Social and Behavioral Research) and double-coded by another trained research assistant (undergraduate honors students and graduate students in clinical psychology). Coders were blind to mothers' diagnostic status, and research assistants scored only one task (pleasant activity or family stressor) per family. Coders met to reconcile any scores that were discrepant (greater than two points apart on the 9 point scale). In addition, following the IFIRS protocol, when inter-rater reliability was below 60%, coders independently recoded the tape for the scales that were discrepant and met to reconcile any scores that remained two steps apart. The current data represents consensus codes for Maternal Sadness summed across the two interactions. The intraclass correlation for inter-rater reliability for Maternal Sadness was .88 ($p < .001$).

Creation of Composite Variables

The degree of intercorrelation across informant was examined for each measure for which there was a parent and child report (i.e., the CBCL and YSR to assess adolescents' affective problems and oppositional defiant problems, and the RSQ to assess adolescents' use of secondary control coping and self-reported stress reactivity). Parent and child reports were significantly correlated on measures of adolescents' affective problems ($r = .40, p < .001$), adolescents' oppositional defiant problems ($r = .63, p < .001$), adolescents' use of secondary control coping ($r = .45, p < .001$), and adolescents' self-reported stress reactivity ($r = .39, p < .01$). Composite variables were created for these measures to combine parent and child reports, thereby reducing error related to shared method variance. Composite variables were created by converting parent and child reports to standardized scores (z-scores) based on the distribution of these scores for this sample and summing the z-scores for each variable. These composite variables were used in all analyses in an attempt to control for method variance.

Results

Preliminary Analyses

Data were investigated for multivariate outliers by examining Mahalanobis' distance and none was identified (using alpha level of .001). Preliminary analyses were conducted to examine adolescents' age and gender as potential confounds within this sample. There were no group differences on gender or age of child, and no significant correlations were found between adolescents' age and gender with observed maternal sadness, maternal depressive symptoms, or adolescents' emotional and behavioral symptoms. Because there were no significant associations between adolescents' age and gender with key variables, age and gender were not included in any further analyses.

Between Group Comparisons

Means and standard deviations for current depressive symptoms, observed maternal sadness, and the composite scores for adolescents' internalizing and externalizing symptoms, use of secondary control coping, and self-reported stress reactivity are presented in Table 1 by group (mothers with and without a history of depression). A multiple analysis of variance was conducted to test for group differences between the adolescent children of mothers with and without a history of depression. To control for Type 1 error, we used an alpha value of .01.

As predicted, significant group differences were found (see Table 1). First, mothers with a history of depression reported significantly more current depressive symptoms (mean BDI = 13.09, indicative of minimal/moderate depression) compared to mothers without a history of depression (mean BDI = 6.28, indicative of minimal depression). Second, mothers with a history of depression displayed significantly more sadness during the interaction tasks than mothers without a history of depression. Third, using the composite variables of parent and child report, adolescents of mothers with a history of depression had more symptoms of affective problems and oppositional defiant problems than adolescents of mothers without a history of depression. Mean *T* scores for adolescents of mothers with a history of depression for affective problems were 57.1 on the CBCL and 55.9 on the YSR, compared to 53.0 on the CBCL and 53.4 on the YSR for adolescents of mothers without a history of depression. Likewise, mean *T* scores for the adolescents of mothers with a history of depression for oppositional defiant problems were 58.0 on the CBCL and 55.9 on the YSR, compared to 53.4 on the CBCL and 54.0 on the YSR for adolescents of mothers without a history of depression. Further, adolescents of mothers with a history of depression had higher levels of self-reported stress reactivity on the RSQ than adolescents of mothers without a history of depression. There was not a significant difference between groups on adolescents' use of secondary control coping or self-reported current depressive symptoms on the CDI.

Correlational Analyses

Bivariate correlations were conducted for the full sample of adolescents in the study (see Table 2). As expected, higher levels of current depressive symptoms on the BDI were related to greater levels of observed maternal sadness ($r = .36, p < .01$). Further, observed maternal sadness was significantly and positively associated with more symptoms of affective problems and oppositional defiant problems, as well as more current depressive symptoms in adolescents (r 's ranged from .42 to .48, all $p < .001$; see Table 2). In support of our second hypothesis, greater use of secondary control coping was significantly related to fewer symptoms of affective problems ($r = -.44, p < .001$) and oppositional defiant problems ($r = -.57, p < .001$) in adolescents. In addition, higher levels of self-reported stress reactivity was significantly related to more symptoms of affective problems ($r = .50, p < .001$) and oppositional defiant problems ($r = .62, p < .001$) in adolescents.

Tests of Mediation

We predicted that adolescents' responses to stress would mediate the relationship between observed maternal sadness and adolescents' symptoms. It should be noted that due to the cross-sectional nature of the current study, all proposed mediational effects are considered exploratory. Maternal sadness was expected to be related to increased self-reported stress reactivity and decreased use of secondary control coping in adolescents, which would, in turn, be related to increased internalizing and externalizing symptoms. However, given the high correlation between secondary control coping and self-reported stress reactivity in our sample ($r = -.81$), which would likely result in a problem of multicollinearity, we chose to focus on secondary control coping as a mediator. Based on Baron and Kenny's (1986) model of mediation, evidence of secondary control coping as a mediator of the association between maternal observed sadness and adolescents' symptoms would be provided if the following conditions were met: a) observed maternal sadness must be correlated with adolescents' symptoms; b) observed maternal sadness must be correlated with secondary control coping; c) secondary control coping must be correlated with adolescents' symptoms; d) a reduction in the overall relationship (i.e., the standardized β) between observed maternal sadness and adolescents' symptoms after controlling for the effects of secondary control coping. Support for the first three conditions for secondary control coping as a potential mediator is described above. A series of hierarchical multiple regression equations were conducted, in which secondary control coping was examined as a mediator of the association between maternal

observed sadness and adolescents' emotional and behavioral symptoms. Maternal history of depression was entered in the first block of each equation, followed by observed maternal sadness, and then the composite score for secondary control coping (see Table 3).

The overall model predicting adolescents' total depressive (CDI) symptoms was significant and explained approximately 28% of the variance in adolescents' CDI scores ($R^2 = .28$). When secondary control coping was added to the model, the beta value for observed maternal sadness decreased from .41 to .30 (see Table 3). In addition, the Sobel test for mediation (Sobel, 1982) was significant ($z = 2.23, p = .026$). Similarly, the overall regression model predicting adolescents' affective problems on the CBCL/YSR was significant, accounting for about 41% of the variance in symptoms ($R^2 = .41$). When secondary control coping was added to this model, the beta value for observed maternal sadness decreased from .34 to .17, and the Sobel test was also significant ($z = 2.76, p = .006$). Finally, the overall regression model predicting adolescents' oppositional defiant problems from these three variables was significant, accounting for about 41% of the variance in oppositional defiant problem scores ($R^2 = .41$). When secondary control coping was added to this model, the beta value for observed maternal sadness decreased from .42 to .27, and the Sobel test was significant ($z = 2.68, p = .007$). Across all three regression equations, greater use of secondary control coping predicted fewer emotional and behavioral symptoms in adolescents.

Discussion

These findings suggest that current maternal depressive symptoms are reflected in mothers' sad affect in their interactions with their children, and the effect of this sadness on adolescents' adjustment is mediated by adolescents' coping style. Further, results suggest that exposure to maternal sadness may compromise adolescents' ability to use more adaptive coping strategies (i.e., secondary control coping) and increase their reactivity to stress (e.g., emotional arousal, physiological arousal, intrusive thoughts).

The current study provides a replication and extension of past research on coping in children of previously depressed parents, while also addressing several methodological limitations of previous studies (e.g., Langrock et al., 2002; Jaser et al., 2005). By including an observational measure of mothers' current depression (observed sadness), we can be more confident about the independent contribution of mothers' current depressed mood to adolescents' symptoms. In addition, the creation of composite z -scores from parent and self-report on adolescents' responses to stress and symptoms reduces the shared method variance in relationships between same-informant variables. Thus, we can be also be more confident that the ways in which adolescents respond to family stress, specifically their self-reported stress reactivity and secondary control coping, are related to adolescents' internalizing and externalizing symptoms. Finally, including a comparison group of the adolescent offspring of mothers without a history of depression allowed us to control for maternal history of depression in our analyses.

The two groups of mothers (with and without a history of depression) and their adolescent offspring differed on several important variables. First, mothers who had a history of depression reported more current depressive symptoms and displayed greater sad affect in interactions with their adolescent children than did mothers without a history of depression. Maternal history of depression may be a marker of risk for children, and one mechanism of this risk may be mothers' persistent, sub-threshold depressive symptoms and sad affect during their interactions with their adolescent children (Jaser et al., 2008). Second, adolescents of mothers with a history of depression were higher than adolescents of mothers without such a history on composite measures of mother and adolescent reports of affective symptoms and oppositional behavior. Effect sizes ranged from $d = .66$ to $.76$, indicating moderate to large differences in symptoms between groups, similar to other research showing children of

depressed mothers to be at risk for developing internalizing and externalizing disorders (e.g., Beardslee, et al., 1998). It is important to note, however, that the mean *T* scores of both groups were below the clinical cutoff. Third, adolescents of mothers with a history of depression were higher in self-reported stress reactivity (e.g., emotional arousal, physiological arousal, intrusive thoughts) than adolescents of mothers with no depressive history. The groups did not differ in their use of secondary control coping. On the other hand, mothers' current depressive symptoms were related to both self-reported stress reactivity and secondary control coping in adolescents. This pattern of findings suggests that self-reported stress reactivity may be more related to the enduring effects of maternal history of depression, whereas coping may be more related to mothers' current depressive symptoms.

In our sample, the mothers with a history of depression, although not currently in episode, were still experiencing significantly higher levels of current depressive symptoms on the BDI than mothers without a history of depression. While remissions in maternal depression have been associated with reductions in children's diagnoses and symptoms, improvements in maternal depressive symptoms of at least 50% were required to detect improvements in child symptoms (Weissman et al., 2006). This suggests that the negative effects of maternal depression on adolescents persist unless depressive symptoms are nearly completely eliminated.

Tests for mediation indicated that the effect of maternal sadness on adolescents' symptoms, controlling for maternal history of depression, was significantly reduced when secondary control coping was accounted for in the regression equations. Thus, secondary control coping may function as a mediator of the relationship between observed maternal sadness and adolescents' symptoms of emotional and behavioral problems, after accounting for mothers' diagnostic history. We did not include self-reported stress reactivity in the regression analyses, due to the high correlation between secondary control coping and stress reactivity ($r = -.81$), which was likely to result in multicollinearity. This strong inverse relationship suggests that as stress reactivity increases, the ability to engage in complex cognitive coping strategies (i.e., secondary control coping) may be compromised (Valiente et al., 2004). Conversely, if an individual is able to cope effectively, he or she may be able to better manage emotional arousal and intrusive thoughts (i.e., reactivity).

Results from the current study suggest that maternal sadness and responses to stress affect both adolescents' internalizing (i.e., depressive symptoms on the CDI and affective problems on the CBCL/YSR) and externalizing symptoms (i.e., oppositional defiant problems on the CBCL/YSR). Correlations between these constructs are nearly identical (see Table 2), suggesting that exposure to maternal sadness may increase the risk for both internalizing and externalizing problems among adolescent children of mothers with a history of depression. This is in line with findings that maternal depressive symptoms are related to comorbid depression and conduct problems in children (Kopp & Beauchaine, 2007).

Although this study includes several improvements over previous studies of stress and coping in families of depressed parents, it also has several limitations. First, the study is cross-sectional and, therefore, the direction of effects cannot be determined. Further, recent discussions of mediation suggest that prospective data are required to fully test mediational models (Maxwell & Cole, 2007). This indicates the need for further research using prospective designs. Second, although we were able to create composite variables using parent and adolescent reports to control for problems associated with the use of single informants, our sample was not large enough to create latent indicators of the major constructs of interest. Larger samples are needed in future research to test structural equation models with latent variables. Third, we recruited only mothers for this study; subsequent research is needed to examine these processes in families of fathers with and without a history of depression (Connell & Goodman, 2002). We have limited information on the timing and severity of mothers' prior episodes of depression,

which may be important to understand the risk to adolescents (Hammen & Brennan, 2003). Finally, the exclusion of other Axis I diagnoses from our comparison sample of mothers and the fact that adolescents' mean *T* scores on the CBCL and YSR were below the clinical cutoff may limit the generalizability of the findings; it is unknown whether these processes would generalize to more dysfunctional children and families.

Implications for Research, Policy, and Practice

In spite of these limitations, the present findings have implications for interventions to facilitate more adaptive coping in adolescent children of depressed mothers. The current study suggests that interventions for adolescents at risk for depression need to focus on helping to reduce adolescents' stress reactivity while helping them to utilize more adaptive secondary control coping strategies, such as cognitive restructuring, distraction, and positive thinking (e.g., the Raising Healthy Children program, Compas, Langrock, Keller, Merchant, & Copeland, 2002). Results from the current study are consistent with recent research with stress reactivity in adults, which indicate that psychotherapy may be more effective than medication in decreasing stress reactivity and therefore in reducing the risk for future episodes in depressed patients (Hawley, Ringo Ho, Zuroff, & Blatt, 2007). Although this research must be replicated with adolescents, these findings support the importance of interventions aimed at increasing the use of beneficial coping skills and decreasing stress reactivity in an attempt to prevent depression in adolescent offspring of depressed parents.

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Table 1
Group Differences on Maternal and Child Variables

	History of Depression		No History of Depression		F value	ES
	Mean	SD	Mean	SD		
BDI	13.09	10.10	6.28	6.44	11.86**	.82
Observed Sadness	8.38	3.03	6.47	2.97	7.29*	.64
CDI	9.03	8.49	5.53	5.23	4.54	---
Affective Problems	0.61	2.07	-0.54	0.96	9.44*	.76
Oppositional Defiant	0.60	1.81	-0.54	1.64	7.75*	.66
Secondary Control Coping	-0.32	1.92	0.29	1.45	2.30	---
Stress Reactivity	.63	1.75	-.56	1.38	10.27*	.76
Child Age	12.21	1.20	12.21	.95	.51	---

Note. BDI = Beck Depression Inventory; CDI = Child Depression Inventory; Scores for Affective Problems and Oppositional Defiant Problems are z scores calculated from parent and child reports on the CBCL and YSR for those scales; Scores for Secondary Control Coping and Stress Reactivity are z scores calculated from parent and child reports on the RSQ; ES = Effect Size

* $p < .01$.

** $p < .001$.

Table 2
Correlations between Maternal Sadness and Depressive Symptoms, and Adolescents' Internalizing and Externalizing Symptoms, Coping, and Stress Reactivity

	Maternal Sadness	BDI	CDI	Affective Problems	Oppositional Problems	Secondary Control Coping	Stress Reactivity
Maternal Sadness	---						
BDI	.36***	---					
CDI	.45***	.26*	---				
Affective Problems	.42***	.38***	.76***	---			
Oppositional Defiant Problems	.48***	.44**	.58***	.63***	---		
Secondary Control Coping	-.37***	-.32**	-.46***	-.44***	-.57***	---	
Stress Reactivity	.41***	.37***	.48***	.50***	.62***	-.81***	---

Note. BDI = Beck Depression Inventory; CDI = Child Depression Inventory; CBCL = Child Behavior Checklist; YSR = Youth Self Report

* $p < .05$,

** $p < .01$,

*** $p < .001$

Table 3
Regression Equations Predicting Adolescents' Symptoms from Maternal Sadness and Secondary Control Coping

Equation 1 – CDI		Final $R^2 = .28$ $F(3,68) = 10.04, p < .001$	
	β	sr^2	
Block 1: R^2 change = .06*			
History of Depression	.25*	.25	
Block 2: R^2 change = .15***			
History of Depression	.12	.11	
Maternal Sadness	.41***	.39	
Block 3: R^2 change = .09**			
History of Depression	.10	.09	
Maternal Sadness	.30**	.27	
Secondary Control Coping	-.33**	-.30	
Equation 2 – Affective Problems		Final $R^2 = .41$ $F(3,68) = 17.42, p < .001$	
	β	sr^2	
Block 1: R^2 change = .12**			
History of Depression	.35**	.35	
Block 2: R^2 change = .11**			
History of Depression	.24*	.23	
Maternal Sadness	.34**	.33	
Block 3: R^2 change = .21***			
History of Depression	.20*	.19	
Maternal Sadness	.17	.15	
Secondary Control Coping	-.49***	-.46	
Equation 3 – Oppositional Defiant Problems		Final $R^2 = .41$ $F(3,68) = 17.43, p < .001$	
	β	sr^2	
Block 1: R^2 change = .10**			
History of Depression	.32**	.32	
Block 2: R^2 change = .16***			
History of Depression	.19	.18	
Maternal Sadness	.42***	.40	
Block 3: R^2 change = .17***			
History of Depression	.15	.15	
Maternal Sadness	.27*	.24	
Secondary Control Coping	-.45***	-.42	

Note: β = standardized beta; sr^2 = semi-partial correlation squared; CDI=Child Depression Inventory; Affective Problems and Oppositional Problems are z scores from CBCL and YSR; Secondary Control Coping is a z score from parent and child report of coping.

* $p < .05$,

** $p < .01$,

*** $p < .001$