Overcoming the Barriers to Teachers' Utilization of Evidence-Based Interventions for Children with ADHD: The *Teacher Help for ADHD* Program

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Although there are many effective classroom-based interventions and programs for managing the negative impact of attention-deficit/hyperactivity disorder (ADHD) on children's school functioning, teachers continue to report limited knowledge and implementation of these strategies in their classrooms. This article reviews the barriers to teachers' utilization of the evidence-based practices, including individual, intervention, organizational, and external factors. We also describe the *Teacher Help for ADHD* online intervention program, which was developed with the goal of overcoming as many of these barriers as possible to increase classroom teachers' utilization of the program. The article reviews the impact of the *Teacher Help for ADHD* on teachers' knowledge, attitudes, and practices regarding students with ADHD, and concludes with recommendations on how to facilitate the implementation of evidence-based classroom interventions for students with ADHD.

What is ADHD and why is it relevant to the school context?

Attention-deficit/hyperactivity disorder (ADHD) affects approximately 5% of school-aged children and is one of the most common childhood psychiatric disorders (APA, 2000 & 2013). It has been reclassified from a disruptive behavior disorder to a neurodevelopmental disorder with the recent release of the Diagnostic and Statistical Manual-5th Edition (DSM-5; APA, 2013). This reclassification is viewed by many researchers as a positive move toward acknowledging its neurological basis and perhaps generating more interest in researching the neurological and neuropsychological aspects of ADHD, which have been studied less extensively than the behavioral manifestation of ADHD (Coghill, Seth, Pedroso, Usala, Currie, & Galiano, 2014; Halperin, Bédard, & Curchack-Lichtin, 2012).

The core symptoms of ADHD (i.e., inattention, impulsivity, and hyperactivity) have the most detrimental impact on children's functioning in school settings, where there is a high need for self-regulation and learning skills, which are typically impaired in children with ADHD (Barkley, 2013, DuPaul, 2007; DuPaul & Weyandt, 2006; Miranda, Jargue, & Táarraga, 2006). In addition to these core symptoms, children with ADHD often have a number of other impairing symptoms, including poor emotion-regulation, working memory difficulties, slow speed in completing tasks, and higher likelihood of having other conditions, such as learning disabilities and behavioral disorders (Barkley, 2013; DuPaul & Weyandt, 2006), all of which have been found to increase teachers' levels of stress (Greene, Beszterczey, Katzenstein, Park, & Goring, 2002). Therefore, the development of effective classroom-based interventions for students with ADHD has been a priority (Miranda et al., 2006).

What are the main evidence-based interventions for ADHD?

There is now clear evidence as to what constitutes evidence-based intervention for ADHD, which includes medication, behavioral interventions (i.e., parent and teacher training to implement behavioral techniques in home and school settings), and a combination of these two types of interventions (DuPaul & Weyandt, 2006; Miranda et al., 2006; MTA Collaborative Group, 1999). Medication is the most common intervention for ADHD; however behavioral, social, and educational interventions have also been developed partly due to the adverse side effects of the medications, lack of response to medication by some youth, and low acceptability of medication by some parents and youth (Charach, Ickowicz, & Schachar, 2004; Monastra, 2005; Radesky, Reddy, Steiner, & Augustyn, 2013). Also, evidence is limited for its long-term positive impact (Jensen, et al., 2007; Radesky et al., 2013). Furthermore, while medication has been found to be effective in improving core symptoms of ADHD (i.e., inattention, impulsivity, and hyperactivity), there is no evidence that medication treats the associated symptoms of ADHD such as poor academic functioning, organization, and social relationships (Waschbusch & Hill, 2003). For this reason, home-based and classroom-based intervention programs that address behavioral, social, and academic functioning of children with ADHD have been developed and empirically validated (Pelham & Fabiano, 2008).

What is known about school interventions for ADHD?

The research literature suggests that behavior-based approaches that are focused on teacher training are among the most well studied and effective interventions for ADHD in the classroom (Evans, Owens, & Bunford, 2014; Pelham & Fabiano, 2008; Rajwan, Chacko, & Moeller, 2012). Teachers, in collaboration with parents and school support staff, can help children with ADHD make notable improvements in their functioning. In fact, a recent study found that youth with ADHD reported that classroom-based learning strategies were the most helpful of all interventions (Walker-Noack, Corkum, Elik, & Fearon, 2013). Classroom-based interventions include general classroom organization and structure, positive reinforcement procedures, reward programs, negative reinforcement procedures (e.g., response cost, which refers to removing a privilege or a point in a reward program in response to an undesirable behavior), daily parent communication, quiet working environment, extra time, chunking (i.e., breaking a task down into smaller, sequential components), and frequent feedback (Rajwan et al., 2012). Unfortunately, a common finding across studies is that in the long term, the gains obtained by these interventions do not generalize to other settings and do not

continue if these techniques are not implemented on an ongoing basis (Parker, Wales, Chalhoub, and Harpin, 2013; Rajwan et al., 2012); the one exception is a study with an older population (secondary students) that found that gains were maintained past one year (Evans, Serpell, Schultz, & Pastor, 2007). In order to support younger children (i.e., elementary rather than secondary students) with ADHD, research findings suggest that it is important to provide consistent and ongoing behavioral supports until children are able to internalize self-control strategies, both at home and at school (Miranda et al., 2006; Rajwan et al., 2012). Therefore, it is important for parents and teachers of children with ADHD to implement behavioral strategies consistently across environments and time.

Table 1 describes the classroom-based interventions for ADHD and their effectiveness in more detail. This table is based on the comprehensive review of the literature by Evans and colleagues (2014), who updated the previous comprehensive review that was completed by Pelham and Fabiano (2008). The table is additionally based on our own review of the classroom-based intervention literature (e.g., Miranda et al., 2006; Rajwan et al., 2012). The categorization of interventions is based on the criteria as outlined by Silverman and Hinshaw (2008):

Level 1 – Effective/Well-established;

Level 2 – Probably Efficacious;

Level 3 – Possibly Efficacious;

Level 4 – Experimental; and

Level 5 – Not Effective.

Understanding which ADHD interventions are evidence-based and which interventions do not have supporting evidence is critical to increasing the use of appropriate interventions in the class-room and ensuring that the effort spent by teachers to help students with ADHD is focused on implementing interventions with known effectiveness.

What are the barriers to teachers' utilization of classroom-based interventions for students with ADHD?

Despite clear knowledge of what is effective in treating ADHD in children, classroom interventions are rarely implemented and when implemented are often ineffective (Fabiano & Pelham, 2003; Repie, 2005). To our knowledge no exact statistics are available about the percentage of teachers or the frequency with which teachers utilize evidence-based interventions, however, research consistently shows that teachers prefer strategies that require less time and complexity (e.g., preferential seating, proximity of the teacher to the student) over those that are more time-consuming and complex, such as individualized response cost programs (Blotnicky-Gallant, Martin, McGonnell, & Corkum, 2014; Girio & Owens, 2009; Martinussen, Tannock, & Chaban, 2011). Among the well-established interventions, only the daily report card strategy has been rated highly by teachers on a consistent basis across studies (Girio & Owens, 2009).

Research has identified a number of barriers to the implementation of effective classroom-based interventions which can be divided into four broad factors based on a synthesis of existing theories in the literature on adoption of innovations (Wisdom et al., 2014): 1) individual factors; 2) intervention (innovation) factors; 3) organizational factors; and 4) external factors. *Individual factors* include teachers' knowledge of ADHD, attitudes about ADHD, stress level and social support system, as well as the extent to which they adhere to manuals/guidelines when implementing interventions (i.e., fidelity). *Treatment (or innovation) factors* include the interventions' complexity or ease of implementation, feasibility, adaptability to individual contexts, acceptability by users, and the extent to which interventions address barriers and include facilitators based on the available research. *Organizational factors* relate to leadership support and the general culture of schools and school boards with respect to their view of evidence-based interventions. Finally, *external factors* relate to supports from the government, collaboration with external agencies, and those factors that are related to students' home environments. Change in one area may have an impact on changes in other domains (Wisdom et al., 2014). For example, teacher-parent collaboration, an external factor, may affect teachers' classroom practices (an individual factor) and the classroom environment (an organizational factor) due to better student functioning.

There is a critical need for evidence-based programs that can be used by classroom teachers to address the needs of children with ADHD. Not only do these interventions need to be effective, but they also need to address the various barriers to implementation. With this in mind, the authors and their colleagues developed the *Teacher Help for ADHD* program. This program puts more emphasis on the individual and intervention-related factors, over which researchers and participants have the most control. In order to address organizational and external factors, the authors collaborated with school boards and the provincial education department to garner organizational and governmental support, and built home-school collaboration into the program through daily report cards. Table 2 provides more detail about barriers to effective intervention within the context of the theory proposed by Wisdom and colleagues (2014) and explains how the *Teacher Help for ADHD* program addresses these barriers.

What is *Teacher Help for ADHD* and how does this program reduce barriers to implementation?

The *Teacher Help for ADHD* program was developed to overcome intervention barriers by being time-flexible, highly accessible (online), and created with the needs of teachers, students, and classrooms in mind. It was designed to provide teachers with knowledge about ADHD characteristics, etiology, and intervention, and to explicitly address their misconceptions and any negative attitudes about ADHD. The program is classroom-focused, and teachers are supported by a study coach as they work through the 6-week program while adjusting and further developing their behavior management and instructional practices to best support students with ADHD. The program focuses on teacher-student-parent collaboration and communication and provides support to teachers to reduce their own

TABLE 1. School-based interventions for ADHD and their effectiveness[1]	
TYPE OF INTERVENTION	**COMPONENTS OF THE INTERVENTION**
LEVEL 1: Effective (Well-Established) Interventions	
Stimulant medication	• Stimulant medications, prescribed by medical doctors, are the most often used intervention for ADHD. Similar to fever-reducing pills, these medications have a certain amount of time during which they show their effect. Fast-acting versions are effective for 4–6 hours. When children are on fast-acting medications, they need to take their pills in the morning, at noon, and sometimes after school. Other medications are slow-release, meaning that their effect continues for 8–12 hours. When children take a long-lasting medication, they usually only need to take it once a day in the morning.
Behavioral classroom management	• Behavioral classroom management includes both classroom-wide and individually administered behavior management strategies, such as praise, individual attention, material rewards, tokens, removal of privileges, consistent and clear contingencies, specific goals, identifying functions of behaviors, avoiding inadvertent reinforcement of misbehaviors, etc. Daily report cards are often part of a behavioral program. • Behavioral interventions are based on answering three basic questions: 1) What are the antecedents (causes) of behaviors? 2) What are the consequences of behaviors (rewards or punishment by adults, or natural consequences, such as being cold when not putting mittens on)? and 3) What are the functions of behaviors (the purpose they serve) such as skipping a difficult class by misbehaving, because the child knows he or she will be sent out of the classroom when they misbehave? Once these are identified, antecedents and consequences can be modified to create a change in behavior, and functions of the behaviors can be achieved in more appropriate ways, such as giving help to the child for the difficult subject that he or she avoids. • Evidence for behavioral classroom management is mostly for elementary school students.
Combination of medication and behavioral interventions	• Medication and behavioral interventions combined • The combination of interventions often results in improvements across many domains of functioning, beyond the core symptoms of ADHD.
Organizational training	• Teaching children how to organize their belongings, track and monitor assignments, and plan for completion of evening homework • This intervention has been found to be most effective for children with higher IQ.
LEVEL 2: Probably Efficacious Interventions	
Combination of various behavioral interventions	• School-based or summer intervention programs that target impairment related to organization, academic skills, and social functioning, and that can be implemented during classroom time, after school, or during the summer. They include about 20 sessions, over a two-to-three month period. • Results have found improved parent ratings of their child's hyperactivity/impulsivity, internalizing problems, delinquency, school adjustment, as well as improved teacher ratings of academic and classroom functioning.
Classroom-based non-behavioral interventions	• Classroom-based non-behavioral interventions involve strategies that are implemented by teachers to make changes in the overall structure of the classroom, adaptations in lessons, and teaching children self-monitoring strategies. Some of these adaptations include seating the student near the teacher and a positive role model, teacher proximity to student when giving directions, simplifying directions, giving written outlines, allowing the student to have an extra set of books at home, pairing a student with another student to check work, breaking long tasks into smaller amounts, and taking frequent breaks.
LEVEL 3: Possibly Efficacious (Promising) Interventions	
Neurofeedback training	• Some researchers and clinicians suggest that giving children feedback from their bodies that tells them when they are not paying attention might increase their attention span. It requires the use of computers and instruments, such as skin receptors attached to parts of the body (usually fingers) or electrodes attached to the head. It is similar to an interactive video game. Based on the child's activity level, the program on the computer screen tells the child whether they are calm or hyperactive

Neurofeedback training (continued)	(based on heart rate) and whether they are paying attention or not (based on brainwaves). Then, the child is taught to control their brain and heart activity by deep breathing and relaxation techniques as well as other strategies. The video game on the screen then changes according to the brain activity of the child; it goes faster or slower and rewards the child for calm and attentive state of body and mind. It is suggested that the child will learn to regulate their impulsive behaviors and attention span. • Research has found improvements in attention and impulsivity but no changes in social or academic functioning.
Non-stimulant medication	• Recently, a new type of medication, generally referred to as non-stimulant medication, has been approved for use in individuals with ADHD. This medication boosts the brain chemical norepinephrine, whereas stimulant medication has an impact on the brain chemical dopamine. Non-stimulant medication has been shown to improve core symptoms of ADHD and help to regulate emotions. This type of medication, however, does not start to show its effect for several weeks, and its effectiveness has not been widely researched.
LEVEL 4: Experimental Interventions	
Cognitive training	• Children with ADHD show significant difficulties in executive functions (planning, organizing, and focusing) and particularly in working memory. Working memory involves temporarily holding information in mind while manipulating it (e.g., repeating a series of numbers backward after hearing them). Computerized programs that target working memory capacity involve a series of daily sessions that focus on working memory related exercises that increase in complexity depending on the child's progress.
Mindfulness-based group therapy	• A new line of research has been developing that includes group therapies for children and their parents (often in separate groups) over 8–12 weeks that focus on reducing conflict in family relationships and improving compliance to parental requests by teaching parents and children about mindfulness-based principles, such as compassion, meditation, and letting go, as well as about cognitive behavioral principles (thought-emotion-behavior interactions). These interventions seem to be better suited for older children, adolescents, and their parents.
Sensory integration	• One of the hypotheses about possible causes of ADHD is that a child with ADHD has a less developed neural system and has difficulty combining information from various sensory systems of his or her brain. This intervention aims to increase a child's ability to self-regulate through increasing simultaneous awareness of and ways to combine sensory information.
Acupuncture	• Acupuncture is a form of traditional Chinese medicine that focuses on balancing the body's energy force by targeting strategic points in the body using needles.
Homeopathy	• Homeopathy is a holistic approach to understanding symptoms of each person and uses natural substances and pills (made from herbs and other organic substances) to treat various symptoms. Homeopathic intervention is provided by a certified homeopath.
LEVEL 5: Interventions That Are Not Effective	
Social skills training	• Teaching children with ADHD social skills through direct instruction (e.g., how to introduce themselves to others)
Dietary changes	• It is always helpful to have a healthy diet. However, research has shown that sugar-free and dye-free diets do not eliminate symptoms of ADHD.
Supplements	• These include iron and protein supplements to improve functioning of children with ADHD. Research has not found that these are helpful in reducing ADHD symptoms.

[1]Level of evidence is based on the criteria proposed by Silverman and Hinshaw (2008): Level 1: Efficacy demonstrated by at least two independent research settings and by two independent research teams, and the intervention is found to be significantly better than placebo or another active intervention, or equivalent to an already established intervention; Level 2: At least two studies showing significantly better results to a waitlist control group, or one or more experiments meeting Level 1 criteria but not by independent teams; Level 3: At least one randomized controlled trial showing superior results to a waitlist or no-intervention control group; Level 4: Not yet tested in a randomized controlled trial (and therefore cannot make a definitive statement about the intervention's effectiveness); and Level 5: Tested in group-design experiments and found to be inferior to waitlist control or other intervention group, or to have no beneficial effect.

TABLE 2. Barriers to implementation of evidence-based interventions for ADHD in school settings and how these are addressed in the *Teacher Help for ADHD* program	
Possible Barriers to Implementation	**How Teacher Help for ADHD Addresses These Barriers**
Individual Factors	
• A person's level of readiness and motivation to adopt an innovation/intervention • Attitudes toward innovation/intervention • Knowledge about the innovation/intervention • Personal support system (e.g., social support) • The amount of feedback and support given to the individual • The amount of monitoring and feedback on the individual's ability to implement the intervention based on the manual (i.e., fidelity) • Affiliation with the organizational culture (i.e., subjective norms)	• Prepares teachers for interventions by providing background knowledge, empathetic support, and an opportunity to discuss their questions with a study coach • Improves teachers' knowledge of ADHD and openly addresses their misconceptions and any negative attitudes regarding ADHD • Openly addresses attitudes and attributions about children's behaviors; videotapes show children's perspectives • Encourages relationship with students' parent(s) through daily reports so that teachers understand the parents' and children's perspectives • Discussion board (which involves all classroom teachers enrolled in the program) to enhance social support network • Weekly monitoring of the teachers' ability to implement the program • Program support by the school boards and provincial education department
Intervention Factors	
• Complexity and ease of implementation • Cost-efficacy and feasibility • Evidence and compatibility • Facilitators and barriers (how much they are addressed) • Intervention fit with the users' norms and values • Relevance, trialibility, and adaptability to specific needs	• Uses simple language that is as easy to understand as possible. • Uses specific and teacher-friendly language to describe recommended classroom interventions paired with practical examples. • Uses exclusively evidence-based interventions and includes only those interventions rated as effective or promising interventions (see Table 1). • Is based on a usability study prior to implementing the program to ensure that the program was acceptably designed for the target participants (i.e., classroom teachers) and changes were made based on this usability feedback prior to program implementation. • Was developed in collaboration with teachers, school administrators, and school board consultants, as well as personnel from the provincial Department of Education.
Organizational Factors	
• Capacity to utilize new and existing knowledge • Leadership and support for the intervention • Social climate and social networks • Norms, values, and cultures • Training readiness and readiness for change • Operational size and climate • Network with innovation/intervention developers and consultants	• Included school board representatives in the study planning from the beginning and were active partners in the implementation of the program. • Received approval and support from school boards, and this approval was communicated to teachers.
External Factors	
• Government policy and regulations • Social network with other systems/organizations • Regulation with financial incentives • External environment • Collaboration with parents	• The provincial education department provided support to teachers taking part in the *Teacher Help for ADHD* study by giving funding for substitute teachers so that the classroom teacher could work on the program. • Was endorsed by personnel from the provincial Department of Education, along with the researchers, through a video-taped recruitment advertisement and contribution to program content with video session introductions. • Shared the highly positive results from program testing with the school boards and the provincial Department of Education to encourage continued support of the program. • Encourages teacher-parent collaboration throughout the program to improve consistency and communication between teachers, students, and students' parents.

stress, in addition to making evidence-based interventions easy to understand and easy for teachers to implement. The sessions are focused on the following topics:

Session 1: Information about ADHD impact, diagnosis, and etiology

Session 2: Teacher's role, goal setting, and introducing the behavior program

Session 3: Developing and implementing the behavior program

Session 4: Classroom structure, school work, and teacher-student relationship

Session 5: Academic and cognitive needs, instructional interventions, ADHD, and learning disabilities

Session 6: Improving meta-cognition and study skills, fading the reward program, dealing with relapses of unwanted behaviors, and rewarding teachers and students for their efforts

A key strength of the program is its comprehensiveness; academic, behavioral, and social needs of students with ADHD are all covered in the program. Another strength is the tone of the program, which is collaborative, encourages open communication with the child, supports teachers to engage in self-care, provides reassurance to help teachers feel less overwhelmed, and includes parents through daily report cards. The intervention was pilot tested and feedback from 20 teachers was incorporated into the final version (Barnett, Corkum, & Elik, 2012). The core components of the final program include PowerPoint presentations relaying information about ADHD and intervention as well as worksheets that teachers use to individualize the program for their students. Additional program components include supplemental materials (e.g., web-links, resources), a discussion board, and an ADHD coach (the coach was a psychologist who specialized in ADHD and who had a significant amount of experience as a classroom teacher).

To assess the effectiveness of this program, a randomized controlled trial (RCT) was conducted (the results of which are currently being prepared for publication). The participants in the recently completed *Teacher Help for ADHD* intervention study included 58 grade 1–6 students with ADHD, along with their classroom teachers and parents, who were recruited from seven public school boards in Nova Scotia, Canada. Three teachers left the study after pre-intervention measures were collected for reasons unrelated to the study; an additional three teachers did not complete post-intervention and/or follow-up data, resulting in an acceptable 90% completion rate. The final analyzed sample consisted of 52 teachers and 52 students. Teacher-student dyads were randomized, 24 dyads to the Intervention group (i.e., *Teacher Help for ADHD*) and 28 dyads to the Waitlist Control group (e.g., access to *Teacher Help for ADHD* delayed until after the last follow-up assessments were completed). The groups did not differ on relevant demographic variables or on baseline characteristics (e.g., the groups were the same in terms of teachers' educational levels and years of practice and the children's level of ADHD symptoms). Once screening, consent, and baseline measures were complete, teachers in the Intervention group were given access to

one online session per week for six weeks. While awaiting intervention, Waitlist Control group teachers were not able to access the *Teacher Help for ADHD* program. Teachers and parents completed demographic questionnaires prior to intervention. Teachers completed outcome measures (all with well-established reliability and validity) at baseline (before intervention), at the end of intervention, and after a 6-week follow-up period. The data from this study are currently being analyzed but preliminary analyses indicate that based on teacher reports, the children in the Intervention group demonstrated significant improvements in their ADHD symptoms as compared to the children in the Waitlist Control group.

The article includes a summary of the qualitative feedback provided by teachers during the RCT. Table 3 describes the results of the study in regard to the barriers to the utilization of the Teacher Help for ADHD intervention. A thematic analysis of teachers' qualitative responses to open-ended questions, based on the types of barriers, was conducted. Qualitative responses, rather than quantitative outcomes are emphasized because qualitative responses provide a richer and more detailed description of teachers' perspectives and experiences.

Teachers in the intervention group reported an increase in their knowledge of behavior management techniques for ADHD. Over time, all teachers became more open to learning new information about supporting students with ADHD, but teachers in the Intervention group were more open to this than were teachers in the Waitlist Control group. Teachers in the Intervention group had higher expectations for themselves in terms of their level of knowledge and competence (subjective norms). Teachers' comments indicated that addressing barriers to intervention implementation (as described by Wisdom et al., 2014) during the process of development of *Teacher Help for ADHD* improved their openness and their ability to implement the evidence-based strategies. The participating teachers all received some substitute teacher support so that they could have the time to devote to the study, and all participants were provided with technical support. However, despite these steps taken to reduce barriers, some teachers continued to experience barriers related to organizational factors (e.g., lack of time) or external factors (e.g., not being able to reach the website from their computer at home).

Teachers were not only engaged and pleased with the *Teacher Help for ADHD* program, but also reported improvements in their students' behaviors in the classroom. Thematic analysis of teachers' comments demonstrated that they observed growth in their students' task completion, self-regulation, interpersonal interactions, and social skills. More specifically, teachers observed an increase in students' tolerance, respect, trust levels with teachers, happiness, motivation, staying in the class (rather than being sent out), excitement about rewards, organization of belongings and time management, ability to calm themselves down more quickly, being settled in their seat, completing their class work and homework, and maintaining friendships. They reported a decrease in their students' argumentativeness, disruptiveness, seeking attention in inappropriate ways, and the frequency of problematic behaviors that were targeted during the intervention.

TABLE 3. Teachers' comments on how barriers to helping children with ADHD were addressed or not addressed through the *Teacher Help for ADHD* program[1]

BARRIERS THAT WERE ADDRESSED	BARRIERS THAT COULD NOT BE ADDRESSED
Individual Factors	

Increased knowledge of ADHD and its management in the classroom, in terms of a better understanding of:
 • Specific symptoms and their manifestation in classroom
 • Myths and misconceptions
 • Related difficulties (e.g., social skills, executive functioning)
 • Medical treatments
 • Cognitive processes related to learning and social functioning
 • Types of rewards that can be given to students
 • How to develop a step-by-step behavior plan
 • How to prevent issues before they occur by having an understanding of students' difficulties and using specific strategies
 • How to handle behaviors more effectively in the classroom
 • Increased understanding of student's experiences, including:
   • Feelings of students with ADHD and why some strategies work while others do not
   • Importance of positive reinforcement for students with ADHD
   • A new and more empathetic perspective on student's learning and behavioral needs, rather than a disciplinary attitude
   • Taking the perspective of students with ADHD and learning problems (this was an emotional experience for some teachers)
 	
 Benefits to the teacher:
 • Reduced frustration levels through a better understanding of how to break maladaptive behavior patterns
 • Increased comfort in dealing with behavioral problems in students with ADHD
 • Experiencing emotional reassurance and learning from other teachers through the discussion board
	Teachers did not provide any comments that would indicate that they experienced continued challenges with individual barriers.

Intervention Factors	
• The information was described as being helpful (even to those teachers with many years of experience), applicable (rather than theoretical), easy to implement, and possible to use in the long term. • The intervention was seen as feasible and flexible, because it was online which teachers a chance to work on their own time. • The checklist format was seen as being very helpful. • Teachers liked the supplementary sites and video mini-lectures, and they planned to use supplementary materials in the long term. They appreciated that they were guided toward the "right" resources (supplementary sites). • Despite being additional work to regular teaching, the intervention program was found to be worth it. • Specific aspects of the intervention were helpful, including a focus on students' strengths, working with students toward common goals (which teachers thought made students feel more cared for), working with students to create rewards, ABC charts, and "I and when" statements. • Discussion board provided a forum to provide and receive ideas and supports from other teachers	• *Teachers wanted to see more examples of behavior plans, particularly simpler ones and those that are for older children.* • *Some students did not benefit from the behavioral component.* • *Teachers felt the need to have two weeks for each session, rather than one week.* • *Some teachers regretted not using the discussion board and the study coach more often, and thought that a weekly chat call from the coach would have been helpful (instead of having a coach that sent a general message at the beginning of each session to all participants, and responding to those who had questions).* • *Reading off the computer screen was not easy for some teachers.*

Organizational Factors	
• Applicable information to other students in the classroom, who struggled with the same issues as students with ADHD. • Interpersonal support from other teachers in terms of the challenges of finding the time to implement the intervention in their busy schedules.	• A wish to have access to the materials every year as professional development sessions. • Very little time to devote to the intervention in teachers' busy schedules, particularly during report card times.
External Factors	
• An increased understanding of the importance of communication with home and positive approaches. Some teachers found that this has increased their students' level of happiness, whether they were on or off medication.	• If teachers were also busy in their home lives or had other commitments of higher priority, they found it difficult to keep up with the timelines of the program that allowed for a comprehensive understanding of the information. • It was difficult to communicate with some parents. • When students were off sick, it was difficult to implement the program. • Students' behaviors were affected by changes in the home situation.

[1] *Themes were based on the responses to the open-ended items on the Teacher Satisfaction Questionnaire and the Discussion Board. Verbatim comments are not provided due to space issues and confidentiality.*

What needs to happen to facilitate the implementation of evidence-based classroom ADHD interventions?

Behavioral and organizational change has been studied in multiple contexts and from multiple perspectives, including education (e.g., Ferrari & Elik, 2003; Hare, 2002, Johnson & Sinatra, 2014; Richardson 1996), sociology (e.g., Jung, Nutley, Morton, & Millar, 2010), public health/medicine (LaRocca, Yost, Dobbins, Ciliska, & Butt, 2012), and psychology (e.g., Elik, Wiener, & Corkum, 2010; Poulou & Norwich, 2002; Prochaska, DiClemente, & Norcross, 1992; Stanovich & West, 2007; Zemore & Ajzen, 2014). This literature indicates that, in general, there is a need to foster an open-minded approach to the use of empirical evidence to improve learning. Some theories of behavior change (e.g., the theory of planned behavior of Fishbein and Ajzen (1975; as cited in Zemore & Ajzen, 2014); transtheoretical model of change of Prochaska and his colleagues (1992); theory of open-minded thinking dispositions of Stanovich and West (2007) and Hare (2002); and Weiner's attribution theory (1985)) have been adapted to explain teachers' behaviors toward children with exceptionalities, including children with ADHD (e.g., Elik et al., 2010; Poulou & Norwich, 2002). These theories on behavior change for teachers focus mostly on individual factors, such as teachers' knowledge, attitudes, and behaviors, and on the type of student behaviors as well as perceptions of organizational norms as external factors. Many other studies have examined specific relationships between teachers' attitudes, knowledge, and behaviors without testing a specific theory (e.g., Blotnicky-Gallant et al., 2014; also see the review by Sherman, Rasmussen, & Baydala, 2008).

Generally, studies on behavioral change conclude that teachers' behaviors cannot be consistently predicted based on one or two factors; rather, predictions require information about a combination of these characteristics, such as open-mindedness, readiness to learn, beliefs, emotions, attributions, and knowledge of instructional and behavior management techniques (Blotnicky-Gallant et al., 2014; Elik et al., 2010; Poulou & Norwich, 2002), as well as external factors, such as organizational supports (Hershfeldt, Pell, Sechrest, Pas, & Bradshaw, 2012; Sherman et al., 2008). For example, it has been found that teachers who did not believe that they were responsible for supporting students with emotional and behavioral difficulties and who attributed the causes of students' misbehaviors to the students' conscious choices rather than students' inability to self-regulate, tended to experience more frustration and anger, and in turn, reacted more punitively to these students and had less intention to adapt instruction (Elik et al., 2010; Poulou & Norwich, 2002).

Studies to date have tended to focus on a limited number of factors that may affect teachers' behaviors and student outcomes. In order to be inclusive of a range of factors, our results from the Teacher Help for ADHD intervention are discussed within the context of the more comprehensive model proposed by Wisdom et al. (2014), which incorporated individual, intervention-related, organizational, and external factors in predicting teachers' likelihood of using evidence-based practices. The *Teacher Help for ADHD* program resulted in very promising results in terms of addressing many of the barriers to utilization of evidence-based interventions. As described in Table 3, our program touched on all four levels of barriers, and facilitated change in teacher (and student) outcomes.

In conclusion, based on the results described in this article, as well as the review of the literature, it is clear that teachers are able to affect significant changes in the behaviors and

functioning of children with ADHD in their classrooms when the needed information and supports are available. An important conclusion is that there are a multitude of factors that are interrelated in creating barriers to teachers' access to and implementation of evidence-based practices for children with ADHD. However, when these barriers are addressed, successful interventions are put in place by teachers, which can have an impact not only for children with ADHD but also other children in the classroom. Therefore, it is important to provide teachers with opportunities to collaborate with their students, students' parents, colleagues, researchers, school support staff, and school administrators in supporting children with ADHD. Teacher education programs can also support this approach by emphasizing the use of evidence-based approaches and providing information targeted at reducing all levels of barriers, such as improving behavior management techniques, attitudes, frustration management, and collaboration skills along with instructional knowledge. Coaches for mentoring and discussion boards for peer support are also recommended, as well as having protected time on a regular basis to implement evidence-based strategies. Providing these types of programs online, with the support of an online coach, allows for more accessibility to the information and supports that teachers need to successfully meet the needs of their students with ADHD in their classrooms.

References

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders (Fourth Edition - Text Revision)*. Washington, DC: Author.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders (Fifth Edition)*. Washington, DC: Author.

Barkley, R. A. (2013). Distinguishing sluggish cognitive tempo from ADHD in children and adolescents: Executive functioning, impairment, and comorbidity. *Journal of Clinical Child and Adolescent Psychology, 42*(2), 161–173. Retrieved from http://search.proquest.com/docview/1346800441?accountid=12347

Barnett, B., Corkum, P., & Elik, N. (2012). A web-based intervention for elementary school teachers of students with attention-deficit/hyperactivity disorder (ADHD). *Psychological Services, 9*(2), 227–230. doi: http://dx.doi.org/10.1037/a0026001

Blotnicky-Gallant, P., Martin, C., McGonnell, M., & Corkum, P. (2014). Nova Scotia teachers' ADHD knowledge, beliefs, and classroom management practices**.** *Canadian Journal of School Psychology, (online first)* 1–19. doi: 10.1177/0829573514542225

Charach, A., Ickowicz, A., & Schachar, R. (2004). Stimulant treatment over five years: Adherence, effectiveness, and adverse effects. *Journal of the American Academy of Child & Adolescent Psychiatry, 43*(5), 559–567. doi: http://dx.doi.org/10.1097/00004583-200405000-00009

Coghill, D. R., Seth, S., Pedroso, S., Usala, T., Currie, J., & Gagliano, A. (2014). Effects of methylphenidate on cognitive functions in children and adolescents with attention-deficit/hyperactivity disorder: Evidence from a systematic review and a meta-analysis. *Biological Psychiatry, 76*(8), 603–615. doi: http://dx.doi.org/10.1016/j.biopsych.2013.10.005

DuPaul, G. J., & Weyandt, L. L. (2006). School-based intervention for children with attention deficit hyperactivity disorder: Effects on academic, social, and behavioural functioning. *International Journal of Disability, Development and Education, 53*(2), 161–176. doi: http://dx.doi.org/10.1080/10349120600716141

DuPaul, G. J. (2007). School-based interventions for students with attention deficit hyperactivity disorder: Current status and future directions. *School Psychology Review, 36*(2), 183–194. Retrieved from http://search.proquest.com/docview/621810318?accountid=12347

Elik, N., Wiener, J., & Corkum, P. (2010). Pre-service teachers' open-minded thinking dispositions, readiness to learn, and attitudes about learning and behavioural difficulties in students. *European Journal of Teacher Education, 33*(2), 127–146. Retrieved from http://search.proquest.com/docview/742873945?accountid=12347

Evans, S. W., Serpell, Z. N., Schultz, B. K., & Pastor, D. A. (2007). Cumulative benefits of secondary school-based treatment of students with attention deficit hyperactivity disorder. *School Psychology Review, 36*(2), 256–273. Retrieved from http://search.proquest.com/docview/621818901?accountid=12347

Evans, S. W., Owens, J. S., & Bunford, N. (2014). Evidence-based psychosocial treatments for children and adolescents with attention-deficit/hyperactivity disorder. *Journal of Clinical Child and Adolescent Psychology, 43*(4), 527–551. doi: http://dx.doi.org/10.1080/15374416.2013.850700

Fabiano, G. A., & Pelham, W. E., Jr. (2003). Improving the effectiveness of behavioral classroom interventions for attention-deficit/hyperactivity disorder: A case study. *Journal of Emotional and Behavioral Disorders, 11*(2), 124–130. doi: http://dx.doi.org/10.1177/106342660301100206

Ferrari, M., & Elik, N. (2003). Influences on intentional conceptual change. In G. Sinatra & P. R. Pintrich (Eds.), *Intentional conceptual change* (pp. 21–54). Hillsdale, NJ: Erlbaum.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behaviour: An introduction to theory and research.* Boston, MA: Addison-Wesley.

Girio, E. L., & Owens, J. S. (2009). Teacher acceptability of evidence-based and promising treatment for children with attention-deficit/hyperactivity disorder. *School Mental Health, 1*(1), 16–25. Retrieved from http://search.proquest.com/docview/819630367?accountid=12347

Greene, R. W., Beszterczey, S. K., Katzenstein, T., Park, K., & Goring, J. (2002). Are students with ADHD more stressful to teach? Patterns of teacher stress in an elementary school sample. *Journal of Emotional and Behavioral Disorders, 10*(2), 79–89. doi: http://dx.doi.org/10.1177/10634266020100020201

Halperin, J. M., Bédard, A. V., & Curchack-Lichtin, J. (2012). Preventive interventions for ADHD: A neurodevelopmental perspective. *Neurotherapeutics, 9*(3), 531–541. doi: http://dx.doi.org/10.1007/s13311-012-0123-z

Hare, W. (2002). Teaching and the attitude of open-mindedness. *Journal of Educational Administration and Foundations, 16*(2), 103–124.

Hershfeldt, P. A., Pell, K., Sechrest, R., Pas, E. T., & Bradshaw, C. P. (2012). Lessons learned coaching teachers in behavior management: The PBISplus coaching model. *Journal of Educational & Psychological Consultation, 22*(4), 280–299. doi: http://dx.doi.org/10.1080/10474412.2012.731293

Jensen, P., Arnold, L., Swanson J., Vitiello, B., Abikoff, H., Greenhill, L., … Hur, K. (2007). 3-year follow up of the NIMH MTA study. *Journal of the American Academy of Child & Adolescent Psychiatry*, 46(8): 989–1002.

Johnson, M. L., & Sinatra, G. M. (2014). The influence of approach and avoidance goals on conceptual change. *The Journal of Educational Research, 107*(4), 312. Retrieved from http://search.proquest.com/docview/1537852884?accountid=12347

Jung, T., Nutley, S., Morton, S., & Millar, A. (2010). Linking research and policy in Scotland. *Evidence and Policy, 6*(2), 213–236. doi: http://dx.doi.org/10.1332/174426410X502455

LaRocca, R., Yost, J., Dobbins, M., Ciliska, D., & Butt, M. (2012). The effectiveness of knowledge translation strategies used in public health: a systematic review. *BMC Public Health, 7*(12), 751–765. doi: 10.1186/1471-2458-12-751

Martinussen, R., Tannock, R., & Chaban, P. (2011). Teachers' reported use of instructional and behavior management practices for students with behavior problems: Relationship to role and level of training in ADHD. *Child & Youth Care Forum, 40*, 193–210. doi: 10.1007/s10566-010-9130-6

Miranda, A., Jarque, S., & Tárraga, R. (2006). Interventions in school settings for students with ADHD. *Exceptionality, 14*(1), 35–52. doi: 10.1207/s15327035ex1401_4

Monastra, V. J. (2005). Overcoming the barriers to effective treatment for attention-deficit/hyperactivity disorder: A neuro-educational approach. *International Journal of Psychophysiology, 58*(1), 71–80. doi: http://dx.doi.org/10.1016/j.ijpsycho.2005.03.010

MTA Collaborative Group. (1999). A 14-month randomized clinical trial of treatment strategies for attention-deficit/hyperactivity disorder. *Archives of General Psychiatry, 56*(12), 1073–1086. Retrieved from http://search.proquest.com/docview/619441308?accountid=12347

Parker, J., Wales, G., Chalhoub, N., & Harpin, V. (2013). The long-term outcomes of interventions for the management of attention-deficit hyperactivity disorder in children and adolescents: A systematic review of randomized controlled trials. *Psychology Research and Behavior Management, 6.* Retrieved from http://search.proquest.com/docview/1544983745?accountid=12347

Pelham, W. E., Jr., & Fabiano, G. A. (2008). Evidence-based psychosocial treatments for attention-deficit/hyperactivity disorder. *Journal of Clinical Child and Adolescent Psychology, 37*(1), 184–214. doi: http://dx.doi.org/10.1080/15374410701818681

Poulou, M., & Norwich, B. (2002). Cognitive, emotional, and behavioural response to students with emotional and behavioural difficulties: A model of decision-making. *British Educational Research Journal, 28*, 111–138.

Prochaska, J. O., DiClemente, C. C., & Norcross, J. C. (1992). In search of how people change: Applications to addictive behaviors. *American Psychologist, 47*(9), 1102–1114. Retrieved from http://search.proquest.com/docview/57759914?accountid=12347

Radesky, J., Reddy, A., Steiner, N., & Augustyn, M. (2013). "When the prescription pad is not enough": Attention-deficit hyperactivity disorder management 2.0. *Journal of Developmental and Behavioral Pediatrics, 34*(2), 138–140. Retrieved from http://search.proquest.com/docview/1317831703?accountid=12347

Rajwan, E., Chacko, A., & Moeller, M. (2012). Nonpharmacological interventions for preschool ADHD: State of the evidence and implications for practice. *Professional Psychology: Research and Practice, 43*(5), 520–526. doi: http://dx.doi.org/10.1037/a0028812

Repie, M. S. (2005). A school mental health issues survey from the perspective of regular and special education teachers, school counselors, and school psychologists. *Education & Treatment of Children, 28*(3), 279–298. Retrieved from http://search.proquest.com/docview/620969224?accountid=12347

Richardson, V. (1996). The role of attitudes and beliefs in learning to teach. In J. Sikula (Ed.), *Handbook of research on teacher education* (pp. 102–119). New York, NY: Simon and Schuster Macmillan.

Sherman, J., Rasmussen, C., & Baydala, L. (2008). The impact of teacher factors on achievement and behavioural outcomes of children with attention Deficit/Hyperactivity disorder (ADHD): A review of the literature. *Educational Research, 50*(4), 347–360. Retrieved from http://search.proquest.com/docview/61969012?accountid=12347

Silverman, W. K., & Hinshaw, S. P. (2008). The second special issue on evidence-based psychosocial treatments for children and adolescents: A 10-year update. *Journal of Clinical Child and Adolescent Psychology, 37*(1), 1–7. doi: http://dx.doi.org/10.1080/15374410701817725

Stanovich, K. E., & West, R. F. (2007). Natural myside bias is independent of cognitive ability. *Thinking and Reasoning, 13, 225–247.*

Walker-Noack, L., Corkum, P., Elik, N., & Fearon, I. (2013). Youth perceptions of attention-deficit/hyperactivity disorder and barriers to treatment. *Canadian Journal of School Psychology, 28*(2), 193–218. Retrieved from http://search.proquest.com/docview/1429633709?accountid=12347

Waschbusch, D. A., & Hill, G. P. (2003). *Empirically supported, promising, and unsupported treatments for children with attention-deficit/hyperactivity disorder.* New York, NY: Guilford Press. Retrieved from http://search.proquest.com/docview/620091404?accountid=12347

Weiner, B. (1985). An attributional theory of achievement motivation and emotion. *Psychological Review, 92*, 548–573.

Wisdom, J. P., Chor, K. H. B., Hoagwood, K. E., & Horwitz, S. M. (2014). Innovation adoption: A review of theories and constructs. *Administration and Policy in Mental Health and Mental Health Services Research, 41*(4), 480–502. doi: http://dx.doi.org/10.1007/s10488-013-0486-4

Zemore, S. E., & Ajzen, I. (2014). Predicting substance abuse treatment completion using a new scale based on the theory of planned behavior. *Journal of Substance Abuse Treatment, 46*(2), 174–182. Retrieved from http://search.proquest.com/docview/1518033515?accountid=12347

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What is evidence based practice? •EBP is an approach to providing the highest quality of health care in all settings to improve health outcomes. •The Institute of Medicine has set a goal that by 2020, the best available evidence will be used to make 90% of all health care decisions; yet most nurses continue to be inconsistent in implementing EBP. true. Research utilization has been defined as "the process of transforming research knowledge into practice" and "the use of research to guide clinical practice". A paradigm shift. Second, be prepared to overcome barriers to learning. Third, consider the appropriateness of using technology in the programs. pedagogy. learning strategies for children and individuals with little knowledge about a health-related topic. Andragogy In children especially, affect drives cognition. Children of all ages function better when they have confidence in a secure base to which they can turn for support if needed. When children have the support they need, they explore more competently, are less fearful, and are able to give more focused attention to cognitive tasks. • The Child Matters. It is important for teachers to focus on the child, not just the skill. Research in developmental neuroscience has demonstrated that children grow cognitively at different rates and may not achieve the same stage at the same time. Because children's Barriers to evidence-based teaching include students' concern that an emphasis on research evidence may ignore the human context of mental health problems, students' perception of inconsistency between messages delivered by an evidence-based program and by clinical supervisors, and students' sense of intimidation by the breadth of material associated with research appraisal. Recommended responses involve an emphasis upon the balance between research knowledge and clinical intuition, explicit discussion of how to manage discrepant approaches to practice in academic and clinical settings, and ca... from better utilization of its empirical base does. However, few evidence-based interventions for young children with ASD have been translated successfully into feasible models for application in authentic early education environments, where educators have varying amounts of experience with ASD (National Research Council, 2001; Bondy and Brownell, 2004; Stahmer et al., 2005). The literature provides some insight into barriers to implementation of evidence-based interventions in public school classrooms. One major barrier pertains to lack of adequate training to prepare educators to effectively instruct children with ASD (Scheuermann et al., 2003; Loiacono and Allen, 2008; Busby et al., 2012; Eapen et al., 2013).