

Does Knowledge About Attention-Deficit/Hyperactivity Disorder Impact Teachers' Reported Behaviors and Perceptions?

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This study surveyed elementary school teachers in Melbourne, Australia to investigate their knowledge about attention-deficit/hyperactivity disorder (ADHD) and its impact on their reported behavior toward and perceptions of children with ADHD. Consistent with previous international findings, teachers demonstrated good overall knowledge about ADHD, with strengths in knowledge of symptoms/diagnosis and weaknesses in knowledge of causes and treatments. To investigate how knowledge impacted reported behaviors and perceptions, teachers also read vignettes of children with ADHD symptoms and rated their reactions to these children. In general, teachers with high, and to some extent average, knowledge about ADHD reported more helpful behaviors (e.g., help-seeking for their students) and perceptions (e.g., perceive the benefit of behavioral and educational treatments). However, teachers with high and average knowledge also predicted that these children would be more disruptive in the classroom, and reported having less confidence in their ability to manage these children. Implications and need for future research are discussed.

Keywords: ADHD, teachers knowledge, elementary school

Attention-deficit/hyperactivity disorder (ADHD) is defined by persistent and elevated levels of inattention and/or hyperactivity-impulsivity (American Psychiatric Association [APA], 2000). With a relatively high prevalence rate of 3% to 8% in English-speaking countries (e.g., APA, 2000; Cuffe, Moore, & McKeown, 2005; Graetz, Sawyer, Hazell, Arney, & Baghurst, 2001; Neuman et al., 2005), elementary school teachers who have class sizes in excess of 20 students likely encounter at least one student with ADHD in their classroom each year. Having a child with ADHD in the classroom can present several challenges to teachers. The student's difficulties with sustained attention, controlling impulses, and staying seated often result in academic problems, social skills deficits, and peer and adult conflicts, paving the road to behavior and emotional problems (e.g.,

APA, 2000; Barkley, 1998, 2006). Thus, many teachers may be unprepared to effectively manage the academic, social, and emotional needs of these children. Nevertheless, teachers often make recommendations about ADHD to parents that, correct or incorrect, parents tend to follow (DiBattista & Shepherd, 1993).

For these reasons, an increasing amount of research worldwide has been aimed at assessing teachers' knowledge about ADHD (e.g., Bekle, 2004; Scitutto, Nolfi, & Bluhm, 2004; West, Taylor, Houghton, & Hudyma, 2005). The first aim of the present investigation is to contribute to this important body of work by examining teachers' knowledge about ADHD in a relatively large sample of teachers in Melbourne, Australia. The second and novel aim of the present study is to examine the impact of teachers' ADHD knowledge on their reported behavior toward and perceptions of children with ADHD. Much of the research on teachers' knowledge about ADHD has assumed that ADHD knowledge impacts teachers' attitudes and behaviors toward students with ADHD. This assumption seems sound and has led some ADHD experts to emphasize urgent provision of sufficient resources and training to impart teachers with adequate knowledge and skills

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about ADHD (e.g., Barkley, 2006). Indeed, there are compelling arguments to support the contention that teachers' knowledge about ADHD would impact their behavior and attitudes. To begin with, teachers are often the first to notice and refer children with ADHD for assessment and treatment (Vereb & DiPerna, 2004); thus, teachers who lack knowledge about ADHD might fail to notice warning signs in children requiring assistance. In addition, teachers are also frequently expected to implement, evaluate, and support treatments for children with ADHD (Hawkins, Martin, Blanchard, & Brady, 1991), and their knowledge (or misinformation) about effective ADHD treatments may, therefore, impact their support of these treatments. Although these arguments seem sound and intuitive, the impact of teachers' knowledge on behavior and perceptions has been largely untested.

What Do Teachers Know About ADHD?

An accruing body of worldwide research indicates that teachers have a good knowledge base about ADHD, with weaknesses in some specific areas. In North America, Jerome et al. (1994) surveyed American (from New York State and Florida) and Canadian (from Ontario) elementary school teachers using their own 19-item true/false scale to assess teachers' general knowledge of ADHD. Canadian and American teachers both displayed moderate levels of overall ADHD knowledge (Canadian teachers, 78%; American teachers, 77%). However, considering that this is a true/false measure, these results must be viewed in light of a 50% chance correct rate. In both countries, teachers were strong at identifying symptoms of ADHD, but were relatively weak in their knowledge of treatment. For example, two thirds of teachers incorrectly reported that dietary strategies, including reducing sugar intake, are effective in treating ADHD.

Other researchers in the United States have used different assessment scales, but have found surprisingly similar results. For example, Sciotto, Terjesen, and Bender Frank (2000) surveyed New York elementary school teachers' knowledge of ADHD using the Knowledge of Attention Deficit Disorders Scale (KADDS), which assesses knowledge of ADHD symptoms/diagnosis, treatment, and general informa-

tion in a true/false/don't know option format. Overall, teachers scored 48% correct (chance is 33% correct). As with Jerome et al. (1994), teachers knew more about the symptoms/diagnosis of ADHD (62% correct), and less about general information and treatment of ADHD (43% correct). These findings were mirrored in a recent study in Philadelphia that used the same instrument (Herbert, Crittenden, & Dalrymple, 2004). Finally, recent research by Vereb and DiPerna (2004) surveyed elementary teachers in Pennsylvania and New Jersey using the Knowledge of ADHD Rating Evaluation (KARE), which assesses ADHD core knowledge and treatments using a true/false/don't know format. On average, teachers scored well on their core knowledge of ADHD (70%), but less so on treatment knowledge (54%). Thus, taken together, studies suggest North American teachers may be able to identify symptoms of ADHD, but are deficient in ADHD treatment knowledge.

Studies outside of North America have suggested that teachers in Australia and New Zealand may have a similar ADHD knowledge base. For example, on the Jerome et al. (1994) true/false questionnaire, a recent sample of teachers in New Zealand scored 76% (Curtis, Pisecco, Hamilton, & Moore, 2006), very similar to the 77% to 78% from North America (Jerome et al., 1994). Studies in Australia suggest that teachers' knowledge base may be somewhat better there, although the representativeness of these samples may influence results. For example, teachers from Perth, Australia scored 83% on the Jerome et al. scale (Bekle, 2004), although a very small sample size ($n = 30$), and a very low participation rate (20%) make generalizability a problem. Moreover, on a 3-response choice scale (true/false/don't know) that used items from both Jerome et al. (1994) and the KADDS, Kos et al. (2004) found an overall correct response score of 61%, which appears somewhat higher than averages of about 48% on similar scales in North America (e.g., Herbert et al., 2000; Sciotto et al., 2000). However, this sample was comprised of teachers from Catholic and private schools, whose knowledge may not be representative of public school teachers or teachers overall. Finally, West et al. (2005) used a similar modified KADDS scale and found that elementary school teachers in Perth, Australia answered 56% of

the items correctly. However, some of these teachers included those who were attending professional development sessions on ADHD, which is likely to have inflated accuracy. Regardless, in both samples, Australian teachers showed the same pattern of knowledge as North American teachers, with relatively strong knowledge of symptoms/diagnosis, but weaker knowledge of treatments. For example, West et al. (2005) found that just 34% of teachers knew that diet changes were not an effective treatment for ADHD.

How Does Teachers' Knowledge About ADHD Impact Their Behavior and Perceptions?

Although the above research indicates that teachers are generally familiar with symptoms/diagnosis of ADHD, this research does not provide insight into how teachers' knowledge impacts their conduct in the classroom. Considering the potential implications of this research for teachers' training, and the implicit and logical assumption that knowledge impacts behavior and attitudes (e.g., Barkley, 2006), surprisingly little research has been conducted on this topic, and what has been done has yielded mixed results. For example, Bekle (2004) recently asked practicing and student teachers in Perth, Australia, to complete Jerome et al.'s (2004) ADHD knowledge questionnaire, and then to rate how favorable they view students with ADHD on a scale from "unfavorable" to "favorable." In both samples, participants who knew more about ADHD viewed students with ADHD more favorably. Although this rating of favorable attitudes was vaguely defined, the results nonetheless suggest that an ADHD knowledge-attitude link might exist for elementary school teachers.

In contrast, Scitutto et al. (2004) failed to find a link between ADHD knowledge and teachers' reported behaviors and perceptions. They asked elementary school teachers from northeastern Ohio to complete the KADDS and to evaluate a series of fictitious report cards that described concerns about inattentive, hyperactive, or hyperactive plus aggressive behavior. Although the vignettes did not contain information that would be diagnostic of ADHD, many of the concerns described were consistent with ADHD. Teachers' ratings of how disruptive

they thought the child would be in their classroom, and how likely they would be to refer the child for professional services were not significantly related to teachers' overall knowledge of ADHD. One possibility is that teachers' knowledge does not impact their referrals or perceptions of children with ADHD. However, it is also possible that the vignettes used were not descriptive enough of ADHD, as each vignette included only a few comments about ADHD symptoms at the end of the report card. Regardless, this prompts the need for a more thorough investigation of the intriguing relationship between teachers' knowledge and behavior.

Current Study

Teachers' knowledge about ADHD clearly has the potential to impact students with ADHD in numerous ways, such as through an increased likelihood that a teacher will seek professional consultation, as well as the likelihood that they teacher will be supportive of behavioral treatments in the classroom. However, research both on teachers' knowledge and its impact on students is relatively scarce, and sample sizes have often been modest, thus making generalizations about these issues difficult. To address these issues, the present study has a dual purpose of contributing to the international research on teachers' knowledge of ADHD, as well as addressing the question of how this knowledge is related to teachers' reported behaviors toward and expectations of students with ADHD.

Method

Participants

Participants were 140 primary (elementary) school teachers (119 female) who were teaching in the greater metropolitan area of Melbourne, Australia (kindergarten through Grade 6). Teachers were aged 42.33 years ($SD = 9.87$; range = 23.00–65.00), and had 19.76 years of teaching experience ($SD = 9.76$; range = 3.00–43.00) on average. All teachers reported experience teaching at least one student with ADHD, with over half instructing 20 or more students with ADHD (range = 1 to over 50). The majority of teachers (89.30%) said that they had recommended and/or sought services on behalf of one or more of these children. Teachers were

predominantly of Caucasian descent ($n = 88$), with 2 teachers of Asian descent, 1 Maori (Aboriginal), and the remaining 10 not reporting their ethnicity.

Measures

Demographic and background questions. Modeled after questions asked by Jerome et al. (1994), the first section of the survey contained demographic questions (i.e., age, gender, education), teaching experience (number of years taught, grades taught), and teachers' experience instructing a child with ADHD (number of students with ADHD taught, and number of students for whom the teacher has sought out professional services).

ADHD Knowledge Scale (Jerome et al., 1994). This 20-item self-report questionnaire developed by Jerome and colleagues (1994) assesses teachers' knowledge of ADHD. In this questionnaire, teachers are asked to read each item and then rate it true or false. Questions assess knowledge of biological factors in ADHD, family influences, medical and educational interventions, and myths. In this study, 19 of the 20 items were included. The sole item that was excluded, "ADHD occurs more in minority groups than in Caucasian groups" (false), was done so due to ethics committee's concerns that failure to provide teachers with immediate accurate feedback on this item may lead some teachers to interpret the item as "true" and impact their subsequent behavior toward children of different ethnic backgrounds. Because it was not possible to provide teachers with immediate feedback without biasing the results of other teachers at that school, this item was omitted. In total, 12 items are reverse-scored (i.e., true receives a "0" score), and a total score is calculated by summing the number of correct responses.

As noted above, the Jerome et al. (1994) scale does have limitations, such as offering only True/False response options. That said, we chose to use it as our measure of teacher knowledge because it offers several important benefits. First, it is brief, which we felt would increase teacher participation and, therefore, the generalizability of our results. Second, it has been widely used in past studies, thereby allowing us to directly compare results to those in the existing literature. Finally, unlike comparable

knowledge scales, it has shown good validity (e.g., utility and sensitivity as a measurement of the impact of teacher education on knowledge).

Vignettes. Participants were given 10 vignettes describing children with inattentive and hyperactive-impulsive behavior, with and without accompanying disruptive behaviors. For half of participants, child names in the vignettes were male, and for the other half, the names were female. Thus, all participants received identical vignettes except for the gender of the child name (e.g., Alexander-Alexandra, Eric-Erica) and pronouns. Each vignette was between 155 and 165 words long, and described an elementary-school aged child who clearly met *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)* symptom criteria for ADHD. To ensure that vignettes described children who clearly met *DSM-IV* ADHD symptom criteria, one clinical psychology graduate student, two undergraduate psychology students, and the first author reviewed each vignette independently and revised them where necessary to ensure that all raters agreed on the number and types of symptoms present and that these met *DSM-IV* symptom criteria. Following each vignette, participants were asked to make nine ratings on 9-point Likert scales reflecting important areas of teachers' behavior toward and perceptions of children with ADHD: likelihood of seeking assessment and perceived benefit of professional service seeking, perceived benefit of common ADHD treatments (medication, learning assistance/educational support, and behavior therapy at home), and expectations of teaching a child with ADHD (disruption to classroom, disruption to peers and social relationships, and teachers' confidence in managing the child's symptoms). A sample vignette with the nine questions is offered in Appendix 1.

Teachers' ratings for each of the nine questions were then averaged across the 10 vignettes and these mean ratings served as the nine dependent variables. Internal consistencies across the 10 vignettes were excellent for the nine items, ranging from a low of .87 (for ratings of benefit of medication) to a high of .93 (for ratings of likelihood of help-seeking). Almost all teachers completed the ratings for all 10 vignettes; however, those with more than 10% missing data on any item (i.e., did not complete

more than one vignette) were excluded from ensuing analyses.

Procedure

This study was approved by our university’s ethics committee and regional public school board. First, principals at randomly chosen Melbourne-area schools were contacted and the study was explained. Despite best efforts, one principal was not available for contact. Of contacted principals, 30 of 36 (83%) agreed to have his or her school participate. After this consent was obtained, teachers at participating schools were invited to participate via letters (with the attached survey) placed in their in-boxes at work. Teachers’ participation rate was 63.97%. All participating schools and the school districts were given a copy of the study results.

Results

We used a two-step approach for data analyses. First, we inspected the distribution of teachers’ knowledge on the Jerome scale. Second, we

used this information to divide teachers into groups according to their level of knowledge. These groups were used to test for the impact of knowledge on teachers’ reported reactions and perceptions using multivariate analysis of variance (MANOVA) models.

Distribution of Knowledge

Frequency of correct and incorrect responses. We began by inspecting the frequency of correct and incorrect responses to the Jerome scale. The percent of teachers answering an item correctly ranged greatly, from almost no teachers getting the correct response (only 13.00% correctly thought that altering a child’s diet would not be an effective ADHD treatment), to almost all teachers responding correctly (93.56% knew that fluctuating educational performance did not contra-indicate an ADHD diagnosis). For a full listing of the frequencies of correct and incorrect responses, please refer to Table 1.

On average, teachers scored correct on 76.34% of items, median = 14.00 (73.68%

Table 1
Jerome Attention-Deficit/Hyperactivity Disorder (ADHD) Knowledge Scale Items With the Frequency of Teachers’ True/False Endorsement

Questionnaire Item	Frequency (%)	
	True	False
ADHD can be caused by poor parenting practices	21.2	78.8*
ADHD can often be caused by sugar or food additives	73.0	27.0*
ADHD girls/boys are born with biological vulnerabilities toward inattention and poor self-control	79.5*	20.5
A girl/boy can be appropriately labeled as ADHD and not necessarily be over-active	79.8*	20.2
ADHD girls/boys always need a quiet, sterile environment in order to concentrate on tasks	24.2	75.8*
ADHD girls/boys misbehave primarily because they don’t want to follow rules and complete assignments	8.9	91.9*
The inattention of girls/boys with ADHD is not primarily a consequence of defiance, oppositionality, and an unwillingness to please others	78.5*	21.5
ADHD is a medical disorder that can only be treated with medication	23.8	76.2*
ADHD girls/boys could do better if they only would try harder	8.8	91.2*
Most ADHD girls/boys outgrow their disorder and are normal as adults	42.7	57.3*
ADHD can be inherited	62.0*	38.0
ADHD is extremely rare in girls/boys	23.2	76.8*
If medication is prescribed, educational interventions are often unnecessary	9.4	90.6*
If a girl/boy can get excellent grades one day and awful grades the next, the he/she must not have ADHD	6.4	93.6*
Diets are usually not helpful in treating most girls/boys with ADHD	13.0*	87.0
If a girl/boy can play Nintendo for hours, she/he probably isn’t ADHD	11.9	88.1*
ADHD girls/boys have a high risk for becoming delinquent as teenagers	50.4*	49.6
ADHD girls/boys are typically better behaved in 1-to-1 interactions than in a group situation	85.0%	15.0
ADHD often results from a chaotic, dysfunctional family life	14.5	85.5*

* indicates correct response.

correct); mode = 15.00 (78.95% correct). The distribution approached normality, with a slight negative skew (skewness estimate = $-.46$) but flattening of the distribution (kurtosis estimate = $-.53$).

Dividing teachers into knowledge groups. In order to best determine the how teachers' knowledge and their reported behaviors and perceptions relate, we grouped teachers based on their knowledge of ADHD and took a mean group-difference approach to analysis. Thus, we did not conduct correlations between teachers' ADHD knowledge and their reported behaviors and perceptions of these children with ADHD because this would assume a linear relation between knowledge and reported behavior and perceptions.

In order to form groups of teachers with low, average, and high knowledge of ADHD, upper and lower quartiles were calculated. Although exact divisions were not possible due to the number of teachers receiving the same score, approximate upper and lower quartile groups were created. Upper (high knowledge group) and lower (low knowledge group) quartiles with an interquartile range (average knowledge group) were used primarily because inspection of the kurtosis of the data indicated that this was a good approach for defining groups (e.g., a flattening of scores at the extremes after the quartile cut-off was seen which was not true of a tertile split; this flattening at around the quartile is what appeared to be the reason for the kurtosis of the distribution; Altman & Bland, 1994). Teachers in the "high" knowledge group had a score of over 15.00 (about 80% correct or better; $n = 32$, or about 23% of teachers); teachers in the "average" knowledge group scored between 13.00 and 15.00 (about 70% to 80% correct; $n = 66$, or about 47% of teachers); and teachers in the "low" knowledge group had scores of less than 13.00 (about 69% or lower correct; $n = 42$ or about 29% of teachers).

Relationship between teachers' ADHD knowledge and demographic questions. There was no significant impact of teachers' gender on ADHD knowledge, $t(1, 130) = 1.46, p = .15$. Correlations between teachers' knowledge and teaching-related experience were also not significant (years of experience, $r(138) = .05, p > .60$; number of students with ADHD that teacher has instructed, $r(138) = .16, p > .15$; and number of students for whom teacher has

sought or recommended ADHD services, $r(138) = .10, p > .27$. In sum, these results suggested that covariates were not necessary in the ensuing analyses.

Teachers' Knowledge and Teachers' Reported Behaviors and Perceptions

General approach to data analysis. In order to test how teachers' ratings of their behavior toward and perceptions of vignettes depicting children with ADHD behavior differed based on their knowledge of children with ADHD, we organized the nine dependent variables into three families for MANOVAs: assessment (two items assessing perceived benefit of assessment, and reports of seeking or encouraging assessment), benefit of common treatments (four items assessing perceived benefit of medication, classroom management strategies, learning/educational assistance, and home-based behavior modification), and expectations of teaching the child depicted (three items assessing expectations of disruptions to the classroom, peer relations, and how difficult the child would be to manage). Overall Type I error for these analyses were controlled by a Bonferroni procedure. Thus, the three MANOVAs were judged against a significance level of .018 (.05 divided by 3).

Teachers' ratings of the child's assessment needs. The first MANOVA examined teachers' ratings of the child's need for professional assessment services on two items (teachers' ratings of how much the child would benefit from assessment, and their reported likelihood of seeking services for and/or encouraging the child's parents to seek services). The overall MANOVA was significant, $F(4, 274) = 3.28, p < .015, \eta^2 = .06$. Follow-up univariate analyses of variance (ANOVA) models indicated significant differences for both items (need for assessment: $F(2, 137) = 3.79, p < .025, \eta^2 = .05$; seek services: $F(2, 137) = 3.92, p < .022, \eta^2 = .06$). According to Tukey's Honestly Significant Difference post hoc tests, relative to teachers with low knowledge, those with high knowledge were significantly more likely to endorse the need for (Cohen's $d = .67$) and seek professional assessment services (Cohen's $d = .64$). See Table 2 for means and standard deviations.

Table 2
Descriptive Information for Teachers' Ratings of Child's Need for Assessment and Teachers' Likelihood of Help-seeking by Knowledge Group

Dependent variable	Knowledge group	M	SD
Benefit of Assessment	Low ^a	4.76	2.11
	Average	5.61	1.82
	High ^a	5.97	1.42
Seek Help	Low ^b	4.83	2.21
	Average	5.06	1.82
	High ^b	6.05	1.52

Note. Superscripts denote significant group differences based on Tukey's Honestly Significant Difference Post-hoc tests.

Teachers' ratings of the child's likely benefit from treatment. The second MANOVA examined the impact of teachers' ADHD knowledge (high, average, low) on teachers' ratings of how much benefit the child would likely reap from commonly used types of ADHD treatments (medication, learning assistance/special education services, within-classroom behavior management, and home-based behavior therapy). The overall MANOVA was significant, $F(8, 268) = 4.70, p < .001, \eta^2 = .08$. Follow-up univariate ANOVA tests were significant for all items: medication, $F(2, 136) = 5.16, p < .007, \eta^2 = .09$; learning assistance/special education services, $F(2, 136) = 5.23, p < .006, \eta^2 = .08$; changes within the classroom, $F(2, 136) = 4.34, p < .015, \eta^2 = .07$; and home-based therapy, $F(2, 136) = 3.96, p < .02, \eta^2 = .06$. According to post hoc comparisons, teachers with average ADHD knowledge were significantly more likely than teachers with high (Cohen's $d = .58$) or low (Cohen's $d = .53$) knowledge to perceive a benefit of medication. For perceived benefit of learning assistance, teachers with high (Cohen's $d = .60$) and average (Cohen's $d = .55$) ADHD knowledge were significantly more likely to perceive a benefit than teachers with low knowledge. For perceived benefit of home-based behavioral therapy, relative to those with low knowledge, teachers with high (Cohen's $d = .54$) and average (Cohen's $d = .45$) ADHD knowledge were significantly more likely to perceive a benefit. Finally, teachers with high ADHD knowledge were significantly

much more likely to perceive a benefit of changes to the classroom than teachers with low (Cohen's $d = 1.16$) knowledge. See Table 3 for means and standard deviations.

Teachers' predictions of children's future behavior. The final MANOVA examined the impact of teachers' ADHD knowledge (high, average, low) on their ratings of how likely the child's behavior problems would interfere with the classroom, how likely the problems would disrupt the child's peer relationships, and how confident the teacher would feel as that child's teacher for the ensuing school year. The overall MANOVA was significant, $F(6, 272) = 7.04, p < .001, \eta^2 = .11$. All follow-up univariate ANOVAs were significant, including teachers' expectations of symptom interference with the classroom, $F(2, 137) = 6.87, p < .002, \eta^2 = .10$; expectations of interference with peers, $F(2, 137) = 11.37, p < .001, \eta^2 = .16$; and expectations of how confident the teacher would be in handling the child's problems without assistance, $F(2, 137) = 4.08, p < .02, \eta^2 = .06$. Post hoc comparisons indicated that, relative to those with low ADHD knowledge, teachers with high and average ADHD knowledge acknowledged the likelihood of ADHD impact-

Table 3
Descriptive Information for Teachers' Perceptions of the Benefit of Treatments by Knowledge Group

Dependent variable	Knowledge group	M	SD
Medication	Low ^{a,b}	1.86	1.49
	Average ^a	2.73	1.51
	High ^b	1.98	1.30
Learning assistance/educational support services	Low ^{c,d}	5.22	2.24
	Average ^c	6.34	1.77
	High ^d	6.40	1.71
Changes within classroom	Low ^e	6.67	1.50
	Average	7.44	1.29
	High ^e	8.26	1.22
Changes at home	Low ^{f,g}	6.68	1.77
	Average ^f	7.39	1.32
	High ^g	7.45	1.01

Note. Groups with the same superscript denote significant group differences based on Tukey's Honestly Significant Difference Post-hoc tests.

Table 4
Descriptive Information for Teachers' Expectations of Having a Child With ADHD in His/Her Classroom by Knowledge Group

Dependent variable	Knowledge group	M	SD
Interfere with classroom function	Low ^{a,b}	5.54	1.71
	Average ^a	6.26	1.32
	High ^b	6.60	1.02
Disrupt peer relationships	Low ^{c,d}	5.94	1.78
	Average ^c	6.98	1.34
	High ^d	7.42	0.97
Confidence in successfully instructing the child	Low ^{e,f}	6.51	1.18
	Average ^e	5.70	1.78
	High ^f	5.60	1.67

Note. Groups with the same superscript denote significant group differences based on Tukey's Honestly significant Difference Post-hoc tests.

ing the child's classroom (high knowledge, Cohen's $d = .75$; average knowledge, Cohen's $d = .47$) and peer relationships (high knowledge, Cohen's $d = 1.03$; average knowledge, Cohen's $d = .66$). In addition, teachers with low ADHD knowledge were significantly *more* likely to report that they would be able to handle the child's problems without assistance than were teachers with high (Cohen's $d = .63$) and average (Cohen's $d = .54$) knowledge. See Table 4 for means and standard deviations.

Discussion

The dual goals of the present study were to examine teachers' knowledge and misperceptions about ADHD and to investigate the impact of teachers' knowledge about ADHD on their perceptions of and reported actions toward children with ADHD in their classrooms. To this end, we found that teachers' knowledge of ADHD was well above chance, with areas of both superior knowledge and misperceptions. Furthermore, we found evidence that this knowledge consistently impacted how teachers reported they would behave toward and perceive children with ADHD. The ways in which knowledge about ADHD impact teachers' behavior and expectations in the classroom are likely to have ramifications for children with ADHD in both the short- and long- terms.

Teachers' Knowledge of ADHD

In examining teachers' knowledge about ADHD, we first inspected the frequencies of teachers' correct responses in order to identify strengths and weaknesses in their knowledge base. Consistent with previous studies in North America (e.g., Jerome et al., 1994; Vereb & Diperna, 2004), Australia (Bekle, 2004) and New Zealand (Curtis et al., 2006), teachers in our sample from Melbourne, Australia were most knowledgeable about ADHD symptoms and diagnosis. For example, 80% of teachers were aware that children without overactivity may still have ADHD (i.e., ADHD-inattentive subtype). Because overactivity is easily observable and disruptive, some experts have expressed concerns that children with primarily inattention may be overlooked (Millstein, Wilens, Biederman, & Spencer, 1997). Our finding suggests that most teachers were aware that children with ADHD may have just inattentive symptoms, which may help teachers identify and refer these children. The vast majority of teachers also knew that ADHD symptoms are not intentional. For example, 91% of teachers knew that ADHD was not a disorder of effort, and 92% knew that children with ADHD do not misbehave out of unwillingness. Thus, despite the high correlation between hyperactive-impulsive ADHD symptoms and oppositional-defiant behaviors (e.g., APA, 2000), most teachers were able to separate these behaviors and did not consciously hold children responsible for their ADHD symptoms.

Still, there were divided opinions for a couple of the items, indicating near-chance or chance levels of correct responding. Many of these items tapped teachers' knowledge of future trajectories for children with ADHD; for example, only 57% of teachers knew that most children do not outgrow ADHD symptoms, and only 50% knew that children with ADHD were at increased risk for later delinquency. This lack of clarity may reflect the fact that teachers do not follow students with ADHD into their teens, and hence they have less experience with the future course of ADHD. However, this knowledge could still be helpful, as teachers who know that children with ADHD are at risk for arrests and school dropout (e.g., APA, 2000; Barkley, 1998) may be more motivated to take

action while the child is still in elementary school.

Finally, teachers in our sample had important misconceptions about ADHD, most notably with respect to the causes and treatments of ADHD. These results are similar to previous studies (e.g., Jerome et al., 1994; Vereb & DiPerna, 2004). In particular, teachers were likely to endorse dietary causes of ADHD. For example, few teachers (27%) correctly reported that ADHD cannot be caused by sugar or food additives, and fewer still (13%) correctly reported that dietary changes are not a successful treatment for children with ADHD.

We next examined the overall average of teachers' ADHD knowledge, which was 76%. Although this appears somewhat lower than other samples in Australia (e.g., Bekle, 2004; Kos et al., 2004; West et al., 2005), these samples have been limited in size, or included teachers who might have artificially inflated results, such as those at professional seminars. Our results are very consistent, however, with other research on teachers' ADHD knowledge in the United States (77%), Canada (78%), and New Zealand (76%) (e.g., Jerome et al., 1994; Scitutto et al., 2000; Vereb & DiPerna, 2004). The remarkable consistency of our results may be somewhat disconcerting, as this implies that there has been little improvement in ADHD knowledge dissemination to 'front-line' workers over more than a decade since the Jerome et al. (1994) study, despite even greater awareness and gains in professional knowledge of ADHD.

Impact of ADHD Knowledge on Teachers' Reported Behaviors and Perceptions

The second major aim of this investigation was to test the impact of teachers' knowledge about ADHD on their reported behaviors toward and perceptions of children with ADHD by asking teachers to rate their likely reactions in response to written descriptions of children with ADHD. In general, the results of the current study indicated that teachers' knowledge about ADHD had a significant impact on their reported behavior and perceptions. However, the results also suggested that greater knowledge might not always be beneficial, as in the case of the impact of knowledge on teachers'

confidence in managing children with ADHD in the classroom.

First, relative to teachers with low ADHD knowledge, teachers with high knowledge were significantly more likely to report that children with ADHD would benefit from professional assessment services, and that they would seek and/or encourage the child's parents to seek professional assessment services. These results are contrary to those found by Scitutto et al. (2004), who found no correlation between teachers' knowledge and ratings of help-seeking. This may be because report-card style vignettes that listed behavioral concerns of inattention, hyperactivity, and/or hyperactivity and aggression in the latter study did not provide teachers with as much of a picture of ADHD as the vignettes created for the present study, which described children who met ADHD symptom criteria.

To the extent that teachers' reported behavior toward children in vignettes reflects their actual behavior toward children, the greater reticence of teachers with low ADHD knowledge to perceive the need for or seek services for the child may ultimately be damaging to students who need these resources. For example, a child's teacher not seeing the potential use of services or failing to approach the parents may dissuade parents from seeking help for their child, incorrectly lead parents to think that there are no problems, and/or lead parents to dismiss future teachers' concerns because parents mistakenly believe that these behaviors are 'new.' In sum, because teachers are often the first to recommend or seek assessments for students (Frankenberger, Lozar, & Dallas, 1990; Lloyd, Kauffman, Landrum, & Roe, 1991), the present results suggest that increasing teacher knowledge of ADHD may be an effective way to ensure their referrals are in the best interest of their students.

These concerns assume, of course, that pursuing services for ADHD is beneficial for elementary school children. Although this issue is a complex one, there is evidence that simply participating in a mental health assessment is beneficial in decreasing symptomatic distress, and increasing self-esteem and hopefulness (e.g., Ackerman, Hilsenroth, Baity, & Blagys, 2000; Finn & Tonsager, 1992). Still, one consequence of this referral process is that children will be diagnosed and labeled as having ADHD.

Such labeling can be beneficial as it often elicits increased sympathy, tolerance and feelings of understanding toward the child (e.g., Fernald & Gettys, 1980). However, labels may also negatively impact teachers' perceptions of children, possibly leading to poorer student outcomes. With respect to ADHD, studies have suggested that the positive influence of labels may outweigh the potential for negative outcomes. For example, Stinnett, Crawford, Gillespie, Cruce, & Langford (2001; see also Cornett-Ruiz & Hendricks, 1993; Koonce, Cruce, Aldridge, Langford, Sporer, & Stinnett, 2004) found that preservice teachers judged hypothetical children labeled with ADHD as having significantly more attentional problems; however, they also made fewer negative judgments about the child's social functioning. This suggests that an ADHD diagnosis may have led preservice teachers to attribute the child's behavior to ADHD rather than personal shortcomings. In short, the evidence suggests that labeling may not negatively impact preservice teachers' perceptions of children with ADHD. That said, additional studies should be done on this issue using a sample of in-service teachers.

We also tested the impact of teachers' ADHD knowledge on their perceptions of treatments or strategies that are commonly used to manage ADHD symptoms (medication, educational support, changes to the classroom, and changes at home). With respect to medication, it should first be noted that, overall, teachers perceived that medication would not be particularly useful for managing ADHD symptoms (i.e., ratings around 2 on a 1 to 9 Likert scale). This may in part reflect a cultural difference between teachers in Australia versus North America. For example, Curtis and colleagues (2006) recently reported that teachers in New Zealand were less accepting of medication for ADHD and less strongly believed in its effectiveness relative to American teachers. Still, both American and New Zealand teachers were less likely to see the utility of medication for ADHD relative to behavioral and educational alternatives (Curtis et al., 2006; Pisecco, Huzinec, & Curtis, 2001), as was also the case in our sample.

With this in mind, in our study, teachers with average ADHD knowledge perceived medication to be significantly more beneficial than teachers with low and high knowledge. Although at first this result appears unexpected, it

is broadly consistent with previous findings of a positive but weak linear correlation between teachers' knowledge of ADHD and medication acceptability (Vereb & DiPerna, 2004). Our findings imply that in fact the relationship between teachers' knowledge and opinions about medication may be inverse U-shaped, such that teachers on the upper and lower ends of ADHD knowledge have relatively less conviction about the sole benefit of medication for ADHD. Interesting to note, however, this difference may stem from different sources. Relative to those with average knowledge, teachers with low knowledge may rate medication as less beneficial due to lack of information about empirically supported ADHD treatments, instead believing in alternative or diet-related therapies. On the other hand, teachers with high knowledge may perceive medication as somewhat less beneficial than those with average knowledge because they may be better acquainted with the side effects of medication, its relatively short-acting benefits, and/or its confined impact on ADHD symptoms (and not on related problems) (The MTA Cooperative Group, 1999). Although these possibilities are clearly speculative at this point, given that teachers' acceptability of treatments influence their willingness to use them (Eckert & Hintze, 2000), future research may help to elucidate these possibilities and the impact of these perceptions on teachers' attitudes and children's adjustment in the classroom when on medication.

We further examined the impact of teachers' knowledge on their perceived benefit of educational and behavior-management strategies. Teachers with high and average ADHD knowledge both perceived significantly more benefits of educational support and changes to the home environment relative to teachers with low ADHD knowledge. Moreover, teachers with high knowledge perceived significantly greater benefits of making changes within their classroom relative to those with low knowledge (those with average knowledge were in-between). To the extent that teachers' perceptions about treatment translate into application, which research suggests may be the case (e.g., Eckert & Hintze, 2000; Wickstrom, Jones, LaFleur, & Witt, 1998), our findings imply that students with ADHD who are in the classrooms of teachers with high knowledge, and to some extent those with average knowledge, may ex-

perience better support and adjustment than students who are in the classrooms of teachers with low knowledge.

Finally, the present study also found that teachers' ADHD knowledge had an impact on their predictions of what it would be like to have a student with ADHD in their classroom (i.e., disruption to the class, disruption to peers, and confidence in managing the problem behaviors). Relative to those with low ADHD knowledge, teachers with both high and average knowledge rated children with ADHD as significantly more likely to interfere with the classroom and their peer relationships. Perhaps this is to be expected given that teachers with more ADHD knowledge will be more familiar with the toll it can take on virtually every area of life (Barkley, 1998). At least for teachers with high knowledge, who are most willing to seek help for students, these predictions may make them more alert to small problems and serve as the impetus for service seeking and making classroom changes. However, it should also be acknowledged that there is a possibility that these perceptions may "backfire" on teachers with high and average knowledge. Research by Rosenthal and Jacobson (1968) has indicated that teachers' perceptions and expectations can influence students' actual behaviors, and if those perceptions are negative, it is possible that negative behavior would be elicited. Follow-up research is needed to determine the impact these perceptions on the behavior of students with ADHD.

Perhaps the most surprising result of the present study was the finding that teachers with high and average ADHD knowledge reported *less* confidence in managing a child with ADHD in their classroom than teachers with low ADHD knowledge. Whether this lack of confidence hinders or helps teachers with average or high knowledge is unknown. On one hand, a teacher's lack of confidence may mean that he or she is more apt to "give-up" or "give-in," resulting in them referring children to services rather than pursuing changes within their environment. This possibility is consistent with research showing that confidence positively influences the choices we make, how long we persist with obstacles, and how much effort we put forth (Bandura, 1995). In addition, research with normative samples of children has shown that

teachers with low confidence negatively influence students' success (Gibson & Dembo, 1984). On the other hand, rather than being cause for concern, that teachers with more accurate knowledge of ADHD report less confidence in being able to manage students with ADHD without assistance may simply reflect their knowledge that this is a serious disorder that requires a team to deal with effectively (The MTA Cooperative Group, 1999), and make them more ready to utilize the help of others. In a similar vein, it is possible that teachers with low ADHD knowledge are *overly* confident because they simply lack the knowledge of the true ramifications of ADHD.

The present findings suggest that further research is needed to determine the interplay between knowledge, teacher confidence, and the impact of teacher confidence on students. For example, if increasing teachers' knowledge of ADHD leads them to feel less confident and these feelings negatively impact their students, then training seminars on ADHD should pay special attention to these perceptions and directly address teachers' confidence and sense of efficacy. The latter is particularly important in light of studies that have suggested that decreased self-efficacy increases the likelihood that teachers will refer a disruptive child for special needs education (e.g., Meijer & Foster, 1988; Soodak & Podell, 1993). Such studies imply that if increased education could bolster teacher's feelings of self-efficacy then student problems might be dealt with more effectively in the regular classroom environment.

Summary

The present study provides a current portrait of teachers' knowledge of ADHD in a relatively large sample of teachers from Melbourne, Australia, that very much mirrors findings from North America and New Zealand that have been gathered over the past decade. Important to note, it is the first report to our knowledge that documents the consistent and sizable impact of teachers' knowledge of ADHD on their reported behaviors toward and perceptions of children with ADHD.

However, there are limitations to the present study. First, we used an experimental

methodology, which required teachers to imagine that children in vignettes were real and to report their reactions. These ratings may not fully reflect teachers' behaviors and perceptions in the classroom. However, examining teachers' actual behaviors and perceptions regarding students with ADHD is itself fraught with problems (e.g., reliance on teachers' memory, lack of control over what the teacher considered "ADHD," and lack of consistency of severity of symptoms, ADHD-subtype, and comorbid symptoms). Thus, although the vignette methodology sacrificed some degree of ecological validity, it maintained excellent control over other extraneous variables that may have otherwise threatened validity. A second notable limitation is the sample was not very representative of both genders (the sample was 90% female). However, the low proportion of men in the sample is representative of the occupational field of elementary school teacher, the majority of whom are women.

In sum, the present study contributes to research on teachers' ADHD knowledge and also demonstrates the impact of this knowledge on reported behaviors toward and perceptions of students with ADHD. Taken on the whole, the results found here suggest that high, and to some extent average, knowledge of ADHD may impact teachers' behaviors and perceptions in positive and important ways (e.g., willingness to seek help for children with ADHD, perceive the benefit of a range of treatments), and thus agree with and buttress experts' calls for teacher education about ADHD (e.g., Barkley, 2006).

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Appendix: Example of a Vignette With Ratings

Matthew is a 9-year-old boy. Matthew's teacher describes him as always moving, from squirming in his seat to wandering around the classroom, chattering endlessly instead of doing his work. His teacher says that Matthew doesn't do what she asks him to do, such as cleaning out his desk, despite her constant instructions. He starts work late because he often misplaces what he needs. While doing his work, he gets side-tracked into doing something else and turns in his work without checking. According to his parents, Matthew never seems to focus on what they say or ask of him, even when they repeat themselves. His behavior with others his age is similar. He often intrudes on what they are doing, and doesn't wait for his turn or concentrate on what's happening in their games.

Assessment Ratings

1. How likely would you be to seek professional services for Matthew or recommend that Matthew's parents seek professional services?

1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____ 7 _____ 8 _____ 9

Not at all/ Would Look into it/ Would Definitely go/ would Not Mention It Would Mention It Would Definitely Encourage

2. How Much Would Matthew Benefit From Professional Assessment services?

1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____ 7 _____ 8 _____ 9

no Benefit Moderate Benefit Definite Benefit

Treatment Ratings

1. How Much Would Matthew Benefit From medication?

1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____ 7 _____ 8 _____ 9

No Benefit Moderate Benefit Definite Benefit

2. How Much Would Matthew Benefit From Learning Resource Assistance or Special Education services?

1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____ 7 _____ 8 _____ 9

No Benefit Moderate Benefit Definite Benefit

3. How much would Matthew benefit from changes that you could implement in the classroom?

1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____ 7 _____ 8 _____ 9

No Benefit Moderate Benefit Definite Benefit

4. How Much Would Behavioral Therapy or Changes at Home Benefit Matthew?

1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____ 7 _____ 8 _____ 9

No Benefit Moderate Benefit Definite Benefit

Expectations of Teaching a Child With ADHD

1. How Disruptive Would Matthew Be in Your classroom?

1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____ 7 _____ 8 _____ 9

Not at All Somewhat Extremely

2. How Much Would Matthew's Problem Interfere With His Peer relationships?

1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____ 7 _____ 8 _____ 9

Not at All Somewhat Extremely

3. How Confident Would You Be in Successfully Managing Matthew in Your classroom?

1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____ 7 _____ 8 _____ 9

Not at All Somewhat Extremely