

Coping and Stress Reactivity in a Preventive Intervention for Children of Parents with
Depression: A Test of Moderated Mediation

By

Abigail E. Ciriegio

Thesis

Submitted to the Faculty of the
Graduate School of Vanderbilt University

In partial fulfillment of the requirements

for the degree of

DOCTOR OF PHILOSOPHY

in

Psychology

August 12, 2022

Nashville, Tennessee

Approved:

Bruce E. Compas, Ph.D

David A. Cole, Ph. D

TABLE OF CONTENTS

	Page
LIST OF TABLES.....	iii
LIST OF FIGURES.....	iv
I. Introduction.....	1
II. Method.....	5
Participants.....	5
Measures.....	6
Intervention and Comparison Conditions.....	9
Statistical Analyses.....	10
III. Results.....	11
Preliminary Analyses.....	11
Direct Effects and Mediation Analyses at 12- and 18-Months.....	12
Moderated Mediation Analyses at 18-Months.....	13
IV. Discussion.....	14
REFERENCES.....	19

LIST OF TABLES

Table	Page
1. Means and Standard Deviations of Variables of Interest.....	23

LIST OF FIGURES

Figure	Page
1. Heuristic Model of Hypothesized Moderated Mediation	24
2. Direct and Indirect Analyses with 12-Month Outcomes	25
3. Direct and Indirect Analyses with 18-Month Outcomes	26

Introduction

Parental depression has been identified as a particularly salient source of stress that significantly increases the risk of symptoms of psychopathology in children and adolescents (e.g., Goodman, 2007; Weissman et al., 2006). The ways in which these children and adolescents cope with the stress presented by their parents' depression may lead to a better understanding of potential buffering and/or risk factors in this population. Given that children have little or no control over their parents' depression, secondary control coping responses which include efforts focused on adapting to a problem or stressor (e.g., acceptance, cognitive reappraisal, distraction) have been shown to mitigate some of the adverse effects of parental depression (e.g., Jaser et al., 2005) and psychopathology more broadly (Compas et al., 2017). Therefore, it is imperative that preventive interventions targeting these at-risk youth focus on bolstering these coping skills that are best suited for uncontrollable stressors. These interventions would also benefit from understanding which factors may attenuate the association between child coping and positive outcomes. One potential candidate of such a moderator is stress reactivity, which has been shown to become dysregulated among individuals facing chronic, uncontrollable stress (e.g., McEwen, 2013).

One example of a preventive intervention targeting these at-risk youth is the family group cognitive behavioral (FGCB) intervention by Compas and colleagues (2009, 2011) who used a two-pronged approach to reduce symptoms of psychopathology in children and adolescents of parents with a history of depression. They sought to enhance positive parenting skills in parents, while simultaneously teaching secondary control coping skills to their children. Investigation of the efficacy of this family-based intervention in reducing child and adolescent symptoms of psychopathology was further tested in the context of a randomized control trial compared to a

written information group. Support was found for changes in parenting behaviors and adolescent secondary control coping strategies at a 6-month follow-up serving as significant mediators of the association between intervention groups and adolescent mental health outcomes one year later (Compas et al. 2010).

Building on these initial findings, the investigators later examined the effects of the FGCB intervention in a larger sample to further ascertain when the prevention effects first emerge and if they persist across long-term follow-ups (Compas et al., 2015). Findings showed a significant group effect emerged immediately after the completion of the intervention for one of seven adolescent mental health outcome measures. Significant findings continued to emerge at follow-up time points with two significant effects at 6 months, four significant effects at 12 months, and three significant effects at each of the 18- and 24-month follow ups. These findings provide initial evidence that the effects of the FGCB intervention emerge early and more importantly continue to strength over time. In addition, children and adolescents in the FGCB intervention were significantly less likely to experience an episode of depression across the study span, which suggests the intervention was successful in reducing the incidence of symptoms of psychopathology (e.g., depressive, internalizing and externalizing symptoms) and were sustained over time (Compas et al., 2015).

Investigators also tested a variety of sociodemographic variables across child, parent, and family levels to better understand if the FGCB intervention was more effective for certain individuals. Surprisingly, very minimal evidence of moderation was found. Analyses indicated the effects of the FGCB intervention were consistent across younger vs. older children, boys vs. girls, families of varying socioeconomic status, and for children regardless of their parent's baseline levels of depression. Ultimately, the data revealed consistent effects across a variety of

child, parent, and family factor levels which indicates the effects of the FGCB intervention are robust. Future studies are needed to continue exploring if other types of interindividual factors potentially moderate the effects of this preventive intervention.

The focus of the FGCB intervention is on teaching and utilizing secondary control coping skills as they have been shown to be an effective buffer against symptoms of psychopathology and uncontrollable stress (e.g., parental depression). Secondary control coping is a response to stress that can be characterized as voluntary, under one's volitional control, and involving conscious effort (Compas et al., 2001; Connor-Smith et al., 2000). There is also a category of stress responses that are involuntary or automatic, temperamentally based and conditioned reactions that may or may not be within conscious awareness. These responses are not under volitional control and therefore are *not* considered coping. They include emotional and physiological arousal, intrusive thoughts and rumination, and impulsive action (Connor-Smith et al., 2000).

Previous research has investigated how these two responses to stress (coping and involuntary responses) might interact to contribute to symptoms of psychopathology. For example, Connor-Smith and Compas (2004) found a composite measure of arousal (intrusive thoughts and other involuntary responses) to have strong, positive correlations with internalizing problems in college aged young adults. Of relevance, this relation between arousal and internalizing symptoms significantly decreased when participants utilized secondary control coping strategies. Further, Monti, Jackson, and Vannatta (2018) investigated similar processes within a sample of adolescent and young adults with congenital heart disease. They found the interaction between primary control coping (e.g., problem solving, emotion modulation) and involuntary responses to stress interacted to significantly predict depression and anxiety. Specifically, primary control

coping significantly predicted lower levels of depression and anxiety only when involuntary responses were approximately a quarter of a standard deviation and two standard deviations below the mean, respectively. Paysnick and Burt (2015) noted nine significant interactions between involuntary physiological arousal and coping in a sample of older adolescents. Taken together, the results of these studies indicate that individual levels of involuntary/ automatic responses to stress are an important factor in understanding the association between coping and symptoms of psychopathology in youth and young adults.

It is important to note majority of studies investigating the relationship between involuntary/automatic responses to stress, coping, and symptoms of psychopathology in youth have been cross-sectional in nature and none, to our knowledge, have looked at these important associations in the context of a preventive intervention. Therefore, the purpose of the present study was to investigate whether individual levels of involuntary stress responses (e.g., stress reactivity) moderated the effectiveness of the FGCB intervention both in terms of utilizing secondary control coping skills, as well as reducing symptoms of psychopathology across time. The specific aims of the present study were three-fold:

Aim 1: To replicate the findings of Compas et al. (2010) which showed changes in adolescent secondary control coping skills at 6 months mediated the relationship between intervention condition (family group vs. written information) and changes in adolescent internalizing and externalizing symptoms 12 months later.

Aim 2: To investigate and extend the mediation findings of Compas et al. (2010) out to changes in adolescent internalizing and externalizing symptoms at 18 months.

Aim 3: To investigate whether the association between intervention condition, changes in secondary control coping, and changes in adolescent internalizing and externalizing symptoms at 18 months varies as a function of adolescent stress reactivity at baseline.

Hypothesis 3a: Adolescent stress reactivity will moderate the relationship between intervention condition and changes in secondary control coping skills, such that changes in secondary control coping skills will be greatest among those in the intervention group with low stress reactivity levels.

Hypothesis 3b: Adolescent stress reactivity will moderate the relationship between changes in secondary control coping and changes in internalizing and externalizing symptoms at 18 months, such that adolescents with the lowest changes secondary control coping skills and highest stress reactivity levels at baseline will display the highest internalizing and externalizing symptoms at the 18-month follow-up.

Method

Participants

Participants included 180 parents with current or past Major Depressive Disorder (MDD) during their child(ren)'s lifetime and the 242 children/adolescents of these parents. All participants were either living in or around Nashville, TN and Burlington, VT. Parents included 160 mothers (M age = 41.16, SD = 7.17) and 20 fathers (M age = 48.30, SD = 7.50). Eighty-two percent of parents were White Non-Latino or Hispanic, 12% Black or African American, 2% Latino or Hispanic, 1% Asian, <1% American Indian or Alaskan Native, and 2% Mixed. Parents came from a range of educational backgrounds including less than high school (6%), completion of high school (9%), some college (30%), college degree (32%), and graduate education (23%). Annual family income ranged from less than \$5,000 to more than \$180,000, with a median

annual income between \$40,000 to 60,000. Sixty-two percent of parents were married or partnered, 22% divorced or annulled, 5% separated, 10% never married, and 1% were widowed. Forty-eight parents (27%) were in a current episode of major depression and 132 parents (73%) were not in episode at the time of the baseline assessment. At baseline, 147 (82%) parents reported experiencing multiple episodes of depression during their child's/children's life (Median = 3), 27 (15%) reported experiencing only a single episode during their child's/children's life, and five (2.7%) parents reported dysthymic disorder during their child's life (one parent did not provide enough information to determine frequency of depressive episodes).

Analyses in the current paper were based on one randomly selected child per family (n = 180). Children/ adolescents included 89 females and 91 males who ranged in age from 9 to 15-years old (M age = 11.46, SD = 2.00). Seventy-four percent of adolescents were White Non-Latino or Hispanic, 13% Black or African American, 2% Latino or Hispanic, 3% Asian, , <1% American Indian or Alaskan Native, and 7% Mixed. Adolescents in this sample ranged in grade level from 3rd – 10th.

Parents and adolescents did not differ significantly on any of these demographic variables based on intervention condition.

Measures

Demographics. Demographic data for parents and adolescents including age, gender, race, ethnicity, and education were reported by the parent.

Adolescent Internalizing and Externalizing Symptoms. Adolescents in the sample completed the Youth Self Report for ages 11- to 18- years old (YSR; Achenbach & Rescorla, 2001). This instrument is an empirically driven, developmentally appropriate tool that has been

well validated to assess psychopathology in childhood and adolescence in both in the United States and in international samples (Achenbach, Ivanova, & Rescorla, 2017). The YSR includes 118-items of problem behaviors that are rated as 0 (*not true*), 1 (*somewhat or sometimes true*), or 2 (*very true or often true*). This measure has been shown to have excellent internal consistency, test–retest reliability, and construct validity. The normative samples for the YSR are representative of the U.S. population, providing adequate data on levels of emotional and behavioral problems in children and adolescents (Achenbach, Dumenci, & Rescorla, 2002). The current study focused on the broad band internalizing and externalizing scales to represent the range of problems that have been identified in children of parents with depression and to match the scales reported in previous research (e.g, Clarke et al. 2001; Compas et al. 2010, 2015) Children ages 9 and 10 years of age also completed the YSR to allow for complete data on all measures. Raw scores on the internalizing and externalizing scales were used in all analyses to maximize variance (i.e., some variability is lost when the raw scores are converted to *T* scores). However, *T* scores are presented in Table 1 to allow for comparison with age and gender norms.

Adolescent Coping and Stress Reactivity. The Responses to Stress Questionnaire-Parental Depression Version (RSQ; Connor-Smith et al., 2000; Jaser et al. 2005) was used to identify the coping strategies adolescents used in response to stress related to their parents' depression (e.g., “My mom is too upset, tense, grouchy, angry, and easily frustrated”). The RSQ includes 57-items that provide three factors of coping: primary control coping, secondary control coping, and disengagement coping, and two factors of automatic responses: involuntary engagement and involuntary disengagement.

Adolescents and their parents were asked separately to rate each item on the RSQ regarding the degree/frequency with which the adolescent responded to the identified stressors

on a 4-point scale from 1 (*Not at all*) to 4 (*A lot*). There is a tendency towards the more stress an individual is under, the more coping strategies are reported. To control for possible response biases in reports of total amounts of coping strategies and automatic responses to stress, the standard scoring method for the RSQ was used in which proportion scores were calculated for each factor by dividing the total score for each factor by the total RSQ score (see Connor-Smith et al., 2000).

The current study is focused on secondary control coping skills because these skills were identified in previous research as most useful for coping with stress related to parental depression and were therefore taught in the family group cognitive– behavioral preventive intervention. The items on the RSQ that make up the secondary control coping scale include *acceptance* (e.g., I realize I just have to live with things the way they are), *cognitive reappraisal* (e.g., I think about the things I'm learning from the situation, or that something good will come from it), *positive thinking* (e.g., I tell myself that I can get through this), and *distraction* (e.g., I keep my mind off the stressful parts of my parent's depression by doing something else).

Stress reactivity in this study was assessed using the involuntary engagement factor on the RSQ. The items on the RSQ that make up this factor include *rumination* (e.g., When problems with my family come up, I can't stop thinking about how I am feeling), *intrusive thoughts* (e.g., Thoughts about problems between us just pop into my head), *physiological arousal* (e.g., When I have problems with my family, I feel it in my body (check all that apply): my heart races, I feel hot or sweaty, my breathing speeds up, my muscles get tight), *emotional arousal* (e.g., When problems with my family come up, I get upset by things that don't usually bother me), and *involuntary action* (e.g., When we are having trouble getting along, I can't control what I say or do). As one indicator of the validity of this scale, previous research has

shown the involuntary engagement factor on the RSQ is moderately correlated to participant heart rate reactivity during lab-based stressor tasks (Connor-Smith et al., 2000, 2004).

The RSQ has demonstrated excellent test-retest reliability, and convergent and construct validity. To reduce effects due to potential biases from single informants and to reduce the number of analyses, we created a composite measure of adolescents' secondary control coping and stress reactivity by converting scores from adolescent self-report and parent reports on adolescents to z scores and calculating the mean z score for each participant.

Parent Depressive Symptoms. Parents' current depressive symptoms were assessed at baseline with the Beck Depression Inventory–II (BDI-II), a standardized and widely used self-report checklist of depressive symptoms with adequate internal consistency ($\alpha=.91$) and validity in distinguishing the severity of major depressive disorder (Beck, Steer, Ball, & Ranieri, 1996; Steer, Brown, Beck, & Sanderson, 2001).

Intervention and Comparison Conditions

The make-up and design of the conditions included in the present study have been described extensively elsewhere (see Compas et al. 2009 for more details). Briefly, the family group cognitive-behavioral (FGCB) intervention received a manualized 12-session program that included 8 weekly sessions and 4 monthly booster sessions. This program was designed to teach unique skills to parents and children separately. Specifically, parents learned parenting skills (i.e., praise, positive time with children, encouragement of child use of coping skills, structure, and consequences for positive and problematic child behavior), while children learned skills for coping with their parents' depression (i.e., acceptance, reappraisal, distraction). The written information (WI) group were mailed three sets of written materials that provided information on

the nature of depression, the effects of parental depression on families, and the signs of depression in children.

Statistical Analyses

Given that multiple children from the same family who participated in the RCT are non-independent, all analyses in the present paper were conducted on one randomly selected child per family. Mean scores for measures at baseline of parent depressive symptoms, adolescent internalizing and externalizing symptoms, adolescent secondary control coping and adolescent stress reactivity at baseline were compared across intervention condition using independent sample *t*-tests.

Guided by Kraemer et al. (2002) and the analytic approach established in previous studies with this sample (e.g., Compas et al., 2010), evidence for mediation within an intervention exists when (1) participants are randomly assigned to condition, (2) a significant association is found between the intervention and change in the mediator (α), and (3) either a significant effect is found for changes in the mediator on changes in the outcome (β) or a significant interaction between the intervention and changes in the mediator on changes in the outcome (β'). Therefore, a change score was calculated for the mediator variable at 6-months (secondary control coping) and outcome variables at 12 and 18-months (adolescent internalizing and externalizing symptoms) by covarying for scores at baseline in all models. Given the sample in the present study targeted parents with a history of depression, parent scores on the BDI-II at baseline was also included as a global covariate in all models. Condition in all models was coded as 1 = written information and 0 = FGCB intervention.

A series of linear regression models were conducted using Models 4 and 58 from PROCESS macro (v3.5; Hayes, 2017) for SPSS, which uses a regression-based approach and is

designed for testing complex models including both mediator and moderator variables. First, to replicate the findings of Compas et al. (2010), Model 4 in the PROCESS macro program was used to test the effect of condition (FGCB vs. written information) on changes in adolescent internalizing and externalizing symptoms from baseline to 12-months through changes in adolescent secondary control coping from baseline to 6 months. Second, to extend the analyses from Compas et al. (2010), an additional set of PROCESS analyses were conducted using Model 4 to test the mediating role of changes in adolescent secondary control coping on the association between condition and changes in adolescent symptoms from baseline to 18 months.

Model 58 in the PROCESS macro program was then used to test the moderating role of adolescent stress reactivity at baseline on the relationship between condition and changes in secondary control coping (a path) as well as the relationship between changes in adolescent secondary control coping and changes in adolescent internalizing and externalizing symptoms at 18 months (b path) (see Figure 1 for heuristic model of these analyses). PROCESS describes the total direct (path c, c') and indirect (path ab) effects through standardized and unstandardized regression coefficients (Hayes, 2017). Further, PROCESS uses list-wise deletion meaning only participants with complete data on all variables in the regression models were included in analyses. Current analyses were conducted with a 95% confidence interval (CI) for all effects.

Results

Preliminary Analyses

After randomly selecting one child per family, the final sample size included $N = 180$ parent-adolescent dyads, half of whom were randomized to the FGCB condition ($n = 90$) and half were randomized to the written information condition ($n = 90$). Means and standard deviations of the hypothesized moderator variable at baseline (stress reactivity) and mediator

variable (secondary control coping) through 6 months, as well as adolescent internalizing and externalizing symptoms through 18 months are presented in Table 1. Consistent with randomization, parent depressive symptoms, adolescent internalizing and externalizing symptoms, secondary control coping skills, and levels of stress reactivity at baseline did not differ significantly between the FGCB and written information conditions.

Direct Effects and Mediation Analyses at 12- and 18-Months

In support of the first aim, analyses revealed that the mediation findings from Compas et al. (2010) were successfully replicated in the PROCESS models (see Figure 2). Specifically, a significant direct effect emerged for the intervention on changes in adolescent internalizing symptoms from baseline to 12-months (path c) ($\beta = .42, p = .01$). The direct effect between condition and changes in adolescent secondary control coping from baseline to the six-month follow-up (path a) was also found to be statistically significantly and medium in magnitude ($\beta = -.57, p = .01$). Those who received the family group cognitive-behavioral intervention had higher scores on secondary control coping as assessed by the composite parent/adolescent report compared with those who received the written information condition after covarying for baseline levels of coping. A significant direct effect was also found between changes in adolescent secondary control coping at six-months and changes in adolescent internalizing symptoms from baseline to 12-months (path b; $\beta = -.28, p = <.01$) indicating that greater use of these coping skills was related to decreased internalizing symptoms. Furthermore, the total indirect effect of intervention condition on changes in adolescent internalizing symptoms from baseline to 12-months through changes in adolescent secondary control coping from baseline to 6-months (path ab) was statistically significant, ($\beta = .16$, standard error [SE] = 0.08; 95% CI [.03, .33]). A similar pattern of significant results was found when changes in adolescent externalizing

symptoms from baseline to 12-months was included in the model as the outcome variable (see Figure 2): path a, $\beta = -.57, p < .01$; path b, $\beta = -.27, p < .01$; path ab, $\beta = .15, (SE = 0.07; 95\% CI [0.05, 0.31])$, with the exception that the direct effect of the intervention condition on changes in externalizing symptoms at 12-months was not significant (path c, $\beta = .21, p = .14$). Thus, evidence was found for an effect of the intervention on changes in adolescent internalizing and changes in externalizing symptoms from baseline to 12-months, in part, through increases in the use of adolescent secondary control coping skills at 6-months.

In partial support of the second aim, PROCESS analyses revealed the mediation findings from Compas et al. (2010) extended out to 18-months (see Figure 3). The direct effect between condition and changes in adolescent internalizing and externalizing symptoms from baseline to 18-months approached significance (path c; $\beta = .31, p = .08$ and $\beta = .29, p = .06$, respectively). Furthermore, the direct effect between condition and changes in adolescent secondary control coping from baseline to 6-months (path a) was significant in both models ($\beta = -.66, p < .001$ and $\beta = -.67, p < .001$ respectively), as was the direct effect between changes in secondary control coping and changes internalizing and externalizing symptoms from baseline to 18-months (path b; $\beta = -.31, p < .01$ and $\beta = -.20, p = .03$ respectively). Finally, the total indirect effect of condition on changes in adolescent internalizing and externalizing symptoms from baseline to 18-months through changes in adolescent secondary control coping (path ab) was significant ($\beta = .21, 95\% CI [.06, .38]$ and $\beta = .13, 95\% CI [.003, .30]$ respectively).

Moderated Mediation Analyses at 18-Months

Given the significant direct relationship between intervention condition and changes in adolescent secondary control coping from baseline to 6-months established above (path a), a composite measure of parent/adolescent reports of adolescent stress reactivity at baseline was

included in the model as a potential moderator of this path. Contrary to the hypothesis, analyses revealed a non-significant interaction term ($b = -.24, p = .23$) in path a, suggesting that the effects of condition on changes in secondary control coping from baseline to 6-months did not significantly vary based on levels of adolescent stress reactivity at baseline. The composite measure of adolescent stress reactivity at baseline was also tested as a potential moderator of the association between changes in adolescent secondary control coping at 6-months and changes in adolescent internalizing and externalizing symptoms from baseline to 18-months (path b). Again, counter to the hypothesis, a non-significant interaction term was found in path b for the associations between changes in secondary control coping and internalizing and externalizing symptoms at 18-months ($b = .49, p = .70$ and $b = -.48, p = .62$ respectively). This suggests that the effect of changes in adolescent secondary control coping at 6 months on adolescent symptoms at 18-months was not dependent on levels of adolescent stress reactivity at baseline¹.

Discussion

The findings from the present study are the first to replicate and extend those reported by Compas et al. (2010) with a slightly larger sample ($n = 115$ in the present study; $n = 111$ in Compas et al., 2010). Evidence was found for the beneficial effects of a family group cognitive behavioral intervention in an at-risk population for depression (i.e., adolescents of depressed parents). Specifically, effects of the intervention on changes in adolescent's internalizing and externalizing symptoms 12-months later were due in part to changes in the use of secondary control coping skills (e.g., cognitive reappraisal, acceptance) at a 6-month follow-up. Further, all three components from the Kraemer et al. (2002) guidelines on evidence for mediation within an intervention were satisfied given (1) participants were randomly selected to either the FGCB

¹ Moderated mediation analyses with internalizing and externalizing symptoms at 12-months as the outcome variable also did not yield significant interaction terms.

intervention or written information condition, (2) a significant association was found between the intervention condition and changes in the mediator (secondary control coping) at 6-months (i.e., path a), and (3) a significant effect was found for changes in the mediator on changes in the outcome (internalizing and externalizing at 12-months). In addition, changes in secondary control coping were assessed at a timepoint that preceded the outcome variables, which establishes temporal precedence. Of note, analyses in the present study revealed the direct effect from intervention condition to changes in adolescent externalizing symptoms from baseline to 12-months only approached significance. This discrepancy may be due, in part, to Compas et al. (2010) using parent report versions of adolescent externalizing symptoms at 12 months, while the present analyses used adolescent self reports of externalizing symptoms at 12 months (of which there were fewer cases).

One important next step pointed out by Compas et al. (2010) was the need for future studies to examine longer term effects of the intervention and the role of coping as a mediator of these later outcomes. In the second aim of the present study, I sought to fill this gap by extending the mediation analyses out to 18-months. In partial support of this aim, the data revealed adolescents in the FGCB intervention displayed greater use of secondary control coping skills from baseline to 6-months according to a composite measure of parents' and adolescents' reports than did adolescents in the written information condition. Furthermore, increases in the utilization of secondary control coping significantly mediated the association between intervention condition and changes in symptoms of internalizing and externalizing from baseline to 18-months according to adolescent self-reports. Once again, it should be noted that the direct pathway from intervention condition to changes in internalizing and externalizing at 18-months was significant at the $p < .10$ level ($p = .08$ and $p = .07$ respectively). Consideration should be

given to the statistically conservative approach used in the present analyses in which only cases with complete data on all variables were included. This likely greatly reduced our power to detect effects.

To our knowledge, there have been no additional mediation analyses of preventive interventions of depression in the 12 years since the original publication. The present study serves as an important first step in replicating and finding partial support for the extension of the original mediation analyses out to an 18-month follow-up. However, additional research is needed to bolster our confidence in the extension of these mediational analyses at later time points. Furthermore, greater confidence in these findings will aid in the better understanding of one of the mechanisms of change (secondary control coping) in the FGCB intervention, which will be critical to successfully scale the preventive intervention into a larger effectiveness trials.

Previous research sought to identify for whom the FGCB intervention would be most and least effective (i.e., tests of potential moderators). Overall, the intervention appeared to produce robust effects regardless of child age, sex, initial parental depression levels, and sociodemographic factors (Compas et al., 2015). Therefore, the third aim of the present study sought to investigate another interindividual factor (stress reactivity) that would likely play a role in coping and symptoms of psychopathology in the context of the preventive intervention. More specifically, I tested whether a parent/adolescent composite measure of adolescent levels of stress reactivity at baseline moderated the established mediation pathway between intervention condition, changes in secondary control coping at 6-months, and changes in adolescent internalizing and externalizing symptoms at 12- and 18-months. Counter to the hypotheses, support was not found for adolescent stress reactivity at baseline moderating the association between intervention condition and changes in secondary control coping at a 6-month follow-up

nor the association between changes in secondary control coping and changes in adolescent internalizing and externalizing symptoms at 12- and 18-months. The non-significant moderation effect in the present analyses is similar to findings presented by Monti and colleagues (2018) who investigated whether associations between coping and symptoms of depression and anxiety were moderated by involuntary stress reactivity in a sample of adolescents and young adults with congenital heart disease. Of relevance, coping and involuntary stress reactivity were assessed using the RSQ (Connor-Smith et al., 2000), which matches the methodology of the present study. Analyses revealed the interaction between secondary control coping and involuntary engagement was not a significant predictor of symptoms of depression or anxiety in this sample, and these interactions were ultimately removed from the model. Interestingly, the findings suggested the more reactive adolescents and young adults were to stress, the stronger the association between *primary* control coping (e.g., problem solving, emotion modulation) and lower symptoms of depression and anxiety (Monti et al., 2018). Future studies may benefit from investigating other child, parent and family factors that could potentially moderate the effects of depression prevention programs for children and adolescents.

There are several limitations in the present study that can be addressed in future research. First, a very conservative statistical approach was utilized in all analyses, specifically the random selection of one child per family and use of list-wise deletion for cases that did not have complete data on all variables of interest. Taking this approach resulted in the loss of greater than 50% of child cases (children in the entire sample $N = 242$; children in the final moderated mediation analyses $N = 103$). It will be important for future research to use alternative methods to manage the missing or partially missing data, as well as incorporate more advanced statistical models that can account for multiple layers of nesting within the data (i.e., siblings within

families, families within group cohorts) to maximize the sample size. Second, the present study assessed secondary control coping and stress reactivity using a composite measure of parents' and adolescents' reports on the same questionnaire. Direct measures of stress reactivity during lab-based tasks or in the adolescents' home environments may provide a more accurate assessment of stress reactivity or could be combined with parent and adolescent self reports as latent indicators of a stress reactivity variable, which would reduce shared method variance. Third, analyses in the present study only included baseline levels adolescent stress reactivity. Although there is research to suggest stress reactivity exhibits some trait-like features in youth (e.g., Hankin, Badanes, Smolen & Young, 2015), future studies will likely benefit from exploring how stress reactivity at different time points or how changes in stress reactivity across time influence coping and symptoms of psychopathology in the context of an intervention. Lastly, adolescent internalizing and externalizing symptoms at 12- and 18- months were assessed using self-reports only in the current analyses. Future research may benefit from incorporating multiple informants (e.g., teachers) as well as direct observations of emotional distress.

These limitations notwithstanding, the findings from the present study provide further evidence that secondary control coping may serve as a significant protective factor for a wide range of symptoms of psychopathology in adolescents of depressed parents. Furthermore, support was not found for adolescent baseline levels of stress reactivity as a significant moderator, which suggests the FGCB intervention continues to produce robust effects regardless of the differences in various interindividual factors.

References

- Achenbach, T., Dumenci, L., & Rescorla, L. (2002). Ten-year comparisons of problems and competencies for national samples of youth: Self, parent, and teacher reports. *Journal of Emotional and Behavioral Disorders, 10*, 194–203.
<http://dx.doi.org/10.1177/10634266020100040101>
- Achenbach, T. M., Ivanova, M. Y., & Rescorla, L. A. (2017). Empirically based assessment and taxonomy of psychopathology for ages 1 ½ -90+ years: Developmental, multi-informant, and multicultural findings. *Comprehensive Psychiatry, 79*, 4–18.
<http://dx.doi.org/10.1016/j.comppsy.2017.03.006>
- Achenbach, T. M., & Rescorla, L. A. (2001). Manual for ASEBA School- Age Forms and Profiles. Burlington: University of Vermont, Research Center for Children, Youth, and Families.
- Beck, A. T., Steer, R. A., Ball, R., & Ranieri, W. F. (1996). Comparison of Beck Depression Inventories 1A and II in psychiatric outpatients. *Journal of Personality Assessment, 67*, 588–597.
- Clarke, G. N., Hornbrook, M., Lynch, F., Polen, M., Gale, J., Beardslee, W., . . . Seeley, J. (2001). A randomized trial of a group cognitive intervention for preventing depression in adolescent offspring of depressed parents. *Archives of General Psychiatry, 58*, 1127–1134.
- 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, 78*(5), 623–634.

- Compas, B. E., Forehand, R., Keller, G., Champion, J. E., Rakow, A., Reeslund, K. L., . . . Cole, D. A. (2009). Randomized controlled trial of a family cognitive– behavioral preventive intervention for children of depressed parents. *Journal of Consulting and Clinical Psychology, 77*, 1007–1020.
- Compas, B.E., Forehand, R., Thigpen, J., Hardcastle, E., Garai, E., McKee, L.,...& Sterba, S. (2015). Efficacy and moderators of a family group cognitive-behavioral preventive intervention for children of parents with depression. *Journal of Consulting and Clinical Psychology, 83*(3), 541-553. <http://dx.doi.org/10.1037/a0039053>
- Compas, B. E., Forehand, R., Thigpen, J. C., Keller, G., Hardcastle, E. J., Cole, D. A., . . . Roberts, L. (2011). Family group cognitive– behavioral preventive intervention for families of depressed parents: 18- and 24- month outcomes. *Journal of Consulting and Clinical Psychology, 79*, 488–499. <http://dx.doi.org/10.1037/a0024254>
- Compas, B. E., Jaser, S. S., Bettis, A. H., Watson, K. H., Gruhn, M., Dunbar, J. P., Williams, E., & Thigpen, J. C. (2017). Coping, emotion regulation, and psychopathology in childhood and adolescence: A meta-analytic and narrative review. *Psychological Bulletin, 143*, 939–991. <https://doi.org/10.1037/bul0000110>
- Compas, B. E., Langrock, A. M., Keller, G., Merchant, M. J., & Copeland, M. E. (2001). Children coping with parental depression: Processes of adaptation to family stress. In S. H. Goodman & I. H. Gotlib (Eds.), *Children of depressed parents: Mechanisms of risk and implications for treatment* (pp. 227–252). Washington, DC: American Psychological Association.

- 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.
<http://dx.doi.org/10.1037/0022-006X.68.6.976>
- Goodman, S. H. (2007). Depression in mothers. *Annual Review of Clinical Psychology, 3*, 107–135.
- Hankin, B. L., Badanes, L. S., Smolen, A., & Young, J. F. (2015). Cortisol reactivity to stress among youth: stability over time and genetic variants for stress sensitivity. *Journal of abnormal psychology, 124*(1), 54–67. <https://doi.org/10.1037/abn0000030>
- Jaser, S. S., Langrock, A. M., Keller, G., Merchant, M. J., Benson, M., Reeslund, K., . . . 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.
- Kraemer, H. C., Wilson, G. T., Fairburn, C. G., & Agras, W. S. (2002). Mediators and moderators of treatment effects in randomized clinical trials. *Archives of General Psychiatry, 59*, 877–883.
- McEwen, Bruce S.(2013). The brain on stress: Toward an integrative approach to brain, body, and behavior. *Perspectives on Psychological Science, 8* (6), 673–675,
[doi:10.1177/1745691613506907](https://doi.org/10.1177/1745691613506907).

Steer, R. A., Brown, G. K., Beck, A. T., & Sanderson, W. C. (2001). Mean Beck Depression Inventory–II scores by severity of major depressive disorder. *Psychological Reports, 88*, 1075–1076.

Weissman, M. M., Pilowsky, D. J., Wickramaratne, P. J., Talati, A., Wisniewski, S. R., Fava, M., . . . Rush, J., for the STAR*D-Child Team. (2006). Remissions in maternal depression and child psychopathology: A STAR*D-child report. *Journal of the American Medical Association, 295*, 1389–1398.

Table 1

Means and standard deviations of variables of interest

Measure	Baseline		6 Months		12 Months		18 Months	
	Written information <i>M (SD)</i>	FGCB <i>M (SD)</i>	Written information <i>M (SD)</i>	FGCB <i>M (SD)</i>	Written information <i>M (SD)</i>	FGCB <i>M (SD)</i>	Written information <i>M (SD)</i>	FGCB <i>M (SD)</i>
Parent Depressive Symptoms	18.56 (11.05)	19.39 (13.69)	14.09 (10.09)	11.72 (10.97)	13.29 (11.73)	12.56 (12.12)	15.79 (12.24)	14.35 (12.92)
BDI-II								
Adolescent Symptoms								
YSR (<i>T</i> scores)								
Internalizing	54.17 (11.72)	55.04 (11.39)	49.31 (13.00)	47.89 (9.90)	51.62 (13.46)	46.67 (9.73)	49.02 (12.89)	45.65 (10.99)
Externalizing	50.32 (10.23)	48.89 (10.17)	48.399 (9.63)	45.24 (9.44)	48.10 (12.29)	45.13 (9.53)	48.91 (11.87)	44.18 (9.75)
Mediator								
Parent-adolescent report of adolescent's secondary control coping (z scores)	-.05 (.68)	-.03 (.83)	-.36 (.79)	.23 (.78)	--	--	--	--
Moderator								
Parent-adolescent report of adolescent's stress reactivity (z scores)	.16 (.79)	-.05 (.82)	--	--	--	--	--	--

Note. BDI-II = Beck Depression Inventory–II; FGCB = family group cognitive– behavioral preventive intervention; YSR = Youth Self-Report

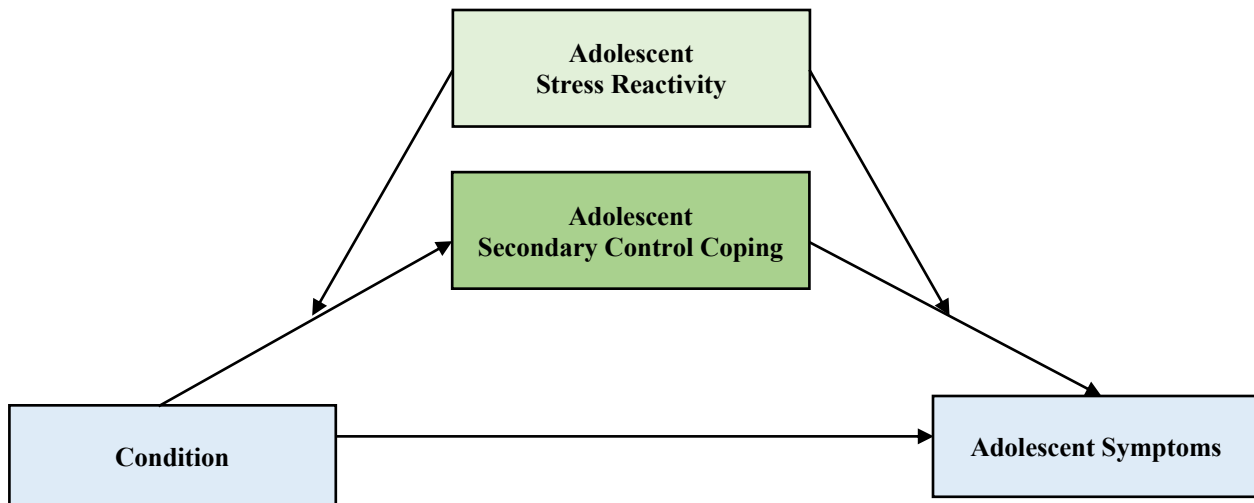


Figure 1. Heuristic model of the hypothesized moderated mediation

ab = .16 (SE = 0.08; 95% CI = .03 to .33)

ab = .15 (SE = 0.07; 95% CI = .05 to .31)

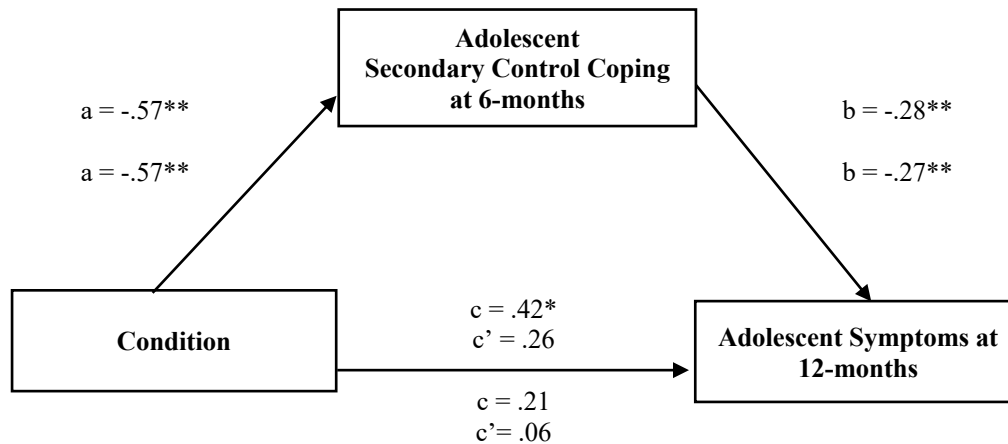


Figure 2. Direct and indirect associations between condition and changes in adolescent symptoms from baseline to 12-months through a parent/adolescent composite measure of secondary control coping at 6-months. Standardized path coefficients are given. Path analyses for both internalizing (top values) and externalizing (bottom values) are shown. Parent depressive symptoms, a composite measure of secondary control coping, and adolescent symptoms at baseline are included as covariates.

N = 115.

Note. Condition is coded as 1 = Written Information and 0 = Family Cognitive-Behavioral Intervention.

** p < 0.01; * p < 0.05

ab = .21 (SE = 0.08; 95% CI = .06 to .38)

ab = .13 (SE = 0.08; 95% CI = .003 to .30)

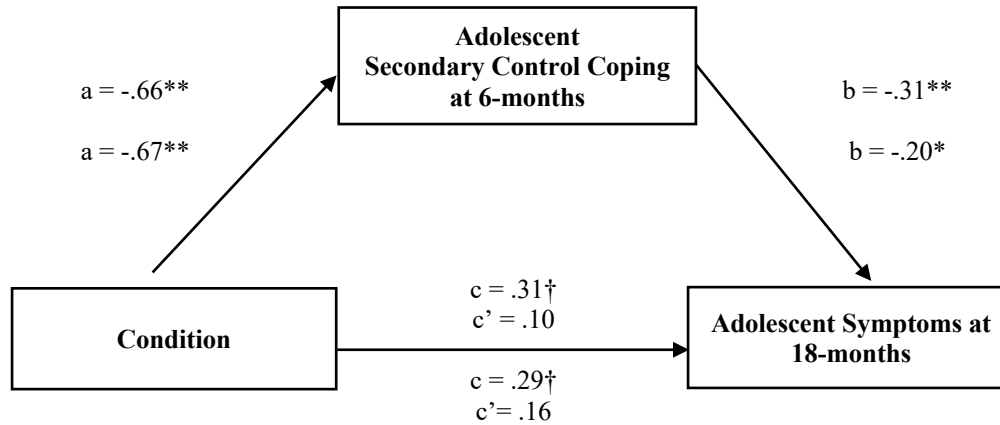


Figure 3. Direct and indirect associations between condition and changes in adolescent symptoms from baseline to 18-months through a parent/adolescent composite measure of secondary control coping at 6-months. Standardized path coefficients are given. Path analyses for both internalizing (top values) and externalizing (bottom values) are shown. Parent depressive symptoms, a composite measure of secondary control coping, and adolescent symptoms at baseline are included as covariates.

N = 103.

Note. Condition is coded as 1 = Written Information and 0 = Family Cognitive-Behavioral Intervention.

** p < 0.01; * p < 0.05; † p < .10