



HHS Public Access

Author manuscript

Curr Psychiatry Rep. Author manuscript; available in PMC 2015 November 30.

Published in final edited form as:

Curr Psychiatry Rep. 2014 October ; 16(10): 474. doi:10.1007/s11920-014-0474-8.

Delivering Evidence-Based Treatments for Child Attention-Deficit/Hyperactivity Disorder (ADHD) in the Context of Parental ADHD

Christine H. Wang, B.A.,

University of Maryland, College Park, Department of Psychology, College Park, MD 20742,
Phone: (301) 405-4606, Fax: (301) 314-9566

Heather Mazursky-Horowitz, M.A., and

University of Maryland, College Park, Department of Psychology, College Park, MD 20742,
Phone: (301) 405-4606, Fax: (301) 314-9566

Andrea Chronis-Tuscano, Ph.D.

University of Maryland, College Park, Department of Psychology, College Park, MD 20742,
Phone: (301) 405-9640, Fax: (301) 314-9566

Christine H. Wang: cwang115@umd.edu; Heather Mazursky-Horowitz: hhorowit@umd.edu; Andrea Chronis-Tuscano: achronis@umd.edu

Abstract

Behavioral parent training (BPT) and stimulant medications are efficacious treatments for child attention-deficit/hyperactivity disorder (ADHD); however, there is some evidence to suggest that parental ADHD may reduce the effectiveness of both treatment modalities. This review paper summarizes the literature related to the evidence-based behavioral and pharmacological treatment of child ADHD in the context of parental ADHD. We also review the literature on the effects of treating parents' ADHD symptoms on parenting and child behavior outcomes. Although the literature is small and inconsistent, studies suggest that medicating parents' ADHD symptoms may or may not be sufficient in demonstrating desired improvements in parenting and child behavioral outcomes. Therefore, interventions targeting both parent and child ADHD, when both are present, are likely needed to improve parent-child interactions and family functioning. Ongoing studies using a multimodal approach are discussed.

Keywords

child ADHD; parental ADHD; adult ADHD; evidence-based treatments; behavioral parent training; behavior therapy; psychological treatments; medication; pharmacological treatment; methylphenidate; atomoxetine; lisdexamfetamine; treatment review; parent child interactions

Correspondence to: Andrea Chronis-Tuscano, achronis@umd.edu.

Conflict of Interest

Christine H. Wang, Heather Mazursky-Horowitz, and Andrea Chronis-Tuscano declare that they have no conflict of interest.

Human and Animal Rights and Informed Consent

This article does not contain any studies with human or animal subjects performed by any of the authors.

Introduction

Attention-Deficit/Hyperactivity Disorder (ADHD) is among the most heritable psychiatric disorders [1]. Forty-three percent of adults with ADHD report having children who also meet diagnostic criteria for ADHD [2]. Bottom-up studies also evidence high concordance rates between parent and child ADHD diagnoses. Compared to mothers of children without ADHD, mothers of children with ADHD are 23 times more likely to have had ADHD during their own childhood [3]. Due to the depth of parent engagement required in evidence-based treatments for child ADHD [4], treating child ADHD in the context of parental ADHD may involve unique challenges.

This review paper summarizes the current literature as it relates to treating child ADHD in the context of parental ADHD. We searched for relevant studies using the following search terms: “maternal adhd or paternal adhd or parent* adhd, child* adhd, treatment” on PsycINFO and Medline databases. We highlight studies examining whether parental ADHD symptomatology is related to evidence-based behavioral and pharmacological treatment outcomes for children with ADHD. We further explore whether treating parental ADHD symptoms pharmacologically is sufficient in addressing parenting difficulties evident among adults with ADHD. Future research directions and clinical implications are discussed accordingly.

Parental ADHD and Child Treatment Outcome: Behavioral Interventions

Several reviews and meta-analyses support the efficacy of behavioral parent training (BPT) for children with ADHD [5,6]. Grounded in social learning theory and operant conditioning principles, BPT involves teaching parents to consistently utilize positive reinforcement and nonphysical discipline techniques to increase prosocial behaviors and decrease noncompliant and disruptive child behaviors. However, due to difficulties with organization, emotion regulation, and planning, parental ADHD symptoms may impact a parent’s ability to consistently implement consequences and token economies, maintain consistent household routines, and modulate responses to tantrums or other child misbehaviors [7,8]. In this section, we review the empirical literature examining the relation between parental ADHD and BPT outcomes for children with ADHD.

Sonuga-Barke and colleagues [9] conducted the first empirical study examining the relation between maternal ADHD symptoms and child ADHD outcomes following an 8-week BPT intervention. Results were conducted by stratifying preschool-aged children with ADHD (n=83) based on low, medium, and high self-reported maternal ADHD symptoms on the Adult ADHD Rating Scale (AARS) [10]. Findings revealed that children of mothers with high ADHD symptoms did *not* show any improvements in parent-reported ADHD symptoms after BPT. In contrast, children of mothers with low ADHD symptoms significantly improved following BPT. This was the *first* study to demonstrate that varying levels of maternal ADHD symptoms *differentially* predict child treatment outcome, providing the foundation for future research in this area.

Next, Harvey and colleagues [11] examined the association between self-reported parental ADHD symptoms on the Adult Attention Deficit Disorders Evaluation Scale (ADDES) [12]

and both audiotaped and self-reported parenting behaviors after an 8-week BPT program. Similar to the results reported by Sonuga-Barke and colleagues [9], in contrast to mothers in the average and medium inattention groups who improved following BPT, mothers in the *high* inattention group (2 SD from the mean on the ADDES) exhibited *no* changes from pre- to post-treatment in audiotaped parenting behaviors. Notably, these parent-child interactions were observed in *unstructured* contexts. Thus, results may have been even more profound in structured situations, which typically elicit more child noncompliant behaviors.

Recently, more methodologically rigorous studies have replicated these early findings that parental ADHD symptoms predict child ADHD behavioral treatment outcomes. In the Multimodal Treatment Study of Children with ADHD (MTA), Jensen and colleagues [13] measured parental inattention using parent self-report on the Conner's Adult ADHD Rating Scale (CAARS) [14]. High parental inattention predicted less improvement in child ADHD symptoms, functional impairment, and reading abilities at three-year follow-up (N=485; child mean age = 11.9 years). This relation was evident regardless of whether children were randomly assigned to receive behavioral, pharmacological, combined behavioral-pharmacological treatment or treatment as usual in the community, highlighting the salience of parental ADHD in the treatment of child ADHD across treatment modalities.

In the first study to utilize multiple informants and assessment methods to evaluate adult ADHD [15], Chronis-Tuscano and colleagues [16] examined the relation between maternal ADHD symptoms and treatment outcome after a brief, 5-session BPT program. Maternal ADHD symptoms, assessed based on self- and collateral-reports, predicted less improvement in post-treatment mother-reported child disruptive behavior symptoms ($B = .325, p < .01$), maternal self-reported inconsistent discipline ($B = .227, p < .01$) and involvement ($B = .222, p < .01$), and observed negative parenting (operationalized as negatively stated commands, critical statements about the child's behavior, and negative physical touch) across both structured ($B = .544, p < .01$) and unstructured contexts ($B = .561, p < .01$). Most importantly, this was the first study to demonstrate that lack of improvement in observed negative parenting *mediated* the association between maternal ADHD and reduced treatment effects on child disruptive behaviors. That is, following BPT, mothers with elevated ADHD symptoms remained unable to inhibit their negative responses to difficult child behavior. However, while this was the first study to highlight mediators of the link between parental ADHD and poor child treatment outcomes, it should be noted that a brief, 5-session BPT program is not likely to produce adequate results for parents with ADHD. More intensive, tailored approaches are likely needed to address the specific difficulties of these complex families.

Recent studies have also begun to examine the impact of parental ADHD on interventions targeting ADHD-related functional impairments in the peer domain. Parental Friendship Coaching (PFC) [17,18] is an 8-week intervention that teaches parents skills to facilitate their children's social relationships (e.g., structuring play dates and providing effective coaching during peer interactions). After receiving PFC, *high* parental ADHD symptoms (1 SD above the mean on the parent self-reported Current Symptom Scale (CSS) [10]), predicted increased teacher-rated peer rejection and decreased observed parental facilitation of social relationships. However, *low* parental ADHD symptoms predicted decreased peer

rejection and increased facilitation at post-treatment. Parental facilitation is a core treatment component of PFC, suggesting that high parental ADHD symptoms may be a barrier to treatment uptake. It could be that social skills difficulties common among adults with ADHD interfered with their role as friendship coaches. Consistent with the MTA study results [13], these findings support the notion that the relation between high parental ADHD symptoms and reduced behavioral treatment effects is not solely limited to treatments targeting parent-child relations.

Contrary to these findings, other behavioral intervention studies failed to find associations between parental ADHD symptoms and child treatment effects. For example, Thompson and colleagues [19] reported that preschool-age children whose parents received home-based BPT (N=21) exhibited greater reductions in ADHD symptoms compared to children who received treatment as usual (TAU; N=20), regardless of maternal ADHD symptoms as reported on the AARS [10]. However, in discussing the strengths of the study, the authors mentioned that treatment was tailored based on parent need. For example, if mothers exhibited ADHD symptoms, therapists directly targeted maternal organizational skills. Thus, it could be that such individualized treatment tailoring reduced the impact of maternal ADHD symptoms on child treatment outcome. Treatment was also administered in the home setting, which may ameliorate performance deficits common among adults with ADHD that may interfere with BPT implementation. Because such ideas are speculative, further studies are needed to empirically explore these possibilities.

In the only study of adolescents with ADHD included in this review, Sibley and colleagues [20] reported that parent self-reported ADHD on the Adult ADHD Self-Report Scale (ASRS)[21] did *not* predict degree of improvement in parent-adolescent conflict following the intensive Summer Treatment Program for Adolescents (STP-A). In discussing the strengths of the study, the authors noted that one component of the STP-A included providing parents with an “organizational blueprint” of how to implement a home behavioral contract. This approach may have compensated for the organizational difficulties parents with ADHD often encounter when implementing behavioral techniques. It is also possible that parental ADHD has fewer (or different) implications for treatment outcome for older children, as parents are not solely responsible for structuring adolescents’ environments. Lastly, while most other studies focused on child and parenting behaviors as primary outcomes, Sibley and colleagues [20] focused on parent-reported conflict. Examining adolescent-reported conflict, observational measures of conflict, or examining adolescent behavioral outcomes may have yielded different results.

In a study of BPT plus routine clinical care (RCC) compared to RCC alone, van den Hoofdakker and colleagues [22] reported that maternal ADHD, as measured on the AARS, did not have a main effect or interaction effect with treatment group (BPT+RCC vs. RCC alone) in predicting child externalizing behaviors or ADHD symptoms at post-treatment. However, the authors noted limited variability in AARS scores in their sample [10].

Lastly, Babinski and colleagues [23] used a multiple baseline design to examine the efficacy of BPT for parents and children both selected for ADHD. Parents completed the ADHD-RS [24] and were required to have at least six ADHD symptoms, as well as associated

impairment, with some impairment required in the home setting. After 8 weeks of BPT, observed parenting skills as well as both observed and mother-reported child behavior improved, although there were no improvements in self-reported parenting. This was the first study to demonstrate that BPT may be efficacious for parents with high and impairing levels of ADHD symptoms. However, this uncontrolled study included an extremely small sample size ($N=12$) consisting of relatively high-functioning parents (i.e. married, educated, employed), potentially limiting generalizability.

While the literature is relatively mixed with respect to the role of parental ADHD symptoms and BPT outcomes, certain patterns are noteworthy. For example, studies that report that parental ADHD does *not* impact behavioral treatment effects are limited by small sample sizes [19,20,23]. Additionally, many studies with null findings did not stratify their sample into low and high parental ADHD symptoms [19,20,22], as did certain studies that did report significant results [9,11,18], with a few exceptions [13,16]. Perhaps only in the context of *extreme* parental ADHD symptoms are the relations between parental ADHD and reduced treatment effectiveness for child ADHD most pronounced. Moreover, of the three studies that did not find that parental ADHD predicted treatment outcome, two studies reported tailoring treatment to directly address ADHD-related difficulties in parents [19,20]. Further research is needed to elucidate whether BPT is more effective when tailored to also address parenting difficulties prevalent among parents with ADHD. Lastly, the available empirical evidence is unclear regarding whether parenting deficits observed in adults with ADHD are more closely linked to skills deficits versus performance deficits, or a combination of both. A more nuanced understanding of the nature of their parenting difficulties could inform efforts to tailor behavioral treatments in order to increase their efficacy for parents with ADHD.

Parental ADHD and Child Treatment Outcome: Pharmacological Interventions

While research on behavioral interventions for ADHD has greatly advanced in recent years, pharmacological treatment remains the most common evidence-based treatment for children with ADHD. Stimulant medication is a well-documented, efficacious treatment for ADHD in children and adults [25,26]. The most commonly prescribed stimulant is methylphenidate (MPH), which works by targeting the dopaminergic system in the brain. More recently, atomoxetine (ATX), a non-stimulant medication that targets the norepinephrine transporter, has also been found to be efficacious for children and adults with ADHD [27,28]. However, approximately 30% of children with ADHD treated with medication do not show adequate improvement in their ADHD symptoms [29]. Parental ADHD may also attenuate treatment effects of pharmacological interventions for child ADHD. For instance, parental ADHD symptoms may be associated with poor medication adherence, and consequently, reduced medication response, through inconsistent implementation and monitoring of children's medication regime.

Indeed, in a Taiwanese sample, Gau and colleagues [30] reported that *paternal* history of ADHD (assessed via clinician interview) predicted poor treatment adherence (defined as "missing 1 or more doses on a school day on 2 or more days per week for 4 weeks") to

immediate-release (IR) MPH. Interestingly, maternal ADHD history did *not* predict treatment adherence. Impairment in family functioning is well documented among families where at least one parent has ADHD [2,31]; this may suggest that, regardless of which parent has ADHD, family dysfunction associated with parental ADHD may be linked to poor adherence to child's medication regimen. In the second phase of the study, poor adherers to IR-MPH were switched to long-acting OROS-MPH, and subsequently, 80% of patients reported better adherence. This was the *first* and only study to examine family history of ADHD as a predictor of medication *adherence* in a large sample (N=607). Future studies should obtain information on which parent holds responsibility for administration of child medication and may consider defining adherence continuously and through multiple methods, including using more objective methodologies.

Beyond adherence, two studies have documented that parental ADHD symptoms predict child treatment *response* to MPH. In a study conducted in Brazil, Chazan and colleagues [32] demonstrated that self-reported maternal ADHD symptoms, but not paternal ADHD symptoms, assessed using the ASRS, predicted worse child treatment response to MPH (N=125), controlling for treatment adherence, MPH dose, and family conflict. Contrarily, Grizenko and colleagues [33] found that children (N=118) who respond well to MPH were *more* likely to have first-degree relatives with ADHD, perhaps suggesting that genetic underpinnings might predict increased response to MPH. However, several methodological factors could have contributed to the conflicting results between these two studies. Grizenko and colleagues [33] operationalized child medication response as a consensus clinician report of overall improvement, whereas Chazan and colleagues [32] operationalized child medication response as parent report of child ADHD symptoms. Additionally, Grizenko and colleagues [33] conducted a double-blind, placebo-controlled trial over a two-week period whereas Chazan and colleagues [32] conducted a non-blinded, open trial in a naturalistic setting spanning several months. Consideration of such methodological differences between these studies may shed light on their discrepant findings.

Overall, due to the paucity of literature examining parental ADHD symptoms and child ADHD medication adherence and response, varied methods, and discrepant results, no clear conclusions can be drawn at this time. Of the three studies reviewed, most studies lacked control groups, did not employ teacher ratings of child ADHD symptoms, included samples with wide age ranges, did not use standardized diagnostic procedures to classify parental ADHD, and were conducted in non-western countries, limiting generalizability. Additionally, there is wide variability in how studies operationally defined treatment adherence and response, which also could have contributed to conflicting results. More methodologically rigorous studies are needed in order to further assess the links between parental ADHD symptoms and adherence and response to pharmacological interventions for child ADHD. Additionally, all three studies reviewed generally focused on predictors of adherence and response to IR-MPH. Therefore, it is unknown if such results could be generalized to other types of medications with different administration schedules and side effects. Future studies should examine these important clinical questions using long-acting stimulant formulations, which are more commonly prescribed at present and pose less of a burden on parents to administer multiple daily doses.

The Relation Between Pharmacological Interventions for Adult ADHD and Subsequent Improvements in Parenting and Child Behaviors

Given the evidence suggesting that parental ADHD symptoms may be related to attenuated behavioral and pharmacological treatment response in children with ADHD, it is plausible to consider whether treating parents' ADHD symptoms might result in improvements in parenting and child outcomes [34]. Studies have shown that treating adult ADHD with medication and/or cognitive-behavioral treatments leads to ADHD symptom reduction, clinician-reported functional improvement, and benefits in work, social, and family domains [35–38]. Yet, few studies have directly examined the relation between adult ADHD pharmacological treatment and subsequent improvements in *parenting and child outcomes*.

The initial studies to make key advances in this area of research were case studies on mothers with ADHD symptoms conducted in the 1990's. Evans and colleagues [39] reported improvements in child behavior and maternal parenting after doctors prescribed the mother MPH. Similarly, Daly and Fritsch [40] found improvements in feeding and weight gain in an infant diagnosed with failure to thrive after the mother's ADHD was successfully treated. While these uncontrolled case reports were the *first* to demonstrate the relation between treating parental ADHD and subsequent improvements in parenting and child behavior, the case study designs largely limit generalizability.

More methodologically sound studies have since been conducted. Chronis-Tuscano and colleagues [41] conducted the first small, double-blind, group-design study (N=20) examining the effect of maternal OROS-MPH on parenting in mother-child dyads with ADHD (with 61% of children also receiving medication for ADHD). In the first phase (lasting 5 weeks), increased dosages of maternal OROS-MPH were related to improvements in maternal self-reported and collateral-reported ADHD symptoms on the CAARS. Improvements were also evident in maternal self-reported parenting behaviors, including inconsistent use of discipline and corporal punishment. However, collateral reports did not indicate improvements in parenting. Additionally, independent, observational measures based on the uncontrolled phase of the study revealed *minimal* stimulant effects on maternal parenting behaviors and child deviance [42]. Such results suggest that while stimulant medication improved maternal ADHD symptoms and perhaps self-perception of parenting quality, there were no demonstrated effects on observed or collateral-reported parenting or child behavioral improvements.

Recently, Waxmonsky and colleagues [43] conducted a double-blind, placebo-controlled study examining the efficacy of lisdexamfetamine (LDX), a stimulant medication, to enhance parenting and child behavior among mother-child dyads with ADHD (N=26; with 86% of children also on ADHD medications throughout the trial). Results revealed that after 8 weeks on optimal doses of LDX, mothers demonstrated improvements in self-reported ADHD symptoms on the ADHD-RS as well as improvements in observed parenting, including increased use of praise and decreased use of commands. Children of parents in the LDX group also demonstrated reductions in observed inappropriate behaviors (e.g., negative talk, negative touch, whining and yelling) compared to the placebo group. While results are quite promising, due to the small sample size, high dropout rate, lack of teacher-report, and

high educational attainment among parents, further replication in more heterogeneous samples is required.

In the only study of non-stimulants, Wietecha and colleagues [44] conducted a randomized controlled trial (RCT) where parents with ADHD were randomized to receive atomoxetine (ATX; N=268), or placebo control (N=234) for 24 weeks. While clinician-rated ADHD symptoms on the CAARS-Investigator Rated: Screening Version (CAARS-INV:SV) [14] significantly improved in the ATX group as compared to the control group, there were no significant differences between the two groups on self-reported parenting behaviors. Post-hoc exploratory analyses suggested that parents who were initially impaired in their parenting showed differences in improvement resulting from ATX depending on whether the child too had ADHD, highlighting the need for future studies to consider baseline parenting impairment and child ADHD status in their analyses.

Overall, the results of these studies are generally consistent with the wider literature regarding the efficacy of medication to improve core ADHD symptoms in adults with ADHD [26,45]. However, the findings varied widely in demonstrating improvements in self-reported parenting [41,44] and/or observed parenting behaviors [42,43] after pharmacological interventions. Several methodological differences may have contributed to such discrepancies. First, parents in the study by Waxmonsky and colleagues [43] were on their optimal doses of medication for longer durations as compared to that of parents in the study by Chronis-Tuscano and colleagues [42]. Second, the studies by Waxmonsky and colleagues [43] and Chronis-Tuscano and colleagues [42] tested the efficacy of stimulant medications, whereas the study by Wietecha and colleagues [44] tested the efficacy of a non-stimulant. In a recent meta-analysis, non-stimulants were found to be less efficacious than stimulants in reducing ADHD symptoms [46]. Third, children in the study by Wietecha and colleagues [44] were not required to have ADHD, whereas other studies required both child and parent to have ADHD [41–43]. Given that parent-child interactions are transactional in nature, it is likely that child ADHD and/or disruptive behavior will impact the effects of parent medication on the quality of parent-child interactions [47]. Related to this point, 86% of the children in the study by Waxmonsky and colleagues [43] were medicated throughout the trial compared to 61% of children in the study by Chronis-Tuscano and colleagues [41,42]. Given evidence suggesting that challenging child behavior elicits negative parenting responses, child medication status and response to medication are likely important factors to consider in future studies of this kind.

In sum, the conflicting results among these studies in parenting and child behavioral improvements after pharmacological treatment for parental ADHD could be attributed to the length of time on optimal doses of medication, type of medication being administered, child ADHD status, and child medication status and response to medication. The studies conducted thus far vary too widely in methodological design to make any conclusive statement regarding the relation between pharmacological treatment of parental ADHD and improvements in parenting.

Conclusions & Future Directions

In recent years, increased research attention has been paid to the role of parental ADHD in evidence-based treatment effectiveness for children with ADHD. In light of the results presented here, it appears that parental ADHD presents unique challenges to the delivery of evidence-based treatments for children with ADHD. In particular, the implementation of behavioral interventions requires parents to consistently provide structure and routines, as well as planned contingent responses to child behavior. Given the core symptoms of ADHD, it is not surprising that the majority of published studies suggest that parental ADHD symptoms reduce the efficacy of behavioral interventions. Adaptation of BPT for parents struggling with their own ADHD symptoms is likely required to address these difficulties. Adaptations may involve the use of organizational strategies and other cognitive-behavioral techniques to target adult ADHD symptoms [38,48], and perhaps in-vivo coaching to aid parents with ADHD in the learning and consistent implementation of new parenting skills [49].

Despite its clinical importance, the impact of parent ADHD on child medication treatment has been understudied. It seems likely that ADHD in the parent who is responsible for the child's medication administration would contribute to poor adherence, and thus poor response. It also seems likely that long-acting medications requiring only single daily doses would be relatively less affected by parental ADHD. Beyond adherence, the limited evidence that exists is inconsistent in showing better or worse responses to medication in the presence of parental ADHD. Clearly, further empirical attention is needed to answer these clinically salient questions.

Assuming that parental ADHD has a negative impact on parenting and child treatment outcome, it follows that treating parental ADHD may improve outcomes related to parenting and family functioning. Although the literature is small and somewhat inconsistent, existing studies suggest that medicating parents for their ADHD may or may not be sufficient to bring about desired improvements in parenting and child outcomes. Medication is clearly efficacious in treating core symptoms of parental ADHD; however, beneficial effects on domains of functional impairment (e.g. parenting) are more often found with combined behavioral-pharmacological approaches [50]. The most promising of these parent medication studies examined effects of parent medication over a much longer follow-up period [43]. It is possible that sustained parent medication may hold greater potential for downstream effects on parenting and parent-child relations. Also, given the reciprocal and transactional nature of parent-child interactions, it is important to consider whether the children in these studies were selected on the basis of ADHD and whether children were medicated during the course of the study.

Parent-child interaction patterns are established over many years and medication may not be sufficient to reverse these patterns; it is more likely that parents with ADHD will need skills training (likely with the opportunity for in-vivo practice and feedback, given their performance deficits) in addition to medication to improve their ability to provide a structured and consistent environment for their children with ADHD. Moreover, given the transactional nature of parent-child interactions, interventions targeting both parent and child

ADHD may be necessary to improve interactions and family functioning. What remains to be examined is how best to *combine* or *sequence* evidence-based treatments for these families, and to answer the question *for whom* combined treatments are recommended.

Consistent with a combined treatment approach, Jans and colleagues [51] recently conducted a multicenter RCT in Germany in which mothers with ADHD were initially randomized to one of two treatment groups to reduce their own ADHD symptoms. One group received behavioral group psychotherapy focused on improving maternal organization skills, impulse control, emotion regulation, and stress management *plus* MPH; the other group received supportive counseling only. Both groups then received BPT for the treatment of child ADHD (age 6–12). The primary outcome was reduction in child ADHD and ODD symptoms, and secondary outcomes included child home behavior, family functioning, and maternal ADHD. The study design allows one to test the impact of treating maternal ADHD symptoms on child behavior as well as the efficacy of BPT when mothers receive prior treatment for their own ADHD symptoms. Publication of study results is underway.

Similarly, using a sequential approach, the senior author (A.C-T), in collaboration with Mark A. Stein, is currently conducting an NIMH-funded collaborative Sequential Multiple Assignment Randomization Trial (SMART) [34,52], in which we are selecting mothers of 3–7 year old children on the basis of their adult ADHD. At the first randomization, mothers are assigned to receive BPT or stimulant medication. Following this phase, we will be able to evaluate acute effects of maternal stimulant medication, compared to BPT, on parenting and child behavioral outcomes. At the second randomization, mothers receive an individualized version of the initial treatment (e.g., incorporating organizational skills training into BPT) or the alternative treatment is added (e.g., maternal stimulant medication plus BPT). Primary outcomes include observed parenting, family impairment, and parent- and teacher-rated child behavior. This SMART design will allow us to examine the optimal sequencing of medication and BPT for mothers with ADHD. Importantly, we will also be able to examine moderators of outcomes, including baseline clinical characteristics (e.g., child ADHD, comorbid maternal depression, parenting stress, socio-demographic disadvantage) as well as adherence and response to first-line treatment, which predict the optimal treatment approach and sequencing. Studies such as this have the potential to inform real-world clinical decision making for families in which both the parent and child have ADHD.

References

- = Of importance
 - = Of major importance
1. Faraone SV, Perlis RH, Doyle AE, et al. Molecular Genetics of Attention-Deficit/Hyperactivity Disorder. *Biol Psychiatry*. 2005; 57(11):1313–1323. [PubMed: 15950004]
 2. Minde K, Eakin L, Hechtman L, et al. The psychosocial functioning of children and spouses of adults with ADHD. *J Child Psychol Psychiatry*. 2003; 44(4):637–646. [PubMed: 12751853]
 3. Chronis AM, Lahey BB, Pelham WE, Kipp HL, Baumann BL, Lee SS. Psychopathology and Substance Abuse in Parents of Young Children With Attention-Deficit/Hyperactivity Disorder. *J Am Acad Child Adolesc Psychiatry*. 2003; 42(12):1424–1432. [PubMed: 14627877]

4. Pelham WE, Wheeler T, Chronis A. Empirically supported psychosocial treatments for attention deficit hyperactivity disorder. *J Clin Child Psychol.* 1998; 27(2):190–205. [PubMed: 9648036]
5. Pelham WE, Fabiano GA. Evidence-based psychosocial treatments for attention-deficit/hyperactivity disorder. *J Clin Child Adolesc.* 2008; 37(1):184–214.
6. Fabiano GA, Pelham WE, Coles EK, Gnagy EM, Chronis-Tuscano A, O'Connor BC. A meta-analysis of behavioral treatments for attention-deficit/hyperactivity disorder. *Clin Psychol Rev.* 2009; 29(2):129–140. [PubMed: 19131150]
- 7••. Johnston C, Mash EJ, Miller N, Ninowski JE. Parenting in adults with attention-deficit/hyperactivity disorder (ADHD). *Clin Psychol Rev.* 2012; 32(4):215–228. Using a theoretically grounded framework, this seminal review paper examines deficits common among adults with ADHD and their relation to parenting, reviews the empirical evidence surrounding parenting outcomes among adults with ADHD, and discusses the implications of parenting in adults with ADHD on interventions for child ADHD. [PubMed: 22459785]
8. Weiss M, Hechtman L, Weiss G. ADHD in parents. *J Am Acad Child Adolesc Psychiatry.* 2000; 39(8):1059–1061. [PubMed: 10939236]
9. Sonuga-Barke EJS, Daley D, Thompson M. Does maternal ADHD reduce the effectiveness of parent training for preschool children's ADHD? *J Am Acad Child Adolesc Psychiatry.* 2002; 41(6):696–702. [PubMed: 12049444]
10. Barkley, RA.; Murphy, KR. Attention-deficit hyperactivity disorder: A clinical workbook. 2nd. New York, NY US: Guilford Press; 1998.
11. Harvey E, Danforth JS, Eberhardt McKee T, Ulaszek WR, Friedman JL. Parenting of children with Attention-Deficit/Hyperactivity Disorder (ADHD): The role of parental ADHD symptomatology. *J Atten Disord.* 2003; 7(1):31–42. [PubMed: 14738179]
12. McCarney, SB.; Anderson, PD. The Adult Attention Deficit Disorders Evaluation Scale: Self-Report Version Technical Manual. Columbia, MO: Hawthorne Educational Services, Inc; 1996.
13. Jensen PS, Arnold LE, Swanson JM, et al. 3-year follow-up of the NIMH MTA study. *J Am Acad Child Adolesc Psychiatry.* 2007; 46(8):989–1002. [PubMed: 17667478]
14. Conners, CKD.; Sparrow, MA. Conners' Adult ADHD Rating Scales (CAARS). New York: Multihealth Systems, Inc; 1999.
15. McGough JJ, Barkley RA. Diagnostic controversies in adult attention deficit hyperactivity disorder. *Am J Psychiatry.* 2004; 161(11):1948–1956. [PubMed: 15514392]
- 16•. Chronis-Tuscano A, O'Brien KA, Johnston C, et al. The relation between maternal ADHD symptoms & improvement in child behavior following brief behavioral parent training is mediated by change in negative parenting. *J Abnorm Child Psychol.* 2011; 39(7):1047–1057. The first study to establish mechanisms by which maternal ADHD is related to child treatment outcomes. The study found that change in negative parenting mediated the relation between maternal ADHD and child behavior after a brief BPT program. [PubMed: 21537894]
17. Mikami AY, Lerner MD, Griggs MS, McGrath A, Calhoun CD. Parental influence on children with attention-deficit/hyperactivity disorder: II. Results of a pilot intervention training parents as friendship coaches for children. *J Abnorm Child Psychol.* 2010; 38(6):737–749. [PubMed: 20339911]
- 18•. Griggs MS, Mikami AY. Parental attention-deficit/hyperactivity disorder predicts child and parent outcomes of parental friendship coaching treatment. *J Am Acad Child Adolesc Psychiatry.* 2011; 50(12):1236–1246. A treatment study of ADHD-related impairment in the peer domain that demonstrated high levels of parental inattention predicted reduced treatment uptake (parental facilitation of peer interactions) and treatment outcome (peer rejection). [PubMed: 22115144]
19. Thompson MJJ, Laver-Bradbury C, Ayres M, et al. A small-scale randomized controlled trial of the revised new forest parenting programme for preschoolers with attention deficit hyperactivity disorder. *Eur Child Adolesc Psychiatry.* 2009; 18(10):605–616. [PubMed: 19404717]
- 20•. Sibley MH, Ross JM, Gnagy EM, Dixon LJ, Conn B, Pelham WE. An intensive summer treatment program for ADHD reduces parent-adolescent conflict. *J Psychopathol Behav.* 2013; 35(1):10–19. The only study to examine the relation between parental ADHD and parent-child conflict (treatment outcome of interest) in adolescents after an intensive behavioral intervention. This study did not find parental ADHD predicted parent-child conflict at post-treatment, but

- methodological characteristics such as small sample size, parent-report of conflict only, and treatment components that likely accommodated parental ADHD symptoms must be considered.
21. Adler LA, Spencer T, Faraone SV, et al. Validity of Pilot Adult ADHD Self-Report Scale (ASRS) to Rate Adult ADHD Symptoms. *Ann Clin Psychiatry*. 2006; 18(3):145–148. [PubMed: 16923651]
 22. van den Hoofdakker BJ, Nauta MH, van der Veen-Mulders L, et al. Behavioral parent training as an adjunct to routine care in children with attention-deficit/hyperactivity disorder: Moderators of treatment response. *J Pediatr Psychol*. 2010; 35(3):317–329. The only study to compare BPT in conjunction with routine clinical care in the community to routine clinical care alone. This study did not find that parental ADHD predicted treatment outcome, possibly due to low variability in ADHD symptoms among parents. [PubMed: 19633060]
 23. Babinski DE, Waxmonsky JG, Pelham WE. Treating parents with attention-deficit/hyperactivity disorder: The effects of behavioral parent training and acute stimulant medication treatment on parent–child interactions. *J Abnorm Child Psychol*. 2014
 24. DuPaul, GJ.; Power, TJ.; Anastopoulos, AD.; Reid, R. ADHD rating scale-IV: Checklists, norms, and clinical interpretation. New York: Guilford Press; 1998.
 25. Faraone SV, Buitelaar J. Comparing the efficacy of stimulants for adhd in children and adolescents using meta-analysis. *Eur Child Adolesc Psychiatry*. 2010; 19(4):353–364. [PubMed: 19763664]
 26. Faraone SV, Glatt SJ. A comparison of the efficacy of medications for adult attention-deficit/hyperactivity disorder using meta-analysis of effect sizes. *J Clin Psychiatry*. 2010; 71(6):754–763. [PubMed: 20051220]
 27. Schwartz S, Correll CU. Efficacy and safety of atomoxetine in children and adolescents with attention-deficit/hyperactivity disorder: Results from a comprehensive meta-analysis and meta-regression. *J Am Acad Child Adolesc Psychiatry*. 2014; 53(2):174–187. [PubMed: 24472252]
 28. Adler LA, Spencer TJ, Williams DW, Moore RJ, Michelson D. Long-term, open-label safety and efficacy of atomoxetine in adults with ADHD: Final report of a 4-year study. *J Atten Disord*. 2008; 12(3):248–253. [PubMed: 18448861]
 29. Spencer T, Biederman J, Wilens T, Harding M. Pharmacotherapy of attention-deficit hyperactivity disorder across the life cycle. *J Am Acad Child Adolesc Psychiatry*. 1996; 35(4):409–432. [PubMed: 8919704]
 30. Gau SS-F, Chen S-J, Chou W-J, et al. National survey of adherence, efficacy, and side effects of methylphenidate in children with attention-deficit/hyperactivity disorder in Taiwan. *J Clin Psychiatry*. 2008; 69(1):131–140. [PubMed: 18312048]
 31. Eakin L, Minde K, Hechtman L, et al. The marital and family functioning of adults with ADHD and their spouses. *J Atten Disord*. 2004; 8(1):1–10. [PubMed: 15669597]
 32. Chazan R, Borowski C, Pianca T, Ludwig H, Rohde LA, Polanczyk G. Do phenotypic characteristics, parental psychopathology, family functioning, and environmental stressors have a role in the response to methylphenidate in children with attention-deficit/hyperactivity disorder? A naturalistic study from a developing country. *J Clin Psychopharmacol*. 2011; 31(3):309–317. A study examining predictors of child response to IR-MPH. Maternal ADHD predicted treatment response to IR-MPH even when controlling for adherence, dose, and family conflict. [PubMed: 21508864]
 33. Grizenko N, Kovacina B, Amor LB, Schwartz G, Ter-Stepanian M, Joobar R. Relationship between response to methylphenidate treatment in children with ADHD and psychopathology in their families. *J Am Acad Child Adolesc Psychiatry*. 2006; 45(1):47–53. [PubMed: 16327580]
 34. Chronis-Tuscano A, Stein MA. Pharmacotherapy for parents with attention-deficit hyperactivity disorder (ADHD): Impact on maternal ADHD and parenting. *CNS Drugs*. 2012; 26(9):725–732. [PubMed: 22647070]
 35. Medori R, Ramos-Quiroga JA, Casas M, et al. A randomized, placebo-controlled trial of three fixed dosages of prolonged release OROS methylphenidate in adults with attention-deficit/hyperactivity disorder. *Biol Psychiatry*. 2008; 63(10):981–989. [PubMed: 18206857]
 36. Wender PH, Reimherr FW, Marchant BK, Sanford ME, Czajkowski LA, Tomb DA. A one year trial of methylphenidate in the treatment of ADHD. *J Atten Disord*. 2011; 15(1):36–45. [PubMed: 20071637]

37. Faraone SV, Spencer T, Aleardi M, Pagano C, Beiderman J. Meta-Analysis of the Efficacy of Methylphenidate for Treating Adult Attention-Deficit/Hyperactivity Disorder. *J Clin Psychopharmacol.* 2004; 24(1):24–29. [PubMed: 14709943]
38. Safren SA, Sprich S, Mimiaga MJ, et al. Cognitive behavioral therapy vs relaxation with educational support for medication-treated adults with ADHD and persistent symptoms: A randomized controlled trial. *JAMA.* 2010; 304(8):875–880. [PubMed: 20736471]
39. Evans SW, Vallano G, Pelham W. Treatment of parenting behavior with a psychostimulant: A case study of an adult with attention-deficit hyperactivity disorder. *J Child Adolesc Psychopharmacol.* 1994; 4(1):63–69.
40. Daly JM, Fritsch SL. Case study: Maternal residual attention deficit disorder associated with failure to thrive in a two-month-old infant. *J Am Acad Child Adolesc Psychiatry.* 1995; 34(1):55–57. [PubMed: 7860457]
41. Chronis-Tuscano A, Seymour KE, Stein MA, et al. Efficacy of osmotic-release oral system (OROS) methylphenidate for mothers with attention- deficit/hyperactivity disorder (ADHD): Preliminary report of effects on ADHD symptoms and parenting. *J Clin Psychiatry.* 2008; 69(12):1938–1947. [PubMed: 19192455]
42. Chronis-Tuscano A, Rooney M, Seymour KE, et al. Effects of maternal stimulant medication on observed parenting in mother-child dyads with attention-deficit/hyperactivity disorder. *J Clin Child Adolesc.* 2010; 39(4):581–587.
- 43••. Waxmonsky JG, Waschbusch DA, Babinski DE, et al. Does Pharmacological Treatment of ADHD in Adults Enhance Parenting Performance? Results of a Double Blind Randomized Trial. *CNS Drugs.* 2014 The only study to show that pharmacological intervention (lisdexamfetamine) for parental ADHD is associated with improvements in parenting and child behavior
Improvements in parenting became evident after an extended duration on optimal dose of lisdexamfetamine.
44. Wietecha L, Young J, Ruff D, Dunn D, Findling RL, Saylor K. Atomoxetine once daily for 24 weeks in adults with attention-deficit/hyperactivity disorder (ADHD): Impact of treatment on family functioning. *Clin Neuropharmacol.* 2012; 35(3):125–133. [PubMed: 22561876]
45. Michelson D, Adler L, Spencer T, et al. Atomoxetine in adults with ADHD: Two randomized, placebo-controlled studies. *Biol Psychiatry.* 2003; 53(2):112–120. [PubMed: 12547466]
46. Faraone SV, Biederman J, Thomas SJ, Aleardi M. Comparing the Efficacy of Medications for ADHD Using Meta-analysis. *MedGenMed.* 2006; 8(4):4. [PubMed: 17415287]
47. Johnston C, Mash EJ. Families of children with Attention-Deficit/Hyperactivity Disorder: Review and recommendations for future research. *Clin Child Fam Psych.* 2001; 4(3):183–207.
48. Solanto MV, Marks DJ, Wasserstein J, et al. Efficacy of meta-cognitive therapy for adult ADHD. *Am J Psychiatry.* 2010; 167(8):958–968. [PubMed: 20231319]
49. Eyberg SM, Funderburk BW, Hembree-Kigin TL, McNeil CB, Querido JG, Hood KK. Parent-child interaction therapy with behavior problem children: One and two year maintenance of treatment effects in the family. *Child Fam Behav Ther.* 2001; 23(4):1–20.
50. MTA Cooperative Group. A 14-month randomized clinical trial of treatment strategies for attention-deficit/hyperactivity disorder. *Arch Gen Psychiatry.* 1999; 56(12):1073–1086. [PubMed: 10591283]
51. Jans T, Philipsen A, Graf E, Ihorst G, Gerlach M, Warnke A. Does the treatment of maternal attention deficit and hyperactivity disorder (ADHD) enhance the efficacy of a behavioural parent training for the treatment of their children’s ADHD? Study protocol of a randomized controlled multicentre trial. *ADHD Atten Def Hyp Disord.* 2009; 1:33–45.
52. Almirall D, Compton SN, Gunlicks-Stoessel M, Duan N, Murphy SA. Designing a pilot sequential multiple assignment randomized trial for developing an adaptive treatment strategy. *Stat Med.* 2012; 31(17):1887–1902. [PubMed: 22438190]