Children in Special Education Programs: Attention Deficit Hyperactivity Disorder, Use of Services, and Unmet Needs

Regina Bussing, MD, MSHS, Bonnie T. Zima, MD, MPH, Amy R. Perwien, BA, Thomas R. Belin, PhD, and Mel Widawski, MA

ABSTRACT

Objectives. Attention deficit hyperactivity disorder (ADHD), a common psychiatric condition, may impair a child's ability to learn and to form social relationships, tasks critical to healthy development. This study describes the prevalence of the disorder among children in special education programs and identifies the extent and predictors of unmet service needs.

Methods. A 2-stage screening protocol of a countywide population of second- through fourth-grade students in special education was conducted to (1) screen for ADHD, employing standardized parent and teacher questionnaires, and determine health services use (n = 499) and (2) perform diagnostic assessments of ADHD (n = 318).

Results. Almost half of the children qualified for a diagnosis of ADHD, yet only half of those were reportedly receiving care for the condition, mainly in the general health care sector. Girls were more than 3 times as likely as boys to have unmet service needs; minority status, low income, and health maintenance organization coverage also emerged as possible risk factors for unmet service needs.

Conclusions. ADHD is a common yet often untreated condition among children in special education. Mental health services for children with this disorder should be integrated with general health care and special education programs. (*Am J Public Health.* 1998; 88:880–886)

Introduction

Attention deficit hyperactivity disorder, a common psychiatric condition, may impair a child's ability to learn and to form social relationships.[1] The prevalence of ADHD is conservatively estimated to be from 2% to 5%,[2] and it is much higher among children with learning problems.[3,4] Prospective studies indicate that up to half of children with the disorder will continue to display symptoms into adulthood.[5–8] Yet, despite the relatively high prevalence and chronicity of the disorder, several recent studies indicate that only a minority of children with ADHD are identified or receive health care interventions.[9–11]

Unmet mental health needs of children with ADHD have significant implications for professionals in the education sector, because the disorder's symptoms often impede academic performance. Public schools are mandated by federal law (Pub L No. 94-142) to provide special education services for students with disabilities, and they must also offer reasonable classroom accommodations to any handicapped student under section 504 of the Rehabilitation Act of 1973.[12] High prevalence rates of ADHD among children in special education programs suggest that children with ADHD may receive school services under the label of having an emotional handicap or a specific learning disability.[13–16]

Suggested treatments for ADHD include family education, parent training, behavioral therapies, classroom accommodations, and medication.[17,18] Numerous studies support the short-term efficacy of medication interventions.[17] A multisite randomized treatment study of children with ADHD currently being conducted compares the efficacy of psychosocial and pharmacological interventions as well as their combined use.[19] Less is known about what types of medical services children with ADHD receive and in which service sectors they obtain treatment. Primary care providers play an important role in the treatment of ADHD, especially under managed care conditions.[20,21] Further, increasing numbers of schools have on-site clinics, which integrate treatment of physical and mental health problems.[22]

Our study focuses on target symptoms of ADHD among students qualifying for special education services in a countywide public school district with an ethnically diverse population. We chose elementary schools to examine children most likely to exhibit the early learning and functional impairments associated with the disorder. Our objectives were to describe how common ADHD symptoms were among children qualifying for special education; to determine what proportion of children with ADHD were receiving treatment; and to explore the level of unmet treatment needs for ADHD, controlling for child's sex, ethnicity, special education category, and health insurance status.

Methods

Subjects

Eligible subjects were all children in second through fourth grades who were listed in the school database as qualifying

Regina Bussing is with the Department of Psychiatry and the Department of Health Policy and Epidemiology and Amy R. Perwien is with the Department of Clinical and Health Psychology, University of Florida, Gainesville. Bonnie T. Zima, Thomas R. Belin, and Mel Widawski are with the Department of Psychiatry and Behavioral Sciences, and Dr Belin is also with the Department of Biostatistics, University of California at Los Angeles.

Requests for reprints should be sent to Regina Bussing, MD, MSHS, Box 100177 UFHC, Gainesville, FL 32610-0177 (e-mail: regina@hpe.ufl.edu).

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for exceptional student education services (n = 722) in a medium-sized county school district in North Florida. Exceptional student education qualification was based on Pub L No. 94-142 criteria for children with specific learning disabilities and emotional handicaps. Respondents included parents and homeroom teachers of the children. All elementary school principals in the district were approached to obtain permission for teachers' participation in the study. Interviewers were a board-certified child psychiatrist and psychology students who had completed 48 hours of interviewer training.

In phase 1, parents of eligible children were contacted during the spring semester of the 1995 school year to complete a 20- to 30-minute telephone interview. A coordinator at each school was responsible for distributing and collecting study materials from the children's homeroom teachers. For inclusion in phase 2, children were classified as being at high risk for ADHD if they scored in the clinical range on 2 parent-report screening measures (described below) or had a history of treatment for ADHD. Parents of all 207 high-risk subjects were invited to participate in a structured parent interview for diagnosis of ADHD. A random sample of 200 parents of low-risk children were selected as subjects for a telephone version of this interview to examine possible rates of false-negative classification and to allow for the calculation of screener utility estimates.

Measures

Sociodemographic characteristics of the entire population eligible for exceptional student education were obtained from the school district administrative office. Race/ethnicity was categorized as non-Hispanic White or other, which included African-American (n = 379), Hispanic (n = 15), Native American (n = 3), and Asian-American (n = 2) children. Children were classified as receiving educational services for emotional handicaps or specific learning disabilities. On the basis of federal government guidelines involving family income, the children were grouped into those eligible for subsidized lunch and those not eligible, with eligibility for subsidized lunch corresponding to lower socioeconomic status (SES). For phase 1 study participants, SES was also calculated with the Hollingshead 4-factor index.[23] Place of residence was characterized as urban for children living in the county seat and rural for children residing in small towns.

Phase 1 data were gathered from participating families via a computer-assisted telephone interview. When available, survey health questions were taken from previously developed measures. For example, questions about the child's current physical health, history of health conditions, and general health status were adapted from the National Health Interview Survey–Child Version.[24] Medical care was assessed by inquiring about frequency of visits to physicians within the past 12 months. To assess health insurance status, parents were asked whether their child was currently covered by any health insurance, the type of insurance carrier, and whether or not services were delivered by a health maintenance organization (HMO). Parents were asked whether their child had seen a mental health professional within the last 12 months or had ever seen their primary care provider for emotional or behavioral difficulties. Parents reported whether their child was receiving treatment for ADHD. A binary variable describing presence or absence of medication treatment for ADHD was derived from parent reports of medications taken by the child within the last 12 months and reasons for the medications used. Use of psychostimulants, clonidine, or antidepressants (if taken for ADHD) was classified as ADHD treatment.

To assess ADHD target symptoms, 2 screening measures for behavior problems with parent and teacher versions were used. One of the measures, the Abbreviated Symptom Questionnaire (ASQ), had previously been employed by the school district for screening when a referral for ADHD evaluation was being considered. The more extensive measure, the Attention Deficit Disorders Evaluation Scale (ADDES), was chosen because the school district was considering future use of this measure for ADHD screening. The study was designed to generate screener utility information for the school district and to allow a comparison of the 2 screening measures. Results of the screener utility analysis are provided elsewhere.[25]

The ASQ is a 10-item instrument addressing behavioral problems frequently exhibited by children with ADHD.[26] Total scores were standardized for age and sex, and T scores above 64 (1.5 SD above the normative mean) indicated clinically relevant problems. (T score indicates a standarized score with mean of 50 and SD of 10.) The ADDES examines the frequency (hourly, daily, weekly, monthly, not at all) of ADHD target symptoms.[27,28] The parent version consists of 46 items, and the teacher version consists of 60 items. The ADDES was also standardized by use of representative reference groups.[27,28] Scores below the 10th percentile were deemed clinically relevant. Psychometric performance has been examined for both measures. On the ADDES (parent and teacher versions), internal consistency estimates and test–retest correlations exceeded 0.90, and interrater correlations were greater than 0.80.[27,28] Test–retest correlations for the teacher ASQ were 0.74.[29] To our knowledge, predictive utility estimates for the ASQ and ADDES have not been determined. To minimize the number of false-positive participants entering phase 2, children were required to meet the criteria for clinical relevance on both instruments to be classified as being at high risk.

In phase 2 of the study, the clinical diagnosis of ADHD based on the *Diagnostic and Statistical Manual of Mental Disorders,* Fourth Edition (DSM-IV),[30] inclusive of impairment criteria, was established with the Diagnostic Interview Schedule for Children (DISC).[31–33] The DISC is a highly structured diagnostic instrument that can be administered by trained lay interviewers. In earlier versions, it has been shown to have good test–retest reliability ($\kappa = 0.62$ for community sample), internal consistency (Cronbach α for ADHD = .87), and validity.[32–34] Interrater agreement was high (100%) after training and remained high (100%) after several months of data collection.

Children were classified as needing services for ADHD if they met diagnostic criteria for ADHD or were receiving treatment for ADHD but did not exhibit problems severe enough to meet diagnostic criteria for ADHD (since ADHD is a chronic health condition like asthma, in which successful treatment can ameliorate symptoms but will not cure the child of the underlying condition). Unmet need was defined as meeting DISC criteria for ADHD and not receiving treatment or medications for ADHD within the past 12 months.

Data Analysis

Pairwise comparisons of means were carried out with *t* tests, and comparisons of the percentages of subjects falling into various categories were carried out with chi-square tests or Fisher's Exact Test. In analyzing health service use, one continuously scaled outcome (number of doctor visits) was analyzed in a multiple regression framework, and 3 binary outcomes (current ADHD treatment; mental health services use in past 12 months; care for emotional or behavioral problems received from primary care provider) were analyzed by logistic regression. A series of models was fit to each outcome variable. In each of these models, we included an indicator for

whether the child met the previously mentioned criteria on the ASQ and ADDES, a demographic factor (one of the following: sex, special education status, race/ethnicity, SES, or availability of any health insurance), and the interaction between the two.

In developing prevalence estimates for attention problems and hyperactivity, we sought estimates that would be applicable to the group of 722 students who were eligible for inclusion in the study. To address nonresponse, we fit a logistic regression model to the subjects who had a definitive ADHD diagnosis and used the fitted model to predict the probability of ADHD, given observed covariates, for those subjects without a definitive diagnosis. The prevalence estimate takes into account the oversampling of high-risk children. Standard errors were then adjusted to reflect uncertainty about diagnosis for those subjects with predicted probabilities instead of actual diagnoses.

One approach to analyzing unmet need relied on "complete cases," that is, individuals for whom both treatment information and ADHD diagnosis information were available. Individuals who were ADHD negative (i.e., who had not received a diagnosis of ADHD) and were not receiving any treatment were excluded from the analysis; for the remaining cases, the binary outcome unmet need vs met need (i.e., not receiving treatment vs receiving treatment) was included in a logistic regression analysis with sex, urban residence, emotional handicap status, age, race, any health insurance, coverage by an HMO, and school lunch status as predictors. Another approach to the analysis made use of a multiple imputation approach[35] to include cases in which treatment information and a variety of demographic and screening variables were observed but a definitive ADHD diagnosis was not available. Specifically, a model for the binary outcome ADHD positive vs ADHD negative, given demographic information, screening information, and treatment information, was fitted to complete cases to produce predicted probabilities of ADHD for those without diagnoses. On the basis of these estimated probabilities, binary ADHD status was imputed 3 times for each subject without an ADHD diagnosis, and then the same strategy as described for the complete cases was applied to each completed data set (i.e., individuals classified as ADHD negative and not under treatment were excluded from the analysis, and the same logistic regression model was fitted to the remaining cases). Because diagnoses were not obtained on a random subsample of the study sample, the multiple imputation approach offers the potential for reduced bias compared with the complete case analysis.[36]

Results

Participation

Of the 722 eligible special education students in the county, the parents of 499 (69%) completed the phase 1 telephone interview. Refusers were more likely than participants to be non-White ($P < .001$). Phase 1 participants did not differ from nonparticipants by child's age, sex, subsidized lunch status, or exceptional student education placement status. Of 407 students eligible for phase 2, the parents of 318 (78%) completed the DISC interview. Nonparticipants were more likely than participants to be poor ($P < .01$), but the 2 groups did not differ by child's age, sex, race/ethnicity, exceptional student education placement status, or urban vs rural residence.

Of the 24 principals, 16 (67%) agreed to let their teachers participate, making 431 (86%) of the 499 phase 1 students eligible for teacher ratings. Teacher ratings were completed for 343 (80%) of the eligible children. Teacher behavior rating scores were similar for children with and without completed parent questionnaires.

Sample Characteristics

The mean age of the 499 children in the sample was 9.6 years (SD = 1.0). Almost three fourths (73%; n = 362) were boys, and almost half (47%; n = 236) were from minority backgrounds, predominantly African-American (n = 223). Half of the children (51%; n = 246) came from single-parent families, one quarter (n = 123) were from the lowest SES level, two thirds (n = 331) were eligible for subsidized lunch, and most (73%; n = 362) lived in an urban setting. Most of the children (87%; n = 434) were covered by a health insurance plan, including Medicaid (44%; n = 194), and for one third of the insured (34%; n = 147), services were provided through an HMO. The majority of the children (74%; n = 367) were identified as learning disabled; 26% (n = 132) were deemed emotionally handicapped.

Mean scores on the 2 measures of ADHD target behaviors are shown in Table 1, along with percentages of children who met the criteria for clinical relevance. On the ASQ, 41% of the parent ratings and 27% of the teacher ratings were 1.5 SD above the normative mean. Likewise, 32% of the parent ratings and 26% of the teacher ratings on the ADDES fell below the 10th percentile of normal range. From both parent and teacher perspectives, children with emotional handicaps exhibited more ADHD target behaviors than their peers qualifying for specific learning disability services, and children from low-income families were more likely than children from higher-income families to screen positive on at least one measure. Teacher and parent reports differed by child's sex, race/ethnicity, and health insurance status. Teachers were more likely to report increased ADHD problem behaviors among girls than among boys ($P < .01$) and among children from minority backgrounds than among non-Hispanic White children ($P < .05$). Children covered by health insurance were rated by their parents as showing more ADHD problem behaviors than their uninsured peers ($P < .05$).

Health Services Use

Parent-reported problems on the combined ADHD screening measures were associated with use of services in the general health care and specialty mental health care sectors (Table 2). Compared with peers with normal scores, children in the clinical range had 1.6 more doctor visits in the past 12 months, and nearly twice the rate of contact with a mental health professional (49% vs 25%) or primary care provider (35% vs 16%) for treatment of mental health conditions.

Girls and learning-disabled students were significantly less likely than boys and non–learning-disabled students to receive treatment for ADHD, to have used mental health services in the past 12 months, and to have seen their primary care provider for emotional or behavior problems. Children from low-SES families were less likely than peers from high-SES families to have seen their primary care provider for emotional or behavioral problems (30% vs 47%, $P < .05$). Children with health insurance had about twice as many doctor visits in the past year as children not covered by insurance.

Parents reported that one quarter (n = 125) of the children were currently receiving some form of treatment for ADHD. For 20% (n = 100) this treatment consisted of medication therapy, most often with methylphenidate (Ritalin). Among the children receiving treatment that did not include stimulants, more than half had been treated with such medications in the past, and 64% had received mental health specialty services within the past year. Rates of medication treatment for ADHD differed markedly by sex (5% for girls, 19% for boys, $P < .001$), special education status (24% for students with emotional handicaps, 11% for students

TABLE 1—Scores on 2 Screening Measures for Attention Deficit Hyperactivity Disorder, by Demographic Characteristics: Special Education Students in Second through Fourth Grades, North Florida, 1995

	Teacher ADDES (n = 343)				Parent ADDES (n = 499)			
	Teacher ASQ (n = 343)		Mean Percentile of Normal Range (SD)	<10th Percentile of Normal Range (n = 88), %	Parent ASQ (n = 499)		Mean Percentile of Normal Range (SD)	<10th Percentile of Normal Range (n = 161), %
	Mean Score (SD)	Score > 64 (n = 93), %			Mean Score(SD)	Score > 64 (n = 204), %		
All phase 1 participants	53.7 (15.7)	27	40.4 (33.0)	26	61.7 (18.7)	41	34.3 (31.5)	32
Sex								
Male	52.8 (14.4)	25	43.7 (34.1)*	24	61.4 (17.7)	40	33.5 (30.1)	34
Female	55.9 (18.2)	32	32.4 (28.7)	29	62.5 (21.0)	41	36.4 (32.7)	28
Socioeconomic status								
Low	53.4 (15.7)	27	39.2 (32.0)**	27	63.0 (19.4)**	43	33.1 (31.1)	34
High	52.2 (15.7)	24	48.8 (35.8)	20	59.5 (17.0)	36	36.4 (32.0)	28
Race/ethnicity								
White	51.6 (14.2)**	22	44.0 (33.1)	22	61.2 (16.9)	40	32.5 (29.8)	33
Other	55.5 (16.7)	32	37.3 (32.6)	29	62.4 (20.4)	42	36.3 (33.2)	32
Special education status								
Specific learning disability	52.5 (15.5)**	24**	41.9 (33.2)	23	59.2 (18.1)***	34***	38.1 (32.1)***	29***
Emotional handicap	57.3 (15.7)	36	35.9 (32.2)	33	68.9 (18.1)	59	23.3 (26.8)	42
Any health insurance								
Yes	53.3 (16.1)	27	41.5 (33.6)	27	62.4 (18.9)**	42	33.5 (31.7)	34**
No	52.2 (13.1)	22	44.7 (33.5)	17	57.2 (16.1)	31	39.4 (29.3)	18

Note. ASQ = Abbreviated Symptom Questionnaire; ADDES = Attention Deficit Disorders Evaluation Scale. The 2 measures were filled out by teachers and parents. T score indicates a standardized score with mean of 50 and SD of 10. T score of more than 64 (ASQ) and rating below 10th percentile of normal range (ADDES) were the cut points for clinical relevance.

*$P < .01$; **$P < .05$; ***$P < .001$ for *t* test or chi-square test of comparison between sociodemographic characteristics for each screening measure.

with specific learning disabilities, $P < .001$), race/ethnicity (22% for Whites, 9% for others, $P < .001$), SES (17% for lower, 31% for higher SES, $P < .001$), and health insurance status (11% for uninsured, 23% for insured children, $P < .05$).

Children whose parents had reported significant problems on the ADHD screening measures were 3 times as likely to be treated with medication for ADHD (Fisher's Exact Test, 2-tailed: $P < .001$ for the ASQ, $P < .001$ for the ADDES). This effect was observed across all levels of sociodemographic characteristics (Table 3). Rates of treatment with stimulants did not differ by teacher reports of severe problem behaviors.

The prediction models for unmet needs were based on DSM-IV diagnostic criteria for ADHD and accounted for nonresponse and oversampling of high-risk children. With these models, 44% (SE = 0.019; 95% confidence interval = 0.40, 0.47) of the children met criteria for a diagnosis of ADHD. The prediction models fitted to multiply imputed data sets produced rather consistent results, as shown under summary inferences (Table 4). In all models, girls were at significantly greater risk for unmet service needs, with estimated odds ratios ranging from 3.0 to 4.7 ($P < .001$). Imputed and complete case estimates varied slightly in statistical significance testing results; however, the analysis suggested that minority status, learning disability label, and subsidized lunch status each approximately doubled the odds that a child with ADHD would not receive ADHD services. Age, urban vs rural residence, and health insurance coverage status did not appear to be independent risk factors. The complete case analysis suggested that coverage through an HMO doubled the likelihood that a child with ADHD would not receive services ($P < .05$), while the analysis of multiply imputed data sets suggested a somewhat smaller effect that did not reach statistical significance.

Discussion

Almost half (44%) of the second- through fourth-grade special education students in our study qualified for a diagnosis of ADHD, yet only half of those diagnosed were receiving care for the disorder.

Our study found that girls with ADHD were at increased risk for not receiving services. This is consistent with studies of adults retrospectively diagnosed with ADHD that indicate that a larger number of women had untreated ADHD in childhood.[37] Attention deficit disorder without hyperactivity, presumed to be more common among girls,[38] may be less obvious to parents and therefore less likely to prompt help-seeking. However, this possibility did not explain the increased rates of unmet need in this study, in which girls exhibited as many problem behaviors as boys. In fact, mean teacher ADDES scores indicated more problems among girls than boys, a surprising finding possibly reflecting a selection effect of the special education qualification process. Hence, important questions are raised about the role of the child's sex in the help-seeking behavior of parents and the medical decision making of providers. Children from minority families experienced decreased access to health services for ADHD, even after poverty and health insurance status were controlled for, consistent with other studies addressing access to health care.[39,40] Referral bias, low cultural competence of health professionals, and cultural differences in health beliefs and help-seeking may contribute to this finding.[41–45] In this study, in contrast to a recent national study,[46] African-American children were overrepresented in special education programs (53%) compared with their representation in 1990 census data from the region (30%).

An association between HMO coverage and higher unmet need was observed in the analysis of complete case estimates, but not in the imputed models. Thus, these findings are not definite, but if they were to be confirmed in future studies they would have important policy implications, since increas-

TABLE 2—Health Services Use among Special Education Students in Second through Fourth Grades, by Attention Deficit Hyperactivity Disorder (ADHD) Risk Status and Demographic Characteristics: North Florida, 1995

Characteristic (% of sample)	Mean No. Doctor Visits in Past 12 Months (SD)		Currently Receiving Treatment for ADHD,%		Used Mental Health Services in Past 12 Months, %		Saw Primary Care Provider for Emotional or Behavioral Problems, %	
	Low Risk	High Risk	Low Risk	High Risk	Low Risk	High Risk	Low Risk	High Risk
All phase 1 participants	2.5 (3.5)	4.1 (4.3)	16	48	25	49	16	35
Sex		*		*, **		*, ***		†, ***
Male (73)	2.6 (3.9)	4.2 (4.2)	20.6	54.1	29.2	50.4	20.2	35.6
Female (27)	2.2 (2.6)	3.9 (4.7)	4.9	29.4	14.6	44.1	7.4	31.3
Special education status		†		*, **		*, **		**, †
Specific learning disability (74)	2.4 (3.1)	3.6 (3.6)	11.9	42.2	19.1	42.2	12.2	28.6
Emotional handicap (26)	3.0 (4.8)	4.9 (5.2)	30.4	58.5	45.6	60.4	31.9	44.2
Race/ethnicity		*		*		*		*
White (53)	2.7 (4.1)	4.5 (3.6)	17.6	56.6	26.7	53.9	18.7	41.9
Other (47)	2.2 (2.9)	3.6 (4.9)	14.2	38.8	23.1	45.3	13.8	25.8
Socioeconomic status		*		*		*		*, ‡
Low (66)	2.3 (3.3)	4.2 (4.3)	15.2	43.9	23.7	45.9	13.1	29.8
High (34)	2.9 (4.0)	4.0 (4.3)	17.9	61.0	26.8	53.7	23.3	47.4
Any health insurance		‡						
No (13)	1.3 (1.8)	2.0 (1.8)	12.0	33.3	20.0	41.7	8.0	33.3
Yes (87)	2.7 (3.7)	4.3 (3.4)	16.7	49.6	25.8	49.6	17.5	34.6

Note. Children at high risk (n = 143) were those whose rating on the Attention Deficit Disorders Evaluation Scale was below the 10th percentile of normal range and whose T score on the Abbreviated Symptom Questionnaire was more than 64 (T score indicates a standardized score with mean of 50 and SD of 10). Low-risk group n = 356. Analyses were conducted with multiple regression for number of doctor visits and with logistic regression for the other 3 outcomes. Each model included an indicator of whether the child met the previously mentioned criteria on the 2 screening measures to assess a screener main effect, a demographic factor (sex, special education status, race/ethnicity, socioeconomic status, or availability of any health insurance) to assess the demographic main effect, and the interaction between the screener and the demographic factor. None of the interaction effects reached statistical significance; main effects are denoted as follows:

*$P < .001$ for screener main effect.
**$P < .001$ for demographic factor main effect.
***$P < .01$ for demographic factor main effect.
†$P < .01$ for screener main effect.
††$P < .05$ for demographic factor main effect.

ing numbers of children receive health care through HMOs. Health insurance organizations are not required by law to serve children with ADHD, unlike schools, which are mandated to provide appropriate educational and related services for these children. This creates considerable difficulties in coordinating separate yet complementary service sectors and finding cost-effective solutions to provide services to children with ADHD.[22,47,48]

Limitations of this study include the relatively high nonparticipation rate, which reduces the generalizability of the findings. Thus, these estimates of prevalence and unmet need, as well as the results of bivariate and multivariate analyses, need to be interpreted with caution. Furthermore, this sample did not include a comparison group of children not qualifying for special education services, whose unmet needs for ADHD services may be higher. An additional limitation is the fact that parents' treatment reports were not validated by information from health care providers or medical record review. However, previous studies indicate that parents can provide valid treatment histories if reasonable time frames are selected.[49]

TABLE 3—Percentage of Students Treated with Medication for Attention Deficit Hyperactivity Disorder (ADHD) in the Past Year, by ADHD Risk Status and Demographic Characteristics: Special Education Students in Second through Fourth Grades, North Florida, 1995

	Parent ASQ		Parent ADDES	
	High Risk (n=202)	Low Risk (n=295)	High Risk (n=159)	Low Risk (n=338)
All phase 1 participants	35	12*	40	13*
Sex				
Male	15	2**	21	2*
Female	43	16*	46	18*
Special education status				
Emotional handicap	46	22***	54	24*
Specific learning disability	29	10*	32	10*
Race/ethnicity				
White	45	14*	50	15*
Other	25	10***	28	11***
Socioeconomic status				
Low	28	9*	31	10*
High	54	18*	63	19*
Any health insurance				
Yes	36	13*	40	14*
No	25	7	42	6***

Note. For the Abbreviated Symptom Questionnaire (ASQ), children at high risk were those whose T score was more than 64 (T score indicates a standarized score with mean of 50 and SD of 10). For the Attention Deficit Disorders Evaluation Scale (ADDES), children at high risk were those whose rating was below the 10th percentile of the normal range. Diffferences by risk status were tested with the Fisher's Exact Test.
*$P < .001$; **$P < .05$; ***$P < .01$.

TABLE 4—Odds Ratios (from Multiple Logistic Regression Analyses) for Unmet Service Needs for Attention Deficit Hyperactivity Disorder, by Risk Factor: Special Education Students in Second through Fourth Grades, North Florida, 1995

	Imputed Model 1 (n = 254)		Imputed Model 2 (n = 255)		Imputed Model 3 (n = 260)		Summary Inferences of Models 1–3		Complete Case Estimates (n = 211)	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Demographic characteristic										
Sex (1 = female)	3.9	1.9, 8.2	4.7	2.2, 9.7	4.7	2.3, 9.6	4.4	2.0, 9.5	3.0	1.3, 6.9
Age (y)	1.1	0.8, 1.5	1.2	0.9, 1.5	1.1	0.8, 1.4	1.1	0.8, 1.5	1.0	0.8, 1.4
Race/ethnicity (1 = non-White)	1.7	0.9, 3.3	1.7	0.9, 3.2	2.0	1.0, 3.8	1.8	0.9, 3.5	2.0	0.9, 4.3
Special education status (1 = EH)	0.6	0.3, 1.1	0.6	0.3, 1.0	0.5	0.3, 0.9	0.6	0.3, 1.1	0.5	0.2, 0.9
Residence (1 = urban)	0.6	0.3, 1.2	0.6	0.3, 1.2	0.7	0.4, 1.3	0.7	0.3, 1.3	0.6	0.3, 1.2
School lunch status (1 = full pay)	0.4	0.2, 0.8	0.4	0.2, 0.9	0.4	0.2, 0.9	0.4	0.2, 0.9	0.5	0.2, 1.3
Insurance status										
Any health insurance (1 = yes)	0.9	0.3, 2.1	0.8	0.3, 2.1	1.0	0.4, 2.6	0.9	0.3, 2.3	0.9	0.3, 2.7
HMO (1 = yes)	1.4	0.8, 2.7	1.6	0.9, 3.0	1.9	1.0, 3.4	1.6	0.8, 3.2	2.0	1.0, 3.9
Screening measure										
ASQ	0.8	0.6, 0.9	0.8	0.7, 1.0	0.8	0.7, 1.0	0.8	0.6, 1.0	0.8	0.6, 1.0
ADDES	0.6	0.5, 0.8	0.6	0.5, 0.8	0.6	0.5, 0.8	0.6	0.5, 0.8	0.6	0.5, 0.8

Note. OR = odds ratio; CI = confidence interval; EH = emotional handicap; ASQ = Abbreviated Symptom Questionnaire: ADDES = Attention Deficit Disorders Evaluation Scale. Odds ratios for screening variables are reported as the odds ratio associated with a 10-point increase in the predictor (for example, an odds ratio of 0.5 would mean that a child with a screener score of 20 would be half as likely to have unmet need as one with a score of 10).

This study proposes high prevalence rates of ADHD and high levels of unmet service needs in this population of children at high risk for adverse educational outcomes. Child mental health services should be integrated with general health care and special education programs to address these unmet needs. School-based health services may be one avenue to accomplish this goal. Improving access to care for this treatable condition will require integrated, consistent policies in the general health care and special education sectors. □

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