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Prevalence and Characteristics of School Services for High School Students with Attention-Deficit/Hyperactivity Disorder

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Abstract

This study examines the prevalence and characteristics of services reported by school staff for 543 high school students participating in the 8 year follow-up of the multi-site Multimodal Treatment study of ADHD (MTA). Overall, 51.6% of students with a history of attention-deficit/hyperactivity disorder (ADHD) were receiving services through an Individualized Educational Plan (IEP) or a 504 plan, a rate higher than expected for this age group. Less than 5% of these had 504 plans; 35.5% attended special education classes. Very few services (except tutoring) were provided outside of an IEP or 504 plan. Almost all students with services received some type of academic intervention, whereas only half received any behavioral support or learning strategy. Less than one-fourth of interventions appear to be evidence-based. Students receiving services showed greater academic and behavioral needs than those not receiving services. Services varied based upon type of school, with the greatest number of interventions provided to students attending schools that only serve those with disabilities. Original MTA treatment randomization was unrelated to services, but cumulative stimulant medication and greater severity predicted more service receipt. Results highlight a need for accommodations with greater evidence of efficacy and for increased services for students who develop academic difficulties in high school.

Keywords

ADHD; high school; School Services; IEP; special education; 504 plan; MTA

Attention-Deficit/Hyperactivity Disorder (ADHD) has a significant negative impact on children's educational functioning and academic performance. Students with ADHD typically experience difficulties completing work and perform at levels below their ability in the classroom. They score 10-30 points lower than students without ADHD on various achievement tests, despite having generally average intelligence (see Barkley, Fischer, Smallish & Fletcher, 2006 for a review). In addition, prior work across a range of ages estimates that approximately 30% of children with ADHD repeat a grade, as many as 56% receive tutoring, and 46% may be suspended (Barkley et al., 2006; DuPaul & Stoner, 2003). High school students with ADHD appear to experience even greater academic impairment, with lower grade point averages, placement in lower level classes (e.g., remedial vs. honors) and failure in more courses compared to students without ADHD (Kent et al., 2011). High schoolers with ADHD are also significantly more likely to be absent or tardy and are eight times more likely to drop out (Kent et al., 2011). Given that 9.3% of high school-aged children are reported by their parents to be currently diagnosed with ADHD (Akinbami, Liu, Pastor & Reuben, 2011), the need for educational interventions for this population is clear.

Despite their academic impairment, there is indication that 15-17 year olds with ADHD receive fewer school-based services than those who are 11-12 years (Leslie, Lambros, Aarons, Haine, & Hough, 2008), a pattern that is also demonstrated among students with a range of educational disabilities (Office of Special Education Programs, 2004). Unfortunately, little data exist regarding the services provided to high school students with ADHD beyond rates of special education. Although such information is important, it is even more critical to examine the characteristics of accommodations and support services that are provided and to evaluate this in relation to students' educational impairment, information that does not currently exist for a representative sample of diagnosed youth. Evaluating indicators of academic need such as current and persistent underachievement and comparing students with and without services on a range of educational functioning measures can help identify students who are struggling without services, or "falling through the cracks" of the educational service system.

Examining school services in detail for this age group is particularly important given the paucity of evidence-based interventions for ADHD in high school (Schultz, Storer, Watabe, Sadler, & Evans, 2011). Some evidence supports use of academic interventions including instructional and task modifications, self-monitoring and reinforcement, strategy training, and homework interventions with parent involvement (Raggi & Chronis, 2006). Behavior modification and organizational skills training also have some support for improving academic performance when delivered as part of specific programs such as the Challenging Horizons Program (Evans, Schultz, DeMars, & Davis, 2011). However, common accommodations such as extended time for taking tests has little evidence for benefitting students with ADHD any more than students without ADHD (Lewandowski, Lowett, Parolin, Gordon & Coddling, 2007). This relatively weak evidence-base for high school ADHD services raises questions about what schools are actually doing for students, particularly given federal mandates to provide interventions shown to be effective (Turnbull, 2005). Such data could inform school policy in this area.

Within the special education system, over one-third of parents of special education students report in national surveys that their child has been diagnosed with ADHD and students with ADHD comprise the majority of those in the Other Health Impairment and Emotional Disturbance categories (Schnoes, Reid, Wagner, & Marder, 2006; Wagner, Marder, & Cardoso, 2004). Another set of studies of well-diagnosed clinical samples using a variety of methodological approaches estimate that one-fourth to one-half of students meeting criteria for ADHD or who are identified as ADHD from school records receive special education services (Bussing et al., 2005; Bussing et al., 2012; Jensen et al., 1999; Reid, Maag, Vasa, & Wright, 1994). These data are based primarily on younger students, however, and there is reason to believe that service rates for high school students with ADHD may be lower (Leslie et al., 2008), perhaps because students are exited from services over time. Importantly, previous work has been based upon parent report and has not included data collected directly from schools, which could capture information unknown to parents and reflect service rates that are potentially higher. Thus, existing data are limited for this important and potentially underserved population.

One of the challenges of research in this area that may contribute to variable service rates is that ADHD is not considered a specific educational disability category under the Individuals with Disabilities Education Act (IDEA). Although federal law clarified in 1999 that ADHD can be included under the “Other Health Impairment” (OHI) category when it creates educational impairment, it appears that most students with ADHD are actually served in other disability categories such as “Specific Learning Disability” (SLD) and “Emotional Disturbance” (ED) [US Department of Education, 2008] . Students with ADHD may also be eligible for accommodations through Section 504 of the Rehabilitation Act of 1973 (Section 504) depending on the nature of their impairment at school; however, reliable rates of 504 plans for ADHD have not been documented. This appears to be an important omission in that 504 plans can be provided to students who do not qualify for special education (which has more restrictive qualifications), and may be considered appropriate for providing classroom accommodations for older students. Finally, academic, behavioral, and other mental health supports may be provided outside of any formal intervention plan. Thus, further examination of service characteristics specific to high school students and provided both within and outside of special education and 504 plans appears warranted.

The current study examines a broad, detailed range of school services for high school students participating in the Multimodal Treatment study of ADHD (MTA), the largest and best characterized, nationally representative sample of youth clinically diagnosed with ADHD. Prior work examining service use in this sample based upon parent report when children were in the 4th-6th grades found that 31.2% were participating in special education classes and 49.8% were receiving some type of ancillary school support services (e.g., tutoring, afterschool programs, and 504 plans), rates that were substantially higher than those for a local normative comparison group (Jensen et al., 2004). Other studies examining academic outcomes in the MTA sample have shown small short-term gains in basic reading skills with a combination of stimulant medication and behavioral treatment (MTA Cooperative Group, 1999) and benefit of behavioral treatment (with or without medication) for improving homework problems in elementary school (Langberg et al., 2010). However, by high school when no difference was apparent between randomly assigned treatment groups, the academic performance of students with ADHD was significantly worse than that of the comparison group with regard to reading and math achievement, grade point average, teacher ratings of academic performance, and grade retention (Molina et al., 2009). This suggests need for continued school-based interventions, yet services data for high schoolers in this sample have not previously been examined. The present study does so using data collected directly from school staff, complementing prior work based on parent report.

The primary goals of the present study are to: 1) compare school characteristics and rates of services received by students with ADHD vs. comparison students without ADHD and 2) describe school services received by students with ADHD including specific special education, 504 plans, and other accommodations and interventions. Secondly, we will 3) examine services in relation to educational need by comparing students with and without services on a number of school functioning measures and identifying the percentage of students receiving services who evidence current and persistent academic impairment, and 4) examine whether services received in high school are related to school type and treatment history, including parent participation in the MTA behavioral treatments that taught school

advocacy skills. We hypothesize that overall service rates for students with ADHD will be higher than for comparison students, and that special education rates will be lower than reported in this sample at a younger age. Given other MTA findings, we do not expect to see any differences in services related to original MTA treatment assignment. However, we expect that students receiving services will be more likely to take medication as consistent with previous research (Schnoes et al., 2006) and to exhibit greater academic impairment as consistent with Bussing et al. (2012). Finally, we expect that students attending alternative school settings may receive a greater number of services relative to students in traditional public or private schools.

Method

Participants

Participants in the present study were from the longitudinal follow-up of the Multimodal Treatment study of Children with and without ADHD (MTA) across seven sites: Duke Medical Center, UC-Irvine/LA, UC-Berkeley/SF, NYU/Long Island Jewish, Columbia, University of Pittsburgh, and Montreal Children's Hospital. ADHD participants ($N = 579$) received a diagnosis of ADHD, Combined Type at study entry when they were 7.0-9.9 years of age (grades 1-4) using procedures detailed by the MTA Cooperative Group (1999). Children meeting inclusion criteria were randomly assigned to one of four treatment groups: Medication Only (MedMgt), Behavioral Treatment Only (Beh), Combined Treatment (Comb), or Community-treated Comparison (CC); study treatments are described further in Wells et al. (2000), Greenhill et al (1996), and the MTA Cooperative Group (1999). Active treatment continued for 14 months, with follow up assessments conducted 10 months later and at 3 and 6 years after baseline and every two years thereafter (through the 16-year assessment). In addition to the ADHD group, a Local Normative Comparison Group (LNCG) was recruited at the 24-month point from the same schools as the participants with ADHD. LNCG participants were identified from school registries to match the group with ADHD in grade and sex and then randomly chosen from those who volunteered to participate. By high school, students may have attended different schools based on various reasons including student needs, school recommendation, or family preferences.

Overall sample retention rates at the 8 year assessment from which data for the present study were drawn were 75% ($n = 436$) for the ADHD sample and 90% ($n = 261$) for the LNCG sample (Molina et al., 2009). In order to interpret school services data in the context of other important demographic, baseline and functional measures, analyses were conducted only on data from those participants with relevant follow up data at the 8-year assessment ($n = 566$). In addition, data from 22 LNCG participants who met ADHD diagnostic criteria at recruitment and one participant with a history of ADHD who was not yet in high school were excluded, resulting in a total of 543 participants with data analyzed (335 with and 208 without ADHD). These participants were predominantly male and Caucasian, although over one-third were racial or ethnic minority.

Measures

School Services Use Questionnaire (SSUQ)—This measure was completed by school staff with instructions to review information in students' files, including special education records, and to consult with other school personnel as needed. It was adapted from the National Longitudinal Transition Study-2 (NLTS2) Student School Program Questionnaire in consultation with the Office for Special Education Programs (OSEP) at the Department of Education. The NLTS2 is a national survey of secondary school students receiving special education developed for OSEP and field tested with a nationally-representative sample of school staff from almost 500 local education agencies providing information on over 11,000 students (Wagner, Kutash, Duchnowski, & Epstein, 2005). Numerous federal reports of the NLTS2 data have been prepared with funding by the Office of Special Education Programs (e.g., Newman et al., 2011; Wagner, Newman, Cameto, Levine & Garza, 2006).

Topic areas assessed in the measure include an overview of the student's educational program (types of classes taken, test accommodations), career and vocational education (enrollment in a vocational program, accommodations, and specific classes), educational support services (presence of IEP/504 plan, disability categories, accommodations, other support services), adult transition (planning, goals, and supports), and school characteristics (type of school and percent of students receiving free/reduced lunch, graduating with diplomas, and being accepted into college). Although ADHD is not a federal disability category, it was included in the SSUQ disability list to capture school awareness of its contribution to need for services. Compared to the original NLTS2 survey, the measure used included fewer questions regarding school characteristics, student behavior and performance in class (as we used other measures to assess this), and specific instructional materials used and progress monitoring methods.

Academic Performance Indicators—Basic reading and math skills were assessed with the Wechsler Individualized Achievement Test (WIAT; Wechsler, 1992) until age 18 and the Wide Range Achievement Test, Revised (WRAT-R; Jastak & Wilkinson, 1984) after age 18. Both include standardized measures of reading decoding and calculation, with means of 100 and standard deviations of 15. WIAT and WRAT-R scores are highly correlated for both reading (.84) and math (.77) subtests (Kamphaus, 2005).

In addition, the average response for the first 5 academic performance items of the Social Skills Rating System, Teacher Form (Gresham & Elliot, 1989) was calculated. Items are rated on a scale of 1 to 5 and assess the student's overall academic, reading, and math performance as compared to others in their class (1 = "lowest 10%", 2 = "next lowest 20%", 3 = "middle 40%", 4 = "next highest 20%", 5 = "highest 10%") as well as reading and math skills with respect to grade level expectations. These five items demonstrated high internal consistency ($\alpha = .91$ at 8 years). Two teachers (English and Math) provided these ratings which were averaged for analysis. Grade point average was calculated on a 4 point scale based upon data obtained on report cards closest in time to the 8 year assessment (coded with more than 90% inter-rater agreement; Molina et al., 2009). Number of grade retentions

(as reported by parents through the 8 year assessment) and school suspensions (out of school suspensions and total suspensions in and out of school) were also examined.

ADHD and ODD Symptoms—DSM-IV inattentive and hyperactive-impulsive symptoms of ADHD and Oppositional Defiant Disorder (ODD) were reported on the Swanson, Nolan, and Pelham Rating Scale (SNAP-IV; adhd.net). Items are rated on a 4-point scale from 0=*not at all* to 3=*very much*, with subscale scores calculated as item averages. Coefficient alpha for overall parent and teacher measures are high (>.94), factor structure is consistent with DSM constructs, and there is evidence of predictive validity (Bussing et al., 2008).

Medication Usage—Using the SCAP (Services for Children and Adolescents-Parent Interview; Jensen et al., 2004), and consistent with previous MTA reports (Molina et al., 2009), cumulative medication use was calculated as the proportion of days that parents reported children received any prescription medication for ADHD or other psychiatric concerns from baseline to the 8 year follow-up.

Procedure

School services data for the present study were collected during 2004-2006, which is nearest to the MTA 8 year follow up assessment (from which other data were analyzed) for 72% of the sample. Participants and their parents provided written informed assent and permission respectively for the collection of school services information during their follow up clinic visit or over the phone with consents signed and mailed or faxed. This study was approved by Institutional Review Boards at each of the participating institutions. Where required, approval was also obtained from local school districts. SSUQs were sent to the identified staff members at each school by mail, with a stamped, self-addressed envelope in which to return them. The majority of SSUQs collected (73.9%) were completed by a guidance counselor; the remaining 26.1% were completed by general education, special education, and other staff. Most SSUQ respondents provided consultation or “related services” to the students rather than direct instruction. Compensation was provided to staff completing SSUQ forms to encourage completion given the time required.

Results

Data Analysis

Initially we examined data collection rates, participant characteristics, and school characteristics for ADHD and non-ADHD students and calculated differences between groups using Chi-square or t-tests (with Satterwaite method for unequal variance). Comparisons of accommodations and services by school type were conducted using Fisher's exact test and ANOVA, with post-hoc testing using the LSD approach to control for multiple comparisons. Descriptive statistics are then presented for school services and accommodations for students with ADHD. Finally, we evaluated differences between students with ADHD who were and were not receiving school services on a number of indicators of academic and behavioral need, again using t-tests or Chi-square as appropriate.

Data Collected

School services data were collected for 347 (79.6%) participants in the ADHD group and 234 (81%) in the LNCG group ($N = 581$ of 697), reflecting similar data collection rates across groups. Reasons for non-collection of school data were: school unwilling ($n = 46$, 6.6%), school unable, e.g., records unavailable which could be due to the youth having dropped out or graduated or the records being inaccessible ($n = 28$, 4%), youth refused consent ($n = 37$, 5.3%), and other ($n = 5$, .01%). Comparison of participants with and without school services data showed few differences for those in the ADHD group but several differences for the LNCG group. For the ADHD group, those without school services data ($n = 100$) had higher parent/teacher ratings of oppositional behavior than those with services data ($M = .99$ vs. $.81$, $p = .03$). However, no other differences were found for socio-demographic/ adversity variables (e.g., parent education, welfare, ethnicity/race) or on measures of the youths' intellectual, academic, or behavioral functioning (e.g., WISC-III full-scale IQ score, standardized achievement scores, ADHD symptom ratings, grades, or teacher ratings of academic performance on the Social Skills Rating Scale). For the LNCG group, those without data collected ($n = 26$) were less likely to be Caucasian (42% vs. 70%, $p = .005$); their mothers were more likely to have only a high school education (40% vs. 22%, $p = .01$) and to be on welfare (32 vs. 9%, $p < .002$). They also had lower estimated IQ scores ($M = 101.4$ vs. 112.3 , $p = .01$). All other behavioral and academic variables including rates of retention, suspension, and graduation were similar.

Comparison of ADHD vs. non-ADHD Participants

As seen in Table 1, participants without ADHD had significantly older mothers, higher family incomes, and higher IQs at baseline than did those with ADHD. Similar to 8 year follow up findings with a slightly larger sample reported by Molina et al. (2009), students with ADHD were on average functioning significantly worse on all academic and behavioral measures relevant to school functioning, as would be expected. More specifically, they were rated by their teachers as having more symptoms of ADHD and ODD and as more aggressive and less academically successful; their standardized achievement test scores and GPA were lower.

Comparison of School Characteristics for ADHD vs. non-ADHD

There were a few differences in school characteristics for students with and without ADHD. Although the overall proportion of those attending regular vs. specialty schools (e.g., alternative, magnet, schools for disabilities) did not differ between groups, there were differences across specialty school type (Fisher's exact test, $p < .001$): there was more magnet school attendance by those without ADHD and greater attendance at alternative schools and schools for disabilities by those with ADHD. No group differences were found in the average number of students enrolled at the schools attended, the percent of students receiving free or reduced lunch at these schools, or the percent of students accepted into college. Somewhat surprising given this latter finding, school graduation rates were significantly lower at schools attended by those with ADHD compared to schools attended by those without ADHD ($t = 8.56$, $p = .003$), a difference which is likely related to more frequent attendance at certain specialty schools by those with ADHD.

Rates of Services for ADHD vs. non-ADHD

Overall, students with ADHD were more than six times as likely to be reported as receiving some type of formal school services through an IEP or 504 plan compared to students without ADHD, 51.6% versus 8% ($X^2 = 106.05, p < .001$), respectively. More specifically, 47.3% (159/335) of students in the ADHD group had an IEP and 4.2% (14/335) had a 504 plan. Only 7.2% (15/208) of students without ADHD had an IEP; less than 1% (2/208) had a 504 plan. An additional 25 students (7.5%) in the ADHD group were reported to have had an IEP or 504 plan in the past (although entrance and exit dates for these services were not collected on the SSUQ).

Description of Services for Students with ADHD

We first examined disabilities identified on the SSUQ for students with an IEP or 504 plan, including the 12 federal special education disability categories applicable to high school students in addition to three other conditions not considered specific IDEA categories: “ADD/ADHD”, “deafness”, and “mental retardation”. Only five designations were reported for more than 5% of the sample. As can be seen in Figure 1, these include (in order of frequency for the subsample of students receiving services): “learning disability”, “ADD or ADHD”, “emotional disturbance/behavior disorder”, “other health impairment” and “speech or language impairment”. School staff reported the *primary* disability as “learning disability” for 46.4%, as “ADD/ADHD” for 23.5%, and “emotional/ behavior disorder” for 17.6%. Two students were receiving services for autism (ruled out at the time of the entry into the MTA study 8 years prior).

As depicted in Figure 2, the majority of students with ADHD who had an IEP or 504 plan had goals targeting overall academic performance, although more than a third also had primary goals to prepare for post-secondary education, improve specific academic skills, and improve general behavior. Only 35.5% of students with ADHD spent any time in special education classes (or what might be considered a resource room). Among students attending special education classes ($n = 119$), most participated in an academic class such as English or Math (57%) or a class that provides help with homework, tests, and study skills (36%). For students in special education classes, there was a teacher's aide in addition to teacher for 59% and a 1:1 instructional assistant for 8.3%.

Specific IEP or 504 plan accommodations reported for the ADHD group are detailed in Table 2. The most common supports were extended time on tests, progress monitoring, and additional time to complete assignments. Approximately one-quarter or more also received shorter or different assignments, more frequent feedback, instruction in learning strategies/skills, slower-paced instruction, a behavior management program, and use of a calculator when otherwise not allowed. Students without an IEP/504 plan received relatively few accommodations, with extended time and adult tutoring being the most common (but less than 21%).

As is also noted in Table 2, the average number of academic accommodations provided was three, but less than one behavioral support/ strategy and/or learning aid (although far fewer of these were listed as response choices). Almost all the students (93.5%) received at least

one academic intervention, whereas 51.2% received a behavioral/strategy intervention and 48.8% received a learning aid. Almost half of the students (48.8%) received academic interventions alone, 1.8% ($n = 3$) received behavioral/strategy supports alone, and 4.7% received learning aids only; 44.7% received both types. Of the 26 accommodations listed on the SSUQ, only five can be considered supported for students with ADHD by research (Raggi & Chronis, 2006; Evans et al., 2011), three of which are behavioral/strategy-focused and two academic. The average number of evidence-supported interventions for ADHD was 1.18 ($SD = 1.17$), which is 23% of the average total number ($M = 5.09$, $SD = 3.58$).

Information about additional services provided through the school system or contracted through outside agencies was also reported when known by the SSUQ respondent. As can be seen in Figure 3, the most common service endorsed was service coordination/case management, for over half the students for whom data were available. Mental health services, counseling, therapy, or psychiatric care and vocational education were identified for approximately one-third, and other services were relatively infrequent, including having a behavior intervention/ specialist. Of note, school staff reported that medication was administered for only 15.6%, half the rate (32.5%) reported by parents at the 8 year assessment (Molina et al., 2009); this discrepancy probably reflects use of longer-acting medications that do not require administration during the school day.

Educational Services in Relation to Need

As noted, we examined the educational services in relation to need in two ways. First, we compared participants with ADHD who were receiving formal services (IEPs or 504 plans) to those who were not on the following indicators of academic and behavioral functioning at school: SNAP teacher rating scale, WIAT (or WRAT-R) scores, GPA and rates of suspension and retention. As seen in Table 3, significant differences ($p < .05$) were found for 8 of 11 indicators, although only 4 of these reached significance at a more conservative level of $p < .01$. Participants with services had higher teacher ratings of ODD symptoms and lower achievement scores in reading, math, and spelling. There were no significant differences in grade point average or retention (“cumulative times held back”).

We also examined whether students with ADHD and persistent academic impairment were receiving formal school services (e.g., had an IEP or 504 plan). We defined persistent academic impairment as: 1) below average teacher ratings of academic performance (< 2.5 on the SSRS) or 2) standardized achievement test scores at or below 80 in reading or math on the WIAT/WRAT-R, at two or more prior assessments (14 months, 2, 3 or 6 years past study baseline). We also examined the association between current impairment (at the 8 year follow-up) defined with the same score cut-offs, and receipt of an IEP/504 plan. As seen in Table 4, students with current as well as persistent impairment were significantly more likely to have an IEP or 504 plan, although many more were receiving services with persistent impairment than with current impairment only. Thirty-five percent of students with low WIAT/WRAT-R scores at the 8 year assessment and over half of those with below-average academic performance on the SSRS at 8 years were not receiving services; this is about twice as high as the percent of those with persistent academic impairment who were not receiving services (17.39% and 29.63%, respectively). Also of note, more students

with persistent impairment on the WIAT/WRAT-R were receiving services than those considered persistently impaired by teacher ratings on the SSRS, a more behavioral than academic measure.

Educational Services and School Characteristics

Given some of the differences between types of schools attended by students with ADHD ($n = 327$ with available data) compared to those without, we examined services in relation to school type to better understand the role school context may have in the likelihood of students with ADHD receiving services and specific accommodations. There was a significant difference in the rate of IEPs/504's for different types of schools ($\chi^2 = 16.74, p = .005$) as well as rates of special education class attendance ($\chi^2 = 30.52, p < .001$). This pattern was also seen in the total number of accommodations provided as well as in the number of evidence-supported accommodations ($F = 2.45, p = .035$ and $F = 4.13, p = .001$, respectively), with schools serving only students with disabilities having higher rates ($p < .01$) as compared to regular schools, alternative, and schools identified as other types (i.e., vocation-technical, juvenile justice or another type not categorized). Of note, private schools include the majority of schools for students with disabilities (84.6%) as well as "other" schools (66.7%), i.e. vocational-technical, juvenile justice, and other. Figures 4 and 5 present these data graphically.

Exploratory examination of selected student characteristics (academic and behavioral) across different school types also revealed some significant differences for teacher ratings of hyperactivity ($F = 3.25, p < .007$) and math scores ($F = 2.39, p = .038$), but not for reading or teacher ratings of inattention or oppositional behavior. Post-hoc testing using a significance cut-off of $p < .01$ indicated that students with ADHD at schools for disabilities ($n = 11$) have significantly higher levels of hyperactivity by teacher report as compared to students with ADHD at regular and "other" schools.

Educational Services and Treatment History

Finally, we examined the extent to which receipt of formal school services (defined as having an IEP or 504 plan) differed by treatment history including original ADHD treatment assignment group and cumulative years of medication use. No significant differences were found across ADHD treatment assignment groups, although there was a trend for the three study treatment groups (Medication Management, Behavioral, and Combined) to have higher rates of services (54.09%) than the Community Care group (43.04%), $\chi^2 = 2.95, p = .09$. Rates of services across the three ADHD treatment groups were similar (57.30% Combined, 54.67% Medication, and 50.54% Behavioral). In the ADHD group, presence of an IEP or 504 plan was associated with more days of stimulants or other psychotropic medication ($M=1962, SD=1402$) than was absence of formal school services ($M = 1382, SD = 1099.1$), $t = 4.22, p < .0001$.

Discussion

Very few data have been published that characterize the nature and extent of support services provided in schools to adolescents with ADHD. The current study, using data

collected directly from schools, addressed this topic for high school-aged adolescents participating in a large, multi-site longitudinal study of childhood ADHD. Rates of school services were examined for high school students with and without a history of ADHD, including special education as well as other accommodations and school-based mental health related interventions. A major strength of the study was the large, well-validated clinical sample in addition to the availability of a grade and sex-matched comparison sample of non-ADHD students, which assists in interpretation of the clinical significance of the findings. Another strength is that services data were obtained directly from school staff with a measure used in several national studies funded by the Department of Education. This work extends the literature by examining specific types of services provided within and outside of IEPs or 504 plans, and by evaluating the extent to which services were provided to students with current and persistent academic impairment.

Rates of School Services

We found that over half of the students with a history of ADHD had an IEP or 504 plan, a rate that is six times as high as for the comparison sample (8%). Twice as many students were qualified for special education services for a learning disability as for ADHD, consistent with prior research (OSEP, 2004). The rate of special education seen in our sample (47.3%) is at the high end of what has been reported in smaller clinical and community samples with varying age ranges (Bussing, et al., 2005; Bussing, et al., 2012; Jensen et al., 1999; Reid, et al., 1994). Current rates are also higher than we expected given national trends of lower service rates for older students, which may reflect some unique MTA sample characteristics. For example, participating in the MTA study may be associated with increased parental motivation to advocate for school services. In contrast, the number of students with ADHD who had 504 plans was quite low (<5%), which we suspect may be related to the higher than expected rate of special education. It is also possible that rates of 504 plans for students with ADHD were lower when data were collected in 2004-2006 than they would be currently, particularly as the definition of what may qualify for a plan has expanded since that time (American Disabilities Act, 2008). However, there is little other research on 504 plans for high schoolers with ADHD to which we can compare our findings.

The rate of participation in special education classes in our sample (35.5%) was consistent with the rate reported by parents in the MTA study approximately six years prior to the current data collection (31.2%; Jensen et al., 2004). On the one hand, it is discouraging that the number of students needing this level of service did not decrease, suggesting the possibility that services have not been effective. On the other hand, it is possible that some students exited from special education classes while others entered due to increased academic impairment which has been documented in this sample (Langberg et al., 2008). Our rate of special education class attendance is significantly lower than the 75% rate seen in a nationally representative sample of secondary students with disabilities of all types (Office of Special Education Programs, 2004), although this latter sample included many disabilities considered more severe than ADHD.

Characteristics of Educational Services

Consistent with national surveys of students with ADHD enrolled in special education (Office of Special Education Programs, 2004; Schnoes et al., 2006), the primary disability category associated with receipt of an IEP or 504 plan in our sample as reported by school staff, was LD. This likely reflects both the high rates of comorbidity of ADHD and LD (DuPaul & Stoner, 2003) as well as the fact that ADHD is not a specific disability category under IDEA. What is unknown is the extent to which any ADHD-related academic impairment may be addressed when students are qualified under other categories.

Importantly, without any formal plan, very few accommodations were provided. The most common of these – extended time on tests or assignments, more frequent feedback, and adult tutoring – were provided to only 10-20% of students in the ADHD group who did not have an IEP or 504 plan. Most accommodations -- such as extended time, modified assignments, tests or grading standards, and slower-paced instruction as well as supports such as progress monitoring, behavior management programs, study skills or learning strategy instruction, and self-advocacy training -- were provided three to four times as often for students with than without an IEP or 504 plan. It is possible, of course, that students who did not have a formal plan did not need such intervention, but our results suggest that a modest proportion of students with academic impairment do not receive help.

It is also interesting to note that the average number of interventions for students with ADHD and an IEP/504 plan based upon the SSUQ was five. Almost all were receiving at least one academic intervention while only half were receiving any behavioral intervention or learning strategy. Many students received more than one type of intervention. Of concern is that only approximately one-fourth of these interventions have evidence of support for ADHD in the literature. For example, learning strategies or study skills assistance was provided to only 37% and modified assignments to only 25% of those with an IEP or 504 plan. Facilitating post-secondary transition and employment (e.g. teaching work-related, self-advocacy and self-management skills) is also considered effective for high school students with disabilities (National Secondary Transitional Technical Assistance Center, 2010), yet only about one-quarter of the students with ADHD were participating in a vocational rehabilitation program. Although other accommodations and interventions provided could be targeting difficulties beyond ADHD (e.g. a learning disability), the low rates of more broadly effective interventions such these suggest that concern is warranted. The most common supports found in our data - extended time on tests and assignments, progress monitoring, and case management - have no reported evidence of efficacy in improving performance among ADHD students. Moreover, additional test time (a frequent “service” provided to students in our sample) apparently provides no more benefits to students with ADHD than students without ADHD (Lewandowski, et al., 2007), raising questions about whether other techniques might reduce the performance gap better. Another commonly provided service, case management, was reported for over half of the sample, consistent with rates reported for a national sample of high school students with disabilities of any type (Office of Special Education Programs, 2004). However, the extent to which this service results in measurable benefit to students’ performance is unknown.

Educational Services in Relation to Need

An important question addressed by this study is the extent to which academically impaired students were receiving services. We found that the majority of students with significant academic impairment, either at the 8 year follow-up, or at repeated assessments prior to the collection of school services data, were the recipients of IEP or 504 plans (mostly IEPs). This association was strongest for students with persistent underperformance regardless of the method of student identification: low standardized testing scores or teacher rating of underperformance in the classroom. This is consistent with national reports that students with disabilities perform at a significantly lower level academically as compared to their non-disabled peers on a number of measures (Wagner et al., 2006), and suggests that school procedures for identifying academic impairment in this population are working, for the most part. However, approximately 20% to 30% of students appear to have “fallen through the cracks” – i.e., needed services but weren’t receiving them (evidence-based or otherwise). Thus, there appears to be a need for greater academic supports for a substantial minority of impaired students with ADHD in our sample, especially those with later-appearing impairment.

Educational Services in the Context of School Characteristics

It should also be noted that the educational services described in this study may be related to school characteristics, with students with ADHD being more likely to attend alternative schools and schools for students with disabilities. All students at these latter schools are considered to be participating in special education classes and a higher number of interventions are provided to students there as compared to other schools. Exploratory analyses suggest that such students may also have lower math scores and higher rates of hyperactivity (but not oppositional behavior), thus, higher levels of services could be related to need rather than school type. Nonetheless, it appears that school characteristics are an important contextual variable that warrants further attention in the ADHD services literature.

Educational Services in Relation to Other Treatment

We did not find any differences in rates of IEPs or 504 plans by original randomly assigned treatment group in childhood. This finding is consistent with our previous failures to find persistence of differential treatment benefits beyond a few years for nearly every symptom and functioning variable examined (MTA Cooperative Group, 2004; Jensen et al, 2007; Molina et al., 2009). Nevertheless, we considered the possibility that parent participation in the behavioral treatment component of the MTA that included education about school services and collaborating with school staff to meet children's educational needs, might lead to increased parent advocacy for school-related services for their child into secondary school. We only found a trend-level association in this direction, suggesting that early priming of parents to advocate for school services does not necessarily translate to long-term supports being provided to students with ADHD, at least at the high school level.

Also of note, the likelihood of receipt of special educational services was predicted by cumulative stimulant treatment: students with ADHD receiving special education had taken stimulants for approximately 40% more days than students not receiving these services. This finding may reflect the greater severity of these children's ADHD-related impairments and

treatment needs (e.g., Tables 3 & 4), which in turn “drives” both their medical and educational services. However, it would be useful for future research to attempt to tease apart how adequate services in one area may impact those in another area that are sought or required for optimal school functioning.

Limitations and Conclusions

As in any longitudinal sample when some data are missing over time, sampling bias must be considered. There was little response bias for the collection of school services data above and beyond those variables that were identified with 8 year drop out characteristics (e.g., primarily psychosocial adversity). Thus, it is possible that findings may slightly under-represent services for the most impaired children with the least familial resources. School service information was assessed by school staff report for one school year only, consistent with other national surveys using the SSUQ. The majority of questionnaires were completed by guidance counselors who often play a role in monitoring student support services and work closely with special education staff. However, school records were not available to verify the accuracy of their reporting.

Given the cross-sectional nature of the data collected during one school year only, we are unable to determine when services started or may have been discontinued. A relatively small number of students were reported on the SSUQ to have received services previously but not currently, suggesting that once services are initiated, they are likely to continue. This may reflect a lack of efficacy in school services, if students with services continue to remain impaired for several years, or it may reflect the chronicity of need for services despite service efficacy (i.e., as with evidence-based treatments for ADHD, acute effects are well-demonstrated but long-term change is not). The absence of longitudinal data make it impossible to determine if students may have actually been more academically and behaviorally impaired earlier and improved with services. Indeed, some of the students we identify as having “fallen through the cracks” may have received services earlier. Clearly, assessing the impact of services involves a number of such complexities. Future research examining actual implementation of services and accommodations in schools and the pattern of service use over time would be useful in informing the development of interventions to address gaps in educational services.

Despite the significant minority of students with academic impairment who are not receiving services, we are generally encouraged by the unexpectedly high rate of services for high school students with ADHD in our sample. However, our enthusiasm is moderated by a recent report indicating that participation in special education may have little positive impact on academic outcomes (Morgan, Frisco, Farkas, & Hibel, 2010). We suspect that this may be related, in part, to the relative lack of evidence-based interventions that appear to be provided as part of special education services. Our data suggest specific areas where services could be improved for high school students with ADHD such as teaching self-advocacy and self-management strategies and specific study/organizational skills rather than simply receiving extended time on tests and case management. This information is timely given recent emphasis on use of school-based problem-solving teams to inform intervention

development and implementation, which may prove to improve the quality of services students receive.

Assuming that increased services may be beneficial, our findings suggest that high school students with ADHD and academic impairment should obtain an IEP or 504 plan to increase the likelihood of obtaining supports. Advocacy for services may be particularly important for students *without* a long history of impairment who begin struggling significantly with the increased attentional and organizational demands of high school. Indeed, it could be argued that these students may benefit from initiating services more than those who continue to struggle with ongoing support. Improving advocacy, identifying more effective interventions, and ensuring their inclusion in IEPs and implementation in schools may help improve long-term outcomes for high school students with ADHD, including increased rates of graduation from high school and successful transition to adult life.

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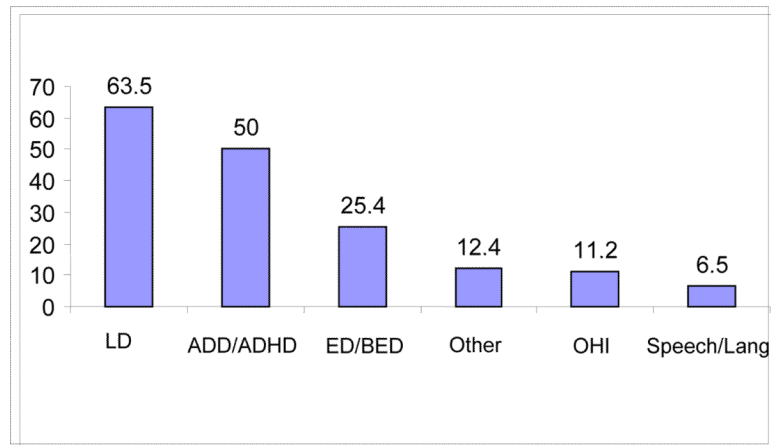


Figure I.

% of students with ADHD and a current IEP or 504 plan (n=107) identified by school staff as having different disabilities. Students may have multiple categories of identification, including “ADHD”, which is not a federal disability category. LD = Learning Disability; ED/BED = Emotionally Disturbed/Behaviorally and Emotionally Disturbed; Other includes autism (n = 2), visually impaired (n = 1), developmental delay (n = 4), mild mental retardation (n = 2), multiple disabilities (n = 4) and “other” (n = 8). OHI = Other Health Impaired, Speech/Lang = Speech or Language Impaired. Three subjects with IEPs/504 plans did not have this data available. Students may have more than one disability identified.

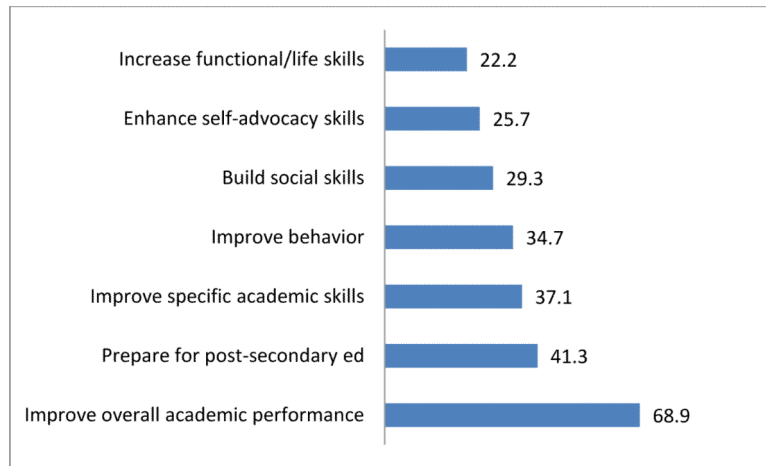


Figure II.
% of students with ADHD identified as having different 504/IEP goals. Students may be identified as having more than one “primary” goal.

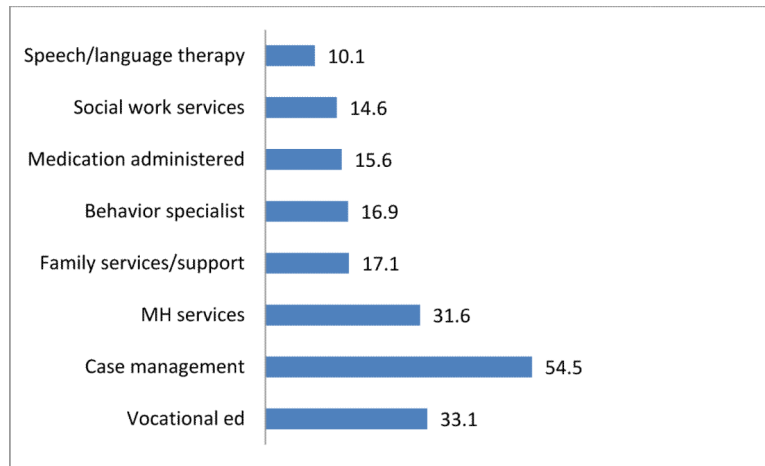


Figure III.

% of students with ADHD identified as receiving other types of services from or through the school. Number of responses used to calculate percentages for each service ranges from 117-142 based upon knowledge of school staff. MH = Mental health

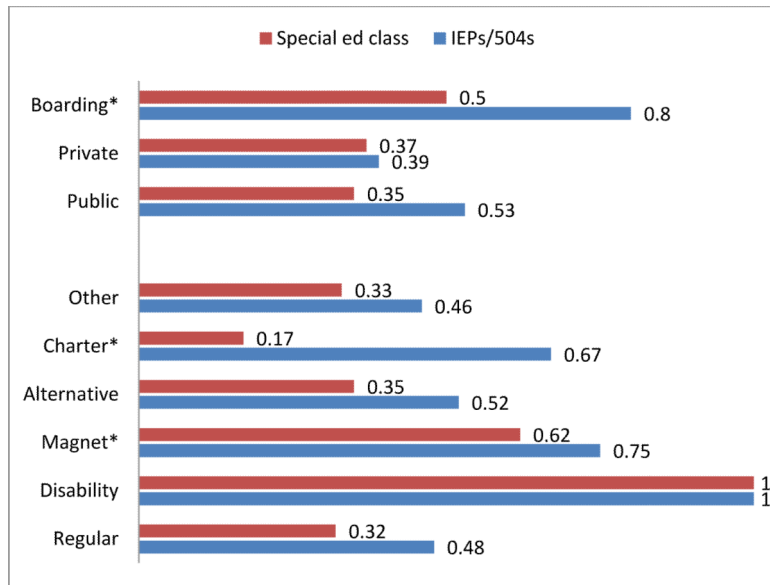


Figure IV.
 % of students with ADHD identified as having an IEP/504 plan and attending a special education class by type of school

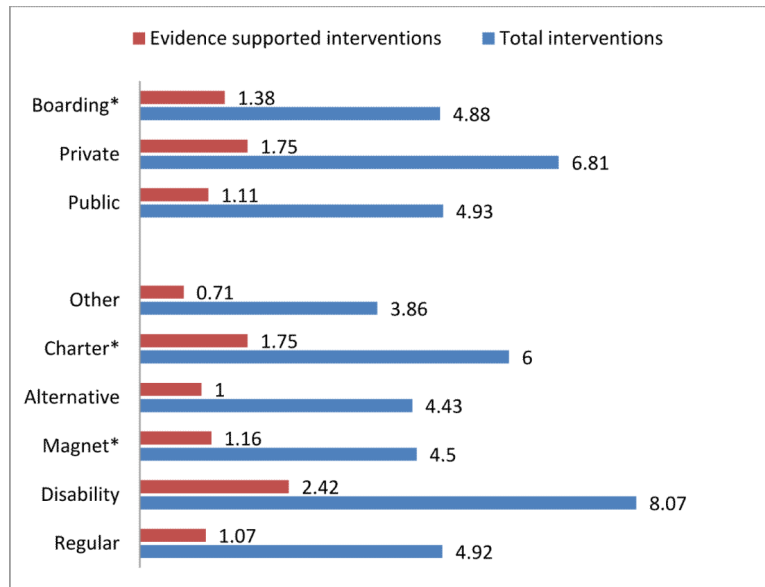


Figure V. Number of evidence-supported and total interventions for students with ADHD by type of school.

Table 1

Demographic and Baseline Characteristics by Group

	ADHD (<i>n</i> = 335)	No ADHD (<i>n</i> = 208)	<i>t</i> (<i>df</i>)	<i>p</i>
At time of 8 year Assessment				
M (SD)				
Age	16.71 (0.95)	16.55 (1.18)	1.67 (370)	.10
Grade (up to 12)	10.43 (1.02) <i>n</i> = 310	10.44 (1.11) <i>n</i> = 193	-0.08 (501)	.93
At Baseline (%)				
Boys	77.3%	78.9%	0.18 (1)	.68
Race/Ethnicity				
White	65.4%	69.7%	1.09 (1)	.30
Nonwhite	34.6%	30.3%		
Welfare	15.5%	8.7%	5.30 (1)	.02
Treatment Group Assignment				
Community Care	23.6%			
Combined	26.3%			
Medication Management	22.4%			
Behavioral	27.8%			
<i>M</i> (<i>SD</i>)				
Age biological mother ^a	28.00 (5.84) <i>n</i> = 323	29.31 (5.67) <i>n</i> = 205	-2.53 (526)	.01
Mother years education ^b	14.61 (2.13) <i>n</i> = 332	14.89 (2.10) <i>n</i> = 206	-1.42 (536)	.16
WISC-III IQ estimate	101.7 (14.23) <i>n</i> = 333	110.7 (17.78) <i>n</i> = 205	-6.12 (362.03)	<.01

Note. Satterthwaite method used due to unequal variances. *n* indicated when varies due to missing data.

^a Calculated from age at the child's birth.

^b No differences were found between groups in father years of education or maximum education.

Table 2

Number and Type of Accommodations and Supports Reported for Students with ADHD

	% of those with an IEP/504 plan (<i>n</i> = 170)	% of those without IEP/504 plan (<i>n</i> = 163)
Academic Accommodation/Support (<i>M</i> = 3.15, <i>SD</i> = 2.45)		
Extended time on tests	87.9	20.9
Test read to student	22.4	.02
Modified tests	18.2	4.3
Alternative tests or assignments	7.6	7.4
Modified grading standards	14.7	4.9
Slower-paced instruction	24.1	9.8
Additional time to complete assignments	50.0	14.1
Shorter or different assignments *	24.7	6.7
More frequent feedback *	25.9	11.0
Reader or interpreter	6.5	1.8
Teacher aide, instructional assistant or personal aide	15.9	4.9
Peer tutors	4.7	4.9
Tutoring by adult	14.7	17.8
Behavioral Support/Learning Strategy (<i>M</i> = .68, <i>SD</i> = .77)		
Behavior management program *	24.1	3.1
Learning strategies/study skills assistance *	37.1	9.8
Self-advocacy training *	6.5	0.1
Learning Aids (<i>M</i> = .75, <i>SD</i> = 1.0)		
Physical adaptations (e.g., special desk)	18.8	4.9
Large print or Braille books or large print computer	0	0
Books on tape	5.9	1.8
Use of calculator (when not permitted by others)	25.3	3.1
Communication aids (e.g., Touch Talker)	0	0
Use of computer when not allowed for others	11.2	1.8
Computer software for students with disabilities	0	0.01
Computer software adapted for student's unique needs	11.2	0
Use of tape recorder when not allowed by others	1.8	0.01
Other		
Student progress monitored by special education staff	50.6	5.5

Note. Students may receive multiple accommodations.

* Research supports use for ADHD.

Table 3

Indicators of Academic and Behavioral Need by Presence of School Services for Students with ADHD

Indicator	IEP or 504 plan (<i>n</i> = 173)	No IEP/504 plan (<i>n</i> = 162)	<i>M</i> (<i>SD</i>)	<i>t</i> (<i>df</i>)	<i>p</i>
Teacher SNAP					
Overall	1.04 (0.65)	0.86 (0.57)		2.22 (244)	.03
Inattentive	1.36 (0.76)	1.17 (0.67)		2.03 (244)	.04
Hyperactive/Impulsive	0.71 (0.71)	0.55 (0.62)		1.90 (244)	.06
Oppositional	0.62 (0.50)	0.38 (0.56)		2.98 (244.0)	<.01 *
SSRS Academic	3.0 (0.89)	3.20 (7.77)		-1.90 (243)	.06
WIAT/WRAT-R					
Reading	90.60 (13.43)	100.7 (11.43)		-7.17 (306.47)	<.01 *
Math	89.42 (16.02)	100.7 (14.98)		-6.36 (308)	<.01
Spelling	86.37 (15.49)	98.08 (14.35)		-6.89 (308)	<.01
GPA	2.76 (0.53)	2.76 (0.59)		0.04 (285)	.97
% suspended during 8 year follow up	63.6	52.5		$\chi^2(1) = 4.25$.04
Cumulative times held back	.49 (0.63)	.42 (0.71)		.89 (222)	.37

Note. N's vary across measures due to missing data (total n's = 135-162 for students with an IEP/504 plan; n's = 110-148 for students without IEP/504 plan).

* Satterthwaite method due to unequal variances

Table 4

Receipt of Services by Students with ADHD and Current or Persistent Academic Impairment

Impairment Indicator	IEP or 504 plan <i>n</i> (%)	Neither IEP nor 504 plan <i>n</i> (%)	χ^2	<i>p</i>
WIAT/WRAT-R 80				
Current (at 8 years)	62 (65.58)	34 (35.42)	43.77 (1)	<.01
Persistent(2+ prior assessments)	38 (82.61)	8 (17.39)	49.01(1)	<.01
SSRS 2.5				
Current (at 8 years)	38 (48.10)	41 (51.90)	5.52(1)	.02
Persistent (2+prior assessments)	19 (70.37)	8 (29.63)	12.28(1)	<.01

Note. WIAT = Wechsler Individualized Achievement Test, WRAT-R = Wide Range Achievement Test, Revised; SSRS = Social Skills Rating Scale.