



Published in final edited form as:

J Child Psychol Psychiatry. 2015 September ; 56(9): 1008–1016. doi:10.1111/jcpp.12430.

Contextual variation in young children's observed disruptive behavior on the DB-DOS: implications for early identification

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Abstract

Background—Contextual variation in child disruptive behavior is well documented but remains poorly understood. We first examine how variation in observed disruptive behavior across interactional contexts is associated with maternal reports of contextual variation in oppositional-defiant behavior and functional impairment. Second, we test whether child inhibitory control explains the magnitude of contextual variation in observed disruptive behavior.

Methods—Participants are 497 young children (mean age = 4 years, 11 months) from a subsample of the MAPS, a sociodemographically diverse pediatric sample, enriched for risk of disruptive behavior. Observed anger modulation and behavioral regulation problems were coded on the Disruptive Behavior Diagnostic Observation Schedule (DB-DOS) during interactions with parent and examiner. Oppositional-defiant behavior, and impairment in relationships, with parents and nonparental adults, were measured with the Preschool Age Psychiatric Assessment (PAPA) interview with the mother. Functional impairment in the home and out-and-about was assessed with the Family Life Impairment Scale (FLIS), and expulsion from child care/school was measured with the baseline survey and FLIS.

Results—Observed disruptive behavior on the DB-DOS Parent Context was associated with oppositional-defiant behavior with parents, and with impairment at home and out-and-about. Observed disruptive behavior with the Examiner was associated with oppositional-defiant behavior with both parents and nonparental adults, impairment in relationships with nonparental

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Supporting Information

Additional Supporting Information may be found in the online version of this article:

Table S1. Factor loadings for DB-DOS measurement model (see accompanying Figure S1).

Table S2. Associations between observed DB on the DB-DOS parent and examiner contexts.

Table S3. Unique associations between observed disruptive behavior in the DB-DOS parent/examiner contexts and reported behavioral and impairment outcomes.

Figure S1. DB-DOS measurement model.

Conflict of interest statement: No conflicts declared.

The authors have declared that they have no competing or potential conflicts of interest.

adults, and child care/school expulsion. Differences in observed disruptive behavior in the Parent versus Examiner Contexts was related to the differences in maternal reports of oppositional-defiant behavior with parents versus nonparental adults. Children with larger decreases in disruptive behavior from Parent to Examiner Context had better inhibitory control and fewer attention-deficit/hyperactivity disorder symptoms.

Conclusions—The DB-DOS showed clinical utility in a community sample for identifying contextual variation that maps onto reported oppositional-defiant behavior and functioning across contexts. Elucidating the implications of contextual variation for early identification and targeted prevention is an important area for future research.

Keywords

Behavioral observation; DB-DOS; developmentally sensitive assessment; context sensitivity; disruptive behavior; ODD; ADHD; functional impairment; sex differences; preschoolers; early childhood

Introduction

There is substantial social contextual variability in the expression of child psychopathology but current assessment approaches typically do not capitalize on it (Dirks, De Los Reyes, Briggs-Gowan, Cella, & Wakschlag, 2012). Assessment across relational contexts (e.g., with parents and nonparental adults) may be particularly important for behaviors associated with oppositional-defiant disorder (ODD; e.g., noncompliance, defiance, irritability), which is known to be responsive to adults' structure and emotional support (Dretzke et al., 2009). Although much has been written about informant discrepancy in rating these behaviors (De Los Reyes & Kazdin, 2005), much less is known about child characteristics that are associated with cross-contextual variation. Contextual assessment of child disruptive behavior (DB) may provide clinically relevant information about which child–adult relationship(s) to target in intervention (Drabick, Gadow, & Loney, 2007), as well as potential mechanisms and modifiability of the child's behavior problems.

Contextual differences in children's clinical symptoms are increasingly recognized as reliable differences rather than measurement error (De Los Reyes et al., 2015; Rommelse et al., 2015). Some have suggested that ODD may be best conceptualized as informant-specific, because ODD identified by mothers only versus teachers only have different correlates (Drabick et al., 2007; Offord et al., 1996). However, these patterns are confounded by shared method variance: the covariates found to be specific to mother-identified ODD (e.g., family dysfunction, maternal detachment) are measured only by maternal report, while those specific to teacher-identified ODD are measured solely by teacher report (e.g., social problems). Relatedly, these studies cannot tease out the role of the context (e.g., home vs. school, or parent–child vs. teacher–child relationship) from that of the informant's perspective (e.g., teachers and parents using different basis for comparison, having different biases, etc.; Kraemer et al., 2003).

Direct observation of child behavior in different contexts can be used to assess contextual variation without confounding context and informant (De Los Reyes et al., 2015). The

Disruptive Behavior Diagnostic Observation Schedule (DB-DOS; Wakschlag, Briggs-Gowan, et al., 2008) is a developmentally sensitive tool for the direct assessment of DB in preschoolers which has demonstrated validity in cross-national clinical samples (Bunte et al., 2013; Wakschlag, Briggs-Gowan, et al., 2008; Wakschlag, Hill, et al., 2008). The behaviors coded are the hallmark of ODD, i.e., problems in anger modulation and behavioral regulation. A key feature of the DB-DOS is its assessment of child behavior in interaction with a parent, as well as in a parallel interaction with an examiner. DB-DOS contextual variation has been shown to relate to variations in child behavior as reported by parents and teachers in the Chicago Preschool Project, a diverse sample of preschoolers including a substantial proportion of clinically referred children. Elevations in observed DB on the DB-DOS Parent Context corresponded to parent-only endorsement of disruptive behavior disorder symptoms, while elevated DB in the Examiner Contexts was associated with teacher-only endorsed symptoms (De Los Reyes, Henry, Tolan, & Wakschlag, 2009).

Differences in child behavior across the Parent and Examiner DB-DOS Contexts have been related to sex differences, particularly among children with high levels of DB (Gray et al., 2012). While disruptive girls were indistinguishable from nondisruptive girls during the Examiner Context, they displayed much higher levels of DB with the parent. In contrast, disruptive boys showed equivalent levels of DB regardless of context (Gray et al., 2012). This is consistent with larger differences found in teacher-versus parent-reported ODD symptoms for girls than boys (Munkvold, Lundervold, Lie, & Manger, 2009). The child's sex may be a proxy for other, more potent child characteristics associated with variation in DB across contexts. In particular, girls may be better able to inhibit their behavior in response to social demands. In contrast, children with attention-deficit/hyperactivity disorder may be poorer at inhibiting DB in any context, because of their high impulsivity.

In this study, we investigate contextual differences in DB in a large, diverse community sample of preschoolers. This is the first report on the DB-DOS in a nonreferred sample. We eliminate potential confounding of informant and context by assessing contextual differences in DB using observations on the DB-DOS and information from the mother about the child's behavior and functioning in separate contexts. The first goal of the study was to examine how contextual variation (with parental and nonparental adults) in observed DB is associated with maternal reports of real-world contextual variation in ODD behavior and impairment. The second goal of the study was to examine child characteristics theorized to explain the magnitude of contextual variation in observed DB.

Methods

Participants

Participants were 497 preschoolers who took part in an intensive follow-up of the Multidimensional Assessment of Preschoolers Study (MAPS). The MAPS sample was a survey cohort of 1857 children aged 3–5 years recruited from pediatric primary care practices (for details see Nichols et al., 2015). For this intensive substudy of developmental psychopathology, a stratified random sample of 746 participants was selected among eligible children (i.e., with an English-speaking biological mother and no developmental delay), oversampling for children with mother-reported past-year intimate partner violence

(Briggs-Gowan et al., 2015) and/or with disruptive behavior scores above the 80th percentile on the Multidimensional Assessment Profile of Disruptive Behavior (MAP-DB; Wakschlag et al., 2014). Of those sampled for the intensive substudy, 497 participated (67%; Nichols et al., 2015).

The sample was composed of 49% boys and was diverse in terms of race/ethnicity (47% African American, 28% Hispanic, 23% non-Hispanic White, and 2% other) and family poverty (44% were poor based on a ratio of income to household size (Barajas, Philipsen, & Brooks-Gunn, 2008). The mean age at the time of participation in the DB-DOS was 4 years, 9 months, with the following age distribution: 20%, 3 years; 44%, 4 years; 25%, 5 years; and 12%, 6–7 years. Based on the PAPA (Egger et al., 2006), 14% met DSM-IV criteria for ODD, 5% met criteria for conduct disorder, 6% met criteria for ADHD, and 34% met criteria for any internalizing disorder.

Procedures

Study protocols were approved by the review boards of the authors' institutions. Mothers provided informed consent, and were compensated for participation and transportation.

Measures

Observed DB—The DB-DOS paradigm has been extensively described previously and is briefly described here (Wakschlag, Briggs-Gowan, et al., 2008; Wakschlag, Hill, et al., 2008). The DB-DOS is a ~50-min semistructured observation designed to elicit DB in preschoolers. Contextual variation is examined via parallel interactions with the parent and examiner.¹ In both Parent and Examiner Contexts, the child is asked to participate in 'do' and 'don't' compliance tasks and is exposed to mild frustration or disappointment (difficult puzzle or malfunctioning toy). In the Examiner Engaged Context, the examiner responds to the child's DB or negative affect (irritability/anger) starting with a minimal level of support and progressing up a hierarchy of supportive responses as necessary. This provides information on how much support the child needs to modulate his/her behavior or affect.

Behaviors are coded separately by context along a clinical continuum (0 = normative variation, 1 = normative misbehavior, 2 = of concern; 3 = clearly atypical). Codes capture qualitative features of behavior such as intensity, modulation and developmental expectability (Wakschlag et al., 2007) in two domains: Problems in Anger Modulation (e.g., rapidity of escalation, difficulty recovering), and Behavioral Regulation (e.g., behavioral inflexibility, intransigence of defiance, see online Table S1).² Coding was completed independently of administration and both examiners and coders were blind to child DB. Eighty tapes (20%) were double-coded for interrater reliability.

¹The DB-DOS contains two Examiner Contexts, 'Engaged' and 'Busy'. In the Examiner Busy Context, the examiner does not actively engage the child and responds minimally to the child's positive social bids, while in the Examiner Engaged Context, the examiner is naturally responsive, engaging and supporting. In both contexts, the examiner responds in the same way to negative affect and disruptive behavior. In this study of behavioral differences across relational contexts, we focus on contrasts between the parallel Parent and Examiner Engaged Contexts. The Examiner Engaged Context has shown better predictive validity than the Examiner Busy Context (Wakschlag, Briggs-Gowan, et al., 2008) and our prior studies have shown that the clinically salient distinction is between Parent and Examiner Contexts (De Los Reyes et al., 2009; Gray et al., 2012; Tseng et al., 2015).

²As in previous work (Wakschlag, Hill, et al., 2008), we excluded 'Directed aggression' and 'Verbal aggression' from the analyses, because the rates of occurrence were very low and their inclusion worsened the fit of the factor structure.

For this study, we derived a factor model for context-based factors using confirmatory factor analysis in Mplus. The model contains two second-order latent factors, Parent Context and Examiner Context, each informed by two first-order latent factors, Problems in Anger Modulation and Behavioral Regulation. Anger Modulation has six observed ordinal behaviors, while Behavioral Regulation has eight in the Parent Context and seven in the Examiner Context.³ Full-Information Maximum Likelihood (FIML) was used to account for missing data on individual behavior codes. The model fit well (CFI = .98, TLI = .98, RMSEA = .04). Factor loadings are presented in Table S1. The Parent and Examiner Context factors were strongly correlated, $r = .61, p < .001$.

Internal consistency were Cronbach's $\alpha = .92$ for Parent Context and $\alpha = .87$ for Examiner Context. Interrater reliability, as measured with intraclass correlation coefficients (ICC), were ICC = .91 for Parent Context and ICC = .91 for Examiner Context. In this community sample, children's observed DB was significantly related to ADHD symptoms (more details about associations with DSM-IV symptoms are presented in Table S2).

To examine contextual differences in *levels* of observed DB, we computed a difference score between Parent and Examiner scores. Because factor scores were centered at zero, they were not as informative to compute this difference score. Therefore, we took the average of the six Anger Modulation items, and the average of the eight Behavioral Regulation items, and averaged the two to create the Parent Mean score, which could range from 0–3. We did the same to create the Examiner Mean score. Those Mean scores were highly correlated with the factor scores ($r = .96, p < .001$ for Parent Context and $r = .89, p < .001$ for Examiner Context). We then calculated the Observed Contextual Difference score as the difference between the Parent Mean score and the Examiner Mean score.

Clinical outcomes

Context-specific ODD behaviors—The PAPA interview (Egger et al., 2006) was conducted with the child's mother by a trained research assistant. The PAPA measures the occurrence of six preschool manifestations of ODD-relevant behaviors (e.g., disobedience, rule-breaking, destructive and nondestructive tantrums) with parental figures and with nonparental figures (i.e., teachers, babysitters, and other adults), over the past three months. Reliability of administration and coding was monitored for 20% of the interviews by an expert clinical psychologist (percent agreement on administration = 80% and ICC = .89 for coding on the Conduct section including ODD).

Relationship-specific impairment—Impairment in the child's relationships with adults was assessed with the PAPA. Problems in those relationships in terms of child withdrawal or discord, were rated separately for parents and nonparental adults (i.e., teachers and other nonparental adults) on an ordinal scale with 0 = absent; 2 = partial incapacity, and 3 = severe incapacity. Interrater reliability for the incapacity section was good (ICC = 0.95).

³There is one fewer Behavioral Regulation item ('Rule Breaking') in the Examiner Context. Unlike in the Parent Context, where the parent was asked to clearly set a rule (not to touch toys on the shelf), there was no rule set in the Examiner Engaged Context.

Context-specific impairment—Impairment was assessed contextually based on the Family Life Impairment Scale (FLIS; Carter et al., 2010). The FLIS includes 36 items rated on a 3-point scale ranging from (0) Not true, (1) Somewhat true, to (2) Very true. We assessed impairment in the Home (3 items, $\alpha = .75$) and Out-and-About (6 items; $\alpha = .85$). With information combined from the FLIS and the baseline survey, we coded whether the child had ever been expelled from daycare/school, which occurred in 5% of children who had ever been in daycare/school ($n = 423$).

Cognitive functioning

Inhibitory control—Participants completed a Go/NoGo task, which measures the ability to execute versus inhibit motor responses to specific cues. The task was an adaptation of the Wack-A-Mole task developed by Sarah Getz and the Sackler Institute for Developmental Psychobiology. Children are asked to press a button to target stimuli (a mole wearing one of four costumes) while inhibiting the response to nontarget stimuli (an eggplant). Each trial began with a fixation display (mole hole) of 500 ms presented in the center of the screen, followed by the target display of either a mole (Go) or an eggplant (NoGo) for 1500 ms or until the subject pressed the button. Error feedback was given as yellow splash on the screen with ‘uh-oh’ sound following incorrect and late responses. We used the data from the first block, which consisted of 40 Go trials presented first to elicit a prepotent motor response, followed by 200 trials (or 100 trials in a short version), with a Go:NoGo ratio of 70:30. Task version was controlled in the analysis. Prior to the task, children were given up to three 20-trial practice blocks and the task was discontinued if the child did not reach an 80% accuracy on practice blocks. Performance was measured using discrimination sensitivity (d'), a normalized measure of the difference between hit rate and false alarm rate, where higher values indicate better discrimination (Macmillan & Creelman, 2005).

Nonverbal reasoning—The Picture Similarities subscale of the Differential Abilities Scales (DAS) III (Elliott, 1983), which assesses child nonverbal reasoning, was used as an indicator of cognitive functioning and included as a covariate.

Analyses

Treatment of missing data—Among the 497 participants in the intensive substudy of developmental psychopathology, 408 had useable data on the DB-DOS, 409 had complete data on the PAPA, and 392 had complete data on both. Families were missing data on both measures if they did not come into the laboratory ($n = 72$, who only completed home-based questionnaires). Missing data on one of those two measures were mostly due to technical problems with DB-DOS recordings ($n = 13$), or lack of time to complete the PAPA ($n = 16$). One mother came to the lab visit without her child so the DB-DOS could not be completed, and 3 additional children were excluded due to global cognitive delays uncovered at the lab visit. To minimize bias due to missing data, we included cases with incomplete data and used FIML in all analyses.

Hypothesis testing—We used negative binomial regression for count outcomes (PAPA ODD behaviors with parents and nonparental adults), ordered logistic regression for ordinal outcomes (PAPA impairment in relationships with parents and nonparental adults), linear

regression for continuous outcomes (FLIS impairment in home and out-and-about), and logistic regression for the binary outcome (child care/school expulsion). In all models, the child's sex, age at the time of DB-DOS administration, poverty status, race/ethnicity, and cognitive functioning on Picture Similarities were controlled. Analyses used sampling strata and weights, which accounted for both unequal probabilities of selection and differential nonresponse rates, and allowed generalization to the original unselected MAPS survey sample of 1857 preschoolers. All analyses were conducted in Mplus 7 with robust maximum likelihood estimation.

We first examined the associations between each DB-DOS context factor score and the seven mother-reported context-specific measures of ODD behavior and impairment, with separate regression analyses. To test whether associations between observed DB and reported ODD behavior/impairment within context (e.g., with parents), were stronger than associations across contexts, we tested three models as illustrated in Figure 1. These models related observed DB in the Parent and Examiner Contexts with (a) ODD behavior with parental and nonparental adults; (b) impairment in relationships with parental and nonparental adults; and (c) impairment in the home, impairment when out-and-about, and child care/school expulsion. We then constrained paths within and across contexts to be equal for each outcome (i.e., $a = b$ and $c = d$ in Figure 1A; $a = b$, $c = d$ and $e = f$ in Figure 1B), and compared the fit between the original unconstrained model and the constrained model with a chi-square difference test using Satorra–Bentler scaling.⁴ A significant difference between the unconstrained and constrained models would indicate that within-context associations are statistically different from across-context associations.

Then, we tested the relationship between the magnitude of contextual differences in observed DB and the magnitude of reported contextual differences in ODD behavior, by regressing the difference in the number of ODD behaviors with parents versus nonparental adults onto the Observed Contextual Difference score. Finally, we tested whether inhibitory control on the Go/NoGo task and ADHD symptoms from the PAPA explained contextual differences in observed behavior on the DB-DOS. We controlled for observed DB with the parent to ensure that we captured contextual differences and not merely severity.

Results

Observed DB in both Contexts decreased with age and nonverbal reasoning ($r = -.34$ to $-.44$, $p < .001$). It was higher in boys than girls (correlation with child's sex $r = .16$ and $.17$, $p < .01$), but unrelated to poverty (p 's $> .30$). Observed DB in the Parent Context was unrelated to child race/ethnicity (p 's $> .20$), but observed DB with the Examiner was lower in Hispanic than African-American children ($r = -.16$, $p = .003$).

Observed DB and mother-reported ODD behaviors and impairment across contexts

We tested the associations between children's observed DB with their Parent and the Examiner and the seven context-specific outcomes (Table 1). Most significant associations were within the same context: Observed DB with the Parent was associated with mother-

⁴See <http://www.statmodel.com/chidiff.shtml>.

reported ODD behavior with parental figures, and with their impairment at home and when out-and-about. In contrast, observed DB with the Examiner was associated with mother-reported ODD behavior with nonparental adults, with impairment in relationships with nonparental adults, and with child care/school expulsion. Observed DB in the Examiner Context was also significantly associated with ODD behavior with the parents.

Next, we tested the unique within-context and across-context associations between observed DB and the three sets of outcomes using three structural equation models (Figure 1). Observed DB in the Parent Context uniquely predicted impairment at home ($\beta = .15, p = .041$), over and above the contribution of observed behavior with the examiner (Table S3, Model 3). Observed DB in the Examiner Context was uniquely associated with impairment in relationships with nonparental adults ($\beta = .27, p = .028$), over and above the contribution of observed behavior with the parent (Table S3, Model 2). In general, within-context associations appeared larger than across-context associations (see Table S3). However, when we tested whether they were statistically different from each other by comparing model fit between constrained and unconstrained models, they were not (p 's > .20).

Magnitude of contextual differences in observed DB and reported ODD behavior—Children were more likely to display DB with their parent than with the examiner, as shown by a positive mean Observed Difference Score between Parent and Examiner Contexts, $M = 0.42$ ($SD = 0.57$, range = -1.44 – 2.07), and by the fact that for most children (75%) this score was above zero. The extent to which children displayed higher levels of DB in the Parent versus the Examiner Contexts of the DB-DOS was associated with the difference in number of ODD behavior reported by the mother as occurring with parents versus nonparental adults ($\beta = .18, p = .010$).

Contextual differences in observed DB and child inhibitory control—We tested whether children's performance-based inhibitory control and ADHD symptoms predicted the Observed Difference Score, while controlling for DB in the Parent Context. Children with better inhibitory control on the Go/NoGo task showed larger decreases in observed DB with the Examiner versus Parent ($\beta = .14, p = .017$). Conversely, children with more ADHD symptoms showed smaller decreases in DB with the Examiner versus the Parent ($\beta = -.15, p = .007$).

Discussion

This study aimed to examine the utility of the direct observational assessment of preschoolers' behavior in interaction with a parent and an examiner for understanding real-world contextual variation in child behavior and impairment. We found that children's observed DB in the DB-DOS Parent Context was generally associated with ODD behavior and functional impairment expressed with parents. In contrast, observed DB with the Examiner was associated with ODD behavior and functional impairment in interaction with nonparental adults. Further, the extent to which children's observed DB differed in the Parent versus Examiner Contexts was related to the discrepancy in ODD behavior with parents versus nonparental adults reported by mothers. Children who showed larger

decreases in DB with the Examiner compared with their Parent had better inhibitory control as indicated by their performance on a Go/NoGo task and fewer ADHD symptoms.

Contextual sensitivity of children's behavior and impairment

Our findings support the idea that contextual differences in children's ODD behavior are 'real,' rather than merely reflecting differences in informants' perspectives (De Los Reyes et al., 2015; Dirks et al., 2012). In contrast to previous studies, where contextual differences were inferred from the reports of different informants, here every one of the three assessment methods (direct observation, clinical interview, and mother-reported questionnaire) measured the child's behavior in different contexts. Thus, contextual variation was not confounded with informant (Kraemer et al., 2003). Our results show that, in general, observed DB in the Parent Context is indicative of ODD behavior with parents and impairment in situations involving the parents (at home or out-and-about). In turn, observed DB in the Examiner Context is indicative of ODD behavior with nonparental adults, and impairment in relationships and settings with nonparental adults.

Most children (75%) displayed higher DB in the DB-DOS Parent Context than in the Examiner Context. The magnitude of the behavioral difference across these contexts paralleled the magnitude of the difference in mother-reported ODD behavior with parents versus nonparental adults. This is consistent with our prior findings in the Chicago Preschool Project that variation in behavior across the Parent and Examiner contexts of the DB-DOS maps onto parent- or teacher-specific problem endorsement (De Los Reyes et al., 2009). The DB-DOS may thus provide an efficient clinical tool for detecting real-world contextual variation, with implications for targeted intervention.

In DSM-5 (American Psychiatric Association, 2013), pervasiveness across settings is utilized as an indicator of ODD severity. Our findings suggest that the DB-DOS Examiner Context may help detect more severe or pervasive problems. Indeed, high DB observed with the examiner was associated with ODD behavior with parents in addition to nonparental adults. Typically developing children are more likely to modulate irritability and noncompliance with non-parental adults. We have previously shown that preschoolers' tantrums with nonparental adults were much less frequent than tantrums with parents (27% vs. 56% in the last month), and were indicative of severity (Wakschlag et al., 2012). Similarly, tantrums when out-and-about (vs. at home or child care/school) differentiate preschoolers with psychopathology from their typical peers (Belden, Thompson, & Luby, 2008). Thus, it may not be merely the *number* of settings but also the interactional partner or type of setting, that provides more information for early identification.

In addition to its utility for understanding children's presentation of clinical symptoms, the DB-DOS was associated with functional impairment, replicating previous work in clinical samples (Wakschlag, Briggs-Gowan, et al., 2008). When we tested the unique contribution of each observational context, independent of the other, the Parent Context provided unique information about impairment in the home, while the Examiner Context showed unique utility for impairment in relationships with nonparental adults. The DB-DOS captures qualitative features of DB such as its malleability and responsiveness to adult support (e.g.,

how much support children require to calm down), which are likely to be related to the extent to which behavior problems interfere with children's day-to-day functioning.

Child inhibitory control and modulation of behavior across contexts

Children who showed less DB in the DB-DOS Examiner Context versus the Parent Context, while keeping DB on the Parent Context constant, had better inhibitory control as measured with a Go/NoGo task. These children also had fewer ADHD symptoms, another indication of dysregulatory deficits (Sobanski et al., 2010). Inhibitory control may be necessary for children to attend to social cues, appropriately respond to varying social expectations, and even respond to environmental structure and support. The fact that DB on the DB-DOS was associated with ADHD symptoms (see Table S2 and Bunte et al., 2013) suggests that these symptoms may contribute to emotional lability and inflexible behavior displayed in the laboratory. In contrast to previous research, we found no indication that girls were more sensitive to context (Gray et al., 2012; Munkvold et al., 2009). Sex differences in prior studies may have been a proxy for differences in inhibitory control or ADHD symptoms (Kochanska, Murray, & Harlan, 2000), although we found no sex differences even in bivariate analyses. The difference in our results may be due to less severe problems in this community sample, where only 4% of children were ever referred for emotional or behavioral problems. Indeed, Gray et al. (2012) only observed sex differences in responsiveness to context among the most disruptive children.

Limitations

We found evidence that the level of contextual differences in observed DB was associated with parallel contextual differences reported by the mother. We also found that child DB in the Parent and Examiner Contexts was independently associated with impairment in the home and impairment in relationships with nonparental adults, respectively. However, when we tested whether the strength of the associations differed for observed DB in the Parent versus the Examiner Context with a given outcome, we found no evidence that they did. In this test of differential utility with structural equation models, associations may take indirect paths when we constrain some parameters. As child behavior in the Parent and Examiner contexts was highly correlated ($r = .61$), the direct association between behavior in one context and a given outcome could 'pass through' its association with behavior in the other context (an indirect effect). A much larger sample would be required to detect a difference in the size of within- versus across-context associations.

In our investigation of explanatory factors for the contextual difference in observed DB, we focused on child inhibitory control, but did not examine the potential contribution of parenting. This will be an important question to investigate for future research on contextual differences in child DB.

Conclusion

Our findings confirm the usefulness of direct observation of children in separate relational contexts for enhancing identification of early psychopathology and functioning. An

important next step will be to examine how contextual difference in child DB evolve with the child's development, and how they contribute to clinical prediction.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

This original article was invited by the journal as part of a special issue; it has undergone full, external peer review. L.W., M. B-G., and R. E. were supported by the National Institute of Mental Health (NIMH) grants R01MH082830 and 2U01MH082830. L.W. and M. B-G. were supported by NIMH grant U01MH090301. L.W. was also supported by the Walden & Jean Young Shaw Foundation. This study would not have been possible without the outstanding efforts of Jacqueline Kestler, our dedicated research staff, and the generous participation of MAPS families. The authors thank the pediatric clinics and participants from Rush University, the University of Illinois at Chicago, NorthShore University Health System, North Suburban Pediatrics and the following pediatric research group practices for their participation: Healthline in Valparaiso, IN, Healthline in Michigan City, IN, and Associated Pediatricians in Valparaiso, IN.

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Key points

- Variations in disruptive behavior across contexts, including the Parent and Examiner Contexts of the DB-DOS, have been linked to informant-specific endorsement of child symptoms.
- This first study of the DB-DOS in a community sample confirms its utility for identifying contextual differences in disruptive behavior that map onto ‘real-life’ oppositional-defiant behavior and functioning in different relational contexts.
- Children with higher inhibitory control were better able to curb their disruptive behavior in an interaction with an examiner than in an interaction with their parent.

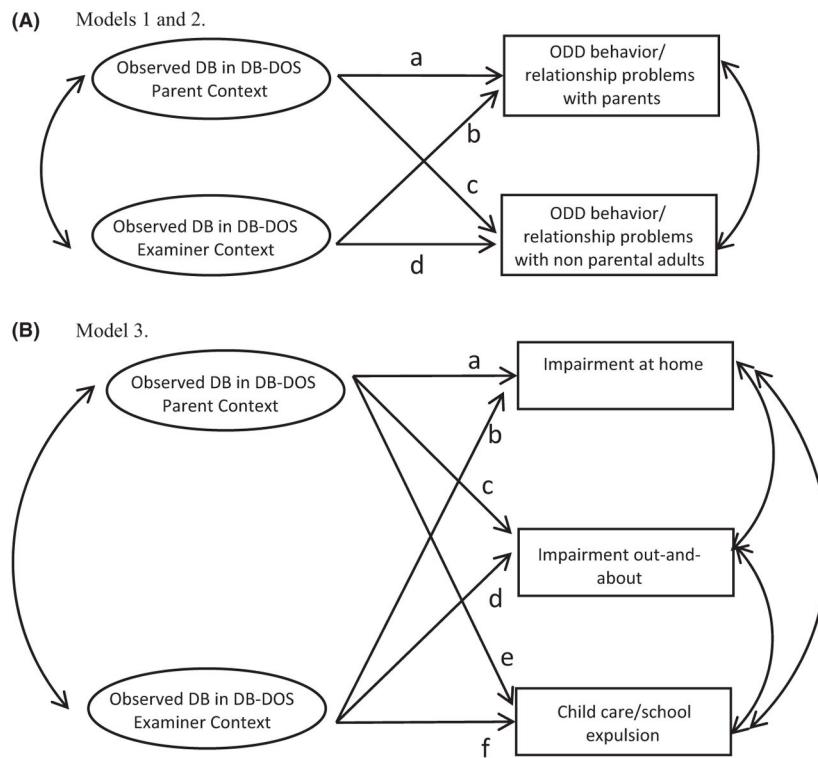


Figure 1. Structural equation models to test associations between observed DB in the Parent and Examiner Contexts and ODD behaviors (Model 1) or relationship problems (Model 2) with parents and nonparental adults; and with impairment at home, out-and-about, and child care/school expulsion (Model 3). Note. The following covariates are not shown on the figures but included for each outcome: child’s sex, age, race/ethnicity, poverty and cognitive performance on Picture Similarities

Associations between observed DB in the DB-DOS Parent Context and Examiner Context with mother-reported ODD behaviors and impairment

Table 1

	Observed DB with parent			Observed DB with examiner		
	<i>b</i>	<i>SE</i>	<i>p</i>	<i>b</i>	<i>SE</i>	<i>p</i>
<i>Outcomes with parents</i>						
Oppositional-defiant behavior with parents ^a	0.13	0.05	0.006	0.63	0.11	0.05
Impairment in relationships with parents ^b	0.00	0.16	0.980	0.00	-0.03	0.17
Impairment at home ^c	0.10	0.05	0.029	0.12	0.03	0.06
Impairment when out-and-about ^c	0.27	0.13	0.035	0.13	0.21	0.14
<i>Outcomes with nonparental adults</i>						
Oppositional-defiant behavior with nonparental adults ^a	0.06	0.07	0.404	0.28	0.14	0.045
Impairment in relationships with nonparental adults ^b	0.38	0.23	0.105	0.17	0.76	0.28
Child care/School expulsion ^d	0.28	0.36	0.433	0.13	1.04	0.46

DB, disruptive behavior; *b*, unstandardized estimate; beta, standardized estimate; SE, standard error; DB-DOS, disruptive behavior diagnostic observation schedule; FLIS, family life impairment scale; PAPA, preschool age psychiatric assessment.

All estimates control for child sex, age, race/ethnicity, poverty and cognitive ability.

Bolded estimates are hypothesized within-context associations.

^aCount outcomes from the PAPA.

^bOrdinal outcomes from the PAPA.

^cContinuous outcomes from the FLIS.

^dBinary outcome from baseline survey and FLIS.