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Parent-Child Interaction Therapy for Children with Developmental Delay: The Role of Sleep Problems

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Abstract

Objective: Sleep problems are common and associated with externalizing behavior problems in young children, particularly among young children with developmental delay (DD). The aims of the current study, which was a secondary data analysis of two previously conducted randomized controlled trials, was to assess whether Parent-Child Interaction Therapy (PCIT) led to decreases in child sleep problems and whether initial sleep problems moderated the effect of PCIT on child behavior.

Methods: Participants were 44 children ($M = 49.19$ months, $SD = 13.1$) with DD or borderline DD and co-occurring clinically significant levels of externalizing behavior problems and their mothers ($M = 35.9$ years, $SD = 7.3$), who were randomly assigned to an immediate treatment or waitlist control group.

Results: Findings revealed a significant direct effect of PCIT on decreases in sleep problems. Additionally, moderation analyses revealed that lower levels of child sleep problems at pretreatment were associated with greater improvements in observed child compliance compared to children with higher levels of sleep problems at pretreatment.

Conclusion: This study extends previous findings by providing support for the preliminary efficacy of PCIT in reducing sleep problems in children with DD and borderline DD and highlighting the role of sleep problems as a factor associated with differential treatment effects in behavioral parenting intervention research.

Sleep problems in young children are common and highly associated with behavioral, cognitive, and emotional dysfunction,¹ particularly among young children with developmental delay (DD).² In the current paper, we define DD as a significant delay in cognitive functioning that can occur in heterogeneous groups of children, some of whom have been shown to display high rates of sleep problems. For example, young children with

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intellectual disability (ID) display prevalence rates of sleep problems as high as 86%.³ Similarly, preterm birth, which is associated with DD⁴, has also been consistently linked with sleep disturbances in children.⁵ Further, young children with DD may also experience other medical conditions (e.g., ear infections, gastroesophageal reflux) that can increase the likelihood of stress in the parents and contribute to the development of child sleep problems.^{5,6} The high prevalence rates of sleep problems and associated difficulties in children with DD warrant research on effective sleep interventions, particularly for children with ID and children born prematurely.

Relation between Sleep and Behavior Problems in Children with DD

In addition to sleep problems, compared to their typically developing peers, young children with DD exhibit higher levels of behavior problems,⁷ which are associated with sleep problems. For example, when sleep disturbances were reported, children with ID exhibited higher rates of externalizing behavior problems (EBPs), which include disruptive behaviors.⁸ Another study found that children with ID and severe sleep problems (e.g., early or nighttime waking problems at least three nights a week) exhibited higher rates of daytime oppositional behavior problems, including aggression and noncompliance (consistent with oppositional defiant disorder (ODD)), than those without severe sleep problems.⁹

Parenting Styles

Child sleep and behavior problems have been shown to be bidirectionally associated with parenting styles.^{9,10} Specifically, parenting styles characterized by high levels of affection, clear limit setting, and monitoring have been positively associated with a child's capacity for sleep regulation,¹ whereas parenting styles that lack consistent limit setting have been associated with child bedtime resistance, difficulty initiating sleep, and nightmares.¹¹ For parents of children with DD, it can be particularly difficult to set consistent limits for their child's sleep behaviors due to their child's sleep problems,¹² co-morbid psychological disorders,¹³ and medical conditions,¹¹ as well as their own elevated levels of stress about parenting a child with DD.¹⁴

Similar to sleep problems, the presence of daytime child behavior problems also has been shown to be associated with the quality of the parenting style. Specifically, parenting styles that incorporate consistency in discipline with a warm and responsive relationship have been associated with fewer child EBPs.¹⁰ Conversely, research suggests a bidirectional positive relation between coercive parenting styles and higher levels of child EBPs.¹⁵ For children with DD, coercive parenting styles are common given the unique challenges associated with parenting a child with DD (e.g., increased demands), and have been shown to increase the risk for EBPs.¹⁶

Treatment for Sleep and Behavior Problems in Children with DD

Given the bidirectional association between parenting styles and both sleep and behavior problems in children with DD,⁶ parenting behavior represents an important target for treatment. For sleep problems, interventions targeting parenting behavior have been used

successfully to treat a variety of sleep difficulties in young children with DD.¹⁴ For instance, a group-based sleep intervention in which parents learned behavioral, communicative, and sensory strategies to manage their child's sleep demonstrated improvements in sleep problems and daytime behavior (e.g., disruptive behaviors) in 2- to 6-year-olds with DD.² Additionally, a randomized controlled trial (RCT) demonstrated significant improvements in sleep problems in 2- to 8-year-olds with ID following a behavioral intervention focused on parents' response to child sleep problems (e.g., use of a sleep diary) when compared to a control group.¹⁶

Although behavioral sleep interventions have shown promise in improving sleep problems in young children with DD, most studies examining behavioral sleep interventions targeting parenting behavior, with the exception of a few, have traditionally included single-subject designs with relatively small samples and with no comparison group to contrast intervention effects. Additionally, most studies have not examined intervention effects on child daytime behavior problems. Furthermore, behavioral sleep interventions have targeted changes in parenting behaviors around sleep routines but have not targeted changes in the parenting style, which has been associated with child sleep problems and daytime behavior problems.¹⁷

For EBPs, behavioral-parent training (BPT) interventions have been demonstrated to be effective for children with DD and borderline DD in two RCTs from which the current study's data was drawn.^{18,19} However, to our knowledge, studies have not examined the extent to which BPT interventions for EBPs in children with DD led to improvements in child sleep. BPT interventions for child EBPs and parenting interventions for child sleep problems incorporate similar strategies, such as providing appropriate reinforcement and consistency in discipline.^{14,18} Thus, research should examine the potential effect of BPT interventions on sleep problems, which are overlooked in the treatment of EBPs in young children with DD.¹⁴ Additionally, research suggests behavior problems are more severe when sleep problems are also present,^{8,9} and poorer sleep quality longitudinally has predicted child EBPs.²⁰ Therefore, further work should explore the differential impact that sleep problems may have on BPT treatment for young children with DD.

Parent-Child Interaction Therapy (PCIT) is an evidenced-based BPT intervention for EBPs in young children. By targeting parenting style via live coaching, PCIT has demonstrated success in significantly reducing child EBPs and increasing child compliance, as well as reducing parental stress related to difficult child behavior, in children with DD and borderline DD and their parents.^{18,19} PCIT targets key components that foster appropriate sleep routines in young children, including a nurturing parent-child relationship²¹ and effective limit setting,²² but no study has examined the effect of PCIT on child sleep problems or the moderating effect of initial sleep problems on the effect of PCIT on child behavior problems.

The Current Study

The current study is a secondary data analyses derived from two randomized controlled trials (Studies A and B) examining the effect of PCIT on clinically elevated EBPs in children with

DD and borderline DD. In Study A, 30 children aged 36 to 70 months were diagnosed with an ID ($IQ < 75$) and thus were considered to have a DD given the young age at which participants presented with cognitive deficits, consistent with recommendations from the American Academy of Pediatrics.²³ In Study B, the sample included 28 children who were born premature and thus considered to be at risk for deficits in physical, cognitive, and socio-emotional functioning given previous research documenting a linear relationship between birth weight and IQ in preterm children.²⁴ In the current study, we only included children from Study B with an $IQ < 80$ ($n = 14$) and were considered to have DD or borderline DD due to the instability of measures of cognitive functioning in early childhood.²³ Results from the two main RCT studies demonstrated that PCIT led to significant reductions in parent-reported child EBPs and increases in observed child compliance.^{18,19} However, neither RCT examined the effect of PCIT on sleep problems or the moderating effect of sleep problems.

The primary aim of the current study was to examine the extent to which PCIT led to reductions in sleep problems in children with DD and borderline DD by combining the samples from these RCTs given the similarities in cognitive functioning and presentation of clinically elevated EBPs. Based on previous research indicating the important role that parenting styles play in shaping and maintaining sleep problems in children,⁶ we predicted that children randomly assigned to receive PCIT would demonstrate significant decreases in sleep problems after treatment when compared to children assigned to a waitlist control group. Although treatment did not directly target sleep-related behavior problems in either of the two RCTs, we hypothesized that PCIT would lead to improvements in child sleep given its focus on enhancing parent-child interactions and improving parental limit setting, which may generalize to nighttime routines.

A second aim of the current study was to investigate whether sleep problems at pretreatment moderated the effect of PCIT on child EBPs and compliance. Given the association between sleep and behavior problems⁸, the increased severity of behavior problems in the presence of sleep problems⁹, and the predictive effect of sleep problems on behavior problems,²⁰ we predicted that variability in treatment response could in part be due to the presence of child sleep problems at pretreatment. Thus, we expected a differential treatment response, such that children with higher levels of sleep problems at pretreatment would demonstrate less improvements in observed compliance and parent-reported child EBPs following PCIT compared to children with lower levels of sleep problems at pretreatment.

Method

Participants

The sample consisted of 44 children (76% male) who were on average 49-months-old ($SD = 13.1$; range = 20–70 months) and were enrolled in two previous RCTs (described below as Study A and B) that had similar designs. Children had DD or borderline DD and presented with clinically significant levels of parent-reported EBPs. Demographic information is presented in Table 1. All participants were accompanied by their primary caregiver, which in this sample was always the mother ($M = 35.9$ years, $SD = 7.33$, range = 25–55). Most mothers reported obtaining some college education or higher (71%). Participants were

enrolled in the study through referrals to an outpatient clinic by pediatric health care professionals (84%), teachers (5%), and staff at early intervention programs (3%), as well as through self-referral (8%).

Study A included 30 children who were between the ages of 36 and 70 months and were diagnosed with an ID based on an IQ ≤ 75 (55% with mild ID and 45% with moderate ID) and thus were considered to have a DD, as described above. Inclusion criteria for the study also required the presence of child ODD according to the Jensen and colleagues' criteria²⁵ based on the Diagnostic Interview Schedule for Children-4th Edition- Parent Version (DISC-IV-P)²⁶ and a score above the borderline clinically significant range (i.e., T score > 64) on the Aggressive Behavior subscale of the Child Behavior Checklist (CBCL).²⁷ Inclusion criteria for the mother required a score of 75 or higher on the Wonderlic Personnel Test (WPT),²⁸ a cognitive screener. Exclusion criteria included children with an autism spectrum disorder, major sensory impairment (e.g., deafness, blindness), or significant motor impairment (e.g., cerebral palsy).

Study B included 14 children (ages 20 to 60 months) who were born prematurely (i.e., < 37 weeks gestation) and had an IQ score ≤ 80 and thus were considered to have a DD or borderline DD, as described above. Of these 14 children, 33% were born extremely preterm and 67% were born very preterm. Similar to Study A, inclusion criteria required children to score above the borderline clinically significant range (i.e., T score ≥ 60) on the Externalizing Problems scale of the CBCL, and that the mother obtained a score ≥ 75 on the Wechsler Abbreviated Scale of Intelligence (WASI).²⁹ Families were also excluded if the child presented with major sensory impairments (e.g., deafness, blindness), autism spectrum disorder, or a significant motor impairment (e.g., cerebral palsy).

Measures

Child and Maternal Cognitive Functioning.—Children younger than 3 years in Study B were administered the Bayley Scales for Infant and Toddler Development-Third Edition³⁰ to assess cognitive functioning. For children 3 years or older in both Studies A and B, the Wechsler Preschool and Primary Scale of Intelligence-Third Edition (WPPSI-III)³¹ was administered to assess cognitive ability. In Study A, children were only included if they had a significant delay (IQ score ≤ 75 on the WPPSI-III). In Study B, child IQ scores were assessed for descriptive purposes. To ensure the mother's ability to learn PCIT skills, mothers were required to score a standard score of 75 or higher on the WPT in Study A and on the WASI in Study B, which are reliable measures of adult cognitive ability.^{28,29}

Child Behavior and Sleep Problems.—The CBCL is a 99-item parent rating scale assessing the frequency of behavioral and emotional problems in 18- to 60-month-olds with excellent psychometric properties.²⁷ Children were required to obtain ratings in the borderline clinical significant ranges on the Aggressive Problems subscale (T score > 64) for Study A and on the Externalizing Problems scale (T score ≥ 60) for Study B. The CBCL Externalizing Problems scale was used as an outcome measure of child behavior problems in this study. Additionally, the CBCL Sleep Problems subscale, which includes items different than those on the Aggressive Behavior subscale and the Externalizing Problems scale

(“doesn’t want to sleep alone”, “has trouble getting to sleep,” “nightmares,” “resists going to bed,” “sleeps less than most kids,” “talks or cries out in sleep,” “wakes often”), was used as a valid measure of sleep problems, consistent with previous research.³² Cronbach’s alpha in the current sample was .81 for the Sleep Problems subscale and .78 for the Externalizing Problems scale.

Child Compliance.—The Dyadic Parent-Child Interaction Coding System (3rd Ed.) (DPICS)²² is an observational tool to assesses the quality of parent-child interactions. For this study, child compliance was measured during a 5-min clean-up situation in which the mother was instructed to have her child clean up all the toys without any help. Percent child compliance was calculated by the number of times the child complied divided by the total number of parent commands with an opportunity to comply (i.e., alpha compliance). Ten undergraduate research assistants, who were masked to group status and trained to 80% agreement with a criterion tape, coded the observations. Half of the observations were coded a second time for reliability purposes, and the mean Kappa scores for compliance was .68, consistent with other PCIT RCTs.

Procedure

Both studies were approved by the affiliated Hospital Institutional Review Boards. To determine eligibility criteria, families participated in a screening after signing a consent form, which included the child and maternal cognitive functioning tests described above. If eligible, families completed a pretreatment assessment and then were randomly assigned to either an immediate treatment (IT; $N = 22$) group, in which the families received PCIT, or to a waitlist control (WL; $N = 22$) group, in which families waited 4 months and then received PCIT. All families were evaluated at a posttreatment assessment 4 months after the pretreatment assessment to compare the PCIT and WL groups (average time between assessments was 18.17 weeks, $SD = 3.73$). The CBCL and the 5-min cleanup situation were administered at both the pretreatment and posttreatment assessments. The cleanup situations were conducted in the clinic using age-appropriate toys (e.g., blocks). Within each study, the same toys were used for both assessments and were different from toys used during treatment. Families in Study A received \$10 for participating in the pretreatment assessment and \$15 for participating in the posttreatment assessment. Families in Study B did not receive compensation. Treatment was at no cost for families in both studies.

Treatment

PCIT encompasses two phases: the relationship enhancement phase termed child-directed interaction (CDI) and the discipline phase termed parent-directed interaction (PDI). Each phase began with a teaching session, in which therapists explained and role played the skills parents used during each phase. In the subsequent coaching sessions, mothers were coached in vivo by a therapist through a one-way mirror by using a wireless headset while parents practiced the use of the CDI and PDI skills. During CDI coaching sessions, parents were instructed to follow their child’s lead while increasing their use of “PRIDE” skills, which stand for *Praising* child positive behaviors, *Reflecting* child speech, *Imitating* child appropriate play, *Describing* child actions, and using *Enjoyment* during play. In addition, parents were instructed to decrease their use of criticisms, commands, and questions and

ignore inappropriate child behaviors during play. During PDI coaching sessions, parents were instructed to use direct commands and consistently follow through with praise for compliance and timeout for noncompliance. Mothers initially practiced the PDI skills during play with their child and eventually learned to use the skills throughout the day and in multiple settings (e.g., public). On average, families completed 12 weekly sessions (ranging from 10 to 18) that lasted between 1 and 1.5 hours and were conducted by advanced clinical psychology graduate students and postdoctoral trainees with prior training and experience with PCIT. Therapists attended weekly group supervision with a licensed clinical psychologist. All treatment sessions were videotaped to assess fidelity to the protocol (97% for Study A and 94% for Study B).

Data Analysis Plan

All analyses were conducted using the Statistical Package for Social Sciences, version 20 (SPSS 20). Preliminary analyses were conducted to examine group differences on demographic and pretreatment variables and for the presence of outliers. Multiple imputation analyses were conducted using expectation maximization methods to account for missing data, and results were comparable to analyses without using imputations. Therefore, we reported analyses using multiple imputation to utilize all available data. Preliminary analyses examined potential differences on demographic variables between IT and WL families. The effect of PCIT on child sleep problems was examined using analyses of covariance (ANCOVA). Specifically, we examined differences between the IT and WL groups on the Sleep Problems subscale T-scores on the CBCL at the posttreatment assessment. The pretreatment Sleep Problems subscale T-score was entered as a covariate to reflect covariate adjusted change in the outcome variable. We examined the moderating effect of pretreatment sleep problems on the relation between group (i.e., IT or WL) and posttreatment child EBPs and child compliance using multiple regression analyses. Pretreatment EBP T-scores and child compliance scores were included as covariates in the multiple regression analyses to reflect adjusted change in the outcome variables. Participation in Study A or B was also entered as covariate in all analyses. In all regression analyses, the covariates and the pretreatment Sleep Problems subscale T-scores were mean centered. Finally, clinically significant change in the IT and WL groups was examined using a reliable change index.

Results

Preliminary Analysis

Preliminary analysis demonstrated no statistically significant differences on demographic characteristics or outcome variables at pretreatment between the IT and WL groups (Table 1). Additionally, outliers were identified using a resistant rule based on a linear combination of quartiles. Using the lower and upper fourths or first and third quartiles to label scores as “outside,” five participant outliers were identified. Analyses were conducted both with and without the outliers, and results were comparable. Thus, all results included the outliers to utilize all available data. Children in Study A had significantly lower IQ scores than those in Study B, $t(42) = -3.018, p < .05$ and child age was significantly higher for Study A when

compared to Study B, $t(42) = 4.787, p < .05$. Therefore, child age and IQ were included as covariates in all analyses. Intercorrelations between study variables are presented in Table 2.

Of the 44 families that completed the pretreatment assessment across both studies, 10 families (23%) dropped out (7 from the IT group; 3 from the WL group) and did not complete the posttreatment assessment. Families that dropped only differed on the racial breakdown of mothers ($\chi^2(1, N=44) = 7.5, p = .023$) when compared to those that completed the posttreatment assessments. Specifically, biracial and African American mothers had higher dropout rates compared to White mothers (see Table 1). Families that dropped out did not differ in any other demographic or pretreatment variables when compared to those that completed the study assessments, and dropout rates were not significantly different between the studies or between the groups.

Direct Effect of PCIT on Child Sleep Problems

Using ANCOVA, we examined differences between IT and WL groups on posttreatment CBCL Sleep Problems subscale T-scores. Levene's test for equality of variances was not significant ($p > .05$). After controlling for Sleep Problems subscale T-scores on the CBCL at the pretreatment assessment, child age, child IQ, and participation in Study A or B, there was a significant effect of group on posttreatment sleep problems on the CBCL $F(1,42) = 15.878, p < .05$. This effect yielded a large effect size ($d = .723$), consistent with the large effect sizes in studies of PCIT for child EBPs.³³ Specifically, children who received PCIT had significantly lower Sleep Problems subscale T-scores ($M = 53.7, SD = 4.9$) than children in the WL group ($M = 61.4, SD = 14.1$). As illustrated in Figure 1, at posttreatment, children receiving PCIT, on average, displayed scores below the clinical cutoff, whereas children in the WL group, on average, displayed scores above the clinical cutoff.

To determine whether changes in child sleep were clinically significant, we used the reliable change index (RCI) as a measure of magnitude of change that exceeds the margin of measurement error. Results demonstrated 19 (86%) children in the IT group had an RCI that reflected a reliable change at $\alpha = .05$ (RCI = 1.96) compared to only 8 (36%) children in the WL. A chi-square analysis revealed that the rate of reliable change in the IT group was significantly larger than that of the WL group, $\chi^2(1, N=44) = 4.9, p = .033$.¹

Moderation Effect

In moderation analyses, the independent variable was treatment group and was dummy coded (0 = WL group and 1 = IT). The dependent variable was the posttreatment CBCL Externalizing Problems scale T-score, and the moderator variable was the pretreatment CBCL Sleep Problems subscale T-score. Child IQ and age, the pretreatment CBCL Externalizing Problems subscale T-score, and participation in Study A or B were included as covariates in the analysis. We evaluated the standardized regression coefficient for the product term (pretreatment sleep problems * treatment group), which represents the

A chi-square analysis was conducted to examine group differences in the number of children who met clinical criteria at pretreatment and posttreatment analyses and no significant group difference was detected, $\chi^2(1, N=44) = .406, p > .05$, largely because the majority of children did not meet clinical criteria at the pretreatment assessment. Specifically, in the IT group, 30% of children met clinical criteria at pretreatment, and only 15% of children met clinical criteria at posttreatment. In the WL group, 36% of children met clinical criteria at pretreatment, and 23% met criteria at posttreatment.

hypothesized interaction. This interaction term was not significant ($\beta = .421$, $t = 1.287$, $p > .05$), suggesting pretreatment sleep problems did not moderate the effect of PCIT on parent-reported child EBPs.

We also examined the moderating effect of pretreatment sleep problems on the relation between group and observed child compliance at the posttreatment assessment (including the same covariates). The interaction term was significant ($\beta = 1.053$, $t = 2.65$, $p < .05$) and yielded a large effect size ($r^2 = .585$). Probing revealed a significant slope for low sleep problems ($p < .001$) and nonsignificant slope at high sleep problems ($p = .396$), suggesting that lower levels of sleep problems at pretreatment were associated with greater improvements in compliance at posttreatment (see Figure 2).

Discussion

The current study examined the direct effect of PCIT on sleep problems in children with DD and borderline DD, as well as the moderating effect of sleep problems on the relation between PCIT and child EBPs and observed child compliance. Consistent with our direct effect hypothesis, children randomly assigned to receive PCIT demonstrated statistically and clinically significant decreases in sleep problems following the intervention when compared to a waitlist control group. These findings provide preliminary support for the use of a behavioral parenting intervention to improve sleep problems in children with DD.

To our knowledge, this was the first study to examine the effect of PCIT on improving child sleep and it yielded a large effect size. Decreases in parent-reported child sleep problems may have resulted from enhanced parenting style. Specifically, changes in parenting behaviors (e.g., increased use of positive attention, consistent limit setting) throughout treatment might have generalized to nighttime parent-child interactions and resulted in healthier child sleep habits (e.g., compliance at nighttime). Similarly, improvements in the parenting style may have led to higher levels of child self-regulation, which in turn could have resulted in decreases in child sleep problems.

The current finding has important clinical implications. For example, PCIT may be a useful approach for early intervention providers to use with children with DD given the high rates at which these children experience sleep problems, which negatively impact behavior, growth, and cognition.¹ PCIT incorporates key components that are similar to existing behavioral treatments for sleep by nurturing the parent-child relationship²¹ and establishing effective limit setting,²² which could explain generalizability of behavior improvement to child sleep problems. Additionally, there is a lack of recognition of and treatment for sleep problems in children with DD,¹³ highlighting the need to streamline intervention efforts. Our findings represent an important first step in treating both behavior and sleep problems, which might serve as a cost-efficient approach to address the burden and lack of treatment for sleep problems in children with DD.

Consistent with our hypothesis, study results revealed a large moderation effect such that children with lower levels of sleep problems at pretreatment demonstrated greater improvements in compliance compared to children with higher levels of sleep problems at

pretreatment. These findings highlight the role of sleep problems as a factor associated with differential treatment response in BPT interventions for young children with DD. Contrary to our initial hypothesis, there was not a statistically significant differential treatment response for parent-reported child EBPs. The significant moderating effect on child compliance but nonsignificant moderating effect on EBPs may be due to the explicit emphasis on increasing child compliance through the use of effective commands and discipline strategies in the PDI phase of PCIT. It is also possible that the sample size of the current study limited power to detect a significant moderation effect on child EBPs. Importantly, the statistically significant moderating effect was demonstrated through observations of compliance by coders masked to group status, suggesting that the effect was not due to negative parent perceptions of child behavior. Additionally, the nonsignificant moderating effect on EBPs may reflect shortcomings of parent-report measures in comparison to more objective observational measures. The moderation findings highlight the need to study variables using a multimethod approach in future investigations.

The significant moderating effect of sleep problems on child compliance has important clinical implications. For example, sleep should be routinely assessed because it can provide essential information regarding the enhancement and personalization of behavioral treatment. Previous research demonstrating the success of brief interventions targeting parenting behavior to treat sleep difficulties in young children with DD¹⁶ suggests that targeting sleep might prove to be an effective avenue towards enhancing intervention efforts and treatment response in children with DD. Additionally, incorporating a brief sleep intervention protocol for children displaying high sleep problems at pretreatment might help enhance BPT treatment response. Further research is needed to examine the benefits associated with targeting sleep problems in parent-training intervention research for children with DD and behavior problems.

It is important to interpret the findings in light of limitations of the current study. First, screening criteria differed between the two RCTs from which the data were drawn. Specifically, Study A included children with ID and ODD, whereas Study B included children born prematurely and who also presented with DD or borderline DD. Nevertheless, both Studies A and B similarly included samples of young children with delay in cognitive functioning and clinically elevated EBPs, and comparison analyses revealed no significant differences between studies on parent-reported scores of EBPs at pretreatment ($p > .05$). Additionally, due to potential systematic differences between samples in Studies A and B, participation in either study was entered as a covariate in all analyses.

Second, we measured child sleep problems based on the mother's report on the CBCL. Although the CBCL does not represent a comprehensive assessment of sleep problems, the CBCL sleep items have been shown to be associated with well-established measures of sleep problems. For example, the CBCL sleep items have been moderately-to-strongly associated with diaries and actigraphy, as well as the Children's Sleep Habits Questionnaire.³² Additionally, the CBCL might be a convenient and user-friendly measure of child sleep problems in clinical practice where time is limited. Nevertheless, future studies examining sleep problems in the context of BPT interventions should use a more comprehensive assessment of child sleep.

A third limitation was that the sample included children with DD and with borderline DD, so findings may not generalize to typically developing children with clinically elevated EBPs. Fourth, the sample size in the study was relatively small and therefore results should be interpreted as preliminary. Thus, future studies should examine the direct effect on and moderating effect of sleep problems in a larger sample including typically developing children. Fifth, reports of sleep problems and EBPs were only collected from the primary caregiver, which was the mother in all cases. Additionally, observations of child compliance were conducted between the child and mother. Future research should include reports from multiple informants (e.g., parents and teachers) and interactions with other caregivers (e.g., fathers, grandparents).

Sixth, the current sample consisted of predominantly middle-class, White families. Therefore, generalizability of the current findings might not extend to families from underrepresented racial and ethnic minority backgrounds. Nevertheless, empirical evidence on the success of standard PCIT for different cultural and language groups has been documented.³⁴ Future research should aim to replicate the effect of PCIT on sleep problems in children from underrepresented racial and ethnic minority backgrounds. Seventh, the current study did not include follow-up assessments, so it is unclear whether the direct effect of PCIT on sleep problems and the moderating effect of sleep problems on treatment response were maintained over longer periods of time. Eighth, mean kappa scores for compliance coding represented a moderate level of interrater agreement but is consistent with previous RCTs examining PCIT.³⁵

Despite these limitations, the current study addressed relatively unstudied research questions and provided preliminary findings that have important clinical implications. Findings suggest that BPT interventions targeting parenting styles may be effectively used to treat comorbid behavior and sleep problems in children with DD. Our findings suggest that BPT interventions might serve as a cost-efficient approach for addressing sleep and behavior problems simultaneously in a high-risk child population. Findings also highlight the impact of initial sleep problems on improvements in child compliance, suggesting the need to assess for and intervene on sleep problems to maximize BPT intervention effects for children with DD.

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Figure 1.
Direct effect of PCIT on posttreatment sleep problems.
Note. IT = Immediate Treatment; WL = Waitlist Control; analysis controlled for pretreatment CBCL sleep problems, child age, child IQ, and participation in Study A or B.

Figure 2.

Interaction between treatment group and pretreatment sleep problems in predicting posttreatment child compliance.

Note. Analysis controls for pretreatment child compliance, child age, child IQ, and participation in Study A or B. IT = Immediate Treatment; WL = Waitlist Control. The simple slope for low sleep problems was significant, $\beta = -.544$ $p < .001$, and the simple slope for high sleep problems was not significant, $\beta = -.404$, $p < .396$.

Table 1.

Descriptive Statistics of Families Across Groups and Completion Status

Demographic Characteristic	Total Sample (<i>n</i> = 44) ^a		<i>t</i> / <i>χ</i> ²	Completers (<i>n</i> = 34) <i>M</i> (<i>SD</i>) or %	Non-Completers (<i>n</i> = 10) ^b <i>M</i> (<i>SD</i>) or %	<i>t</i> / <i>χ</i> ²
	<i>IT</i> (<i>n</i> = 22)	<i>WL</i> (<i>n</i> = 22)				
Demographic Characteristic						
Child Age (Months)	48.5 (11)	49.9 (14.9)	-.345	48.3 (14.6)	52 (6.1)	-.771
Child Sex (% Male)	81	72	.406	84.4	70	1.02
Child Race (%)			.284			.727
White	80	63.6		78.1	50	
Asian	15	13.6		6.3	40	
Biracial	5	18.3		12.5	10	
African American	0	4.5		3.1	0	
Child IQ	60.7 (11.3)	63.7 (12.1)	-.822	62.2 (12.1)	63.3 (10.7)	.909
Mother Age	34.1 (7.7)	37.5 (6.7)	-1.50	36.3 (6.9)	34.8 (8.8)	.541
Mother Ethnicity Race (%)			2.35			7.54*
White	80	90.9		93.8	60	
Biracial	10	0		3.1	10	
African American	10	9.1		3.1	30	
Pretreatment Scores						
CBCL Externalizing Problems Scale	76.5 (10.7)	74.4 (8.7)	.697	74.6 (8.9)	78.1 (11.9)	-.992
CBCL Sleep Problems Subscale	62.75 (13.6)	62.95 (13.9)	-.048	61.6 (12.1)	66 (17.7)	-1.05
Child Observed Compliance (%)	58.7 (22.7)	61.9 (26.4)	-.419	60.2 (26.7)	61.1 (16.7)	-.101

Note: IT = Immediate Treatment; WL = Waitlist Control; IQ = Intelligence Quotient; CBCL = Child Behavior Checklist. Families in the IT and WL groups did not significantly differ on any demographic or pretreatment variables (all *ps* > .05);

* *p* < .05.

Table 2.

Intercorrelations Between Study Variables

	1	2	3	4	5	6
Pretreatment Variables						
1. Sleep Problems	1					
2. Externalizing Problems	.356 [*]	1				
3. Observed Compliance	.221	.113	1			
Posttreatment Variables						
4. Sleep Problems	.427 ^{**}	.132	.297	1		
5. Externalizing Problems	.4 [*]	.434 [*]	.360 [*]	.568 ^{**}	1	
6. Observed Compliance	.427 ^{**}	.117	.270	-.59 ^{**}	-.245	1

Note: Intercorrelations are Pearson correlations, which are Point-Biserial correlations.

^{*} $p < .05$.

^{**} $p < .01$