

**Parenting Adolescents with ADHD: Maternal and Adolescent Contributions and the Intervening Role of
Stress**

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Declarations

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Abstract

Compared to parents of typically developing youth, parents of children and adolescents with ADHD tend to engage in fewer positive and more negative parenting behaviors. However, relatively few studies have tested process-oriented models to explain why such deficits in parenting are more common among these parents. In a sample of 107 mothers and their adolescents with ADHD (ages 11-15, mean age 12.6), the current study investigated whether difficulties associated with adolescents' ADHD predicted greater parenting-related stress and problems in parenting behavior. Adolescents and their mothers completed questionnaires measuring parenting behavior, parental stress, adolescent executive functioning, adolescent ADHD symptoms, and maternal depression. Using path analysis, we tested a model in which mothers' parenting stress mediated the relation between difficulties associated with adolescent ADHD (adolescent metacognitive and self-regulatory problems, maternal depressive symptoms) and parenting behavior (warmth, psychological control). We found that parenting stress was a significant mediator in several model associations. Findings suggest that parenting stress may be an important mechanism through which ADHD and associated problems predict problematic parenting. Furthermore, our findings suggest that maternal stress and factors that contribute to it (adolescent metacognitive and self-regulatory problems, maternal depressive symptoms) should be specifically addressed during interventions aimed at improving parenting and the parent-child relationship for adolescents with ADHD and their parents.

Keywords: attention-deficit hyperactivity disorder, parenting, stress, adolescents, path analysis

Highlights:

- Higher levels of ADHD-related difficulties were associated with greater maternal parenting stress.
- Maternal parenting stress predicted less warm parenting behavior and greater parental psychological control.
- Path analysis indicated that parenting stress mediated the relations between adolescent ADHD and parenting behaviors.

Parenting adolescents with ADHD: Maternal and adolescent contributions and the intervening role of stress

Associations between attention-deficit hyperactivity disorder (ADHD) and problems in the parent-child relationship are well-documented (for reviews, see Deault, 2010; Johnston & Mash, 2001). Compared to mothers of typically developing youth, mothers of children and adolescents with ADHD tend to engage in fewer warm and affectionate interactions with their youngsters (Hutchison et al., 2016; Tripp, et al., 2007), are more likely to use psychologically coercive strategies such as guilt- and anxiety-induction to control youth behavior (Cartwright et al., 2011; Gao & Chang, 2013; Molina & Musich, 2016), and report experiencing significantly higher levels of depression (Thomas et al., 2015) and parenting-related stress (Biondic et al., 2019; Fischer, 1990; Schermerhorn et al., 2012; Williamson & Johnston, 2016). Although most research has focused only on mothers, a few studies have found heightened stress, depression, and parenting problems among fathers as well (e.g., Biondic et al., 2019; Margari et al., 2013; Williamson & Johnston, 2016). Such patterns concerning parental distress and disrupted parenting are troubling, given the importance of parenting to child and adolescent development and wellbeing; however, although difficulties in the parent-child relationship have been extensively observed, the nature of associations between ADHD and parenting are as yet not well-understood.

It is unlikely that ADHD and parenting are directly associated – in other words, that child or adolescent ADHD symptoms directly elicit ineffective parenting practices. Instead, given the complexity of parenting, it is likely that the problematic parenting behaviors observed among parents of youth with ADHD are the result of a combination of interrelated parental and child factors, wherein a parent's cognitive and affective processes intervene between parenting and distal predictors of parenting behavior (e.g., a child's behavioral problems, a mother's psychological adjustment). This conceptualization is supported by theoretical models of parenting. For example, Abidin (1992) posited that parenting stress mediates relations between more distal factors that might influence parenting and parenting outcomes. In his conceptualization, parenting stress is produced by a parent's perception that they are unable to effectively meet the demands of parenting. Parents who feel overwhelmed are more likely to experience stress and subsequently engage in problematic parenting behaviors.

Parenting a child or adolescent with ADHD is often more demanding than rearing a typically developing child; thus, for the parents of youth with ADHD, parenting stress is a logical mediator between maternal and child factors and parenting behavior. As Mash and Johnston (1990) discussed in their theoretical paper on determinants of stress for parents of children with ADHD, youth with ADHD exhibit higher levels of hyperactive and inattentive

behaviors than their typically developing peers. Additionally, given difficulties with self-regulation, youth with ADHD also exhibit more externalizing behaviors, such as aggression and defiance, as well as deficits in executive functioning, including low working memory, problems with planning and organization, and inhibitory difficulties (Barkley, 1997; Willcutt et al., 2005). When faced with chronic child and adolescent problems in the context of ADHD, Mash and Johnston (1990) suggest that parents are likely to feel overwhelmed by the challenges of parenting. Over time, negative affect and cognitions surrounding parenting may manifest in enduring parenting stress (DuPaul et al., 2001; Theule et al., 2013; Whalen et al., 2011). In turn, persistent parenting stress is likely to undermine parenting behavior (Mash & Johnston, 1990).

As discussed above, prior research (e.g., Biondic et al., 2019; Williamson & Johnston, 2016) indicates that parents of children and adolescents with ADHD tend to be more stressed than their peers in the general population; however, questions still remain regarding which specific factors in the parent-child relationship are the most salient predictors of stress for these parents. Moreover, few studies have attempted to model relationships among potential stressors for parents of youth with ADHD. However, existing research on parenting children and adolescents with ADHD (e.g., Graziano et al., 2011; Melnick & Hinshaw, 2000; Rapport et al., 2008) suggests that three factors are likely predictors of parenting stress: (1) offspring difficulties regulating behaviors and emotions, (2) offspring cognitive difficulties, and (3) maternal psychopathology, particularly depressive symptoms.

First, children and adolescents with ADHD often struggle to regulate behaviors and emotions. For example, when faced with a difficult or frustrating task, studies have found that children and adolescents with ADHD focus on the frustrating aspects of the task and display frequent behavioral indicators of their frustration such as whining and slamming their fists (Melnick & Hinshaw, 2000; Walcott & Landau, 2004). In turn, children's and adolescents' self-regulatory difficulties and behaviors associated with poorly regulated negative emotions have been associated with elevated parental distress (Morrissey & Gondoli, 2012; Pelham et al., 1997; Whalen et al., 2011).

Second, in addition to its core symptoms, ADHD is also typically accompanied by significant impairment in executive functioning (Martel et al., 2007; Rapport et al., 2008; Toplak et al., 2009). Connections between child or adolescent executive functioning and parenting is a developing area of research; in a sample containing children and adolescents aged 4.5 to 18 (mean age about 11 years), Graziano et al. (2011) found the relation between youth ADHD and parental stress was at least partially mediated by offspring executive functioning difficulties. In a similar

sample of youth aged 7-18 years, Hutchison et al. (2016) also found significant associations between executive functioning in offspring with ADHD or an autism spectrum disorder (ASD) and elevated parental stress.

Third, parents of children and adolescents with ADHD are more likely than parents of typically developing youth to experience depressive symptoms (Gau & Chang, 2013; Margari et al., 2013). The broader literature on parental depression suggests that higher rates of depression are positively associated with parenting stress (e.g., Nam et al., 2015; Norizan & Shamsuddin, 2010). Additionally, Biondic et al. (2019) found that parental depression was a significant predictor of parenting stress specifically for mothers and fathers of adolescents with ADHD, with greater levels of depression predicting higher stress.

Finally, it should also be noted that there are a variety of accepted approaches to measuring and operationalizing parenting stress (Holly et al., 2019). For example, measures such as the Stress Index for Parents of Adolescents (SIPA; Sheras et al., 1998) focus on specific stressors that parents of adolescents may face, such as problematic adolescent behavioral and mood disturbances. Other approaches, such as Crnic and Greenberg's (1990) Parenting Daily Hassles Scale, examine daily stressors and operationalize parenting stress in terms of the cumulative effect of these stressors. In our study, we sought to examine how difficulties faced by adolescents with ADHD (e.g., problems with behavior regulation) were associated with parenting stress, so we chose a measure of stress (Pearlin & Schooler, 1978) with items that focused on parents' reflective evaluations of the parent-adolescent relationship, role-strain, and perceptions of their own ability to successfully rear their children.

To summarize to this point, compared to the parents of typically developing youth, parents of children and adolescents with ADHD engage in higher levels of maladaptive parenting practices; however, the mechanisms underlying the relationship between offspring ADHD and problematic parenting practices are not well-understood. Because the parents of youth with ADHD experience elevated levels of parenting stress, and parenting stress is associated with problematic parenting, we examined relations among these variables.

We also focused particularly on a young adolescent sample (ages 11-15, mean age 12.6). Much of the extant research focuses on school-age children (DuPaul et al., 2001; Tripp et al., 2007) or includes a wide age range from childhood to emerging adulthood (Cartwright et al., 2011; Hutchinson et al., 2016). A more limited set of studies includes young adolescents to emergent adults (e.g., around ages 11- 18; see Biondic et al., 2019; Gau & Chang, 2013), while other studies include pre- through young-adolescent participants (e.g., around ages 7-11; see

Theule et al., 2013; Whalen et al., 2011; Williamson & Johnson, 2016). We have not found research most relevant to our study which focuses specifically on the young adolescent period.

Although the basics of positive parenting do not change across development (e.g., warmth, guidance, appropriate autonomy promotion), young adolescence is a context which presents unique socialization challenges, including greater day-to-day parent-adolescent conflict, and increased adolescent need for autonomy combined with continued needs for parental monitoring, guidance and emotional support (Baumrind, 1991; Steinberg, 2001). Successfully negotiating and adapting to these family perturbations is a challenge that, while normative, can be emotionally draining, likely more so for parents than adolescents (Steinberg, 2001), and for mothers in particular (Silverberg & Steinberg, 1990; Steinberg, 2001), as they often have greater day-to-day parenting responsibilities than do fathers (Bureau of Labor Statistics, 2020; Coury et al., 2020). The normative and expected parental challenges of balancing structure with greater freedom and weathering conflict while maintaining closeness may be especially challenging when one's adolescent experiences ADHD-related symptoms and impairments (see Biondic et al., 2019). However, few prior studies have examined associations among ADHD, parenting stress, and parenting during the young adolescent period specifically. Thus, we focused on that particular adolescent age range.

In the current study we tested the following hypotheses, depicted in Figure 1:

- (a) Greater levels of ADHD-related difficulties (i.e., adolescent's self-regulatory and cognitive difficulties, maternal depression) will be associated with greater maternal parenting stress.
- (b) Greater parenting stress will be associated with greater maternal psychological control and reduced maternal warmth.
- (c) Parenting stress will mediate the relations between adolescent ADHD-related difficulties and maternal psychological control and warmth.

(PLACE FIGURE 1 ABOUT HERE)

Method

Participants

Our sample consisted of 107 mother-adolescent dyads recruited from schools in the rural and suburban communities surrounding a medium-sized, Midwestern university. Contact with participants was initiated primarily through letters mailed directly to families, describing our interest in adolescents with an ADHD diagnosis and their mothers. Mothers who were interested in participating contacted our research office by phone and were

subsequently screened. If the phone screening indicated that adolescents had an ADHD diagnosis, but no ASD diagnosis, then the dyad was scheduled for a visit to our research laboratory.

Adolescents' ADHD status was confirmed via structured interviews administered in-person to mothers (C-DISC-IV; Shaffer et al., 2000). Mothers also reported on the severity of their children's ADHD symptoms using the ADHD Rating Scale IV (ARS; DuPaul et al., 1998). At the time of the study, mean adolescent age was 12.6 years ($SD = 1.2$), and mean maternal age was 42.5 years ($SD = 6.7$). The sample was predominantly European-American (96.3%). Mothers reported low socioeconomic risk; the majority of mothers were married (74.8%), middle-income (mean income = \$77,608, $SD = \$56,011$), and well-educated (56% held at least a four-year college degree). For additional sample details, see Table 1.

(PLACE TABLE 1 ABOUT HERE)

Procedure

During the laboratory visit, adolescents completed neuropsychological assessments and self-report questionnaires, while mothers completed the C-DISC-IV interview and self-report questionnaires. The present analyses utilized the mother and adolescent self-report data. Dyads were compensated \$40 for the visit. The University Institutional Review Board (IRB) approved all procedures.

Measures

Adolescent ADHD Symptoms

Mothers reported their adolescent's ADHD symptoms using the ARS (DuPaul et al., 1998). The ARS contains 18 items corresponding to the DSM-IV criteria for an ADHD diagnosis. Items measured adolescents' inattentive (e.g., "fails to give close attention to details or makes careless mistakes in schoolwork"), hyperactive (e.g., "is 'on the go' or acts as if 'driven by a motor'"), and impulsive (e.g., "blurts out answers before questions have been completed") behaviors. Mothers rated how often their adolescents demonstrated each behavior on a scale from 0 ("never or rarely") to 3 ("very often"). For our analyses, we used a measure of overall ADHD symptoms to create a more parsimonious model, an approach that has been used in previous studies (e.g., Chronis-Tuscano et al., 2007; Gerdes et al., 2003). The ARS has demonstrated high internal consistency (alpha), high test-retest correlations, and moderate interobserver agreement between parents and teachers (DuPaul et al., 1998). The scale has also demonstrated convergent and divergent relations with the Connors Parent Rating Scale (Connors et al., 1998) and the Child Behavior Checklist (CBCL; Achenbach, 1991), and has shown adequate discriminant and predictive

validity within referred samples of children and adolescents (DuPaul et al., 1998). Cronbach's alpha in the current sample was .893 for the total ARS.

Adolescent Behavioral Regulation and Executive Functioning

To assess adolescents' difficulties in the domains of executive functioning and behavioral regulation, mothers completed the Metacognitive and Behavioral Regulation indices of the Behavioral Behavior Rating Inventory of Executive Function (BRIEF; Gioia et al., 2002). Mothers endorsed each item on a scale from 1 ("never") to 3 ("often"), with higher scores representing more problems. The two indices have demonstrated good to excellent internal consistency and test-retest reliability (Gioia et al., 2002). In evidence of convergent and divergent validity, the indices have demonstrated expected correlations with indices of child and adolescent cognitive and behavioral functioning drawn from well-validated measures such as the CBCL (Achenbach, 1991).

The Metacognitive index contains 34 items intended to assess difficulties in cognitive functioning. Items in the Metacognitive index were drawn from the following BRIEF subscales: Initiation (e.g., "is not a self-starter"), Working Memory (e.g., "when given three things to do, only remembers the first or last"), Planning and Organization (e.g., "cannot connect doing tonight's homework with grades"), Organization of Materials (e.g., "leaves playroom a mess"), and Self-Monitoring (e.g., "does not check work for mistakes") subscales. Cronbach's alpha for the Metacognitive index was .922.

The Behavioral Regulation index contains 28 items, intended to assess problems controlling negative behavior and emotion and adaptability. Items were drawn from the BRIEF's Inhibition (e.g., "gets out of control more than friends"), Emotional Control (e.g., "overreacts to small problems"), and Shifting (e.g., "becomes upset with new situations," "resists change of routine, foods, places, etc.") subscales. Cronbach's alpha for the Behavioral Regulation Index was .932.

Maternal Depression

Mothers reported on their own depressive symptoms via the Depression subscale of the 18-item Brief Symptoms Inventory (BSI-18; Derogatis, 2001), a reliable measure of depression and anxiety that has good convergent validity with more comprehensive measures (Derogatis & Fitzpatrick, 2004). We computed mothers' depression as the average of the six subscale items relating to clinical criteria for depression. Items included "feeling hopeless about the future," "feeling blue," and "feelings of worthlessness." Mothers indicated the degree to which they had experienced the feelings described by each item over the last seven days, rating each symptom from 0 ("not

at all”) to 4 (“extremely”). Higher scores indicated higher levels of maternal depressive symptoms. Cronbach’s alpha for the subscale was .845.

Maternal Parenting Stress

The parenting stress measure was adapted from the Parental Stress Items scale (PSI; Pearlin & Schooler, 1978). The original PSI contained 7 items pertaining to parents’ enduring strains in the parental role. Parents are instructed to show how much they are experiencing each of several distressed feelings about parenting. A sample item asked, “When you think of your experiences as a parent to this child, how emotionally worn out do you feel?” Following previous research (Bonds et al., 2002; Steeger et al., 2013), we added 4 positively worded items intended to reduce response bias (e.g., ‘When you think of your experiences as a parent to this child, how happy do you feel?’); these items were reversed prior to summing the 11 items. Mothers rated each item with a scale ranging from 1 (“not at all”) to 4 (“very much so”), with higher scores indicating greater levels of parenting stress. In previous research, the scale has shown high internal consistency (alpha) and significant test-retest correlations over a three-year period (Steeger et al., 2013). In evidence of convergent and divergent validity, the scales have demonstrated expected correlations with well-validated measures of depression, parental coping strategies, and parenting efficacy (Steeger et al., 2013; Sturge-Apple et al., 2003). Cronbach’s alpha for the PSI was .935.

Maternal Parenting Behavior

Finally, both mothers and adolescents completed parallel measures of maternal warmth and psychological control. Warmth was reported via a 13-item scale measuring positive and affectionate parenting behaviors such as “I smile at my child” and “my mother gives me a hug or a pat on the back” (Gondoli et al., 2008). The scale was closely based on the Acceptance versus Rejection subscale of the revised short form of the Child Report of Parental Behavior Inventory (Schaefer, 1965; Schludermann & Schludermann, 1970). The warmth scale has predicted increases in adolescent self-disclosure to mothers as well as maternal knowledge of adolescent behavior and whereabouts over time (Blodgett Salafia et al., 2009; Grundy et al., 2010), suggesting associations with positive affect and interactions in the mother-adolescent dyad. The warmth scale was also found to be positively associated with, yet empirically distinct from, cohesion in the mother-adolescent dyad (Gondoli et al., 2008).

Maternal psychological control was reported via the Psychological Control Scale (PCS), an eight-item scale with demonstrated validity and reliability across samples (Barber, 1996). The PCS was found to be moderately negatively correlated with warmth in an analysis of parenting among diverse families (Luk et al., 2016), and

consistently predictive of depressive symptoms in cross-national samples of adolescents (Barber et al., 2005). The PCS includes eight items measuring emotionally manipulative or coercive parenting behaviors such as “I am less friendly with my child if he/she does not see things my way” and “my mother will avoid looking at me if I have disappointed her.” For mother-reported variables, Cronbach’s alphas were .904 and .723 for warmth and psychological control, respectively. For adolescent-reported variables, Cronbach’s alpha was .914 and .765 for warmth and psychological control, respectively.

Results

Analysis Strategy

We first examined descriptive statistics and bivariate correlations (see Table 2) using IBM’s Statistical Package for Social Science (SPSS). Subsequently, path analysis and fit indices were computed using the Lavaan package for R (Rosseel, 2015). We tested our theoretical model depicted in Figure 1 first using mother-reported parenting variables and then using adolescent-reported parenting variables. To compute estimates and standard errors, we bootstrapped estimates for each model, drawing from 1000 iterations. We then examined indices to determine whether our theoretical model fit well with our data. We also inspected confidence intervals for each of the estimates in our model.

Bivariate Analyses

Pearson correlations (see Table 2) indicated initial support for the hypothesized relations among model variables. Adolescent ADHD symptoms were positively correlated with maternal depression ($r = .197; p = .042$), adolescent metacognitive problems ($r = .330; p = .001$), adolescent behavioral regulation difficulties ($r = .462; p < .001$), and maternal parenting stress ($r = .259; p = .007$). In turn, maternal depression was positively associated with parenting stress ($r = .449; p < .001$). Adolescent metacognitive problems ($r = .462, p < .001$) and behavioral regulation difficulties ($r = .607, p < .001$) were also positively associated with parenting stress. Furthermore, parenting stress was positively associated with mother reports of psychological control ($r = .494; p < .001$) and negatively associated with mother reports of warmth ($r = -.364; p < .001$). Parenting stress was positively correlated with adolescents’ perceptions of maternal psychological control ($r = .261; p = .007$) but not with their perceptions of maternal warmth ($r = -.099; p = .311$).

(PLACE TABLE 2 ABOUT HERE)

Path Analyses

First, we tested a model in which adolescent metacognitive and behavior regulation problems, in addition to maternal depression, predicted maternal reports of parenting indirectly through parenting stress (see Figure 2). Model fit was good ($\chi^2(9) = 12.784, p = .173$; CFI = .980; TLI = .953; RMSEA = .063; SRMR = .058), and all pathways in the model were significant. Path estimates shown in Figure 2 are standardized to facilitate comparison of effect sizes relative to other variables in the model. Finally, we computed estimates for indirect effects, most of which were also significant, or marginally significant ($p < .10$) in the anticipated directions (see Table 3). We computed and examined confidence intervals for each estimate in the model and found that no interval contained zero. Thus, the path model supported our hypotheses that ADHD-related difficulties would be associated with increased parenting stress, which, in turn, was associated with greater psychological control and lower warmth.

Second, we retested the model using adolescent-reported variables, finding that model fit was adequate ($\chi^2(9) = 15.245, p = .084$; CFI = .959; TLI = .905; RMSEA = .081; SRMR = .072; see Figure 2). Although the pathway from maternal stress to adolescents' perceptions of maternal warmth was non-significant ($\beta = -.099, p = .282$), maternal stress significantly predicted adolescents' perceptions of maternal use of psychological control ($\beta = .261, p = .003$). Furthermore, several estimates of indirect effects were significant when considering adolescent-reported parenting variables, including the paths from maternal depression and behavior regulation problems to adolescent-reported psychological control (see Table 3). As with the model containing mother-reported parenting variables, confidence intervals were computed, and those for significant estimates did not contain zero. Significant indirect effects (see Table 3) also had acceptable confidence intervals. As with the results for maternal reports of parenting, the path model with adolescent-reported parenting generally supported our hypotheses that ADHD-related difficulties would be associated with increased parenting stress, which, in turn, was associated with more problematic parenting.

(PLACE TABLE 3 AND FIGURE 2 ABOUT HERE)

Discussion

This study examined a potential process through which adolescent ADHD is associated with problematic parenting practices. Parents of children with ADHD engage in higher rates of problematic parenting than parents of typically developing children; however, few studies have sought to determine *why* parents of children with ADHD tend to struggle with parenting, beyond acknowledgement that ADHD symptoms play a role. We tested a model in

which adolescent and maternal characteristics predicted greater levels of maternal stress, which in turn predicted more problematic and fewer positive parenting behaviors.

Results supported our conceptual model and hypotheses; adolescents' ADHD symptoms were positively associated with problems in executive functioning and behavioral self-regulation. Mothers also experienced greater depressive symptoms when their children had higher ADHD symptoms. All three of these factors (i.e., adolescents' cognitive and regulatory difficulties, maternal depression) predicted higher levels of parenting stress. Mothers with higher stress, in turn, exhibited lower warmth and greater psychological control in parenting.

In the context of our sample and specific model, our results suggest that adolescent ADHD symptoms have relatively small direct effects on mothers' feelings of stress in the maternal role. Rather, as ADHD symptoms become more severe and chronic, both mothers and adolescents may experience different kinds of regulation breakdown, with mothers experiencing depression and adolescents experiencing inability to regulate behavior and cognitive functions in various social settings including within the parent-child dyad. In turn, it is the perception and daily experience of such breakdowns that may feed more proximally into maternal stress. In this way, perhaps it is more useful to focus on impairments that accompany ADHD, rather than the severity of symptoms, as explanatory variables accounting for parenting problems. The challenge of managing a child's impairment and one's own associated impairment may be most relevant for understanding how mothers of children with ADHD come to experience generalized stress in their role and problems in key aspects of parenting.

The current study also has implications for treatments and interventions for ADHD within the family context. Although previous research has identified the problems that often exist within the parent-child relationship for individuals with ADHD, this information is of limited use to interventionists without a more intricate understanding of the fundamental factors and processes underlying those problems. The model presented in the current study indicates several important potential targets for interventions intended for families of individuals with ADHD: Parenting stress, parental depressive symptoms, children's cognitive difficulties and problems with behavioral regulation.

First, the models evaluated in this study suggest that addressing parental stress is essential when designing and evaluating interventions for the families of children and adolescents with ADHD. Our results suggest that a parent's perceived stress may be the lynchpin in the relations between youth ADHD symptoms and problematic parenting. In our sample, mothers' self-reported parenting stress completely mediated the relations between the

problems associated with adolescents' ADHD and maladaptive parenting. This finding indicates that reducing parents' stress may be an effective means of reducing their negative parenting behaviors. Fortunately, in groups of parents facing similar challenges with their children (e.g., parents of children with intellectual disabilities or ASD), interventions aimed at reducing parenting stress through methods such as respite care, support groups, and stress-management have shown reasonable success (e.g., Harper et al., 2013; Hastings & Beck, 2004). At present, few studies have explored the efficacy of parent-focused stress-reduction specifically for parents of children with ADHD (e.g., van der Oord et al., 2012), but we hope that our results will encourage further investigation into reducing stress for the parents of children and adolescents with ADHD.

Second, in addition to parenting stress, parents' depressive symptoms may be an important target for intervention. In our model, maternal depression was a powerful predictor of mothers' parenting stress, which in turn predicted maladaptive parenting behavior. Maternal depressive symptoms were also significantly associated with higher levels of adolescents' ADHD symptoms as well as their problems with cognition and self-regulation. Thus, the current investigation provided further support for the well-documented relation between youth ADHD and parental depression (e.g., Margari et al., 2013) as well as the relations between depression and parenting noted throughout the broader parenting literature (e.g., Lovejoy, 2000). These findings make it even more surprising that depressive symptoms are rarely a complementary focus of intervention for the parents of children with ADHD, though some investigations of cognitive-behavioral treatments for mothers of children with ADHD have indicated that such an approach may be effective (e.g., Chronis-Tuscano et al., 2013; Chronis-Tuscano et al., 2006). Additionally, interventions aimed at reducing parental stress may also be successful in ameliorating parental depressive symptoms (Hastings & Beck, 2004).

Third, our results suggest that adolescents' behavioral and cognitive regulation difficulties play important roles in predicting levels of parental stress and subsequent parenting behaviors. A robust intervention literature indicates the importance of reducing oppositional behaviors and improving behavioral regulation among children and adolescents with ADHD. In recent years, some interventions for ADHD have been aimed at improving child and adolescent cognitive functioning, usually focusing on key executive functions such as working memory (Steege et al., 2016). Such interventions have been shown to reduce children's ADHD symptoms, increase cognitive performance, and even improve the climate of the parent-child relationship (Holmes et al., 2009; Klingberg et al., 2002, 2005). Unfortunately, some of the aforementioned positive effects of executive functioning interventions,

including far-transfer gains (e.g., improvements to the parent-child relationship), have proven difficult to replicate (for meta-analysis, see Melby-Lervåg & Hulme, 2013). Nevertheless, the results of the current study support the notion that executive functioning interventions may indeed be an effective means of reducing parental stress and problematic parenting behavior.

All of the intervention targets discussed above represent important directions for future research as well as for novel interventions intended to improve parent-child relationships among families experiencing ADHD. The current study indicates that the relations among ADHD, family functioning, and parenting problems are complex and multifaceted. Thus, it is likely that the most promising treatments and interventions for families affected by ADHD will reflect this complexity through a holistic, multifaceted approach by addressing many of the aforementioned targets. Some researchers have already begun to evaluate such approaches (for review, see Chronis-Tuscano et al., 2004), for example testing dual-pronged interventions aimed at improving parenting and children's and adolescents' cognitive functions and behavioral regulation (Gathercole, 2014; Neville et al., 2013; Steeger et al., 2016). Others have combined parental behavioral training with depression treatments for parents, especially mothers (Chronis-Tuscano et al., 2013). Still, as of the writing of this article, few interventions embrace a fully holistic approach targeting the range of problems observed among children and adolescents with ADHD and their parents.

The current investigation added important findings to the existing literature; however, it was an initial attempt to model selected mechanisms through which ADHD affects parenting behavior, and it therefore had some limitations. First, the current study is cross-sectional, examining data gathered at one time-point. Thus, it will be worthwhile for future longitudinal research to investigate whether relations among dyadic characteristics, maternal stress, and maternal parenting behavior change over time. For instance, some research (e.g., Langberg et al., 2008; Reef et al., 2010) indicates that some behavioral problems among children with ADHD decrease over adolescence, which could result in shifts to the model examined in the current study. Alternatively, it is possible that over time, the problematic parenting we observed among parents of young adolescents with higher ADHD-related difficulties may exacerbate those difficulties as adolescents mature. For example, our study indicates that adolescent behavior regulation deficits are indirectly associated with higher levels of problematic parental control (i.e., psychological control). Such control could potentially contribute to more behavioral problems over time. Examining such a relation would require longitudinal analysis and is thus beyond the scope of the current investigation, but such ideas warrant investigation in future studies. Relatedly, it could also be the case that other parental stresses associated with

adolescence (e.g., growing concerns about developmentally appropriate increases in adolescent autonomy; feelings of decreased self-efficacy in parenting) might lead to increased maternal stress, which could continue to affect parenting behaviors. Additionally, a longitudinal follow-up could help us better determine whether bidirectional effects exist between dyadic characteristics, parenting stress, and parenting behavior. In the current study, we selected predictor variables that should be relatively unaffected by changes in parenting over time (e.g., ADHD and metacognitive and self-regulatory abilities); however, longitudinal research would allow us to confirm whether such variables change over time and whether these changes are impacted by other variables in the model.

Sample diversity is a second potential limitation of the current study. Dyads in our sample were relatively low risk, with the exception of adolescent ADHD diagnosis. Notably, although some dyads in our sample were from households with lower SES, the majority came from families who were well-resourced and middle-income. Low SES has been associated with overall higher levels of stress for parents (Conger & Donnellan, 2007; Emmen et al., 2013); thus, future research should examine similar models among parents characterized as low-income, whose parenting stress may be exacerbated by their socioeconomic situation. Our sample was also primarily European-American, so future research could benefit from establishing whether stress and dyadic characteristics have a comparable effect on parenting in samples representing diverse sociocultural backgrounds. Lastly, the majority of mothers in the current study were married, but future research could investigate whether single parenthood intensifies the stresses associated with parenting an adolescent with ADHD. Single-parent status has been shown to increase levels of stress and depression for parents of children in the broader population (Cairney et al., 2003; Compas & Williams, 1990). However, existing studies have failed to find significant associations between maternal marital status and parenting stress for mothers of children with ADHD (e.g., Harrison & Sofronoff, 2002).

As in all studies, some reflection on measurement limitations is warranted. A more nuanced description of the subjective experience of parenting might be accomplished by including maternal perceptions of efficacy and competence in addition to perceived stress (Sturge-Apple et al., 2003). Although our study incorporated data from both mothers and adolescents, we did not recruit fathers or measure mother or adolescent reports of father behaviors. Focusing on maternal parenting makes comparison to previous findings easier, as most studies in the literature focus on mothers. Additionally, mothers presently remain disproportionately involved in daily childcare and household labor, as compared to fathers (Bureau of Labor Statistics, 2020; Coury et al., 2020; Patterson et al., 2004; for discussion, see also Biondic et al., 2019); such gendered patterns within the family make it difficult to argue that

mothers are not an appropriate focal point in studies of child and adolescent adjustment, stress, and parenting. Nevertheless, it is certainly important to examine relations between stress and parenting among fathers. It is, for example, possible that fathers of children with ADHD experience significantly lower levels of stress than do mothers, due to their relatively more limited role in day-to-day parenting tasks (Patterson et al., 2004).

Furthermore, some prior work suggests that paternal involvement in parenting has important effects on maternal levels of stress, with greater paternal involvement associated with reduced maternal parenting stress (Harmon & Perry, 2011). Thus, future investigations into co-parenting of children and adolescents with ADHD could also be important to our understanding of complex family roles and their amplification or attenuation of stress. In addition, future investigations of relations between family members' reports of adjustment, stress, and parenting may be informative. For example, recent research using regression has demonstrated that congruences and discrepancies in mother and adolescent reports of maternal control accounted for variance in core familial attitudes, over and above the main effects of separate maternal and adolescent reports of parenting (Leung et al., 2017). Such techniques could be productively applied to various subsystems beyond the parent-child dyad, including co-parents, and could help capture the complexity of parenting within the family, from a systemic perspective. Finally, although adolescents' behaviors towards their mothers were captured to varying degrees in all of our model variables, we did not assess such behavior either directly, via observations of mother-adolescent interactions or through reports of explicitly dyadic behaviors, such as conflict. Parenting stress is influenced by parent-child interactions, and adding targeted measures of such interactions might add to the explanatory power of hypothesized models.

Limitations notwithstanding, the current study adds considerably to our understanding of why parents of young adolescents with ADHD are more likely to struggle with effective parenting. Our findings indicate that parenting stress plays a significant role in predicting problematic parenting behavior, and that this stress is predicted both by characteristics of adolescents and their mothers.

In sum, the current study highlights key mechanisms of the relations between a young adolescent's ADHD and two critical parenting problems commonly observed among parents of children and adolescents with the disorder. In the model discussed herein, the impact of ADHD on parenting behavior was shown to operate through parental stress. The study provided support for the idea that ADHD has a complex and widespread influence on the parent-child relationship and the family, impacting adolescents and parents alike through multiple paths and factors. Furthermore, results suggest that interventions for families impacted by ADHD might effectively target relevant

characteristics of both adolescents (e.g., cognitive difficulties, behavior regulation) and parents (e.g., stress, depression). Our study thus provides a valuable glimpse into the intricacies of the parent-child relationship for families of adolescents with ADHD.

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Table 1

Sample Characteristics

Characteristic	<i>n</i>	%	Mean (SD)	Min	Max
Adolescent Gender					
Male	74	69.2			
Female	33	30.8			
Mother Age			42.5 (6.7)	28	64
Adolescent Age			12.6 (1.2)	11	15
Maternal Years Education			15.5 (2.9)	10	25
Maternal Ethnicity					
Caucasian	103	96.3			
African-American	2	1.9			
Asian-American	1	0.9			
Multi-ethnic	1	0.9			
Maternal Marital Status					
Married	80	74.8			
Separated	3	2.8			
Divorced	17	15.9			
Single	5	4.7			
Widowed	2	1.9			
Annual Household Income			\$77,608 (56,011)	\$0	\$300,000

Table 2

Correlations Among Variables

Variable	1	2	3	4	5	6	7	8	9
1. ADHD	--								
2. Metacognition	.330**	--							
3. Behavioral Regulation	.462***	.494***	--						
4. Depressive Symptoms	.197*	.253**	.310**	--					
5. Parenting Stress	.259**	.462***	.607***	.449***	--				
6. Psychological Control	.071	.264**	.319**	.316**	.494***	--			
7. Warmth	.035	-.032	-.156	-.332***	-.364***	-.475***	--		
8. AR Psych Control	-.113	-.013	.119	.056	.261**	.140	-.206*	--	
9. AR Warmth	.220*	-.023	.025	-.144	-.099	-.123	.252**	-.345***	--
Mean	33.99	103.46	55.56	.488	23.64	7.60	42.89	10.16	41.69
SD	9.99	13.64	11.39	.589	6.98	3.40	5.91	5.47	7.86

Note. ADHD = Attention-deficit hyperactivity disorder; AR = Adolescent-reported. † $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 3

Indirect Effects

Variables	Estimate	Std. Error	Std. Estimate
Maternally Reported Parenting			
Maternal depression -- Stress -- Warmth	-.981	.394	-.098 *
Maternal depression -- Stress -- PC	.766	.268	.133 **
Metacognition -- Stress -- Warmth	-.028	.015	-.065 †
Metacognition -- Stress -- PC	.022	.012	.089 †
Behavior Regulation -- Stress -- Warmth	-.082	.026	-.158 **
Behavior Regulation -- Stress -- PC	.064	.015	.215***
Adolescent Reported Parenting			
Maternal depression -- Stress -- Warmth	-.354	.352	-.027
Maternal depression -- Stress -- PC	.651	.308	.070 *
Metacognition -- Stress -- Warmth	-.010	.012	-.018
Metacognition -- Stress -- PC	.019	.010	.047 †
Behavior Regulation -- Stress -- Warmth	-.030	.029	-.043
Behavior Regulation -- Stress -- PC	.054	.020	.113 **

Note. Std. = Standard; ADHD = Attention-deficit hyperactivity disorder; PC = psychological control;
 † $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

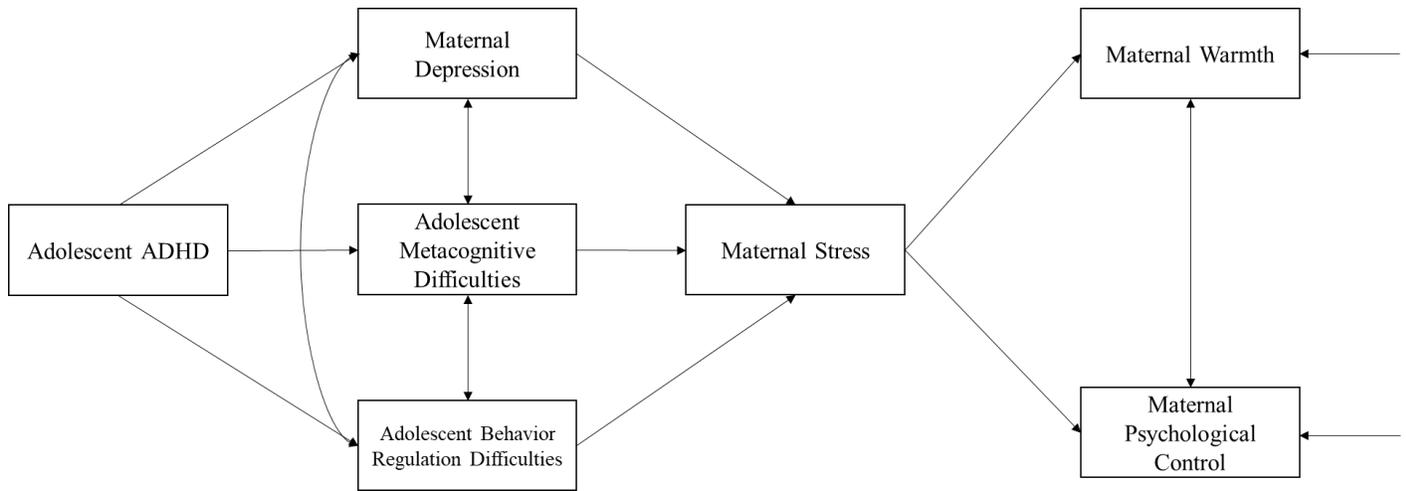


Figure 1. Theoretical model in which maternal parenting stress mediates the relationship between parenting behaviors and adolescent and maternal ADHD-related difficulties.

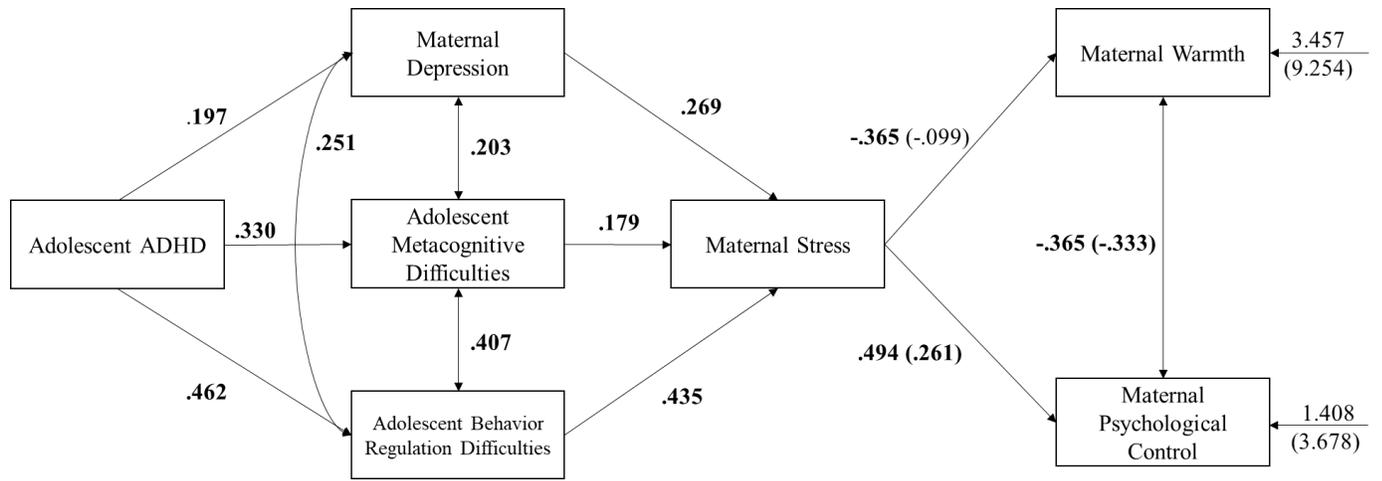


Figure 2. Maternal parenting stress mediates the relationship between parenting behaviors and adolescent and maternal ADHD-related difficulties. Coefficients are standardized. Coefficients in bold are significant at $p < .05$. Coefficients enclosed in parentheses indicate path estimates using adolescent-reported parenting variables.