

Severity of Children's ADHD Symptoms and Parenting Stress: A Multiple Mediation Model of Self-Regulation

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Abstract The goal of the current study was to determine the extent to which the perceived self-regulation deficits across behavioral, cognitive, and emotional domains seen in children with ADHD explain the association between the severity of ADHD symptoms and parenting stress. Participants for this study included 80 children (mean age = 10 years, 9 months) with a DSM-IV diagnosis of ADHD confirmed by a comprehensive clinical diagnostic assessment. Parents reported their own stress levels as well as the severity of their children's ADHD symptoms, aggression, emotional lability, and executive functioning difficulties. Results indicated that the severity of children's hyperactivity/impulsivity symptoms but not their inattention related to parenting stress. Multiple mediational analyses indicated that the association between hyperactivity/impulsivity and parenting stress was explained by children's perceived comorbid aggression levels, emotional lability, and executive functioning difficulties. No significant differences in the strength of the mediators were found. The current study provides initial data showing that the perceived impairments in children's self-regulation across

emotional, cognitive, and behavioral domains are what parents report as stressful, not simply the severity of ADHD symptoms. Due to the cross-sectional nature of this study and shared variance from relying solely on parent report, it will be critical for future research to replicate our findings using longitudinal and multi-informant data such as teacher reports and standardized assessments.

Keywords ADHD · Parenting stress · Self-regulation · Emotional reactivity · Child · Executive functioning · Mediation

The demands of the parenting role create stress for almost all parents. Measurement of parenting stress can entail examining normative every day hassles experienced by all parents (Crnic and Greenberg 1990) or assessing more significant distress within the parent–child relationship (Abidin 1990). A popular conceptualization of parenting stress is provided by Abidin (1992, 1995) who proposes that it is the mismatch between the perceived demands of parenting and available resources to meet those demands that create aversive feelings. The attribution of such feelings can also be placed upon the parent (e.g., not feeling competent as a parent) or the child (e.g., “this child is problematic”). Regardless of the source of attribution of such aversive feelings or how one measures parenting stress, higher levels of parenting stress translates to poorer parental and child outcomes (see Deater-Deckard 1998 for a review). Not surprisingly then, reducing parenting stress has been recognized as crucial in not only improving the parents' psychological well-being, but also because it may impact the parents' ability to successfully implement a treatment for their child's difficulties (Kazdin 1995; Mellins et al. 2004; Nezu et al. 2006). Clearly, understanding what factors

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contribute to parenting stress would allow for a more focus clinical intervention on how to reduce such parenting stress.

At the parent level, the research literature has shown that parents with poorer coping strategies tend to report higher levels of parenting stress (Jarvis and Creasey 1991). Parents who report higher levels of parenting stress are also more likely to use an authoritarian and harsh/negative style (Belsky et al. 1996; Deater-Deckard and Scarr 1996) and are less involved in their children's lives (McBride and Mills 1994; Fagan et al. 2007). The parents' overall psychological well-being is also related to parenting stress with maternal psychopathology (e.g., depression) being related to higher levels of parenting stress (Misri et al. 2006; Sheinkopf et al. 2006; Webster-Stratton and Hammond 1988). On the other hand, greater emotional and social support from partners, family members, and friends, appear to be related to lower levels of parenting stress (Abidin and Brunner 1995; Roggman et al. 1994; Budd et al. 2006) and can buffer the potential negative effects of other risk factors such as being a young parent and/or economically disadvantaged (Adamakos et al. 1986; Richardson et al. 1995; Ceballo, and McLoyd 2002).

At the child level, associations between externalizing behaviors and parenting stress are well documented (Morgan et al. 2002). While some research has shown that parenting stress levels predict later behavior problems (Benzies et al. 2004; Cummings et al. 2000), the direction of such association is often difficult to disentangle (Crnic and Low 2002). Evidence for a bi-directional association has emerged with a recent study using hierarchical linear modeling (HLM) showing that early externalizing problems at age 2 were initially related to higher parenting stress and that across a three-year period changes in children's externalizing problems also directly predicted changes in parenting stress (Williford et al. 2007). Of interest to the current study are parents of children with Attention-Deficit/Hyperactivity Disorder (ADHD) who also report higher levels of parenting stress compared to parents of children without ADHD (Breen and Barkley 1988; Johnson and Reader 2002; Mash and Johnston 1983) as well as compared to parents of children with health problems (Gupta 2007). Given the above findings, it is particularly important to determine what specific behaviors of children with ADHD parents find stressful.

The core symptoms of ADHD, consisting of inattention, hyperactivity, and impulsivity, are associated with significant impairment across children's social, cognitive, academic, and behavioral functioning (Hoza et al. 2005; Mash and Barkley 2003; Raggi and Chronis 2006). These symptoms also contribute to dysfunctional parent-child interactions in which children with ADHD are seen as more talkative, negative, demanding, and less cooperative and independent than children without ADHD (Anastopoulos et al. 2009; Danforth et al. 1991; DuPaul et al. 2001). To the

extent to which such dysfunctional parent-child interactions contribute to parenting stress, it is not surprising then that the severity of ADHD symptoms is related to parenting stress (Anastopoulos et al. 1992; Podolski and Nigg 2001; Theule et al. 2010), although some research has suggested that this association is only significant for hyperactive/impulsive symptoms (Johnson and Reader 2002). What remains relatively unexamined in the literature, however, is if it the multiple impairments associated with ADHD (e.g., emotional, cognitive, behavioral) versus the actual severity of ADHD symptoms are what parents perceive as stressful.

Cognitive theories along with neuropsychological data have stressed the role of behavioral inhibition in the development of ADHD (Barkley 1997; Posner 2004). Behavioral inhibition deficits impact children with ADHD's ability to control their impulsive behaviors and increase their likelihood in engaging in aggressive acts (Barkley 1997; Kimonis et al. 2006; Stevens et al. 2002). For example, there is a high comorbidity between ADHD and aggressive or oppositional symptoms with estimates rates ranging from 30 to 50% (Biederman 2005; Spencer 2006). Some researchers have suggested that it is the defiant and aggressive behaviors seen in children with ADHD that are particularly stressful for parents, not simply their symptoms of hyperactivity, impulsivity, and/or inattention (Barkley 2003; Johnson and Mash 2001). This view is supported by a recent review of the literature by Deault (2010) showing that across development parenting stress and family conflict show more robust associations with ODD and aggressive behaviors rather than ADHD symptoms alone.

In addition to having difficulty controlling their behavior, children with ADHD also present with self-regulation deficits across cognitive and emotional domains (Barkley 2006; Nigg 2006; Nigg and Casey 2005; Skirrow et al. 2009). Within the cognitive domain, executive functioning difficulties have been documented in children with ADHD (Barkley 2003; Martel et al. 2007; Willcutt et al. 2005) and further contribute to their functional impairment later in life (Barkley and Murphy 2010; Stavro et al. 2007). The organizational, planning, and working memory difficulties experienced by children with ADHD not only contribute to their functional impairment in daily activities (Mash and Barkley 2003) but likely also contribute to parenting stress. For example, parents of children with ADHD often rush to help their children finish an assignment they waited until the last minute to complete, or receive a call from the school stating that their child forgot to bring an important project. Limited research has shown an association between children's executive functioning difficulties, as reported by parents, and parenting stress (Joyner et al. 2009), although this study did not examine comorbid aggressive symptoms. Within the emotional domain, children with ADHD perform or are reported as having poorer emotion regula-

tion skills and are more emotionally reactive or labile compared to controls (Anastopoulos et al. 2010; Walcott and Landau 2004; Melnick and Hinshaw 2000; Maedgen and Carlson 2000). The emotional lability present in some children with ADHD is also associated with more significant impairment and greater risk for the development of more serious disorders such as substance abuse (Anastopoulos et al. 2010; Sobanski et al. 2010). In light of these findings, it may be the case that the challenging behaviors that occur within parent–child interactions are only perceived as stressful when the child is emotionally reactive or labile.

Hence, the aim of the current study was to examine the extent to which the perceived self-regulation deficits across behavioral, cognitive, and emotional domains seen in children with ADHD explain the association between the severity of ADHD symptoms and parenting stress. While there is significant evidence suggesting that the behavioral deficits (e.g., aggression) present in some children with ADHD contribute to parenting stress (Anastopoulos et al. 1992; Johnson and Mash 2001), significantly less research has examined whether self-regulation deficits across cognitive (i.e., executive functioning difficulties) and emotional domains (i.e., reactivity/lability) provide any incremental validity in predicting parenting stress. In order to significantly lower parents' stress, it is crucial to determine what is associated with their distress as interventions may have to be modified or added to address them. For example, while medication alleviates some of the severity of ADHD symptoms and/or emotional lability, it will not necessarily address the defiant behaviors (Kaplan et al. 2004). Similarly, while evidence-based parent training interventions are successful in reducing defiant behaviors (Eyberg et al. 2008; Pelham and Fabiano 2008), they may not necessarily target some of the executive functioning difficulties (e.g., disorganization, planning problems) that are causing stress in some parents. Based on previous literature (Johnson and Reader 2002), we expected that the severity of hyperactivity/impulsivity ADHD symptoms but not inattention to be associated with parenting stress. Additionally, given that children with ADHD experience impairment across self-regulation domains (e.g., behavioral, cognitive, and emotional control processes), we expected that deficits across all three domains to be associated with parenting stress and fully mediate the association between severity of ADHD symptoms and parenting stress.

Method

Participants

Participants for this study included 80 children (18 girls) with a diagnosis of Attention-Deficit/Hyperactivity Disor-

der (ADHD) whose parents provided consent to participate in the study at a large university hospital in the Southeastern United States. The mean age of the participating children was 10 years, 9 months (range: 4.5 years to 18 years of age). Further demographic characteristics of this sample are presented in Table 1. All participants had a previous DSM-IV diagnosis of ADHD ($n=51$ for Combined Type, $n=25$ for Predominantly Inattentive Type, $n=1$ for Predominantly Hyperactive/Impulsive Type, and $n=3$ for ADHD Not Otherwise Specified) confirmed by a licensed psychologist via a comprehensive clinical diagnostic assessment including the use of a semi-structure interview (e.g., diagnostic interview schedule for children) and Conners Parenting Rating Scales. In terms of treatment history, 64% of the children in our sample were currently taking medications to address their symptoms. Exclusionary criteria included a diagnosis of Mental Retardation, Autistic Disorder, or a psychotic disorder.

Measures

ADHD Symptoms To assess children's current severity level of ADHD symptoms, the Conners' Parent Rating

Table 1 Demographics for sample

Characteristic	Percentage in sample
Race/ethnicity (%)	
Non-hispanic white	71
African-American	14
Hispanic	11
Other	4
Family status (%)	
Intact two-parent household	48
Single parent household	30
Remarried household	11
Adoptive/foster family placement	11
Participating legal guardian (% mothers)	87
Total family income (%)	
<\$20,000	3
\$20,001–35,000	11
\$35,001–50,000	14
\$50,001–65,000	22
\$65,001–80,000	9
\$80,001–95,000	14
\$95,001–110,000	8
>\$110,000	19
Referred from (%)	
Psychiatrist	69
Pediatrician	13
Self-referred	13
Other	5

Scale, 3rd edition was administered (Conners 2008). The Conners-3 is a widely used questionnaire that covers core symptoms of ADHD. The parent version used for children ages 6–18 contains 108 items. Each item on the Conners-3 is rated on a four-point scale with respect to the frequency of occurrence (never, occasionally, often, and very often). The measure yields t-scores on internalizing, hyperactivity/impulsivity, learning problems, executive functioning, defiance/aggression, and peer relations as well as DSM-IV-TR symptom scales. The Conners-3 has well-established internal consistency, reliability and validity (Conners 2008). For the purpose of the present study, the inattention and hyperactivity/impulsivity t-scores ($M=50$, $SD=10$) were used to measure severity of ADHD symptoms. T-scores of 40–59 are considered to be within normal limits while t-scores of 60–64 are considered high average. T-scores of 65–69 are considered clinically elevated and t-scores 70 or above are considered clinically very elevated.

Behavioral Functioning To assess children's behavioral functioning, parents completed the Behavior Assessment System for Children, 2nd Edition (BASC-2; Reynolds and Kamphaus 2004). The BASC-2 is a widely used behavior checklist that taps emotional and behavioral domains of children's functioning. There are three parent versions: Preschool Form (ages 2–5, 134 total items), Child Form (ages 6–11, 160 total items), and Adolescent form (ages 12–21, 150 total items). Each item on the BASC-2 is rated on a four-point scale with respect to the frequency of occurrence (never, sometimes, often, and almost always). The measure yields scores on broad internalizing, externalizing, and behavior symptom domains as well as specific adaptive/social functioning skills scales. The BASC-2 has well-established internal consistency, reliability and validity (Reynolds and Kamphaus 2004). Given the wide age range of our sample and different forms used, the aggression subscale t-score ($M=50$, $SD=10$) rather than the raw score was examined. T-scores of 41–59 are considered to be within normal limits. T-scores of 60–69 are considered “at-risk” whereas t-scores 70 or above are considered clinically elevated.

Emotional Functioning To assess children's emotional reactivity/lability, parents completed the Emotion Regulation Checklist (ER Checklist; Shields and Cicchetti 1997). The ER Checklist is a 23-item questionnaire that uses a 4-point Likert scale (1 = almost always to 4 = never) and yields two subscales: the Negativity/Lability scale (15 items), which represents negative affect and mood lability, and the Emotion Regulation scale (8 items), which assesses processes central to adaptive regulation such as equanimity and empathy. The Negativity/Lability scale raw score (Cronbach's $\alpha = 0.79$; range of possible scores: 15 to 60) was the focus of the current study.

Executive Functioning To assess children's executive functioning, parents completed the Behavior Rating Inventory of Executive Function (BRIEF; Gioia et al. 2000). The parent version contains 86 items, which yield eight nonoverlapping but correlated clinical scales (inhibit, shift, emotional control, initiate, working memory, plan-organize, organization of materials, and monitor) and two validity scales. Parents circle “never,” “sometimes,” or “often” to indicate whether their child has experienced problems over the last 6 months with a given behavior as described in each item. Higher scores indicate poorer executive functioning. The BRIEF has well-established internal consistency, reliability and validity (Gioia et al. 2000). For the purpose of the present study, the overall global executive t-score ($M=50$, $SD=10$) was used as our measure of executive functioning. T-scores of 65 or above are considered clinically significant.

Parenting Stress Parents completed the Parenting Stress Index/Short Form (PSI; Abidin 1995) to assess the source and degree of parenting stress. The PSI contains 36 items rated on a 1 (*strongly disagree*) to 5 (*strongly agree*) scale and yields subscales assessing parental distress, stress related to parent–child interactions, stress related to the child's behavior, and a total score. This measure demonstrates good reliability and validity (Abidin 1995). For the purpose of the present study, the total stress raw score (Cronbach's $\alpha = 0.93$; range of possible scores: 36 to 180) was used as our measure of parenting stress where higher scores indicate increased parenting stress.

Data Analytic Strategy

Preliminary analyses were conducted to examine the normative distribution of each variable and to examine whether there were any statistically significant associations between demographic variables (i.e., sex, age, race, family income) and our study variables (sex and age associations were not examined among any measures that yielded t-scores). In addition, we conducted intercorrelations to examine the associations between severity of children's ADHD symptoms, aggressive symptoms, emotional lability, executive functioning difficulties, and parenting stress. Regression analyses were then conducted to determine whether both ADHD symptom clusters as well as aggressive symptoms, executive functioning difficulties, and emotional lability were uniquely associated with parenting stress. Finally, for our primary analyses, a multiple mediation model was examined to determine whether the relation between the severity of ADHD symptoms and parenting stress was mediated by children's aggressive symptoms, emotional lability, and executive functioning difficulties. While the direction of our model is based on

past theoretical and empirical work, we recognize the limitation of a cross-sectional mediation model in terms of inferring directionality.

Following procedures recommended by Preacher and Hayes (2008), a multiple mediation model involves a) an analysis of the total indirect effect—the aggregate mediating effect of all the mediators being examined and b) an analysis of the specific indirect effect—the mediating effect of a specific mediator. The significance of the indirect effects was tested via bootstrap analysis, which is commonly performed in multiple mediator analyses given its advantage of greater statistical power without assuming multivariate normality in the sampling distribution (Williams and MacKinnon 2008; Mallinckrodt et al. 2006; Preacher and Hayes 2008). Based on the obtained sample, bootstrap analyses generate multiple random samples that serve the basis for repeatedly computing the statistic under investigation (Mallinckrodt et al. 2006). As recommended by Preacher and Hayes (2008), parameter estimates and confidence intervals of the total and specific indirect effects were generated based on 2,000 random samples. Mediation is demonstrated via a statistically significant indirect effect (i.e., if the 95% bias-corrected confidence interval for the parameter estimate does not contain zero). We also compared the magnitude of each mediator or indirect effect via contrast tests. In order to compare the magnitude of the indirect effects, all variables were standardized as suggested by MacKinnon (2000). All analyses were conducted using SPSS 18.0 including an SPSS macro designed for assessing multiple mediation models (Preacher and Hayes 2008).

Results

Descriptive statistics for the study variables, which were all normally distributed, are presented in Table 2. All available data were used for each analysis. Preliminary analyses indicated no significant associations between demographic

characteristics (i.e., sex, race, maternal income, maternal education, child age) and any of the study's variables.

Associations among Variables

Correlations among the study's variables are presented in Table 3. Both ADHD symptom clusters (inattention and hyperactivity/impulsivity) were significantly associated with parenting stress as well as emotional reactivity/negativity, executive functioning, and comorbid aggression symptoms. Thus, children with ADHD with higher severity levels of inattention and hyperactivity/impulsivity symptoms were reported by parents as having higher levels of emotional lability, aggression, and executive functioning difficulties. Higher levels of parenting stress were also associated with higher levels of inattention and hyperactivity/impulsivity symptoms.

Regression Analyses

A simultaneous regression was conducted to determine whether both ADHD symptom clusters were uniquely associated with parenting stress. This analysis revealed a significant association between ADHD symptoms severity and parenting stress, $F(2, 70) = 5.31, p < 0.001$, total $R^2 = 0.13$. However, only hyperactivity/impulsivity symptom severity was related to parenting stress, $\beta = 0.29, p < 0.05$. Thus, parents who reported their children as having higher severity levels of hyperactivity/impulsivity also reported higher levels of parenting stress. It is important to note that the significant association between hyperactivity/impulsivity and parenting stress was over and above the effects of inattention. On the other hand, the severity of children's inattentive symptoms was not related to parenting stress, $\beta = 0.12, p = 0.37$, after accounting for the effects of hyperactivity/impulsivity symptoms. A simultaneous regression was also conducted to determine whether executive functioning, aggressive symptoms, and emotional

Table 2 Descriptive statistics for all variables

	M	SD	Min	Max	N
ADHD symptom severity (CPRS-3)					
Inattention t-score	78.05	12.66	18	100	73
Hyperactivity/impulsivity t-score	76.96	16.98	43	113	73
Executive functioning (BRIEF)					
Global executive t-score	71.24	9.97	43	96	74
Emotional lability/reactivity (ER checklist)					
Emotional negativity/reactivity subscale	35.04	8.11	20	53	78
Behavioral functioning (BASC-2)					
Aggression t-score	56.64	13.21	37	101	80
Parenting stress (PSI)					
Total raw score	89.53	21.57	51	139	80

CPRS-3 Connors' Parent Rating Scale, 3rd edition, BRIEF Behavior Rating Inventory of Executive Functioning, ER emotion regulation, BASC-2 Behavior Assessment System for Children, 2nd Edition, PSI Parenting Stress Inventory

Table 3 Correlations among variables

Variable	1	2	3	4	5	6
1. ADHD- inattention t-score (CPRS-3)	–					
2. ADHD-hyper/impulsivity t-score (CPRS-3)	0.53***	–				
3. EF-global executive t-score (BRIEF)	0.51***	0.65***	–			
4. Emotional lability/reactivity (ER)	0.50***	0.58***	0.70***	–		
5. Aggression t-score (BASC-2)	0.36**	0.39**	0.47***	0.71***	–	
6. Parenting Stress Overall Score (PSI)	0.27*	0.35**	0.59***	0.66***	0.63***	–

CPRS-3 Conners' Parent Rating Scale, 3rd edition, BRIEF Behavior Rating Inventory of Executive Functioning, EF Executive functioning, ER Emotion Regulation Checklist, BASC-2 Behavior Assessment System for Children, 2nd Edition. PSI Parenting Stress Inventory* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

lability were uniquely associated with parenting stress. The overall regression was significant, $F(3, 69) = 26.04$, $p < 0.001$, total $R^2 = 0.53$, and indicated that executive functioning ($\beta = 0.24$, $p < 0.05$), aggressive symptoms ($\beta = 0.30$, $p < 0.05$), and emotional lability ($\beta = 0.31$, $p < 0.05$) provided unique variance towards the association with parenting stress. Thus, parents who reported their children as having higher levels of aggressive symptoms, emotional lability, and executive functioning difficulties also reported higher levels of parenting stress.

Mediational Analyses

As seen in Fig. 1, the total effect of hyperactivity/impulsivity on parenting stress was significant, $c = 0.34$, $p < 0.01$ with an overall model R^2 of 0.55. However, after adjusting for the indirect effects of the mediators, the direct effect of hyperactivity/impulsivity on parenting stress was no longer significant, $c' = -0.19$, $p > 0.05$. While these results suggest a full mediation scenario according to Baron and Kenny (1986), more recent statistical research suggests the importance of examining the indirect effects separately given that the total effect is not necessary for mediation to occur (MacKinnon 2000; Preacher and Hayes 2008; Shrout

and Bolger 2002). Table 4 contains the parameter estimates for the total and specific indirect effects on the association between hyperactivity/impulsivity and parenting stress as mediated by children's aggressive symptoms, emotional lability, and executive functioning difficulties. The total indirect effect and the indirect effects of children's aggressive symptoms, emotional lability, and executive functioning difficulties were all significant as evidenced by confidence intervals that did not contain zero. Hence, children's aggressive symptoms, emotional lability, and executive functioning difficulties were all significant mediators. As illustrated in Fig. 1, hyperactivity/impulsivity symptoms were positively related to all three mediators which in turn were significantly related to parenting stress. Finally, there were no significant contrasts between the mediators, indicating that no mediator had a significantly greater indirect effect than any other mediators on parenting stress.

Discussion

The purpose of this study was to examine the extent to which the self-regulation deficits across behavioral, cogni-

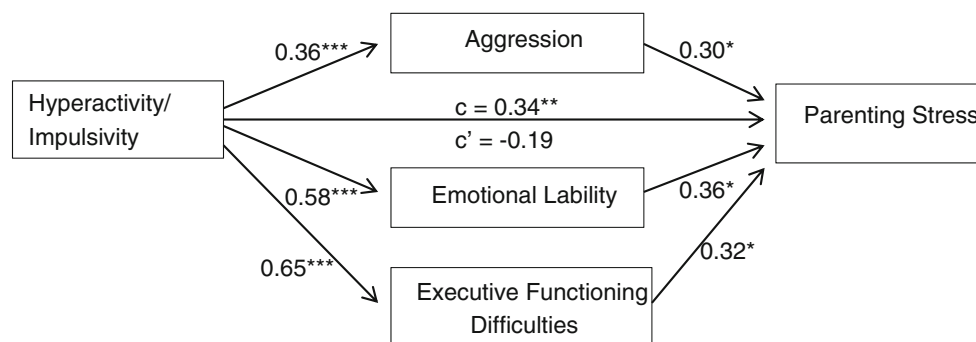


Fig. 1 A multiple mediation model of the association between hyperactivity/impulsivity symptoms and parenting stress via children's aggressive symptoms, emotional lability, and executive functioning difficulties. Standardized regression coefficients from a bootstrap procedure are provided along the paths. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Given the cross-sectional nature of this study, the direction of this model is based on past theoretical and empirical work

Table 4 Indirect effects of hyperactivity/impulsivity on parenting stress

Mediator	Parameter estimate	SE	Lower 95% BC CI	Upper 95% BC CI
Total	0.531*	0.13	0.280	0.778
Aggressive symptoms	0.107*	0.06	0.005	0.258
Emotional lability/reactivity	0.225*	0.13	0.001	0.457
Executive functioning difficulties	0.199*	0.09	0.044	0.403

BC CI bias-corrected confidence intervals. * $p < 0.05$

tive, and emotional domains seen in children with ADHD explain the association between the severity of ADHD symptoms and parenting stress. First, consistent with our hypothesis only the severity of hyperactivity/impulsivity ADHD symptoms but not inattention was associated with parenting stress. This finding is consistent with previous work showing that parents of children with ADHD-Combined Type report higher levels of parenting stress compared to parents of children with ADHD-Predominantly Inattentive Type (Johnson and Reader 2002). Most importantly, our study further demonstrated via a multiple mediation model that the association between hyperactivity/impulsivity symptoms and parenting stress is mediated by co-morbid self-regulation deficits across behavioral (i.e., aggressive symptoms), cognitive (i.e., executive functioning), and emotional (i.e., emotional lability) domains.

Our findings corroborate past studies documenting children's comorbid behavioral difficulties (i.e., aggressive and oppositional behaviors) as being perceived as more stressful than ADHD symptoms (Anastopoulos et al. 1992; Johnson and Mash 2001). We further extend such research by showing that children's emotional lability and executive functioning difficulties are viewed as equally stressful by parents as children's aggressive behaviors. There is an emerging literature examining the importance of emotional lability in the conceptualization of ADHD given how such lability predicts worse functional outcomes, above and beyond the effects of ADHD symptoms (Anastopoulos et al. 2010; Barkley 2006; Sobanski et al. 2010). Our study shows that the emotional lability present in children with ADHD is also uniquely associated with parenting stress. This finding is consistent with developmental research that has documented higher rates of parenting stress among parents who have children with a difficult temperament, consisting of high emotional reactivity (Chang et al. 2004; Ostberg and Hagekull 2000; Williford et al. 2007).

While there is a substantial literature documenting executive functioning difficulties in children with ADHD and showing their importance for functional outcomes in childhood and adulthood (Barkley 2006; Willcutt et al. 2005), almost no research has examined the extent to which such executive functioning difficulties contribute to parenting stress. While clinical descriptions of children with

ADHD capture how a child's disorganization and planning difficulties can cause dysfunction in a family (e.g., procrastinating a school project), such stress has been viewed as relatively minor compared to the more seemingly serious behavioral and emotional difficulties children with ADHD exhibit. However, a significant strength of our study was the examination of a multiple mediator model. Using contrast tests we were able to conclude that there were no significant differences in the magnitude of each mediator. Hence, from a parental perspective, such executive functioning difficulties are just as stressful as their children's behavioral and emotional difficulties. It is important to note that we did not find any significant associations between child age and our study variables as most of our measures were already age normed t-scores. However, it is important to recognize that marked developmental changes are observed in children's performance on complex executive functioning tasks from ages 5 to 12 with continued growth into adolescence (Brocki and Bohlin 2004; Diamond 2006; Huizinga et al. 2006) and that such changes are also related to ADHD symptoms (Brocki et al. 2010). Future research should examine the extent to which parents of children with ADHD can accurately detect developmental changes in children's actual executive functioning performance.

Overall, our findings indicate that while parenting a child with ADHD may generally be more stressful than parenting a child without ADHD (Anastopoulos et al. 2009; Johnson and Reader 2002; Podolski and Nigg 2001), it seems that it is the impairment across self-regulation domains (i.e., behavioral, emotional, and cognitive) that are particularly stressful for parents. Our findings have significant implications for the clinical management of ADHD. First, similarly to the importance of assessing children with ADHD's functional impairment versus simply their symptoms (Pelham et al. 2005; Gordon 2006), an evidence-based assessment of ADHD should include not only an overall assessment of the parents' stress but also what specific child behaviors are impairing the parents' functioning. Our results would suggest not only examining defiant/aggressive symptoms that have been previously documented as being a source of stress (Anastopoulos et al. 1992; Johnson and Mash 2001) but also children's emotional lability and executive functioning difficulties.

Clinicians' awareness that parenting stress is not only related to the severity of the child's ADHD symptoms also has treatment implications. For example, while pharmacological treatment reduces children's ADHD symptoms, elevated levels of parenting stress persist and are similar to parents of children with ADHD who are not on medication (Johnson and Reader 2002). Similarly, psychosocial treatments for ADHD and comorbid defiant/aggressive behaviors tend to focus on changing parents' discipline strategies and/or interaction style (LaForett et al. 2008; Barkley et al. 1992), and not necessarily addressing specific parental stressors. Hence, it is critical for clinicians to monitor parenting stress throughout treatment and not necessarily end treatment just because the child's ADHD symptoms have been addressed. Treatment modifications to address other potential sources of parenting stress such as the child's emotional lability and executive functioning may need to be considered, especially since these two domains are often not addressed in either typical medication management or parent-training programs.

In terms of this study's limitations, it is important to point out that because our significant findings were based on parent report, we must acknowledge the potential that our findings were related to source variance. While the use of different questionnaires for each domain of functioning reduces some of the source variance, the use of a laboratory measure (e.g., frustration task to assess emotional lability) as well as the inclusion of teacher reports would have strengthened the findings. The cross-sectional aspect of this study also limits our ability to infer not only the temporal association between the severity of children's ADHD symptoms, aggressive symptoms, executive functioning difficulties, emotional lability, and parenting stress but also their directionality. While the direction of our mediational model was based on past theoretical and empirical work, it is also possible that ADHD symptom severity mediates the association between regulatory processes and parenting stress or that parenting stress mediates the association between ADHD symptom severity and regulatory processes. Future studies should implement multiple time point assessments to determine whether changes in children's aggressive, executive functioning, and emotional lability represent risk factors for the development of parenting stress and/or if they are a consequence of such stress via a reporting bias.

It is also important to note that we were not able to assess whether our mediational model functions similarly for mothers and fathers as 87% of the measures were filled out by mothers. While the extant research suggests that fathers experience similar levels of stress or dysfunction associated with their child's ADHD symptoms compared to mothers (Baker 1994; Fabiano 2007), it remains unclear the extent to which fathers attribute such stress to their

children's behavioral, cognitive, and emotional difficulties. Given that fathers proportionally spend more of their interactions with children in a play setting (see Lamb 2010 for a review), they may not view their children's executive functioning difficulties as stressful as they are likely more associated with school or academic related tasks of which mothers tend to oversee. Understanding the source of stress for fathers of children with ADHD may be critical in improving their participation in their child's treatment, which has historically been very low (see Fabiano 2007 for a review). Along similar lines, it is important to note that our sample only included 18 girls which may limit our ability to generalize our findings to both sexes. We also did not have information on parents' own level of psychopathology which is known to contribute to parenting stress levels (Misri et al. 2006; Sheinkopf et al. 2006). It will be important for future research to determine whether parents' level of psychopathology moderates the extent to which they find some aspects of their children with ADHD's impairment (e.g., emotional lability) stressful. Lastly, although all parents in our study reported during the clinical interview that their children's impairment was evident across settings, we were not able to collect corroborating teacher reports to substantiate children's ADHD status. Given the importance of teacher reports in the diagnosis of ADHD (Barkley 2006), it may be that our sample was not as impaired as if we had included teacher reports in making diagnostic decisions.

Despite these limitations, our study contributes to literature by showing that the concurrent association between children's ADHD symptom severity and parenting stress is mediated by children's impairment across self-regulation domains. While it is not surprising that comorbid aggressive symptoms contribute to parenting stress, our multiple mediation model demonstrates that children's emotional lability and executive functioning difficulties are equally as stressful to parents and should be considered during initial evaluations and treatment monitoring. It will also be critical for future research to examine whether adjustments to current evidence-based treatments (e.g., including emotion regulation modules, coping with anger, organizational/planning skill building) to better target these self-regulation deficits are also successful in reducing parenting stress.

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