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ORIGINAL PAPER

The Impact of Parental ADHD Symptoms on Parenting Practices and Stress After Behavioral Intervention: Comparisons across Co-occurring Presentations

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Abstract

The goal of this study was to examine whether parent attention-deficit/hyperactivity disorder (ADHD) symptoms impact parenting outcomes (i.e., parenting practices and stress) after group-based Parent Child Interaction Therapy (PCIT). The study included parents of preschoolers ($M_{age} = 4.97$) with autism spectrum disorder and co-occurring externalizing behavior problems (ASD + EBP; 37) and parents of children with EBP-only ($n = 41$) who participated in a multimodal behavioral intervention, including an 8-week group-based PCIT. Parents reported on their own ADHD symptoms, practices, and stress at pre-and-post-treatment. Accounting for child EBP, parental ADHD symptoms were predictive of higher negative and lower positive parenting at post-treatment, for parents in the ASD + EBP group but not the EBP-only group. Parental ADHD symptoms also predicted higher parenting stress for the ASD + EBP group only. Results of mediational analyses indicated that for the ASD + EBP group, the indirect effect of parental ADHD symptoms on negative and positive parenting through parenting stress was significant. Findings highlight the differential impact of parental mental health challenges on parenting outcomes. Specifically, parental ADHD symptoms seem to have a larger impact on treatment outcomes for parents of children with co-occurring presentations, which seems to be partially mediated by parenting stress.

Keywords Externalizing behavior problems · Autism · Parental ADHD · PCIT

Highlights

- The current study examined the role of parental ADHD symptoms on parenting outcomes after participation in a behavioral parent training program for young children with externalizing behavior problems with and without autism spectrum disorder.
- Parental ADHD symptoms were associated with parenting practices and stress for parents of preschoolers with ASD and elevated EBP.
- The impact of parental ADHD symptoms on parenting practices was partially mediated by parenting stress after completing group PCIT.
- Parental ADHD symptoms played a lesser role on parenting outcomes for parents of children with EBP-only after group PCIT.

Externalizing behavior problems (EBP) such as hyperactivity/impulsivity, aggression, and oppositionality, are amongst the most prevalent mental health concerns in preschoolers (Upshur et al., 2009). EBPs are associated with a host of negative outcomes and relatively stable if left untreated (Roberts et al., 2003). Fortunately, a very large and compelling body of literature exists on the efficacy of behavioral interventions such as behavioral parent training (BPT) for treating EBP (Evans et al., 2014, Pelham & Fabiano, 2008). Specifically, Parent-Child-Interaction

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Therapy (PCIT) is amongst the most well-established BPT interventions for young children with EBP and utilizes a live coaching approach to encourage positive parenting practices (Zisser & Eyberg, 2010). Given the extensive involvement of parents within interventions such as PCIT, considerable work has examined how parent factors, such as parental mental health, relate to changes in parenting outcomes, including parenting practices and stress, following BPT interventions. However, limited work has examined how parental mental health relates to changes in treatment outcomes across diagnostic groups. Thus, the following study will focus on the impact of parental symptoms of attention-deficit/hyperactivity disorder (ADHD) on PCIT outcomes for families of children with EBPs with and without autism.

Parental ADHD

Given the high heritability rates for EBPs (Faraone et al., 2005, Larsson et al., 2014), a growing literature has emerged on parental ADHD symptomatology. Estimates suggest that about 17% of parents of children with ADHD also present with clinically significant ADHD symptoms (Chronis et al., 2003). Importantly, previous work has documented that maternal ADHD is associated with higher levels of inconsistent parenting practices (Chronis-Tuscano et al., 2008, Mokrova et al., 2010). Of specific relevance to BPT interventions, severity of maternal ADHD symptoms is also associated with attenuated child outcomes after treatment (Chronis-Tuscano et al., 2011, Sonuga-Barke et al., 2002). Much of the previous work on the impacts of parental ADHD has focused primarily on child outcomes following BPT for school aged children. Notably, traditional BPT interventions for school-aged children often focus on presenting families with behavioral strategies within a more didactic approach (Chronis et al., 2004). It is not surprising that parental ADHD symptoms may impact BPT outcomes as these interventions often require parents to use executive functioning skills such as working memory and cognitive flexibility, which are typically impaired in individuals with ADHD (Azar et al., 2008, Crandall et al., 2015). These skills are especially important for parents to implement strategies learned in BPT (e.g., plan/organize home routines, remember skills presented). However, less is known about the role of ADHD symptoms within interventions such as PCIT, which employ live coaching within sessions and very structured instructions for parents to practice between sessions. Live coaching and daily practice of specific skills may have distinct demands on parental attentional capabilities. Further, examining the role of parental ADHD symptoms during PCIT may be important as it not only employs a different intervention format, but also targets a unique developmental period (i.e., young children between 2 and 6) in which the role of parents in the management of disruptive behavior is of increasing relevance and a significant source of parenting stress (Neece et al., 2012).

Autism Spectrum Disorder

Children with EBP often present with multiple neurodevelopmental disorders (Larson et al., 2011) such as Autism Spectrum Disorder (ASD). ASD is a pervasive developmental disorder marked by difficulties in social interaction, social communication, and repetitive/restricted behaviors (Ozonoff et al., 2007). Considerable work has documented heightened levels of ASD symptoms within children with ADHD (Grzadzinski et al., 2011, Mulligan et al., 2009, Reiersen et al., 2008). Similarly, studies also document that about 60% of children with ASD meet diagnostic criteria for ADHD (Goldstein & Schwebach, 2004). Fortunately, BPT interventions, such as PCIT, have also demonstrated initial promise in improving EBP for children with ASD (Solomon et al., 2008, Zlomke et al., 2017). Of relevance to the current study, group adaptations of PCIT that have been validated in samples of children with EBP (Graziano et al., 2018), have also yielded positive outcomes for children with ASD and EBP (Ros & Graziano, 2019).

Children with ASD and co-occurring elevated EBP represent an especially complex group in that parents are taxed with managing challenges associated with ASD (e.g., social communication challenges, repetitive behaviors) in addition to challenges managing EBP related behaviors (e.g., oppositionality, aggression). Limited knowledge exists on the role of parental ADHD on parent or child outcomes for families with co-occurring ASD and EBP. Although implications from work on EBP samples may be drawn, parents of children with ASD and EBP face unique challenges. Therefore, it is important to examine the differential impacts of parental ADHD symptoms for this group. Understanding the role of parental ADHD symptoms in the context of BPT interventions for children with ASD and EBP may be a crucial clinical tool for intervention recommendations. Although PCIT has been recommended for children with ASD and EBP, perhaps considerations for parent factors such as ADHD symptomatology may be especially important to address.

Parenting Stress

Parenting stress must also be considered as it relates to parental mental health and parenting practices. Not surprisingly, heightened levels of parenting stress have been

documented in parents of children with EBP (Anthony et al., 2005, Barroso et al., 2018, Krahé et al., 2015) and are associated with more inconsistent discipline styles (Pinderhughes et al., 2000). Although links between other parental diagnoses and parenting stress (e.g., depression; (Perren et al., 2005)) have been established, less is known about the impact of parental ADHD symptoms on parent stress levels. Although significant work has established the association between parental ADHD and negative parenting practices, further work is needed to examine mechanisms that underlie this association. More importantly, it is crucial to examine not only the link between parental ADHD symptoms and parenting stress but also the role of stress as a potential mediator between parental ADHD symptoms and parenting practices.

The role of parenting stress is also important to consider within the ASD population. Considerable work has documented heightened stress amongst parents of children with ASD compared to other clinical populations with EBP (Barroso et al., 2018). Indeed, it is posited that EBP related behaviors (i.e., impulsivity and aggression) in children with ASD are key contributors to elevated levels of parenting stress (Lecavalier et al., 2006, Osborne & Reed, 2009). While there is evidence to suggest there are improvements in stress for parents of children with EBP after BPT (Anastopoulos et al., 1993), some studies have documented that improvements in stress are not maintained in parents of children with ASD and EBP after group PCIT (Ros & Graziano, 2019). Thus, it is of importance to also examine the mediating role of parenting stress on the association between parental ADHD symptoms and parenting practices amongst children with ASD and EBP.

The Current Study

While substantial work has examined parental ADHD as a significant predictor of poorer child outcomes following BPT, less is known about parents' own outcomes within the context of PCIT. The goal of this study was to examine whether parental ADHD symptoms predict parenting practices after group based PCIT within the context of a multimodal behavioral intervention for children with ASD + EBP and EBP-only. A secondary aim of the study was to examine parenting stress as a potential mediator between the association between parental ADHD symptoms and parenting practices. We hypothesized that heightened parental ADHD symptoms would be more strongly associated with poorer parenting practices for children with co-occurring presentations. Lastly, we expected that parenting stress would mediate the association between parental ADHD symptoms and parenting practices across both groups.

Method

Participants and Recruitment

The study was conducted at a large urban university in the Southeastern United States with a large Hispanic/Latino population. Families were recruited from local preschools and mental health agencies through brochures, radio ads, and open houses/parent workshops to participate in an intensive summer treatment program. The study sample consisted of 78 preschoolers ($M_{age} = 4.97$, 87% male) and their parents. In order to be included in the study, all children had to be classified as having elevated levels of EBP according to parent/teacher reports. In order to meet inclusion criteria, children were required to have a t-score of 60 or above on the Hyperactivity, Inattention, or Aggression Scales of the Behavior Assessment System for Children, 2nd Edition (BASC-2) (Reynolds & Kamphaus, 2004) parent or teacher reports, (b) be transitioning to kindergarten or prekindergarten, (c) have a verbal IQ above 65 ($M = 86.97$, $SD = 17.86$) on the Wechsler Preschool and Primary Scale of Intelligence, 4th Edition (WPPSI-IV) (Wechsler, 2012), and (d) attend a daily 8-week summer program. Of note, inclusion criteria for the 8-week summer program were the same. Additionally, children in the ASD + EBP group were required to qualify for an ASD diagnosis via the Autism Spectrum Diagnostic Interview Schedule-Revised (ADI-R) (Rutter et al., 2003), or have a previous documented diagnosis of ASD with elevated levels of ASD symptoms on the Autism Spectrum Rating Scale (Goldstein & Naglieri, 2009). Thirty-seven children were diagnosed with ASD and co-occurring EBP and 41 classified as having EBP-only.

Although both mothers and fathers were invited to participate in the parenting intervention, study questionnaires for each child were completed by one parent and were primarily completed by mothers (87%). Eighty-one percent of caregivers identified their children as being of Hispanic/Latino background. Regarding parental education, 12% of parents reported having completed high school, 17% completed some college, and 71% completed a bachelor's degree or higher. Forty-nine percent of families identified as being a primary English speaking household, 47% identified as being an English and Spanish-speaking household, and 4% identified as being a primary Spanish-speaking household.

Study Design and Procedures

This study was approved by the university's Institutional Review Board. All families participated in pre-treatment assessment and subsequently a post-treatment assessment 1-2 weeks following the completion of the intervention.

As part of the pre-treatment assessment, consenting caregivers brought their children to the clinic on two occasions and were videotaped during several tasks. During the first visit, clinicians administered the WPPSI-IV (Wechsler, 2012) while the consenting caregiver completed various questionnaires (e.g., BASC-2, ASRS, APQ, PSI, described in further detail below) and participated in two structured interviews, the ADI-R (Rutter et al., 2003) and the Kiddie- Disruptive Behavior Disorder Schedule (K-DBDS) (Keenan et al., 2007). Although the ADI-R was utilized for confirming ASD diagnosis, the K-DBDS was utilized to characterize the sample and not an inclusion measure (i.e., only elevated EBP on the BASC-2 was required). Eligible participants were invited to attend the second laboratory visit within 1–2 weeks of the initial visit, where parents and children were videotaped during a parent-child interaction. All pre-treatment assessments, with the exception of diagnostic interviews and IQ tests, were re-administered at the post-treatment assessment and parents were asked to complete post-treatment questionnaires.

Intervention Description

All children participated in the summer treatment program for pre-kindergarteners (STP-PreK) (Graziano & Hart, 2016, Graziano et al., 2014). The STP-PreK is an 8-week multimodal intervention which includes a behavior modification program and academic and social-emotional curriculum delivered within a classroom summer camp setting. As part of their participation in the STP-PreK and of interest to the current study, parents attended a school readiness parenting program each week for 2 h (SRPP) (Graziano et al., 2018). Although group delivery presents an adaptation in itself from traditional PCIT (Zisser & Eyberg, 2010), no formal changes from the standard SRPP (as tested in Graziano et al. 2018) were made. The SRPP includes group PCIT along with the addition of several discussion topics on school readiness. The first half of each session focused on traditional BPT aspects (e.g., improving the parent-child relationship, use of reinforcement, time-out) based on the PCIT protocol with 4 sessions focused on the child-directed interaction (CDI) and 4 sessions focused on the parent-directed interaction (PDI).

The 4 CDI sessions included a teaching session, where parents were taught via large group didactic format (10–15 parents) to increase labeled praise, reflections, and behavior descriptions while decreasing questions, commands, and criticisms during play. During the 3 CDI coaching sessions, parents were divided into 2–3 subgroups to practice skills with their own child for 10–15 min each. While one parent in each subgroup practiced, the other parents observed and coded CDI skills. During practice, two therapists rotated coaching parents in each subgroup and then allowed observing parents to provide positive feedback. Parents in each subgroup then rotated to practice with their own child for the total 45 min coaching period. After the coaching period, a large group discussion was facilitated to review session challenges and progress. The remaining 4 PDI sessions included a very similar structure, including a PDI teach session where parents were taught to increase direct commands and utilize a time-out system for non-compliance. PDI coaching sessions were implemented in the same format as CDI coaching sessions but typically only included 2 parents practicing at a time. (i.e., 2 subgroups). Consistent with standard PCIT, time-out procedures were included as a core component of the intervention. This group-based PCIT approach has been validated and utilized within samples of children with disruptive behavior problems (Graziano et al., 2018) as well as in ASD samples (Ros & Graziano, 2019). To facilitate discussion within a large group format, parents contributed to the didactic discussion via a Community Parent Education Program (COPE) (Cunningham et al., 1998) style. During the second half of each session, school readiness topics were discussed (e.g., how to use PCIT skills to manage behavior during homework time, reinforcing social skills).

Of note, given the high prevalence of participants from Hispanic/Latinx backgrounds, the PCIT groups were available in English and Spanish with bilingual therapists. The parenting program was delivered by graduate clinical psychology students trained in PCIT under the supervision of a licensed clinical psychologist (last author). Fidelity for sessions was completed by a doctoral level graduate student for 2 of 8 sessions. Fidelity checklists included coverage of session content (e.g., providing overview, reviewing homework, coaching parent practice) as well as ratings of therapist engagement and social reinforcement during sessions. Twenty percent of sessions were coded for treatment fidelity (all between 80 and 100%).

The STP-PreK was run every weekday from 8:00 a.m. to 5:00 p.m. with periods of seatwork, large and small group activities, circle time, and recreational periods. Staff for each classroom included one lead teacher, one lead counselor, and four developmental aides. Lead counselors and lead teachers for each classroom were an advanced clinical psychology graduate student and an elementary school teacher, respectively. The developmental aides were primarily undergraduate students with backgrounds in psychology or education. Lead teachers and lead counselors were trained to deliver the social-emotional, self-regulation, and academic curriculums with aid from supporting counselors (e.g., developmental aids). Supporting counselors were also responsible for aiding with the implementation of the behavior modification component of the intervention throughout the day.

Measures

Parental ADHD symptoms

Parents reported on their own ADHD symptoms on the Adult ADHD Self-Report Scale (ASRS) (Adler et al., 2006), an 18-item questionnaire which assesses for frequency of attention and hyperactivity/impulsivity symptoms rated on a 5-point scale ("never," "rarely," "sometimes," "often," "very often"). The ASRS has high internal consistency and high concurrent validity with other adult ADHD measures (Adler et al., 2006). For the purposes of this study, the mean rating for ADHD symptoms (hyperactivity/impulsivity and inattention) was used with higher scores indicating higher mean frequency of ADHD symptoms (current study $\alpha = 0.94$).

Parenting practices

Parents completed the Alabama Parenting Questionnaire (APQ) (Shelton et al., 1996), which consists of 42-items measuring: positive parenting, parental involvement, inconsistent discipline, poor monitoring/supervision, and corporal punishment. Studies utilizing the APQ have provided evidence of criterion validity and good test-retest reliability (Essau et al., 2006). The APQ has been used with parents of children as young as three (Clerkin et al., 2007). To reduce the number of analyses, the current study examined a positive parenting practices composite (pre-and-post-therapy current study $\alpha = 0.78$–0.83), comprised of the positive parenting and parental involvement scales, and a negative parenting practices composite (pre-and-post-therapy current study $\alpha = 0.60$–0.75) comprised of the inconsistent discipline, poor monitoring/supervision, and corporal punishment scales.

Parenting stress

Parents completed the Parenting Stress Index-Short Form (PSI-SF) (Abidin, 1995). The PSI-SF is a 36-item self-report measure yielding scales of parental distress, child behavior, and parent-child dysfunctional interaction. Studies have documented acceptable internal consistency and concurrent validity (Haskett et al., 2006). For the current study, the parental distress scale was used as our measure of parenting stress (current study $\alpha = 0.92$). The parental distress scale was utilized as this scale tends to capture stress related to parenting more readily than the other PSI scales, which tend to include more questions related to perceived child behavior.

Data Analysis Plan

All analyses were conducted using the Statistical Package for the Social Sciences version 25.0 (SPSS 25). For pre-and-post treatment measures there was less than 10% missing data on all parent and objective reports. All available data were used for each analysis. Independent regression analyses were conducted to examine the extent to which parental ADHD symptoms uniquely predicted parenting outcomes at post-treatment. Independent regressions controlled for pretreatment levels of the outcome variable. Lastly, indirect effects models were tested with post-treatment parenting stress as a mediator of the association between parental ADHD symptoms and post treatment parenting practices (i.e., positive parenting and negative parenting) following procedures recommended by Preacher and Hayes (Preacher & Hayes, 2008). Pre-treatment scores for parenting stress and parenting practices were included in the model. Parameter estimates and confidence intervals for total and indirect effects were generated based on 10,000 random samples. We determined the indirect effect to be statistically significant by a bias-corrected confidence interval for the parameter that did not contain zero.

Results

Preliminary Analyses

Bivariate correlations were examined between the demographic variables, child baseline variables (e.g., child level of EBP based on parent ratings), and parent outcome measures at pre and post therapy. These preliminary analyses revealed associations between parental education level and parenting stress, such that parents with lower levels of education tended to report higher levels of parent stress at pre-treatment ($r = -0.23$, $p < 0.05$). Parent rated Child EBP was also associated with diagnostic group membership, such that children in the EBP-Only group tended to have higher levels of pre-treatment EBP as rated by parents ($r = 0.26$, $p < 0.05$). Therefore, all subsequent analyses controlled for child EBP and parent education level. No other demographic variables (e.g., child age, sex, ethnicity) were associated with variables of interest or diagnostic group membership. Descriptive statistics for parental ADHD symptoms and parenting outcomes are displayed in Table 1. Of note, parents of children with EBP-only and parents of children with ASD + EBP did not differ on any study outcomes (i.e., parental ADHD symptoms, pre or post parenting strategies, pre or post parenting stress). Although significant variability exists on measurement of parental ADHD (Chronis-Tuscano et al., 2017), previous studies using the ASRS in samples of children with ADHD found mean values for parent ADHD on the ASRS (Sibley et al., 2013) consistent with our sample. Notably, these mean values are well below the clinical cut off and represent a non-clinical sample of parental ADHD.

Table 1 Sample Descriptive Statistics

	ASD + EBP ($n = 37$)		EBP-Only ($n = 41$)	
	M (*SD*)	Range	*M* (*SD*)	Range
Mean Parental ADHD Symptoms	1.32 (0.72)	0.06–3.78	1.38 (0.80)	0.06–3.28
Pre-Treatment Positive Parenting	66.68 (6.21)	53–79	68.20 (6.87)	50–79
Post-Treatment Positive Parenting	69.18 (7.50)	52–80	69.50 (6.23)	55–79
Pre-Treatment Negative Parenting	28.03 (4.61)	19–38	31.05 (8.56)	20–67
Post-Treatment Negative Parenting	23.88 (4.10)	19–35	24.88 (4.53)	19–39
Pre-Treatment Parenting Stress	26.57 (9.61)	12–48	25.34 (10.84)	12–54
Post-Treatment Parenting Stress	23.65 (9.28)	12–52	20.83 (8.37)	12–48

Table 2 Effect of Parental ADHD Symptoms on Parenting Outcomes in Children with ASD + EBP ($n = 37$)

	β	t	Model R^2	ΔR^2	ΔF
Post-Treatment Positive Parenting Practices					
Step 1. Pre-Treatment Positive Parenting Practices	0.32	1.59	0.15	0.15	1.78
BASC-2 Child EBP	0.12	0.62	–	–	–
Parent Education	−0.01	−0.05	–	–	–
Step 2. Mean Parental ADHD Symptoms	−0.35*	−2.16	0.27	0.12	4.68*
Post-Treatment Negative Parenting Practices					
Step 1. Pre-Treatment Negative Parenting Practices	0.60***	4.15	0.44	0.44	7.85**
BASC-2 Child EBP	0.07	0.53	–	–	–
Parent Education	0.15	1.05	–	–	–
Step 2. Mean Parental ADHD Symptoms	0.33*	2.37	0.53	0.09	5.63*
Post-Treatment Parenting Stress					
Step 1. Pre-Treatment Parenting Stress	0.72***	5.52	0.50	0.50	10.17***
BASC-2 Child EBP	0.09	0.71	–	–	–
Parent Education	0.13	1.02	–	–	–
Step 2. Mean Parental ADHD Symptoms	0.29*	2.27	0.58	0.08	5.17*

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$. *BASC-2* Behavior Assessment System for Children- 2nd Edition.

Parental ADHD Symptoms and Parenting Outcomes by Group

ASD + EBP group

Regression analyses were conducted to examine the unique effect of parental ADHD symptoms on post-treatment parenting outcomes while accounting for initial levels of the outcome variable, as well as child EBP and parental education level (covariates entered in step 1 and parental ADHD symptoms entered in step 2 of the equations). As seen on Table 2, parental ADHD symptoms were associated with parenting outcomes for children in the ASD + EBP group. Specifically, parents with higher levels of ADHD symptoms tended to report higher levels of negative parenting practices ($\beta = 0.33$, $p < 0.05$) and lower levels of positive parenting practices ($\beta = -0.35$, $p < 0.05$) at post-treatment. Parental ADHD symptoms were also associated with higher parenting stress levels at post-treatment ($\beta = 0.29$, $p < 0.05$).

EBP-Only group

Regression analyses were also conducted to examine the unique effect of parental ADHD symptoms on post-treatment parenting outcomes for children in the EBP-Only group. As seen in Table 3, Parental ADHD symptoms were not significantly associated with any parent outcomes for the EBP-Only group.

Parenting Stress and Parenting Practices

Across groups, post-treatment parenting stress was associated with post-treatment parenting practices. For parents of children with ASD + EBP, higher post-treatment parenting stress was associated with higher post-treatment negative parenting ($\beta = 0.64$, $p < 0.001$) and lower positive parenting ($\beta = -0.79$, $p < 0.001$). Similarly, for parents of children with EBP-Only, higher post-treatment parenting stress was associated with higher negative parenting ($\beta = 0.33$, $p < 0.05$) and marginally lower positive parenting ($\beta = -0.32$, $p = 0.09$).

Table 3 Effect of Parental ADHD Symptoms on Parenting Outcomes in Children with EBP-Only ($n = 41$)

	β	t	Model R^2	ΔR^2	ΔF
Post-Treatment Positive Parenting Practices					
Step 1. Pre-Treatment Positive Parenting Practices	0.66***	4.95	0.41	0.41	8.40***
BASC-2 Child EBP	0.01	0.02	–	–	–
Parent Education	−0.26	−1.20	–	–	–
Step 2. Mean Parental ADHD Symptoms	0.03	0.22	0.41	0.00	0.05
Post-Treatment Negative Parenting Practices					
Step 1. Pre-Treatment Negative Parenting Practices	0.34*	2.20	0.20	0.20	3.07*
BASC-2 Child EBP	0.18	1.20	–	–	–
Parent Education	−0.10	−0.66	–	–	–
Step 2. Mean Parental ADHD Symptoms	0.19	1.23	0.24	0.04	1.51
Post-Treatment Parenting Stress					
Step 1. Pre-Treatment Parenting Stress	0.59***	3.83	0.37	0.37	6.91***
BASC-2 Child EBP	0.01	0.06	–	–	–
Parent Education	−0.02	−0.14	–	–	–
Step 2. Mean Parental ADHD Symptoms	0.24	1.80	0.42	0.05	3.23

***$p < 0.001$, *$p < 0.05$. *BASC-2* Behavior Assessment System for Children- 2nd Edition.

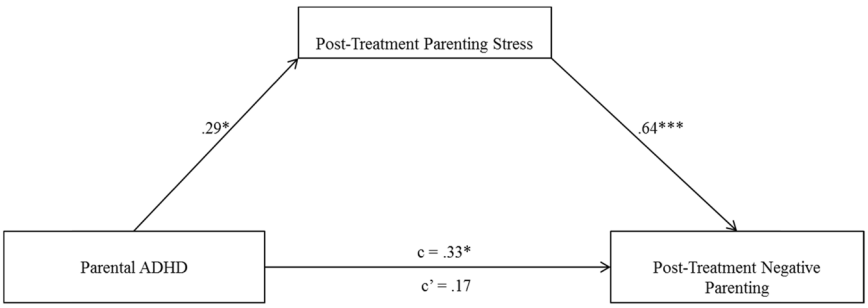

Fig. 1 An indirect effects model of the association between parental ADHD and post-treatment negative parenting (controlling for pre-treatment scores) via post-treatment parenting stress (controlling for pre-treatment scores) for the ASD + EBP Group ($n = 37$). Standardized regression coefficients are provided along the paths. Indirect effect (ab) = 0.19. *$p < 0.05$, ***$p < 0.001$

Indirect Effect of Parental ADHD Symptoms

Given the independent impacts of parental ADHD symptoms and parenting stress on parenting practices, an indirect effects model was tested for both groups. However, given that parental ADHD symptoms were not predictive of treatment outcomes for the EBP-Only group, mediational analyses are only presented for the ASD + EBP group. As illustrated in Fig. 1, the total effect of parental ADHD symptoms on post-treatment negative parenting was significant ($c = 0.33$, $p < 0.05$). However, once adjusting for post-treatment parenting stress (controlling for pre-treatment levels), the direct effect of parental ADHD symptoms was no longer significant ($c' = 0.17$, $p = 0.23$). The indirect effect (ab = 0.19) was statistically significant as the bias corrected confidence interval did not contain zero with a lower limit of 0.01 and upper limit of 0.38.

As illustrated in Fig. 2, the total effect of parental ADHD symptoms on post-treatment positive parenting was significant ($c = -0.35$, $p < 0.05$). However, once adjusting for parenting stress, the direct effect of parental ADHD symptoms was no longer significant ($c' = -0.01$, $p = 0.97$). The indirect effect (ab = −0.20) was statistically significant as the bias corrected confidence interval did not contain zero with a lower limit of −0.40 and upper limit of −0.01.

Discussion

The purpose of the current study was to examine the impact of parental ADHD symptoms on parenting practices after group based PCIT for children with ASD + EBP and EBP-only. Study findings indicated that parental ADHD symptoms predicted parenting practices and parenting stress at post-treatment, for the ASD + EBP group but not the EBP-only group. Specifically, heightened parental ADHD symptoms were associated with increased levels of negative parenting practices and stress and decreased positive

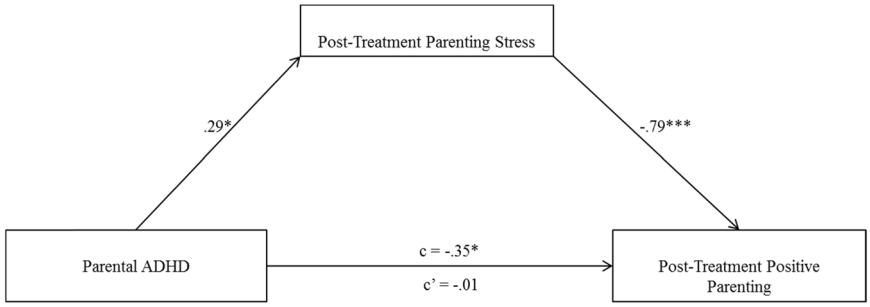

Fig. 2 An indirect effects model of the association between parental ADHD symptoms and post-treatment positive parenting (controlling for pre-treatment scores) via post-treatment parenting stress (controlling for pre-treatment scores) for the ASD + EBP Group ($n = 37$). Standardized regression coefficients are provided along the paths. Indirect effect (ab) = −0.20. $*p < 0.05$, $***p < 0.001$

parenting practices in the ASD + EBP group. Additionally, the indirect effect of parental ADHD symptoms on negative and positive parenting through parenting stress was significant for the ASD + EBP group. Implications of these results are discussed in further detail below.

In line with our hypothesis, parental ADHD symptoms were only associated with poorer parenting outcomes for parents of children with ASD and EBP, suggesting that parental ADHD symptoms have a larger impact on treatment outcomes in families of children with co-occurring presentations. Perhaps, the additive challenges of multiple chronic conditions further exacerbate the impact that parental mental health has on parenting practices. For instance, parents of children displaying social communication concerns coupled with disruptive or aggressive behaviors may require greater executive functioning skills to manage complex behaviors consistently and effectively. Indeed, previous work has implicated executive functioning skills with regard to efficacy of parenting interactions and practices (Azar et al., 2008, Crandall et al., 2015).

Contrary to previous studies (Chronis-Tuscano et al., 2011, Sonuga-Barke et al., 2002), parental ADHD symptoms were not predictive of BPT outcomes for children with EBP-only. This inconsistency may be due to the nature of the PCIT and its unique format. The reliance on live coaching during PCIT may create more structured modeling and practice opportunities for parents within sessions. Although PCIT also makes use of between session practice, as do other parent training programs that are more didactic in nature, the in-session practice may be especially helpful for parents needing further supports. These findings suggest that perhaps PCIT may be beneficial for parents with attentional challenges who could make use of further modeling and structure. Additionally, our study findings may have been incongruent with previous studies on EBP samples due to the young nature of our sample. Perhaps the impacts of parental ADHD symptoms on parenting styles become more salient over time and thus more readily observed in samples of school-aged children. These findings suggest that regardless of parent related impairments such as ADHD, there may be malleability in parenting practices earlier on in development which may be fostered with early intervention.

With regard to parenting stress, parents across both groups experienced reductions following group PCIT. Perhaps not only does the structure of group PCIT buffer the impact of ADHD symptoms on treatment outcomes, but also the inherent social support built into the group intervention may be especially helpful for parents. Indeed, social support has been linked to lower parenting stress after accounting for parental ADHD symptoms (Theule et al., 2011). However, for families with co-occurring presentations (i.e., ASD + EBP) parental ADHD symptoms continued to predict suboptimal outcomes after participating in the group intervention.

In line with our second study aim, parenting stress partially mediated the association between parental ADHD symptoms and parenting practices. Perhaps difficulties managing own attentional challenges may impact perceived stress levels, which ultimately is known to impact parenting practices (Pinderhughes et al., 2000). Future studies should examine these associations in comparison with individual PCIT in order to test the protective effects of group-based intervention in supporting parenting stress and attenuating the impact of parent mental health challenges.

Given the consistent findings between parent perceived stress and parenting outcomes across children with EBP and ASD + EBP, future studies should consider the moderating role of parental ADHD symptoms. It may be the case that parents with high levels of ADHD are experiencing the most difficulties learning and implementing the skills. On the same note, future work can examine the underlying mechanisms associated with ADHD in parents. For example, emotion regulation is a significantly impaired domain in individuals with ADHD (Graziano & Garcia, 2016). There is literature to support the notion that parents with ADHD and poor ER

functioning also report greater parenting stress and poorer child outcomes (Chronis-Tuscano et al., 2017, Woods, Mazursky-Horowitz, Thomas, Dougherty, & Chronis-Tuscano, 2021).

Clinical Implications

Clinical implications of these findings highlight the need for more attention to parental mental health and parenting stress during BPT interventions for families managing multiple chronic diagnoses. While some previous work has examined adaptations to BPT interventions in an effort to target parental mental health (Chronis-Tuscano et al., 2013), these additions may be burdensome to include for all families. Thus, it is important to highlight groups at highest risk for which intervention modifications may be most beneficial and necessary. Clinicians providing services for families that include parents with mental health concerns may need to provide considerations for parents' ability to organize routines at home consistent with therapy recommendations, sustain attention to didactic information presented, and be sensitive to parents' own management of their symptoms.

Theoretical Implications

Theoretical implications of the current study also include considerations for heritability and impact of ADHD symptoms across parents of children with ASD and disruptive behavior disorders such as ADHD. Although not directly tested in the current study, it appears that ADHD symptoms among families with ASD, may be more impairing as they were predictive of treatment outcomes. Perhaps other factors associated with having multiple neurodevelopmental disorders (i.e., ASD, ADHD) are implicated in the presentation of ADHD symptoms amongst parents. An extensive literature exists on the broader autism phenotype, which posits that mild symptoms of ASD are present across families of children with ASD (Bishop et al., 2004, Losh et al., 2008). Perhaps the presentation and impairment of ADHD symptoms among parents of children with ASD may be further complicated by the presence of ASD-related behaviors in parents. Future studies should examine not only ADHD symptoms among parents but also parent ASD-related challenges as they relate to parenting behaviors.

Limitations

There are several limitations of the current study that should be noted. First, the current study utilized a pre-post design with a modest sample size. Absence of a treatment control group limited our ability to draw conclusions about the causality of mediational relationships.

The indirect effects model only employed pre-and-post treatment data limiting the true longitudinal ability to capture mediational processes across several timepoints. Thus, the indirect effect of parenting stress must be interpreted as a partial mediator as true mediation was not feasible. Additionally, it is important to acknowledge that our findings may be partially attributed to shared reporter bias as parents reported on their own ADHD symptoms and parenting practices.

A limitation that should be noted is that children in the study were also enrolled in the classroom component of the STP-PreK. This makes it challenging to dissect the effects of the PCIT component from the classroom component. It is plausible that improvements in children's behavior, along with parental perceptions of effort in bringing their child to the day camp, may have had impacts on parent's perceptions of their parenting skills and stress. Future work is needed comparing the effect of parental ADHD symptoms on parenting outcomes for children participating in varying levels of multimodal intervention. Notably, a recent randomized clinical trial of the STP-PreK documented no additive effect of the classroom component on behavioral functioning outcomes (Graziano & Hart, 2016).

Lastly, the current study examined ADHD symptoms within a non-clinical sample of parents. Perhaps the role of ADHD symptoms on parenting practices may be more robust across samples of parents with clinically significant levels of ADHD symptoms. Given heritability estimates for ADHD average around 0.80 (Faraone et al., 2005, Larsson et al., 2014), it may be assumed that within a sample of children with EBP, rates of ADHD may be more elevated than in true non-clinical samples.

In sum, the current study highlighted the differential impact of parental ADHD symptoms of parent outcomes after group PCIT for children with ASD and EBP. Results suggest that greater considerations be placed on parental mental health for optimizing success within BPT interventions for parents of children with multiple chronic disorders. Parent stress among parents with ASD and EBP was also highlighted as an important factor as it relates to parental mental health and treatment gains.

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Compliance with Ethical Standards

Conflict of Interest The authors declare no competing interests.

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