

*International Perspectives on Attention-Deficit/Hyperactivity Disorder: A Comparison of
Teachers in the United States and Sweden*

Steven Carlson,
William Frankengerger,
Kristina M. Hall,
and
Sara J. Totten,
University of Wisconsin-Eau Claire
and
Katarina House,
Eau Claire School District

A total of 157 general education elementary classroom teachers in the United States and 116 general education elementary classroom teachers in Sweden were sent surveys assessing how teachers in the United States and Sweden (1) view the use of stimulant medication to treat ADHD behaviors in children, (2) attribute the causes of ADHD behaviors, and (3) rate the acceptability of various interventions used to treat ADHD behaviors. Compared to Swedish teachers, U.S. teachers indicated that more children in their classrooms were diagnosed with ADHD and received stimulant medications to treat ADHD behaviors. Regarding causation, both groups believed that ADHD behaviors could have environmental and genetic causes. Teachers from both countries agreed that lacking basic academic skills could be a cause of inattention in the classroom. Although Swedish and U.S. teachers reported similar beliefs about the causation of ADHD behaviors, Swedish teachers viewed stimulant medication in a significantly more negative manner. In addition, a majority of Swedish teachers preferred an intervention package that did not include stimulant medication.

Attention-Deficit/Hyperactivity Disorder (ADHD) occurs in approximately three to seven percent of school-aged children according to the Diagnostic and Statistical Manual of the American Psychiatric Association, Fourth Edition Text Revised (American Psychiatric Association, 2000). In the U.S., the incidence of stimulant treatment in the school-age population has increased dramatically in the past few years. In a national survey of 19 school districts, Frankengerger, Lozar, and Dallas (1990) reported that only 1.47% of the students surveyed were diagnosed with ADHD and were receiving treatment with stimulants. More recently, LeFever, Dawson and Morrow (1999) reported mean rates of ADHD and concomitant use of stimulant medication as high as 10% in particular North Carolina school districts. LeFever et al. (1999) also found that 17% of white males in grades 2 through 5 were receiving stimulant medication. Rowland, Umbach, Stallone, Naftel, Bohlig, and Sandler (2002) completed a school-based survey that revealed 10% of the 6099 children included in the study had been identified as having ADHD and were being treated with stimulant medication.

In Sweden the use of stimulants to treat ADHD is currently believed to be much lower than in the United States. However, data indicate that despite a history of restrictions on stimulants, Sweden may have begun to follow the example of the United States. According to Båsen (2000),

from 1996 to 1999 Swedish school age children treated with stimulant medication increased from 429 to 1,629, an increase of 400% in three years. More current data indicate that approximately 3,000 children (less than 0.2% of Swedish children) are being treated with stimulant medication in Sweden, a country of approximately 9 million people (Medical Products Agency, 2003).

Though professionals in Sweden diagnose children with ADHD, they also have a related condition called deficits in attention, motor function, and perception (DAMP). Although considerable diagnostic overlap exists, the DAMP diagnosis is narrower and distinct in its addition of specific motor and IQ criteria. DAMP is defined as severe problems in at least one of the following areas or moderate problems in at least two of the following areas: attention span, activity level, vigilance and ability to sit still. In addition, one of the following criteria must be met: (1) fine motor dysfunction as documented by a detailed neurological exam, (2) gross motor dysfunction as documented by a detailed neurological exam, or (3) perceptual/visual motor dysfunction as documented by a 15 IQ point discrepancy between the Block Design or Object Assembly subtests of the Wechsler Intelligence Scale for Children-III (WISC-III) and the Full Scale IQ score or dysfunction as documented by a visuo-motor dyscoordination test (Landgren, Kjellman, & Gillberg, 1998).

Causes of ADHD

The entire range of causes and how these causes interact to create the disorder of ADHD is generally unknown (Snider, Busch, & Arrowood, 2003). Jerome, Gordon, and Hustler (1994) reported that a majority of teachers perceive the causes of ADHD to be primarily biological and genetic rather than psychosocial (e.g., parenting practices, chaotic family structure). In a more recent study, Frankenberger, Farmer, Parker, and Cermak (2001) reported that school psychologists generally agreed that ADHD was caused by brain malfunction. Leo and Cohen (2003) reviewed data from imaging studies widely viewed as support for the brain deficit hypothesis. They concluded that the existing body of research was not sufficient to identify a specific *biological basis* for ADHD.

Researchers have also posited other potential causes of ADHD behaviors, which often lead to a diagnosis of ADHD. Weber, Frankenberger, and Heilman (1992) reported significant drops in academic achievement scores the year before children were placed on stimulant medication. The authors posited that a child in the early years of elementary school may become so frustrated with his/her inability to read that the student loses motivation, becomes restless and stops paying attention (Weber et al., 1992). Similarly, Snider et al. (2003) asserted that inattention in the classroom is commonly caused by an inability to complete school tasks.

Treatment of ADHD

Regarding the effectiveness of various interventions for ADHD, the most comprehensive study to date is The Multimodal Treatment Study of Children with ADHD (MTA Cooperative Group, 2004). The initial results of the MTA study published in December of 1999 demonstrated significantly higher effects on ADHD symptoms for the long-term combined treatment (medication and behavioral treatment) and the medication alone treatment than for behavioral

treatment alone. In several other areas of functioning, including academic performance, the combined treatment was consistently superior to the routine community care condition. However, the effect of behavioral treatment is highlighted when looking at the summer portion of the study (Pelham, et al., 2000). During this summer portion, the combined and behavioral treatment groups were compared. The children in the combined group were better on only five measures. On the remaining 30 measures, there were no significant differences between the two groups. This differed from the general MTA assumptions that the Combined group would do better than the BT group on these measures. The MTA studies elucidate the significant role that behavioral intervention can play in treating children with ADHD. Additionally, Sinha (2005) reported use of cognitive-educational interventions resulted in improved academic performance for non-medicated children with ADHD.

Attitudes Related to Stimulants

In the U.S., there appears to be growing acceptance among educators and parents of pharmacological treatments for childhood behavioral disorders (Frankenberger et al., 2001; Snider et al., 2003; Liu, C., Robin, A. L., Brenner, S., & Eastman, J., 2004). This acceptance of stimulant medication is significant because researchers have shown that, as a group, teachers appear to be those most likely to refer children for evaluations, which often result in a diagnosis of ADHD (Frankenberger et al., 2001; Snider et al., 2003).

Gillberg (1997) reported that in Sweden there has been less public and cultural acceptance regarding stimulant medications and treatment of children with stimulants. The origin for this attitude toward stimulants may be, in part, due to the abuse of these drugs while they were more openly prescribed in Sweden from 1939-1968. Methylphenidate (Ritalin) and all amphetamines and amphetamine-like drugs, were removed from the Swedish market in 1968 (except for use in a few rare conditions) after an epidemic of reported abuse cases (U.S. Pharmacist, 2000). However, within the last few years, debate has increased in Sweden about removing those restrictions. According to Larsson (2002) a series of plans and actions by psychiatrists and government agencies to further the use of amphetamines for medical purposes has resulted in a forceful sales promotion and growing use of stimulant treatment for school-age and pre-school Swedish children.

The purpose of this study was to determine and compare the rate of ADHD and concomitant treatment with stimulant medication in the U.S. and Sweden. The study was also designed to assess teachers' attitudes about the possible causes and treatments of ADHD. Finally, the study was designed to determine teachers' attitudes related to the use of stimulant medication to treat children diagnosed with ADHD.

Method

Participants

The sample included 400 general education elementary teachers in the state of Wisconsin (U.S.) and 242 general education elementary teachers in Sweden.

Instrument

A descriptive survey questionnaire was adapted from those used in Frankenberger, et al. (2001) and Snider et al. (2003) studies. Teachers in the U.S. were given an English language version of a survey questionnaire, whereas teachers in Sweden were given a Swedish language version that was identical in content. Two bilingual psychologists from the research team, fluent in both English and Swedish, translated the survey. One of these researchers, a practicing school psychologist, originated from Sweden and is now living in the U. S. and the other, a practicing clinical psychologist, was a resident of Sweden. The survey was also shown to other Swedish/English speakers to determine the clarity and identical content of the survey items. The survey is described below.

Section One: Background Information. The survey asked the participating teachers questions about their background including: their sex, the grade levels and ages of the children they taught, number of years of teaching experience, overall number of students in their classroom, number of students in the classroom identified as having ADHD (DAMP in Sweden), and number of students in their classroom known to receive stimulant medication.

Section Two: Student Description. The survey included one vignette of a 9-year-old boy (*Christopher*) exhibiting behaviors consistent with ADHD and concomitant academic difficulties in the classroom (Carlson, 2003). All teachers received the same vignette, which used behavior considered diagnostic for ADHD in the DSM-IV-TR (American Psychiatric Association, 2000). The number of problem behaviors observed equaled the minimum number necessary to receive a diagnosis of ADHD combined type (behaviors of inattention and hyperactivity/impulsivity). In addition, the vignette depicted what is often considered the classic or pure ADHD child, which means DSM-IV-TR descriptors from other frequently comorbid diagnoses were not included. However, reading difficulties were mentioned in the vignette to highlight academic difficulties common in students with ADHD diagnoses.

Section Three: Student Description Items. After reading the vignette, the teachers were asked to respond to a series of questions with regard to the student in the vignette. Question responses were based on a six-point Likert scale ranging from 1-Strongly Disagree to 6-Strongly Agree.

Section Four: Intervention Methods. This section prompted teachers to read three interventions and answer six questions pertaining to their perceptions of intervention effectiveness and risks, as well as overall acceptability. Question responses were recorded on a five-point Likert scale. The scale descriptors changed depending on the question.

Section Five: General Questions. These questions did not refer to the vignettes but instead asked direct questions about ADHD, stimulant medication, and classroom behavior trends. Once again, question responses were recorded on a five-point Likert scale and the scale descriptors changed depending on the question.

Procedure

A list of elementary general education teachers was obtained from the Department of Public Instruction (DPI) in Wisconsin and Lärarförbundet (Sweden's Teacher Union) in Sweden. All participants were sent a cover letter explaining the purpose of the study assuring anonymity. Also included was a survey and a return envelope.

Initially, teachers from the U.S. and Sweden were to be sampled identically. However, privacy laws in Sweden did not allow teachers to be contacted directly. The U.S. sample of 400 first through fourth grade general education teachers was obtained directly by randomly sampling teachers using the file provided by Wisconsin's Department of Public Instruction. The Swedish sample of 242 teachers was obtained indirectly by contacting randomly selected rektors (similar to U.S. principals) via fax using the CD-ROM årsbok för skolan 01-02 (a CD-ROM with a complete database of Swedish rektors) provided by Lärarförbundet (Sweden's Teacher Union). Thirty-three rektors agreed to participate in the study. The surveys were sent to the rektors. The thirty-three rektors participating in the study gave their first through third grade general education classroom teachers the surveys. The teachers then sent the surveys directly back to the researchers.

The number of surveys/participants (400 in Wisconsin and 252 in Sweden) chosen was based on the assumption that given at least a 30% return rate, the participant set would still be large enough for adequate data analysis.

Results

Of the 400 questionnaires sent to classroom teachers in Wisconsin, 10 teachers indicated either by email or on the returned survey that they did not meet the criteria for the study (e.g., were now a principal, retired, teaching at a different grade level, etc.). Out of the 390 eligible surveys distributed in the United States, 157 teachers responded (40%) with surveys included in the data analysis. Of the 242 surveys disseminated to Swedish classroom teachers, 116 teachers (48%) responded with surveys included in the data analysis. Both samples of teachers were similar in their gender composition (predominately female), and the average number of students in their classes (U.S, $M=19.85$, $SD=4.73$, Sweden, $M=20.28$, $SD=5.74$). As expected, U.S. teachers typically taught one grade level whereas Swedish teachers typically taught three grades levels.

Rate of ADHD and Treatment with Stimulant Medication

The teachers were asked to indicate the number of students with ADHD and DAMP (Sweden) diagnoses and the number receiving stimulant medication. The mean number of children per classroom who were identified as having ADHD was 1.21 ($SD=1.33$) in the U.S. sample and .33 ($SD= .59$) in the Swedish sample. This represents 6.10% of the U.S. children and 1.63% of the Swedish children having a diagnosis of ADHD. An additional 1.04% of the Swedish children were identified as having DAMP so the combined total of DAMP and ADHD for the Swedish sample was 2.67%. Overall, 4.38% of the U.S. children were being treated with stimulant medication and .69% of the Swedish children were being treated with stimulants. Thus, 72% of the U.S. children diagnosed with ADHD received stimulant treatment while 26% of the diagnosed Swedish children received stimulants. Interestingly, 20.38% of the U.S. classrooms contained two or more students who were treated with stimulants as opposed to .17% of Swedish classrooms.

Causes of ADHD

Teachers were presented with a description of Christopher whose behaviors met the minimum diagnostic criteria for the DSM-IV-TR diagnosis of ADHD, Combined Type. The teacher's ratings are presented in Table 1. Ratings were on a six-point scale with a mean of 3.5 being in

the neutral range. Significant differences between U.S. and Swedish teachers are noted by asterisks in Table 1. Both U.S. and Swedish teachers tended to disagree ($m < 3$) that an active personality or immaturity could be the more likely cause of Christopher's ADHD behaviors (questions 3 & 7). They also tended to believe that Christopher did not learn ($m < 3$) to be the way he was (question 5). Conversely, the teachers tended to agree ($m > 4$) that behaviors like Christopher's could result from stress at home (question 2), and lack of basic academic skills (question 6). However, the U. S. teachers tended not to believe ($m < 3$) that the behaviors resulted from unclear classroom expectations (question 4) with Swedish teachers rating this question in the neutral range. U.S. teachers believed that incongruent classroom expectations (question 9) could cause Christopher's behaviors while Swedish teacher's ratings were in the neutral range.

Table 1
Possible Causes of ADHD: Ratings of U.S. and Swedish Teachers

Item	U.S. Teachers			Swedish Teachers		
	<u>D</u>			<u>D</u>		
1. Children with Christopher's behaviors are probably born with a genetic predisposition towards hyperactivity and poor self-control.	57	.86	.36	16	.19	.41
2. Stress and conflict in the student's home life can cause behaviors like Christopher's.	57	.76	.17	16	.66	.31
3. Behaviors like Christopher's are more likely to be the result of an active personality rather than a disorder.	56	.87	.26	13	.53*	.21
4. Behaviors like Christopher's are often the result of unclear expectations in the classroom.	57	.45	.37	16	.15**	.58
5. Christopher has probably learned to be the way that he is.	57	.71	.30	15	.04**	.25
6. Lacking basic skills in an academic area (e.g., Christopher's lack of basic reading skills) often causes students to have difficulty paying attention.	57	.33	.35	16	.88**	.22
7. Christopher's behaviors are more likely the result of immaturity than an attentional disorder (ADHD or DAMP).	57	.71	.14	15	.77	.27
8. Behaviors like Christopher's can result from certain parenting methods, such as little positive reinforcement for good behavior and attention for bad behavior.	57	.90	.25	14	.24**	.41
9. Behaviors like Christopher's can result when classroom expectations are incongruent with the developmental abilities of	55	.04	.39	16	.48**	.46

the child.

Note. Teachers responses were assessed using a 6-point Likert scale. (1=Strongly Disagree, 2=Moderately Disagree, 3=Slightly Disagree, 4=Slightly Agree, 5=Moderately Agree, 6=Strongly Agree).

*p< .05; **p<.01.

Treatment of ADHD

Teacher’s general attitudes about interventions for ADHD and their ratings of the specific *Medication*, *Behavioral*, and *Educational* interventions defined in the *Interventions Methods* section above are presented in Table 2. Again, significant differences between U.S. and Swedish teachers are noted by asterisks. Both U.S. teachers and Swedish teachers agreed that teachers should first try classroom interventions to improve *Christopher’s* behavior before referring him to a doctor or for special education evaluation (questions 1 & 3). However, U.S. teacher’s ratings for these questions were significantly higher than those of the Swedish teachers (p < .01). Swedish teachers did not believe that behavioral interventions would not work without concomitant treatment with medication (question 2).

The teachers were asked how effective they thought each specific intervention would be in improving *Christopher’s disruptive hyperactive and impulsive behaviors* (question 4), *academic achievement in the long run* (question 5), and *attention in the classroom* (question 6). On all three questions, U.S. teachers rated medication and behavioral interventions as significantly more efficacious interventions for *Christopher* than Swedish teachers (p< .05). Swedish teachers did not believe that either medication or behavioral interventions were particularly effective interventions for children with ADHD. However, the Swedish teachers did rate educational interventions as being effective ($\bar{m} > 4$). U.S. teachers did not agree that behavioral interventions were likely to help *Christopher* but they did agree that medication would be an effective treatment for *Christopher’s* behavior. However, they were less sure medication would necessarily help improve his academic achievement.

Table 2

Attitudes Related to Use of Stimulant Medication for Treatment of ADHD:
 Ratings of U.S. and Swedish Teachers

Item	U.S. Teachers		Swedish Teachers			
	<u>D</u>	<u>D</u>	<u>D</u>	<u>D</u>		
1. Rather than refer him to a doctor for these behaviors, Christopher’s teacher should first find ways to try classroom interventions to	57	.10	.13	16	.97**	.33

improve Christopher's disruptive behavior.

2. Behavioral interventions with children like Christopher often will not work unless they are treated with stimulant medication first.

	57	.76	.21	12	.08**	.35
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3. Christopher's teacher should try classroom interventions to improve his academic achievement before referring him for a special education evaluation.

	57	.43	.79	14	.52**	.50
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4. How effective will each intervention be in improving Christopher's disruptive, hyperactive and impulsive classroom behaviors?

-Medication Intervention

	53	.58	.98	12	.04**	.14
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-Behavioral Intervention

	55	.19	.97	12	.83**	.92
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-Educational Intervention

	55	.98	.78	13	.20*	.79
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5. How effective will each intervention be in improving Christopher's academic achievement in the long run?

-Medication Intervention

	52	.34	.11	12	.74**	.11
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-Behavioral Intervention

	54	.07	.04	14	.79*	.88
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-Educational Intervention

	53	.99	.91	14	.21*	.83
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6. How effective will each intervention be in improving Christopher's attention in the classroom?

-Medication Intervention

	52	.67	.95	12	.12**	.03
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-Behavioral Intervention

	55	.17	.95	14	.90*	.01
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-Educational Intervention

	55	.77	.87	14	.01*	.84
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Note. Teachers responses were assessed using a 6-point Likert scale for questions 1-3. (1=Strongly Disagree, 2=Moderately Disagree, 3=Slightly Disagree, 4=Slightly Agree, 5=Moderately Agree, 6=Strongly Agree).

Note. Teacher responses were assessed using a 5-point Likert scale for questions 4-6. The following scales were used: Q1, Q2, and Q3 (1-Not at all effective to 3-Moderately Effective to 5-Very Effective), Q4 (1-No risks are likely to 3-Some risks likely to 5-Lots of risks are likely), Q5 (1-Very negative to 3-Neutral to 5-Very positive). Levels of significance from the T-tests comparing U.S. teachers to Swedish teachers are only reported in the Swedish Teacher column to eliminate unnecessary duplication.*p< .05; **p<.01.

Attitudes related to Stimulants

Teacher's attitudes related to the use of stimulant medication for treatment of ADHD are presented in Table 3 (asterisks denote significant differences). In most cases, Swedish teachers disagreed ($\bar{m} < 3$) with statements that suggested stimulant medication was a necessary and appropriate way of treating behaviors associated with ADHD (*questions 1, 3, 4, 6, 7*). They were in particular disagreement ($\bar{m} < 2$) with the statement that it would be a disservice not to treat children who have ADHD with stimulant medication (question 7). U.S. teachers rated stimulant medication significantly higher than Swedish teachers on all of these questions ($p < .05$).

Table 3
 Possible Interventions for Treatment of ADHD: Rating of U.S. and Swedish Teachers

Item	U.S. Teachers			Swedish Teachers		
	<u>D</u>	<u>D</u>	<u>D</u>	<u>D</u>	<u>D</u>	<u>D</u>
1. If children like Christopher do not receive stimulant treatment to treat their hyperactivity, impulsivity, and inattention, they will probably be worse off in the long run.	57	.65	.33	15	.58**	.52
2. Christopher may benefit from a trial dosage of stimulant medication.	56	.35	.23	16	.14**	.67
3. If his behavior markedly improves after taking the stimulant medication, it would seem to indicate that he has an attentional disorder (ADHD or DAMP).	55	.27	.21	14	.78**	.65
4. Stimulant medication is a safe way to improve behaviors like Christopher's.	53	.60	.29	15	.27**	.36
5. Too many U.S. children, like Christopher, receive stimulant medication.	57	.06	.37	8	.96	.44
6. Before his behavior can be improved, Christopher needs to be evaluated by a pediatrician or child psychiatrist, so he can be treated with stimulant medication.	55	.20	.61	15	.18**	.31
7. It is a disservice to children with behaviors like Christopher's when they do not receive stimulant medication.	56	.31	.46	15	.57**	.04
8. There are many more children like Christopher who are in need of stimulant treatment for their behaviors but do not presently receive it.	56	.29	.34	14	.53	.63

Note. Teachers responses were assessed using a 6-point Likert scale. (1=Strongly Disagree, 2=Moderately Disagree, 3=Slightly Disagree, 4=Slightly Agree, 5=Moderately Agree, 6=Strongly Agree).

* $p < .05$; ** $p < .01$.

Discussion

Rate of ADHD and Treatment with Stimulant Medication

Swedish general education classrooms have fewer students diagnosed with ADHD and fewer students treated with stimulants than U.S. classrooms. The percentages reported by the U.S. and Swedish teachers in this study are similar to those reported in recent studies in the U.S. and Sweden (Doherty, Frankenberger, Fuhrer, & Snider, 2000; Zito, Safer, dosReis, Gardener, Boles, & Lynch, 2000; Basen, 2000). The rate of ADHD reported by the U.S. teachers was 228% (6.10% vs. 2.67%) percent higher than the combined rate of ADHD and DAMP reported by the Swedish teachers. Furthermore, the rate of stimulant treatment reported by the U.S. teachers was 635% (4.38% vs. .69%) higher than the rate reported by the Swedish teachers. It is important to note that the U.S. reported rate may be an underestimate since in the United States, teachers often do not know when students are taking medications (Musser, Ahmann, Theye, Mundt, Broste, and Mueller-Rizner, 1998).

Furthermore, based on the results of this study, the percentage of U.S. general education classrooms where at least one student was being treated with stimulants was nearly 500% higher (56.05% vs. 11.30%) than in Sweden. The U.S. percentage of classrooms with multiple students (two or more) receiving stimulants was over 750% higher (20.38% vs. 1.74%) than the percentage of Swedish general education classrooms with multiple stimulant-treated students. Finally, over 870% more (7.50% vs. 0.87%) general education classrooms in the U.S. than in Sweden had three or more students being treated with stimulants.

Causes of ADHD

Researchers have determined that in the U.S., teachers and other professionals believe ADHD is a neuro-biological disorder that may have a genetic basis (Frankenberger, et al., 2001, Snider et al., 2003). This view is held even though persuasive evidence supporting an identifiable neuro-biological cause is lacking (Leo & Cohen, 2003; NIH Consensus Report, 1998). In the current study, teachers from both countries believed that ADHD was a result of a genetic predisposition. Neither group believed that children with behaviors associated with ADHD learned to be the way they were, but they agreed that environmental factors could influence and exacerbate behaviors associated with ADHD. For example, they believed that stress and conflict in the child's home as well as the lacking of basic academic skills could play significant roles in causing ADHD behaviors.

One interpretation of this ambivalence related to causes may be that teachers in both countries view ADHD as a genetic condition when it is already diagnosed and called a disorder. However, when only specific behaviors associated with ADHD are described, teachers may believe the behavior could be environmentally caused. Another explanation may be that the above interpretation is descriptive for U.S. teachers but may not be for Swedish teachers. The children diagnosed with ADHD Swedish teachers encounter may display more severe symptoms than those commonly diagnosed in the U.S., because the proportion of diagnosed children in Sweden

is much smaller. Therefore, the Swedish teachers may view children with ADHD as having a more severe disorder that probably results from neurobiological causes.

Treatment of ADHD

U.S. teachers strongly believed that behavioral and educational interventions should be attempted before treatment with medication is initiated. They expressed this belief even though past research indicated such pre-referral interventions were infrequently employed in practice (Weber et al., 1992). Swedish teachers were more neutral in response to the pre-referral interventions.

With regard to the effectiveness of non-pharmaceutical interventions, U.S. teachers had a more positive reaction and predicted that the behavioral intervention would be a more effective treatment than Swedish teachers. However, Swedish teachers believed that the effectiveness of behavioral interventions would not be diminished without concomitant treatment with medication. Swedish teachers rated the educational intervention as being the most effective and this intervention was also the most highly rated by the U.S. teachers. Teachers' faith in educational interventions are supported by recent research (Sinha, 2005).

Attitudes related to Stimulants

With regard to interventions, the most noticeable difference between teachers from the two countries involved the use of stimulant medication. Possibly reflecting less public and cultural acceptance of stimulants (Gillberg, 1997), the Swedish teachers viewed stimulant medication less positively and showed more skepticism and wariness about the safety of using stimulant medication to treat children. Likely related to this attitude, Swedish teachers were more likely to prefer an intervention package without the use of stimulants. Conversely, U.S. teachers appeared more confident about the positive effects of stimulant medication on students' disruptive, hyperactive and impulsive behaviors, academic achievement and attention. Both groups of teachers, especially Swedish teachers, believed that stimulant medication would be less effective for improving academic achievement in the long run than it would be in improving other ADHD symptoms. The U.S. teachers in this study, as well as in previous studies (Snider et al., 2003), held to the misconception that the diagnosis of ADHD could be confirmed if the child's behavior improves as a result of taking stimulant medication. Swedish teachers correctly believed that this was not the case. Research has shown that stimulant medication improves behavior, attention, and concentration for children without ADHD in the same way that it does for children with ADHD (Peloquin & Klorman, 1986).

Implications

One implication of this study is that teachers in both countries could benefit from exposure to broader research related to ADHD diagnosis. Although both the U.S. and Swedish teachers believed that ADHD related behaviors could be caused by both genetic and environmental factors, they clearly believed that ADHD was a valid diagnosis. ADHD often gets explained to teachers as an inarguably valid diagnosis that is purely a genetic, neurobiological or neuropsychiatric disorder in which stimulant medication corrects ADHD behaviors like glasses correct vision problems (CHADD, 2001). These suppositions are reinforced by the imaging studies that are widely disseminated as supplying indisputable evidence that ADHD is a condition of the brain, and that a definitive medical test is just around the corner. In fact, the promise of a definitive medical test can be tracked back as far as Zametkin, et al. (1990) and

further espoused by Barkley (1998) where he predicted such a test within the next five years. However, Leo and Cohen (2003) completed a recent review of the imaging research and concluded that such a definitive diagnostic test is still an unfulfilled promise.

A second implication is related to treatment of ADHD. U.S. teachers evinced conflicting attitudes related to the treatment of ADHD. They believed that pre-referral interventions should be attempted before a child is referred for an ADHD diagnosis but they also had a positive view of the impact stimulant medication had on improving classroom behavior and attention. Interestingly, they did not have the same positive attitudes about the efficacy of behavioral interventions, even though well-designed behavioral interventions may be as effective as medication (Pelham et al., 2000; Barry & Messer, 2003). Perhaps these attitudes about behavioral interventions reflect reality in the typical school setting, where medication is relatively easy to utilize while personnel having the knowledge and experience necessary to develop behavioral programs with the fidelity needed to be effective are not readily available.

Therefore, if behavioral interventions are to live up to their potential in U.S. schools, teachers need to be better informed about the risks related to the large scale use of stimulant medications (Brandon, Marinelli, Baker & White, 2001; Brandon & Steiner 2003; Bolanos, Barrot, Berton, Wallace-Black & Nestler, 2003; Carlezon, Mague & Andersen, 2003; Chase, Brown, Carry & Wilkinson, 2003; Moline & Frankenberger, 2001; MTA, 2004; Warden, Robling, Sanders, Blizotes, & Turner, 2005; Garland, 2004; Wilkinson, Taylor, & Holt, 2002). They will also need to be educated about the effectiveness of well-designed behavioral programs and have access to school professionals with the training and experience necessary to develop such programs in the school setting. Iowa represents a state model where teachers receive training in the use of effective behavioral interventions and school psychologists occupy the role of behavior program designers (Reschly, Tilly & Grimes 1999).

The Swedish teachers clearly preferred educational to medical interventions for treatment of ADHD related symptoms. However, Swedish teachers did not believe that behavioral interventions represented an effective method for treating children with ADHD types of behaviors. Therefore, Swedish teachers could benefit from further information related to the success of well-designed behavioral interventions for treatment of ADHD (Barry & Messer, 2003). In addition, even in the presence of increased knowledge of efficacy of behavioral treatment, Swedish schools would need to provide the needed personnel with knowledge and experience in the use of behavioral interventions in school settings. This is the same challenge facing schools in the U.S. that was delineated above.

Finally, stimulant treatment growth in Sweden may not emulate the dramatic increase in stimulant use in the United States. Although there are forces attempting to move Sweden towards a more liberalized view of stimulant treatment, only a small percentage of children in general education classrooms are currently being given stimulant medications to treat ADHD (Larsson, 2002). Gillberg (1997) stated that Sweden needs to soften what the author called Sweden's rigid view of stimulants to treat ADHD and DAMP. However, even stimulant proponents in Sweden advise that stimulant treatment be reserved for severe cases of ADHD and DAMP (Gillberg, 1997).

References

- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed. text revision). Washington, DC: Author.
- Barkley, R.A. (1998, Sept.). Attention deficit hyperactivity disorder. *Scientific American*.
- Barry, L.M. & Messer, J.J. (2003). A practical application of self-management for students diagnosed with attention-deficit/hyperactivity disorder. *Journal of Positive Behavior Interventions*, 5, 238-248.
- Bäsen, A. (2000, October 10). *Dagens Medicin*, 41.
- Bolanos, C.A., Barrot, M, Berton, O, Wallace-Black, D, Nestler, E.J. (2003). Methylphenidate treatment during pre-and periadolescence alters behavioral responses to emotional stimuli at adulthood. *Biological Psychiatry*, 54(12), 1317-1329.
- Brandon, C.L., Marinelli, M., Baker, L.K., White, F.J. (2001). Enhanced reactivity and vulnerability to cocaine following methylphenidate treatment in adolescent rats. *Neuropsychopharmacology*, 25(5), 651-661.
- Brandon, C., & Steiner, H. (2003). Repeated methylphenidate treatment in adolescent rats alters gene regulation in the striatum. *European Journal of Neuroscience*, 18(6):1584.
- Carlezon, W.A.jr., Mague, S.D., Andersen, S.L. (2003). Enduring behavioral effects of early exposure to methylphenidate in rats. *Biological Psychiatry*, 54(12), 1330-1337.
- Carlson, S. (2003). *International perspectives regarding ADHD and stimulant treatment: U.S. and Swedish teacher samples*. Unpublished master's thesis, University of Wisconsin-Eau Claire.
- Chase, T., Brown, R., Carrey, N., & Wilkinson, M. Daily methylphenidate administration attenuates c-fos expression in the striatum of prepubertal rats. *Neuroreport*. 2003; 14(5): 769-772.
- Doherty, S., Frankenberger, W., Fuhrer, R., & Snider, V. (2000). Children's self reported effects of stimulant medication. *International Journal of Disability, Development and Education*, 47, 39-54.
- Frankenberger, W., Farmer, C., Parker, L., & Cermak, J. (2001). The use of stimulant medication for treatment of attention-deficit/hyperactivity disorder: A national survey of school psychologists' knowledge, attitudes, and experience. *Developmental Disabilities Bulletin*, 29, 132-151.
- Frankenberger, W., Lozar, B., & Dallas, P. (1990). The use of stimulant medication to treat attention deficit hyperactive disorder (ADHD) in elementary school children. *Developmental Disabilities Bulletin*, 18, 1-13.
- Garland, E. J. (2004). Facing the evidence: antidepressant treatment in children and adolescents. *CMAJ*, 170, (4). Retrieved Jan. 14, 2005 from www.cmaj.ca/cgi/content/full/170/4/
- Gillberg, C. (1997). Central nervous system stimulants to hyperactive children? Time to soften up the attitude towards an efficient treatment. *Lakartidningen*, 94 (23), 2161-2162.
- Jerome, L., Gordon, M.G., & Hustler, P. (1994). A comparison of U.S. and Canadian teachers' knowledge and attitudes towards attention-deficit hyperactivity disorder (ADHD). *Canadian Journal of Psychiatry*, 39, 563-567.
- Landgren, M., Kjellmen, B., & Gillberg, C. (1998). Attention deficit disorder with developmental coordination disorders. *Archives of Disease in Childhood*, 79, 207-212.
- Larsson, J. (2002, January 13). Letter to International Narcotics Control Board (INCB): the use of

- central stimulants for medical purposes in Sweden. Hassela Nordic Network, Retrieved July 17, 2003, from <http://www.hnnsweden.com/0002/01jan2002/02jan-005.htm>.
- LeFever, G. Dawson, K., & Morrow, A. (1999). The extent of drug therapy for attention deficit hyperactivity disorder among children in public schools. *U.S. Journal of Public Health, 89*, 1359-1364.
- Leo, J., & Cohen, D. (2003). Broken brains or flawed studies? A critical review of ADHD neuroimaging research. *The Journal of Mind and Behavior, 24*(1), 29-56.
- Liu, C., Robin, A. L., Brenner, S., & Eastman, J. (2004). Social acceptability of methylphenidate and behavior modifications for treating attention deficit hyperactivity disorder. *Pediatrics, 88*, 560-565.
- Medical Products Agency (2003). Retrieved December 5, 2003, from <http://www.mpa.se/eng/index.shtml>
- Moline, S. & Frankenberger, W. (2001). Use of stimulant medication for treatment of attention-deficit/hyperactivity disorder: A survey of middle and high school students' attitudes. *Psychology in the Schools, 38*, 569-584.
- MTA Cooperative Group (2004). National institute of mental health multimodal treatment study of ADHD follow up: Changes in effectiveness and growth after the end of treatment. *Pediatrics, 113*, 762-770.
- Multimodal Treatment Study of Children with ADHD Cooperative Group. (1999). A 14-month randomized clinical trial of treatment strategies for attention-deficit/hyperactivity disorder. *Archives of General Psychiatry, 56*, 1088-1096.
- Musser, C., Ahmann, P., Theye, F., Mundt, P., Broste, S., Mueller-Rizner, N. (1998). Stimulant use and the potential for abuse in Wisconsin as reported by school administrators and longitudinally followed children. *Developmental and Behavioral Pediatrics, 19* (3), 187-192.
- National Institutes of Health. (1998). NIH consensus report. *Diagnosis and treatment of attention deficit hyperactivity disorder. Nov. 16-18. 16*, 1-37.
- Pelham, W.E., Gnagy, E.M., Greiner, A.R., Hoza, B., Hinshaw, S.P., Swanson, J.M., et.al. (2000). Behavioral versus behavioral and pharmacological treatment in ADHD children attending a summer treatment program. *Journal of Abnormal Child Psychology, 28*(6), 507-525.
- Peloquin, L. & Korman, R. (1986). Effects of methylphenidate on normal children's mood, event-related potentials, and performance in memory scanning and vigilance. *Journal of Abnormal Psychology, 95*(1), 88-98.
- Reschly, D.K., Tilly, W.D., III & Grimes, J.P. (1999). *Special education in transition: Functional assessment and noncategorical programming*. Longmont, CO: Sopris West.
- Rowland, A.S., Umbach, D.M., Stallone, L., Naftel, A.J., Bohlig, E.M., & Sandler, D.P. (2002). Prevalence of medication treatment for attention deficit-hyperactivity disorder among elementary school children in Johnston County, North Carolina. *American Journal of Public Health, 92*(2), 231-234.
- Sinha, G. (2005). Training the brain: Cognitive therapy as an alternative to ADHD drugs. *Scientific American, 293*, 22-24.
- Snider, V., Busch, T., & Arrowood, L. (2003). Teacher knowledge of stimulant medication and ADHD. *Remedial and Special Education, 24*(1), 46-56.
- U.S. Pharmacist Continuing Education. (2000). Attention-deficit hyperactivity disorder and the rise in methylphenidate use (ACPE Program No. 430-000-00-054-H01). [On-line continuing education course].

- Warden, S. J., Robling, A. G., Sanders, M. S., Bliziotis, M. M., & Turner, C. H. (2005). Inhibition of the serotonin transporter (5-HTT) reduces bone accrual during growth. *Endocrinology, 146*, 685-693.
- Weber, K., Frankenberger, W. & Heilman, K (1992). The effects of Ritalin on the academic achievement of children diagnosed with attention-deficit hyperactivity disorder. *Developmental Disability Bulletin, 20*(2), 49-68.
- Wilkinson, G. B., Taylor, P., & Holt, J. R. (2002). Bipolar disorder in adolescence: Diagnosis and treatment. *Journal of Mental Health Counseling, 24*, 348-358.
- Zametkin, A.J., Nordahl, T.E., Gross, M., King, A.C., Semple, W.E., Rumsey, et al. (1990). Cerebral glucose metabolism in adults with hyperactivity of childhood onset. *New England Journal of Medicine, 323*(20), 1361-1367.
- Zito, .M., Safer, D.J., dosReis, S., Gardener, J.F., Boles, M., & Lynch, F. (2000). Trends in prescribing of psychotropic medications to preschoolers. *Journal of the American Medical Association, 283*, 1025-1030.
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