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# Teacher Knowledge of Stimulant Medication and ADHD

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## ABSTRACT

This study was designed to assess general and special education teachers' knowledge, opinions, and experience related to the diagnosis of attention-deficit/hyperactivity disorder (ADHD) and its treatment with stimulant medication. A random sample of 200 general educators and 200 special educators from Wisconsin were surveyed. Results revealed that teachers had limited knowledge about ADHD and the use of psychostimulant medication. Teachers' opinions about the effect of stimulant medication on school-related behaviors were generally positive, although special education teachers were more positive than general educators. The survey confirmed previous research indicating that teachers were the school personnel who most frequently recommended an assessment for ADHD. The results are discussed in terms of their educational significance and implications for teacher preparation and continuing education.

Frankenberger, & Hazelkorn, 1996). According to data provided by the U.S. Drug Enforcement Agency (2002), there was a 900% increase in methylphenidate production from 1990 to 2001. Ninety percent of the methylphenidate was consumed in the United States for the treatment of ADHD. Production of other drugs used to treat ADHD has also increased. From 1993 to 2001, the production of amphetamines (Dexedrine and, later, Adderall) increased by 5,767%. By 2001, amphetamine production accounted for 44% of the stimulants produced in the United States, the vast majority of which are used to treat ADHD.

Statistics like these have provoked publicity (e.g., Dawson, 2001; Marks, 2000) and created concern among parents and teachers. The overdiagnosis of children with ADHD and the large increases in the production of stimulant medications have led some states to political solutions. The boards of education in both Texas and Colorado have adopted nonbinding resolutions recommending that schools consider alternative, nonmedical solutions for children with behavior and attention problems. The concern behind these resolutions is that teachers are too quick to recommend medication to parents (Porter, 2000). Congress has gotten into the act, too. On September 9, 2000, the Education and Workforce Committee heard testimony about schools that were forcing parents to put kids on medication (Sack, 2000).

The behaviors associated with ADHD may be first observed or most troublesome in a classroom setting. Snider, Frankenberger, and Aspensen (2000) found that teachers were involved in making the initial referral nearly 40% of the time. This suggests that teachers play an important role in the initial screening for ADHD. In light of current concerns about

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**A**TENTION-DEFICIT/HYPERACTIVITY DISORDER (ADHD) is the most commonly diagnosed psychiatric disorder of childhood (National Institutes of Health [NIH] Consensus Statement, 1998). According to the *Diagnostic and Statistical Manual of Mental Disorders* (American Psychiatric Association, 1994), ADHD affects approximately 3% to 5% of school-age children. Children with ADHD are unable to stay focused on a task, cannot sit still, act without thinking, and rarely finish projects they begin at home or school. Children who have been diagnosed with ADHD are frequently treated with psychostimulant medications, most commonly methylphenidate (e.g., Ritalin; Frankenberger, Lozar, & Dallas, 1990; Kwasman, Tinsley, & Lepper, 1995; Reeve, 1990; Runnheim,

treatment of ADHD with stimulant medication, it is critical that teachers are knowledgeable and objective if they are to play a role in the diagnosis of ADHD.

A limited number of studies have examined teachers' knowledge about and attitudes toward the education of children with ADHD, but few have examined their knowledge of and attitudes toward its treatment with stimulant medications. Reid, Vasa, Maag, and Wright (1994) examined teachers' perceptions of instructional barriers and their self-efficacy in working with students with ADHD based on their previous training and experience. They found that teachers with more training and experience had more confidence than inexperienced teachers but that all identified important barriers to effective instruction, including lack of time to administer specialized interventions, lack of training, large class size, and severity of students' problems. Jerome, Gordon, and Hustler (1994) evaluated Canadian and U.S. teachers' knowledge of concepts related to ADHD and found that although teachers had little training regarding ADHD, they did well on knowledge-based questions regarding etiology and educational implications.

## STIMULANT MEDICATION AND ADHD

There is widespread agreement that ADHD is a valid diagnosis; however, there is no definitive neurological cause for it (NIH Consensus Statement, 1998) and no valid neurological or physiological test that can be used to diagnose ADHD (Agency for Health Care Policy and Research, 1999). Despite repeated reports in the press that a neurological cause for ADHD has been identified (e.g., Fine, 2001; MSNBC, 2000), there is no persuasive evidence that children diagnosed with ADHD differ from other children in any identifiable neurological or biochemical manner (NIH Consensus Report, 1998). A recent review of brain imaging studies suggested numerous problems with these studies, including small and heterogeneous samples, which prevent physicians from using them for diagnostic purposes (Hendren, DeBacker, & Pandina, 2000). The Agency for Health Care Policy and Research (AHCPR) found that medical screening tests were not useful for diagnostic purposes. These tests included measures of lead levels and thyroid function; imaging of the brain (computed tomography, computerized axial tomography, and magnetic resonance imaging); electroencephalograms; neurological screening tests; and continuous performance tests (Agency for Health Care Policy and Research, 1999). There is widespread agreement that stimulant medications ameliorate the symptoms associated with ADHD, but they do not treat the cause. The cause is generally unknown.

The medications used to treat ADHD, including Adderall, Ritalin, and Dexedrine, are classified as Schedule II drugs, which means that they have some therapeutic value but also some potential for abuse (NIH Consensus Statement, 1998). Production quotas for Schedule II drugs are regulated

by the Drug Enforcement Agency. Other Schedule II drugs with a similar potential for abuse include barbituates, codeine, and morphine. Although there is little information about the long-term effects of psychostimulants, there is no conclusive evidence that moderate, carefully monitored doses of stimulant medication are harmful (NIH Consensus Statement, 1998). Some children who take stimulant medication for the treatment of ADHD experience side effects. These include insomnia, reduced appetite, mood changes, weight loss, irritability, stomachaches, and headaches (Fitzpatrick, Klorman, Brumaghim, & Borgstedt, 1992; Swanson, McBurnett, Christian, & Wigal, 1995; Weiss & Hechtman, 1979). In addition, high doses have been associated with compulsive behaviors and in some cases with movement disorders or tics, although these side effects are infrequent (NIH Consensus Statement, 1998). Also, there is evidence that children build a tolerance to stimulant medication with prolonged use, which causes it to lose its effectiveness over time and may cause the side effects to increase (Doherty, Frankenberger, Fuhrer, & Snider, 2000; Moline & Frankenberger, 2001). Dosages must be carefully titrated to avoid harmful side effects and to maintain the drug's maximum effectiveness.

Although stimulant medication reduces the symptoms associated with ADHD, scientists are still unsure about how it works to reduce hyperactivity and sharpen focus. A common misconception is that stimulants have a different effect on individuals with ADHD than they do on the general population. This so-called paradoxical effect suggests that stimulants calm individuals with ADHD and energize people without ADHD. Because of this misconception, people reason that if a child's behavior improves after receiving medication, the diagnosis can be confirmed, but this is untrue. Children without ADHD respond to low doses of stimulant medication in the same way as children with ADHD (Pelouquin & Klorman, 1986). This suggests that stimulants do not have a paradoxical effect on children with ADHD and thus this reasoning cannot be used to verify a diagnosis.

There seems to be little doubt about the benefits to stimulant medication for treatment of the core ADHD symptoms of inattention, hyperactivity/impulsivity, and aggression for up to 1 year (Forness, Kavale, Sweeney, & Crenshaw, 1999; NIH Consensus Statement, 1998). The Multimodal Treatment Study of Children with ADHD (MTA) supports the benefits of stimulant drug therapy (MTA Cooperative Group, 1999). Although short-term trials of stimulants have supported their efficacy, stimulant treatments may not completely "normalize" children's behavior, meaning they may still experience a higher level of problem behaviors than average children. This may be related to the fact that ADHD is usually associated with one or more comorbid conditions (Barkley, 1996; Conners & Erhardt, 1998). In a technical review of current scientific evidence on the prevalence of ADHD, the AHCPR found that almost one third of children with ADHD also have more than one comorbid condition, including oppositional defiant disorder, conduct disorder, depressive disorder, anxiety disorder,

der, and learning disabilities (Agency for Health Care Policy and Research, 1999). A recent study reported that a learning disability was present in as many as 70% of the children diagnosed with ADHD in a clinical sample (Mayes, Calhoun, & Crowell, 2000).

There is some question about whether stimulant medication improves academic performance to the same extent that it corrects social and behavioral problems. Several researchers have suggested that there is little or no improvement for children with reading disorders who are treated with stimulant medication (Aman & Werry, 1982; Ballinger, Varley, & Nolen, 1984; Cooter, 1988; Gittleman, Klein, & Feingold, 1983), and there is no clear evidence that medication improves academic achievement in general (Alto & Frankenberg, 1994; Barkley & Cunningham, 1978; Frankenberg & Cannon, 1999; Weber, Frankenberg, & Heilman, 1992). Frankenberg and Cannon (1999) found that even after 4 years, children treated with stimulant medication did not demonstrate improvement in specific or broad areas of academic achievement. In fact, children seemed to fall further behind academically. A meta-analysis of all studies on stimulant medication between 1981 and 1995 revealed that effect sizes for behavior ( $ES = .72$ ) were larger than effect sizes for academics ( $ES = .46$ ; Crenshaw, Kavale, Forness, & Reeve, 1999; Forness, Kavale, & Crenshaw, 1999). In addition, results indicated greater improvement on academic measures such as percentage of work completed and accuracy of classroom assignments than on academic achievement tests.

Scientists' understanding of the nature of ADHD is incomplete, and implications for diagnosis and treatment are emerging continually. Because teachers are often the first ones to recognize the symptoms of ADHD, it is essential for them to draw upon a current and accurate knowledge base as they interact with parents, physicians, and other professionals.

## EXISTING PRACTICES IN IDENTIFICATION AND EVALUATION

Teachers play their most crucial role before any diagnosis is actually made by the family physician, psychiatrist, or pediatrician. According to Weber et al. (1992), children who are suspected of having ADHD are initially identified because of their behavioral and academic performance in the classroom. Studies conducted in schools repeatedly report the same sequence of events for many children referred for suspected ADHD. Teachers become aware of the students' difficulty in meeting the behavioral, attentional, and academic norms for the class and suggest the possibility of ADHD to parents (Percy, Clopton, & Pope, 1993; Runnheim et al., 1996; Weber, et al., 1992). Parents are concerned about their child's academic performance and behavior in the classroom and follow through with a referral to a physician. Referred students are frequently diagnosed as having ADHD by the physician

based on reports from the teachers and parents. Kwasman et al. (1995) reported that 39% of physicians telephoned the schools of children who had been referred for ADHD and 77% attempted to obtain a written report from the school. In the absence of independently valid tests for ADHD (NIH Consensus Statement, 1998), teacher referrals have become a significant factor in determining whether a child will be diagnosed with the disorder. If a teacher informs parents that the child should be evaluated for ADHD, that teacher is also likely to rate the child high on characteristics associated with the disorder. As a result of this circular procedure, children diagnosed with ADHD are viewed as having a medical disorder that must be treated by a physician.

Because teachers play such a pivotal role in the identification and treatment of ADHD, they need to be knowledgeable. However, past studies have revealed that special education teachers received little or no training on ADHD or issues related to stimulant drug therapy (Kasten, Coury, & Heron, 1992; Reid et al., 1994), and more recent studies suggest that this is still the case. Piccolo-Torsky and Waishwell (1998) reported that teachers in their sample had very little preservice training in the area of ADHD. Both general education teachers (Piccolo-Torsky & Waishwell, 1998) and special education teachers (Snider et al., 2000) have reported that they need more information about ADHD and the use of stimulant medication. This study addressed the following research questions: Are teachers knowledgeable about ADHD and its treatment with stimulant medication? What are teachers' opinions about the effect of stimulant medication on behavior and academic work in school? What professional experiences do teachers have with students who are diagnosed with ADHD?

## METHOD

### Participants

Participants for the study were 200 general education teachers and 200 special education teachers in Wisconsin. Their names were randomly selected by the Department of Public Instruction.

### Instrument

A four-page questionnaire was designed for the study. It was similar to previous surveys developed to explore teachers' knowledge and opinions about ADHD (Doherty et al., 2000; Reid et al., 1994; Runnheim et al., 1996) in that respondents were asked to rate statements using a 5-point Likert-type scale (1 = *strongly disagree*, 3 = *neutral, don't know*, 5 = *strongly agree*). However, it was uniquely designed around the specific research questions to reflect current knowledge about the nature of ADHD and treatment with stimulant medications. The survey began with eight demographic questions. The remaining three parts of the survey consisted of state-

ments to which teachers were asked to respond using the 5-point Likert-type scale. Part A of the survey consisted of 13 items to assess factual knowledge about ADHD and the use of stimulant medication. Although Part A assessed factual information, a Likert-type scale was used rather than a true/false format for two reasons: (a) to provide consistency in format throughout the survey and (b) to increase the probability that responses reflected knowledge (or lack of knowledge) rather than guessing. Part B consisted of 23 items that asked participants to indicate their views about the effects of stimulant medication on classroom behavior. Part C assessed teachers' experience and involvement with students who have ADHD. Teachers were also asked to indicate how they obtained information on ADHD by checking multiple-choice items and to specify the one source they used most frequently to obtain information. Similarly, they were asked to indicate who referred students for ADHD and name the one professional (e.g., school psychologist, teacher, parent) who most frequently referred students for ADHD. They were also asked to check which interventions they had used with students with ADHD.

The survey was pilot-tested on 15 teachers who participated in a graduate clinical experience at the university. The pilot-test confirmed that the survey took 10 to 15 minutes to complete. Minor changes in wording were made in response to written and verbal feedback from the pilot group.

### **Procedure**

The Department of Public Instruction generated the randomly selected names and provided mailing labels. A cover letter explaining the purpose of the study and assuring anonymity, a questionnaire, a return envelope, and a refrigerator magnet from the University of Wisconsin–Eau Claire were mailed to each participant. Approximately 2 weeks after the questionnaires had been mailed, follow-up postcards were mailed to thank participants and to remind them to return the survey. All surveys were mailed in September.

## **RESULTS**

### **Demographic Data**

Of the 400 surveys that were sent, 3 were returned as undeliverable and 145 were returned completed, for an overall response rate of 36.5%. The response rate for special educators was 43% ( $n = 86$ ) compared to 30% ( $n = 59$ ) for general educators. There were 29 male and 116 female respondents. Seventy-four of the teachers who completed the survey indicated that they taught elementary school, 40 taught middle or junior high school, and 50 taught high school. (The total exceeds the sample size because some teachers taught more than one level.) The teachers had a mean of 16.5 years of experience ( $SD = 9.46$ ) and a range of 1 to 36 years as a teacher. Fifty-two respondents had more than 20 years of

classroom experience. There were no significant correlations between years of experience and answers to items. All respondents indicated that they had experience with students who had been diagnosed with ADHD.

### **Factual Knowledge**

The percentage of teachers who correctly agreed or disagreed with statements on the 5-point Likert-type scale is shown in Table 1. Responses were determined to be correct on the basis of the NIH Consensus Statement (1998). Only 5 out of 13 items were answered correctly by more than half of the responding teachers. To determine whether the mean differences were significant between general and special educators, an analysis of variance (ANOVA) comparing means was completed. There were no statistically significant differences between general and special educators.

### **Opinions**

The means for the opinions of general education teachers and special education teachers are shown in Table 2. Many of the means were near 3 on the 5-point scale, indicating uncertainty or ambivalence among respondents. Teachers generally agreed that stimulant medication helped students diagnosed with ADHD behave better in the classroom, do better on seatwork assignments, improve grades, improve test performance, improve organizational skills, improve relationships with their peers, improve relationships with their teachers, improve attention in school, and learn more in school. They also agreed that professionals need more information about stimulant medications and their side effects. They disagreed that other methods of interventions are unnecessary, that most students with ADHD want to continue taking their stimulant medication, and that ADHD is underdiagnosed.

The opinions of general and special educators were compared using an ANOVA. Special educators were significantly more likely than general educators to agree that stimulant medication helps students diagnosed with ADHD improve grades,  $F(1, 135) = 6.0, p < .05$ ; improve test performance,  $F(1, 135) = 8.1, p < .01$ ; improve relationships with parents,  $F(1, 135) = 5.0, p < .05$ ; and learn more in school,  $F(1, 135) = 5.9, p < .05$ . General educators were significantly less likely to believe that students should remain on medication into adulthood,  $F(1, 135) = 4.2, p < .05$ , and they were less able to differentiate between ADHD hyperactive-impulsive versus inattentive type,  $F(1, 135) = 10.7, p < .01$ .

### **Experience**

The means for all teachers, general education teachers, and special education teachers are shown in Table 3. Seventy-eight percent of the teachers surveyed indicated that they attempt prereferral programs, and 73% indicated that they refer students who they believe exhibit symptoms of ADHD.

Eighty-eight percent agreed or strongly agreed that they could identify students who had not taken their medication, and 83% agreed or strongly agreed that their classroom is more manageable when students with ADHD are medicated. Sixty-four percent of the respondents indicated that they remind students to take their medication if they have forgotten. Forty-seven percent agreed that they were involved in assisting with the initial diagnosis of ADHD, and 51% agreed that they were involved in assessing the effectiveness of medication. Forty-five percent agreed that they frequently participate on teams that assess students for ADHD.

There were numerous differences in the experiences that general education teachers and special education teachers have had with students with ADHD. Special education teachers were more involved in assessing the effectiveness of medication,  $F(1, 139) = 5.8, p < .05$ , and participated more frequently on assessment teams,  $F(1, 139) = 8.7, p < .01$ . Special educators were more likely than general educators to agree that they could identify when students had not taken their medication,  $F(1, 139) = 6.3, p < .05$ , and were more likely to remind students to take their medication if they had forgotten to take it on their own,  $F(1, 139) = 6.9, p < .05$ . Special education teachers were also more likely than general educators to hear students attribute their successes to medication,  $F(1, 139) = 4.8, p < .05$ , or to hear students say something like, "I forgot my medicine this morning, so I don't have to behave today,"  $F(1, 139) = 9.1, p < .01$ .

Teachers were asked to indicate who most frequently recommended students for ADHD assessment. Again, they were instructed to check all that applied. Respondents named teachers (92%), parents (47%), school psychologists (46%), and physicians (33%). However, when respondents were asked to name the *one* group that recommended initial assessment the most, 64% indicated that teachers make the initial referral.

Teachers were also asked to indicate what sources they relied on for information about ADHD. Respondents were instructed to check all that applied. In-service training (80%), other professionals (66%), and parents of children with ADHD (57%) were the most frequently checked sources of information. Other sources of information included professional journals (48%); media (45%); professional organizations (40%); and the parent organization Children and Adults with Attention Deficit Disorder (17%). When teachers were asked to name the one source that they relied on most, 32% indicated other professionals, 25% indicated in-service training, and 12% indicated professional journals.

Finally, teachers were asked what interventions they had used with students with ADHD. Respondents were instructed to check all that applied. Communication with parents through parent-teacher conferences (87%), notes or phone calls home (82%), daily reports (75%), and consequences for misbehavior (78%) were the most frequent interventions. Other interventions included social skills training (65%), self-monitoring (55%), 504 plans (51%), and token economy (42%).

**TABLE 1. Percentage Correct for Teachers' Knowledge**

Item	Percentage correct
ADHD is the most commonly diagnosed psychiatric disorder of childhood. (True)	58
There are data to indicate that ADHD is caused by a brain malfunction. (False)	10
ADHD symptoms (e.g., fidgets, does not follow through on instruction, easily distracted) may be caused by academic deficits. (True)	63
Stress and conflict in the student's home life can cause ADHD symptoms. (True)	71
Diagnosis of ADHD can be confirmed if stimulant medication improves the child's attention. (False)	33
Stimulant medication use may decrease the physical growth rate (i.e., height) of students. (True)	38
Stimulant medication use may produce tics in students. (True)	45
Adderall, Ritalin, and Dexedrine have abuse potential similar to Demerol, cocaine, and morphine. (True)	46
The long-term side effects of stimulant medications are well understood. (False)	67
Over time, stimulant medication loses its effectiveness. (True)	46
While on stimulant medication, students exhibit similar amounts of problem behaviors as their normally developing peers. (False)	27
Short-term studies show that stimulant medication improves the behaviors associated with ADHD. (True)	86
Studies show that stimulant medication has a positive effect on academic achievement in the long run. (False)	6

*Note.* Statements were rated using a 5-point Likert-type scale (1 = *strongly disagree* to 5 = *strongly agree*). Percentage correct indicates percentage of respondents who answered 4 or 5 to an item that was true and 1 or 2 to an item that was false.

## DISCUSSION

The teachers who responded to this survey had less knowledge about ADHD and the use of stimulant medication than one would expect considering their pivotal role in the recognition and treatment of ADHD. These results differed from those of Jerome et al. (1994), who found that teachers did well on knowledge-based questions about ADHD. These differences can be explained by the type of questions asked in

**TABLE 2. Means and Standard Deviations for Teachers' Opinions**

Item	All teachers		General educators		Special educators	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Taking stimulant medication helps students diagnosed with ADHD behave better in the classroom.	3.93	.68	3.95	.72	3.90	.64
Taking stimulant medication helps students diagnosed with ADHD do better on seatwork and homework assignments.	3.83	.71	3.70	.81	3.93	.61
Taking stimulant medication help students diagnosed with ADHD improve their cognitive and language functioning in the long run.	3.17	.83	3.05	.86	3.26	.79
Taking stimulant medication helps students diagnosed with ADHD improve their grades.	3.59	.78	3.39	.90	3.70*	.66
Taking stimulant medication helps students diagnosed with ADHD improve their test performance.	3.62	.72	3.40	.80	3.74**	.63
Taking stimulant medication helps students diagnosed with ADHD improve their organizational skills.	3.61	.85	3.73	.84	3.56	.82
Taking stimulant medication helps students diagnosed with ADHD improve their relationships with their peers.	3.58	.77	3.50	.81	3.61	.74
Taking stimulant medication helps students diagnosed with ADHD improve their relationships with their parents.	3.42	.78	3.21	.77	3.53*	.78
Taking stimulant medication helps students diagnosed with ADHD improve their relationships with their teachers.	3.64	.80	3.55	.89	3.72	1.71
Taking stimulant medication helps students diagnosed with ADHD improve their attention at school.	4.13	.58	4.07	.57	4.16	.60
Taking stimulant medication helps students diagnosed with ADHD learn more in school.	3.61	.81	3.39	.86	3.74*	.74
Too many students receive stimulant medication for ADHD.	3.27	1.01	3.36	.86	3.91	1.09
Abuse of stimulant medication in schools is common.	2.92	1.03	2.96	1.03	2.89	1.01
If a student is receiving stimulant medication, other methods of interventions are unnecessary.	1.66	.87	1.70	.69	1.65	1.00
Students on stimulant medication should remain on medication into adulthood.	2.68	.84	2.51	.81	2.80*	.79
Most students with ADHD want to continue taking their stimulant medication.	2.45	.85	2.55	.76	2.38	.91
ADHD is underdiagnosed in the school-age population.	2.28	.91	2.39	.93	2.24	.91
Professionals (school psychologists, speech–language pathologists, school nurses, teachers, etc.) need more information about stimulant medications and their side effects.	4.18	.63	4.21	.62	4.17	.63
I can accurately identify students with ADHD prior to formal assessment.	2.97	.99	2.98	.96	3.05	.97
I can tell the difference between ADHD hyperactive–impulsive and inattentive types.	3.18	1.07	2.88	1.17	3.43**	.89
Stimulant medication works equally well for ADHD hyperactive–impulsive and inattentive types.	2.73	.79	2.75	.84	2.69	.77
High doses of stimulant medication can improve behavior but may impair creative thinking or learning.	3.24	.81	3.25	.75	3.25	.85
High doses of stimulant medication can improve both behavior and creative thinking or learning.	2.80	.79	2.80	.77	2.78	.81

Note. Statements were rated using a 5-point Likert-type scale (1 = *strongly disagree* to 5 = *strongly agree*).

**TABLE 3. Means and Standard Deviations for Teachers' Experience**

Item	All teachers		General educators		Special educators	
	M	SD	M	SD	M	SD
I attempt prereferral programs or intervention with students who are displaying ADHD-like symptoms.	3.99	.75	3.95	.68	3.99	.79
I refer students for evaluation if I believe they are exhibiting ADHD symptoms.	3.70	.84	3.85	.78	3.59	.87
I am involved in assisting with the initial diagnosis of ADHD.	3.31	1.00	3.25	1.06	3.36	.94
I am involved in assessing the effectiveness of stimulant medication for the treatment of ADHD.	3.27	1.09	3.0	1.07	3.46*	1.06
I can identify when a student has not taken his or her medication.	4.06	.71	3.88	.89	4.19*	.53
I frequently participate on multi- or interdisciplinary teams that assess students for ADHD.	3.28	1.08	2.98	1.1	3.51**	1.01
My classroom is more manageable when my students with ADHD have taken their medication.	3.92	.81	3.92	.86	3.91	.79
I have heard of students in my district selling or giving away their stimulant medication.	2.47	1.25	2.32	1.07	2.54	1.34
I have heard students attribute their successes (e.g., academic, social) to their medication.	3.10	1.02	2.88	.93	3.26*	1.06
I have heard students say things like, "I forgot my medicine this morning, so I don't have to behave today!"	3.16	1.19	2.81	1.05	3.42**	1.20
I remind students diagnosed with ADHD to take their medication if I think they have forgotten to take it on their own.	3.62	.96	3.40	.97	3.78*	.94

Note. Statements were rated using a 5-point Likert-type scale (1 = *strongly disagree* to 5 = *strongly agree*).

the two studies. Jerome et al. asked questions related to basic concepts of ADHD, whereas the current study focused on the effects of stimulant medication.

There were no differences between general and special educators on the factual items. This may reflect the fact that general and special educators get their information (or misinformation) from similar sources—primarily colleagues, parents, and in-service workshops.

Although teachers knew that the long-term effects of stimulant medication were not well understood, they were surprisingly uninformed about the risks of stimulant medication. Most were unaware of the possible side effects of stimulant medication, especially the possibility of decreased growth rate and increased risk of tics. Fewer than half knew that stimulant drugs such as Adderall, Ritalin, and Dexedrine have abuse potential similar to Demerol, cocaine, and morphine. If teachers knew more about the side effects, perhaps they could more carefully weigh the pros and cons of pharmacological solutions for behavior problems.

Another misconception was the belief that the diagnosis of ADHD can be confirmed if the child's behavior improves as a result of taking stimulant medication. In fact, stimulant medication improves behavior, attention, and concentration

for children without ADHD in the same way that it does for children diagnosed with ADHD (Peloguin & Klorman, 1986). If a child's behavior improves as a result of the diagnosis of ADHD and subsequent stimulant drug therapy, teachers may incorrectly assume that a disorder with a neurological basis has been confirmed. This sense of validation may bolster their confidence and contribute to an escalating cycle of referrals.

Although there were no differences between general and special educators' factual knowledge, their opinions about the benefits of stimulant medication on school performance differed. General educators were more skeptical about whether medication could improve grades, test performance, learning, or relationships with parents.

Although students with ADHD have reported that stimulant medication helps them do better on tests, do homework after school, do well in school, be more organized at school, and pay better attention during the school day (Doherty et al., 2000), research has suggested that stimulant medication does not have measurable long-term benefits in terms of academic achievement (Frankenberger & Cannon, 1999; NIH Consensus Statement, 1998). One would think that if grades, organization, homework completion, and test performance

improved, there would be a corresponding increase in learning. This discrepancy could be caused by our imperfect ways of measuring learning; researchers have, as yet, been unable to measure actual gains in achievement. It could be that stimulant medication does improve study and test-taking behaviors but improvement in this area is insufficient to translate into long-term academic gains. It could be that short-term improvements in work habits provide the expectation for long-term achievement gains. Or perhaps students' improvement in school-related behavior is due more to teachers' wishful thinking than to actual improvement. As Matt, an adolescent who is no longer taking Ritalin, observed, "Ritalin can't help you with everything. I mean, if you're not an organized person, Ritalin's not going to organize [you]" (Morrow Report, 1995). Although there is no evidence to either confirm or refute the idea that stimulant medication improves organization, study habits, grades, and interpersonal relationships, it seems optimistic to assume that a pill could undo years of poor work habits or reverse the cumulative effects of academic underachievement without other interventions occurring as well.

One of the most interesting findings of this study was the extent to which teachers were involved in the referral and diagnosis of students suspected to have ADHD. Special educators tended to be more involved in this process than general educators. Two thirds of the teachers in this study indicated that teachers were the first to recommend that a child be evaluated for ADHD. This confirms previous research indicating that as many as 40% to 60% of initial referrals come from teachers (Frankenberger et al., 1990; Runnheim et al., 1996; Weber et al., 1992). This is also consistent with the perceptions of other school professionals. When speech and language clinicians and school nurses were asked to identify the professional who first recommended assessment for ADHD, 74% of speech and language clinicians and 80% of school nurses said that teachers were the first ones to suggest an assessment for ADHD (Parker & Frankenberger, 2000). School psychologists reported that teachers were responsible for initiating the referral process for cases of suspected ADHD 77% of the time (Frankenberger, Farmer, Parker, & Cermak, 2001).

### **Practical Implications**

Issues related to referral for assessment of ADHD may present a dilemma for teachers. Specific additions to the content of teacher education programs and continuing education can provide teachers with useful knowledge that will broaden their perspectives about ADHD. Specific suggestions include (a) providing more information on psychopharmacology, (b) training teachers in behavioral assessment and specialized interventions, (c) helping teachers understand the ambiguities associated with the diagnosis of ADHD, and (d) providing more opportunities for teachers to read and evaluate empirical research.

**Psychopharmacology.** Previous estimates have suggested that 2% to 3% of all school-age children may be on one or more medications at any time and that 15% to 20% of children in special education take one or more drugs regularly (Barkley, 1977, 1990; Forness & Kavale, 1988). In light of increases in methylphenidate and amphetamine production during the past decade (U.S. Drug Enforcement Administration, 2002), it is likely that these numbers have increased. Knowledge about the categories of medication, the probable indications and contraindications, and beneficial and known side effects of common drugs should be included as part of every teacher education curriculum.

**Behavioral Assessment and Intervention.** It is important for teachers to be aware that inattention or inappropriate behavior may be explained by factors other than ADHD. Many of the behaviors that teachers interpret as symptoms of ADHD may actually be behaviors that are maintained by the need to obtain something (e.g., attention from teacher or peers) or to avoid something (e.g., school tasks; O'Neil et al., 1997). Inattention is certainly a common and understandable response to the inability to complete school tasks. These powerful determinants of problem behavior must be ruled out before considering ADHD. A behavioral assessment followed by reasonable interventions should be sufficient to address many classroom behaviors without a referral for ADHD. Teachers in this study and others (e.g., Jerome et al., 1994) agreed that even if a student is receiving stimulant medication, other methods of interventions are still necessary; however, the interventions teachers indicated they used were limited. The most frequently mentioned interventions were communication with parents and punishment. Proactive or aggressive interventions, such as social skills training and self-monitoring, were less common, and only 42% of the respondents had used a token economy with children with ADHD. Other researchers have observed that general education teachers may lack the training in specific techniques to meet the needs of children and youth with disabilities (Roberts & Mather, 1995) and that they are often inconsistent in management strategies (Smith, Young, West, Morgan, & Rhode, 1988). Both general and special education teachers must be able to distinguish misbehavior from a psychiatric disorder and have the skills to use a variety of cognitive and behavioral interventions for routine misbehavior. With rates of ADHD approaching 20% of the children in schools (LeFever & Dawson, 1999), there is reason to suspect that not all the children diagnosed actually have a psychiatric disorder.

**ADHD Diagnosis.** A diagnosis of ADHD is thought to explain a cause when in fact it does nothing more than describe a set of symptoms that include inattention, hyperactivity, and impulsivity (e.g., Why is Johnny inattentive? Because he has ADHD. Why does he have ADHD? Because he is inattentive.) When the explanation is circular, the pre-

sumed cause is sometimes called “explanatory fiction” (Michael, 1993, p. 53). This often happens when a cause cannot be observed independent of the effect that it is supposed to explain.

Unnecessary referrals could be avoided if more teachers understood this important concept. ADHD has no known cause or cure, so there is no valid independent way of diagnosing it. Teachers must be especially sensitive to ambiguities in the diagnosis of ADHD because the treatment often involves powerful stimulant drugs.

**Emphasis on Research.** Only 12% of the teachers surveyed relied on journals as their primary source of information about ADHD. Some teachers may not have learned how to be critical consumers of research or may not have time to keep up with professional journals. This lack of reliance on the professional literature for information may also reflect some ambivalence in the field of education about the value of empirical data.

One of the challenges faced by the teaching profession today is how to become a more research-based discipline. Unlike other professions, such as medicine, education has been slow to evolve to a point where educational decisions are based on research rather than on what is popular or what feels good (Carnine, 1999, 2000). There seems to be a disconnect between research and practice. Spear-Swerling and Sternberg (2001), for example, lamented the research-to-practice gap in reading research and suggested 10 things teachers could do to let research inform their reading instruction. The same applies to issues surrounding the diagnosis and treatment of ADHD. Teachers’ lack of knowledge about ADHD in light of their central role in referral and diagnosis and the increasing numbers of students diagnosed with ADHD suggests that this is an area where teachers could increase their reliance on research knowledge to inform and guide their professional decisions.

### Limitations

A significant limitation of this study was the possibility of sample bias. The respondents were all from Wisconsin, which may not be representative of the rest of the country. However, in a national survey of teachers of students with learning disabilities, there were no significant differences between responses in Wisconsin and those in other states (Snider et al., 2000). The low response rate of 36.5% was also disappointing. This study was one part of an interdisciplinary study to examine knowledge and attitudes among school professionals, including speech and language clinicians, school psychologists, and school nurses. All surveys were of a similar length, mailing procedures were identical, and all were sent at the same time. The response rate was 51% for speech and language clinicians, 64% for school psychologists, and 48% for school nurses. The response rate for teachers was inexplicably lower than for the other disciplines.

A final limitation of the study is the questionable validity of the survey instrument. First, using a 5-point scale, rather than a 4-point scale, may have contributed to the neutral responses. Also, some of the questions may have been ambiguous or misleading. For example, one item, “There are data to indicate that ADHD is caused by a brain malfunction,” was meant to be a false statement because there are no convincing, reliable data suggesting a single cause; however, some studies have found evidence of neurological involvement, which could make the statement true.

### Conclusions

This study suggested that teachers have a positive opinion about the effects of medication on school-related behavior; however, they have limited knowledge about ADHD and its treatment with stimulant drug medication. Teachers have a responsibility to stay abreast of current research knowledge because they are key players in the initial screening and diagnosis. Because of the circular nature of the referral and diagnostic process, a referral will often result in a diagnosis and treatment with stimulant drug medication. To ensure that only an appropriate population of children is identified with ADHD, preservice and in-service courses should provide information on pharmacological and behavioral interventions and emphasize the difficulty of diagnosing psychiatric disorders. In these and other contexts, teacher educators and in-service trainers should provide opportunities to read and discuss research so that teachers become comfortable with empirical data. Finally, all educators should remember that there is no substitute for a well-conceived educational program that effectively addresses a child’s complete academic and social needs. ■

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