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Predictors and Moderators Two Treatments of Oppositional Defiant Disorder in Children

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ABSTRACT

Objective: The aim of this study was to examine predictors and moderators of behavioral improvement in children with Oppositional Defiant Disorder (ODD) following treatment with Parent Management Training (PMT) and Collaborative and Proactive Solutions (CPS). Initial problem severity, inconsistent discipline, parental attributions of child misbehavior, and child lagging cognitive skills were examined.

Method: One hundred and forty-five children aged between 7 and 14 (103 males, $M = 8.88$ years, ethnicity representative of the wider Australian population) were randomly assigned to PMT and CPS. Assessment was conducted at baseline, post-intervention, and at 6-month follow-up, using independently rated semi-structured diagnostic interviews and parent-ratings of ODD symptoms. Using an intent-to-treat sample in this secondary analysis (Murrihy et al., 2022), linear regressions and PROCESS (Hayes, 2017) were used to examine these predictors and possible moderators of treatment.

Results: Higher pre-treatment levels of conduct problems, lagging skills, and inconsistent discipline predicted poorer behavioral outcomes following both treatments. The only characteristic that moderated treatment outcome was child-responsible attributions – mothers who were more likely to attribute their child's problematic behaviors to factors in the child had significantly poorer outcomes in PMT than CPS at 6-month follow-up.

Conclusions: CPS may be a more beneficial treatment than PMT for families who have been identified as having higher levels of child-responsible attributions before commencing treatment for ODD. While tentative, this provides promising insights as to how treatment outcomes for children with ODD may be improved.

Introduction

Oppositional Defiant Disorder (ODD) is one of the most common childhood psychiatric disorders, with 12-month prevalence rates up to 12.3% in the general population (Demmer et al., 2017; Lawrence et al., 2015). Moreover, the impairments associated with disruptive behaviors represent the most common reason families seek professional intervention (see Merikangas et al., 2009, for a review) and investigating ways to effectively intervene has received considerable attention (Kaminski & Claussen, 2017; Murrihy et al., 2010).

Parent Management Training (PMT) is among the most extensively studied and validated treatments for ODD and Conduct Disorder (CD; e.g., Dedousis-Wallace et al., 2021; Deković & Stoltz, 2015; Eyberg et al., 2008). A major premise of PMT is that ineffective parenting practices, such as harsh and inconsistent discipline, contribute to the origins and course of oppositional behavior in youth and that, therefore, addressing these problematic parenting practices should be the primary focus of intervention. Another promising evidence-based treatment is Collaborative & Proactive Solutions (CPS; see Greene & Winkler, 2019 for a recent review). In contrast to PMT's assumption that challenging behavior occurs largely as a result of ineffective parenting practices, CPS views a child's cognitive deficits (or "lagging skills") —particularly in the domains of flexibility/adaptability, frustration tolerance, and problem-solving – as a major factor contributing to the development of oppositional behavior in youth (Greene, 2010). More specifically, challenging behaviors are said to occur due to "incompatibility episodes," which are conditions where the expectations being placed upon a child outstrip their skills to respond adaptively to the situation (Greene, 2010). For example, consider a child with executive function impairments

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and a parent who insists their child prepare for school independently in the morning. There may be a mismatch between the child's skills and the environmental demands, which may then lead to oppositional behaviors. Treatment focuses primarily on providing the parent and young person training in a collaborative and proactive problem-solving approach that seeks to reduce child-environment incompatibility, develop these lagging skills, and encourage parents to shift their "lenses" (attributions for their child's behavior; Greene & Winkler, 2019; Greene, 2010).

While both treatments have shown significant reductions in disruptive behaviors (e.g., Greene & Winkler, 2019; Ollendick et al., 2016), there is considerable room for improvement inasmuch as only about 50% of youth and their families respond positively to each of these treatments (Colalillo & Johnston, 2016; Greene et al., 2004; Ollendick et al., 2016). Examining predictors and moderators of treatment response may be key in furthering our understanding and improving the outcomes associated with both treatments.

Although predictors for externalizing disorders have received substantial examination, moderators of treatment outcome have only recently emerged. For example, in two recent reviews examining predictors and moderators of psychosocial interventions for conduct problems, one review only identified five potential moderators of treatment outcome (McMahon et al., 2021): initial severity of conduct problems, father engagement, maternal depressive symptoms, individual administration (vs. group), and treatment/targeted prevention approaches (vs. universal prevention). The second review, which examined familial and parental characteristics as predictors and moderators of PMT for conduct problems, found very few familial and parental characteristics that predicted PMT treatment outcomes. Only 5 of the 21 RCT studies examined moderators of treatment outcome and, of these, little consistency was found (Dedousis-Wallace et al., 2021). Both reviews highlighted that moderator analyses have focused on immediate post-intervention outcomes, with only three studies examining response at follow-up, making it difficult to determine whether moderation effects are sustained. Overall, while these findings are promising, the range of potential moderators examined has up until now been limited, particularly in the domains of child and parent characteristics, as well as in establishing moderation of treatment outcomes at a longer term follow-up (Dedousis-Wallace et al., 2021; McMahon et al., 2021; Shelleby & Shaw, 2014).

To date, there has been no examination of moderators of treatment outcome for CPS. Considering this gap in the literature, it is imperative that we continue to systematically identify and examine variables that are both conceptually and empirically associated with response to treatments such as CPS and PMT (Dedousis-Wallace et al., 2021; Maric et al., 2015). The present study's goal is to address this gap by examining pre-treatment characteristics that are conceptually related to CPS and PMT – lagging skills, inconsistent discipline, and parental attributions of child-misbehavior – as well as initial problem severity, which is of empirical interest based on earlier studies (see Shelleby & Shaw, 2014); although, its impact on treatment is not consistent and warrants further attention. These variables will be examined as both predictors and moderators of treatment outcome in the current study at post-intervention and at 6-month follow-up.

Initial Problem Severity

Severity of conduct problems at pretreatment as a predictor and moderator of treatment outcome has been extensively researched (Shelleby & Shaw, 2014). A relatively robust finding is that children with more severe initial conduct problems benefit the most from PMT interventions (Leijten et al., 2018; McMahon et al., 2021); children with more severe problems have a larger range for improvement and their parents may be more motivated to change. In some trials, however, children with more severe behavior problems predicted reduced responsiveness to standard parent training protocols (Dittman et al., 2014; Drugli et al., 2010), and others have found no significant effect (see Shelleby & Shaw, 2014). While these discrepancies, may, in part, be explained by the different study approaches (i.e., prevention versus treatment) and limited variability of initial problem severity (Leijten et al., 2018), they fail to explain the entire variability in these findings (Shelleby & Shaw, 2014). Given that child conduct problems are directly targeted in PMT interventions and indirectly targeted in CPS, understanding their impact on treatment (versus prevention) was considered to be important in this study.

Inconsistent Discipline

Modifying parenting behavior so that parents are more consistent with their disciplinary practices, such as time-out and response cost, is a primary focus in many PMT programs (e.g., McMahon & Forehand, 2003). This is due to poor parenting practices, such as the use of inconsistent discipline, being strongly associated with conduct problems in children and adolescents (e.g., Patterson et al., 1998; Pederson & Fite, 2014). While some studies have

examined parenting behaviors as predictors of treatment outcome, parenting has generally been operationalized in terms of global positive/negative dimensions, such as "ineffective parenting" or "positive parenting" (Dittman et al., 2014; Drugli et al., 2010). Few studies have looked explicitly at the potential impact of inconsistent discipline on conduct problems following PMT intervention (see Dedousis-Wallace et al., 2021). One study examined the predictive effects of inconsistent discipline in a sample of 64 Italian children treated with the Coping Power Program (Muratori et al., 2015). Here, it was found that a decrease in inconsistent discipline was associated with a better outcome in children. However, this was a preventative study, and intervention effects have been found to differ for prevention versus treatment studies (McMahon et al., 2021). While the association between inconsistent discipline and conduct problems is strong, the empirical research examining the impact of inconsistent discipline on treatment outcomes, either as a predictor or moderator, is sparse.

Parental Attributions of Child Misbehavior

Maladaptive attributions of children's behavior (i.e., attributing child behavior to internal, stable, and global causes) are hypothesized to influence how parents accept, engage, and benefit from parent training (Mah & Johnston, 2008; Sawrikar & Dadds, 2018). Parental causal attributions of child misbehavior typically fall into two categories: factors under the parent's control or "parental causal" attributions (e.g., parenting practices and competence) and factors within the child or "child responsible" attributions (e.g., genetic predisposition or negative intent; Snarr et al., 2009).

Research to date suggests that parental causal attributions of child misbehavior are a known predictor of problematic parenting and ongoing child problems (Johnston et al., 2006; Snarr et al., 2009). In contrast, although "child responsible" attributions have been suggested to influence parent training outcomes (Mah & Johnston, 2008), the potential impact on parent training outcomes for children with ODD is unclear as research is limited (Dedousis-Wallace et al., 2021; Sawrikar & Dadds, 2018). For example, child responsible attributions in children with behavioral problems have been shown to predict poor treatment outcomes in some studies (Hoza et al., 2000; Mattek et al., 2016; Sawrikar et al., 2018), while other studies have found no significant impact of parental attributions on treatment outcome (Dittman et al., 2014; Whittingham et al., 2009). No studies, to our knowledge, have examined child responsible attributions as a moderator of treatment outcome in children with behavioral problems. However, the conceptual associations between child-responsible attributions and both CPS and PMT suggest this would warrant further exploration. One of the hypothesized mechanisms of change in CPS is a paradigm shift in how parents view the cause of their child's challenging behavior. More specifically, CPS posits that by viewing their child's challenging behaviors through the prism of lagging skills, parents typically shift the perception of their child as intentionally misbehaving to their child lacking the skills to respond adaptively in a given situation (Greene & Winkler, 2019; Greene, 2010).

Lagging Skills

As noted above, the CPS model conceptualizes children with ODD as possessing deficits in discrete skill sets or lagging skills – in the general domains of flexibility/adaptability, frustration tolerance, emotion regulation, and problem solving – that contribute to oppositional behavior (Greene, 2010). There is also significant evidence supporting the lack of these skills in youth with externalizing disorders (e.g., Burke et al., 2010; Cavanagh et al., 2017; Rhodes et al., 2012; Schoorl et al., 2018). Although several studies have explored the impact of lagging skills on various child-related outcomes (Maric et al., 2015), to our knowledge, no study has examined pre-treatment lagging skills as either a predictor or moderator of treatment outcomes for youth with ODD. Given the theoretical underpinnings of lagging skills within the CPS framework, specifically in its etiology of challenging behaviors and as a target of intervention, it is important to examine the impact of lagging skills on treatment outcome.

The Current Study

The purpose of the present study was to examine initial problem severity, lagging skills, inconsistent discipline, and parental (child-responsible) attributions of child misbehavior as possible predictors and moderators of behavioral improvement in children in an Australian sample of families who received PMT or CPS treatment. We undertook

secondary analyses of data from a randomized control trial with a hybrid clinical trial design.[1] (see Murrihy et al., 2022, for a more in-depth discussion) in which children aged 7–14 years of age were treated for ODD with either PMT or CPS. For the predictor analyses, we hypothesized that higher levels of child behavior problems would predict greater intervention benefits for both treatments, given that it is a target of both interventions. We also hypothesized that higher levels of child inconsistent discipline, child-responsible attributions, and lagging skills would predict poorer treatment outcomes for both CPS and PMT. To date, there have been no studies examining these variables as moderators of treatment outcome for CPS and PMT and, as such, these analyses are exploratory in nature. However, based on relevant theory and the targets of change in these two treatments, we predicted that higher levels of lagging skills would be associated with better outcomes for CPS than PMT, and increased use of consistent discipline would be associated with better outcomes for PMT than CPS. We also predicted that higher levels of child responsible attributions would be associated with better outcomes for CPS than PMT. The differential impact, and severity, of initial child conduct problems across the two treatments is less clear and therefore remains exploratory in nature.

Method

Participants

Participating families included parents, caregivers, and young people (aged 7–14-years-old) who entered a larger study providing treatment for oppositional problems (see Murrihy et al., 2022, for more details). Recruitment avenues were typical for the treatment facility. The Center is a community clinic located in North Sydney, Australia. Clinical referrals constituted 55% of the sample, coming from health practitioners and school personnel. Forty-five percent of families self-referred in response to media advertisements. An initial 20-min phone screen ($n = 232$) was conducted to deem eligibility (see below). Children who met the clinical cutoff on the ODD subscale of the Disruptive Behavior Disorder Rating Scale (DBDRS parent-report; Pelham et al., 1992) were provided with information regarding the study intent, procedures, and random allocation process. Following the screening, 192 families (parent(s) and child) attended the center for a comprehensive assessment to confirm study eligibility and to complete baseline questionnaires. ODD was assessed via clinician observation, parent and child self-report questionnaires, and a semi-structured diagnostic interview.

For inclusion in the study, the young person was required to be 7–14 years of age and to receive a clinical diagnosis of ODD based on the DSM-IV-TR criteria (American Psychiatric Association [APA], 2000). Participants were excluded if they met diagnostic criteria for CD, autism spectrum disorder, or developmental delay or were at high risk of suicide. The current use of illicit substances also rendered participants ineligible for the study. Medication use (e.g., stimulants) was permitted; however, participants were encouraged to stay on a consistent regime during the trial. Parents provided informed consent prior to research participation and data were collected as per the ethical guidelines provided by the Human Research Ethics Committee (HREC 2014000159). Figure 1 shows the movement of participants through each stage of the study.

The data collected for the current study included 145 young people (103 males, $M = 8.88$ years, $SD = 2.04$) and was undertaken as part of a larger outcome study where 160 young people were recruited, met full criteria for participation, and were allocated to treatment. A power analysis was conducted using G*Power 3.1.0 (Faul et al., 2007). With an alpha set at .05, and a sample size of 145, the power was .95 to detect a medium effect size ($d = .50$).

All participants randomized to treatment were included in an intent-to-treat analysis (ITT, N = 145), regardless of program attendance. Young people were predominantly from two-parent families (78%) who identified their ethnicity as Australian (56%). This was followed by European (21%), Asian (6%), African (5%), Central American (4%), New Zealand (2%), and North American (1%). The majority of the participants came from relatively high socioeconomic backgrounds, with 57% of families reporting earning an annual wage greater than AUD$150,000/annum, which is equivalent to USD$101,000/annum. Approximately three-quarters of the parents had obtained undergraduate university degrees.

Of the families included in the current sample, 117 (81%) families completed post-treatment assessments and 100 (70%) families completed 6-month follow-up assessments. No differences were found between treatment conditions or referral sources for the number of families completing treatment, not starting treatment or dropping out of treatment. There were no significant differences between conditions in the severity of behavior problems

[1]The RCT is a hybrid clinical trial in an effort to increase conclusions made about the treatment's generalizability (Michelson et al., 2013). In this study, the hybrid design has been operationally defined as containing a blend of efficacy and effectiveness trial components. Specifically, recruitment sources were from a mixture of clinics and medical settings and through media.

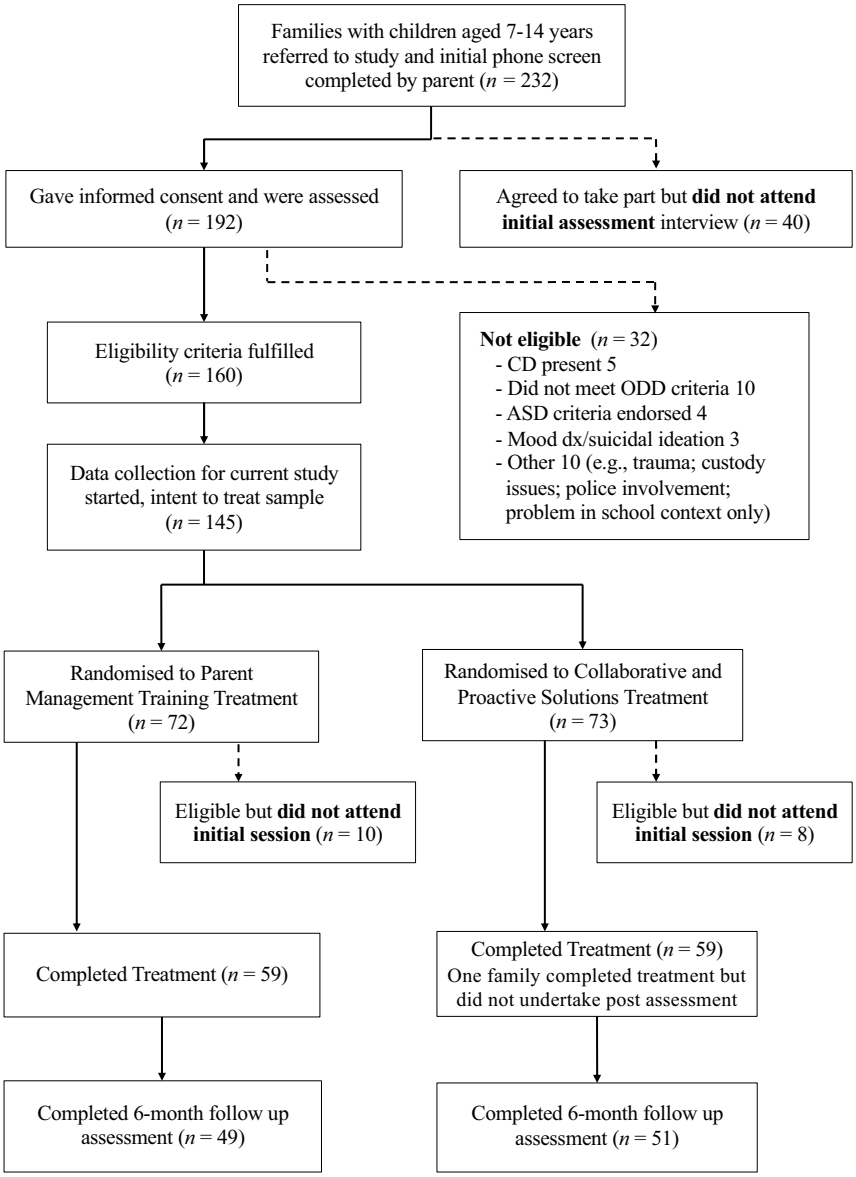

Figure 1. Flow chart of participants through the study.

(ADIS CSR, see below) at pre-treatment for those who dropped out of treatment (both after randomization and also before mid-treatment), and for those who completed treatment ($\chi 2$ (6, 145) = 6.12, $p = .41$). Analyses also revealed no differences ($p > .05$) between sociodemographic variables of families who completed the pre-ADIS assessment only, those who completed the pre- and post-ADIS assessments only, and those who completed all assessments including the follow-up ADIS in terms of income; mother's education; father's education; ethnicity; child's gender; child's age; mother's age; or father's age. Finally, no significant differences ($p > .05$) were observed in the severity of behavioral problems (ADIS CSR) between recruitment source at pre-treatment, post-treatment, or six-month follow-up.

A primary diagnosis of ODD was present for 82% of the participants, whilst 13% had a secondary diagnosis of ODD, and 3% had ODD as a tertiary diagnosis. Of the 18% of participants that did not present with ODD as the primary diagnosis, 58% had Attention-Deficit Hyperactivity Disorder (ADHD) as the primary diagnosis, whilst 27% had an anxiety disorder as the primary concern. Close to the entire sample (96%) had at least one comorbid disorder, with 55% having three or more comorbid disorders. Co-occurring internalizing disorders were frequent with 71% of participants meeting criteria for one or more anxiety disorders. ADHD was the next most commonly co-occurring disorder with over two-thirds of the sample receiving both diagnoses (67%).

Procedure

Assessments were conducted with families at three time points: (1) prior to commencing treatment (pre-treatment); (2) at treatment completion (post-treatment) and (3) 6-months after treatment completion (follow-up). The three assessment time points consisted of the administration of a semi-structured diagnostic interview – The Anxiety Disorders Interview Schedule for DSM-IV, Child and Parent Versions (ADIS-IV-C/P; Silverman & Albano, 1996) - and parent and child self-report questionnaires (see Measures; note all self-report parent measures reported in this study were based on maternal report only). Diagnostic status and symptom severity were determined by the ADIS, which was administered by two separate assessors – one for the parent(s) and another for the young person. The assessors were postgraduate trained psychologists, either current Master of Clinical Psychology interns or experienced clinical psychologists. All assessors received training specific to the ADIS-C/P, which involved a one-and-a-half-day seminar that included training in the differential diagnosis, live observations, and role-plays (under the guidance of a supervisor). Lastly, trainees were required to watch two videos of structured interviews to determine the diagnostic status and clinician severity rating (CSR). An inter-rater reliability of .90 or above on diagnostic status and CSRs was required. Both the parent and child ADIS assessor provided a report of their assessment observations and justification for suggested diagnoses and symptom severity ratings. Final diagnostic status and symptom severity rating were reached by consensus between the two assessors, under the guidance of an experienced clinical psychologist (supervisor). Before commencing treatment, and for the 6-month follow-up assessment, the full ADIS-C/P was administered. However, at the post-treatment assessment, only the ADIS-C/P modules of those disorders that were endorsed at pre-treatment were administered. Although assessors were masked to treatment condition, they were not masked to the endorsed diagnoses at post-treatment assessment. Assessors did not assess cases in which they were involved in treatment and were not aware of the treatment condition to which the youth were randomly assigned. After completing the post-treatment assessment, and again after the follow-up assessment, families were given a gift voucher valued at AU$100. Assessments began in August 2014 and continued throughout the project until its completion in May 2019. Following pre-treatment assessment, eligible families were randomly assigned, using a block randomization procedure (to ensure equivalent treatment group sizes), to one of the two treatment conditions: Parent Management Training ($n = 72$) or Collaborative & Proactive Solutions ($n = 73$). Each treatment condition included up to 16 weekly 60-min sessions, with a booster session delivered two weeks after the last treatment session. The two treatment conditions are further detailed by (Murrihy et al., 2022).

After the initial assessment, 19% of participants withdrew before commencing treatment, most frequently for logistical reasons (e.g., parental work schedules and unable to attend appointment times). Once treatment began, three participants dropped out of the PMT condition (5%), and six dropped out of CPS (9%). Treatment dropout was defined as completing seven or fewer of the 16 treatment sessions. From treatment completion to the post-treatment assessment, no additional participants dropped out of the PMT condition and only one family from the CPS condition completed treatment but did not undertake the post-assessment. Of those who completed treatment, 10 families from the PMT condition and 7 from CPS condition did not complete the follow-up assessment.

A mixture of experienced clinical psychologists (36%) and Master of Psychology interns (64%) delivered the treatment. Of the total families who received treatment, 23% received CPS and 14% received PMT from experienced clinical psychologists. Of the remaining families, 28% of CPS and 35% of PMT families were seen by intern clinical psychologists.

Measures

Treatment Response Outcome Measures

The Disruptive Behavior Disorders Rating Scale (DBDRS; Barkley, 1997; Pelham et al., 1992)

The DBDRS is a parent self-report questionnaire developed to measure symptoms that reflect DSM-IV criteria for ODD, CD, and ADHD. This study used a version of the DBDRS, revised by Barkley (1997), to assess a young person's behavior. Parents scored each item on a 4-point Likert scale ranging from 0 (never or rarely) to 3 (very often). For the eight ODD symptoms, ratings of a "2" (often) or "3" (very often) were treated as meeting criteria for the symptom (see Barkley, 1997). Using this criterion, total scores for the ODD inventory could range from 0 to 8, with a score of 4 or above indicating clinical levels of ODD. The ODD subscale of the DBDRS was used as an outcome measure of severity of conduct problems. Parents completed this measure at pre-, post- and follow-up assessment time points. The DBDRS has demonstrated good reliability (Ollendick et al., 2016; $\alpha = .90$). In the current study, internal consistency was acceptable at each assessment ($\alpha > .80$).

The Anxiety Disorders Interview Schedule for DSM-IV, Child and Parent Versions (ADIS-IV-C/P; Silverman & Albano, 1996)

The ADIS-IV-C/P are parallel semi-structured diagnostic interviews used to assess the presence of psychological disorders, symptom severity, and interference in youth aged 6–16 years. The clinician assesses symptoms and obtains frequency, intensity, and interference ratings (0–8 scale), which are then used by the clinician to identify diagnostic criteria and to develop a clinician severity rating (CSR). A CSR of 4 or above on a 0–8 scale indicates a diagnosis. The ADIS-C/P is reliable and valid for the diagnosis of both ODD and ADHD, in addition to the anxiety and affective disorders (Anderson & Ollendick, 2012; Jarrett et al., 2007; Ollendick et al., 2016). For the current study, the reliability of the structured interview diagnoses was evaluated by an independent rater who listened to, and scored, a random selection of 20% of the recorded interviews. Agreements on diagnoses were $\kappa = .65$ for both the primary and secondary ODD diagnoses, indicating an acceptable level of agreement between raters (Cohen, 1960). The CSR of the ODD interview was used as a second outcome measure for symptom severity at post- and follow-up assessments and as a predictor measure for pre-treatment symptom severity.

Predictor/Moderator Measures

Inconsistent Parenting

The Inconsistent Discipline subscale from the Alabama Parenting Questionnaire – Short Form (APQ-SF; Elgar et al., 2007) was used to measure inconsistent parenting (e.g., "You threaten to punish your child and then do not actually punish him/her"). This is a 3-item subscale that parents respond on a 5-point Likert scale ranging from 1 = "never" to 5 = "always," with total scores ranging from 3 to 15. Psychometric properties have been demonstrated for the APQ-SF in the previous literature, including studies of parents of children with disruptive behaviors (Elgar et al., 2007; Wade & Andrade, 2015). For our current sample, the inter-item reliability, as indicated by Cronbach's alpha, ranged from $\alpha = .744$to .806 across time points.

Child Responsible Attributions

The Child Responsible Attributions (CRA) 10-item subscale from the Parent Cognition Scale (PCS; Snarr et al., 2009) was used to measure child-directed causal interpretation for children's misbehavior (e.g., "My child is headstrong"). Parents indicated their agreement with each statement on a 6-point Likert scale (0 = always true; 5 = never true). All items are reverse scored, with higher scores indicating more biased attributions and a total score ranging from 0 to 50. The PCS has strong psychometric properties with community and clinical samples (Hautmann et al., 2018; Kil et al., 2020; Snarr et al., 2009). The inter-item reliability for this subscale in the current sample, as indicated by Cronbach's alpha, ranged from $\alpha = .860$to .919 across time points.

Lagging Skills

The Assessment of Lagging Skills is a 9-item self-report measure designed to examine lagging skills in the child (Greene, 2010). The lagging skills examined are in the domain of executive functioning (e.g., "Has difficulty considering the likely outcomes or consequences of actions"), emotion regulation (e.g., "Has difficulty managing an emotional response to frustration so as to think rationally"), and social skills ("Shows difficulty appreciating another person's perspective or point of view"). Parents indicated their agreement with each statement on a 4-point Likert scale (0 = never; 3 = always), with higher scores indicating greater impairment and total scores ranging from 0 to 27. The Assessment of Lagging Skills is a shortened version of the Assessment of Lagging Skills and Unsolved Problems used by Greene (2014). The inter-item reliability for this subscale in the current sample, as indicated by Cronbach's alpha, ranged from $\alpha = .895$to .922 across time points.

Results

Statistical Analysis

Data were analyzed using intent-to-treat analysis (ITT). All analyses were conducted using IBM SPSS Statistics for Windows (Version 26.0). Independent sample *t*-tests, one-way ANOVAs, and chi-square analyses were used to compare baseline differences between treatment groups, between participants who completed treatment versus those who dropped out of treatment, as well as between those who did or did not complete post and follow-up assessments. Little's Missing Completely at Random (MCAR) test (Little, 1988) was used to assess whether data were missing completely at random and indicated that the dataset did not deviate from randomness. Data were missing because participants did not attend assessments or randomly missed completing questionnaire items. Missing data were imputed using the Estimation Maximization (EM) method. The statistical significance level set for all the analyses was $p < .05$ (one-

tailed). Baseline analyses were undertaken prior to imputation of missing data. Subsequent analyses were completed using imputed data.

Predictors and Moderators of Treatment Outcome

Severity of initial conduct problem, lagging skills, child-responsible attributions, and the use of inconsistent discipline were examined. Linear regressions were conducted to identify significant predictors of treatment outcome. Initial symptom severity, child age, and child sex were controlled for when examining lagging skills, child responsible attributions and the use of inconsistent discipline. The PROCESS macro version 3.0 (Hayes, 2017) in SPSS 26 was then used to test the moderating effects of treatment on the predictor and outcome variables, using PROCESS Model 1, with 1000 bootstrapped samples. In this model, the independent variable was Treatment (PMT vs CPS), the moderating variable was one of the following: initial problem severity; inconsistent discipline; parental attributions of child misbehavior; and child lagging cognitive skills. The dependent variable was the outcome measure (one of the ADIS or DBDRS measures at either post or follow-up). Child's age, sex, and the initial problem severity scores were added as covariates, except for the moderation analysis that examined initial problem severity, which included sex and age only as covariates. For moderation analyses where the independent variable was multicategorical, indicator coding was used. Unstandardized beta coefficients (B) and 95% confidence intervals were interpreted for significance and effect size. Finally, in the case of a significant interaction effect, further analyses were performed to investigate the effects with simple slope analyses. Interactions were probed using a simple slope procedure with 1 SD above and below the mean (see Aiken & West, 1991; Hayes, 2017).

Baseline Comparisons

Included families did not significantly differ between the two treatment conditions on child gender ($\chi 2$ (1, N = 145) = 1.99, p = .16), child age (t (143) = .12, p = .91), maternal ethnicity ($\chi 2$ (7, N = 145) = 13.36, p = .55), income ($\chi 2$ (2, N = 145) = .151, p = .93), family structure ($\chi 2$ (2, N = 145) = 4.38, p = .63), maternal education ($\chi 2$ (4, N = 145) = 8.817, p = .07), paternal education ($\chi 2$ (4, N = 145) = 5.619, p = .23) and referral source ($\chi 2$ (1, N = 64) = 2.206, p = .14). In addition, no significant baseline differences were found for severity of child conduct problems as measured by the ADIS-IV CSR scores (t (143) = −.735, p = .46) or the ODD scores on the DBDRS (t (143) = −.021, p = .98). Baseline analyses on demographic variables (i.e., child age, child gender, maternal ethnicity, income, maternal and paternal education, and type of school) by referral source were also conducted. No significant differences were observed ($p > .05$).

Table 1. Descriptive statistics for pretreatment study variables and outcome measures by intervention condition.

	CPS		PMT		
	M	(S.D.)	M	(S.D.)	Range
Outcome measures ADIS CSR					
Pretreatment	6.8	(0.9)	6.8	(1.0)	4–8
Posttreatment	4.2	(1.9)	3.7	(1.9)	0–8
Follow-up	3.7	(1.8)	3.8	(1.7)	0–8
DBDRS					
Pretreatment	5.3	(2.1)	5.1	(2.0)	0–8
Posttreatment	3.1	(2.3)	2.7	(2.1)	0–8
Follow-up	2.7	(2.2)	2.4	(2.0)	0–8
Study variables at pretreatment					
Lagging skills	16.9	(4.3)	14.7	(3.7)	6–27
Child-responsible attributions	36.4	(6.3)	35.4	(5.8)	22–48
Inconsistent discipline	8.3	(1.9)	8.3	(1.8)	3–12
Initial problem severity	6.8	(0.9)	6.8	(1.0)	4–8

CPS = Collaborative and Proactive Solutions; PMT = Parent Management Training; ADIS CSR = Anxiety Disorders Interview Schedule, Clinician Severity Ratings, Oppositional Defiant Disorder; DBDRS = Disruptive Behavior Disorder Rating Scale; Initial problem severity = Pre-treatment Anxiety Disorders Interview Schedule, Clinician Severity Ratings.

Preliminary Analyses

Table 1 summarizes the descriptive statistics for all study variables at pre-treatment and correlations for all study variables are presented in Table 2.

Predictors

Of the four predictor variables examined, each yielded significant results (see Table 3). Higher levels of pre-treatment conduct problems as obtained on the ADIS-IV predicted poorer treatment outcomes at post treatment (CSR: F(1, 144) = 5.96, ΔR^2 = .094, $p < .001$) and at 6-month follow-up (CSR: F (1, 144) = 2.06, ΔR^2 = .022, $p < .05$).

Lagging skills were also a significant predictor on both outcome measures at post therapy (CSR: F(1, 144) = 7.12, ΔR^2 = .175, p = .001; DBDRS: F(1, 144) = 6.02, ΔR^2 = .122, $p < .001$). The pattern of results was similar for each measure, whereby elevated levels of lagging skills at pre-treatment were associated with poorer treatment outcomes.

Similarly, higher levels of inconsistent discipline significantly predicted poorer treatment outcomes at post

Table 2. Correlations among pretreatment study variables and outcome measures.

		1	2	3	4	5	6	7	8	9	10	11
1.	ADIS CSR-Post	1										
2.	ADIS CSR-Follow	.54**	1									
3.	DBDRS- Pre	.32**	.015	1								
4.	DBDRS-Post	.60**	.48**	.30**	1							
5.	DBDRS-Follow	.51**	.68**	.23**	.41**	1						
6.	Age in Years (child)	.09	.04	.19*	.02	.08	1					
7.	Sex (child)	−.020	−.12	−.06	−.17	.08	.05	1				
8	Initial Prob sever	.26*	.014	.23**	.19	.22	.13	.12	1			
9.	Lagging Skills	.022	.02	.31**	.18	.017	.12	.05	.33*	1		
10.	Child Resp Attri	.36**	.40**	.36**	.29*	.33**	.08	−.20*	.355*	.23	1	
11.	Inconsistent Disc	.24*	.12	.19*	.13	.12	.10	.05	.17	−.05	.32**	1

ADIS CSR = Anxiety Disorders Interview Schedule, Clinician Severity Ratings, Oppositional Defiant Disorder; DBDRS = Disruptive Behavior Disorder Rating Scale; Initial Prob sever = Pre-treatment Anxiety Disorders Interview Schedule, Clinician Severity Ratings, Oppositional Defiant Disorder; Child Resp Attri = child responsible attributions; Inconsistent Disc = Inconsistent Discipline.
*$p < .05$ level (two-tailed).
**$p < .01$ level (two-tailed).

Table 3. Pretreatment predictors of child behavior outcomes at posttreatment and 6-month follow-up.

Outcome variable	Predictor variable	B	SE	β	*p*-Value
Posttreatment					
ADIS CSR	Initial problem sev	0.615	0.162	0.305	0
	Inconsistent disc	0.2	0.083	0.194	.018
	Attributions-Child res	0.058	0.026	0.185	.026
	Lagging skills	0.116	0.036	0.254	001
DBDRS	Initial problem sev	0.386	0.197	0.163	.053
	Inconsistent disc	0.069	0.103	0.057	.504
	Attributions-Child res	0.086	0.031	0.235	.006
	Lagging skills	0.173	0.043	0.323	0
6-month follow-up					
ADIS CSR	Initial problem sev	0.336	0.154	0.182	.031
	Inconsistent disc	0.03	0.081	0.031	.715
	Attributions-Child res	0.041	0.025	0.145	.093
	Lagging skills	0.059	0.035	0.141	.094
DBDRS	Initial problem sev	0.284	0.187	0.128	.13
	Inconsistent disc	0.106	0.097	0.093	.281
	Attributions-Child res	0.063	0.03	0.182	.037
	Lagging skills	0.072	0.042	0.143	.091

ADIS CSR = Anxiety Disorders Interview Schedule, Clinician Severity Ratings, Oppositional Defiant Disorder; Attributions-Child resp = child responsible attributions; DBDRS = Disruptive Behavior Disorder Rating Scale; Initial problem sev = initial problem severity based on ADIS ODD CSR; Inconsistent disc = inconsistent discipline.

therapy, but only for the CSR: $F(1, 144) = 6.06$, $\Delta R^2 = .12$, $p < .001$.

Furthermore, attributions of child misbehavior significantly predicted treatment outcomes for mothers who attributed responsibility to the child for their misbehavior. Specifically, the more mothers attributed the child's misbehavior to factors under the child's control, the poorer the treatment outcome at post-treatment on both outcome measures (CSR: $F(1, 144) = 5.87$, $\Delta R^2 = .119$, $p < .001$; DBDRS: $F(1, 144) = 3.72$, $\Delta R^2 = .07$, $p < .05$), as well as at 6-month follow-up but only on the DBRS; DBDRS: $F(1, 144) = 2.14$, $\Delta R^2 = .031$, $p < .05$).

Moderators

Of the four variables examined, only one was found to be significant and only at the 6-month follow-up. In the moderation test using ADIS CSR 6-month follow-up scores, the overall model containing child-blame attributions, therapy type, and the interaction of the two variables, PROCESS output showed that the model had a significantly good fit ($R^2 = .089$, $F(6, 138) = 2.251$, $p < .041$. As shown in Table 4, the interaction was significant ($\Delta R2 = .025$), $F(1, 138) = 3.91$, $p < .049$, indicating a significant moderation effect of the therapy type. To visualize the interaction of child responsible attributions and therapy type, we plotted the slopes for the interaction effect in Figure 2. Child responsible attributions significantly predicted treatment outcome on the CSR for PMT ($b = .096$, $t = 2.630$, $p = 0.0095$, 95% CI [.0238, .168]) but not for CPS ($b = .0020$, $t = .0649$, $p = .949$, 95% CI [−.0608, .0649]. Figure 2 shows that mothers who were more likely to attribute their child's problematic behaviors to factors in the child did significantly poorer in PMT than in CPS at 6-month follow-up on the CSR.

Table 4. Regression model testing moderation effects of treatment type on the relationship between child-responsible attributions and ADIS CSR ODD symptom score at 6-month follow-up.

Effect	*B*	*SE*	*t*	*p*	95% CI	
					LL	*UL*
Constant	2.766	1.245	2.219	.0281	.3010	5.231
Child resp	.0960	.0365	2.631	.0095	.0238	.1681
Therapy	−.276	.3212	−.858	.557	−.727	.394
Interaction						
Child resp × Therapy	−.0939	.0475	−1.980	.0498	−.1878	−.0001

Child resp = child responsible attributions.

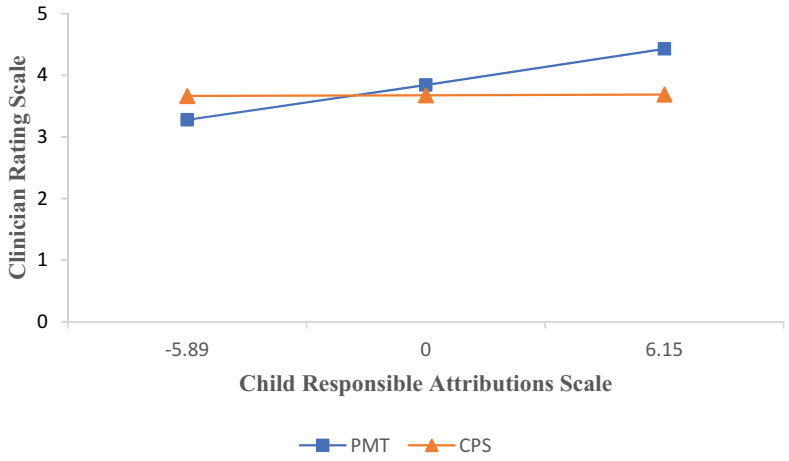

Figure 2. Parental child responsible attributions as a moderator of treatment response (CPS and PMT) for the clinician severity rating outcome. PMT = Parent Management Training; CPS = Collaborative & Proactive Solutions; Clinician Severity Rating = Anxiety Disorders Interview Schedule, Oppositional Defiant Disorder.

Discussion

Although both PMT and CPS have been shown to be effective treatments for children with conduct problems and are considered to be evidence-based (Eyberg et al., 2008; Ollendick et al., 2016), only about 50% of youth improve following these treatments. As a result, the need to identify variables that might serve as predictors of change and potential moderators of change is evident. Although variables can serve as both predictors and moderators of treatment outcome (Judd et al., 2001), not all predictor variables serve as moderators of treatment outcome and indeed not all moderators serve as predictors of treatment outcome (see Maric et al., 2015; for further discussion; Ollendick et al., 2008). The current study examined the impact of four potential predictors/moderators of change: severity of initial child conduct problems, lagging skills, parental attributions of child responsibility for behavior ("child responsible attributions") and inconsistent discipline on child conduct problems in families with children with ODD. Families were randomized to either PMT or CPS, and outcomes were measured post-treatment and again at 6 months following treatment. Of these four variables, all were found to be predictors of change, but only child-responsible attributions were shown to have a moderation effect on outcomes.

We found that mothers who were more likely to attribute their child's problematic behaviors to factors the child can ostensibly control did significantly poorer in PMT than CPS at 6-month follow-up, although not at the initial post-treatment assessment. We can only hypothesize about the factors underlying this limited moderation finding. PMT identifies and directly targets child misbehavior as a primary focus of intervention. The main focus is arguably therefore on "fixing" the child. For those parents who have high pre-treatment child responsible attributions, this may inadvertently reinforce the belief that the child is indeed to blame for their misbehavior. Also, while the variant of PMT utilized in this study does make mention of child characteristics that may contribute to problematic behavior, the primary emphasis in this study was on inept parenting practices contributing to such behavior. By contrast, CPS places a strong emphasis on a child's lagging skills as a major contributor to children's oppositional behavior while also emphasizing the transactional forces that combine to result in concerning behavior. As noted by Greene and Winkler (2019), this provides an

opportunity to build parental empathy about how lagging skills make responding to certain situations as challenging, rather than being attributable solely to factors solely under the child's control (e.g., being intentionally defiant and headstrong). It is possible that parents who come into treatment believing that a child's problematic behaviors are attributable to characteristics of the child – and who endorse beliefs such as "My child is headstrong," "My child purposely tries to get me angry," and "My child likes to see how far he/she can push me" – may have greater difficulty being helped to appreciate the role of parenting practices in children's oppositional behavior as delineated by PMT. Furthermore, these beliefs may hinder parents from successfully engaging in the parenting strategies contained in PMT. As such, our findings suggest that parents with high levels of child responsible attributions before commencing treatment appear to benefit less from engaging in PMT interventions than CPS.

Interestingly, in addition to being a moderator, high levels of child responsible attributions were also found to predict poorer treatment outcomes across both treatments. Specifically, the more mothers attributed the child's misbehavior to factors under the child's control, the poorer the treatment outcome at 6-month follow-up, although not at the initial post-treatment assessment. Mattek et al. (2016) showed similar findings – caregivers of low-income urban children with behavioral problems, who at intake viewed their child as more responsible for their own behavioral problems, were also significantly more likely to be classified as not attaining early treatment success. While both of these findings require replication, they suggest that parental attributions of child misbehavior may play an important role in the treatment outcome for children with conduct problems and may provide useful information for clinicians before commencing treatment. For example, considering high pre-treatment child responsible attributions predicted poorer outcomes for both treatments, it may prove to be beneficial to regularly "check in" and monitor parental beliefs regarding their attributions to the causes of their child's misbehavior and provide additional modules and/or time spent targeting attributions either directly or indirectly. Perhaps for PMT this could include extending the modules on the psychoeducation on the causes of child misbehavior whilst encouraging parents to modify these beliefs using strategies such as Socratic questioning or cognitive restructuring. For CPS, this may include more deliberately and explicitly discussing causes of misbehavior (i.e. mismatch between the child's skill and demands of the situation) more consistently throughout the intervention. It may also prove to be beneficial to continue to provide regular "check ins" or booster sessions once treatment has finished to further reinforce these strategies and to ensure parents continue to implement them post treatment.

Our hypothesis that higher levels of child behavior problems would predict more significant intervention benefits for both treatments was not supported. Instead, we found that higher levels of child behavior problems predicted poorer treatment outcomes at post-therapy and at 6-month follow-up for both treatments. Although inconsistent with our hypotheses, this finding is consistent with that of Drugli et al. (2010) who showed that children who displayed more severe externalizing problems before treatment were more likely to exhibit conduct problems one year after treatment. In our main treatment study, many children achieved a substantial reduction in conduct problems immediately following treatment, with 45–50% of children moving into the non-clinical range after treatment, and two-thirds being considered much improved. These gains were maintained at the 6-month follow-up (Murrihy et al., 2022). However, despite these improvements, a significant proportion of children (up to 50%) still had a diagnosis of ODD at post-therapy and 6-month follow-up. These children are likely to represent those children who are particularly difficult to treat. Perhaps, children who exhibit severe conduct problems before commencing treatment require more extensive support (e.g., longer treatment time and more intensive follow-up) than what was provided in the current study.

We also found that greater use of inconsistent parental discipline at pre-treatment significantly predicted poorer treatment outcomes at post-therapy for both treatments, albeit not at 6-month follow-up across the treatments. Our findings are in contrast to a recent preventive study that found families were more likely to benefit from the Incredible Years intervention if they showed high levels of disruptive behavior combined with high levels of inconsistent parenting (van Aar et al., 2019). Thus, the role of problem severity and inconsistent discipline seems to differ depending on the context of the intervention, i.e., as treatment (in the current study) or as in prevention (van Aar et al., 2019). Our results extend previous findings linking inconsistent discipline with the development of conduct problems and add to the relatively scarce research examining this as a predictor of treatment outcome for children with conduct problems (Dedousis-Wallace et al., 2021).

Similarly, we found that both treatment conditions were less effective at post-treatment for children with higher levels of lagging skills. This pattern of results was found on both our outcome measures from the

independent assessor (CSR-ADIS) and the parent report measure (DBDRS) at post-therapy. While our hypothesis for a differential effect between CPS and PMT was not met, these results add support to the notion that lagging skills may be present in many children and in turn may contribute to the development of disruptive behaviors and, in addition, may need to be directly assessed and addressed in future studies (Greene & Winkler, 2019).

In sum, the current study found that high pre-treatment levels of child responsible attributions, lagging skills, inconsistent discipline, and the severity of initial child conduct problems all predicted poorer treatment outcomes across treatments. These predictor variables potentially serve as prognostic indicators (MacKinnon et al., 2013) of treatment outcome and, therefore, can inform treatment. For example, clinicians may be more cognizant of providing additional support (e.g., additional intervention components to target family stressors) for parents identified as inconsistent in their disciplinary practices before commencing treatment, especially so for children presenting with more severe behavioral problems. Additionally, children with a high degree of lagging skills at pre-treatment and whose parents blame them for their misbehavior may benefit from a more extended treatment in terms of duration and/or intensity (Sanders, 1999).

Strengths, Limitations, and Future Directions

This study had several strengths. Overall, this study advances the field by addressing significant gaps in the extant literature. The trial simultaneously explores both predictors and moderators of change for children with conduct problems. The importance of furthering our understanding of predictors of change, as well as increasing our understanding for whom and under what circumstances treatments have different effects by examining moderators, has long been identified as a worthy goal for improving treatments (Kraemer et al., 2002). Despite this, research exploring moderators of treatments for children with conduct problems is an understudied area of research (see Dedousis-Wallace et al., 2021 for a review). In the absence of strong empirical support for intervention moderators that have been examined in the literature to date, we examined variables that we thought were conceptually associated with treatment outcomes for CPS and PMT (see Prins et al., 2015, for this strategy). The study employed different means of assessing the children's behavior: a dimensional parent-report measure and a clinician-rated semi-structured interview measure that indicated the presence of a diagnosis and the severity of the symptoms. Sole reliance on parent-report measures may result in a treatment bias effect whereby participants overestimate rates of improvement due to demand characteristics and the desire to demonstrate improvement (Loerinc et al., 2015). The use of a clinician-rated measure in conjunction with a parent-rated measure served to mitigate this effect.

Notwithstanding these positive features, this study also had several limitations. As previously mentioned, the use of both parent report and clinician-rated measures was a strength of our study; however, the current study could be further strengthened by including a multi-informant method of measuring changes in child conduct problems. For instance, future studies may benefit from the inclusion of additional informants (such as the child's teacher or the child) or an additional mode of assessment (such as direct observation). With regard to the latter, it has been suggested that direct behavioral observations as an outcome measure may be more sensitive to intervention effects in comparison to parent reports alone of child behavior (see Scott, 2001). Also, the assessment of lagging skills used in the current study was relatively global, including both cognitive and behavioral skills. Future research may benefit from a more fine-tuned approach to the examination of specific lagging skills that target various components of these skills (e.g., planning/organizing and working memory) as moderators and/or predictors.

An additional limitation is the drop-out rate at post-assessment (19%) and at 6-month follow-up (30%), potentially impacting our results. However, such dropout rates are not uncommon in studies addressing ODD (Chacko et al., 2016; Murrihy et al., 2010; Ollendick et al., 2016), with our drop-out rate being relatively modest compared to other multiphase intervention studies addressing externalizing problems (Chacko et al., 2016). Nevertheless, to mitigate this potential risk, rigorous statistical procedures were used to ensure that outcomes were representative of the total sample. Analyses undertaken confirmed that no differences were found between treatment conditions for the number of families completing treatment, not starting treatment, or dropping out of treatment. The current study was also limited by the demographic homogeneity of the sample (i.e., predominantly white and middle to upper-class families). However, it is noteworthy that our sample was representative in terms of income, education, and schooling levels, for a clinic in this region (Australian Bureau of Statistics [ABS], 2016). In addition, no differences were found at baseline on income level between the two treatment groups. Despite this, the sample reflects the challenges of recruiting and maintaining participation from a diverse

sample of families for participation in clinical treatment studies (Booker et al., 2019).

Although our findings suggest that parents who were more likely to attribute their child's misbehavior as being within the child's control benefited more from CPS than PMT, this result requires further replication in order to make more definitive conclusions. Nonetheless, it provides promising insights as to how treatment outcomes for children with ODD may be improved. Future studies should explore the potential impact of addressing parental attributions on treatment outcomes. Additionally, it might be of benefit to explore family and therapist characteristics, such as family and therapist treatment preference, which may signal the "goodness of fit" between therapists, treatments, and families (Ollendick et al., 2016). This suggestion is particularly indicated by findings that parents are likely to selectively use strategies presented over the course of treatment depending on how well these fit with their parenting experiences and personal philosophies (Rahmqvist et al., 2014). Also, while we did not find lagging skills to moderate treatment outcome, future studies could benefit from examining the interaction between unique individual characteristics, such as lagging skills, with environmental characteristics, such as specific parenting factors (i.e., responsiveness and demandingness). Another important individual characteristic is child temperament. While specific child temperament profiles have been shown to differentially predict child treatment outcomes in anxiety disorders (e.g., Capriola et al., 2017), the research exploring the potential impact of child temperament on ODD treatment outcomes is sparse. This line of investigation may be particularly pertinent in the context of recent findings whereby child temperament both predicted and moderated ODD symptoms in preschoolers following an eight-week multimodal intervention that included a behavioral modification component (Hare & Graziano, 2021). Such findings further highlight the continued importance of examining a range of moderating factors that could lend nuance to treatment responses. An additional consideration is that the current study is obviously limited to the examination of only two treatments: CPS and PMT. It may be of future interest to also explore the impact of the variables examined, or indeed other characteristics noted, on other evidence-based treatment for conduct problems (Kaminski & Claussen, 2017). In terms of additional future directions, exploring mediators of treatment outcome would be of benefit, as the mechanisms through which gains are made will likely differ between the two treatment approaches.

Disclosure Statement

R.G., A.D.-W., and S.D. received royalties related to work concerning Collaborative and Proactive Solutions. The remaining authors have no conflict of interest.

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