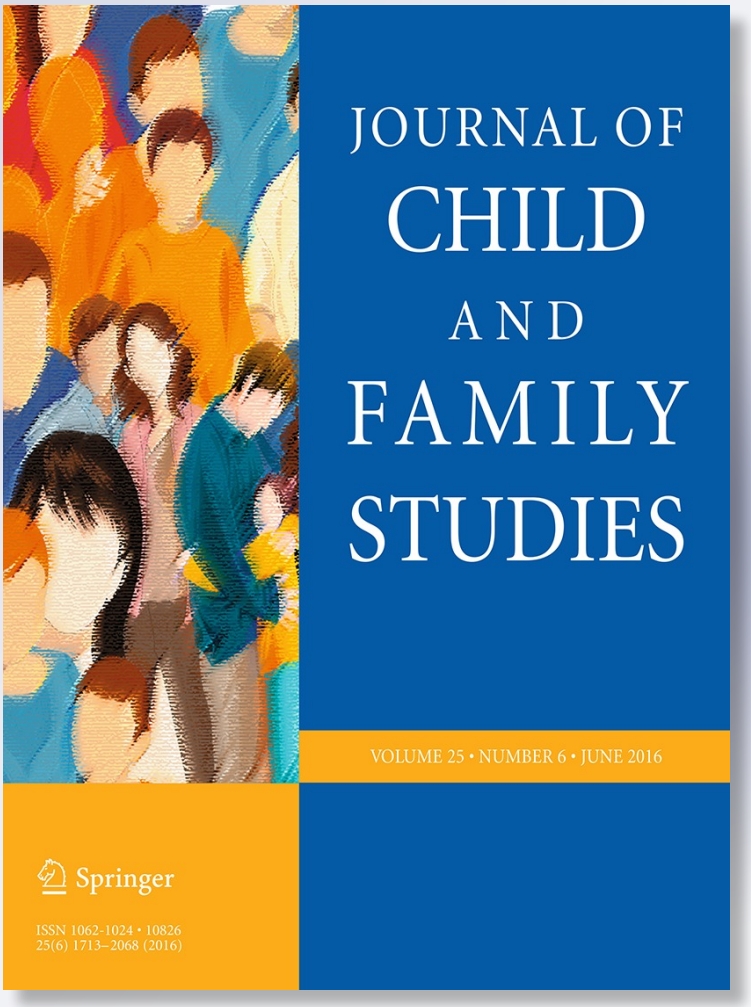
Parent–Child Synchrony in Children with Oppositional Defiant Disorder: Associations with Treatment Outcomes

Rachel L. Miller-Slough, Julie C. Dunsmore, Thomas H. Ollendick & Ross W. Greene

Journal of Child and Family Studies

ISSN 1062-1024
Volume 25
Number 6

J Child Fam Stud (2016) 25:1880-1888
DOI 10.1007/s10826-015-0356-7



Springer

J Child Fam Stud (2016) 25:1880–1888
DOI 10.1007/s10826-015-0356-7

ORIGINAL PAPER

Parent–Child Synchrony in Children with Oppositional Defiant Disorder: Associations with Treatment Outcomes

Rachel L. Miller-Slough[1] · Julie C. Dunsmore[1] · Thomas H. Ollendick[1] · Ross W. Greene[1]

Published online: 30 December 2015

Abstract Oppositional defiant disorder (ODD), characterized by angry/irritable mood, and argumentative/defiant behavior, is associated with significant negative outcomes in childhood and beyond. Researchers posit that these behaviors arise from poor parenting and/or an incompatibility between characteristics of the child and the child's parents, resulting in strained interaction styles. The present study examines parent–child synchrony, the inverse of parent–child incompatibility as a predictor of children's emotional lability, aggression, and overall functioning following psychosocial treatment. Participants were 75 treatment-seeking families with children diagnosed with ODD (46 boys). Families received one of two empirically supported treatments for ODD (Parent Management Training or Collaborative and Proactive Solutions). Findings indicated that pre-treatment parent–child synchrony was associated with decreased emotional lability and aggression following both treatments, as well as improvement in overall functioning, irrespective of treatment condition. These results reflect the importance of parent–child relations at the onset of treatment in predicting response to treatment and suggest potential treatment targets within parent–child relationships.

Keywords Oppositional defiant disorder · Parent–child synchrony · Treatment outcomes · Adjustment · Psychosocial treatment

✉ Rachel L. Miller-Slough
rlm527@vt.edu

[1] Department of Psychology, Virginia Tech, 109 Williams Hall, Blacksburg, VA 24060, USA

Introduction

Oppositional defiant disorder (ODD) is an externalizing behavior disorder characterized by angry/irritable mood, noncompliance, and defiance (APA 2013) that is often comorbid with other conditions, particularly ADHD (Burke et al. 2002). Longitudinal research suggests that ODD in childhood often precedes later conduct disorder and substance abuse, as well as academic underachievement and school dropout in adolescence (Biederman et al. 2008; Bradshaw et al. 2010; Burke et al. 2002; Murrihy et al. 2010; Nock et al. 2007). Children with ODD may also experience social difficulties, such as peer rejection, that may affect their socio-emotional development and psychological adjustment (Hamilton and Armando 2008). Finally, emotional lability and aggression are common in children diagnosed with ODD (Aebi et al. 2010). Emotional lability refers to frequent mood swings and emotional outbursts that are easily triggered (APA 2013; Shields and Cicchetti 1997).

The prevalence of ODD symptoms may vary depending on specific demographic characteristics. Symptoms of ODD are more prevalent in boys as compared to girls (Loeber et al. 2009), particularly in middle childhood. Oppositional behavior and aggression have been found to peak midway through late childhood and then decrease in adolescence, at which time property and status offenses tend to become more prevalent (Lahey et al. 2000). Traditionally, the behaviors associated with ODD are thought to stem from inadequate parent management (e.g., Eyberg and Bussing 2010; McMahon et al. 2011). However, parent–child incompatibility has also been proposed as a possible factor contributing to oppositional behavior in youth (e.g., Greene 2011; Greene and Doyle 1999). As an extension of goodness-of-fit theories (e.g., Chess and

Thomas 1977; Sameroff and Seifer 1983), Greene proposed that oppositional behavior occurs as the byproduct of a poor "fit" or "match" between characteristics of a child (including his or her skills) and characteristics of the child's parents (including the demands and expectations they are placing on the child). Parent–child synchrony is likely to overlap (in the obverse direction) with Greene's concept of parent–child incompatibility.

Parent–child synchrony is defined as the ability of a parent–child dyad to share meaning and perspective on events and reflects the degree to which the dyad exhibits active involvement by both parent and child in problem solving efforts (Laible and Song 2006). A parent–child dyad high in synchrony tends to be responsive to one another and actively engages each other in conversation, rather than the parent solely directing the child through the conversation (Deater-Deckard and Petrill 2004). Parent–child synchrony may be lower in less compatible dyads and affect their ability to work together to both minimize problem behaviors and to effectively solve them. Thus, the purpose of the current study was to examine parent–child synchrony as a predictor of children's treatment response in a clinical sample of youth referred for treatment.

There is a growing body of literature regarding the benefits of parent–child synchrony, sometimes referred to as mutuality, shared positivity/affect, or dyadic intersubjectivity (Kim and Kochanska 2012; Laible 2011). Responsive and cooperative parent–child exchanges may help children develop self-regulatory capacities and reduce excessive negative affect (Koren-Karie et al. 2003). By working together to co-construct details and derive meaning from previous challenging events, children may also strengthen their awareness and identification of their emotions (Morris et al. 2007). Research demonstrates that parent–child dyadic synchrony is related to higher self-esteem in early adolescence. Further, parent–child shared positive affect has been shown to be associated with prosocial behavior (Lindsey et al. 2008). Deater-Deckard and Petrill (2004) reported that shared warmth and cooperation between parent and child were associated with less aggression. These effects appear to be relationship-specific, in that children higher in aggression exhibit less mutuality with parents than do their less aggressive siblings. Further, Barber et al. (2001) reported that a warm, supportive family environment in which parents are in tune with their child's emotions was related to fewer conduct problems and greater emotional adjustment. Synchrony has recently been examined in clinical samples and found to be lower in families of clinic-referred youth, compared to families of typically developing children (Im-Bolter et al. 2015). Given its associations with fewer behavior problems, parent–child synchrony may be an important consideration in treating children with ODD. Flowing from the belief that inadequate parent management practices are a primary contributor to the behaviors associated with ODD, Parent Management Training (PMT; Barkley 1997) teaches parents to identify and monitor their child's behavior in order to promote desired behaviors, such as pro-social behavior, and to decrease oppositional behaviors through contingency management (see also Kazdin 2005). Many randomized controlled trials have demonstrated that PMT is more effective than other treatment and control conditions in treating disruptive behaviors and promoting positive social behaviors, with many children maintaining treatment gains 1–3 years following treatment (Feldman and Kazdin 1995; McMahon et al. 2011; Webster-Stratton and Reid 2011). Although the majority of PMT focuses on modifying parent behaviors and practices, the intervention can also have positive effects on the emotional adjustment in the parent–child dyad.

Emanating from the belief that ODD-related behaviors stem from parent–child incompatibility, Collaborative and Proactive Solutions (CPS; Greene 2011; Greene and Doyle 1999) is another treatment option for oppositional children and their families. A family-based cognitive-behavioral treatment, the CPS approach teaches parents and children how to effectively problem-solve together. CPS aims to improve parent–child synchrony and decrease conflict through the collaborative resolution of problems. Early research in a small randomized trial demonstrated CPS to be as effective as parent training interventions in reducing children's behavior problems both at post-treatment and four-month follow-up (Greene et al. 2004). A larger, randomized controlled trial of PMT and CPS, from which the secondary analyses reported in this paper are drawn, also reported that CPS was as effective as PMT in reducing children's oppositionality and psychological adjustment (blinded for review).

The present study utilized multi-method assessment to examine whether parent–child synchrony enhances treatment response for children with ODD. More specifically, parent–child synchrony was examined in relation to children's emotional lability, aggression, and overall functioning following treatment. The present study extends the current research on parent–child synchrony to middle childhood and also to atypically developing children undergoing treatment (Deater-Deckard and Petrill 2004; Im-Bolter et al. 2015; Laible and Song 2006). Further, measurement at multiple time points is critical to examine changes in children's behavior following treatment. We put forth three hypotheses, corresponding to our three outcomes of interest. First, across treatment groups, observed parent–child synchrony at pre-treatment will be associated with decreased emotional lability at post-treatment, as measured by parental report on the Emotion Regulation Checklist (Shields and Cicchetti 1997). Second, across

treatment groups, observed parent–child synchrony at pre-treatment will be associated with decreased aggression at post-treatment, as measured by parental report on the Behavioral Assessment Scale for Children, Second Edition (BASC-2; Reynolds and Kamphaus 2004). Third, across treatment groups, parent–child synchrony at pre-treatment will be associated with improved overall functioning at post treatment. Specifically, parent–child synchrony is expected to be associated with an improved score on the Children's Global Assessment Scale (CGAS), which was determined by assessment clinicians at post-treatment.

Method

Participants

Participants were 75 children (46 boys; 7–12 years old; $M = 9.66$, $SD = 1.75$) and their parents (55 mothers, 20 fathers) who received treatment for ODD as part of a larger treatment outcome study (Ollendick et al. 2015). To be included in the study, children had to meet diagnostic criteria for ODD but not Conduct Disorder, Autism Spectrum Disorder, or psychosis. Further, children could not have estimated Full Scale IQs below 80 or current suicidal or homicidal ideation. For a summary of demographic information in this subsample, see Table 1. Overall, sample demographics were comparable to those in the region from which the sample was drawn (4.75 % African American, 4.3 % Asian American, 88.45 % Caucasian, 2.65 % Hispanic/Latino, .25 % Native American, 1.8 % Biracial; 77.35 % two-parent households; United States Census Bureau 2014).

Table 1 Family demographics as a percentage of the sample (n = 75)

Characteristic	*n* (%)
Family structure	
Adoptive/foster	3 (4.0)
Married/together	44 (58.7)
Parent and step-parent	5 (6.7)
Single parent	9 (12.0)
Divorced/separated	11 (14.7)
Other	3 (4.0)
Race/ethnicity	
African-American	7 (9.3)
Asian	2 (2.7)
Caucasian	60 (80.0)
Hispanic	4 (5.3)
Other	2 (2.7)
Maternal education	
Some high school	2 (2.7)
High school diploma	5 (6.7)
Trade school	3 (4.0)
Some college	18 (24.0)
College diploma	31 (41.3)
Graduate school	16 (21.3)
Paternal education	
Some high school	4 (5.3)
High school diploma	22 (29.3)
Trade school	2 (2.7)
Some college	9 (12.0)
College diploma	13 (17.3)
Graduate school	18 (24.0)

Procedure

Families seeking treatment for their children's oppositional behaviors were recruited from a university-based clinic. After completing an initial screening interview via telephone with a research assistant, those meeting inclusion criteria were randomly assigned to a treatment condition [Collaborative and Proactive Solutions (CPS) or Parent Management Training (PMT)] and invited for a pre-treatment assessment session. After obtaining written and verbal informed consent, the parent and child completed a structured clinical interview, measures regarding the child's emotional adjustment and disruptive behaviors, and an emotion-focused discussion task.

Families in both treatment conditions received weekly treatment for up to 14 sessions. Participating families received treatment free of charge, along with $50 for each assessment session (pre-treatment, post-treatment).

All clinician therapists and assessment interviewers were post-masters graduate students in clinical psychology under the supervision of licensed clinical psychologists and were trained on the treatment and assessment procedures (blinded for review). Assessment interviewers were blind to treatment condition and did not serve as treatment clinicians. All assessments were videotaped; 30 % of which were coded by another independent assessor blind to the treatment condition to ensure reliability amongst assessment interviewers.

Measures

Anxiety Disorder Interview Schedule, Fourth Edition (ADIS-IV; Silverman and Albano 1996)

To measure ODD symptoms and other behavior problems at pre- and post-treatment, an assessment clinician

administered the ADIS-IV. The ADIS-IV is a widely used assessment used to ascertain the presence of a number of child psychiatric disorders. The interview consists of symptom and criteria-relevant questions based on the Diagnostic and Statistical Manual of Mental Disorders, (4th ed., DSM-IV; APA 2000). At the end of the ADIS, the clinician determined Clinician Severity Ratings for areas of concern and assigned diagnoses. The ADIS-IV has been found to be a reliable assessment tool, demonstrating test–retest reliability in clinical and community samples (Silverman et al. 2001), including youth with ODD (Anderson and Ollendick 2012). In the present study, 65.4 % of children also met criteria for ADHD and 58.7 % of children also met criteria for an anxiety disorder in addition to ODD. All interviews were videotaped, 20 % of which were reviewed by a second clinician for reliability. Using Cohen's Kappa, agreement on primary, secondary and tertiary diagnoses were .77, .85, and .86, respectively.

In addition to determining diagnoses, the information from the ADIS was used to create the CGAS rating at pre and post-treatment (CGAS; Shaffer et al. 1983). As mentioned earlier, children's CGAS score at pre and post-treatment was utilized in the present study as a measure of overall functioning. Research demonstrates the CGAS to be a valid and reliable tool in clinical research and practice to capture broader functioning, rather than disorder-specific ratings (Bird et al. 1987; Green et al. 1994).

Emotion Talk Task

Parent–child synchrony was observed during a parent–child conversation task intended to facilitate discussion of positive and negative emotions. Dyads were provided with three prompts relevant to the past week: discuss a time they felt happy, a time they felt upset (sad/angry/scared), and what they did the previous Sunday. Both parent and child responded to each prompt. Children completed this task with whichever parent (mother or father) accompanied them to the appointment. Thus the present study examined *parent*–child synchrony, and was not specific to either mother–child or father–child synchrony. Dyads were given nine minutes to complete this task, which was video-recorded and subsequently coded. Based on coding procedures recommended by Laible and Song (2006), dyads were coded for the degree of shared meaning and togetherness expressed during the task, such as agreement on details of the event, perceived connectedness or concordance, and shared affect. Dyads were coded as 0 (did not share focus, attention, or ideas at all), 1 (very disconnected, rarely expressed shared meaning or togetherness), 2 (seemed to share focus, attention, or ideas occasionally), 3 (often expressed shared meaning, fairly connected), or 4 (very connected, frequent shared meaning). Dyads were coded for parent–child synchrony during the discussion of the negative events discussion task only.

Videos were coded by an undergraduate team led by a graduate student, with 30 % of videos coded for reliability. The team was trained on the coding scheme for 3–4 weeks, after which they met for bi-weekly consensus meetings. The inter-rater reliability for the aforementioned code was maintained at an intra-class coefficient >.80.

Behavior Assessment System for Children, Second Edition (BASC-2; Reynolds and Kamphaus 2004)

Parents reported on their child's internalizing and externalizing symptoms, as well as adaptive functioning, on the Parent Rating Scales of the BASC-2. Parents completed the BASC-2 at pre-treatment and post-treatment. Raw scores were converted to *T*-scores based on age and gender.

The BASC possesses adequate internal consistency and test–retest reliability (Reynolds et al. 2011). The BASC also exhibits convergent and criterion validity, and also contains validity checks to inform clinicians of careless responding or reporter bias (Doyle et al. 1997; Reynolds et al. 2011). The present study utilized the pre-treatment and post-treatment scores on the Aggression scale from the parent BASC. Given the aforementioned high comorbidity between ODD and ADHD (Burke et al. 2002), the Inattention and Hyperactivity *T*-scores at pre-treatment were entered as covariates. All of these scales were found to be reliable in the present study ($\alpha > .80$).

Data Analyses

Thirty of the 75 dyads had complete data on all measures at pre-treatment and post-treatment. The data were missing as follows: at pre-treatment, 54 families completed the emotion talk task, 66 parents completed the BASC, 55 parents completed the ERC, and all 75 families completed the ADIS and received a CGAS score. At post-treatment, 46 parents completed the BASC, 34 parents completed the ERC, and 64 families completed the ADIS and received a CGAS score. Logistic regression and Chi-square analyses indicated that missing data on the study measures did not vary by income, gender, family structure, or racial/ethnic background, suggesting that the data were missing at random. As such, multiple imputation was implemented to achieve complete data for all 75 families (Tabachnick and Fidell 2012).

Although there were no significant differences between CPS and PMT in the original paper, differences between the two treatments for the current study were examined. No differences were obtained for any of the study variables ($ps > .05$). Moreover, moderation analyses indicated that treatment type did not moderate the association between

synchrony and treatment outcomes. Therefore, treatment type was simply controlled as a potential covariate in the current analyses.

Results

First, demographic differences were examined. Correlations, *t* tests, and one-way ANOVAs examined the effects of age, child and parent gender, family income, and racial/ethnic background on the study variables. Age was associated with higher post-treatment aggression, $r = .38$, $p = .008$. However, as aggression was represented by *T*-scores on the BASC, which are already age and gender-normed, age was not entered as a covariate. Emotional lability was higher in girls ($M = 38.81$, $SD = 5.41$) than boys ($M = 35.15$, $SD = 6.05$) at pre-treatment, $t\ (53) = -2.28$, $p = .026$. As such, gender was included as a covariate in the model with emotional lability. There were no effects of parent gender, family income or racial/ethnic background on the model variables.

Bivariate correlations were calculated to examine associations among model variables. These analyses indicated that parent–child synchrony, as coded during the Emotion Talk Task at pre-treatment, was associated with children's emotional lability, aggression, and overall functioning at post-treatment. See Table 2.

Three hierarchical regressions were conducted to test hypotheses (see Table 3). The first examined parent–child synchrony at pre-treatment on the Emotion Talk Task as a predictor of children's emotional lability at post-treatment. Treatment type, pre-treatment ADHD symptoms, child gender, and pre-treatment emotional lability were entered as covariates. The model was significant, $F(7, 67) = 5.47$, $R^2 = .44$, $p < .05$. However, only pre-treatment parent–child synchrony ($\beta = -.32$) was a significant predictor of post-treatment emotional lability. Please see Table 3.

The second regression examined parent–child synchrony during the Emotion Talk Task at pre-treatment as a predictor of post-treatment aggression. Treatment type, pre-treatment aggression, and pre-treatment ADHD symptoms were entered as covariates. The model was significant, $F(5, 69) = 6.64$, $R^2 = .30$, $p < .05$. Pre-treatment aggression ($\beta = .40$) and parent–child synchrony ($\beta = -.31$) were significant predictors of post-treatment aggression.

Finally, the third regression examined parent–child synchrony at pre-treatment on the Emotion Talk Task as an indicator of post-treatment global functioning, as measured by the CGAS. Treatment type and pre-treatment CGAS were entered as covariates. The model was significant, $F(3, 71) = 8.24$, $R^2 = .26$, $p < .05$. Pre-treatment global functioning ($\beta = .42$) and pre-treatment parent–child synchrony ($\beta = .29$) were significant predictors of post-treatment global functioning.

Discussion

The present study examined whether parent–child synchrony was associated with enhanced children's treatment response, with respect to decreased emotional lability and aggression, and increased global functioning following participation in one of two evidence-based treatments for ODD. This investigation is novel in its examination of synchrony as a predictor of treatment response in a clinical sample of youth during middle childhood and early adolescence.

There was support for Hypothesis 1, as parent–child synchrony at pre-treatment was associated with lower emotional lability at the end of treatment. This finding is consistent with extant research in which parent–child reciprocity has been shown to be indicative of fewer excessive displays of negative affect and improved emotional adjustment (Koren-Karie et al. 2003; Morris et al.

Table 2 Correlations and descriptive statistics of model variables

	1	2	3	4	5	6	7	8	*M*	*SD*
1. Age	1								9.65	1.68
2. Pre-tx parent–child synchrony	−.09	1							2.05	1.08
3. Pre-tx emotional lability	.11	−.13	1						36.62	6.03
4. Post-tx emotional lability	−.17	−.40*	.33*	1					31.61	6.09
5. Pre-tx aggression	.10	−.05	.35*	.28*	1				72.83	10.92
6. Post-tx aggression	.31*	−.36*	.26*	.55*	.43*	1			59.17	10.26
7. Pre-tx CGAS	−.10	.01	−.28*	−.30*	−.17	−.21	1		59.87	5.13
8. Post-tx CGAS	−.15	.28*	−.24*	−.40*	−.11	−.46*	.44*	1	67.97	7.22

* $p < .05$

Table 3 Standard coefficients and standard errors for predictors of children's treatment outcomes

Emotional lability				Aggression				Global functioning			
Step and variable	b[a]	*SE* b	R^2	Step and variable	b[a]	*SE* b	R^2	Step and variable	b[a]	*SE* b	R^2
Step 1:			.22	Step 1:			.22	Step 1:			.19
Child gender	.87	1.01									
Treatment type	−.06	1.18		Treatment type	1.99	1.71		Treatment type	1.53	1.72	
Pre-treatment score	.14	.11		Pre-treatment score	.31**	.094		Pre-treatment score	.60**	.168	
Pre-treatment inattention	.04	.10		Pre-treatment inattention	.02	.18					
Pre-treatment hyperactivity	.08	.06		Pre-treatment hyperactivity	.07	.13					
Step 2:			.32	Step 2:			.30	Step 2:			.26
Parent–child synchrony	−1.46**	.48		Parent–child synchrony	−2.38*	.89		Parent–child synchrony	1.67*	.76	

On Step 1, only covariates that preliminary analyses showed to be related to the outcome variable were included

* $p < .05$; ** $p < .01$; *** $p < .001$

[a] Unstandardized regression coefficients

2007). Though these linkages were previously found in younger children, the present study extends these findings to older children, and also to a clinical sample. Parent–child synchrony entails more cooperative exchanges between parent and child. As such, parents and children with higher levels of synchrony prior to treatment may have a stronger relationship and communication foundation and may therefore be more receptive to and able to benefit from intervention. This appears to be true irrespective of treatment condition. Thus, great synchrony may make it easier for parents and children work together on behavioral goals (as in PMT) and may also help parents and children more easily discuss and resolve problems together (as in CPS).

It is important to note that these findings held when controlling for pre-treatment emotional lability and that correlations demonstrated that parent–child synchrony at pre-treatment was not related to children's emotional lability at pre-treatment. This suggests that children from more synchronous dyads were no less emotionally labile at the beginning of treatment, but rather *decreased* in their emotional lability over the course of treatment.

The findings of the present study also support Hypothesis 2 in that parent–child synchrony at pre-treatment was associated with less aggression in children following treatment. This finding is consistent with previous research with typically developing adolescent samples that indicates that parent–child synchrony is associated with fewer conduct problems (Barber et al. 2001; Deater-Deckard and Petrill 2004). As noted above, synchrony is characterized by active engagement, shared understanding, and willingness to listen to others (Laible and Song 2006). Thus, synchrony may assist parent and children in practicing the skills learned in treatment in a cooperative manner, again maximizing treatment efficacy. Also, Lindsey et al. (1997) note that synchrony is characterized by mutual cooperation. Thus, pre-existing parent–child synchrony may lay a foundation for reducing aggression in treatment-seeking families, by modeling and reinforcing compliance rather than aggressive opposition. For example, a child from a more synchronous dyad may be more receptive to parental limit setting, and a parent from a more synchronous dyad may be more perceptive of his/her child's perspective when upset. Again, findings held when controlling for pre-treatment aggression, and correlations demonstrate that parent–child synchrony at pre-treatment was not related to children's aggression at pre-treatment, suggesting that children from more synchronous dyads were no less aggressive at the beginning of treatment, but rather *decreased* in their aggression over the course of treatment.

There was also support for Hypothesis 3, as parent–child synchrony was related to improvements in children's

global functioning. Specifically, children from more synchronous dyads experienced greater improvement in global functioning after receiving treatment for ODD. Parent–child discourse is an opportunity to practice cooperative social interaction and flexibility, which may assist children in being more cooperative in other settings, such as school and social settings (Lindsey et al. 1997). That is, the flexibility that exists in the parent–child dyad may generalize to other areas of the child's life, thus improving children's global functioning. As with emotional lability and aggression, we note that pre-treatment global functioning was controlled and was unrelated to synchrony, thus supporting a link of synchrony with *increases* in global functioning over the course of treatment. This finding is especially promising, as it indicates that parent–child synchrony may have ramifications for improving children's general well-being over the course of treatment, in addition to more specific outcomes. Examining positive outcomes, in addition to symptom-specific outcomes, is important for treatment-outcome research to provide information on protective factors that may maintain symptom reduction over time.

It bears mention that treatment type was not a significant covariate in any of the hypothesized models, indicating that the treatments performed equally well in improving children's outcomes at post-treatment. This is consistent with findings from the larger study from which this sample was drawn (blinded for review). Moreover, the present study also indicates that parent–child synchrony performed similarly in improving children's outcomes regardless of treatments, as treatment type did not moderate the hypothesized associations. Lastly, all children demonstrated significant difficulties with oppositionality at the beginning of treatment, thus it is not merely the case that more synchronous dyads were higher functioning overall, but rather that they demonstrated stronger improvements following treatment. These findings suggest that synchrony may be a broad indicator of treatment response and therefore a worthwhile consideration when treating families with oppositional children.

Strengths, Limitations and Future Directions

The present study possesses a number of strengths. A key strength was measurement at pre- and post-treatment, allowing conclusions to be drawn regarding changes in children's functioning. The use of observational data permitted a more ecologically valid measurement of parent–child synchrony, rather than relying solely on parent-report which may be subject to social desirability or reporter bias. Also, the focus on treatment outcome data, following the implementation of two empirically supported treatments for ODD, allowed conclusions to be drawn about the role of synchrony with treatment response.

There are three specific limitations of the present study that also deserve comment. First, there was an abundance of missing data. This was addressed in accordance with established statistical guidelines (Tabachnik and Fidel 2012); nonetheless, less missing data would have been desirable. Second, the discourse task occurred in the context of a treatment study. Families may discuss emotional situations differently when being observed in a treatment setting, as it may prime them to respond to each other in a certain manner. Relatedly, these discussions were prompted, rather than arising naturally in the context of a disagreement as they may have at home. Nonetheless, observational data tend to be more ecologically valid than parent or child-report, being less subject to social desirability effects, and allowing observation of behavioral cues of synchrony that may not be readily apparent to families or captured on a questionnaire. Third, we did not measure the effects of our treatment in school settings. As suggested by Webster-Stratton and Hammond (1997), such would be desirable inasmuch as teacher report could be informative in assessing treatment gains across multiple settings.

Findings also suggest fruitful directions for future research. First, future research examining the role of parent–child synchrony with other clinical populations, such as children with internalizing difficulties, may determine whether there are disorder-specific treatment implications. Dyads higher in parent–child synchrony may have parents who are more attuned to their child's internalizing symptoms. Hence, these parents may be more accurate reporters of their child's symptoms and be better able to monitor and contribute to their child's progress. Further, ODD is often comorbid with other forms of psychopathology. Therefore these dynamics should be examined across a broad range of child psychopathology to further inform treatment implications for children with ODD who have comorbid conditions.

Second, maintenance of treatment gains is important not only immediately following treatment, but in the months and years following its completion. Indeed, research on PMT has focused on its effectiveness one to three years after treatment (Feldman and Kazdin 1995; Webster-Stratton and Hammond 1997) and research on CPS has examined symptom improvement up to 4 months after treatment (Greene et al. 2004) and 1-year in the current study from which these data were drawn. Thus, future studies should examine trajectories of parent–child synchrony and child behaviors, symptoms, and functioning both at multiple time points during treatment and at later time points following treatment. This would provide more fine-grained information on the process by which synchrony influences treatment response to ascertain the extent

to which findings of the present study hold across time, and provide insight into the dynamic transactions linking children's socio-emotional functioning and parent–child relations.

Third, the present study primarily consisted of mother–child dyads. Differences were not found between mothers and fathers in the present sample. However, research suggests that mothers and fathers serve unique functions to their children's socio-emotional adjustment (Baker et al. 2011; Cassano and Zeman 2010; Lunkenheimer et al. 2007). Thus future studies should incorporate more fathers when examining parent–child synchrony, to ensure adequate power when testing for parent gender differences.

Conclusion

The present study sheds light on the parent–child dyad and how such interactions are associated with treatment response in families with ODD. Specifically, it appears that pre-existing parent–child synchrony is associated with decreased emotional lability and aggression after receiving treatment for ODD, as well as improvements in overall functioning. As such, a key treatment implication is that considering parent–child relations at the beginning of treatment may be informative for anticipating treatment response or may be an important treatment target for families with a child showing oppositional behavior. Moreover, fostering parent–child synchrony at an early age may be a preventative method against disruptive behavior, though longitudinal work with younger children is needed to address this possibility.

Acknowledgments This research was supported by the National Institute for Mental Health (Treatment of Oppositional Youth, R01 MH59308). The authors would like to extend special thanks to the families who participated in this research, the staff of the Child Study Center, and Social Development Lab.

References

Aebi, M., Müller, U. C., Asherson, P., Banaschewski, T., Buitelaar, J., Ebstein, R., et al. (2010). Predictability of oppositional defiant disorder and symptom dimensions in children and adolescents with ADHD combined type. *Psychological Medicine, 40*, 2089–2100.

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: American Psychiatric Association.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: American Psychiatric Association.

Anderson, S. R., & Ollendick, T. H. (2012). Diagnosing oppositional defiant disorder using the anxiety disorders interview schedule for DSM-IV: Parent version and the diagnostic interview schedule for children. *Journal of Psychopathology and Behavioral Assessment, 34*, 467–475.

Baker, J. K., Fenning, R. M., & Crnic, K. A. (2011). Emotion socialization by mothers and fathers: Coherence among behaviors and associations with parent attitudes and children's social competence. *Social Development, 20*, 412–430.

Barber, J. G., Bolitho, F., & Bertrand, L. (2001). Parent–child synchrony and adolescent adjustment. *Child and Adolescent Social Work Journal, 18*, 51–64.

Barkely, R. A. (1997). *Defiant children: A clinician's manual for parent training* (2nd ed.). New York, NY: Guilford.

Biederman, J., Petty, C. R., Dolan, C., Hughes, S., Mick, E., Monuteaux, M. C., & Faraone, S. V. (2008). The long-term longitudinal course of oppositional defiant disorder and conduct disorder in ADHD boys: Findings from a controlled 10-year prospective longitudinal follow-up study. *Psychological Medicine, 38*, 1027–1036.

Bird, H. R., Canino, G., Rubio-Stipec, M., & Ribera, J. C. (1987). Further measures of the psychometric properties of the Children's Global Assessment Scale. *Archives of General Psychiatry, 44*, 821–824.

Bradshaw, C., Schaeffer, C., Petras, H., & Ialongo, N. (2010). Predicting negative life outcomes from early aggressive-disruptive behavior trajectories: Gender differences in maladaptation across life domains. *Journal of Youth and Adolescence, 39*, 953–966.

Burke, J. D., Loeber, R., & Birmaher, B. (2002). Oppositional defiant disorder and conduct disorder: A review of the past 10 years, part II. *Journal of the American Academy of Child and Adolescent Psychiatry, 41*, 1275–1293.

Cassano, M. C., & Zeman, J. L. (2010). Parental socialization of sadness regulation in middle childhood: The role of expectations and gender. *Developmental Psychology, 46*, 1214.

Chess, S., & Thomas, A. (1977). Temperamental individuality from childhood to adolescence. *Journal of the American Academy of Child Psychiatry, 16*, 218–226.

Deater-Deckard, K., & Petrill, S. A. (2004). Parent–child dyadic mutuality and child behavior problems: An investigation of gene–environment processes. *Journal of Child Psychology and Psychiatry, 4*, 1171–1179.

Doyle, A., Ostrander, R., Skare, S., Crosby, R. D., & August, G. J. (1997). Convergent and criterion-related validity of the behavior assessment system for children–parent rating scale. *Journal of Clinical Child Psychology, 26*, 276–284.

Eyberg, S. M., & Bussing, R. (2010). Parent–child interaction therapy for preschool children with conduct problems. In R. C. Murrihy, A. D. Kidman, & T. H. Ollendick (Eds.), *Clinical handbook of assessing and treating conduct problems in youth* (pp. 139–162). New York: Springer.

Feldman, J., & Kazdin, A. E. (1995). Parent management training for oppositional and conduct problem children. *The Clinical Psychologist, 48*, 3–5.

Green, B., Shirk, S., Hanze, D., & Wanstrath, J. (1994). The children's global assessment scale in clinical practice: An empirical evaluation. *Journal of the American Academy of Child and Adolescent Psychiatry, 33*, 1158–1164.

Greene, R. W. (2011). Collaborative problem solving. In R. C. Murrihy, A. D. Kidman, & T. H. Ollendick (Eds.), *Clinical handbook of assessing and treating conduct problems in youth* (pp. 193–220). New York, NY: Springer.

Greene, R. W., Ablon, J. S., Goring, J. C., Raezer-Blakely, L., Markey, J., Monuteaux, M., et al. (2004). Effectiveness of collaborative problem solving in affectively dysregulated children with oppositional-defiant disorder: Initial findings. *Journal of Consulting and Clinical Psychology, 72*, 1157–1164.

Greene, R. W., & Doyle, A. E. (1999). Toward a transactional conceptualization of oppositional defiant disorder: Implications for assessment and treatment. *Clinical and Family Psychology Review, 2*, 129–147.

Hamilton, S., & Armando, J. (2008). Oppositional defiant disorder. *American Family Physician, 78*, 861–866.

Im-Bolter, N., Anam, M., & Cohen, N. J. (2015). Mother–child synchrony and child problem behavior. *Journal of Child and Family Studies, 24*, 1876–1885.

Kazdin, A. E. (2005). *Parent management training: Treatment for oppositional, aggressive, and antisocial behavior in children and adolescents*. New York, NY: Oxford University Press.

Kim, S., & Kochanska, G. (2012). Child temperament moderates effects of parent–child mutuality on self-regulation: A relationship-based path for emotionally negative infants. *Child Development, 83*, 1275–1289.

Koren-Karie, N., Oppenheim, D., Haimovich, Z., & Etzion- Carasso, A. (2003). Dialogues of seven-year-olds with their mothers about emotional events: Development of a typology. In R. N. Emde, D. P. Wolf, & D. Oppenheim (Eds.), *Revealing the inner worlds of young children: The MacArthur story stem battery and parent–child narratives* (pp. 338–354). New York: Oxford University Press.

Lahey, B. B., Schwab-Stone, M., Goodman, S. H., Waldman, I. D., Canino, G., Rathouz, P. J., et al. (2000). Age and gender differences in oppositional behavior and conduct problems: A cross-sectional household study of middle childhood and adolescence. *Journal of Abnormal Psychology, 109*, 488–503.

Laible, D. (2011). Does it matter if preschool children and mothers discuss positive vs. negative events during reminiscing? Links with mother-reported attachment, family emotional climate, and socioemotional development. *Social Development, 20*, 394–411.

Laible, D., & Song, J. (2006). Constructing emotional and relational understanding: The role of affect and mother-child discourse. *Merrill-Palmer Quarterly, 52*, 44–69.

Lindsey, E. W., Colwell, M. J., Frabutt, J. M., Chambers, J. C., & MacKinnon-Lewis, C. (2008). Mother-child dyadic synchrony in European American and African American families during early adolescence: Relations with self-esteem and prosocial behavior. *Merrill-Palmer Quarterly, 54*, 289–315. doi:10.1353/mpq.0.0003.

Lindsey, E. W., Mize, J., & Pettit, G. S. (1997). Mutuality in parent–child play: Consequences for children's peer competence. *Journal of Social and Personal Relationships, 14*, 523–538.

Loeber, R., Burke, J. D., & Pardini, D. A. (2009). Development and etiology of disruptive and delinquent behavior. *Annual Review of Clinical Psychology, 5*, 291–310.

Lunkenheimer, E. S., Shields, A. M., & Cortina, K. S. (2007). Parental emotion coaching and dismissing in family interaction. *Social Development, 16*, 232–248.

McMahon, R. J., Long, N., & Forehand, R. L. (2011). Parent training for the treatment of oppositional behavior in young children: Helping the noncompliant child. In R. C. Murrihy, A. D. Kidman, & T. H. Ollendick (Eds.), *Clinical handbook of assessing and treating conduct problems in youth* (pp. 163–191). New York, NY: Springer.

Morris, A. S., Silk, J. S., Steinberg, L., Myers, S. S., & Robinson, L. R. (2007). The role of the family context in the development of emotion regulation. *Social Development, 16*, 361–388.

Murrihy, R. C., Kidman, A. D., & Ollendick, T. H. (2010). *Clinical handbook of assessing and treating conduct problems in youth*. New York, NY: Springer.

Nock, M. K., Kazdin, A. E., Hirpi, E., & Kessler, R. C. (2007). Lifetime prevalence, correlates, and persistence of oppositional defiant disorder: Results from the National Comorbidity Survey Replication. *Journal of Child Psychology and Psychiatry, 48*, 703–713.

Ollendick, T. H., Greene, R. W., Austin, K. E., Fraire, M. G., Halldorsdottir, T., Allen, K. B., et al. (2015). Parent management training and collaborative & proactive solutions: A randomized control trial for oppositional youth. *Journal of Clinical Child and Adolescent Psychology, 9*, 1–14.

Reynolds, C. R., & Kamphaus, R. W. (2004). *BASC-2: Behavior assessment system for children*. Circle Pines, MN: Pearson.

Reynolds, C. R., Kamphaus, R. W., & Vannest, K. J. (2011). Behavior assessment system for children (BASC). In J. Kreutzer, J. DeLuca, & B. Caplan (Eds.), *Encyclopedia of clinical neuropsychology* (pp. 366–371). New York, NY: Springer.

Sameroff, A. J., & Seifer, R. (1983). Familial risk and child competence. *Child Development, 54*, 1254–1268.

Shaffer, D., Gould, M. S., Brasic, J., Ambrosini, P., Fisher, P., & Bird, H. (1983). A children's global assessment scale (CGAS). *Archives of General Psychiatry, 40*, 1228–1231.

Shields, A., & Cicchetti, D. (1997). Emotion regulation among school-age children: The development and validation of a new criterion Q-sort scale. *Developmental Psychology, 33*, 906–916.

Silverman, W., & Albano, A. (1996). *The anxiety disorders interview schedule for children-IV (child and parent versions)*. San Antonio, TX: Psychological Corporation.

Silverman, W., Saavedra, L., & Pina, A. (2001). Test–retest reliability of anxiety symptoms and diagnoses with the Anxiety Disorders Interview Schedule for DSM-IV: Child and parent versions. *Journal of the American Academy of Child and Adolescent Psychiatry, 40*, 937–944.

Tabachnick, B. G., & Fidell, L. S. (2012). *Using multivariate statistics*. Upper Saddle River, NJ: Pearson Education.

United States Census Bureau (2014). *State and county quickfacts.* Retrieved from: http://quickfacts.census.gov/qfd/states/51/51121.html.

Webster-Stratton, C., & Hammond, M. (1997). Treating children with early-onset conduct problems: A comparison of child and parent training interventions. *Journal of Consulting and Clinical Psychology, 65*, 93–109.

Webster-Stratton, C. H., & Reid, M. J. (2011). The incredible years program for children from infancy to pre-adolescence: Prevention and treatment of behavior problems. In R. C. Murrihy, A. D. Kidman, & T. H. Ollendick (Eds.), *Clinical handbook of assessing and treating conduct problems in youth* (pp. 117–138). New York, NY: Springer.

Webster-Stratton, C., Reid, J., & Hammond, M. (2001). Social skills and problem-solving training for children with early-onset conduct problems: Who benefits? *Journal of Child Psychology and Psychiatry, 42*, 943–952.