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Evaluating the Content of Individualized Education Programs and 504 Plans of Young Adolescents With Attention Deficit/Hyperactivity Disorder

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The purpose of this study was to evaluate the degree with which Individualized Education Programs (IEPs) and 504 Plans prepared for middle school students with attention deficit/hyperactivity disorder (ADHD) conformed to best practices and included evidence-based services. Specifically, we examined the problem areas identified in the statement of students' present level of academic achievement and functional performance (PLAAFP) and targeted in the students' measurable annual goals and objectives (MAGOs). In addition, we compared services with lists of recommended services provided by the U.S. Department of Education (ED) and reviews of evidence-based practices. Participants were 97 middle school students with ADHD, 61.9% with an IEP, and 38.1% with a 504 Plan. Most (85%) IEP PLAAFP statements described nonacademic/behavior problems, but fewer than half had MAGOs targeting these areas of need. Services listed on IEPs and Section 504 Plans were frequently consistent with ED recommendations, but had little to no research supporting their effectiveness. In addition, services with evidence supporting benefit to students with ADHD were rarely included on IEPs or 504 Plans. Implications for special education policy and future directions are discussed.

Keywords: ADHD, individualized education programs, section 504 plans

Students with a diagnosis of attention-deficit/hyperactivity disorder (ADHD) frequently experience significant academic impairment compared to normally developing peers (Barkley, Fischer, Smallish, & Fletcher, 2006; Kent et al., 2011). As a result, students with ADHD are more likely than same-aged peers to receive individualized school-based services (Barkley et al., 2006; Murray et al., 2014). These services, in addition to the costs associated with grade retention and discipline problems common in this population, are expensive; with estimates suggesting that educating a student with ADHD costs an annual average of $5,007 more than educating a student without the disorder (Robb et al., 2011). To determine whether costs for services are spent in an efficient and effective manner, it is important to know the extent to which the content on the Individual Education Programs (IEPs) and 504 Plans of students with ADHD align with student impairments identified in these documents and are research based. However, little is known about these issues and the information that is available indicates that many of the services that are provided may not be effective (Harrison, Bunford, Evans, & Owens, 2013; Murray et al., 2014). The purposes of this study are to evaluate the degree with which IEPs and 504 Plans prepared for middle school students with ADHD conformed to best practices and included research-based services.

ADHD is one of the most common disorders in youth affecting 8.8% of the population (Visser et al., 2014). Relative to peers without ADHD, individuals with ADHD typically experience serious academic impairment including poor grades, failure to complete assignments, and high rates of

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course failure (Barkley et al., 2006; Kent et al., 2011). In classroom settings, students with ADHD are more off-task and disorganized, are less likely to comply with teacher requests and commands, and are more likely to experience significant social impairment compared with their same aged peers (Pelham, Fabiano, & Massetti, 2005; Wolraich et al., 2005). These negative academic and social outcomes often extend into adolescence as adolescents with ADHD tend to receive lower grades, are more likely to be placed in lower levels of classroom placement (e.g., remedial vs. honors), and have higher rates of course failure relative to their peers (Kent et al., 2011). In attempts to assist this population, many students with ADHD receive individualized school-based services either under the Individuals with Disabilities Education Improvement Act (IDEIA) or Section 504 of the Rehabilitation Act of 1973.

The majority of services students with emotional and behavioral problems receive are through schools (Burns et al., 1995). Approximately one quarter (28%; Bussing et al., 2005) to one half (57%; Reid, Maag, Vasa, & Wright, 1994) of students with ADHD receive additional education services. Although ADHD is not a specific disability category under IDEIA, a large portion of students who receive special education services are diagnosed with ADHD, including 65.8% of students in the other health impaired category, 57.9% of students in the emotional disturbance category, 20.2% in the learning disability category, and 20.6% in the mental retardation category (now known as intellectual disability; Schnoes, Reid, Wagner, & Marder, 2006). Students who qualify for services under IDEIA are entitled to receive individualized services that are recorded on an IEP. Similarly, students who qualify for services under Section 504 of the rehabilitation act of 1973 are entitled to receive individualized services that are included on a 504 Plan.

Although students with ADHD may receive school-based services under IDEIA or Section 504, there are several differences between these laws. For example, the purpose of IDEIA is to ensure a free and appropriate public education for children with a disability that falls within one of the specific disability categories as defined by law. In comparison, Section 504 is a broad civil rights law that protects individuals with disabilities to be allowed the opportunity to fully participate with their peers, to the extent possible, in any institution receiving federal funding. There are also differences in the services that are to be provided. Services provided through IDEIA are largely intended to provide individual supplemental education services and supports in addition to the general curriculum. Section 504 requires school staff to eliminate barriers that would prevent students from participating fully in the curriculum. Parents have fewer rights under Section 504 compared with IDEIA and states are not provided with any additional funds to serve children eligible under Section 504. This is in contrast to the Federal funds provided to states for students eligible under IDEIA. Given the distinctions between IDEIA and Section 504, one could expect to see differences between the students who receive services under these two laws and differences between the types of services recorded on these two types of service plans. As such, a comparison of the students who receive services under IDEIA and Section 504 as well as the categories of services listed on these plans for students with ADHD could be useful to researchers and practitioners. For example, psychologists often need to make decisions about whether a child with ADHD is eligible for and IEP or a 504 Plan. Knowing what is typically done could provide some guidance.

Regardless of whether students receive services through IDEIA or Section 504, providing these services adds considerable educational costs for students with ADHD (Robb et al., 2011). To ensure funds are spent effectively, it is important for school-based services to align with special education policy and best practices. Federal regulations require that the services included in the students' IEPs be need-based (IDEIA, 34. C.F.R. § 300.320). The term 'need-based' refers to the recommendation that all goals and services included on an IEP are individualized to each child's needs that result from the child's disability. To demonstrate that IEPs are need-based, IEP teams are to include (a) statements of the student's present level of academic achievement and functional performance (PLAAFP), (b) measurable annual goals and objectives (MAGOs), and (c) specially designed services provided to address those goals (U.S. Department of Education, 2006). Although 504 Plans may contain sections similar to those found in IEPs, this is not required by the law and 504 Plans may contain only a description of services to be provided to the student. However, the purpose of 504 Plans is to provide services that

are specific to the student and allow him or her to participate with same-aged peers to the extent possible in public education. Therefore, individualized need-based goals and services are an important aspect of an IEP and a 504 plan.

In recent years, there has also been an emphasis on providing services that are research-based. For example, No Child Left Behind (NCLB) legislation and IDEIA legislation mandate the provision of services that are based on peer-reviewed research to the extent practicable (34. C.F.R. § 300.320; hereafter referred to as 'research-based'). Not all IEP services must have a research-base as IEP teams are allowed to develop services believed to best meet the educational and behavioral needs of each student. However, if research-based services that address specific needs exhibited by eligible students exist and the services can feasibly be implemented, then it would be expected that these services be provided. This emphasis on research-based services also aligns with best practices. The importance of evidence based practice in terms of outcomes has been shown in clinic based therapy (Weisz, Jensen-Doss, & Hawley, 2006) and has been communicated by leaders in the field in school mental health (Buvinger, Evans, & Forness, 2007). Providing services that do not have a research-base could potentially lead to unintended negative consequences such as prolonged impairment, frustration and a lack of motivation from those administering the services, and a waste of resources. Therefore, based on federal policy, the best interests of students, and the most efficient use of limited resources, it is important for IEP teams to prioritize research-based services over untested services when designing IEPs.

There are multiple sources available to help school professionals in their task to create IEPs and 504 Plans with research-based services for students with ADHD. For example, in 2008 the Federal Department of Education (ED) published a manual titled *Teaching Children with Attention Deficit Hyperactivity Disorder: Instruction Strategies and Practices* (U.S. Department of Education, 2008), which includes 128 recommended services for teaching children with ADHD. In addition, there are other published resources, such as reviews of evidence-based treatments for this population (e.g., Sibley, Kuriyan, Evans, Waxmonsky, & Smith, 2014; Evans, Owens, & Bunford, 2014), that could be helpful to school personnel to identify research-base services and create IEPs and 504 Plans that include these services. There also have been several published studies investigating the effects of psychopharmaceutical medication, behavioral modification, or their combination on the academic and behavioral performance of youth with ADHD (e.g., Pelham et al., 2014). These could also be helpful to school personnel in identifying services with a research-base.

Currently, little is known about the extent to which the IEPs and 504 Plans of students with ADHD align with concerns identified in these documents and are evidence based. This may partially be because ADHD is not a specific disability category under IDEIA. One study conducted by Murray and colleagues (2014) described the services provided to 170 high school students with ADHD and IEPs or 504 Plans and reported that the services provided did not conform well with the current research base or what might be considered best practice. Another study compared the types of services that 464 students with ADHD and 932 students without ADHD received in special education in first through seventh grade (Schnoes et al., 2006). They reported that 67.5% of students with ADHD and IEPs received at least one type of nonacademic intervention, and that students with ADHD were significantly more likely than students without ADHD to receive services such as behavior management, mental health, social work services, family counseling, and behavioral interventions. In contrast to the conclusions of Murray and colleagues (2014), these authors concluded that "the types of supports provided are consistent with what are thought to be best practices for these students" (Schnoes et al., 2006). However, many of the specific types of academic and nonacademic services, as well as the specific research-base of these services, were not provided. In addition, data on services in the study conducted by Murray and colleagues (2014) as well as Schnoes and colleagues (2006) were obtained through surveys completed by school personnel rather than directly from the IEPs, leaving open the possibility of social desirability or recall biases. Collecting data directly from the IEPs and 504 Plans would eliminate these concerns and allow for a careful examination of the needs identified and specific types of the services selected by IEP teams.

Purpose of the Present Study

There are two primary goals of this study. First, we will identify the concerns documented in the PLAAFP and MAGO sections of the IEPs of youth with ADHD. Second, we will examine the services listed on IEP and 504 Plans to (a) determine the percent of IEPs and 504 Plans with a given service, (b) compare these percentages between students receiving services under IDEIA and Section 504, and (c) evaluate whether or not services listed are recommended by ED or are research-based. Based on the studies conducted by Murray et al. (2014) and Schnoes et al. (2006), we anticipate that many of the IEPs of students in this sample will contain both academic and nonacademic/behavioral goals and services. Although a thorough analysis of the extent to which academic interventions provided to students with ADHD are research-based and align with impairments or concerns may be warranted, the focus of this study will be on the extent to which nonacademic/behavioral services are research-based.

Method

Participants

Participants were 97 students in sixth through eighth grade recruited in three cohorts over three successive academic years from nine schools (see Table 1 for school characteristics). Participants were recruited by mailing study announcement letters to the primary caregivers (hereafter "parents") of all students attending nine urban, suburban, and rural middle schools. Respondents to these flyers were screened via telephone and those whose report of their child suggested significant levels of inattention (i.e., at least four of nine *Diagnostic and Statistical Manual of Mental Disorders, fourth edition, text revision* [*DSM–IV–TR*] symptoms) or a previous diagnosis of ADHD were invited to complete a clinical evaluation. A total of 574 participants completed the phone screen, and 483 were scheduled for a clinical evaluation.

During the clinical evaluation, written documentation of informed consent and assent were obtained. Semistructured diagnostic interviews were administered to the parents and

Table 1
School Characteristics

School	# of IEPs	# of 504 Plans	% Free/reduced lunch[a]	Persons per square mile[b]	# of students[a]	% White/non-Hispanic[a]	Median household income[c]
School 1	5	5	48	2,425.2	433	91.00	$21,695
School 2	6	4	31	923.7	1,025	93.00	$71,583
School 3	4	2	16	1,598.2	800	75.00	$75,541
School 4	9	4	52	2,058.3	653	98.00	$38,869
School 5	10	9	56	1,492.8	1,243	99.00	$35,185
School 6	14	8	58	3,809.8	1,147	37.00	$34,104
School 7	4	0	77	3,435.8	641	53.00	$35,759
School 8	3	1	17	3,809.8	832	77.00	$34,104
School 9	5	4	54	2,058.3	707	98.00	$38,869

[a] Based on 2011 school records. [b] Based on 2010 U.S. Census data for the city in which the school is located. [c] Based on 2007–2011 U.S. Census data from for the city in which the school is located.

tests of cognitive (i.e., Wechsler Intelligence Scale for Children - 4th edition [WISC-IV]; Wechsler, 2003) and academic (i.e., Wechsler Individual Achievement Test - 3rd edition [WIAT-III], Wechsler, 2009) ability were administered to youth participants by advanced doctoral students supervised by a licensed psychologist. Rating scales were administered to parents and requested of participants' teachers to inform eligibility and diagnostic decisions. A total of 389 participants completed the clinical evaluation. Participants were evaluated to determine eligibility for a study that investigated the effect of two school-based interventions for middle-school students with ADHD compared with a treatment-as-usual condition (Evans, Langberg, et al., 2014). Adolescents were included in this study if they met the following criteria: (a) met full *DSM–IV–TR* (APA, 2000) diagnostic criteria for ADHD based on the Parent Children's Interview for Psychiatric Syndromes (P-ChIPS; Weller, Weller, Fristad, Rooney, & Schecter, 2000) combined with teacher ratings on the Disruptive Behavior Disorders Rating Scale (DBD; Pelham, Gnagy, Greenslade, & Milich, 1992); (b) impairment was reported in at least two settings during the P-ChIPS interview and/or by scores above the clinical cut-off of 3 on the Impairment Rating Scale (IRS; Fabiano et al., 2006); (c) the adolescent's intellectual ability score was estimated to be 80 or higher as measured by four subtests of the WISC-IV; (d) the adolescent did not meet diagnostic criteria for Bipolar Disorder, a psychotic disorder, or Obsessive-Compulsive Disorder; and (e) the adolescent had no reported psychoactive substance dependence. Data from each participant's assessment were reviewed by two doctoral level psychologists. These procedures resulted in 326 eligible participants. Data regarding student special education status was collected using school district administrative records. Of this larger sample (n = 326), 60 students (18%) had an IEP and 37 students (11%) had a 504 Plan. The 97 students with current IEPs or 504 plans were included in the present study. Copies of participants' most recent IEPs or 504 Plans were collected from participants' schools. See Table 2 for participant characteristics.

Procedures

Coding IEP and 504 Plans. Sections of the IEPs and 504 Plans were coded by the first author using the cutting and sorting technique described by Ryan and Bernard (2003). This technique involves identifying important text and arranging it in groups of coherent themes. All sections that were labeled as PLAAFP or MAGO were coded within each IEP. Using the codes that resulted from this initial round of coding, two trained research assistants independently coded the PLAAFP and MAGO section of the IEPs. The coding process was iterative, with the option for any coder to create new codes, merge codes, or redefine codes until a consensus was reached. For the PLAAFPs and MAGOs sections, the coding resulted in the identification of 10 areas of academic and behavioral deficits[1] (i.e., themes, see Table 3). PLAAFP and MAGO sections were again coded into these 10 themes by two research assistants who were not involved with the initial coding with agreement falling in the substantial range for the PLAAFP coding (83.6% interrater agreement, κ = .65) and almost perfect range for MAGO coding (96.1% interrater agreement, κ = .81). The coding of the PLAAFP and MAGO sections was done dichotomously (i.e., theme was either coded as present or absent for an IEP), and it was possible for multiple themes to be coded within each section.

As anticipated, most of the IEPs in this sample included both academic (e.g., mathematics) and nonacademic/behavioral (e.g., off-task behavior, organization) MAGOs. To stay true to the purpose of this study, all sections describing services that were specifically indicated to address nonacademic/behavioral goals as well as all services listed as accommodations and modifications on the IEPs were coded. In addition, all services listed on the 504 Plans were coded. Services listed in these sections were identified, com-

[1] Twelve (4.8%) concerns identified in the PLAAFP and 5 (2.1%) concerns targeted in the MAGOs were coded as "other" and not included in the analysis either because (a) the concerns occurred infrequently (i.e., listed <3 times among all IEPs) or (b) because the concern described was too vague or poorly written to be categorized.

Table 2
Participant Characteristics With Results From Chi-Square and ANOVA Comparisons of the Three groups

Variable	Students with IEPs (n = 60)	Students with 504 Plans (n = 37)	Students with neither (n = 229)	χ^2 (1, n = 97)
Gender		*N* (%)		
Male	44 (73.3%)	26 (70.3%)	162 (70.7%)	0.17
Female	16 (26.7%)	11 (29.7%)	67 (29.3%)	
Grade				
6th	33 (55.0%)	11 (29.7%)	85 (37.1%)	
7th	10 (16.7%)	18 (48.6%)	84 (36.7%)	3.73
8th	17 (28.3%)	8 (21.6%)	60 (26.2%)	
Race				
African American	7 (11.7%)	2 (5.4%)	29 (12.7%)	
White	40 (66.7%)	31 (83.8%)	180 (78.6%)	
More than one race	6 (10.0%)	4 (10.8%)	17 (7.4%)	19.21
Not reported	4 (6.6%)	—	1 (0.4%)	
Other	3 (5.2%)	—	2 (0.9%)	
Income				
Below $12,500	16 (26.6%)	5 (13.5%)	25 (10.9%)	
$12,501–$37,499	22 (36.7%)	9 (24.3%)	48 (20.9%)	
$37,500–$87,499	15 (25.0%)	18 (48.6%)	96 (41.9%)	24.00
$87,500–$124,999	4 (6.7%)	2 (4.5%)	27 (11.8%)	
$125,000+	1 (1.7%)	3 (8.1%)	31 (13.3%)	
Not reported	2 (3.3%)	—	2 (0.9%)	
Learning disability				
Parent reported	19 (31.0%)	5 (13.5%)	19 (8.3%)	22.68**
ADHD subtype				
Inattentive	29 (48.3%)	11 (29.7%)	127 (55.5%)	
Hyperactive/impulsive	—	—	1 (0.4 %)	9.32
Combined	31 (51.7%)	26 (70.3%)	101 (44.1%)	
		M (*SD*)		*F*(2, 326)
ADHD, ODD, and CD symptoms[a]				
Inattentive	5.9 (2.67)	7.42 (2.18)	6.84 (2.18)	5.42**
Hyperactive/impulsive	3.55 (2.98)	4.31 (2.68)	3.76 (2.86)	0.73
ODD	2.19 (2.33)	2.97 (2.77)	3.02 (2.61)	2.66
CD	0.57 (1.14)	0.67 (1.17)	0.75 (1.32)	0.55
Cognitive/achievement scores				
WIAT-III basic reading composite score	87.25 (13.78)	99.57 (13.04)	96.71 (13.73)	13.26**
WIAT-III mathematics composite score	83.15 (14.24)	94.43 (14.61)	92.41 (14.45)	10.862**
WISC-IV FSIQ	90.05 (8.86)	98.00 (13.87)	94.85 (12.98)	8.24**

[a] Parent-reported symptoms on the DBD (Pelham, Gnagy, Greenslade, & Milich, 1992).
** $p < .005$.

piled, and qualitatively assessed using the same cutting and sorting technique (Ryan & Bernard, 2003) and iterative process described above. A total of 1,060 services were compiled from the IEPs and 504 Plans, and 18 categories of services (i.e., themes) were identified[2] (see Table 4). Two trained research assistants independently coded the 1,060 services into the 18 identified themes with agreement falling in the substantial range (97.6% interrater agreement, $\kappa = .77$). The first author coded sections where disagreement was found and the majority consensus was accepted.

[2] Forty-nine (4.6%) of the services listed were coded as "other" and were not included in the analysis either because they occurred infrequently (i.e., listed <6 times among all IEPs and 504 Plans) or because the service listed was too vague or poorly written to be categorized.

Table 3
Areas of Academic and Behavioral Deficits Identified in the PLAAFP and MAGO Sections of IEPs of Students With ADHD

Areas of academic and behavioral deficits	% of students with theme identified in the PLAAFP	% of students with theme identified in the MAGO
Mathematics[a]	66.67%	63.63%
Off-Task behavior[b]	62.16%	23.33%
Reading comprehension[a]	50.00%	58.33%
Written language[a]	46.67%	58.33%
Assignment completion[b]	40.00%	25.00%
Organization[b]	38.33%	31.67%
Social skills w/peers[b]	35.00%	10.00%
Compliance[b]	26.67%	21.67%
Reading fluency[a]	26.67%	23.33%
Verbal communication	20.00%	10.00%
Cumulative areas		
Academic deficits	90.9%	77.2%
Nonacademic/behavioral deficits	84.8%	46.9%

[a] Indicates area of academic deficit. [b] Indicates area of nonacademic/behavioral deficit.

Analysis. The percent of PLAAFPs and MAGOs that address nonacademic/behavioral concerns (i.e., off-task behavior, homework completion, social-skills, compliance, and organization) was calculated by dividing the number of PLAAFPs and MAGOs that included statements with these concerns by the total number of IEPs ($n = 60$; see Table 3). The percent of PLAAFPs and MAGOs that address academic concerns (i.e., mathematics, reading comprehension, written language, and reading fluency) was calculated by dividing the number of PLAAFPs and MAGOs that include statements with concerns in academic areas by the total number of IEPs.

Similarities and difference on demographic variables as well as indices of cognitive (i.e., WISC-IV) and achievement (i.e., WIAT-III) performance between students with IEPs, students with 504 plans, and students who did not receive additional school-based services in the larger sample from which the sample for this study was drawn were analyzed using one-way analyses of variance (ANOVAs) and chi-squared analysis. Significant omnibus tests were followed by all pairwise comparisons.

Chi-square analyses were used to investigate similarities and differences between the services listed on IEP and 504 Plans. Similarities between the services listed on the IEP and 504 Plans and services recommended by the ED in the manual *Teaching Children with Attention Deficit Hyperactivity Disorder: Instruction Strategies and Practices* (U.S. Department of Education, 2008) was conducted by comparing the lists of services and identifying matches. To calculate the percent of services listed on IEPs and 504 Plans that matched services listed in the ED manual, the number of services identified on the IEP and 504 Plans in this sample that matched services listed in ED manual were divided by the total number of services identified on all IEP and 504 Plans.

Finally, a literature search for the 18 service categories identified was conducted to determine the research-base of the most frequently used services listed on IEPs and 504 Plans. The literature search began with examining meta-analysis and reviews of school-based services for individuals with ADHD (i.e., DuPaul & Evans, 2008; Fabiano et al., 2009; Harrison et al., 2013; Owens, Storer, & Girio, 2011; Raggi, & Chronis, 2006; Sadler, & Evans, 2011; Trout, Lienemann, Reid, & Epstein, 2007). Eleven of the services identified in our sample of IEP and 504 Plans matched services discussed in these articles. Studies cited in the reviewed literature related to the 11 services were reviewed for evidence of efficacy or effectiveness. For the remaining seven of the 18 services identified in our sample of IEPs, research databases were consulted, including Educational Resources In-

Table 4
Services Categories and Descriptions Coded in IEPs and 504 Plans and the Level of Support for These Services

Service	Description of service category	Support	% of IEPs	% of 504 Plans	$\chi^2(1, n = 97)$
Extended time	Increased time allotted for tests, quizzes, projects, or assignments	R, 1, 3	88.33	78.38	1.74
Small group	Instruction or testing in a small group	R, 2	85.00	56.76	9.54*
Prompting	Direct the students' attention to the task at hand	R, 2	76.67	64.86	1.59
Test aids	Allowed the use of calculator or notes during tests	R	73.33	29.72	17.72*
Read-aloud	Allowing students to read instructions, tests, and/or quizzes aloud or have these read aloud to them	R, 2	70.00	32.43	13.09*
Breaks	Providing students with additional breaks	R	58.33	27.02	9.02*
Study support	Teaching skills to improve independent study of materials (developing note cards, guided worksheets)	R	36.67	8.11	9.78*
Reduction	Reduced the number or length of tests or assignments while including the same content (e.g., reduce number of repetitions)	R, 1, 2	30.00	2.70	10.83*
Behavior modification	Reinforcements or punishments	R, 1, 2, 3	28.33	5.41	7.64*
One-on-one	Pull student out of the general education setting for one-on-one instruction or testing	R, 2	26.67	29.73	0.11
Modeling skills	Provide example or demonstration of skills or concepts	R, 2	25.00	0.00	10.94*
Preferential seating	Relocated student closer to point of instruction	R, 1, 2	21.67	35.14	2.12
Material organization	Increase student organization of classroom materials or assignments	R, 1, 2, 3	21.67	27.03	0.36
Planner organization	Increase student temporal organization (e.g., daily planner)	R, 1, 2, 3	16.67	54.05	14.98*
Adapted grading	Modify how projects, assignments, tests, and/or quizzes are graded	N	13.33	10.81	.134
Copy of notes	Provide a copy of notes from class	N	8.33	18.91	2.37
Divide tasks	Breaking tasks into smaller segments	R, 2	8.33	13.51	0.66
Parent-teacher contact	Increase parent-teacher communication	R	3.33	21.62	8.28*

Note. Codes under "Support" R = Recommended by ED, 1 = multiple studies investigating service, 2 = study or studies report(s) positive impact on academic and/or behavioral performance, 3 = adequate experimental control, N = No level of support and not included on ED list of recommended services.
* $p < .05$.

formation Center (ERIC), PsychInfo, Psychology and Behavioral Sciences Collection, and Google Scholar. Terms searched for in this review included variations of the names of remaining services and attention-deficit/hyperactivity disorder, attention deficit disorder, ADHD, ADD, hyperactivity, and attention. The abstracts of the resulting articles were reviewed for their relevance to the remaining services. Articles were excluded if they (a) were not published in a peer-reviewed journal, (b) were not published in English, (c) did not report the

evidence of efficacy or effectiveness of a given service, or (d) included individuals with disabilities other than ADHD with no separate analysis for students with ADHD as the primary diagnosis. In all, this literature search resulted in 199 articles evaluating the outcomes of the 18 identified services. These articles were evaluated based on the (a) age group of the participants, (b) study setting, (c) experimental control used, (d) types of measurements used, and (e) outcome.

To determine the research base of the services listed on the IEPs and 504 Plans, the literature associated with each service category was compared with a basic level of supporting research. Specifically, services with (a) multiple studies (b) reporting a positive impact on the performance and/or behavior of students with ADHD (c) more than an alternative intervention or a no-intervention group (i.e., adequate experimental control) was considered research-based.

Results

Results from the IEP coding indicated that 90.9% of adolescents with IEPs in our sample had PLAAFPs that described academic concerns and 84.8% had PLAAFPs that described nonacademic/behavioral concerns. The majority (i.e., 77.2%) of adolescents with IEPs also had at least one goal to improve academic functioning. Fewer than half (46.9%) of the adolescents with IEPs had at least one goal to improve nonacademic/behavioral functioning.

Results of the ANOVAs and chi-squared analysis indicated that students with IEPs, students with 504 Plans, and students without any additional school-based services differed on percentage of parent reported learning disability, number of parent-reported inattentive symptoms, reading ability, mathematics ability, and overall cognitive abilities (see Table 2). Pairwise comparisons using *t* test of means and chi-squared analysis indicated that students with IEPs performed significantly worse on measures of reading ability, $t(95) = 4.35$, $d = -.62$, mathematics ability, $t(95) = 3.74$, $d = -.78$, and overall cognitive abilities, $t(95) = 3.44$, $d = -.68$, than students with 504 Plans and had fewer parent reported symptoms of inattention, $t(95) = 3.44$, $d = -.62$, and were more likely to be reported as having a learning disability by their caregivers, $\chi^2(1, n = 97) = 4.05$, $\varphi = .20$; all $ps < .05$. Students with IEPs also performed significantly worse on measures of reading ability, $t(287) = 4.72$, $d = -.39$, mathematics ability, $t(287) = 4.40$, $d = -.65$, and overall cognitive abilities, $t(287) = 3.69$ $d = -.43$, had fewer parent reported symptoms of inattention, $t(287) = 3.69$ $d = -.39$, and were more likely to be reported as having a learning disability by their caregivers, $\chi^2(1, n = 289) = 22.73$, $\varphi = .28$, all $ps < .05$, compared with students without any additional school-based services. There were no significant differences between students with ADHD and 504 Plans and students with ADHD who received no additional school-based services.

There were also several differences in the provided services between students with IEPs and students with 504 Plans. Students with IEPs were more likely to be pulled out of the general education setting for instruction or testing in a small group, $\chi^2(1, n = 97) = 9.54$, $\varphi = .31$, be allowed to use an aid during tests when otherwise not permitted, $\chi^2(1, n = 97) = 17.72$, $\varphi = .43$, have tests read out-loud, $\chi^2(1, n = 97) = 13.09$, $\varphi = .37$, receive additional breaks through the day, $\chi^2(1, n = 97) = 9.02$, $\varphi = .31$, receive services designed to teach skills to improve independent study skills, $\chi^2(1, n = 97) = 9.78$, $\varphi = .32$, have the number or length of tests or assignments reduced, $\chi^2(1, n = 97) = 10.83$, $\varphi = .33$, receive behavior modification, $\chi^2(1, n = 97) = 7.64$, $\varphi = .28$, and be provided with examples or demonstrations compared with students with 504 Plans, $\chi^2(1, n = 97) = 10.94$, $\varphi = .34$, all $p < .05$) Students with 504 Plans were more likely to have services designed to increase students' use of time management strategies, $\chi^2(1, n = 97) = 14.98$, $\varphi = -.39$, and increased parent-teacher contact, $\chi^2(1, n = 97) = 8.28$, $\varphi = -.29$, all $p < .05$ (see Table 4).

The results of the comparison between services listed on the IEP and 504 Plans of participants in this study and the list of recommended services by ED indicated that, of the 18 categories identified, 16 (88%) were on the ED list. The two categories of services not recommended by ED were: (a) providing students with a copy of class notes and (b) modifying the grading criteria for tests and quizzes.

Finally, results of the literature search to determine the evidence-base of the services listed on the IEP and 504 Plans of the participants in this study indicated that six of the 18 service categories (33%) had been investigated by at

least two studies, five of which report a positive impact on the performance and/or behavior of students with ADHD and 1 (i.e., extended time on tests and assignments) with mixed results (see Tables 4 and 5). Of the five remaining services, three (i.e., behavior modification, materials organization, and planner organization) were reported to result in a positive impact that was significantly greater than an alternative intervention or a no-intervention group. Thus, based on the criteria for research-based services described above, 16.6% of the services listed on the IEPs and 504 Plans of this sample were considered research-based. Table 4 describes each service and describes the level of support for each. Table 5 contains a summary of the related research for each service. Details regarding the studies cited for each service can be found on Table 6.

Discussion

Results from this study provide mixed evidence on whether IEPs of young adolescents with ADHD are needs-based and raise questions about the extent to which IDEIA regulations pertaining to research-based services are being adhered to in the development of IEPs. Findings from this study suggest that IDEIA regulations regarding the provision of need-based services may be inconsistently applied. Among students with ADHD who qualified for services under IDEIA, the majority (85%) of PLAAFPs described difficulties with nonacademic/behavioral functioning (i.e., off-task behavior, homework completion, compliance, social-skills, and organization). These are problem areas that are of higher frequency and are more problematic for youth with ADHD compared with their peers (Pelham et al., 2005; Wolraich et al., 2005). This finding indicates that IEP teams recognized many of the problem areas that are common for students with ADHD; however, fewer than half (47%) of students with an IEP had MAGOs that address these nonacademic/behavioral problems. Thus, even though these areas of need are recognized, close to half of IEPs contained no goals for improving these behaviors.

In our comparison between students with IEPs, students with 504 plans, and students with neither IEP nor 504 Plans, we found that students with IEPs had lower cognitive ability and significantly greater academic problems (i.e., lower achievement scores on the WIAT-III, more likely to be reported as having a learning disability) compared with their peers with ADHD (see Table 2). In addition, students with IEPs had significantly fewer parent-endorsed symptoms of inattention on the DBD and also fewer symptoms of hyperactivity/impulsivity, ODD, and CD (although not statistically significant) in comparison to their peers with 504 plans or without any plan. This finding is counter to previous research suggesting that behavior problems are more important than academic issues for students being considered for special education with an emotional disturbance classification (Becker, Paternite, & Evans, 2014). In this ADHD specific sample, it seems likely that academic and cognitive limitations were the driving factors in determining which students received IEPs (>10 point difference on WIAT-III Basic Reading and Mathematics composite scores between students with IEPs and 504s; see Table 2). An alternative explanation is that parent ratings are largely based upon symptoms/behavior at home and are not representative of behavior at school.

We found that the frequency of service delivery varied significantly between students with IEPs and 504s. Interestingly, the main difference between the nonacademic/behavioral services listed on IEPs and 504 Plans was not in the category of services, but rather the amount of services. With the exception of the modeling skills category, every category of nonacademic/behavioral service found on IEPs were also found on 504 Plans. However, eight of 18 were listed more frequently on the plans of students with IEPs compared with students with 504 Plans. Many of these services require significant individual attention and school resources. It may be that IEP teams are more willing to provide resource-expensive services for students in special education than are those who develop 504 Plans. Thus, school psychologists and school-based teams may be making decisions about whether a child with ADHD is eligible for and IEP or a 504 Plan based upon the amount of services required to meet the student's needs rather than the type of service that may be required to meet the student's needs. There is a lack of information available to guide the determination of when to classify a student within special education and when to provide a 504 Plan. Furthermore, there is an absence of clear policy for school psychologists and educators as to what should distinguish the services on these two plans (if anything).

Table 5
A Summary of The Literature per Service Category

Service	Summary of the literature
Extended time	Extended time on tests increases number of items completed for students both with and without ADHD (Lewandowski et al., 2007; Pariseau et al., 2010). It also reduces the discrepancy between the reading comprehension abilities score and verbal comprehension abilities (Brown et al., 2011).
Small group	Students with ADHD displayed more on-task behavior during the small-group condition than during the independent-seatwork and the whole-group instruction conditions. However, students with ADHD completed a greater proportion of work accurately during independent seatwork than in small group or whole-group conditions. Thus, small group instruction may improve students' on-task behavior, but not accuracy or speed (Hart et al., 2011).
Prompting	This is often suggested as a method to help students with ADHD stay on task (e.g., Pfiffner & Barkley, 1998). Prompting/cueing resulted in increased on-task behavior when in combination with other services (e.g., Granger et al., 1996), but it is unclear what improvement can be attributed to prompting and cueing alone.
Test aids	No studies were found investigating the effect of this modification on on-task behavior or performance of students with ADHD. However, studies investigating the use of calculators during tests for non-ADHD populations have reported that the effect of using a calculator differs largely depending on the types of items included in tests (Loyd, 1991) and the students' prior experience using a calculator (Bridgeman et al., 1995).
Read-aloud	Oral reading consistently produced more effective comprehension than did silent reading. However, due to a small sample size ($n = 2$), no firm conclusions can be drawn from these results (Dubey & O'Leary, 1975).
Breaks	Although this strategy is recommended by some researchers (e.g., Nadeau, 1995), no studies were found investigating the effect of this service on on-task behavior or performance of students with ADHD.
Study support	No studies were found investigating the effect of this service on the behaviors of students with ADHD.
Reduction	Shortening tasks resulted in more intervals of on-task behavior than did long assignments. However, this strategy was also combined with others, so it is difficult to draw firm conclusions (Kern et al., 1994; Penno et al., 2000).
Behavior modification	This intervention is the most studied and empirically validated approach to improve the behavior of student's with ADHD. In a meta-analysis conducted by Fabiano and colleagues (2009), the overall unweighted effect sizes in between group studies (.83), pre–post (.70), within group studies (2.64), and single subject studies (3.78) of behavioral treatments for children with ADHD indicated that behavioral treatments are effective.
One-on-one	While on-task behavior did not improve, students with ADHD completed a greater proportion of work accurately during independent seatwork than in small group or whole-group (Hart et al., 2011).
Modeling skills	Modeling appropriate behavior, in addition to contingent rewards, increased practice, and a token economy system, increased the reading fluency for three 9 year old boys (Noell et al., 1998).
Preferential seating	Closer teacher proximity resulted in lower rates of disengagement, although no differences were found in socially appropriate behaviors or aggressive behaviors when teachers were proximal compared with distal for 10 to 13 year old boys (Granger et al., 1996). Dunlap and colleagues (1993) reported higher rates of appropriate behaviors. However, because of small sample size and unclear diagnostic criteria, it is difficult to draw firm conclusions.
Material organization	Studies have investigated the effects of providing organization support to adolescents with ADHD in both organization specific studies (e.g., Abikoff et al., 2012; Langberg et al., 2008, 2012) and as a part of multicomponent studies (e.g., Evans et al., 2004, 2005, 2007, 2009; Hechtman et al., 2004; Pfiffner et al., 2007; Power et al., 2012). Improvement in organization of school materials and the used of assignment books to track homework was reported for students with ADHD following the implementation of this intervention.
Planner organization	See the summary of the literature by "Material Organization Support"[a]

Table 5 (*continued*)

Service	Summary of the literature
Adapted grading	No studies were found investigating the effect of this modification on on-task behavior or performance of students with ADHD.
Copy of notes	No studies were found investigating the effect of giving copies of notes to students on on-task behavior or performance of students with ADHD.
Dividing tasks	This technique is a main component in several promising interventions (e.g., Computer Assisted Instruction, peer tutoring, note-taking instruction, and self-monitoring interventions; Raggi & Chronis, 2006) and one case study reported that dividing tasks resulted in improved behaviors (Dunlap et al., 1993).
Parent-teacher contact	Although no studies were found investigating the effects of increased parent-teacher communication alone on on-task behavior or performance, this service is a key aspect of an empirically supported intervention called the Daily Report Card (DRC; see Evans, Owens, Reinicke, Brown, & Grove, 2013).

[a] Material Organization and Planner Organization were coded as separate categories as often either one or the other would be listed on an IEP or 504 Plan. However, the research base for these categories combines these approaches.

We also investigated the percent of services that were recommended by ED for students with ADHD and/or have a research-base. The high percentage (88%) of services listed on the IEPs and 504 Plans that were consistent with recommendations by ED suggest that resources published by ED on teaching students with ADHD may be influencing or reflecting choices of services. If best practices for students with ADHD are defined by the recommendations put forth by ED, this finding would support the conclusion reached by Schnoes and colleagues (2006) that the services provided are mostly consistent with best practices. However, when we analyzed the research-base of the services provided, a different conclusion was reached.

Many of the most commonly used services for students with ADHD have very little research support, and the most empirically validated approaches were rarely included on the IEPs of students with ADHD. For example, the most widely studied and empirically supported approach for improving the behavior of students with ADHD is behavior modification (Fabiano et al., 2009). The results of several reviews of treatments for ADHD have concluded that behavior classroom management is a well-established treatment for ADHD (e.g., Evans, Owens, & Bunford, 2014; Fabiano et al., 2009). However, fewer than one third (25.8%) of IEPs and one twentieth (5.3%) of the 504 Plans had behavior modification listed as a service (or any application of it; e.g., point system). Conversely, 80.3% of IEPs and 76.3% of 504 Plans listed extended time on tests or assignments as a service. The research conducted investigating the use of extended time shows mixed results and suggests that it may actually have an iatrogenic effect on students with ADHD (Lewandowski, Lovett, Parolin, Gordon, & Codding, 2007; Pariseau, Fabiano, Massetti, Hart, & Pelhem, 2010). In addition to extended time, three of the top 10 most frequently listed services on IEPs and 504 Plans (test aids, breaks, and study supports) had no research to support their efficacy. Thus, when best practices for students with ADHD are defined by the research-base, it appears that the types of supports provided are inconsistent with best practices for students with ADHD. These findings suggest that the mandate for students with IEPs to receive services based on peer-reviewed research to the extent practicable (34. C.F.R. § 300.320) was rarely followed in our sample. School psychologists have an important role in determining services for students with IEPs and 504 plans and can be the advocate for providing evidence-based services. These results also indicate the need for research to evaluate some of the frequently used services for students with ADHD. Although there is some evidence that a few services are not helpful (e.g., extended time), the majority of services that appear on these plans were never systematically evaluated. Finally, if services recommended by ED actually influence practice, it may help to consider the research base when compiling such a list of recommended services.

Limitations

One limitation of these findings is that information regarding disability categories was not listed on IEPs or collected. Although disability

Table 6
Research Base Identified by Service

Service author, year	*n*	Age group	Setting[a]	Study design[b]	Dependent measures[c]
Extended time					
Brown et al., 2011	145	13–18	SS	2	P
Lewandowski et al., 2007	54	10–13	ns	2	P
Pariseau et al., 2010	33	7–12	STP	3	P, O
Small group					
Hart et al., 2011	33	7–12	STP	3	P, O
Prompting					
Granger et al., 1996	49	5–12	SS	3	O
Test aids	—	—	—	—	—
Read-aloud					
Dubey and O'Leary, 1975	2	8–9	SS	5	P
Breaks	—	—	—	—	—
Study support	—	—	—	—	—
Behavior modification					
Fabiano et al., 2008[d]	2094	<18	ns, SS, STP	1, 2, 3, 4	PR, TR, O, P
Reduction					
Kern et al., 1994	1	11	SS	5	P
Miller et al., 2003	3	9–12	SS	5	P, O
Penno et al., 2000	1	13–14	SS	5	P
One-on-one					
Hart et al., 2011	33	7–12	STP	3	P, O
Material/planner organization					
Abikoff et al., 2012	158	8–11	SS	1	PR, TR
Evans et al., 2004	7	11–14	SS	4	P, PR, TR
Evans et al., 2005	27	11–14	SS	2	P, PR, TR
Evans et al., 2007	79	10–14	SS	1	P, PR, TR
Evans et al., 2009	49	11–14	SS	1	P
Gureasko-Moore et al., 2006	3	12	SS	4	P
Gureasko-Moore et al., 2007	6	11–12	SS	4	P
Hechtman et al., 2004	103	7–9	SS	1	P, PR, TR, SR
Langberg et al.,2008	37	9–14	SS	1	P
Langberg et al., 2012	47	11–14	SS	1	PR, TR
Pfiffner et al., 2007	69	7–11	SS	1	PR, TR
Power et al., 2012	199	7–12	SS	1	P, PR, TR
Preferential seating					
Dunlap et al., 1993	1	11	SS	5	O
Granger et al., 1996	49	5–12	SS	3	O
Modeling Skills					
Noell et al., 1998	3	9	STP	4	O
Copy of notes	—	—	—	—	—
Breaking up tasks					
Dunlap et al., 1993	1	11	SS	5	O
Adapted grading scale	—	—	—	—	—
Parent/teacher contact	—	—	—	—	—

[a] ns = Study was conducted in a non-school setting (i.e., lab); STP = Study was conducted in a summer treatment program; SS = Study was conducted in a general or special education or analogous setting (i.e., setting designed to mimic a school setting, etc.). [b] 1 = Randomized Controlled Trial, 2 = Not randomized but with a control group, 3 = ABAB or reversal single subject design, 4 = Multiple baseline single subject design, 5 = Case study. [c] P = Performance measure, O = Observation, TR = Teacher Rating, PR = Parent Rating, SR = Self-Rating. [d] Results from a meta-analysis of 114 studies on behavior modification for children with ADHD.

category does not restrict the range of services that can be provided to a student, it may be that students with ADHD found eligible for services under the specific learning disability category receive different services from students with ADHD found eligible for services under emotional disability or other health impairment. Other limitations include that only the current

IEPs and 504 Plans were collected for the students in this sample, and we cannot determine when services may have started or discontinued. In addition, although IEPs were collected from nine schools in two states, it may be that some of the IEPs and 504 Plans in our sample were created by the same groups of individuals and, thus, our findings may not be generalizable to the IEPs of students with ADHD in other areas. Studies are needed with samples of IEPs across a larger area to address this limitation.

Future Directions

Our findings suggest that, whereas 88% of the services listed on IEPs and 504 Plans were recommended by ED, only 18% were considered research-based. This suggests that the services recommended by ED may need to be changed to be consistent with their own guidelines that services provided should be based on peer-reviewed research to the extent practicable (34. C.F.R. § 300.320). If the consistency between ED recommended services and services that appeared on the IEPs and 504 Plans of students in our sample is attributable to educators referring to ED guidelines, then these guidelines provide a potent opportunity to improve the use of evidence based practices in schools. Adherence to guidelines that prioritize evidence based practices could become part of state and district-wide policies. In addition, future research might assess the degree to which specific ED best practice interventions were not included on IEPs or 504 plans. Such an investigation might highlight recommended services that were omitted from these documents.

Finally, it is important to consider the long-term goal that is being pursued when providing services to students with ADHD. If the goal of services is to stop the problem by raising struggling students' scores to pass a test or course, many of the most commonly listed services may be adequate. Extending time on tests or accepting late assignments without negative consequences may improve the grade of a student with ADHD by reducing expectations. Similarly, allowing a student who struggles with math to use a calculator or class notes during a test when otherwise not permitted will also likely improve the student's scores. However, if the goal is to enhance the competencies of students so they can independently meet age-appropriate social, behavioral, and academic expectations, many of the most common services provided to students with ADHD will be inadequate. For this alternative goal to be achieved, it may be necessary for the goal of parents and educators to change from stopping the problem by reducing expectations to improving the competencies of students (see Evans, Owens, Mautone, DuPaul, & Power, 2014). Finding and developing methods to help educators identify students with ADHD and provide research-based services that help to align IEPs and 504 Plans to best facilitate students' self-reliance and achievement is critically important to improving outcomes for students with ADHD.

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