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Predictors of Receipt of School Services in a National Sample of Youth With ADHD

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Abstract

Objective: The objective of the study is to describe the extent to which students with ADHD received school-based intervention services and identify demographic, diagnostic, and impairment-related variables that are associated with service receipt in a large, nationally drawn sample.

Method: Parent-reported data were obtained for 2,495 children with ADHD aged 4 to 17 years from the National Survey of the Diagnosis and Treatment of ADHD and Tourette Syndrome (NS-DATA)

Results: The majority (69.3%) of students with ADHD currently receive one or more school services. Educational support (62.3%) was nearly twice as prevalent as classroom behavior management (32.0%). More than 3 times as many students with ADHD had an individualized education program (IEP; 42.9%) as a Section 504 plan (13.6%).

Conclusion: At least one in five students with ADHD do not receive school services despite experiencing significant academic and social impairment, a gap that is particularly evident for adolescents and youth from non–English-speaking and/or lower income families.

Keywords

ADHD; academic functioning; social functioning; school services

Youth with ADHD display clinically significant levels of inattentive and/or hyperactive-impulsive behaviors relative to peers of the same gender and age, and must exhibit

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Authors' Note

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Supplemental Material

Supplemental material for this article is available online.

impairment in functioning to receive an ADHD diagnosis (American Psychiatric Association [APA], 2013). In fact, problems with educational and/or social functioning often are the primary reasons why children with ADHD are referred for services (Angold, Costello, Farmer, Burns, & Erkranli, 1999) and these problems often endure even when symptoms abate (Lahey et al., 2016).

Students with ADHD are at higher risk for grade retention, academic underachievement, identification for special education services, and school dropout (Frazier, Youngstrom, Glutting, & Watkins, 2007) and are at higher risk for learning disabilities (LDs), with comorbidity rates of 30% to 45% across studies (DuPaul, Gormley, & Laracy, 2013). Students with ADHD also exhibit academic performance difficulties as a function of lower rates of on-task behavior (Kofler, Rapport, & Alderson, 2008) and work completion (Atkins, Pelham, & Licht, 1985). Given the chronic nature of these difficulties, it is unsurprising that adolescents with ADHD continue to show deficits in reading, math, and spelling compared with their peers (Frazier et al., 2007).

Social impairment associated with ADHD is characterized by difficulties interacting with peers and adult authority figures, building and sustaining friendships, and experiencing higher rates of peer rejection (Hoza, 2007). Peer relationship difficulties tend to be chronic, as students with ADHD have fewer reciprocal friends (Mikami, 2010) and friendships that are of lower quality and less likely to be sustained over time (Normand et al., 2013).

Given the scope and severity of functional impairment experienced by youth with ADHD in academic and social domains, school-based intervention and services often are necessary (Pfiffner & DuPaul, 2015). Randomized controlled trials and other experimental studies have shown school-based interventions (e.g., contingency management, daily report card) improve classroom behavior and academic performance with moderate to large effect sizes (DuPaul et al., 2012; Fabiano et al., 2009). Students with ADHD may also qualify for individualized instruction and related special education services (Bussing, Zima, Perwien, Belin, & Widawski, 1998) as well as educational accommodations and support through Section 504 (Schnoes, Reid, Wagner, & Marder, 2006). An individualized education program (IEP) is mandated by federal law when a student meets criteria for an educational disability (e.g., LD, other health impairment) and the disability limits educational functioning to the extent that special education services are necessary. Under Section 504, educational accommodations (e.g., preferential seating, extra time on tests) in the general education classroom are warranted when a student has a disability or could be considered to have a disability that limits one or more life activities (e.g., learning).

Few studies have examined the extent to which students with ADHD receive various school-based support and intervention services. Early studies indicated that only about 25% of children with ADHD received school-based services for ADHD and related impairments (Leslie & Wolraich, 2007). However, Merikangas and colleagues (2011) found that 63% of adolescents with ADHD ever received school-based mental health services. Murray et al. (2014) examined the prevalence of special education services and Section 504 plan receipt in 543 high school students with ADHD who were participants in the Multimodal Treatment study of ADHD (MTA). Just over half (51.6%) of students received special education

services through an IEP while less than 5% of students had Section 504 plans. IEP and 504 plans primarily provided academic intervention, with only half of students with these plans receiving any behavioral intervention or learning strategy support. Similar findings were obtained by Spiel, Evans, and Langberg (2014); among middle school students with ADHD with an IEP, less than 50% received services focused on behavioral difficulties.

Research that has examined school-based services for students with ADHD is limited by several factors. First, few intervention studies have examined the degree to which school-based services are actually implemented in the community (i.e., school services as delivered by practitioners under "real world" conditions). Available studies provide data regarding receipt of school services at a general level (Merikangas et al., 2011) or for specific age groups (Murray et al., 2014; Spiel et al., 2014), but have not examined school intervention and support in a nationally drawn sample across elementary, middle, and high school students. Furthermore, we know very little regarding student characteristics and other variables that correlate with service receipt (i.e., *which* children with ADHD get *which* school-based services). There is evidence that students with the greatest academic and behavioral impairment are most likely to receive services (e.g., Murray et al., 2014); however, the association between school-based services and student functioning in a nationally drawn sample has not been examined.

The aims of this study were thus to (a) describe the percentage of children and adolescents with ADHD who receive school-based interventions and services, and (b) identify demographic, diagnostic, and impairment-related variables correlated with service receipt. Based on prior research (e.g., Merikangas et al., 2011; Murray et al., 2014), we hypothesized that children with more severe ADHD, particularly those with the hyperactive-impulsive or combined symptom presentations; those with one or more comorbid disorders; children from higher socioeconomic status (SES); and males would be more likely to receive school support services.

Method

Data for this study were collected in 2014 for the National Survey of the Diagnosis and Treatment of ADHD and Tourette Syndrome (NS-DATA; Centers for Disease Control and Prevention [CDC], National Center for Health Statistics [NCHS], State and Local Area Integrated Telephone Survey, 2015), a follow-back telephone survey of selected households that participated in the 2011-2012 National Survey of Children's Health (NSCH; Bramlett et al., 2017). The NSCH was a nationally representative, random-digit-dialed telephone survey on the health and well-being of noninstitutionalized children aged 0 to 17 years living in the United States. The sample of eligible respondents for NS-DATA included households that completed an NSCH survey for a child aged 2 to 15 years who was reported to have ever been diagnosed with ADHD or Tourette syndrome by a doctor or other health care provider. NS-DATA was administered in 2014, 2 to 3 years after the 2011-2012 NSCH interview, and was sponsored by the CDC's National Center on Birth Defects and Developmental Disabilities (NCBDDD) and NCHS.

To participate in the NS-DATA ADHD module interview, the NS-DATA respondent was first asked, “Has a doctor or other health care provider ever told you that your child had ADHD or attention-deficit disorder (ADD) (even if he or she does not have the condition now)?” to confirm that the child had ever received an ADHD diagnosis. Of households eligible to participate in NS-DATA, 47% completed an NS-DATA interview. There were 2,966 interviews completed for the ADHD module of NS-DATA with data available in the public-use dataset. Unless otherwise noted, all data described in this study were collected during the NS-DATA follow-up interview.

Measures

Analyses for this study were restricted to children whose parent responded affirmatively to the question, “Does (your child) currently have ADHD?” in the NS-DATA ADHD module (n = 2,495). Children with completed NS-DATA interviews ranged in age from 4 to 17 years; although less than 0.5% of interviews were about children aged 4 or 5 years, this is primarily a school-aged and adolescent sample (i.e., between 6 and 17 years of age).

To describe the receipt of school services, parents were asked whether their child had ever received the following treatments or interventions for ADHD or other difficulties with their child’s emotions, concentration, or behavior: (a) school-based educational support, intervention, or accommodation, such as tutoring, extra help from a teacher, preferential seating, extra time to complete work, or being enrolled in special education (hereafter referred to as “school support”), or (b) classroom management, such as reward systems, behavioral modification, or a daily report card (hereafter referred to as “classroom management”). If the parent reported that the child had ever received any of these, they were asked whether the child was currently receiving that intervention. Parents were also asked whether their child currently had an IEP or 504 plan. Children were considered to have received any school services if they ever had received school support or classroom management, or if they had a current IEP or 504 plan.

Comparisons regarding the receipt of school-based services were made for these demographic and clinical subgroups: child sex (male, female), age (4-11 years, 12-17 years), race (White, Black, Multiracial/Other), ethnicity (Hispanic/Latino, non-Hispanic/Latino), poverty status (<100% of federal poverty level, 100%-199% of federal poverty level, ≥200% of federal poverty level; U.S. Department of Health and Human Services, 2014), health insurance status (private insurance, public insurance, uninsured), and health insurance continuity over the past year (yes, no). Three additional indicators from linked 2011-2012 NSCH data were also included in the comparisons: region of residence (Northeast, Midwest, South, West), highest level of education in the family (less than high school, high school graduate, more than high school), and primary language in the home (English, any other language).

Indicators of academic and social functioning were derived using the performance section of the Vanderbilt ADHD Parent Rating Scales (VAPRS; Wolraich et al., 2003). These questions asked how the parent would describe their child’s performance in the past 6 months when he or she was not taking medication for ADHD. Children were considered to have social impairment if their parent reported problematic or somewhat problematic relationships with

peers or participation in organized activities such as teams. Children were considered to have academic impairment if their parents reported problematic or somewhat problematic performance for overall school performance, reading, mathematics, or writing. Additional indicators of academic impairment included in the analysis were whether the parent considered the child to be a D or F student or if the child had repeated a grade. Parents were also asked whether the child had ever been expelled or asked not to return to a child care center, preschool, or school, although this indicator was not incorporated in the composite indicator of academic impairment.

For comparisons related to ADHD expression, parents were asked to describe their child's ADHD as mild, moderate, or severe. Parents also reported the age at which their child first received their ADHD diagnosis (0-5 years, 6-10 years, 11 years or older); the person who was first concerned with the child's behavior, attention, or performance (family member, school/daycare staff member, doctor/health care professional, other); and whether there were concerns before the ADHD diagnosis about the child's behavior at home, behavior at school/daycare, school performance, and relationships with other children.

Parent-perceived current ADHD symptom presentation was characterized using the symptoms section of the VAPRS. The parent completed 18 questions regarding child ADHD symptoms (nine related to inattention and nine related to hyperactivity/impulsivity, per *Diagnostic and Statistical Manual of Mental Disorders* [4th ed.; *DSM-IV*; APA, 1994] diagnostic criteria) in the last 6 months based on their child's behavior when not taking ADHD medication. The VAPRS symptoms section has been shown to have high internal consistency (Cronbach's $\alpha \geq .90$) and concurrent validity ($r = .79$; Wolraich et al., 2003). A child was considered to have the symptom if the parent reported that the child exhibited the behavior often or very often. Presentation types were determined as follows: combined presentation if the child had six or more inattentive symptoms and six or more hyperactive/impulsive symptoms, inattentive presentation if the child had at least six inattentive symptoms but fewer than six hyperactive/impulsive symptoms, hyperactive/impulsive presentation if the child had at least six hyperactive/impulsive symptoms but fewer than six inattentive symptoms, and subthreshold presentation if the child had fewer than six symptoms in both categories.

Parents were also asked to report whether their child had ever been diagnosed by a doctor or other health care provider with a set of comorbid conditions and, if so, whether the child currently had the condition. The presence of comorbid conditions considered for these analyses was categorized into four nonmutually exclusive groups: externalizing disorders (oppositional defiant disorder, conduct disorder), internalizing disorders (obsessive-compulsive disorder, posttraumatic stress disorder, other anxiety disorder, bipolar disorder, depression, major depressive disorder, or dysthymic disorder), learning/cognitive disorders (learning disorder, language disorder, intellectual disability), and autism spectrum disorder or other pervasive developmental disorder (ASD/PDD).

Data Analytic Plan

The weighted percentage of children with current ADHD who received each type of school service was calculated overall and by demographic and ADHD presentation indicators.

Bivariate comparisons by demographic and ADHD expression indicators were compared using chi-square tests. To consider groups of independent variables together, sets of multivariable logistic regression models were developed to identify independent predictors of receipt of any and each type of school services. All predictor variables were categorical. For each model, indicators with a bivariate chi-square test p value < .10 were entered, and the model was reduced using a backward stepwise selection process that retained indicators with a p value < .05. Odds ratios (ORs) were calculated for all indicators with a statistically significant association with the dependent variable (i.e., receipt of school services) while controlling for all other indicators retained in the final model. These analyses were conducted for the sample as a whole and then separately for students with no learning or developmental comorbidities (i.e., students without a report of a comorbid learning/cognitive disorder or ASD/PDD), which automatically make students eligible for school services. All statistical analyses were conducted using SAS-callable SUDAAN v.11.0.1 (RTI International, Cary, NC) to account for the complex survey design and incorporate sample weights that adjust for differential probabilities of selection, noncoverage, and nonresponse.

Results

Children with current ADHD in this sample were predominantly male (70.3%), between the ages of 12 and 17 years (66.0%), with mild (30.3%) or moderate (49.9%) ADHD severity (Table 1). Children exhibited ADHD combined (27.7%), predominately inattentive (30.9%), and predominately hyperactive-impulsive (4.8%) symptom presentations, although 36.5% were classified as having subthreshold presentation based on parent ratings. A proportion of children with current ADHD were reported to have current externalizing conditions (18.7%), internalizing conditions (32.8%), learning/cognitive disorders (37.5%), or ASD/PDD (13.0%). Large percentages of children with ADHD were reported to exhibit problems with overall school (50.7%), reading (43.7%), math (46.6%), and writing (54.0%) performance as well as difficulties with peer relationships (30.4%) and participation in organized activities (31.9%). Also, 15.1% were reported to obtain low grades (Ds or Fs), 23.9% had repeated a grade, and 15.8% had ever been expelled from school/child care. Using the definitions of academic and social impairment stated previously, 44.1% of children with current ADHD met criteria for academic impairment alone, 5.3% for social impairment alone, 36.8% for combined academic and social impairment, and 13.7% for neither.

Type and Frequency of School-Based Intervention and Services

The majority of children were reported to have received school-based educational support (80.2%), or classroom management (59.9%) at some point in their lives, with 62.3% and 32.0% currently receiving these services, respectively (Table 2). In addition, 54.4% of children with current ADHD had either a current IEP or 504 plan; 42.9% of children currently had an IEP while 13.6% had a 504 plan. Bivariate comparisons revealed statistically significant associations with receipt of one or more school services for most demographic and clinical variables (see Table 2). In particular, children between 4 and 11 years, those with public insurance, students with severe ADHD or combined presentation, children diagnosed before age 6 years, individuals with comorbid disorders, and students with both academic and social impairment were most likely to receive school services. In

contrast, child race or ethnicity, continuous insurance over the previous year, geographic region, and prereferral concern with school performance were not associated with receipt of any school services.

Correlates of School-Based Intervention and Services in Multivariable Models

Receipt of school-based educational support at any point during a child's schooling was associated with academic impairment alone or in combination with social impairment and presence of current comorbid learning/cognitive disorder or ASD/PDD (Table 3). Specifically, children with academic impairment alone were 2.5 times as likely and those with combined academic and social impairment were 3.7 times as likely as those without impairment to have ever received school-based educational support; there was no difference for children with social impairment alone compared to children with no impairment. Children with comorbid learning/cognitive disorders were 7.7 times as likely to have received school-based educational support as those without a learning/cognitive disorder, while those with comorbid ASD/PDD were 3.7 times as likely to have ever received school-based educational support as those without ASD/PDD. Similar findings were obtained regarding variables correlated with current receipt of school-based educational support (Table 3). In addition, children aged 4 to 11 years were 48% more likely than older children to currently be receiving educational support.

The implementation of classroom management strategies at any point in a child's schooling was associated with multiple variables including sex, age, ADHD symptom presentation, prediagnostic concerns about school behavior or peer relationships, impairment type, and current comorbidity status in the multivariable model (Table 3). Boys were 61% more likely than girls and children aged 4 to 11 years were 78% more likely than older children and to have ever received classroom management. Children exhibiting the hyperactive-impulsive symptom presentation were 158% more likely than children with subthreshold presentation to have received classroom management. Not surprisingly, students for whom there was a prediagnosis concern with school behavior were about twice as likely as those without such prediagnostic concerns to have received classroom management. Students for whom there was a prediagnosis concern about peer relationships were 47% more likely to have received classroom management than their peers. Youth with academic impairment alone or in combination with social impairment were 72% to 117% more likely, respectively, to have received classroom management. Finally, children with a current comorbid internalizing, learning/cognitive, or ASD/PDD condition were 57%, 81%, and 105% more likely, respectively, to have received classroom management support than students without those comorbid conditions. Many of these variables were similarly associated with current receipt of classroom management (Table 3).

The presence of an IEP was associated with current ADHD severity, ADHD symptom presentation, age at ADHD diagnosis, presence of academic and/or social impairment, and presence of learning/cognitive or ASD/PDD comorbid conditions in the multivariable model (Table 3). Children with moderate ADHD were 66% more likely to have a current IEP than children with mild ADHD. Children with inattentive symptom presentation were 41% less likely to have a current IEP than children with subthreshold symptom presentation. Children

diagnosed prior to age 6 years or between ages 6 and 10 years were 198% and 158% more likely to have a current IEP than children and adolescents diagnosed at or after age 11 years. Students with academic impairment alone, social impairment alone, or combined academic and social impairment were 97%, 340%, and 206% as likely, respectively, as those without impairment to have an IEP. Finally, children with comorbid learning/cognitive or ASD/PDD conditions were 4 to 5 times as likely to have an IEP as those without such comorbid disorders.

Implementation of a 504 plan was associated with primary language used in the home, health care coverage type, and presence of combined academic and social impairment (Table 3). Children from families where English was the primary language were more likely to have a current 504 plan than those from families where English was not the primary language, although this difference has a large confidence interval (CI) (OR = 39.8, 95% CI = [5.0, 313.7]). Students from families with private insurance were 96% more likely to have a 504 plan than those with public insurance. Students with both academic and social impairment were more than 3 times as likely as those with social impairment only to have a 504 plan.

Summary.—Table 3 provides a summary of significant independent variables associated with the various school services in the context of the six multivariable logistic regression models described previously as well as for associations with current receipt of *any* school service. Comorbid learning/cognitive and ASD/PDD conditions were significantly associated with receipt of five of six school services (with the exception of 504 plan receipt). The combination of academic and social impairment was significantly related to all six school services while academic impairment alone was associated with all services except receipt of a 504 plan. Child age (either current or at time of diagnosis) was also associated with receipt of four of six school services, with older children and adolescents significantly less likely than younger children to receive educational support, classroom management, or an IEP. All remaining variables were associated with receipt of two or fewer school support services. Receipt of *any* school service was significantly more likely for children aged 11 years and younger, those with moderately severe ADHD, students with comorbid learning/cognitive or ASD/PDD conditions, or those with academic impairment alone or combined academic and social impairment.

School Services for Children Without Learning/Cognitive Disorders or ASD/PDD

Because 982 participants (41.8% of the weighted sample) were reported to have a learning/cognitive disorder and/or ASD/PDD, multivariable logistic regression analyses were conducted for the subsample of children with ADHD who were not identified with either learning/cognitive disorder or ASD/PDD. These additional analyses allowed identification of variables associated with receipt of school services for those children with ADHD who do not have significant identified learning/cognitive disorders or ASD/PDD, which automatically make children eligible for school services. Although many of the same variables were found to be associated with services in this subsample as were obtained for the full sample, there were some differences in predictors for virtually every outcome of interest (Supplementary Table 1).

A more extensive prediction model was found for the subsample regarding ever having received school-based educational support, with prediagnosis concern with home behavior and presence of academic impairment (alone or in combination with social impairment) predicting receipt of educational support. Current receipt of classroom management in the subsample was associated with child age younger than 12 years, English as primary language, having moderate or severe ADHD, being diagnosed with ADHD by age 10 years, comorbid externalizing condition, and exhibiting academic impairment (alone or with social impairment). For children without learning/cognitive disorders or ASD/PDD, having an IEP was associated with male sex, non-Hispanic ethnicity, having public insurance, receipt of continuous insurance over the previous year, having a comorbid externalizing or internalizing condition, and having social impairment, with or without academic impairment. In contrast, only three predictors for having a 504 plan were found: children from homes where English was the primary language, children with private insurance, and children with combined academic and social impairment were significantly more likely to have a 504 plan than their peers.

Discussion

More than two thirds of students with ADHD currently received one or more type of school service, with educational support (62.3%) nearly twice as prevalent as classroom behavior management (32.0%). These results indicate that about one of every three students with ADHD were not receiving *any* school-based interventions and two of three were not receiving classroom management, which represents a major gap in addressing chronic impairment related to ADHD symptoms. The gap in services addressing academic and behavioral impairment is particularly compelling given that nearly one in four students were reported to have repeated a grade, and one in six had been expelled from school. This study also found that 42.9% of students with ADHD had an IEP, which is lower than that reported in the MTA sample (51.6%; Murray et al., 2014), potentially due to higher ADHD severity or other sampling characteristics (e.g., treatment-seeking vs. national sample) in the MTA study. Far fewer students with ADHD had a 504 plan (13.6%) than an IEP; however, this is a higher rate than reported for the MTA sample (5%; Murray et al., 2014). Our findings provide an estimate of special education and 504 plan receipt among students with ADHD using a more geographically diverse and representative sample across a wider age range than prior published results.

Students with academic impairment with or without social impairment were more likely than those without academic impairment to receive school services. This is not surprising given that eligibility for school services is typically based on academic underachievement (even though social impairment that impacts educational functioning may also warrant IEP receipt). Also, students with comorbid learning/cognitive disorders or ASD/PDD were more likely to receive school services than those without these comorbidities, an expected finding given that students with these comorbid disorders typically receive special education support that may or may not target the impairment resulting from ADHD specifically (U.S. Department of Education, Office of Special Education and Rehabilitative Services, Office of Special Education Programs, 2016).

Middle and high school students with ADHD (i.e., 12- to 17-year-olds) are significantly less likely than elementary school students to receive any type of school service (except 504 plans), despite generally similar, if not worse, impairment and higher risk for academic failure and expulsion than younger children. These findings were expected as most intervention research studies have been conducted with elementary school-aged children (Barkley, 2015) and, thus, there are fewer evidence-based treatment options for adolescents with ADHD (Evans, Owens, Wymbs, & Ray, 2018). In addition, because secondary school students have multiple teachers, there may be less consistent engagement in classroom-based intervention across instructors (Evans et al., 2016).

Boys, children in elementary school, students with hyperactive-impulsive presentation, children whose behavior was a concern to health care professionals or someone outside of the family, and children for whom there were prediagnostic concerns regarding behavior at home, school, and/or with peers were more likely to receive classroom management. Possible reasons for these differences include that boys with ADHD are more likely to exhibit disruptive behavior than girls (Gershorn, 2002), elementary school teachers may be more amenable to implementing behavioral interventions (Power, Hess, & Bennett, 1995), symptomatic behaviors representing hyperactivity-impulsivity are inherently disruptive and can be addressed by behavioral strategies (Evans et al., 2018), and disruptive behaviors across settings can be chronic for children with ADHD (e.g., Lahey et al., 2004). As was the case for school services in general, students with academic impairment were more likely to receive classroom management than those without academic difficulties.

Different variables were related to receipt of IEP services versus those related to receipt of a 504 plan. Among all children with ADHD, only the presence of academic and/or social impairment was associated with receipt of both an IEP and a 504 plan. Factors related to receipt of an IEP were severity indicators (younger age at diagnosis and presence of learning/cognitive disorders or ASD/PDD), while factors related to having a 504 plan were related more strongly to demographics (living in a home where English is the primary language, having private insurance). These findings could be due to important distinctions between IEP services and processes (e.g., referral, evaluation, and placement) that are based on specific federal mandates and associated funding versus 504 services that, while based on federal mandate, lack specificity and funding. Furthermore, it is possible that parents and school staff are more cognizant of possible special education support through IEPs than they are of services through 504 plans. Thus, our findings could indicate that parents with sociocultural advantages (e.g., language, access to insurance) may be more aware of 504 services and therefore are more likely to advocate for their children to receive such services. When considering only children with ADHD but not a co-occurring learning/cognitive disorder or ASD/PDD, additional demographic and severity indicators were associated with receipt of an IEP (male sex, non-Hispanic ethnicity, having public insurance, receipt of continuous insurance, social impairment, and a comorbid externalizing disorder), but no additional indicators were associated with receipt of a 504 plan. Interestingly, federal data regarding the general school population also indicate an underrepresentation of students from non–English-speaking backgrounds receiving 504 plans (The Advocacy Institute, 2015). Thus, similar to racial differences in ADHD diagnosis and medication treatment (Morgan, Staff, Hillemeier, Farkas, & Maczuga, 2013), there appear to be sociocultural

factors associated with receiving a 504 plan that, if confirmed with data sources not reliant on parent report, may warrant outreach to non–English-speaking and lower income communities (e.g., through bilingual/bicultural community professionals) to alert them to their children's educational rights. Overall, although the prevalence of 504 plans is higher than in the general school population, it appears low relative to the percentage of students experiencing social and/or academic impairment. This finding of lower than expected 504 plan receipt provides data to support the recent directive from the U.S. Department of Education, Office for Civil Rights (2016) addressing many complaints regarding violation of civil rights of students with ADHD in the context of Section 504.

Impairment (particularly academic) is highly prevalent for students with ADHD and strongly correlated with receipt of all school services. There are also more (87.7%) students with ADHD who are academically and/or socially impaired than students who are currently receiving any school services (69.3%), resulting in an impairment versus service gap where approximately one out of every five students (20%) with ADHD have some impairment but were not receiving school services. Further research could be helpful in identifying specific characteristics associated with the impairment versus service gap.

There are several limitations that should be considered when interpreting the results of this study. First, the NS-DATA has a low overall response rate (11%), calculated by multiplying the NS-DATA completion rate (47%) with the final response rate of the 2011-2012 NSCH (23%). Results from surveys with low response rates may have bias due to differences between respondents and nonrespondents, but sample weights were developed and applied to the analysis to reduce nonresponse bias. Weighted analysis of demographic indicators for children in the NS-DATA ADHD sample showed a similar demographic composition to that for children ever diagnosed with ADHD in the 2011-2012 NSCH and 2012 NHIS (Visser, Zablotsky, Holbrook, Danielson, & Bitsko, 2015). Furthermore, results from a nonresponse bias analysis suggested that while nonresponse bias could not be completely ruled out, it is likely that any potential bias in weighted estimates would be smaller than sampling error (Visser et al., 2015). Second, all indicators were collected using parent report, and have not been validated by clinical judgment or school records, nor corroborated with teacher report of performance or implementation of school services. Similarly, although the VAPRS impairment questions direct the parent to report on their child's performance when their child is not taking medication, parents may have difficulty accurately reporting their child's baseline level of impairment if their child has been taking medication consistently over an extended period of time. Third, multiple comparisons were conducted without adjusting *p* values or the alpha threshold for determining statistical significance. Because this is the first study to examine predictors associated with receipt of school services in a population-based nationally drawn sample, we prioritized the reduction of Type II error (i.e., not missing any potentially significant predictors) rather than using multiple comparisons adjustments to reduce the possibility of Type I error (i.e., erroneously identifying a variable as a predictor when it is not) at the expense of Type II error. Fourth, although survey questions asked about receipt of school services, no information was collected on duration or quality of these services. Fifth, the cross-sectional design does not allow us to examine the temporal ordering of study variables, for example, whether comorbid internalizing problems led to the need for services or whether academic impairment over time contributed to internalizing

problems. Finally, due to timing of survey administration, only children who had an ADHD diagnosis for 2 years or more were included in the sample, so these results may not be representative of children with a more recent diagnosis.

These findings have several important implications for mental health professionals working in or consulting with schools. First, given the impairment versus services gap for at least one out of every five students with ADHD, children with ADHD may benefit from school professionals working to actively identify students who are experiencing significant impairment and are not receiving interventions. Second, children with ADHD may benefit from school-based teams that emphasize the development, implementation, and evaluation of evidence-based interventions for ADHD in all age groups (including adolescents) and work to reduce the use of ineffective strategies such as grade retention/expulsion. Our results indicate that less than a third of students with ADHD currently receive classroom management support; thus, there may be a particularly acute need for mental health professionals and special education teachers to collaborate with general education teachers to use evidence-based behavioral strategies across classroom settings. Third, nearly half of students with ADHD were reported to have neither IEP nor 504 plans despite the fact that most students with ADHD experience academic and/or social impairment. Although receipt of both IEP and 504 support services are associated with SES, this relationship is especially strong for 504 plans. Thus, families of children with ADHD may require additional outreach in their primary language by school professionals who may alert families of their children's rights to protection and possible intervention and accommodations through Section 504 and support them through the advocacy process. This may be especially important for families from lower SES and/or non–English-speaking backgrounds.

These results also have implications for future research. First, these findings highlight the need to evaluate the receipt of school-based ADHD services in large, geographically diverse samples in addition to convenience samples or highly selected samples of participants from intensive research trials. Second, longitudinal studies using a multiinformant, multimethod assessment approach could identify trends in school services for students with ADHD beyond the currently employed cross-sectional, parent report methodology. Perhaps most importantly, this research highlights the need to identify methods of engaging schools and communities to ensure that underserved families are aware of and able to access school services and accommodations. Additional research could help explicate the discrepancy between the academic impairment among adolescents with ADHD and the lower levels of service receipt in this group. Research could explore innovative ways to implement evidence-based approaches to treating academic and social impairment in students with ADHD through collaborative school-home intervention (e.g., Pfiffner et al., 2018) and in a manner that can be sustained within the context and structure of secondary schools as in the Challenging Horizons Program (e.g., Evans et al., 2016).

The results of this first large-scale examination of school services in a nationally drawn sample of youth with ADHD lead to several important conclusions. First, we found a critical gap in the percentage of students with ADHD who need school support due to academic or social impairment and the percentage of students who currently receive services. Second, students from non–English-speaking backgrounds appear to be less likely to receive some

types of services, especially protections and accommodations under Section 504. Third, secondary school students with ADHD are less likely to receive school support than younger children, despite experiencing commensurate or higher levels of impairment. Finally, ineffective approaches such as grade retention and school expulsion (Lamote, Pinxten, Van Den Noortgate, & Van Damme, 2014) are used regularly for students with ADHD, as approximately a quarter of students with ADHD had repeated a grade and nearly one out of six students has ever been expelled. Children with ADHD may benefit from initiatives to proactively identify students with this disorder and directly target their specific impairments with evidence-based intervention approaches. Furthermore, families of secondary school students and youth from non–English-speaking and/or low SES backgrounds may benefit when bilingual mental health professionals work to increase awareness of and access to effective school supports and interventions.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1.

Characteristics of Children With Current ADHD, NS-DATA, 2014.

Characteristics	Unweighted *n*	Weighted % (95% CI[a])
Sex		
Male	1,762	70.3 [67.1, 73.4]
Female	733	29.7 [26.6, 32.9]
Age group		
4-11 years	768	34.0 [30.7, 37.4]
12-17 years	1,727	66.0 [62.6, 69.3]
Race		
White	1,940	71.7 [68.3, 74.9]
Black	232	16.2 [13.6, 19.1]
Multiracial/Other	312	12.1 [9.9, 14.7]
Ethnicity		
Non-Hispanic/Latino	2,276	84.8 [81.7, 87.4]
Hispanic/Latino	213	15.2 [12.6, 18.3]
Primary language in the home[b]		
English	2,462	96.7 [94.7, 97.9]
Any other language	32	3.3 [2.1, 5.3]
Poverty status		
< 100% of federal poverty level	350	28.0 [24.6, 31.7]
100%-199% of federal poverty level	460	22.3 [19.4, 25.5]
≥200% of federal poverty level	1,559	49.7 [46.1, 53.2]
Highest education in family[b]		
Less than high school	109	9.1 [7.1, 11.7]
12 years, high school graduate	402	25.4 [22.3, 28.8]
More than high school	1,980	65.4 [61.8, 68.9]
Any health care coverage		
Public insurance	953	49.7 [46.2, 53.2]
Private insurance	1,467	48.6 [45.2, 52.1]
No insurance	37	1.6 [0.9, 2.9]
Continuous insurance over past year		
Yes	2,316	93.6 [91.5, 95.3]
No	117	6.4 [4.7, 8.6]
Region[b]		
Northeast	422	15.3 [13.5, 17.3]
Midwest	592	22.5 [20.5, 24.7]
South	990	44.0 [41.5, 46.6]
West	491	18.2 [16.3, 20.2]
Current ADHD severity		
Mild	814	30.3 [27.3, 33.5]

Characteristics	Unweighted *n*	Weighted % (95% CI[a])
Moderate	1,247	49.9 [46.4, 53.4]
Severe	416	19.9 [17.1, 23.0]
Current ADHD symptom presentation		
Combined	580	27.7 [24.6, 31.1]
Inattentive	782	30.9 [27.8, 34.2]
Hyperactive/impulsive	113	4.8 [3.6, 6.6]
Subthreshold	1,020	36.5 [33.2, 39.9]
Age at diagnosis		
Diagnosed before age 6 years	719	32.2 [29.0, 35.6]
Diagnosed at age 6-10 years	1,535	59.6 [56.1, 63.0]
Diagnosed at or after age 11 years	208	8.2 [6.6, 10.3]
Person first concerned with behavior/attention/performance		
Family member	1,613	65.9 [62.5, 69.1]
School/daycare staff member	739	28.6 [25.5, 31.8]
Doctor or other health care professional	49	2.0 [1.3, 3.0]
Someone else	79	3.6 [2.5, 5.3]
Before diagnosis, concern with behavior at home		
Yes	1,602	66.5 [63.1, 69.7]
No	878	33.5 [30.3, 36.9]
Before diagnosis, concern with behavior at school/daycare		
Yes	2,028	81.9 [79.0, 84.4]
No	457	18.2 [15.6, 21.0]
Before diagnosis, concern with school performance		
Yes	1,812	75.9 [72.9, 78.7]
No	671	24.1 [21.3, 27.1]
Before diagnosis, concern with peer relationships		
Yes	1,414	58.7 [55.2, 62.1]
No	1,076	41.3 [38.0, 44.8]
Current externalizing condition		
Yes	369	18.7 [15.9, 21.8]
No	2,078	81.3 [78.2, 84.1]
Current internalizing condition		
Yes	792	32.8 [29.5, 36.1]
No	1,703	67.3 [63.9, 70.5]
Current learning or cognitive disorder		
Yes	828	37.5 [34.1, 41.0]
No	1,620	62.5 [59.0, 65.9]
Current autism spectrum disorder or pervasive developmental disorder		
Yes	352	13.0 [10.8, 15.5]
No	2,112	87.1 [84.5, 89.2]
ADHD-related impairment		
Academic and social impairment	922	36.8 [33.5, 40.3]

Characteristics	Unweighted *n*	Weighted % (95% CI[a])
Academic impairment only	1,019	44.1 [40.7, 47.7]
Social impairment only	133	5.3 [4.0, 7.1]
Neither academic nor social impairment	372	13.7 [11.5, 16.3]

Note. NS-DATA = National Survey of the Diagnosis and Treatment of ADHD and Tourette Syndrome; NSCH = National Survey of Children's Health.

[a]CI = confidence interval.

[b]Indicator collected during 2011-2012 NSCH interview.

Table 2.

Parent-Reported Receipt of School Services by Children Aged 4 to 17 Years With Current ADHD, by Demographic Subgroups and ADHD Characteristics, NS-DATA 2014.

	School-based educational support	School-based educational support	Classroom management	Classroom management	IEP	504 plan	Any school services
	Ever	Current	Ever	Current	Current	Current	Current
	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)
Overall	80.2 [77.3, 82.8]	62.3 [58.9, 65.6]	59.9 [56.4, 63.2]	32.0 [28.7, 35.4]	42.9 [39.4, 46.4]	13.6 [11.4, 16.2]	69.3 [66.0, 72.4]
Sex							
Male	81.1 [77.7, 84.1]	62.9 [58.8, 66.8]	**63.2 [59.1, 67.2]**	33.9 [30.0, 38.1]	44.8 [40.7, 49.1]	13.2 [10.6, 16.3]	69.8 [65.8, 73.4]
Female	78.0 [72.1, 82.9]	60.9 [54.5, 66.9]	**51.9 [45.5, 58.2]**	27.3 [21.9, 33.4]	38.0 [32.2, 44.2]	14.7 [10.9, 19.5]	68.2 [61.9, 73.9]
Age group							
4-11 years	78.9 [73.6, 83.4]	**66.9 [61.1, 72.3]**	**70.8 [65.2, 75.9]**	**48.4 [42.3, 54.6]**	**48.2 [42.1, 54.3]**	12.6 [9.1, 17.1]	**75.7 [70.3, 80.4]**
12-17 years	80.8 [77.2, 84.0]	**59.9 [55.6, 64.0]**	**54.3 [50.0, 58.5]**	**23.6 [20.2, 27.5]**	**40.1 [36.0, 44.4]**	14.2 [11.5, 17.4]	**66.0 [61.8, 70.0]**
Race							
White	78.9 [75.5, 82.0]	60.8 [56.9, 64.5]	57.5 [53.5, 61.4]	31.4 [27.7, 35.4]	43.6 [39.7, 47.6]	14.0 [11.5, 17.0]	68.2 [64.4, 71.8]
Black	83.0 [74.3, 89.2]	66.1 [56.3, 74.8]	67.3 [57.7, 75.7]	36.0 [27.3, 45.8]	42.7 [33.4, 52.6]	12.7 [7.4, 20.9]	72.7 [63.0, 80.7]
Multiracial/Other	83.7 [74.2, 90.1]	65.3 [54.6, 74.6]	64.1 [53.6, 73.4]	30.6 [22.0, 40.7]	39.2 [29.7, 49.5]	12.9 [7.3, 21.7]	70.2 [59.4, 79.1]
Ethnicity							
Non-Hispanic/Latino	79.4 [76.3, 82.2]	62.2 [58.6, 65.7]	60.3 [56.7, 63.8]	31.6 [28.2, 35.2]	43.5 [39.9, 47.2]	13.9 [11.5, 16.6]	69.4 [66.0, 72.7]
Hispanic/Latino	83.8 [74.1, 90.4]	61.4 [50.8, 71.0]	56.1 [45.5, 66.1]	34.0 [24.8, 44.7]	38.3 [28.6, 49.0]	12.4 [7.2, 20.5]	67.4 [56.8, 76.5]
Primary language in the home[a]							
English	80.1 [77.2, 82.8]	61.8 [58.4, 65.1]	60.0 [56.5, 63.3]	32.1 [28.8, 35.6]	43.3 [39.8, 46.8]	**14.0 [11.8, 16.6]**	69.0 [65.7, 72.2]
Any other language	82.5 [57.2, 94.3]	75.4 [52.2, 89.6]	57.6 [34.0, 78.1]	28.5[b] [11.4, 55.5]	28.3[b] [11.0, 55.8]	**0.33[c] [0.04, 2.43]**	76.9 [53.4, 90.6]
Poverty status							
<100% of FPL	79.2 [71.9, 85.1]	62.3 [54.4, 69.7]	**66.4 [58.6, 73.4]**	35.3 [28.1, 43.2]	45.9 [38.1, 53.8]	**9.3 [5.7, 15.0]**	71.6 [63.9, 78.3]
100%-199% of FPL	81.3 [74.6, 86.6]	63.2 [55.5, 70.3]	**62.7 [54.9, 69.9]**	35.7 [28.6, 43.6]	44.9 [37.4, 52.8]	**11.2 [7.2, 17.0]**	70.9 [63.4, 77.5]
≥200% of FPL	79.4 [75.6, 82.7]	60.5 [56.1, 64.8]	**53.6 [49.0, 58.1]**	27.6 [23.6, 32.0]	39.1 [34.8, 43.6]	**17.3 [14.0, 21.1]**	66.5 [62.1, 70.6]
Highest education in family[a]							
Less than high school	76.6 [62.6, 86.4]	65.4 [51.5, 77.1]	56.0 [42.4, 68.8]	28.2 [17.8, 41.6]	45.3 [32.1, 59.2]	**5.6[b] [1.7, 17.2]**	68.4 [54.4, 79.7]

	School-based educational support	School-based educational support	Classroom management	Classroom management	IEP	504 plan	Any school services
	Ever	Current	Ever	Current	Current	Current	Current
	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)
12 years, high school graduate	84.6 [78.4, 89.2]	63.2 [55.4, 70.3]	61.2 [53.5, 68.3]	34.8 [27.8, 42.5]	46.5 [38.8, 54.4]	**10.6 [6.6, 16.6]**	74.2 [66.7, 80.4]
More than high school	79.0 [75.6, 82.1]	61.5 [57.6, 65.2]	59.9 [56.0, 63.7]	31.4 [27.7, 35.4]	41.1 [37.3, 45.1]	**15.9 [13.2, 19.0]**	67.6 [63.8, 71.1]
Any health care coverage							
Public Insurance	82.0 [77.4, 85.8]	65.1 [59.8, 70.0]	**66.1 [60.8, 71.0]**	**37.5 [32.4, 42.9]**	**49.5 [44.1, 54.9]**	**10.0 [7.3, 13.5]**	**74.5 [69.5, 79.0]**
Private Insurance	79.4 [75.6, 82.8]	60.8 [56.4, 65.1]	**53.4 [48.8, 58.0]**	**26.8 [22.8, 31.3]**	**37.2 [32.9, 41.7]**	**17.8 [14.5, 21.7]**	**65.2 [60.7, 69.4]**
No Insurance	61.2 [31.3, 84.5]	34.2[b] [16.0, 58.7]	**56.0 [28.1, 80.6]**	**12.7[b] [4.8, 29.7]**	**27.1[b] [11.6, 51.3]**	**5.1[c] [1.2, 19.1]**	**41.2[b] [19.9, 66.4]**
Continuous insurance over past year							
Yes	80.5 [77.5, 83.2]	63.1 [59.5, 66.4]	59.7 [56.1, 63.2]	32.0 [28.6, 35.6]	43.6 [40.0, 47.3]	14.3 [12.0, 17.1]	70.4 [67.0, 73.5]
No	79.1 [63.5, 89.2]	56.7 [41.1, 71.1]	58.2 [42.5, 72.4]	34.9 [22.1, 50.4]	36.7 [23.4, 52.4]	7.7[b] [3.0, 18.1]	60.3 [44.3, 74.4]
Region[a]							
Northeast	83.3 [74.6, 89.4]	68.6 [59.7, 76.3]	57.5 [48.4, 66.2]	32.5 [24.5, 41.7]	46.7 [38.0, 55.6]	14.4 [9.8, 20.5]	74.5 [65.7, 81.7]
Midwest	79.8 [74.2, 84.5]	64.2 [57.6, 70.3]	61.3 [54.6, 67.6]	36.0 [29.4, 43.1]	48.1 [41.3, 55.0]	9.2 [6.0, 13.8]	71.1 [64.9, 76.7]
South	78.7 [74.0, 82.8]	62.3 [56.9, 67.3]	61.4 [56.0, 66.4]	32.6 [27.5, 38.1]	40.6 [35.3, 46.2]	15.6 [12.0, 20.1]	69.3 [64.0, 74.1]
West	81.6 [74.5, 87.1]	54.6 [46.6, 62.3]	56.5 [48.2, 64.5]	25.0 [18.9, 32.3]	38.3 [31.0, 46.2]	13.9 [9.3, 20.3]	62.6 [54.5, 70.0]
Current ADHD severity							
Mild	**76.7 [71.1, 81.5]**	**53.3 [47.3, 59.3]**	**49.6 [43.5, 55.7]**	**20.4 [15.8, 25.8]**	**33.1 [27.6, 39.0]**	12.5 [8.8, 17.3]	**58.0 [51.9, 63.9]**
Moderate	**79.6 [75.5, 83.2]**	**63.0 [58.2, 67.6]**	**59.8 [54.8, 64.5]**	**34.5 [29.8, 39.5]**	**44.6 [39.7, 49.6]**	13.3 [10.3, 16.9]	**71.2 [66.6, 75.4]**
Severe	**87.6 [80.3, 92.4]**	**74.3 [65.9, 81.3]**	**76.3 [68.4, 82.8]**	**44.1 [35.9, 52.6]**	**53.4 [44.9, 61.7]**	16.6 [11.5, 23.3]	**82.0 [73.7, 88.1]**
Current ADHD symptom presentation							
Combined	83.4 [77.6, 87.9]	**69.6 [62.9, 75.6]**	**74.5 [68.2, 80.0]**	**46.9 [40.0, 54.0]**	**51.5 [44.6, 58.4]**	12.9 [9.1, 18.0]	**76.8 [70.3, 82.2]**
Inattentive	81.2 [75.7, 85.7]	**63.4 [57.1, 69.2]**	**55.7 [49.5, 61.7]**	**26.3 [21.1, 32.2]**	**39.9 [33.9, 46.2]**	17.3 [13.2, 22.3]	**69.9 [63.8, 75.4]**
Hyperactive/ impulsive	64.5 [47.2, 78.7]	**47.0 [32.0, 62.6]**	**72.2 [56.0, 84.2]**	**30.9 [18.4, 46.9]**	**29.9 [18.2, 45.0]**	8.8[b] [3.4, 20.9]	**57.2 [40.6, 72.2]**
Subthreshold	79.0 [74.3, 83.1]	**57.8 [52.2, 63.1]**	**50.7 [45.1, 56.3]**	**25.9 [21.1, 31.4]**	**40.3 [34.9, 46.0]**	11.7 [8.4, 16.1]	**64.7 [59.2, 69.8]**
Age at diagnosis							
Diagnosed before 6 years	82.6 [77.1, 87.1]	**69.2 [63.0, 74.7]**	**75.5 [69.8, 80.4]**	**45.0 [38.7, 51.5]**	**55.4 [48.9, 61.7]**	13.1 [9.4, 18.0]	**77.7 [71.9, 82.7]**

	School-based educational support	School-based educational support	Classroom management	Classroom management	IEP	504 plan	Any school services
	Ever	Current	Ever	Current	Current	Current	Current
	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)
Diagnosed at 6-10 years	79.9 [76.1, 83.2]	**60.2 [55.7, 64.5]**	**54.1 [49.6, 58.6]**	**27.5 [23.5, 31.8]**	**39.2 [34.9, 43.7]**	14.6 [11.7, 18.0]	**66.8 [62.4, 70.9]**
Diagnosed at or after 11 years	72.8 [61.8, 82.6]	**51.4 [39.7, 62.9]**	**39.8 [28.8, 52.1]**	**14.6 [7.4, 26.6]**	**21.4 [13.3, 32.7]**	9.9 [5.6, 16.8]	**55.0 [43.2, 66.3]**
Person first concerned with behavior/attention/performance							
Family member	78.8 [75.1, 82.1]	61.5 [57.3, 65.6]	**61.3 [57.1, 65.4]**	33.8 [29.7, 38.2]	43.4 [39.2, 47.7]	12.9 [10.4, 16.0]	68.9 [64.7, 72.7]
School/daycare staff member	82.6 [77.2, 87.0]	60.8 [54.2, 67.0]	**53.6 [47.1, 60.0]**	27.4 [22.0, 33.6]	38.8 [32.7, 45.2]	15.7 [11.4, 21.2]	68.1 [61.7, 73.9]
Doctor or other health care professional	89.0 [70.3, 96.5]	72.4 [50.8, 86.9]	**74.7 [54.5, 87.9]**	25.5 [12.0, 46.1]	50.8 [30.4, 70.9]	6.0[b] [2.3, 14.7]	72.8 [51.1, 87.3]
Someone else	79.5 [58.6, 91.4]	77.7 [57.4, 90.0]	**73.3 [53.9, 86.6]**	34.5 [19.7, 53.0]	57.5 [38.0, 74.9]	11.2[b] [4.1, 27.1]	80.6 [59.6, 92.1]
Before diagnosis, concern with behavior at home							
Yes	78.7 [75.0, 82.0]	62.8 [58.6, 66.9]	**64.0 [59.8, 67.9]**	**36.1 [32.0, 40.5]**	43.6 [39.3, 48.0]	13.2 [10.7, 16.2]	70.3 [66.1, 74.1]
No	83.0 [78.1, 86.9]	60.9 [55.0, 66.6]	**51.8 [45.8, 57.7]**	**23.9 [19.1, 29.4]**	41.1 [35.3, 47.1]	14.6 [10.7, 19.7]	67.2 [61.4, 72.6]
Before diagnosis, concern with behavior at school/daycare							
Yes	80.2 [77.0, 83.1]	63.4 [59.7, 67.0]	**64.0 [60.2, 67.6]**	**34.5 [30.9, 38.4]**	**45.1 [41.3, 49.0]**	13.3 [10.9, 16.2]	70.8 [67.2, 74.1]
No	80.2 [72.6, 86.1]	57.1 [48.9, 64.8]	**41.2 [33.5, 49.4]**	**20.7 [14.9, 28.0]**	**32.2 [25.3, 40.0]**	15.1 [10.3, 21.5]	62.6 [54.3, 70.3]
Before diagnosis, concern with school performance							
Yes	81.3 [77.9, 84.2]	63.1 [59.1, 66.9]	60.0 [56.0, 63.8]	31.8 [28.0, 35.7]	42.6 [38.7, 46.7]	14.2 [11.6, 17.2]	69.8 [66.0, 73.4]
No	77.2 [71.0, 82.4]	59.7 [52.9, 66.1]	59.5 [52.5, 66.1]	32.7 [26.3, 39.8]	42.6 [35.9, 49.6]	12.3 [8.7, 17.1]	67.0 [60.2, 73.1]
Before diagnosis, concern with peer relationships							
Yes	81.7 [77.9, 85.0]	**66.4 [62.0, 70.6]**	**69.3 [64.9, 73.3]**	**39.4 [34.9, 44.1]**	**49.8 [45.2, 54.5]**	12.4 [9.7, 15.7]	**73.6 [69.4, 77.5]**
No	78.0 [73.3, 82.1]	**56.3 [51.0, 61.5]**	**46.5 [41.2, 51.9]**	**21.4 [17.2, 26.2]**	**32.9 [28.1, 38.0]**	15.4 [12.0, 19.6]	**63.1 [57.8, 68.1]**
Current externalizing condition							
Yes	83.9 [76.4, 89.4]	**72.4 [64.0, 79.4]**	**73.5 [64.7, 80.8]**	**49.4 [40.6, 58.3]**	**52.5 [43.7, 61.3]**	10.0 [6.1, 16.2]	**82.4 [75.0, 88.0]**
No	79.1 [75.8, 82.1]	**60.0 [56.1, 63.7]**	**56.1 [52.3, 59.9]**	**27.7 [24.4, 31.4]**	**40.4 [36.7, 44.2]**	14.7 [12.1, 17.6]	**66.4 [62.6, 69.9]**
Current internalizing condition							
Yes	**85.9 [80.8, 89.8]**	**71.9 [66.0, 77.2]**	**72.4 [66.6, 77.6]**	**45.1 [38.9, 51.5]**	**55.1 [48.7, 61.3]**	11.6 [8.5, 15.6]	**79.1 [73.5, 83.9]**
No	**77.4 [73.8, 80.7]**	**57.6 [53.4, 61.7]**	**53.8 [49.6, 57.9]**	**25.7 [22.1, 29.6]**	**36.9 [32.9, 41.0]**	14.6 [11.8, 17.9]	**64.5 [60.4, 68.4]**
Current learning or cognitive disorder							

	School-based educational support	School-based educational support	Classroom management	Classroom management	IEP	504 plan	Any school services
	Ever	Current	Ever	Current	Current	Current	Current
	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)
Yes	**96.1 [93.3, 97.7]**	**86.6 [82.0, 90.1]**	**73.2 [67.9, 78.0]**	**48.6 [42.7, 54.5]**	**69.7 [63.9, 75.0]**	11.2 [8.0, 15.5]	**92.7 [89.1, 95.2]**
No	**70.4 [66.2, 74.3]**	**47.8 [43.4, 52.2]**	**51.9 [47.4, 56.2]**	**22.1 [18.5, 26.1]**	**26.8 [23.0, 30.9]**	15.0 [12.2, 18.4]	**55.0 [50.6, 59.3]**
Current autism spectrum disorder or pervasive developmental disorder							
Yes	**96.3 [89.1, 98.8]**	**92.5 [86.7, 95.9]**	**86.2 [78.3, 91.5]**	**60.2 [50.5, 69.2]**	**81.3 [73.0, 87.5]**	11.7 [6.8, 19.2]	**96.7 [94.4, 98.1]**
No	**77.6 [74.4, 80.6]**	**57.4 [53.7, 61.0]**	**55.6 [51.8, 59.3]**	**27.4 [24.1, 31.0]**	**36.6 [33.0, 40.3]**	14.0 [11.6, 16.8]	**64.9 [61.2, 68.4]**
Impairment type							
Academic and social impairment	**90.0 [86.3, 92.8]**	**75.1 [69.7, 79.7]**	**73.1 [67.6, 77.9]**	**43.9 [38.1, 49.9]**	**56.6 [50.7, 62.3]**	**17.0 [12.9, 22.0]**	**82.8 [77.9, 86.7]**
Academic impairment only	**81.6 [77.0, 85.5]**	**62.7 [57.4, 67.8]**	**56.2 [50.8, 61.4]**	**28.6 [23.9, 33.9]**	**38.6 [33.5, 43.9]**	**12.2 [9.4, 15.8]**	**67.8 [62.5, 72.6]**
Social impairment only	**61.6 [46.8, 74.5]**	**43.1 [29.5, 57.8]**	**51.0 [36.5, 65.3]**	**27.9 [16.8, 42.7]**	**47.9 [33.4, 62.7]**	**6.1**[b] **[3.1, 12.0]**	**56.5 [41.5, 70.4]**
No impairment	**58.7 [49.2, 67.5]**	**35.8 [27.4, 45.2]**	**39.3 [30.6, 48.8]**	**11.7 [6.9, 19.4]**	**18.6 [12.2, 27.4]**	**12.3 [7.3, 20.1]**	**43.9 [34.8, 53.3]**

Note. Estimates in bold indicate a chi-square test p value < .05. Figures in bold indicate statistically significant CIs. NS-DATA = National Survey of the Diagnosis and Treatment of ADHD and Tourette Syndrome; IEP = individualized education program; CI = confidence intervals; FPL = federal poverty level; NSCH = National Survey of Children's Health.

[a] Indicator collected during 2011-2012 NSCH interview.

[b] Estimate is unstable and may be unreliable. It has a relative *SE* between 30% and 50% and should be interpreted with caution.

[c] Estimate is unreliable. It has a relative *SE* larger than 50% and should not be used except for inferential statistics (e.g., comparisons with other estimates).

Table 3.

ORs Derived From Final Multivariable Logistic Regression Models Predicting Receipt of School Services, NS-DATA 2014.

	School-based educational support	School-based educational support	Classroom management	Classroom management	IEP	504 plan	Any school services
	Ever	Current	Ever	Current	Current	Current	Current
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Sex							
Male			1.61 [1.14, 2.28]		NS		
Female			Ref.				
Age group							
4-11 years		1.48 [1.03, 2.11]	1.78 [1.24, 2.54]	3.63 [2.52, 5.22]	NS		1.74 [1.18, 2.56]
12-17 years		Ref.	Ref.	Ref.			Ref.
Race							
White			NS				
Black							
Multiracial/Other							
Ethnicity							
Non-Hispanic/Latino							
Hispanic/Latino							
Primary language in the home[a]							
English						39.77 [5.04, 313.65]	
Any other language						Ref.	
Poverty status							
>100% of FPL			NS			NS	
100%-199% of FPL							
≥200% of FPL							
Highest education in family[a]							
Less than high school						NS	
12 years, high school graduate							
More than high school							
Any health care coverage							

	School-based educational support	School-based educational support	Classroom management	Classroom management	IEP	504 plan	Any school services
	Ever	Current	Ever	Current	Current	Current	Current
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Public insurance			NS	NS	NS	0.51 [0.33, 0.78]	NS
Private insurance						Ref.	
No insurance						0.27 [0.06, 1.15]	
Continuous insurance over past year							
Yes						NS	
No							
Region[a]							
Northeast							
Midwest							
South							
West							
Current ADHD severity							
Mild	NS	NS	NS	Ref.	Ref.		Ref.
Moderate				1.77 [1.19, 2.63]	1.66 [1.13, 2.46]		1.56 [1.10, 2.21]
Severe				1.59 [0.94, 2.69]	1.36 [0.76, 2.44]		1.89 [0.99, 3.64]
Current ADHD symptom presentation							
Combined		NS	1.52 [0.97, 2.39]	NS	0.74 [0.45, 1.22]		NS
Inattentive			0.90 [0.62, 1.33]		0.59 [0.39, 0.90]		
Hyperactive/impulsive			2.58 [1.17, 5.69]		0.47 [0.21, 1.03]		
Subthreshold			Ref.		Ref.		
Age at diagnosis							
Diagnosed before age 6 years		NS	NS	NS	2.98 [1.46, 6.07]		NS
Diagnosed at age 6-10 years					2.58 [1.34, 4.94]		
Diagnosed at or after age 11 years					Ref.		
Person first concerned with behavior/attention/performance							
Family member			NS				
School/daycare staff member							

	School-based educational support	School-based educational support	Classroom management	Classroom management	IEP	504 plan	Any school services
	Ever	Current	Ever	Current	Current	Current	Current
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Doctor or other health care professional							
Someone else							
Before diagnosis, concern with behavior at home							
Yes			NS	NS			
No							
Before diagnosis, concern with behavior at school/daycare							
Yes			1.89 [1.23, 2.90]	NS	NS		
No			Ref.				
Before diagnosis, concern with school performance							
Yes							
No							
Before diagnosis, concern with peer relationships							
Yes		NS	1.47 [1.05, 2.07]	NS	NS		NS
No			Ref.				
Current externalizing condition							
Yes		NS	NS	NS	NS		NS
No							
Current internalizing condition							
Yes	NS	NS	1.62 [1.12, 2.34]	1.81 [1.22, 2.67]	NS		NS
No			Ref.	Ref.			
Current learning or cognitive disorder							
Yes	7.68 [4.07, 14.47]	5.50 [3.66, 8.28]	1.90 [1.34, 2.69]	2.73 [1.89, 3.95]	5.43 [3.76, 7.82]		8.26 [4.95, 13.80]
No	Ref.	Ref.	Ref.	Ref.	Ref.		Ref.
Current autism spectrum disorder or pervasive developmental disorder							
Yes	3.74 [1.09, 12.83]	5.28 [2.57, 10.83]	2.23 [1.22, 4.11]	2.04 [1.23, 3.39]	4.48 [2.35, 8.54]		7.75 [4.06, 14.77]
No	Ref.	Ref.	Ref.	Ref.	Ref.		Ref.
Impairment type							
Academic and social impairment	3.74 [2.13, 6.56]	3.21 [1.90, 5.43]	2.29 [1.40, 3.74]	3.56 [1.81, 6.99]	3.06 [1.64, 5.71]	3.48 [1.57, 7.70]	3.25 [1.95, 5.40]

	School-based educational support	School-based educational support	Classroom management	Classroom management	IEP	504 plan	Any school services
	Ever	Current	Ever	Current	Current	Current	Current
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Academic impairment only	2.45 [1.48, 4.07]	2.45 [1.52, 3.95]	1.80 [1.13, 2.87]	2.63 [1.36, 5.08]	1.97 [1.12, 3.45]	2.20 [1.00, 4.83]	2.05 [1.33, 3.15]
Social impairment only	1.01 [0.48, 2.15]	1.15 [0.51, 2.60]	1.01 [0.47, 2.20]	2.13 [0.85, 5.32]	4.40 [1.95, 9.93]	Ref.	1.33 [0.66, 2.68]
No impairment	Ref.	Ref.	Ref.	Ref.	Ref.	2.19 [0.86, 5.58]	Ref.

Note. Estimates in bold indicate a chi-square test *p* value < .05. NS indicates variable that was not significant in multivariable logistic model and reduced from final model; empty cells indicate variables not significant in bivariate comparisons. NS-DATA = National Survey of the Diagnosis and Treatment of ADHD and Tourette Syndrome; IEP = individualized education program; OR = odds ratio; CI = confidence interval; FPL = federal poverty level; NSCH = National Survey of Children's Health.

[a]Indicator collected during 2011-2012 NSCH interview.