DESCRIPTIVE ANALYSIS OF PARENT–CHILD INTERACTIONS IN YOUNG CHILDREN WITH OR AT RISK FOR DEVELOPMENTAL DELAY

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Children with developmental delay (DD) are at risk for behavior problems, but little is known about natural contingencies of reinforcement that these children experience. The present study used descriptive analysis (antecedent–behavior–consequence observations) to study parent–child interactions of forty-seven, 2–3 year-old children with or at risk for DD. Child adaptive and inappropriate behavior as well as their antecedents and consequences were observed across four conditions (free play, parent-directed play, mealtimes, parental distraction). When parents were engaged in another task (distraction), child appropriate behavior occurred less frequently than in the other conditions, and child inappropriate behavior occurred 63% of the time. A lack of parental attention and no activity were the most frequent antecedents for inappropriate behavior. Potential positive reinforcers appeared as consequences of inappropriate child behavior 77% of the time. These findings have implications for the development and prevention of serious behavior disorders. Copyright © 2004 John Wiley & Sons, Ltd.

INTRODUCTION

Although about 50% of people with developmental delay (DD) have some form of psychopathology, little research exists on the prediction of future behavior problems in young children with DD (Feldman, Hancock, Reilly, Minnes, & Cairns, 2000). Recent studies show that children with DD as young as 2–3 years of age are at risk for behavior disorders (Baker, Blacher, Crnic, & Edelbrock, 2002; Feldman et al., 2000). Behavior analysis of child development stresses the importance of daily parent–child interactions in creating reinforcement contingencies that promote the development of adaptive behavior (Bijou, 1992; Patterson, 1982, 1997; Patterson, DeBaryshe, & Ramsey, 1989).

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Contract/grant sponsors: Health Canada; Human Resources Development Canada; Hospital for Sick Children’s Foundation; Scottish Rite Charitable Foundation; Canadian Institute of Health Research; Social Sciences and Humanities Research Council of Canada.
Descriptive analysis using antecedent–behavior–consequence (ABC) observations is a well established clinical tool in the functional assessment of problem behavior and in guiding treatment, particularly in persons with DD (Feldman, Condillac, Tough, Hunt, & Griffiths, 2002; Feldman & Griffiths, 1997; O’Neill, Horner, Albin, Storey, & Sprague, 1990). Recently, ABC assessments have been used to identify possible naturally occurring reinforcement contingencies in older children and adults with DD and behavior disorders (Borrero & Vollmer, 2002; Thompson & Iwata, 2001; Vollmer, Borrero, Wright, Camp, & Lalli, 2001).

Despite the increased risk of behavior problems in young children with DD, research is lacking on the natural reinforcement contingencies these children experience in different milieu. Although it is recognized that parent and child behavior varies according to context (Holden & Miller, 1999), surprisingly little research has examined naturally occurring parent–child interactions across situations. Laboratory studies showed how parent–child interactions differ according to context. Donenberg and Weisz (1997) reported that parents of clinic-referred depressed and anxious children used more belittling and blaming in a conflict task, while nurturing and protecting interactions were more pronounced in a planning task. Landry, Garner, Pirie, and Swank (1994) found that mothers of children with Down syndrome exhibited a higher proportion of directives and praise during a puzzle task, and a higher number of suggestions during a pretend play task. They also found that children were more likely to show attempts to comply during the puzzle task than during the pretend task. Natural observation via ABC recording is a viable method to identify different rates of parent and child behavior and reinforcement contingencies for child behavior across different situations.

This study provided naturalistic descriptive analyses of possible reinforcement contingencies for appropriate and inappropriate behavior in 2–3-year-old children with or at risk for DD across four typical home situations (free play, parent-directed play, meal time, and parental distraction). This investigation expanded previous research on the use of descriptive analyses of reinforcement contingencies for behavior disorders by studying young children with or at risk for DD before they had developed serious behavior problems. This study also enhanced the ecological validity of previous laboratory research of contextual influences on parent–child interactions by conducting home observations of a variety of natural everyday activities. Because children with DD are at increased risk to develop behavior problems, we hypothesized that there would be a substantial amount of potential reinforcement for inappropriate behavior. It also was hypothesized that less appropriate and more inappropriate child behavior would occur in an everyday situation in which positive reinforcement for prosocial child behavior is relatively scarce—that is, the parental distraction condition, where the mother is engaged in another task while maintaining supervision of the child.
METHOD

Participants

The participants were forty-seven, 2–3-year-old children \((M = 2.69\) years, \(SD = 0.54\) years) and their parents. Potential families were identified by contacting services for young children with or at risk for DD (e.g. child development clinics and early intervention programs) across southern and eastern Ontario. Qualified children were either receiving or eligible for services reserved for children with or at risk for developmental problems; those children whose only risk factor was low socioeconomic status were not included. Participant families were chosen based on pre-existing independent evaluations of risk status and formal diagnosis.

Approximately 60% of the children were male, 52% were premature, and 96% lived with their biological parents. Forty-eight percent of the children had mild to severe developmental delay, with 19% falling in the moderate to severe range. In categorizing the children by diagnosis type, 42% of the children had DD due to known etiology, 27% had DD—unknown etiology (e.g. global DD), and 31% were low birth weight/premature/multiple birth children. The children’s mothers (mean age = 35.12 years, \(SD = 6.06\) years) were observed in this study because each mother had nominated herself as the child’s primary caregiver. The majority of mothers had received high school education and over 60% completed some form of post-secondary education. Sixty percent of mothers were employed either full or part time, and 93% of parents were married or living together and owned their own home. Generally, between two and three adults and two and three children were living at the home at any given time and the median family income range was $34 000–$38 000 US per year.

Measures

Family Demographics

The locally developed Family Information Questionnaire (FIQ) obtained data on child, parent, and family characteristics (e.g., child age, sex, diagnosis, and health; parents’ age, education, marital status; family income).

Parent–Child Interactions

Parent–child interactions were recorded on video and coded (using a format developed by the authors) for a number of parent and child behaviors as well as their
antecedents and consequences (for observational definitions see the appendix). Twenty percent of the total of 115 clips were chosen at random and coded by both of the two tape coders (the primary investigator and a naïve observer) at the same time, but independently to assess reliability. Coders were two undergraduate psychology students (one had no clinical experience and one had provided behavioral training to a young child with autism), who received training in the coding system until they achieved at least 85% inter-rater agreement. Both observers were blind to the children’s adaptive and problem behavior scores, level of delay, and diagnosis. Interobserver reliability was high for all antecedent, behavior, and consequence categories (Cohen’s kappa: 0.89–0.95).

Procedure

Participating families were visited in their home and interviewed by a trained researcher for approximately 2–3 hours, during which the mother completed a series of questionnaires and was videotaped interacting with the child for about 20–40 min. For coding purposes, clips 5 min in length were obtained from the middle of the observation period for each of the four different situations: free play, parent-directed play (such as putting together a puzzle), meal time, and parental distraction (in which the parent was engaged in another task—e.g. filling out a form, making lunch—while maintaining sole supervision of the child). The authors chose these conditions as they represented the types of interaction that were thought to frequently occur naturally in the home. These conditions were also hypothesized to be associated with varying opportunities to observe different behaviors. For example, in the parental distraction condition there might be more opportunities to observe the child alone, and in the parent-directed play condition the children may display more turn taking and compliance. If a condition lasted less than 5 min, then the entire segment was used. Although parents were requested to set up each of the four conditions for at least 5 min, not all parents were able to complete the full set primarily because of the behavior of their child (e.g. the child finished the snack in less than 5 min; the child did not want to play with the toy the parent had chosen in the parent-directed play condition).

We used 10 s partial interval coding in an ABC coding format similar to that used by Thompson and Iwata (2001). For every interval in which a defined child behavior was observed, the designated behavior category was coded. Then the tape was rewound to view the immediate 10 s interval before the behavior; this segment was coded for several antecedent categories as either ‘present’ or ‘absent’ (Lerman & Iwata, 1993). Likewise, the immediate 10 s interval following the behavior was viewed and coded for several consequence categories. Antecedent and consequence categories are not mutually exclusive (as multiple behaviors may occur in each of
these 10 s intervals) and therefore several antecedents or consequences may have
been observed and recorded for each behavior. For example, 10 s before the behavior
occurred a parent may have provided attention by speaking to the child, and then at
2 s before the behavior made a demand. Therefore, in this case both ‘attention’ and
‘demand’ would be coded as antecedents.

RESULTS

Overall Results

The total viewing time of 115 clips was 9.23 hours, comprised of 1979 codeable
observations of behavior. The mean number of appropriate behaviors (social
engagement and compliance combined) per child was 28.12 (SD = 15.95), and the
mean number of inappropriate behaviors (disruptive and dangerous behavior
combined) per child was 16.03 (SD = 13.91). The mean number of conditions per
child was 2.43 conditions (SD = 0.74 conditions), and the mean total viewing time
per child was 11.78 min (SD = 3.73 min). Alpha was set a priori at 0.05 for all
statistical tests.

A multivariate analysis of variance (MANOVA) was conducted to determine
differences among the four conditions (free play, parent-directed play, meal time,
parental distraction) in the occurrence of the two dependent variables: appropriate
behavior and inappropriate behavior. Tests of between-subjects effects using the
Tamhane method revealed unequal proportions of behavior between conditions. The
amount of appropriate behavior differed by condition, $F(3, 110) = 16.47, p < 0.001$,
such that free play ($M = 17.93, SD = 1.87$) and meal time conditions ($M = 11.15,$
$SD = 1.71$) had significantly higher occurrences of appropriate behavior than the
parental distraction condition ($M = 6.30, SD = 1.76$). Inappropriate behavior differed
by condition, $F(3, 110) = 3.48, p = 0.018$, such that the parental distraction condition
($M = 9.38, SD = 1.63$) had a significantly higher occurrence than the parent-directed
play condition ($M = 2.33, SD = 5.47$).

Specific Behaviors

The data were then examined descriptively to identify the prevalence of behaviors,
antecedents, and consequences overall and by context. The appropriate behaviors of
compliance and social engagement occurred during a mean of 65.8% of the intervals
and inappropriate behaviors of disruptive and dangerous behavior occurred a mean of
34.2% of the intervals. Figure 1 illustrates the percentage occurrence of child
behavior by condition. Social engagement was the most common behavior for all conditions except the parental distraction condition, during which disruptive behavior was the most common.

Antecedents

Overall, the most common antecedent was parental attention, which occurred 65% of the time, and activity, which occurred 62% of the time. Attention was the most prevalent antecedent in all conditions except the parental distraction condition, in which alone/no attention was the most common. Figure 2 illustrates the percent occurrence of antecedents across appropriate and inappropriate child behavior. The reader will note that several antecedents could be coded in the interval preceding the behavior and therefore the percentages in this figure do not sum to 100%. Whereas attention and activity were the most common antecedents for appropriate behavior, alone/no attention and activity were the most common for inappropriate behavior.

Consequences

For the purposes of these analyses the consequences of attention and tangibles were grouped together, as both categories represented positive reinforcers. Overall,
Descriptive analysis

Figure 2. Percent occurrence of antecedents across appropriate and inappropriate child behaviors.

Figure 3. Percent occurrence of consequences across appropriate and inappropriate child behaviors.
positive reinforcers were the most common consequences occurring at 87% of the time. Figure 3 illustrates the percent occurrence of consequences broken down by appropriate and inappropriate child behavior. As can be seen, potential positive reinforcement occurred frequently following both appropriate and inappropriate behavior (slightly more often for appropriate behavior). Possible negative reinforcement occurred more frequently for disruptive behavior than appropriate behavior and likely sensory reinforcers occurred more often for disruptive and (especially) dangerous behavior than for appropriate behaviors. For dangerous behavior, sensory consequences occurred almost as frequently as potential positive reinforcers (sensory consequences were more prevalent in the parental distraction condition than the other conditions).

DISCUSSION

The present study found a high occurrence of both appropriate and inappropriate child behavior. Both categories of child behavior were highly effective in obtaining potential positive reinforcers for the child: given the risk of behavior problems in these children, it is noteworthy that 77% of all inappropriate behaviors were followed by parental attention or delivery of tangibles. This situation may increase the risk of these children developing more serious behavior problems, especially if they also have biological predispositions toward psychopathology (Feldman et al., 2000).

In this study, dangerous behavior (the majority being pica and hand mouthing) occurred 4.1% of the time and were followed by sensory consequences 73% of the time. While some pica and hand mouthing may occur in typically developing 2–3-year-olds, pica occurring beyond 18 months of age may be considered a serious clinical concern (Baltrop, 1966). It is possible that we were seeing the early stages of more serious pica and hand mouthing in some of these children (note that we provided information about local behavioral treatment services to the parents if needed or requested).

Appropriate and inappropriate behavior occurred in differing proportions across conditions. Consistent with the original hypothesis, appropriate child behavior occurred significantly less often in the parental distraction condition than in the other three contexts and inappropriate behavior occurred 63% of the time (significantly more frequently than in the parent-led play condition). Attention and sensory consequences were the most prevalent potential reinforcers in the parental distraction condition. These findings indicate that when a young child with DD is in a relatively attention-deprived and unstructured environment he or she may lack appropriate independent play skills and resort to aberrant behavior to gain the parent’s attention or to provide him or herself with sensory stimulation. In fact, across all conditions,
being alone or receiving no attention was a common antecedent for inappropriate behavior, especially for dangerous behavior, for which it was present 66% of the time. Not surprisingly, alone/no attention was the most common antecedent to occur in the parental distraction condition. Preventative parent training could be offered to show parents how to teach independent play skills to their children so that they can access safe and appropriate sensory reinforcers when not receiving social interactions. The parents could also be taught how to multi-task and still provide intermittent contingent attention for appropriate behavior, and ignore or redirect the child’s inappropriate behavior (Feldman et al., 2002).

The variety of antecedents and consequences observed for disruptive and dangerous behavior highlights the complexity of inappropriate behavior and is consistent with previous descriptive analysis research (Iwata et al., 1994; Day, Horner, & O’Neill, 1994; Vollmer et al., 2001). An inappropriate behavior may serve one function for one child or in one context while serving another for another child or situation. Functional assessments of problem behavior are crucial to understanding the motivation driving certain behaviors, and also in designing interventions to teach children more appropriate means of obtaining reinforcers (McDowell, 1988; Vollmer et al., 2001). This study highlights the need for future research to examine the function of appropriate and inappropriate behavior in different contexts.

This preliminary study advances previous research on descriptive analysis and the development of behavior problems in children with DD. First, this study looked at the occurrence of naturally occurring appropriate and inappropriate behavior in a non-clinical sample of young children with or at risk for DD, while previous research has focused on older children and adults referred for behavior problems. Second, rather than examining behavior in simulated environments or congregate residential settings, this study observed natural interactions between children and their mothers (primary caregivers) in the family home. Third, this study highlighted the social and nonsocial antecedents and consequences in several everyday contexts that may lead to the development of problem behavior in children with DD.

The generality of these findings are limited by the relatively small sample size and should be replicated with a larger sample of young children with or at risk for DD. This study also used a mixed diagnostic sample of young children with or at risk for DD; therefore, the findings may not be generalizable to specific diagnostic categories or older children with DD. There were no differences, however, in adaptive behavior (Vineland Adaptive Behavior Scales, Sparrow, Balla, & Cicchetti, 1985) or behavior problem scores (Child Behavior Checklist, Achenbach, 1988; Reiss Scales of Children’s Dual Diagnosis, Reiss & Valenti-Hein, 1990) between children with DD due to known etiology, DD—unknown etiology (e.g. global DD), and low birth weight/prematurity/multiple birth. We also did not investigate genetic, other biological, medical predispositions to developing behavior disorders, although we
do recognize the complex interaction between biological and environmental variables in the genesis of psychopathology (Feldman & Griffiths, 1997). Finally, we did not conduct experimental (functional) analyses to verify which consequences were actually functioning as reinforcers. However, Vollmer et al. (2001) showed that descriptive analyses in natural settings corresponded to controlled analog assessments.

**Future Directions and Considerations**

Although in this study we focused on the parent’s influence on child behavior, we appreciate the reciprocal nature of parent–child interactions; future research could use a similar ABC method to examine coercive parent–child interactions from the primary caregiver’s perspective (Thompson & Iwata, 2001) to better understand the effects of a children’s behavior on their parents. Future studies should also examine differences in reinforcement contingencies between specific etiological groups of children with DD. The contingencies experienced and rates of behavior produced by children with autism may differ from those of children with Down syndrome. This information may be helpful in assisting parents to improve the quality of interactions they have with their children.

It might also be interesting to compare the antecedents and consequences and rates of behavior observed for this sample to those of a sample of typically developing children. Previous research has found that, compared with parents of typically developing children, those parents with children who have DD are more directive, experience more difficulty in interpreting and responding to cues from their children, and find it harder to stimulate their children who are in turn less responsive (Kelly & Barnard, 2000). Examining group differences would help in determining whether young children with DD experience different contingencies than typically developing children that may contribute to the former group’s risk status for behavior disorders. For example, it would be interesting to examine whether parents of typically developing children deliver positive reinforcers for appropriate and inappropriate behavior at similar rates to those of parents of children with DD. Understanding how parents of children with DD naturally respond to incipient behavior problems may aid in the design of early intervention programs aimed at preventing the development and escalation of severe problem behavior.

**ACKNOWLEDGEMENTS**

This research was supported by grants to M. Feldman from Health Canada, Human Resources Development Canada, Hospital for Sick Children’s Foundation, the
Scottish Rite Charitable Foundation, the Canadian Institutes of Health Research, and the Social Sciences and Humanities Research Council of Canada. We wish to thank Jennifer Laforce and Danielle Ostfield for their assistance in coding and analysing the data, and Colleen Cairns for collecting the data.

APPENDIX

Behaviors

Compliance: the child initiates the correct response to a specific instruction made by the primary caregiver within 10 s.

Social engagement: the child is engaged in appropriate social interactions with an adult, another child, or a pet. This includes making eye contact, appropriate listening or communication (verbal or non-verbal), or appropriate play or activity with another person. The mere presence of another individual while the child is engaged in an activity does not constitute social engagement; the child must be acknowledging that individual and actively engaged. Does not include compliance, which is recorded separately.

Disruptive behavior: the child is engaged in any behavior that is disruptive (e.g. feet stamping, running, throwing or dropping objects, or inappropriate touching or use of an object) or antisocial (e.g. snatching an object, sticking out tongue, or spitting) including noncompliance or inappropriate verbalizations such as crying, whining, screaming, or oppositional verbalizations. Also includes urine/bowel accidents, stereotypy (nonfunctional repetitive asocial behavior), stripping (totally disrobes or to diaper), and inappropriate touching of self or others (excluding hands in mouth, which is coded as self-injury).

Dangerous behavior: the child is engaged in an activity that threatens their safety or someone else’s or damages property. This includes physical aggression (biting, hitting, throwing objects at a person or pet) or self-injurious behavior (biting, hitting, slapping self or nonaccidentally bringing body into contact with a hard object or surface). This category also includes pica (mouthing of a non-nutritive substance or object—excludes pacifier). Any behavior where the child causes damage to an object constitutes property damage and is therefore coded (e.g. banging surface with object or appendage). Attempts to engage in these behaviors also are scored.

Antecedents

Attention: another person interacts nonverbally, verbally, and/or physically with the child in a positive (e.g. smiling, speaking, hugging), neutral (pointing, passing of
information) or negative (e.g. frowning, restraining, criticizing) fashion. This includes custodial care, approval and disapproval. Does not include demands or requests.

 Demand or request: another person verbally or physically asks the child to engage in a task or response (e.g. when caregiver asks the child to put away his/her toys or go to bed), presents task materials to the child (e.g. hands the child a toothbrush), or completes a self-care task for the child (e.g. washing the child’s face). Includes stop commands and statements that implicitly direct the child to perform a task.

 Alone or no attention: the child is by him/herself in a room or is not interacting with another person if alone. If only pets, but no people, are present in the room with the child then the alone category will be coded.

 Denial, removal of, or waiting for attention or object: another person ignores the child’s attempts to secure attention or stops attending to the child or does not provide the child with desired/requested object or activity, or takes it away (e.g. not giving child requested toy, turning off TV).

 Transition in task, person, or place: the child changes from one activity, person, or location to another (e.g. from playing to going to bed, mother to father, playroom to bedroom).

 Activity: refers to a situation in which the child is actively engaged in any activity (e.g. watching TV or playing; specific activity should be indicated in the comments row).

 Consequences

 Attention: another person interacts nonverbally, verbally, and/or physically with the child in a positive (e.g. smiling, speaking, hugging), neutral (pointing, passing of information) or negative (e.g. frowning, restraining, criticizing) fashion. This includes custodial care, approval, disapproval, demands, and requests.

 Tangible or activity: refers to a situation in which the child obtains an item (e.g. food or a toy) or is actively engaged in any activity (e.g. watching TV or playing; specific activity should be indicated in the comments row).

 Avoids/escapes: the child avoids or escapes performing a task, going to a place, or being with a person.

 Sensory: the child receives obvious sensory stimulation either internally (automatically generated by the behavior—e.g. masturbation) or externally (e.g. vibration). Does not include other consequences above with sensory components (e.g. hugging, watching TV, eating food, general motor movements).

 None: refers to a situation in which there is no observed consequence of the child’s behavior, within the interval in which the behavior occurs or the next 10 second interval.
REFERENCES


