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Preschool children with disruptive behavior: Three-year outcome as a function of adaptive disability

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Abstract
A significant discrepancy between intelligence and daily adaptive functioning, or adaptive disability (AD), has been previously found to be a associated with significant psychological morbidity in preschool children with disruptive behavior (DB). The utility of AD as a predictor of later developmental risks was examined in a 3-year longitudinal study of normal ($N = 43$) and DB preschool children. The DB children were grouped into those with AD (DB+AD; $N = 28$) and those without AD (DB-only; $N = 98$). All children were followed with annual evaluations to the end of second grade. Both DB groups demonstrated substantial and pervasive psychological and educational morbidity at 3-year follow-up. In comparison to DB-only children, DB+AD children had more symptoms of attention-deficit hyperactivity disorder (ADHD) and conduct disorder (CD), more severe and pervasive behavior problems at home, more parent-rated externalizing and internalizing, and lower academic competence and more behavioral problems at school. Parents of DB+AD children also reported greater parenting stress than did parents in the other groups. A significant contribution of AD to adverse outcomes in the DB group remained on some measures even after controlling for initial severity of DB. AD also contributed significantly to CD symptoms at follow-up after controlling for initial DB severity and initial CD symptoms. The results corroborate and extend earlier findings of the utility of AD as a risk indicator above severity of DB alone. They also imply that AD in the context of normal intellectual development may arise from both the deficient self-regulation associated with ADHD and from disrupted parenting, with exposure to kindergarten moderating these adverse effects.

Children who display significantly elevated levels of hyperactive, impulsive, and inattentive behavior, or attention deficit hyperactivity disorder (ADHD), as well as aggressive or oppositional defiant behavior have markedly greater psychological, academic, emotional, and social morbidity. This is true for both concurrent and prospective risks in comparison to children having either behavior pattern alone or than normal children (Campbell, 1987; Hinshaw, 1987; McGee, Partridge, & Silva, 1991; Pope & Bierman, 1999; Taylor, Sandberg, Thorley, & Giles, 1991; Tremblay,

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Pihl, Vitaro, & Dobkin, 1994). Longitudinal studies of children with high levels of such disruptive behavior (DB) followed into later childhood and adolescence reveal a markedly higher likelihood of persistence of DB and a substantially greater risk for conduct disorder (CD), delinquency, and criminal activities (Loeber, 1990; Moffitt, 1990; Patterson, Dishion, & Reid, 1992; Tremblay et al., 1994). This greater risk of CD is associated with a higher likelihood of developing later substance experimentation, use, and abuse in adolescence than is the case for normal children or for those displaying only hyperactive–impulsive behavior (Barkley, Fischer, Edelbrock, & Smallish, 1990; Biederman, Faraone, Milberger, et al., 1996; Fischer, Barkley, Edelbrock, & Smallish, 1990; Mannuzza, Gittelman–Klein, Bessler, Malloy, & LaPadula, 1993; Satterfield, Hoppe, & Schell, 1982; Walker, Lahey, Hynd, & Frame, 1987; Weiss & Hechtman, 1993).

DB has also been associated with greater family adversity, poor parental child-rearing skills, and maladjustment in school (Patterson et al., 1992). Specifically, these families are characterized by significantly higher levels of aggression among other family members, and more harsh, extreme, and unpredictable methods of child discipline. Parents in these families also demonstrate greater strife in marital interactions, higher probabilities of divorce, and greater levels of psychological maladjustment or psychiatric disorders (Barkley, Anastopoulos, Guevremont, & Fletcher, 1992; Lahey, Piacentini, McBurnett, Stone, Hardagan, & Hynd, 1987; McGee et al, 1991; Patterson et al, 1992; Stormont–Spurgin & Zentall, 1995). In school, DB children have greater academic achievement deficits, more school behavioral problems, and receive more school disciplinary actions than non-DB children (Heller, Baker, Henker, & Hinshaw, 1996; Kingston & Prior, 1995; McGee et al., 1991; Stormont–Spurgin & Zentall, 1995).

One area of psychological morbidity that has not been well studied in DB children is their daily adaptive functioning. Adaptive functioning refers to the "performance of the daily activities required for personal and social sufficiency" (Sparrow, Balla, & Cicchetti, 1984). Several measures have been developed to assess this important domain of human social functioning, including the Vineland Adaptive Behavior Scale (Sparrow et al., 1984), the Normative Adaptive Behavior Checklist (NABC; Adams, 1984a), or the Comprehensive Test of Adaptive Behavior (CATB; Adams, 1984b). Such measures represent a composite index reflecting both the acquisition and the actual performance of the requisite skills needed for the child to assume increasing social independence from others in major domains of daily living. These skills often entail self-help routines, such as dressing, bathing, feeding, toilet training, personal hygiene, and care of one's property, among other aspects of self-care, and the motor abilities necessary to carry out these tasks. Other skills involve increasing independence from parents in learning and following rules that pertain to appropriate social conduct within the home and later the neighborhood and community. These may include the pragmatics of language use in social interactions with others, rules governing interpersonal interactions within the culture, and those governing social and economic exchange. For instance, such rules may pertain to etiquette, reciprocal altruism and contractual obligations with others, and religious and moral conduct. Eventually, across development, children are expected to understand and adhere to these cultural rules with minimal or no direct supervision as they assume social self-sufficiency.

At first glance, adaptive functioning might seem to be similar to global assessments of functioning (GAF), such as that provided in the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; American Psychiatric Association, 1994). However, GAF scores are merely global impressions rendered by clinicians. Instruments evaluating adaptive functioning, in contrast, are not global impressionistic judgments but assess far more specific and varied domains of daily functioning using vastly more items of far more explicit detail than GAF judgments. These instruments also permit children

to be compared to norms to better establish the child's standing relative to age-appropriate performance—something not done using GAF judgments. Consequently, GAF scores are but a very crude approximation of daily adaptive functioning in comparison to adaptive functioning inventories.

Children having ADHD manifest major elevations in DB, particularly in the dimension of hyperactive–impulsive–inattentive behavior. Research shows that children with ADHD manifest significant deficits in most domains of adaptive functioning (Barkley, DuPaul, & McMurray, 1990; Roizen, Blondis, Irwin, & Stein, 1994). Indeed, their degree of deficits may be comparable to that associated with mild mental retardation (MR) or even pervasive developmental disorders (PDDs; Stein, Szumowski, Blondis, & Roizen, 1995). Roizen et al. (1994), for instance, found that adaptive functioning in ADHD children fell markedly below intellectual level (*SD* = 1.5–2). Differences between adaptive functioning and IQ in normal children, by contrast, may be very small (approximately 3 standard score points; Sparrow et al., 1984). In the study by Roizen et al. (1994), the IQ-adaptive functioning discrepancies were not a function of either comorbid learning disabilities or other disruptive behavior disorders. This led the authors to posit that a discrepancy between IQ and adaptive functioning, termed adaptive disability (AD), might serve as a useful marker of risk for other problems in children with ADHD.

Stein et al. (1995) later calculated the discrepancy between measured intelligence and adaptive functioning in three groups of clinic-referred children: ADHD, ADD (i.e., attention deficit disorder without hyperactivity), and PDD or MR. Results revealed that both the ADHD and ADD groups demonstrated significantly lower levels of adaptive functioning relative to their intelligence than did the PDD/MR group in communication and daily living. No significant group difference was found in socialization. These findings held despite statistically controlling for comorbid ODD/CD symptoms. Such studies suggest that AD may be a useful marker among DB children for those likely to have exceptionally greater concurrent morbidity, and hence prospective risks, than other DB children not so disabled.

Several causes may contribute to AD among DB children. Obviously, some children may manifest AD by kindergarten due to an inability to learn the requisite skills for social self-sufficiency secondary to generalized intellectual retardation or severe developmental disorder, such as autism or childhood psychosis (Stein et al., 1995). Other DB children may develop AD as a consequence of a lack of opportunity for such learning. Orphans adopted from war-torn regions after months or years of early or prolonged institutionalization, for example, might manifest AD. This could arise from a failure to be exposed to appropriate contexts and social interactions, particularly with parents, that seem to be the initial training ground for adaptive skills needed for later social self-sufficiency. In both of these instances, however, AD would likely be associated with some intellectual delay as well. Both could be conceptualized as a failure in the acquisition process of adaptive functioning.

Where AD is manifested in the presence of relatively normal intellectual development, however, an argument could be made for some failure or disruption on the performance side of adaptive functioning. That is, children in this case are clearly developmentally capable of acquiring adaptive skills and have had adequate opportunity for training but do not perform these skills so as to proceed normally to self-sufficiency. AD that is associated with problems of performance rather than of acquisition could arise in at least two ways. One would seem to be impairment in the prerequisite executive functions that permit self-regulation, planning, and the cross-temporal organization of behavior. Such self-regulation would seem to be essential to deploying the self-sufficiency skills a child has acquired at those critical times in the social ecology where they are important for social effectiveness. ADHD has been shown to be associated with impaired executive functioning and therefore might well result in a deficit in performing adaptive skills and self-suffi-

ciency despite adequate acquisition of those skills (Barkley, 1997). The earlier studies finding ADHD children to have greater deficits in adaptive functioning despite normal intelligence would be consistent with this view.

Yet another problem with the performance of adaptive skills could arise from a disruption in the family training process that encourages the adoption and performance of those skills. Disturbances in parental training and management of children might well result in a discrepancy between IQ and adaptive functioning, or AD, independent of whatever deficits in executive functioning a child may display. Disrupted parenting is frequently associated with the development of aggressive and antisocial behavior in children (Patterson, 1982; Patterson et al., 1992) and partly accounts for the increased risk of hyperactive children for later conduct problems and antisocial behavior (Patterson, DeGarmo, & Knutson, 2000). DB children would therefore be more at risk for AD not only as a consequence of those executive function deficits associated with ADHD but also from their greater likelihood of exposure to disrupted parenting that may interfere with the normal performance of skills related to adaptive self-sufficiency. Indeed, many of the types of parental commands and requests that aggressive, oppositional children are likely to defy or oppose are those associated with self-care, chore performance, and general responsibilities within the family considered part of self-sufficiency (Patterson, 1982). This line of reasoning implies that DB children having AD would have parents suffering far greater psychological distress and disrupted parenting practices and the children would be far more likely to manifest symptoms of conduct disorder and antisocial behavior as a consequence than DB children without AD.

In an earlier paper, Shelton et al. (1998) reported results from a project detecting high-risk children with DB among public school children registering for kindergarten in a metropolitan school system. These preschool DB children, many of whom met diagnostic criteria for ADHD and ODD, were selected to eventually participate in a multimethod intervention program for high-risk children. The results of that treatment study are reported elsewhere (Barkley et al., 2000; Shelton et al., 2000). Although initial treatment effects were evident, no differences between treated and untreated children were found by 2-year post-treatment follow-up. The initial paper on the pretreatment characteristics of these children focused upon the various forms of psychiatric, psychological, and educational morbidity found in association with the DB behavior pattern in this preschool age group (Shelton et al., 1998). That paper examined the various psychological, educational, and social morbidities found in the DB children as a function of subgrouping on AD at kindergarten entry.

The initial findings were quite consistent with the view that AD in DB children in the absence of significant intellectual delay may be a function of disrupted training and performance of routines related to self-sufficiency within the family. All DB children had significantly greater morbidity and had parents who displayed greater psychological problems and poorer child management skills. However, compared to DB children without adaptive disability (DB-only), DB+AD children had (a) more conduct disorder; (b) greater inattention and aggression symptoms; (c) more social problems, less academic competence, and poorer self-control at school; (d) more severe and pervasive behavior problems across multiple home and school settings; and (e) parents with poorer child management practices. Not determined in that paper, however, was the critical issue of whether AD was serving merely as a marker for more severe initial symptoms of DB. Such severity alone would have predicted similar findings to those noted above for the DB+AD group.

The present study reports the results of a 3-year follow-up evaluation of these same DB children. It focuses on five issues:

1. What is the utility of using preschool AD as a predictor of adverse outcomes at a three-year follow-up?
2. Does the presence of AD among DB chil-

dren at kindergarten entry add incrementally to predicting later psychological morbidity beyond that associated with the initial severity of DB symptoms, with which preschool AD was associated?

3. To what extent do parent characteristics and parenting practices at kindergarten contribute to AD both at kindergarten and at 3-year follow-up?

4. Does the presence of AD in preschool DB children make any additional contribution to future morbidity beyond the severity of those impairments already associated with it at kindergarten entry? This question was raised because it is possible that AD is associated with morbidity at kindergarten entry but makes no further contribution to these same areas of later morbidity. For instance, AD was associated with higher levels of CD symptoms at kindergarten. Hence any association of AD with the severity of CD symptoms at follow-up may simply have resulted from that initially increased level of CD symptoms associated with AD at kindergarten. AD might make no further contribution to later risk beyond the effect it has at kindergarten.

5. How stable is AD across the 3-year follow-up period?

Methods

Participants

The screening took place from 1991 to 1993 as part of each spring's kindergarten registration process for children entering Worcester, Massachusetts, public schools for the fall. The screening for high levels of DB was permitted just 10 min during the already hectic registration process. Worcester is a city of nearly 170,000 residents having an annual enrollment of approximately 1,200–1,600 children per year for kindergarten.

At registration, parents were invited to complete a questionnaire about their child's DB but were not required to do so to register their children. As a result, a sizable minority of parents (up to 20%) declined to complete the scale. No information is available concerning the families who declined the offer. Children who did not speak English or whose parents were not familiar with English sufficient to complete the screening questionnaire were excluded. In the end, approximately 800–1,100 children per year over 3 years were ultimately screened (for a total of approximately 3,100 children). More information on the screening instrument and selection criteria is provided below and in earlier reports on this project (Barkley et al., 2000; Shelton et al., 1998). Once identified as DB (see below), the children's parents were contacted and told that their ratings had placed their children significantly above the normal range for these domains of behavior. Parents were told such high ratings might indicate a greater than normal risk for school behavioral adjustment problems in the upcoming kindergarten year. Families were further told that this was an early intervention project and that they were being randomly assigned to one of the four treatment conditions (parent training only, special kindergarten enrichment classroom only, the combined treatment condition, and a no treatment condition). The study sample therefore represents preschool DB children whose families were willing to enter an early intervention study. Of those identified as DB and presented with this invitation, 59% accepted it and joined this project, yielding a total of 170 DB children. Subsequently, 12 DB children either withdrew from the project before their initial evaluation or were deemed ineligible at that evaluation. Another four subjects did not have scores available on the adaptive functioning measure to make them eligible for classification on this variable, reducing the sample to 154. By the end of the 3-year follow-up, an additional 28 DB children had dropped out of the project, leaving 126 DB children available for the present analysis.

A normal community control group was also chosen from this screening process. These families were invited to receive the same free annual psychological evaluations, described below, as did the DB children.

Fifty-eight percent accepted the invitation to enter the project, resulting in 47 normal children for this group. By the 3-year follow-up, this group had been reduced to 43 through attrition.

The DB children were subdivided into those who did and did not have AD (see Shelton et al., 1998). Adaptive functioning was assessed using the NABC (Adams, 1984) described below. The total adaptive behavior standard score was used for subgrouping purposes. We initially identified children as AD following the same IQ discrepancy formula recommended by Reynolds (1984) for learning disabilities and adopted later by Greene et al. (1996) in defining social disability. This formula calculates a significant discrepancy between expected and actual adaptive functioning standard scores using IQ as the predictor of expected level of adaptive functioning. This formula resulted in 38 DB children (25%) at study entry being classified as DB+AD, leaving 116 DB children as not adaptively disabled (DB-only), and 47 control children. Results for these baseline comparisons were previously reported (Shelton et al., 1998).

For the present 3-year follow-up analysis, we chose to define AD slightly differently, using a simpler approach. A standard score on the NABC of 80 or lower at study entry served to identify the DB children as AD or not. We did so for several reasons. For one, this approach resulted in a nearly complete overlap among the subjects identified by both approaches. More than 95% (36 of 38) of the subjects identified by the discrepancy formula as AD had scores at or below 80. And none of the DB subjects classified as not being AD had a score at or below this threshold. For another reason, the concept of AD as defined through the discrepancy formula presumes that a child's IQ is a valid indicator of their expected level of adaptive functioning. If that were so, then a substantial correlation ought to exist between IQ and adaptive functioning measures. As noted above, this relationship among normal children in our control group was low and not significant ($r = .14$) while that in the DB group was slightly higher ($r = .21$). Developers of adaptive functioning inventories have found the same nonsignificant association with IQ in their normative samples (Adams, 1984a; Sparrow et al., 1984). Such findings seriously undermine the assumption that IQ can serve as an indicator of daily adaptive functioning. Finally, the simpler approach used here makes replication of this study much less cumbersome for future investigators. Using the simpler approach to defining AD, the resulting sample sizes at 3-year follow-up were 28 DB+AD children, 98 DB-only children, and 43 control children. The two DB groups did not differ in the percentage of children who had received the kindergarten classroom intervention program (DB+AD 60%, DB-only 47%, $\chi^2 = 1.65$, $df = 1$, $p = .198$).

Procedures

A parent-completed rating scale was constructed for the identification of youngsters having significant elevations in the DB behavior pattern for use at kindergarten registration. The screening scale contained the 14 symptom items for ADHD and 8 symptom items for oppositional defiant disorder (ODD) from the third edition, revised, of the DSM (DSM-III-R; American Psychiatric Association, 1987) as well as the nonredundant hyperactive–impulsive factor items and conduct problem factor items from the Conners Parent Rating Scale—Revised (CPRS; Goyette, Conners, & Ulrich, 1978). The items comprising the screen were rated on a 4-point Likert scale and are shown in the Appendix. To be identified as hyperactive–aggressive, parents had to rate their children as placing +1.5 *SD* above the normal mean on either the ADHD items or CPRS hyperactive–impulsive items *and* on the ODD or CPRS conduct problem items. Consequently, scores on *both* the hyperactive–impulsive–inattentive dimension and the conduct problem dimension had to place the child approximately in the top 7% of normal children.

The DB and normal children received a lengthy initial evaluation. This battery consisted of structured psychiatric interviews, psychological and academic tests, parent behavior rating scales, and direct behavioral ob-

servations of the children in the clinic and at school. These tests and observations were conducted in the same order for all children. All of the DB children were randomly assigned to four treatment groups for their fall kindergarten program. These included no treatment, parent training only, special treatment classroom only, and combined parent training and special classroom. As noted earlier, the results for these interventions are reported elsewhere (see Barkley et al., 2000; Shelton et al., 2000). Results indicated no significant effect of parent training at the posttreatment (end of kindergarten) evaluation but a significant effect for the special classroom intervention (Barkley et al., 2000). However, by the 2-year posttreatment follow-up point, no significant effects of the classroom treatment program remained evident (Shelton et al., 2000). Consequently, for purposes of the present paper, all DB children were collapsed back together across their treatment groups to once again form a single sample of DB children. These DB children were then reclassified as being AD or not as described above.

The research assistants conducting the initial evaluation were blind to group membership (DB or control). By 3-year follow-up, however, these assistants were no longer entirely blind to group membership (DB or not), as they had conducted observations of the DB children in their classrooms, some of which were the special project classrooms. Such knowledge would clearly have indicated that the subject being observed in that special class was in the DB group. However, the research assistants certainly were blind to the present subgrouping of the DB children as adaptively disabled or not.

Dependent measures collected at 3-year follow-up

Clinical diagnostic interview. The printed version of the DISC-P version 2.1 that was constructed and used in the DSM-IV field trials (Lahey et al., 1994) was employed in this study. This particular interview was designed to collect information on both DSM-III-R and DSM-IV symptom lists for 12 childhood disorders. As a result, far more symptoms of these disorders were reviewed with parents than just those that eventually appeared in the DSM-IV. Where symptom counts are reported below for any disorders, they reflect the number endorsed from this total item pool and not just the final DSM-IV symptom lists.

Interviewers held master's degrees in psychology and had received training in the use of this interview as part of the DSM-IV field trials or were trained and supervised by the principal investigators who participated in those trials (T.S. and R.A.B.). The final decisions as to the presence or absence of a symptom and the age of onset of symptoms or impairments, where necessary, were made by these trained interviewers. The final diagnosis was made by the application of the subsequently developed DSM-IV diagnostic algorithms as applied to these data. No intercoder reliability information was collected on these interviews; however, test–retest reliability was collected on a subset of subjects and provided to the DSM-IV field trial project (Lahey et al., 1994). Since the final DSM-IV symptom lists for each disorder are now published (American Psychiatric Association, 1994), this study employed these more recent diagnostic algorithms in the conversion of the results of this interview into DSM-IV diagnoses.

Parent ratings.

NABC. This checklist (Adams, 1984a) is a 120-item parent-completed survey of the child's adaptive functioning in six areas of development, including fine motor and gross sensory-motor skills, language concepts, self-help skills, independent living, home living skills and responsibilities, and social skills. Norms are available from a sample of more than 12,000 children. These 120 items were originally drawn from the same item pool used to construct the CTAB (Adams, 1984b). Reliability and validity have been established and are quite satisfactory (see CATB/NABC Technical Manual, Adams, 1984b).

Child Behavior Checklist (*CBCL*). This scale (Achenbach & Edelbrock, 1983) provides *T* scores for eight different dimensions of child psychopathology and has been used extensively in child mental health research.

The revised 1991 scoring system was employed in this study. Scores for the sex problems scale were not reported as they were of no interest to this study and because no comparable scale exists on the teacher version of the scale, noted below.

Home Situations Questionnaire (*HSQ*). This scale (Barkley, 1990) assesses the pervasiveness of behavior problems across 16 different home and public settings (number of problem settings score) and the severity of these behavior problems (mean severity score) on a Likert scale of 1–9.

Parenting Stress Index—Short Form (*PSI*). This scale (Abidin, 1986) completed by parents evaluates the degree of perceived stress in the role of being a parent to this particular child. Only the total stress raw score was used here.

Teacher rating scales.

Child Behavior Checklist—Teacher Report Form (*CBCL-TRF*). This scale (Achenbach & Edelbrock, 1986) contains 126 items related to children's behavioral and emotional problems. It yields *T* scores for seven scales identical to those for the parent version noted above with the exception that no sex problems scale is generated. Again, the 1991 scoring system was employed for this study.

School Situations Questionnaire (*SSQ*). This rating scale (Barkley, 1990) provides a measure of the pervasiveness of a child's behavior problems across 12 different school situations (number of problem settings score). Each problem setting was rated as to severity using a 9-point Likert scale from which a mean severity score across all problem settings was calculated. These two raw scores were used here.

Self-Control Rating Scale (*SCRS*). This is a 33-item scale (Kendall & Wilcox, 1979) that assesses children's self-control; a single raw score was used here.

Social Skills Rating Scale (*SSRS*). This standardized and normed teacher completed scale (Gresham & Elliott, 1990) assesses a child's social skills (30 items), behavioral problems (18 items), and academic competence (9 items). Three standard scores are the result, one for each domain.

Psychological testing.

Woodcock–Johnson Psychoeducational Test Battery. This battery (Woodcock & Johnson, 1984) includes tests assessing cognitive abilities (intelligence), academic knowledge (science, social studies, humanities), and academic skills (reading, math, spelling). Standard scores for each subtest and for general cognitive ability were employed here.

Continuous Performance Test (*CPT*). The preschool version (Gordon, 1983) was used here. The device provided raw scores for total correct and number of commission errors. The task presents single digits on the screen of a computerized device at the rate of 1 per second with the target digit ("1") appearing in a random series of digits. The task lasts 6 min. Due to the young age of the subjects and consistent with recommendations of the test developer, the examiner remained in the room during the testing. Research suggests, however, that this may produce an inhibiting effect on children's disruptive behavior (Draeger, Prior, & Sanson, 1986).

Observations of disruptive behavior during the CPT. During the child's performance of the CPT, the child's behavior was videotaped from behind a one-way mirror. These videotapes were later coded for four categories of behavior related to ADHD using the Restricted Academic Situations Coding System developed by Barkley (1990). These categories were as follows: off-task, fidgets, vocalizes, and out-of-seat. Definitions of the codes and information on the reliability and validity of the system can be found elsewhere (Barkley, 1990; Barkley, DuPaul, & McMurray, 1990). The examiner recorded the occurrence of each behavior category within each 15-s interval. The measures were obtained by calculating the percent occurrence of each category relative to the total possible occurrences. A second coder independently recoded 20% of the videotapes so as to provide an estimate of intercoder reliability. Agreement between these two coders was computed using Pearson correlations for the scores of percent occurrence for each category. The intercoder agreements (*r*s) were as follows: off-task, 0.97; fidgets, 0.93; vocalizes, 0.95; and out-of-seat, 0.97.

Examiner ratings of subject's behavior throughout testing. A rating scale was created comprising 17 items of various behavioral problems. The items dealt with anxiety, shyness, and withdrawal as well as symptoms of ADHD and ODD. Each item was rated on a 7-point scale by the examiner based upon the subject's behavior throughout the entire session they spent testing the child. The total raw score served as the measure. Higher total scores reflected more deviant behavior.

Measures of parent psychological functioning collected only at study entry (*baseline*)

The following measures were utilized only in the regression analyses reported below as possible predictors of child adaptive disability. Differences among the groups at baseline on these measures were previously reported (Shelton et al., 1998).

Symptom Checklist 90—Revised (*SCL-90-R*). This scale (Derogatis, 1986) was completed by the parents (chiefly mothers) and yields *T* scores for eight different dimensions of adult psychopathology, including anxiety, depression, phobic, hostility, interpersonal sensitivity, somatic complaints, psychosis, and so forth. Only the total general severity score was employed here.

Parenting Sense of Competence Scale. This self-report scale (Gibaud–Wallston & Wandersman, 1978; Mash & Johnston, 1983) evaluates a parent's degree of self-perceived competence or efficacy (nine items) and satisfaction (seven items) in their role as a parent. It produces separate raw scores for each of these two domains.

Parenting Practices Scale. This is a 34-item scale (Strayhorn & Weidman, 1988) used to assess the extent to which parents use practices commonly taught in most behavioral parent training programs. A single raw summary score was used.

Mother–child interactions during free play and task periods. Mothers and children were asked to play with each other using toys in a playroom for a 10-min period (free play). The mother was then given a list of commands to have her child perform (task period). These included picking up toys, dusting a table, picking up trash scattered about the floor, picking up clothes scattered about the floor, putting them into a box, drawing a line together through a maze on an Etch-A-Sketch toy, and having the child copy simple geometric designs. Throughout, a television played a videotape of a popular cartoon show ("Scoobie Doo") in the background. These periods were videotaped from behind a one-way mirror. Observers later reviewed the tapes and then rated the mother and child on a rating form of various negative behaviors. Of these items, 14 dealt with maternal behavior (i.e., directive, commanding, punitive, unrewarding, etc.) and 15 with child behavior (i.e., defiance, conflict, negativity, uncooperative, etc.). Each item was rated on a 7-point Likert scale. Separate scores were determined for the children and their mothers for each period (free play, task). A second coder reviewed 20% of these videotapes and rated the mothers' and children's behavior so as to determine intercoder reliabilities. Agreement was computed using Pearson correlations for the total raw score. The results for free play were as follows: mother's behavior, 0.59; child's behavior, 0.54. For the task setting, they were as follows: mother's behavior, 0.67, and child's behavior, 0.79. The moderate reliabilities for free play suggest caution in the interpretation of those ratings.

Results

Demographic and initial selection information

The initial baseline demographic information obtained at kindergarten entry on the parents and children who completed the follow-up assessment along with results on the initial selection measures for the groups are shown in Table 1. The groups were compared on these measures using either one-way analyses of variance (ANOVAs) or chi-square tests, as appropriate. The level of significance chosen

Table 1. *Initial subject characteristics of two DB groups and control group at study entry*

Measure	Control (1)		DB-Only (2)		DB+AD (3)				
	M (%)	*SD*	*M* (%)	*SD*	*M* (%)	*SD*	F/χ^2	*p*	Contrasts
Child age (years)	4.8	0.4	4.7	0.5	5.2	0.5	11.25	.001	3 > 1, 2
Child IQ	104.2	13.1	98.3	13.0	98.3	12.8	3.83	.036	1 > 2
CPRS conduct problems	2.8	2.5	12.4	6.0	15.7	7.9	62.07	.001	1 < 2 < 3
CPRS impulsive–hyperactive	1.9	2.0	7.4	2.8	8.2	3.2	78.26	.001	1 < 2, 3
No. ADHD symptoms	3.6	3.9	16.4	8.1	22.2	10.1	68.44	.001	1 < 2 < 3
No. ODD symptoms	1.4	1.6	6.7	3.1	7.7	3.5	69.26	.001	1 < 2, 3
Child NABC score	97.2	13.0	93.3	9.4	74.5	4.8	49.79	.001	1 > 2 > 3
Mother's age (years)	33.0	5.2	29.7	4.8	29.7	5.4	6.87	.001	1 > 2, 3
Mother's education	13.8	2.4	12.8	2.1	12.8	2.5	2.88	—	—
Mother's SES	35.8	26.6	31.3	25.3	31.8	23.6	0.41	—	—
Father's age (years)	35.0	6.0	32.9	5.4	33.2	10.0	1.52	—	—
Father's education	14.0	2.9	12.9	2.4	12.4	2.7	3.18	.04	1 > 2
Father's SES	50.8	22.8	46.7	23.7	50.0	24.5	0.43	—	—
Sex: Male	62.8	—	68.4	—	67.9	—	0.43	—	—
Parents married	90.2	—	67.7	—	66.7	—	8.12	.017	1 > 2, 3
Public assistance	9.3	—	30.6	—	46.4	—	12.55	.001	1 < 2, 3

Note: +AD, with adaptive disability (NABC score ≤ 80); Contrasts, results of the pairwise comparisons among the three groups; CPRS, Conners Parent Rating Scale—Revised (Conduct Problems and Impulsive–Hyperactive factor scores); DB, disruptive behavior; *F*, results for the omnibus analysis of variance; IQ, score from the Woodcock Johnson Psycho-educational Test Battery; NABC, Normative Adaptive Behavior Checklist; *p*, probability value for the *F* test or chi-square analysis; *SD*, standard deviation; SES, socioeconomic status as determined by the Hollingshead Two-Factor Index of Social Position (1975); χ^2, results for the omnibus chi-square analysis.

for these particular statistical tests was set more liberally at $p < .05$ so as to allow for a determination of how well equated the groups were on these demographic and child variables. Where these omnibus analyses were significant, pairwise comparisons were conducted, using either Newman–Keuls, in the case of a significant ANOVA, or pairwise chi-square tests, in the case of significant omnibus chi-square tests.

The DB group having AD (DB+AD) was significantly older than the other two groups. Both DB groups had significantly lower IQ scores on the Woodcock–Johnson Psychoeducational Test Battery than the control group but did not differ from each other. As would be expected from the initial screening and subject selection criteria, both DB groups had significantly higher scores on the Conners factors and on the number of DSM symptoms of ADHD and ODD, all of which were used to create the screening instrument. The DB+AD group had significantly higher scores than the DB-only group on the conduct problems factor and on the number of ADHD symptoms at study entry but did not differ on these other two selection criteria. Also as expected from the grouping of DB children as with or without AD using their NABC scores, the three groups differed significantly on this measure.

On parental characteristics, the groups differed in mothers' age and mother and father educational levels. Significantly more parents of both DB groups were receiving public assistance compared to control children. The groups also were different in their parents' marital status. Significantly fewer biological parents of the DB groups were married to the child's other biological parent than in the control groups.[1]

1. The study dropouts from the normal group were compared on the initial demographic and group selection measures (see Table 1) to those normal participants who remained in the study to the follow-up evaluation. There were no significant differences. Next, those DB children who dropped out were compared to those who remained in the study on these same measures. Those who dropped out had significantly lower scores on the CPRS impulsive–hyperactive factor and had lower IQ scores on the Woodcock–Johnson test than those who remained in the study. The mothers and fathers of the

There were no differences among the groups in ethnic composition. (DB+AD group: 85.7% White, 7.1% Hispanic, and 7.1% other; DB-only group: 78.6% White, 5.1% Hispanic, 12.2% Black, and 2% other; control group: 90.7% White, 2.3% Hispanic, 4.7% Black, and 2.3% Asian.

Impairment at follow-up as a function of AD

Parent-completed measures. The results for all dependent measures taken at 3-year outcome are shown in Table 2. To reduce the likelihood of Type I errors all dimensional measures were first grouped into sets according to the source of information (parent interview, parent ratings, teacher ratings, clinic measures) and multivariate analyses of covariance (MANCOVAs) were used initially to analyze these sets. Second, the level of significance chosen for the MANCOVA was set at $p < .01$. If this was significant, the univariate analyses of covariance were computed and the threshold for significance on these statistical tests was also set at $p < .01$. If this test was significant, then pairwise contrasts among the three groups were conducted using univariate analyses of covariance. For these, the threshold for significance was set at $p < .05$. Age at study entry served as the covariate in these analyses. Before using this covariate, Levene's Test for Equality of Variances was computed comparing the two DB groups and the normal group. The test was not significant ($F = 1.43$, $p = .23$), suggesting equivalent variances across these groups. For the categorical measures, chi square was employed for the analyses in which the threshold for significance for the omnibus chi square was initially set at $p < .01$. If significant, subsequent pairwise chi-square analyses were conducted with significance set at $p < .05$. Unless otherwise specified, this approach was used for the initial analyses of all groups of dependent measures.

The overall MANCOVA on the number of symptoms endorsed for each of the three disruptive disorders (ADHD, ODD, CD) was significant, $F\ (\Lambda) = 16.83$, $df = 6/332$, $p < .001$. Both DB groups displayed significantly more symptoms of ADHD, ODD, and CD than did the control group. Consequently, both DB groups had a significantly greater proportion of their children meeting DSM diagnostic criteria for all three of these disorders. The DB+AD group had significantly more symptoms of ADHD and proportionately more of them met criteria for the disorder than did the DB-only group. Significantly more DB+AD children also had more symptoms of and were more likely to receive a diagnosis of CD than did the DB-only group.

The MANCOVA on the parent ratings was significant ($F = 5.63$, $df = 24/312$, $p < .001$). Both groups of DB children were rated as having significantly more pervasive and more severe home behavior problems on the HSQ than the control group. The DB+AD group was also rated as being significantly worse in these respects than the DB-only group. This pattern was also found on the PSI Total Parenting Stress score and seven of the eight CBCL scales, the exception being the withdrawn scale.

Teacher-completed measures. The MANCOVA was significant ($F = 2.12$, $df = 28/340$, $p < .001$). Teachers rated both DB groups as having significantly more pervasive and severe behavior problems on the SSQ than control children, but the two DB groups did not differ from each other. The same pattern was observed for the child SCRS. For the three scores from the SSRS, results indicated that both DB groups were rated as significantly more impaired than the control group. Furthermore, the DB+AD group was rated as more impaired than the DB-only group on two of these scales.

On the CBCL-TRF, teachers rated both groups of DB children significantly higher on

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dropouts had significantly fewer years of education and the fathers had significantly lower socioeconomic status than those parents of DB children remaining in the study. More of the dropouts were also no longer married to the other biological parent and more were receiving public assistance. There were no differences on any other measures. Thus, the DB children remaining in the study were more impulsive and hyperactive yet had higher IQ scores and were from more intact families with higher education and social class levels than those who dropped out.

Table 2. *Results at 3-year outcome for comparison of DB and control groups*

Measure	Control (1)		DB-Only (2)		DB+AD (3)				
	M (%)	*SD*	*M* (%)	*SD*	*M* (%)	*SD*	F/χ^2	*p*	Contrasts
Parent measures									
DISC-P									
No. ADHD symptoms	2.9	5.2	14.6	9.9	20.7	12.3	38.72	<.001	1 < 2 < 3
ADHD diagnosis	2.3		48.0		71.4		40.24	<.001	1 < 2 < 3
No. ODD symptoms	0.5	1.4	4.8	3.6	6.2	3.9	33.83	<.001	1 < 2, 1 < 3
ODD diagnosis	6.8		46.0		60.7		26.89	<.001	1 < 2, 1 < 3
No. CD symptoms	0.0	0.0	0.8	1.5	2.2	2.8	17.02	<.001	1 < 2 < 3
CD diagnosis	0.0		9.2		29.6		16.43	<.001	1 < 2 < 3
No. HSQ settings	2.2	2.9	5.9	3.8	8.5	4.2	27.38	<.001	1 < 2 < 3
HSQ mean severity	1.2	1.3	3.1	1.8	4.1	1.8	27.46	<.001	1 < 2 < 3
PSI total stress	27.4	31.0	60.6	32.5	80.5	26.3	28.94	<.001	1 < 2 < 3
CBCL *T* scores									
Inattention	50.3	0.9	57.0	7.9	65.8	8.5	57.37	<.001	1 < 2 < 3
Aggression	50.8	3.2	58.9	11.6	66.5	11.0	28.21	<.001	1 < 2 < 3
Delinquent	51.0	2.4	57.0	7.7	63.1	9.5	26.47	<.001	1 < 2 < 3
Anxious–depressed	50.5	1.4	55.1	7.7	59.4	8.3	13.68	<.001	1 < 2 < 3
Somatic complaints	51.8	3.8	54.1	6.2	57.5	8.1	7.34	<.001	1 < 2 < 3
Social problems	50.8	2.3	56.3	9.5	62.8	9.8	25.24	<.001	1 < 2 < 3
Thought problems	50.5	1.9	54.7	6.2	58.6	7.3	19.45	<.001	1 < 2 < 3
Withdrawn	51.2	2.5	52.9	5.9	55.8	5.4	5.51	<.002	1 < 2, 1 < 3
Teacher measures									
No. SSQ settings	1.4	2.5	4.1	3.6	4.5	4.2	10.79	<.001	1 < 2, 1 < 3
SSQ mean severity	1.0	1.5	2.3	2.0	2.3	2.0	7.71	<.001	1 < 2, 1 < 3
Child self-control	57.0	10.6	49.4	12.0	47.3	13.5	9.04	<.001	1 > 2, 1 > 3
SSRS									
Academic competency	102.0	11.9	95.8	11.9	92.0	11.9	8.45	<.001	1 > 2 > 3
Behavior problems	96.2	13.2	104.8	14.7	110.4	16.5	9.81	<.001	1 < 2 < 3
Social skills	101.9	14.0	97.5	14.1	93.1	12.6	4.88	<.009	1 > 3, 2 > 3
TRF *T* scores									
Inattention	53.6	5.2	58.0	8.5	60.9	8.9	9.13	<.001	1 < 2 < 3
Aggression	53.5	5.8	57.9	9.1	59.7	10.2	5.48	<.001	1 < 2, 1 < 3
Delinquent	51.7	3.6	56.4	7.3	57.0	8.7	8.23	<.001	1 < 2, 1 < 3
Anxious–depressed	52.9	4.7	55.5	6.7	57.0	7.9	3.49	—	—
Somatic complaints	52.9	5.9	54.1	6.4	51.8	4.5	2.64	—	—
Social problems	52.7	4.7	56.7	7.7	57.4	7.9	5.64	<.004	1 < 2, 1 < 3
Thought problems	51.8	5.0	54.4	7.8	53.1	6.4	2.62	—	—
Withdrawn	52.6	4.5	55.4	7.4	55.9	6.3	3.19	—	—
Clinic measures									
Academic knowledge	108.0	10.1	102.7	11.5	102.1	11.4	3.77	—	—
Academic skills	115.7	12.9	103.8	17.5	99.6	18.3	9.52	<.001	1 > 2, 1 > 3
No. CPT correct	28.2	2.1	26.3	4.5	27.6	1.9	3.17	—	—
No CPT commissions	2.7	4.6	10.3	16.2	8.6	17.4	4.07	—	—
CPT off-task %	1.1	5.8	3.9	9.6	2.7	8.2	1.41	—	—
CPT out-of-seat	8.0	19.7	7.6	14.5	8.6	18.4	0.19	—	—
CPT fidgets	7.4	18.1	19.7	16.4	14.9	15.2	0.53	—	—
CPT vocal	8.3	13.2	14.6	18.8	14.0	19.2	1.88	—	—
Test behavior	18.6	3.9	21.2	6.0	23.1	7.6	5.57	<.005	1 < 2, 1 < 3

Note: +AD, with adaptive disability (NABC score ≤ 80); ADHD, attention deficit hyperactivity disorder; CBCL, Child Behavior Checklist (parent form); CD, conduct disorder; Contrasts, results of the pairwise comparisons among the three groups if significant ($p < .05$); CPT, Continuous Performance Test; DB, disruptive behavior; DISC-P, Diagnostic Interview Schedule for Children—Parent Report Form; *F*, results for the omnibus analysis of covariance using age at study entry as a covariate; HSQ, Home Situations Questionnaire; ODD, oppositional defiant disorder; *p*, probability value for the *F* test or chi-square analysis if significant ($p < .01$); PSI, Parenting Stress Index; SSQ, School Situations Questionnaire; SSRS, Social Skills Rating Scale; TRF, Teacher Report Form of the CBCL; χ^2, results for the omnibus chi-square analysis.

Table 3. *Percentage of DB children with and without adaptive disability and control community children on categorical outcomes that occurred within the final follow-up year*

Outcome	Control (1)	DB-Only (2)	DB+AD (3)	χ^2	*p*	Contrasts
School conference	7.0	33.7	53.6	18.82	.001	1 < 2, 1 < 3
Grade retention	2.3	3.1	3.6	0.10	—	—
Suspended from school	0.0	1.0	10.7	10.25	.005	1 < 3, 2 < 3
Special education	14.0	22.4	46.4	10.15	.006	1 < 3, 2 < 3
Child in therapy	2.3	18.4	28.6	9.69	.007	1 < 2, 1 < 3
Child on psychiatric medicines	0.0	14.3	28.6	12.56	.001	1 < 2, 1 < 3

Note: +AD, with adaptive disability; Contrasts, results of pairwise contrasts if omnibus chi-square was significant; DB, disruptive behavior; *p*, probability value for the omnibus chi-square analysis if significant at <.01; χ^2, results of the omnibus chi-square analyses.

the scales of inattention, aggression, delinquent, and social problems than the control group. The DB+AD group was also rated as being significantly worse on the inattention scale than the DB-only group.

Psychological test results. Again, the omnibus MANCOVA was significant ($F = 2.32$, $df = 18/306$, $p < .002$). Both DB groups scored significantly lower only on the overall academic achievement skills score but did not differ from each other on this measure.

There were no significant group differences on CPT scores or on the observations of ADHD-related behaviors observed during this test. Both DB groups were rated as having significantly more behavioral problems during the entire testing session than did the control children, but the two DB groups did not differ from each other in this respect.

Categorical outcomes at 3-year follow-up. Six categorical outcomes were evaluated at follow-up (see Table 3). Both DB groups were more likely to have had parent–teacher school conferences during the past year concerning problems with their child's behavior or learning at school. Significantly more of the DB+AD group also were suspended from school during the past year than were children in either the control or DB-only groups. More of the DB+AD children received various forms of special educational services during the past year than did either of the other two groups, which did not differ. Both groups of DB children were more likely to be receiving therapy from a mental health provider and to be taking psychiatric medications during the previous year than the control children but the DB groups did not differ from each other in these outcomes.

Predictive utility of AD at kindergarten entry beyond initial DB severity

In our earlier study (Shelton et al., 1998), the DB+AD group had higher levels of DB symptoms than the DB-only group. It is possible that the differences found above at 3-year outcome between the DB+AD and DB-only groups were simply a function of the greater severity of initial DB in the DB+AD group. AD could simply be a marker for severity of DB, making no independent contribution to outcome. To examine this possibility, regression analyses were conducted on the 16 dimensional measures in Table 2 on which the DB+AD group was found to be significantly more impaired than the DB-only group. In these analyses, age at study entry was entered first, followed by CBCL inattention and then aggression scores at kindergarten entry (used as measures of severity of DB at study entry). The NABC score at study entry was entered last in the stepwise analyses. Only the DB children were used in these analyses.

The child's adaptive functioning score (NABC) was found to make a significant contribution to four of the measures at the follow-up point beyond that contribution made by severity of DB symptoms at study entry. These were (a) the number of CD symptoms, (b) the

Table 4. *Regression analyses examining the contribution of adaptive disability (NABC) in DB children at kindergarten entry to selected impairments at 3-year follow-up after controlling for age and degree of disruptive behavior (CBCL inattention and aggression) at kindergarten entry*

Outcome/Predictor Variables	R	R^2	ΔR^2	F	df	p
No. CD symptoms (follow-up)						
CBCL inattention (study entry)	.227	.051	.051	6.83	1/126	.010
CBCL aggression (study entry)	.314	.099	.047	6.58	1/125	.012
NABC (study entry)	.383	.147	.048	7.01	1/124	.009
No. HSQ Problem Settings (follow-up)						
CBCL inattention (study entry)	.272	.074	.074	10.04	1/126	.002
CBCL aggression (study entry)	.407	.166	.092	13.81	1/125	<.001
NABC (study entry)	.481	.231	.066	10.57	1/124	.001
Parenting Stress (follow-up)						
CBCL inattention (study entry)	.241	.058	.058	7.76	1/126	.006
CBCL aggression (study entry)	.440	.193	.135	20.97	1/125	<.001
NABC (study entry)	.470	.221	.028	4.41	1/124	.038
SSRS Academic (follow-up)						
CBCL inattention (study entry)	.002	.000	.000	.000	1/141	.985
CBCL aggression (study entry)	.010	.000	.000	.013	1/140	.908
NABC (study entry)	.205	.042	.042	6.09	1/139	.015

Note: CBCL, Child Behavior Checklist (parent form); DB, disruptive behavior; HSQ, Home Situations Questionnaire; NABC, Normative Adaptive Behavior Checklist; SSRS, Social Skills Rating Scale (teacher completed).

number of different problem settings at home (from the HSQ), (c) total parenting stress, and (d) teacher ratings of academic competence (from the SSRS). The results for these four measures are shown in Table 4. Age at study entry made no significant contribution to any of these outcome measures. However, CBCL inattention and aggression contributed significantly to all 16 of the outcome measures, suggesting that initial severity of DB is largely the determinant of most, though not all, of these outcomes.

Contribution of AD to later psychological morbidity beyond the level of initial morbidity with which it was associated

The next question posed was whether AD had ongoing effects across the follow-up period on any of the four measures noted above apart from its initial contribution to those dependent measures at study entry. In essence, is the effect of AD an ongoing one? To address this issue, the regression analyses used above for those four measures on which NABC scores had made a significant contribution beyond severity of initial DB were reanalyzed. In this case, however, the child's baseline score on each measure was entered at Step 4, after age and CBCL inattention and aggression scores, but before the baseline NABC score. Results indicated that baseline NABC scores made a significant ongoing contribution to only one of these four measures, that being number of CD symptoms at follow-up. Results for that analysis appear in Table 5. Thus, degree of adaptive disability at study entry continued to contribute to later CD symptoms over and above its contribution to initial CD symptoms at the study entry point and beyond the initial severity of DB.

Relationship of parental psychological adjustment and parenting practices to child adaptive functioning

The next set of analyses focused on the extent to which the child's level of adaptive functioning at kindergarten entry and at 3-year follow-up was predicted by parental psychological characteristics and parenting attitudes and practices. Two stepwise linear regression

Table 5. *Regression analyses examining the contribution of degree of adaptive disability (NABC) at kindergarten entry to CD symptoms in DB children at 3-year follow-up after controlling for age, degree of disruptive behavior (CBCL Inattention and Aggression), and CD symptoms at kindergarten entry*

Outcome/Predictor Variables	R	R^2	ΔR^2	F	df	p
No. CD symptoms (follow-up)						
CBCL inattention (study entry)	.227	.051	.051	6.83	1/126	.010
CBCL aggression (study entry)	.314	.099	.047	6.58	1/125	.012
No. CD symptoms (study entry)	.525	.276	.177	30.32	1/124	<.001
NABC (study entry)	.566	.320	.045	8.08	1/123	.005

Note: CBCL, Child Behavior Checklist (parent form); CD, conduct disorder; DB, disruptive behavior; NABC, Normative Adaptive Behavior Checklist.

analyses were computed using only the DB subjects, one for predicting level of adaptive functioning (NABC scores) at kindergarten entry and the second for predicting adaptive functioning at the 3-year outcome. Two blocks of independent variables were created for the first analysis. Block 1 variables were entered in the first step and included child characteristics at kindergarten entry found above to be associated with AD. These were child age and CBCL inattention and aggression scores. Block 2 independent variables comprised the following parent measures: parenting satisfaction, parenting efficacy, total parenting stress, parenting practices scale, general severity score from the SCL-90-R, observer ratings of mother behavior with her child during free play, and observer ratings of mother behavior with her child during the task setting. Results for this analysis are shown in Table 6. Two child measures (CBCL attention problems and child age) were significantly associated with adaptive functioning at kindergarten entry. However, beyond these, one parent measure from Block 2 also made a significant positive contribution to child adaptive functioning, that being parenting practices.

The second regression analysis examined predictors of adaptive functioning at 3-year outcome (NABC scores) using the same independent variables arranged in the same blocks of entry as noted above. This time, however, the child's NABC score at kindergarten was also entered in Block 1 along with the other child characteristics. These results also appear in Table 6. As expected, the child's baseline level of adaptive functioning (NABC) was significantly predictive of their level of adaptive functioning 3 years later. Two baseline parent measures made small but significant contributions as well. These were parenting satisfaction and observed mother negative behavior toward the child during the task period.

Stability of AD from preschool to 3-year follow-up

Finally, we wished to determine what proportion of children in each of the groups continued to meet criteria for AD at the 3-year follow-up. Results indicated that none of the control group met AD criterion at follow-up, while 6% of the DB-only group had now shifted to becoming DB+AD by this follow-up point. Surprisingly, only 36% of the DB+AD group remained AD by the follow-up period. This suggested that the degree of AD was not especially stable over the follow-up period. This instability was examined via two approaches. First, the initial NABC scores were correlated with the NABC scores at follow-up. Results revealed only a moderate degree of stability of adaptive functioning ($r = .53$, $p < .001$) within the DB groups and also in the control group ($r = .57$, $p < .001$).

Second, the scores for the NABC at the initial and three annual evaluations were graphically plotted for each group (see Figure 1) and then analyzed to determine the extent to which each group had changed across all evaluations. The four scores were submitted

Table 6. *Regression analyses examining relationship of parent characteristics to adaptive functioning (NABC scores) in DB children at study entry and 3-year follow-up after controlling for relevant child characteristics*

Variable	β	*R*	R^2	ΔR^2	*F*	*df*	*p*
NABC at study entry							
CBCL inattention (entry)	−.251	.338	.114	.114	19.12	1/148	<.001
Child's age (entry)	−.260	.400	.160	.045	7.94	1/147	<.006
Parent practices scale (entry)	.261	.472	.223	.063	11.82	1/146	<.001
NABC at follow-up							
NABC (Entry)	.543	.530	.281	.281	47.19	1/121	<.001
Parenting satisfaction (entry)	−.183	.557	.310	.030	5.41	1/120	<.025
Mother behavior (task setting)	−.158	.579	.335	.025	4.41	1/119	<.038

Note: CBLC, Child Behavior Checklist; DB, disruptive behavior; NABC, Normative Adaptive Behavior Checklist (adaptive functioning). Betas are standardized coefficients.

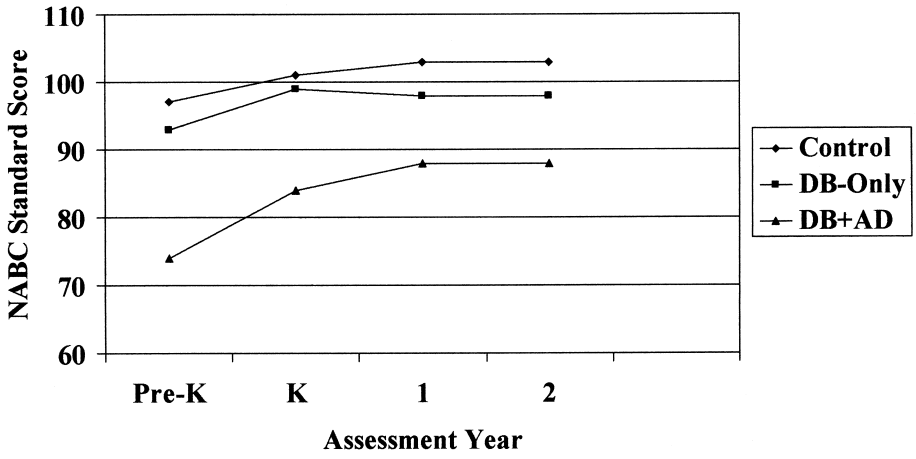

Figure 1. Adaptive functioning (NABC scores) at kindergarten entry (Pre-K) and at the end of each academic year across the 3-year follow-up period for each group.

to two-way ANOVA (3 groups by 4 assessments) with repeated measures on the last factor.[2] While both main effects were significant ($p < .001$), so was the interaction term, $F = 3.27$ (Λ), $df = 6/328$, $p = .004$. Subsequent pairwise analyses contrasted the temporally adjacent evaluations within each group and showed that the improvement in each group was significant only between the pre- and postkindergarten evaluations. There was no significant improvement occurring thereafter. Further pairwise comparisons of the three groups at each time point indicated that, as already reported in Table 1, the DB+AD group was significantly below the DB-only group, which was significantly lower than the control group. At the end of kindergarten, and again at the end of first and second grade, only the DB+AD group was significantly below the remaining two groups, which did not differ from each other.

Discussion

This study addressed five issues concerning the concept of AD as an indicator of future

2. Analyses available upon request to the first author.

deficits in DB children and the contribution disrupted parenting may make to AD. The results are discussed as they pertain to each of these issues.

Is AD at kindergarten useful as a predictor of impairments in DB children at 3-year follow-up?

Substantial previous research reviewed above indicates that preschool children having high levels of DB have more serious and more numerous areas of concurrent and future impairment than children who do not have such high levels of this behavior pattern. The present study replicates these earlier studies and continues to document the substantial risks posed to preschool-age DB children over the subsequent 3 years of development. More than half of all DB children were diagnosed as ADHD and more than half as ODD at the end of second grade. Not surprisingly, DB children were therefore at greater risk for the diagnosis of CD at follow-up as well (9–30%). Behavior ratings by parents and teachers, academic achievement skills, and observations of test-taking behavior in a clinical setting all identified areas of significant maladjustment for DB children relative to normal community control children. These findings are consistent with earlier research (August, Realmuto, Crosby, & MacDonald, 1995; Kingston & Prior, 1995; Lochman & the Conduct Problems Prevention Research Group, 1995; McGee et al., 1991; Stormont–Spurgin & Zentall, 1995) and clearly underscore the high-risk nature of DB in young children. The results continue to encourage efforts at early intervention and prevention with this population.

Unlike previous studies of DB children, however, the present study sought to determine the utility of using AD at kindergarten as a marker for greater developmental risks at 3-year outcome. AD at kindergarten entry was found to identify DB children who were at higher risk for various problematic outcomes 3 years later. Specifically, children with DB+AD at kindergarten had significantly more symptoms of ADHD and CD at follow-up than DB-only children and hence were more likely to receive a clinical diagnosis of those two disruptive disorders. On all eight subscales of the CBCL, DB+AD children were also rated by their parents as being significantly worse than DB-only children. Moreover, the DB+AD children demonstrated more severe and pervasive behavioral problems across a wider variety of home and community settings than did DB-only children. For instance, AD seemed to contribute to the risk for CD symptoms both at kindergarten entry and at the end of second grade. As such, AD might forebode a greater risk for later delinquency, substance abuse, and academic failure among DB children given that early CD symptoms are predictive of these outcomes (Biederman et al., 1996; Coie, Lochman, Terry, & Hyman, 1992; Farrington, Loeber, & van Kammen, 1990; Loeber, 1990; Mannuzza et al., 1993).

Greater behavioral and social problems, higher levels of inattention, and lower levels of academic competence at school were also more likely to occur among the DB+AD children than those without AD based on teacher reports. No differences, however, were found between the two AD groups on the clinic measures of academic skills, attention, inhibition, or behavior during the testing session. Even so, there are sufficient results here from parent and teacher reports to continue to suggest the utility of the concept of adaptive disability as distinguishing a higher risk group of children within the DB population than does DB alone. AD is therefore not only a marker for other concurrent impairments at kindergarten entry but also predisposes to a continuation of those problems in the home setting, and to a lesser extent the school setting, at 3-year follow-up.

As in our earlier report, this study found higher levels of internalizing symptoms in DB children as reflected in parent and teacher ratings on the CBCL. These findings agree with other studies of both clinic-referred and community-based samples of DB children (Biederman, Faraone, & Lapey, 1992; Eiraldi, Power, & Nezu, 1997; Gaub & Carlson, 1997) and extends those findings by showing that internalizing symptoms were even more evident among DB children having AD. The presence

of AD in DB children at kindergarten is therefore not only a marker for concurrent and later externalizing symptoms but also for concurrent and later internalizing ones as well.

The parents of DB children reported substantially higher levels of stress in their parental roles compared to parents of control children. Other studies have also found this association (Anastopoulos, Guevremont, Shelton, & DuPaul, 1992; see Fischer, 1990, and Mash & Johnston, 1990, for reviews). This is especially likely to be the case in young children with elevations in both symptoms of ADHD and those of ODD/CD than in children with symptoms of ADHD alone (Anastopoulos et al., 1992; Barkley et al., 1992; Hinshaw, 1987). The present results go further, however, in demonstrating that preschool AD is associated with even greater degrees of parental stress beyond that associated with DB alone, not only at study entry as was previously shown (Shelton et al., 2000) but also at 3-year follow-up.

It has been previously argued that DB confers a differentially negative impact on the child's daily performance of adaptive responsibilities, self-care, chores, social functioning, and the development of independence from parents more than it does on general cognitive or intellectual ability (Shelton et al., 1998). The impact of DB seems to be more on the children's application of their intelligence in day-to-day adaptive functioning rather than so much on their acquisition of intellectual knowledge (Roizen et al., 1994; Stein et al., 1995). The problem posed by DB in children may be in its interference with the child doing what they know rather than in knowing what to do. It was conjectured earlier that in those cases where AD arises in the context of normal intellectual development, as was the case in this study, it does so as a consequence of at least two possible processes. AD might arise from deficits in executive functioning and the self-regulation it affords the individual, as might be expected in children with ADHD. Supporting this view, the present study found that higher parental ratings of child inattention at kindergarten entry were significantly associated with deficits in adaptive functioning in the DB children, accounting for more than 11% of the variance in adaptive functioning. Ratings of aggression, in contrast, did not add significantly to predicting adaptive functioning at that age. However, neither child inattention nor aggression at kindergarten appeared to make any further or ongoing contribution to predicting adaptive functioning at the end of second grade beyond the significant contribution made by baseline (kindergarten) levels of adaptive functioning. These findings suggest that future research should examine the mechanisms by which ADHD symptoms adversely affect adaptive functioning. Perhaps it is via the impact of ADHD on executive functioning, as was conjectured here.

Does AD make a significant contribution to impairment at follow-up beyond the severity of preschool DB with which it is associated?

Our previous study did not examine the extent to which AD was specifically associated with the various impairments in DB children beyond that resulting from the severity of DB alone. Given that AD was associated with higher levels of DB, it is possible that the adversities documented at kindergarten as well as those found here at the end of second grade are merely a function of severity of DB. Further analyses conducted here that controlled for initial severity of DB suggest that this interpretation is true for some outcomes but not for others. The greater severity of parent ratings of both externalizing and internalizing symptoms and teacher ratings of inattention in the DB+AD children appeared to result from the children's greater initial severity of DB. Once that was statistically controlled, degree of AD made no further contribution to these outcomes. However, four outcomes appeared to be related to extent of initial AD even after controlling for initial severity of DB. These outcomes were the number of CD symptoms, the situational pervasiveness of behavior problems at home, parenting stress, and academic competence at school. Such findings solidify the position taken here that AD may be a useful predictor of some future developmental risks apart from severity of DB alone.

Does AD make an ongoing contribution to later developmental adversities beyond its initial contribution to impairments at study entry?

A further focus of this study was whether AD at kindergarten continued to make additional contributions to the prediction of later developmental risks beyond its initial effects at kindergarten. In other words, is its adverse impact on development one that occurs only in the preschool period or does it continue to contribute to risk for later morbidities beyond that initial effect? Analyses of those four outcomes on which initial AD appeared to make an independent contribution indicated an ongoing contribution for just one of them. That contribution was to the risk for CD symptoms at 3-year outcome. The process by which AD may make these initial and ongoing contributions is unclear, but one mediator of this contribution is discussed next.

Is AD partly a function of disrupted parenting?

As noted earlier, a second reason why AD may arise in the presence of normal intellectual development in DB children is as a consequence of disrupted training for self-sufficiency at home. Disrupted training could result from parental psychological impairment and disrupted parental involvement with and management of the child with DB. If so, then AD should be significantly associated with measures of these areas of parental adjustment and functioning beyond those associations it has specifically with ADHD symptoms, as shown above, and the child's initial severity of DB more generally. To explore this possibility, we examined the contribution made by several measures of parental adjustment taken at study entry to the children's level of adaptive functioning both at kindergarten entry and at the second grade follow-up point. These analyses indicated that several parent variables contributed significantly to the children's level of adaptive functioning over and above those made by the children's initial severity of DB. Among the parent variables analyzed, the extent to which poor parenting practices were used in the home at study entry was significantly associated with the degree of child deficits in adaptive functioning at kindergarten. Parenting variables also made a small but significant contribution to adaptive functioning 3 years later even after accounting for the child's initial level of adaptive functioning in kindergarten. Initial levels of parenting satisfaction and the degree of negative, directive, and controlling maternal behavior during a task period with their child in the clinic both made a significant contribution to predicting deficits in adaptive functioning at the end of second grade. Parental psychological adjustment, particularly child management practices and parenting satisfaction, have been shown to play a significant role in the genesis and maintenance of DB in young children. This has been evident in numerous cross-sectional (Hinshaw & Anderson, 1996) and longitudinal studies (e.g., Olson, Bates, Sandy, & Lanthier, 2000; Patterson et al., 1992, Patterson et al., 2000), as well as in twin studies of genetic and environmental components to DB (Taylor, McGue, & Iacono, 2000). The present study goes further in suggesting that parenting practices, parental satisfaction, and maternal negative behavior make additional contributions to deficits in adaptive functioning and self-sufficiency beyond their effects on just DB. Indeed, as intimated in the regression analysis above, the deficits in parenting identified here seem to continue to operate over time to have a further adverse impact on the degree of deficits in later adaptive functioning beyond their effects on adaptive functioning in the preschool years. This would seem to explain why AD at kindergarten was associated with both concurrent and later risks for CD symptoms beyond that contribution made by initial severity of DB. Disrupted parenting is the common element, making a contribution to both impaired self-sufficiency and to antisocial behavior. If further research replicates these results, it would support the hypothesis raised here that one reason AD may arise in young DB children, despite normal general cognitive development, is via disrupted parenting. The detrimental influence of disrupted parenting may be an ongoing process. It seems to be over and above what-

ever more specific contribution ADHD symptoms may make to delays in self-sufficiency, or AD.

How stable is AD over development?

The present study treated AD categorically so as to more clearly examine its value as an indicator of developmental risk. It is obvious, though, that AD represents a dimension of level of adaptive functioning or self-sufficiency and is measured as such. Yet this study found that it is not a highly stable dimension or category over the first few grades of formal schooling. Only 36% of those DB children initially classified as +AD retained that categorization at 3-year follow-up. Further analyses revealed that degree of adaptive functioning at kindergarten entry correlated only modestly with such functioning at the end of second grade, sharing just 28–31% of the variance on this measure. Inspection of the development of adaptive functioning in all three groups studied here (see Figure 1) revealed that the greatest changes (improvements) occurred as a consequence of the kindergarten year with there being little additional improvement in this domain by either the end of first or second grade. This suggests that attendance at kindergarten may help to attenuate children's initial levels of adaptive disability in the preschool years, perhaps by offering another powerful set of contributing forces to the children's development of self-sufficiency, that being teachers, the educational curriculum, and classmates. Daily exposure to these influences may provide some sort of countermanding effects to those adverse effects that may result from disrupted parenting and even preschool ADHD. Even so, DB children in the +AD group remained significantly below the other two groups in adaptive functioning by the end of second grade despite many no longer meeting criteria for the +AD categorization.

Limitations

The present study experienced several limitations of its methodology that deserve note. The DB sample employed here constituted children not only who experienced high degrees of DB but whose parents were willing to enter the children into an early intervention project. As a result of this fact as well as the refusal of as many as 20% of parents to even complete the DB kindergarten screening scale, this sample may not be entirely representative of the larger population of DB preschool children as they exist in urban communities. The fact that our results are in nearly complete accord with past studies of children having high levels of DB is reassuring, however. It suggests that the present results are not just a function of parental motivation to complete a screening instrument or to enter a treatment program, or of the particular characteristics of families residing in this region.

A different limitation arises from the fact that parents served as the source for defining AD and that most of the differences at follow-up between adaptively disabled and non-disabled DB children were on measures completed by these same parents. Given this circumstance, it is not possible to completely rule out common method variance as accounting for some of these results. The fact that some differences between the DB+AD and DB-only groups were evident on some teacher ratings and that +AD children were more likely to be suspended from school in the previous year all argue against this being the sole explanation for our findings, however. Nor could this explanation account for the more numerous group differences between these two DB groups that were found at the initial kindergarten entry on measures relying on different sources of information (e.g., teachers, examiners, classroom observers).

A further limitation, of course, was the fact that most of these DB children had participated in one or more forms of behavioral or psychoeducational intervention during their kindergarten year. While the treated and untreated DB children were not found to differ significantly on any measures by this 3-year follow-up point, lesser treatment effects might still contribute some confounding effects to the present results. The fact that relatively equal proportions of children in the DB+AD and DB-only groups of children had received the initially effective classroom intervention

might at least serve to counterbalance any such confounding effects across the two AD groups if they existed in our data.

A further consideration in appreciating the limits of this study was the finding that the DB children who dropped out of the study before reaching the 3-year follow-up were not comparable in some respects to those remaining in the study. The subjects who remained were more impulsive–hyperactive yet had higher IQ scores and were more likely from intact families with higher parental educational levels, social class, and income than those who dropped out. This may have posed a conservative bias to the study, particularly in its examination of parenting variables. Had the dropouts remained in the study, perhaps even greater differences between the DB and control groups might have been evident. Although the DB children who remained in the study had higher hyperactivity scores on the CPRS, this is unlikely to have biased that DB sample to more extreme DB than at baseline. The subjects who remained did not differ from the dropouts on other measures of DB symptoms (ADHD or ODD symptoms, CPRS conduct problems). Nor did they differ on the more critical variable of baseline adaptive functioning (NABC scores) used to create the two AD subgroups. Nevertheless, these and other limitations may have compromised the internal or external validity of the study to some degree and so argue for further replications and extensions of these findings by others.

With these limitations in mind, this study adds to a small but growing body of evidence that a deficit in adaptive functioning, or AD, confers additional risks on preschool children, both concurrently and prospectively, beyond those risks conferred by the presence of high levels of DB alone.

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Appendix

The items used to construct the screening scale were as follows, each being rated on a 4-point Likert scale (0–3).

From the DSM-III-R ADHD symptom list (all 14 items).

1, Often fidgets with hands or feet or squirms in seat; 2, Has difficulty remaining seated when required to do so; 3, Is easily distracted; 4, Has difficulty taking turns in games or group situations; 5, Often blurts out answers to questions before they have been completed; 6, Has difficulty following through on instructions from others; 7, Has difficulty sustaining attention in tasks or play activities; 8, Often shifts from one uncompleted activity to another; 9, Has difficulty playing quietly; 10, Often talks excessively; 11, Often interrupts or intrudes on others; 12, Often does not seem to listen to what is being said to him or her; 13, Often loses things necessary for tasks or activities at home or at school; 14, Often engages in physically dangerous activities without considering the possible consequences.

From the DSM-III-R ODD symptom list (all 9 items).

1, Often loses temper; 2, Often argues with adults; 3, Often actively defies or refuses adult requests or rules; 4, Often deliberately does things that annoy other people; 5, Often blames others for his or her own mistakes; 6, Is often touchy or easily annoyed by others; 7, Is often angry or resentful; 8, Is often spiteful and vindictive; 9, Often swears or uses obscene language.

From the CPRS hyperactivity factor (3 of 4 items used).

1, Excitable, impulsive; 2, Wants to run things; 3, Restless, always up and on the go. The fourth item not used was "Restless in the 'squirmy' sense," because it was felt to overlap with Item 1 from the DSM-III-R ADHD symptom list above.

From the CPRS conduct problems factor (8 of 12 items used).

1, Destructive; 2, Pouts and sulks; 3, Steals; 4, Bullies others; 5, Mood changes quickly and drastically; 6, Doesn't like or doesn't follow rules; 7, Basically an unhappy child; 8, Quarrelsome. The four items that were not used were "Sassy to grownups," "Carries a chip on his shoulder," "Denies mistakes or blames others," and "Disobedient or obeys but resentfully." These were felt to be redundant with the items from the DSM-III-R list of ODD items shown above.