

ABSTRACT

Title of Dissertation: TEACHER IN-SERVICE TRAINING FOR
 ATTENTION-DEFICIT/HYPERACTIVITY
 DISORDER (ADHD): INFLUENCE ON
 KNOWLEDGE ABOUT ADHD, USE OF
 CLASSROOM BEHAVIOR MANAGEMENT
 TECHNIQUES, AND TEACHER STRESS

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Children with Attention-Deficit/Hyperactivity Disorder (ADHD) evidence many problems in the classroom, including difficulty staying seated and trouble with organizational tasks. Such behaviors cause impairment for the child in their academic functioning and place a burden upon their teachers. Despite the large evidence base for classroom behavioral interventions, teachers often lack specific training on and accurate knowledge about ADHD. Teacher in-service training is routinely utilized to inform school professionals about a number of special topics. However, the efficacy of such training for ADHD has not been established. The present study examined the efficacy of

brief in-service training in improving teacher knowledge about ADHD, use of behavior management techniques, and levels of stress related to teaching a child with ADHD. Six schools in the Washington, D.C. metropolitan area participated. Teachers at these schools were randomly assigned to receive in-service training immediately or to a waitlist control group that received in-service training one month later. Teacher ratings of ADHD knowledge, use of behavior modification techniques, and stress were measured pre in-service intervention and 1 month post in-service intervention. Behavioral observations of behavior modification strategies were gathered on a random subset of teachers from each school at each time point. Mixed model analyses of variance were used to examine the effects of the intervention on ADHD knowledge, use of behavior modification techniques, and teacher stress. A Treatment Group X Time interaction was found for teacher-reported ADHD knowledge, such that the immediate in-service group reported significantly increased knowledge from pre to post in-service intervention while the waitlist control group did not. Teacher use of reported behavior modification techniques appeared to change for special education teachers only. Stress did not change as a result of the intervention. Observational data did not correlate highly with teacher self-report data. Limitations of this study include the use of a newly- developed measure of ADHD knowledge that requires psychometric testing and the lack of observations of child behavior. Future studies should examine ways to better measure and promote actual behavior change among teachers of children with ADHD.

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Chapter 1: Introduction

Approximately 3-10% of school-aged children meet criteria for attention-deficit/hyperactivity disorder (ADHD), making ADHD one of the most common disorders of childhood (Breton et al., 1999; Fergusson, Horwood, & Lynskey, 1993; Wolraich, Hannah, Pinnock, & Baumgaertel, 1998). This disorder is characterized by a pattern of inattention and/or hyperactivity and impulsivity, some symptoms of which must be present before age seven. Table 1 presents a list of the DSM-IV symptoms of ADHD. For a diagnosis of ADHD, these symptoms have to cause social or academic impairment for the child in more than one setting, typically at home and at school. The cross-situational impairment reported by parents and teachers includes negative interactions with parental figures (Mash & Johnston, 1983) and increased familial stress (Johnston & Mash, 2001) in the home setting and decreased academic achievement (DeShazo Barry, Lyman, & Klinger, 2002) and poor teacher and peer relationships (Clark, Prior, & Kinsella, 2002) in the school setting. These difficulties are chronic and most often persist into adolescence and adulthood, continuing to negatively impact the lives of individuals with ADHD and those around them (Hechtman & Weiss, 1986).

It is important to note that ADHD-related difficulties (e.g., inattentiveness, disruptive behavior) represent the number one referral concern in child mental health agencies, as parents often seek professional assistance due to problem behaviors at home or school (Beiderman, Faraone, Keenan, Knee, & Tsang, 1990). As this disorder is more prevalent than others, the treatment literature for ADHD is more advanced and has identified empirically-supported treatments for the disorder

(Pelham, Wheeler, & Chronis, 1998). These treatments include stimulant medication, psychosocial behavioral interventions at home and in the classroom, and a combination of both. Recent literature has suggested that a combination of both stimulant medication and behavioral treatment may allow for lower doses of stimulant medication to be prescribed (MTA Cooperative Group, 1999) and result in greater parent and teacher satisfaction with treatment (Pelham et al., submitted for publication).

Classroom Behavior of Children with ADHD

The prevalence rate for ADHD translates into approximately one child with ADHD per regular education classroom, with ADHD being overrepresented in special education classrooms as well (Bussing, Zima, Perwein, Belin, & Widawski, 1998). Research using different methodologies has consistently shown differences between the classroom behavior of children with ADHD and non-disordered children. For instance, teachers report differences in the behavior of children who meet diagnostic criteria for ADHD and those who do not on standardized rating scales, including increased distractibility and more conduct problems (Miller, Koplewicz, & Klein, 1997). Likewise, observational studies indicate that children with ADHD intrude on others' activities in the classroom setting, are off-task more often during classroom instruction, and break more classroom rules (e.g., Abikoff et al., 2002; Atkins & Pelham, 1991). For instance, in the Multimodal Treatment Study for ADHD (MTA; Abikoff et al., 2002), researchers compared differences in observed classroom behavior in 502 pairs of children with and without ADHD. In addition to higher rates of intrusive, hyperactive, and off-task behaviors, children with ADHD

were observed to be more noncompliant and verbally aggressive toward both their classmates and teachers than children without ADHD. The results from this large sample of children are consistent with early smaller-scale observational studies of children with ADHD and matched comparison children in showing that children with ADHD exhibit more behavior problems in the classroom than children without the disorder (Abikoff, Gittleman-Klein, & Klein, 1977; Atkins, Pelham, & Licht, 1985; Klein & Young, 1981; Zentall, 1980).

The inattentive and hyperactive behaviors characteristic of children with ADHD cause impairments in different areas of the child's academic life. Such behaviors may impact a child's school functioning, as more severe ADHD symptoms are negatively related to academic functioning (DeShazo Barry, et al., 2002; Hinshaw, 1992; Mash & Barkley, 2003; Zentall, 1993). Children with ADHD often are less prepared for class, disruptive in the classroom, misread directions on assignments, have poorer study skills, and exhibit lower grades than children without ADHD (Evans, Axelrod, & Langberg, 2004; Hinshaw, 1992; Zentall, 1993). ADHD behaviors also may contribute to the poor communication skills and social competence evidenced in children with the disorder that then influence peer relationships (Clark et al., 2002). Not surprisingly, children with the disorder show a preference for less difficult work and report lower self-expectations in the classroom (Carlson, Booth, Shin, & Canu, 2002; Hoza et al., 2001). Finally, children with ADHD are more likely to have co-occurring learning difficulties, repeat grades, drop out of school, and be expelled (Barkley et al., 1990; Faraone, Beiderman, Lehman, &

Spencer, 1993). Therefore, a diagnosis of ADHD has important implications for a child's school functioning, both in the short- and long-term.

Aside from ADHD negatively impacting the individual child's school functioning, the behavior of children with ADHD may have a detrimental influence on the daily lives of school professionals. Specifically, ADHD symptoms may impair a teacher's life in the classroom (Raggi, Evans, Hackethorn, & Thompson, 2003; Reid, Vasa, Maag, & Wright, 1994). That is, when children are off-task or otherwise noncompliant, teachers may spend more time issuing commands than focusing on lessons. In fact, in a study of teacher-reported barriers to instruction, Reid and colleagues (1994) found that the most common barriers to teachers being able to teach the curriculum included spending time delivering specialized interventions to individual children and the severity of child behavior problems in the classroom. In other words, these results indicate that teachers feel that children with behavior problems and the needed specialized treatment may pose barriers to their daily lesson planning. Likewise, children with ADHD dominate school psychologists' caseloads, and these professionals spend a significant amount of time consulting with teachers about children with ADHD (Demaray, Schaefer, & DeLong, 2003). Taken together, these studies point to ADHD and associated behaviors as impediments to a teacher's ability to teach in their classrooms.

Teacher Training and Knowledge about ADHD

Although children with ADHD may consume much of a teacher's time, many teachers receive little training regarding ADHD (e.g., Barbaresi & Olsen, 1998; Bussing, Gary, Leon, Garvan, & Reid, 2002; Jerome, Gordon, & Hustler, 1994). As

such, they may have incorrect knowledge about the disorder or attitudes that may deter them from wanting to implement a behavior management program with the child. For example, if a teacher holds the opinion that a student will not stay seated on purpose, then that teacher may be more likely to react with harsh criticism for leaving his seat (as opposed to labeled praise when the child is sitting appropriately). In fact, research on parental attributions suggests that when parents make negative child-centered attributions for child behaviors, they use more overreactive discipline strategies and report feeling angrier (Slep & O’Leary, 1998). Therefore, the cognitions (e.g., attributions) that teachers may have concerning a child’s ADHD behaviors may influence their behavior towards the child. Just as they are important to discuss in treatment with parents, misconceptions about ADHD are necessary for mental health professionals to address when working with teachers, as that may impact their willingness to attempt evidence-based approaches to working with the children.

Teacher Training about ADHD

Teachers do not receive much instruction about ADHD or how to effectively manage symptoms of the disorder. Knowledge about ADHD for both special *and* regular education teachers is important as many children with ADHD are in regular education classrooms rather than isolated special education classrooms (Reid et al., 1994). Given the amount of teacher time children with ADHD often monopolize, it is important to consider whether teachers are trained to handle their difficult classroom behaviors.

A handful of studies have examined the amount of training that educators have received about ADHD (Barbarese & Olsen, 1998; Bussing et al., 2002; Jerome et al., 1994). Bussing and colleagues explored formal teacher training and sources of knowledge in a sample of 365 school teachers in Florida. When asked about formal training during their educational career, exactly half of the sample reported not receiving any formal ADHD training. Reporting on their career following graduation, 65% of the teachers stated that they had obtained “brief training” about ADHD. In terms of sources of knowledge about ADHD, the authors found that experience with children with ADHD was related to the amount of reading completed about ADHD, such that those teachers who had more students with the disorder had read more articles and books about ADHD. Similar research examined teacher experience with ADHD in a Minnesota sample of 44 elementary school teachers (Barbarese & Olsen, 1998). The majority of teachers in this sample (77%) reported receiving no instruction about ADHD in their undergraduate training at their various universities. Moreover, since the completion of requirements for their teaching certificate, most had sought additional ADHD-related training, presumably because either the teachers themselves or their principals felt that such training was necessary. However, 86% of the teachers believed that, in the past 2 years, they had taught at least one undiagnosed child with ADHD who should have been diagnosed. The study did not examine how competent the teachers felt in dealing with children with ADHD; however, an overwhelming majority of the teachers (98%) believed that they could benefit from further training on ADHD.

Jerome and colleagues (1994) compared knowledge about ADHD in two samples: American teachers from New York and Florida, and Canadian teachers. Information on the university attendance of teachers was not reported in the study; however, 18% of the total sample was certified in Special Education. Results indicated that 99% of the Canadian sample and 89% of the American sample received little to no instruction about ADHD during their study to become a teacher. Despite the fact that 47% had obtained Master's degrees, most of the sample (89% of Canadian teachers and 92% of American teachers) remained untrained in ADHD classroom behavior management following their university education. However, similar to those teachers included in Barbaresi and Olsen's (1998) study, the teachers in this sample maintained a strong interest in receiving additional training: 97% of Canadians, 98% of Americans indicated that they would like additional ADHD training. Taken together, these studies illustrate the point that very little training regarding ADHD is provided within the educational curriculum for teachers. Nevertheless, teachers commonly encounter children with ADHD in their classroom and wish to receive more training, particularly with regard to tools for managing ADHD behavior in the classroom.

Teacher Knowledge about ADHD

On the occasions when teachers have been introduced to the topic of ADHD, it is unknown whether the training received or literature read is empirically-based, representing the current state of the research literature. In fact, studies have indicated that numerous teachers hold incorrect beliefs or harmful attitudes about children with ADHD (e.g., Barbaresi & Olsen, 1998; Jerome et al., 1994; Scituito, Terjesen, &

Frank, 2000; Skinner & Hales, 1992). Sciuttio and colleagues reported common misperceptions that regular and special education teachers in their sample ($N = 149$, 37% special education) had about children with ADHD. Approximately 57% of teachers in their sample thought that children with ADHD have more difficulties in novel rather than familiar situations, when indeed, the opposite is true (Breen & Altepeter, 1992). Other popular beliefs unsupported by research included that a reduction of sugar would lead to a reduction in symptoms (42.3% of teachers), when research has shown sugar has no effect on ADHD symptoms (Milich & Pelham, 1986) and that ADHD occurs in about 15% of children (37.8% of teacher), a rate much higher than the established prevalence rates (American Psychiatric Association, 2000). The teachers queried by Barbaresi and Olsen (1998) reported similar incorrect beliefs. For instance, in their sample, 41% of teachers believed that ADHD is caused by sugar or food additives. Another 41% stated that ADHD is caused by poor parenting. As of yet, the cause of ADHD is unknown; however many researchers have found evidence for the familial transmission of ADHD (e.g., Ehringer, Rhee, Young, Corley, & Hewitt, 2006; Faraone & Doyle, 2001).

Despite these studies finding that teachers have poor knowledge about ADHD, one study presented a more positive view of teacher knowledge about ADHD. Jerome and colleagues (1994) found that, in general, American and Canadian teachers seemed to be knowledgeable about the biological and environmental factors related to ADHD as well as pharmacological intervention for the disorder. For instance, the majority of the 1,280 Canadian and American teachers in their sample were aware that ADHD is not a result of defiant behavior; ADHD is

not caused by poor parenting; ADHD can be treated with interventions other than medication; and medication does not necessarily eliminate the need for educational interventions. However, most studies have provided strong support for the fact that teachers hold many misperceptions about ADHD and desire more training related to the disorder.

Such misperceptions are important to study as they have implications for the way that children with ADHD are managed in the classroom. As discussed earlier, research on parental perceptions indicated that parents who held negative child-centered beliefs about the child with ADHD (e.g., the child is inattentive purposefully to be noncompliant) were observed using poorer parenting strategies and being angrier than those parents who did not hold such beliefs (Slep & O’Leary, 1998). As another example, teachers who believe that poor parenting causes ADHD may be less likely to use school-based interventions for ADHD, instead believing that the onus of treatment is on the parents. Therefore, trying to ensure that teachers hold accurate perceptions about a child with ADHD may positively impact the way that they manage the child in the classroom and their willingness to use evidence-based behavior management strategies.

One issue central to this line of research is that researchers typically develop their own scales to measure teacher knowledge about ADHD. It is unclear whether such scales always reflect the latest research advances or consensus in the field. For example, one question on the multiple-choice Test of Knowledge about Attention Deficit Hyperactivity Disorder (Hepperlen, Clay, Henly, & Barke, 1998) asks the participant to complete this statement: “ADHD continues from childhood into

adolescence in ___% to ___% of children suffering from ADHD.” The authors cite the answer as “30-50%.” However, estimates from prospective studies have found that approximately 70-80% of children with ADHD continue to exhibit significant symptoms which persist into adolescence (Barkley, Fischer, Edlebrock, & Smallish, 1990; Biederman, Faraone, Milberger, & Guite, 1996). Additionally, these ADHD knowledge scales often were adapted from parent knowledge measures and have no published psychometric data when used with teachers (for example, the ADHD Knowledge and Opinions Survey by Power, Bennett, & Rostain, 1995). Moreover, no studies have examined whether ADHD knowledge is associated with teacher behavior in the classroom.

Regardless of the measurement difficulties, it seems apparent from existing studies that teachers seem to hold incorrect views about children with ADHD. Children with ADHD evidence great difficulty in the classroom, and teachers report being disrupted during their lessons by children with the disorder. Taken together, these studies suggest a clear need for experts to offer teacher training in evidence-based classroom interventions for ADHD.

School-based Interventions for ADHD

Up to 44% of children in special education classrooms meet diagnostic criteria for ADHD (Bussing et al., 1998). However, the majority of children with ADHD who receive special education services (e.g., one-on-one instruction) receive such services from within their regular education classrooms (Reid et al., 1994). As such, treatments have to be implemented in all settings in which the child is impaired, including those classrooms. In fact, Pelham, Wheeler, and Chronis (1998) reported

that larger effect sizes for behavior change are found in settings that are directly targeted by behavioral treatment. Classroom behavioral interventions have been identified as a “well-established treatment” for children with ADHD (Pelham et al., 1998). For these interventions, teachers are the agents by which the treatment is delivered through consultation with a behavioral specialist.

In classroom interventions, teachers are taught to use functional behavioral analyses to identify target behaviors, antecedents (i.e., precipitants to the behavior, such as people, environmental context, time of day when behavior is more or less likely to occur) and consequences (i.e., that which follows the behavior, such as reward or punishment). As teachers spend much more time responding to negative child behaviors than to positive ones (Brophy, 1996; Martens & Meller, 1990), the review of behavior management strategies with teachers stresses the use of immediate rewards and punishments for child behavior in the classroom. Teachers are taught to ignore minor misbehaviors (i.e., “choose your battles”). The review also recommends increasing task structure by using appropriate direct commands to the children. Both of these strategies help increase wanted behavior and decrease unwanted behavior (Abramowitz, Eckstrand, O’Leary, & Dulcan, 1992; Rosen, O’Leary, Joyce, Conway, & Pffiffner, 1984; Zentall, 1989). Therefore, teaching teachers to use such behavioral skills within a functional behavioral analysis framework may be an effective determinant of behavior change in children with ADHD (DuPaul & Stoner, 2003).

Although long-term benefits beyond 24 months have yet to be established, behavioral school-based interventions most often result in large, short-term improvement on teacher ratings and classroom observations of behavior (e.g.,

Barkley, 2002). In their meta-analysis of school-based interventions for children with ADHD, DuPaul and Eckert (1997) noted that school-based behavior management programs have a large average effect size of approximately 1.44.

The Daily Report Card

The Daily Report Card (DRC) is one specific behavioral tool that has empirical support in reducing problem behaviors for children with ADHD (Chronis et al., 2001; McCain & Kelley, 1993; O’Leary et al., 1976). On the DRC, specific behavioral goals are set at school, and the child is reinforced based on their daily goal attainment. Goals are set at a level slightly higher than what the child is currently achieving in order to increase the chances for the child’s initial success and future motivation. If a child is experiencing difficulty reaching a goal, clinicians troubleshoot the problem with the teacher using a functional analytic approach to examine explanations (e.g., goal too difficult or child is getting reinforced non-contingently or for misbehavior). Goals are made increasingly difficult, shaping the child’s behavior until it is brought within the normal range. At that point, teachers evaluate whether the DRC is needed to maintain the current level of behavior. If not, the DRC may be faded out of practice. Training teachers in these foundation behavioral principals might allow minimal clinician involvement in this monitoring process as teachers would be able to modify the DRC and troubleshoot problems based on these principles.

Use of the DRC has been found to result in decreased disruptive behavior in the classroom and decreased teacher ratings of problem behaviors (e.g., Fabiano & Pelham, 2003; McCain & Kelley, 1993; O’Leary et al., 1976). Unfortunately, while

clinical researchers often utilize this strategy, due to insurance reimbursement limitations, community clinicians often may not have the opportunity to spend time assessing and treating behavioral problems in the school setting using the methods discussed above (Nabors, Weist, & Mettrick, 2002). Rather, teachers are most often in the role of attempting to manage these behaviors with little assistance or training in empirically-supported behavior management techniques for use with children with ADHD.

In-service Training

An approach very different than the individualized, ideographic school-based behavioral interventions discussed above is teacher in-service training (i.e., presentations designed to improve teacher performance in the classroom; Bolam, 1981). In-service training is a form of teacher education that involves teaching a group of teachers about a particular subject (e.g., ways to enhance reading comprehension, identification of child behavior problems). Much of the research on in-service training in psychology was conducted immediately following the rise of behaviorism in the 1970's and 1980's (Merrett & Wheldall, 1984). In-services have been shown to increase the use of contingency management programs in schools (Hall, 1971). Additionally, in-services are amenable to disseminating information and also provide strategies that are easy for educators to implement (Aubrey, 1986).

Joyce and Showers (1980) have identified five important components to successful in-services, including the presentation of information, modeling of the teacher strategy, teacher practice in a controlled environment, opportunity for feedback, and transfer to the classroom. Several researchers have indicated that

effective in-services must provide learning opportunities that are collaborative in nature (Guskey, 1994; Little, 1993; Miller, Lord, & Dorney, 1992). A meta-analysis of key components of teacher in-services, reported that in-services are more effective when they are participatory and provide opportunities for the teachers to practice their newly-learned skills (Wade, 1984).

ADHD in-services typically focus on psychoeducation about the disorder (e.g., symptoms, course) and issues relevant to the delivery of behavioral treatment in a school setting (e.g., Barbaresi & Olsen, 1998). Similar to the individual consultations discussed earlier, these large group training sessions are used to provide teachers with research-based information about ADHD and tools to manage a child with ADHD (e.g., issuing brief, one-step commands) in the classroom.

Empirical evidence suggests that instructing teachers in the application of behavioral techniques may result in improvements in problem behaviors even in children who do not meet full diagnostic criteria for ADHD (Borg & Ascione, 2001; Boyajian, DuPaul, Handler, Eckert, & McGoey, 2001). For instance, one study by Jason and Ferone (1978) compared two different types of in-services about childhood behavior problems in the classroom, a behavioral in-service and one more supportive or process-oriented. The behavioral in-service focused on teaching teachers about behavioral strategies in the classroom and how to individualize behavioral interventions. The process-oriented in-service focused on being supportive to the teachers and used reflective statements to help the teacher better understand the children's difficulties. Only students of teachers who received the behaviorally-oriented training evidenced decreases in problematic child behaviors in their

classrooms. Therefore, behaviorally-oriented in-services appear to be more successful in decreasing child behavior problems than process-oriented or supportive in-services.

One of the best-validated teacher in-service programs currently being used is that of Carolyn Webster-Stratton (U.S. Department of Justice, 2000). Webster-Stratton's Incredible Years Teacher Training Program offers teachers the opportunity to participate in 6 day-long workshops offered monthly or in 2-hour sessions offered weekly for 24 weeks. Although these sessions are not intended to educate teachers about ADHD specifically, teachers are trained in the behavioral strategies mentioned earlier with a focus on the management of oppositional and conduct-disordered behavior. Videotaped vignettes are used to promote group discussion. This program has been found to increase teacher use of classroom behavior management skills and decrease child aggression and noncompliance in the classroom (Webster-Stratton, Reid, & Hammond, 2001). The reduction in child negative behaviors has been found to be maintained 2 years post-treatment (Reid, Webster-Stratton, & Hammond, 2003).

Despite the established efficacy of this program in decreasing noncompliance and aggression (Webster-Stratton et al., 2001), there are some notable disadvantages. The Incredible Years Teacher Training Program is a costly intervention and requires schools to commit a large amount of teacher time. Often, schools have only a limited number of times and dates designated for teacher continuing education. Time allotted for in-service training sessions provided during the school year is usually less than 2 hours. Furthermore, the length of Incredible Years requires the use of substitute teachers for the workshop days, which is made feasible with grant funding. However, it may be an unrealistic alternative for many psychologists and schools without such

funding. Therefore, there are some concerns about the feasibility of this evidence-based teacher training program that may limit dissemination efforts.

Many clinicians offer ADHD-specific in-services to area schools and organizations, but only one published study was found examining the effects of an in-service specifically designed to educate teachers about ADHD (Barbaresi & Olsen, 1998). Barbaresi and Olsen investigated the effects of an in-service intervention on teacher knowledge regarding ADHD and stress related to teaching students with ADHD. These researchers evaluated an already-developed in-service from the national advocacy organization, Children and Adults with Attention-Deficit Disorder (CHADD)¹, in a sample of 44 regular education teachers from a single school. This in-service lasted approximately 2.5 hours and included didactic training about ADHD, as well as discussions about classroom management techniques to manage ADHD behaviors. Their in-service also contained handouts with information about ADHD. In addition, a case study was presented, and teachers discussed appropriate interventions. Following the behavior management discussion, stimulant medications were briefly explained. Teachers were invited to ask questions at the conclusion of the in-service. Prior to the in-service and then one month later, teachers completed 2 questionnaires: one measuring their ADHD knowledge and another measuring their stress related to a self-identified child with problems whom they had known at least 1 month.

In this study, the in-service resulted in increased teacher ADHD knowledge on a true/false measure they adapted based on the above-cited Jerome et al. publication.

¹ An attempt was made to obtain this in-service. However, due to a change in CHADD's location, the in-service could not be located by CHADD personnel.

The authors also found decreased levels of stress on the Index of Teaching Stress (ITS; Greene, Abidin, & Kmetz, 1997) at post-intervention.

This small pilot study had several limitations. The major limitation is that there was no control group. A control group would not have received the in-service, allowing the researchers to rule out extraneous variables (e.g., the passage of time) that might be responsible for their results. Also, the in-service used by the authors is not currently available to clinicians, limiting replicability of this study. Although the authors reported that their in-service contained “facts” related to ADHD, it is unclear how these “facts” translate to current empirical evidence. Additionally, the authors did not measure teacher use of behavioral strategies in the classroom, so they are unable to draw conclusions about whether their in-service resulted in actual changes in teachers’ use of classroom behavior management techniques. Other limitations to this study included a small sample size drawn from a single school and no observations of teacher classroom behavior, which did not allow a comparison between observed and reported use of behavioral techniques.

In-services, like that of Barbaresi and Olsen (1998), are nomothetic treatments (i.e., they do not single out one teacher with a particular problematic child), can be more widely disseminated, are relatively inexpensive, and are less time-consuming than individual behavioral consultations. As hiring individual behavioral consultants may be an unrealistic goal given current educational economic concerns, school in-services represent a viable initial phase in efficiently disseminating information regarding evidenced-based school behavioral interventions for ADHD to large groups of teachers.

Teacher Stress

Teaching is one of the most stressful professions compared to others (Kyriacou, 2001). As reviewed earlier in this paper, children with ADHD take time away from teachers in the classroom who have to continually deal with their attention and behavior problems in the classroom. Studies have found that the primary sources of teacher stress include trying to maintain discipline and teaching pupils who lack motivation (Kyriacou, 2001). Children with ADHD may contribute to either of the aforementioned stressors through hyperactive/impulsive behaviors or inattention that may seem like a lack of motivation and interfere with classroom instruction. Presumably, not having the knowledge or tools to manage children with ADHD may further contribute to teacher stress.

Most studies of stress specifically related to managing the behavior of children with ADHD have focused on parental distress. In general, these findings suggest increased levels of stress in mothers and fathers of children with ADHD, across ages and for different levels of symptomatology (e.g., Breen & Barkley, 1988; DuPaul, McGoey, Eckert, & VanBrakle, 2001; Harrison & Sofronoff, 2002; Mash & Johnston, 1983). Factors that have been found to contribute to parental stress include lower perceived control, limited knowledge about ADHD, and severity of ADHD (Harrison & Sofronoff, 2002). Studies also have documented decreases in parental stress following interventions designed to teach parents behavioral strategies to manage their children's ADHD behavior, such as parent training (e.g., Anastopoulos, Shelton, DuPaul, & Guervremont, 1993). Based on this literature on parent training with parents of children with ADHD and Barbaresi & Olsen's findings (1998), one

might expect that education regarding behavioral treatment for teachers of children with ADHD would decrease their stress levels in regard to managing these students.

Few studies have examined teacher stress with specific regard to children with ADHD; however, it appears likely that teachers of children with ADHD may also experience high levels of stress (e.g., Greene, Beszterczey, Katzenstein, Park, & Goring, 2002). In one existing study, Greene and colleagues explored whether children with ADHD were more stressful to teach than children without the disorder. Sixty-four teachers were asked to rate their levels of stress in dealing with a student with ADHD and a student without ADHD on the ITS (Greene et al., 1997). Results suggested that teachers found students with ADHD more stressful to teach than children without the disorder. An analysis of the observational data concluded that teachers not only engaged in more negative interactions with children with ADHD relative to non-disordered children, but also spent more time in positive, neutral, and “providing help” interactions with them. The authors interpreted these results as an indication that children with ADHD consume more of the teacher’s total time than children without attention and behavioral difficulties. These findings further point to the need for teacher training in evidence-based management of ADHD in the classroom.

Chapter 2: Study Overview

As reviewed herein, there is a pressing need for the empirical study of more feasible in-service training programs to educate teachers about evidence-based behavior management for ADHD. Yet, there are currently no published, randomized-controlled studies of in-service interventions for ADHD in children. The primary purpose of this study was to extend Barbaresi and Olsen's (1998) study to examine whether in-service training in evidence-based assessment and treatment of ADHD would result in improvements in teacher reports of their knowledge about ADHD, use of behavior management techniques, and teaching-related stress. Appropriate Internal Review Board approval was obtained from the University of Maryland and the corresponding school district, Prince George's County Public School System.

For this study, schools were recruited through flyers and phone calls to principals of Washington, DC metropolitan area elementary schools. Six schools were chosen in the order that they expressed interest for participation in the research study. Participating schools provided several available times for the in-service during the fall semester to allow for random assignment. Then, consenting schools were randomly assigned to either the immediate in-service intervention condition or waitlist control condition. Each immediate in-service intervention school was matched with a waitlist control school which received the in-service approximately 1 month after their matched immediate in-service intervention school received their in-service (see Figure 1 for study timeline). Teachers at these schools were exposed to a small number of self-report measures pre in-service intervention and at a 1-month post in-service intervention.

As this was an exploratory study, the primary aims of the study were to examine whether a brief ADHD-specific in-service would result in improvements in 3 domains for the immediate in-service intervention group but not the waitlist control group: 1) teacher knowledge about ADHD; 2) teacher use of classroom behavior management techniques; and 3) reported levels of teacher stress. Given Barbaresi and Olsen's findings, it was hypothesized that the in-service would result in improvements in teacher knowledge and stress. However, as research concerning the generalizability of behavior has been mixed, it was unclear whether this brief in-service would produce actual behavior change in the classroom as intended.

Chapter 3: Method

Participants

One hundred and forty-two teachers from 6 elementary schools in the Prince George's County Public School System participated in this study. Refer to Table 2 for characteristics of participating teachers.

Materials and Apparatus

In-service

The in-service was prepared and presented by the principal investigator, an advanced doctoral student in clinical psychology. The principal investigator had extensive, supervised experience co-presenting teacher ADHD in-services with a Ph.D.-level psychologist who possessed expertise in ADHD and behavioral techniques specific to children with ADHD.

The in-service contained a general overview of ADHD (including identification and diagnosis), evidence-based treatment for ADHD (including pharmacological and psychosocial treatments), and specific classroom management strategies with activities designed to enhance teacher understanding and appreciation of the material (slides are presented in Appendix A). Specifically, the structure and order of the in-service was as follows: Causes of ADHD (including genetics), evidence-based assessment of ADHD, subtypes of ADHD (including diagnostic criteria), associated difficulties (i.e., comorbid conditions), empirically-supported treatment recommendations (including stimulant medication, psychosocial interventions, and combined treatment), specific school-based strategies, and small

group practice and feedback in the development of behavioral programs for children with ADHD.

These general categories were chosen for several reasons. The general overview was important to review as teachers have many misperceptions about children with ADHD in these areas (e.g., “ADHD is caused by poor parenting”) that are likely to influence their approach to the student and willingness to implement behavioral strategies in the classroom. Evidenced-based treatment was important to review, as many teachers may have been unaware of the treatment literature on the efficacy of stimulant medication and behavioral interventions. Also, hearing an explanation about evidenced-based treatment, teacher may have been more willing to try strategies that have a basis in the research literature. Finally, the primary goal of the in-service was to impart specific behavioral tools that teachers may use so that they are more effective in the classroom and thereby less stressed by managing their students with ADHD.

As the empirical investigation of an easily-distributable in-service was the goal of this study, the in-service modeled an in-service utilized clinically by the principal investigator and her mentor, in terms of content. The content chosen for the in-service was chosen based on those reasons discussed in the prior paragraph. Due to the addition of a small group practice session, certain sections had to be tailored for the time allotted. For example, the associated features section was shortened in order to make time for the teachers to practice their skills and receive feedback

Similarly, information concerning neurological and neuropsychological deficits in ADHD (e.g., poor working memory) was not discussed due to time

constraints. Knowledge of such information was not felt to be as salient to teachers in the classroom as knowledge about school-based behavior management strategies. As such, the time break-down for the in-service was as follows: 15 minutes (20% of in-service) for causes, assessment, and associated difficulties; 30 minutes (40% of in-service) for empirically-supported treatment recommendations and specific school-based strategies; 30 minutes (40% of in-service) for small group practice (and questions which were allowed throughout the in-service). Approximately 15 minutes was spent prior to the in-service completing the questionnaires described below, thus totaling 1.5 hours of teacher time consumed by this intervention. One and one-half hours is consistent with the time typically allotted by the principals for in-service training.

The in-service was designed to be consistent with those components that have been supported by the research (Joyce & Showers, 1980; Wade, 1984). Therefore, there was an information-providing portion of the in-service. All information was discussed in an interactive format, as teachers were asked several times to relate the information presented to their own classrooms or teaching experiences. For instance, teachers were asked to name the symptoms of ADHD that they often see in the classroom. When behavioral strategies were reviewed during the latter half of the in-service, the strategies were each modeled for the teachers. Teachers were able to practice their strategies in a controlled environment (i.e., the in-service location), and then they received feedback on their suggested strategies. All of these components are consistent with the literature on successful in-services (Wade, 1984).

The in-service was presented in PowerPoint presentation format. Also, handouts on ADHD and constructing daily report cards (Pelham, 2002) were distributed to teachers to supplement the material presented in the in-service and to provide teachers a reference for future use.

After presenting all of the material, two case study examples were presented (see Appendix A). Participants were divided into small groups of 5 or 6 teachers to discuss possible strategies for delivering treatment and to develop a DRC for the hypothetical students in the case studies, and all teachers reconvened into a large group to discuss each group's strategies. A representative from each small group presented the findings to the rest of the audience and the principal investigator. The principal investigator both prompted the audience for and offered constructive feedback on the possible classroom behavior management strategies to be used in the sample situations. This allowed the teachers to practice the skills taught and to receive feedback from the principal investigator, including clarifications of any strategies or behavioral principles that had not been understood, which is consistent with the literature on effective in-service components (Wade, 1984). In an effort to be both consistent with real-world clinical practice and practical in consideration of time limitations, teachers did not have to meet any criteria (e.g., a 80% correct ADHD knowledge score) prior to participating in the small group portion of the in-service, although such criteria are often used when professionals are seeking Continuing Education Credits. Although many teachers asked questions to clarify topics, the groups at each in-service were too large for the principal investigator to subjectively assess how well each teacher understood the topics.

Treatment integrity and fidelity (Snyder, Thompson, McLean, & Smith, 2002) was monitored by having a trained research assistant attend each in-service and complete a checklist ensuring that each point on every PowerPoint slide was discussed by the principal investigator. For each school, the research assistant reported that over 88% of the material was covered ($M = .96$, $SD = .04$). Additionally, as a manipulation check, teachers completed a true/false measure following the in-service measuring whether specific topics were covered by the presenter (Appendix B), indicating that they believed that over 86% of the material was covered by the presenter.

Teacher Characteristics

Information concerning teacher gender, ethnicity, age, prior ADHD training (e.g., specific course, in-service, book), type of teacher (i.e., regular education, special education, or “other” such as art or reading), grade currently taught, number of students taught with an ADHD diagnosis during their career, number of students taught taking ADHD medications during their career, and total number of years teaching was gathered from all of the participants before the in-service (see Appendix C for Teacher Characteristics measure).

When examining the raw data, two variables were unable to be used due to the variability in the types of answers: number of students taught with an ADHD diagnosis and number of students taught taking ADHD medications. As there was no standard way of directing teachers how to answer these questions, some teachers gave qualitative answers (e.g., “a lot,” “hundreds”, while others gave numerical estimations ranging from 0 to 2000). However, the other teacher characteristic

information was used to examine any significant differences between treatment and waitlist groups on these other characteristics (e.g., grade taught, years teaching, ethnicity, age, type of teacher, and prior ADHD training) and to examine correlations between teacher characteristics and the outcome variables.

Teacher Knowledge about ADHD

Knowledge about ADHD assessment, diagnosis, and treatment was measured prior to the in-service and 1 month later. Due to the lack of ADHD knowledge measures with published reliability or validity data and reasons outlined in the introduction (e.g., the need for measures representing the current consensus in the research literature), a 25-item true/false measure of ADHD knowledge was constructed for the study based upon a review of the current ADHD literature (Appendix D). In an attempt to ensure content validity, the measure was designed to tap into the information teachers need to know in the 6 major areas reviewed by the in-service: causes of ADHD (3 questions), assessment of the disorder (3 questions), subtypes of ADHD (3 questions), common associated problems (3 questions), treatment of the disorder in general (8 questions), and specific school-based strategies to treat the disorder (5 questions). Information was drawn from all sections of the in-service, so that the questionnaire was equally balanced with information from the entire presentation. The dichotomous true/false nature of the questionnaire was modeled after other ADHD knowledge questionnaires that have been described in the literature (Jerome et al., 1994; Sciutto et al., 2000).

As the in-service reviewed a great deal of information about ADHD, it was necessary to decide on what information to test teachers. First, five of the questions (2

of the cause questions, 2 of the type questions, and 1 treatment question) chosen for the knowledge questionnaire had been used in past research reviewed above, such as “ADHD is caused by too much sugar” and “ADHD occurs in 15% of the population.” The other 20 questions were designed to tap into other important knowledge. For instance, as reviewed herein, teacher attributions may affect their approach to the child and willingness to use classroom interventions; thus questions relating to the causes were deemed necessary.

There were several reasons why it was necessary to discuss the subtypes of ADHD and how it is distinguished from other associated problems. One, this disorder is currently a popular topic in the press, and there is a multitude of misinformation about ADHD on the internet and in the media that sometimes confuses ADHD with other disorders (e.g., Oppositional Defiant Disorder, Learning Disorders). Additionally, many in the general public continue use outdated terminology (i.e., Attention Deficit Disorder) to describe the disorder. As such, these topics were covered during the beginning of the in-service.

Similarly, general treatment and specific school treatment questions comprised 50% of the questionnaire and were designed to examine whether teachers understood not only the major point that behavioral school interventions are empirically supported treatments for ADHD (while one-on-one therapy is not), but that there are several specific evidence-based strategies for use in the classroom, such as ignoring minor misbehaviors and giving specific, labeled praise.

Finally, the principal investigator’s mentor, who has expertise in ADHD, viewed the scale as containing the major components of ADHD knowledge needed by

teachers to more effectively manage their students with ADHD. In the current sample, internal consistency for this measure was poor at both pre in-service intervention ($\alpha = .33$) and post in-service intervention ($\alpha = .54$).

Teacher Use of Classroom Behavior Management Strategies

Behavior modification strategies were examined using a checklist of strategies designed for use by teachers (e.g., Appendix E; Fabiano et al., 2002; Pelham, 2002). This measure asks teachers to indicate how frequently they use particular strategies on a scale from “this would not fit well with my teaching” to “I use regularly.” To examine the types of strategies used both with a teacher-identified child with ADHD-related difficulties and the teacher’s entire classroom, the measure’s format was modified to clearly explain to the teacher which questions they should complete relative to the teacher-identified child with inattention, hyperactivity, or impulsivity and which they should complete based on the strategies they use with the classroom as a whole. These behavior modification strategies were measured prior to the in-service and 1-month post in-service intervention. Normative data on a nationally-representative sample ($n=986$) for each question have been presented at a professional conference (Fabiano et al., 2002), and were comparable to the scores gathered in this study; however, reliability statistics have not yet been published for this measure. In this study, reliability scores using Cronbach’s alphas were .58 and .72 for pre in-service intervention and post in-service intervention (respectively) for the behavioral strategies used with the teacher-identified child. Cronbach’s alphas were .50 and .76 for the pre in-service intervention and post in-service intervention (respectively) for the behavioral strategies used with the classroom as a whole.

A total score for this measure was calculated by totaling the answers for 16 questions (questions #1-16 for the child-related strategies and #22-38 for the classroom-related strategies) which directly related to material reviewed during the in-service. A score was obtained for both the specific behavioral strategies used with the identified child and the entire classroom.

To supplement this self-report measure of behavior modification use, direct, in-class observations of 51 teachers ($n = 24$ in the immediate in-service treatment group, $n = 27$ in the waitlist control group) were conducted to objectively examine the use of classroom behavior modification techniques pre-intervention and at the 1-month follow-up. Only one observed teacher dropped out of the study prior to its completion. The observations were conducted using a subset of categories from the observational coding system, Dyadic Parent-Child Interaction Coding System-II (DPICS; Robinson & Eyberg, 1981, current revised version 2000).

The DPICS is a behavioral coding system commonly used with parents and children with behavior problems to measure parent and child behavior during a structured interaction. Prior studies have utilized the DPICS to code teacher behaviors in the classroom (e.g., Filcheck, McNeil, Greco, & Bernard, 2004). Researchers utilizing this coding scheme to study parent and teacher behaviors have found that the mean inter-rater reliability (utilizing Pearson product-moment correlations) ranges from 0.75-1.0 (Robinson & Eyberg, 1981; Filcheck et al., 2004). Following behavioral treatment, teachers have been found to show a decrease in negative teaching strategies (e.g., issuing criticisms) and an increase in the use of more effective strategies (e.g., using labeled praise) using the DPICS.

For this study, raters coded five different categories of behavior that most closely mapped onto the information presented during the in-service: time out, labeled praise, direct commands, ignoring misbehavior, and descriptive comments. Using this coding system, all behaviors within a set period of time were coded. This well-validated coding system was used as many of the DPICS categories correspond exactly to the five strategies that the principal investigator reviewed during the in-service intervention. See Appendix F for the Coding Sheet and list of observed behaviors. Appendix G includes the definitions for each observed behavior category.

All randomly-selected teachers were observed for 10 minutes in vivo during an instructional period of the day. Ten minutes was chosen as the length of observations in the aforementioned studies utilizing the DPICS (e.g., Robinson & Eyberg, 1981) was 10 minutes. Additionally, 10 minute observations were thought to minimize any classroom disruption caused by having observers present. In an attempt to standardize the types of interactions observed (e.g., instruction versus independent work) and to maximize the potential for teacher-child interaction, the morning instructional period of the day was chosen for all observations. Teachers were not observed while children were taking exams. The principal investigator collaborated with each school's principal to decide the best days and times (e.g., not during a bell ring) for observation.

The principal investigator and 2 advanced undergraduate students trained on the coding system using pilot videotapes of parent-child interactions until 75% inter-rater agreement was established. Next, the principal investigator and the 2 undergraduates trained in vivo at a summer preschool on the University of Maryland,

College Park campus. The principal and teachers at this school were told that information gathered during this in vivo training would be used for training purposes only. A release of information was obtained from teachers in these instructional programs who agreed to be observed during an instructional period of the day for training purposes. Once 75% agreement among raters was met using the in vivo training method, independent coding commenced by the coders. One coder, who was blind to treatment group membership, coded all randomly-selected teachers, while the other coder independently coded a random sample of 35% ($n = 18$) of the teacher observations for reliability purposes.

Consistent with past research (e.g., Robinson & Eyberg, 1981), reliability was calculated using Pearson product-moment correlations between observers. Overall inter-rater reliability was .99. Inter-rater reliability coefficients were .96 for Descriptive Comments/Questions, .97 for Labeled Praise, and .99 for Direct Commands. Reliability coefficients could not be computed for Teacher Ignore or Time Out as the coders did not observe teachers using these behavioral strategies during their overlapping coding time.

Teacher Stress

Teacher stress relative to one teacher-identified child with ADHD characteristics was measured using the Index of Teaching Stress (Greene et al., 1997) prior to the in-service and at 1-month follow-up (Appendix H). The ITS is a 90-item forced-choice questionnaire meant to evaluate the degree of teacher-student compatibility. A factor analysis of the ITS revealed two global scales: Teacher Characteristics and Student Characteristics. The Teacher Characteristics scale is

comprised of four subscales: Self-Doubt/Needs Support, Loss of Satisfaction from Teaching, Disrupts Teaching Process, and Frustration Working with Parents. The Student Characteristics scale is comprised of five subscales including ADHD, Emotional Lability/Low Adaptability, Low Ability/ Learning Disabled, and Aggressive/Conduct Disorder, which are all associated with the different demands placed upon teachers of children with these difficulties. For each item, teachers assume the item is true and indicate how stressful the statement is for them. Sample items on the ADHD subscale are: “I have found that getting this student to follow directions is much harder than for most students” and “This student is so active it exhausts me.”

As the ITS measures teacher compatibility with 1 student in particular, teachers were instructed to complete the form for a student in their classroom who has demonstrated impairment due to inattentive and/or hyperactive/impulsive behaviors. If a teacher had more than one student who fit this description, they were instructed to complete the ITS based on whichever child’s last name appears first on the alphabetical roster. Greene and colleagues (1997) reported that the internal consistency for each ITS global scale and the total score are excellent (.96 for Teacher Characteristics, .96 for Child Characteristics, and .97 for the Total Score). Teachers have reported high levels of stress in relation to a child with ADHD ($M = 61.3$, $SD = 23.5$) and low levels in relation to a child without ADHD ($M = 37.4$, $SD = 8.5$; Greene et al., 2002).

As teachers from the first 2 schools participating in this study and their principals strongly indicated that this measure was too long and burdensome to

complete after receiving it pre-in-service, one of the creators of this scale was consulted by the principal investigator. In an effort to retain participants who had completed the pre-treatment assessment, an abbreviated version of this scale was used for subsequent data collection points with all schools. In these cases, only questions from the ADHD Index were administered to the teachers. This ADHD Index measures the degree of stress teachers experience in response to the teacher-identified child with ADHD. Internal consistency reliability for this subscale in a sample of students with behavior problems was .96 (Abidin, Greene, & Konold, 2003). In the current sample, Cronbach's alpha for the ADHD Index was .96 for pre in-service intervention and .97 for post in-service intervention.

This subscale was chosen as it remains the *only* measure of teacher stress in relation to children with ADHD reported in the literature. Other stress measures are more general and do not tap into specific ADHD-related behavior (e.g., the Perceived Stress Scale by Cohen, Kamarck, & Mermelstein, 1983 or the Teacher Stress Inventory by Fimian, 1984), which was the focus of this intervention. In their 1997 manuscript, Greene and colleagues published discriminant validity data to show the ITS's ability to discriminate between behaviorally-challenging students and comparison children. Alpha internal consistency reliabilities on the Total Stress and 9 subscales of the measure ranged from .78 to .97, with the exception of one subscale (Disrupts Teaching, .46). One subsequent study (Greene et al., 2002) found modest correlations between scores on the ITS and scores on the widely-used teacher measure of child classroom behavior, the Teacher Report Form (TRF; Edelbrock & Achenbach, 1984). For instance, the correlation between the Attention Problems

subscale of the TRF and the ADHD subscale of the ITS was .57. As this is a relatively new measure, more studies have yet to be published examining the correlations between the ITS and other measures of child psychopathology or teacher behavior.

Teacher Satisfaction

A measure of teacher satisfaction with the in-service training program also was given after the in-service for both the intervention and waitlist control schools to evaluate how helpful teachers found the in-service, how applicable they felt it was to them, how effectively the material was presented, and whether they would recommend this training session to other teachers (Appendix I). Teachers rated these questions on a scale from 0 to 6, with higher scores indicating that they felt the in-service was more helpful, more applicable, presented more effectively, or that they were more likely to recommend it.

Procedure

Subject Recruitment

Schools were recruited for participation in the research study through mailings and phone calls to principals in Washington, DC metropolitan area elementary schools, including the nearby counties of Prince George's and Montgomery. The Maryland ADHD Program and University of Maryland Human Development Department already had established relationships with several of these schools. The Washington metropolitan area is racially and ethnically diverse; consequently, a diverse sample of teachers participated (See Table 2).

After a school expressed interest, the principal provided several dates for which a one and one-half hour in-service could be scheduled. After another school expressed interest and provided dates, the 2 in-services were scheduled 1 month apart, with one school randomly assigned to the treatment condition and the other to the waitlist control condition. Schools were assigned numbers (School 1 – School 6) based on the order in which consent was gathered. All in-services were conducted between October 2004 and May 2005; however, there were several months during which the research study was on hiatus due to the winter holiday season and the mandatory state testing period for students in early spring.

Data Collection

Prior to the day of pre-treatment data collection for all schools, the principal investigator for this study attended faculty meetings at each individual school, reviewed the consent form with teachers, and gathered signed consent forms from those teachers who were willing to participate. On the day of the scheduled in-service for the schools in the treatment condition (e.g., School 1, School 3, and School 5), teachers convened in the school's library or cafeteria. On the day of the in-service, just prior to the start of the training session, teachers completed the pre-treatment self-report measures, which took approximately 15-20 minutes. The order in which the measures were provided to the participants was randomized across teachers.

Consistent with Barbaresi and Olsen (1998), one month after the pre-in-service data collection period, the teachers were asked to complete the questionnaires again (i.e., the 1-month post-treatment data point). Either the principal investigator or the research assistants dropped off and collected measures at this second time point.

So as not to allow too much time to pass between data collection points, the following day, a second attempt was made to contact teachers who did not return their ratings. For each school, study staff returned to the school to pick up any remaining measures within 2 days of the original 1-month post-treatment point. If teachers had not returned their measures by this time, they were considered dropouts. To increase the likelihood of measure completion, teachers who completed all forms were entered into a lottery to win \$25. One teacher won this incentive per school. See Figure 1 for the study timeline.

Thirteen teachers dropped out of the study before the post-treatment measures were collected (10% of total sample, 4 immediate in-service, 9 waitlist control), leaving 129 teachers who completed measures at both time points. Possible reasons for dropout included being absent the day the in-service was delivered or deciding not to participate; however reasons for withdrawal were not measured. Teachers who dropped out were compared on teacher characteristics and pre in-service intervention variables to teachers who remained in the study (i.e., treatment completers). There was a significant difference between treatment dropouts and completers on only one teacher characteristic variable (See Table 3). There were significantly more treatment dropouts who had heard ADHD mentioned in an undergraduate class than treatment completers.

Corresponding data were collected from the waitlist control group at all data collection times. During a faculty meeting, teachers in the waitlist control group (e.g., School 2, School 4, and School 6) provided consent and completed their pre in-service intervention measures. During the same week, randomly-selected waitlist

control teachers were observed. Approximately 1 month later (i.e., during the same week that the matched immediate in-service intervention school completed their post in-service intervention measures), post in-service intervention observations were completed at the waitlist control schools. During the day of the scheduled in-service, the waitlist control teachers completed their post in-service intervention measures and then received the in-service.

Chapter 4: Results

Analytic Strategy to Examine Treatment Effects

To examine the effectiveness of the in-service training, 2 x 2 (Treatment Group: immediate in-service v. waitlist control; Time: pre in-service intervention, post in-service intervention) mixed model analyses of variance (ANOVA) were performed for each outcome measure (Huberty & Morris, 1989). To determine the proportion of the variance in the outcome variables associated with the group status (e.g., immediate in-service versus waitlist control), effect sizes were calculated using Cohen's (1988) recommendation for computing partial eta-squared (η^2_p), or the proportion of variance accounted for by the effect being examined. Consistent with Cohen's guidelines (1988), η^2_p values of .01, .06, and .14 were interpreted as "small", "medium", and "large", respectively. These interpretations are only descriptive as the use of η^2_p with mixed models has not been fully explored. Partial eta-squared is reported for significant results; however partial eta-squared for the non-significant results is included in Appendix J, along with its 95% confidence interval (Wilkinson and the APA Task Force on Statistical Inference, 1999).

Consistent with current literature in this area, data were analyzed in two different ways. The first method utilized an intent-to-treat (ITT) approach, in which data from all of the participants were included in the analyses. The second method included only the data collected at each time point, thereby only including those "treatment completers" who contributed data at pre in-service intervention and post in-service intervention. For both the intent-to-treat and "completers" analyses, a mixed model approach (using the SPSS MIXED procedure) rather than repeated

measures MANOVA was utilized, as the repeated measures MANOVA approach requires complete data on participants (necessarily excluding participants missing follow-up observations). In contrast, a mixed model approach is able to include all available observations in estimating parameters and conducting tests of significance (Levine, 1991).

Preliminary Item Analyses with New ADHD Knowledge Measure

In order to examine which items on the new ADHD Knowledge measure were most sensitive to change and which items may have been too easy, the percentage of teachers answering each item correctly was calculated for both the immediate in-service and waitlist control groups at both pre in-service intervention and post in-service intervention (See Table 4). Percentage change on items for the immediate in-service group ranged from -27 (i.e., 27% fewer teachers obtaining the item correct at post than at pre) to +35 (i.e., 35% more teachers obtaining the item correct at post than at pre). For the immediate in-service group, the questions representing the most positive change were Questions 1 (disorder that is now called ADHD has had different names over the years including Attention Deficit Disorder), 5 (children with ADHD are more likely to have a parent with ADHD than children without the disorder), 12 (traditional one-on-one therapy has been shown to be an effective treatment for ADHD), 16 (stimulant medications have not been extensively studied in children), and 18 (when a child responds well to medicine for ADHD it proves that the diagnosis is correct). Change on items for the waitlist control group ranged from -10 (i.e., 10% fewer teachers obtaining the item correct at post than at pre) to +9 (i.e., 9% more teachers obtaining the item correct at post than at pre).

To better understand the performance of teachers on this new measure, it is important to explore the percentage of items correct in each treatment group. The average score for the immediate in-service group was 78% correct at pre in-service intervention and 82% at post in-service intervention. The immediate in-service group scores ranged from 56%-88% correct at pre in-service intervention and 60%-92% correct at post in-service intervention. The average score for the waitlist control group was 76% correct at pre in-service intervention and 76% correct at post in-service intervention. The waitlist control group scores ranged from 44%-96% correct at both pre in-service intervention and post in-service intervention.

Prior ADHD Training

χ^2 goodness-of-fit tests were used to examine pre-treatment differences between the Treatment Groups on the four questions about prior ADHD training (i.e., taken an undergraduate class about ADHD, heard ADHD mentioned in an undergraduate class, read a book about ADHD, or attended an ADHD-specific in-service). Percentages of teachers endorsing prior ADHD training are listed in Table 2 with the other teacher characteristic data. The percentages of teachers endorsing prior ADHD training varied by type of training (e.g., ADHD in-service, book about ADHD). There were no significant differences between the two treatment groups on any of the prior ADHD training questions.

t -tests and χ^2 goodness-of-fit tests also were used to examine whether prior ADHD training was related to the other teacher characteristic variables, such as age, number of years teaching, grade taught, ethnicity, type of teacher, and education level. Having taken an ADHD-specific class as an undergraduate was not

significantly related to ethnicity, education level, age, number of years teaching, or grade taught. Having taken an ADHD-specific class as an undergraduate was, however, significantly related to type of teacher [$\chi^2(2) = 9.72; p < .01$], such that special education teachers were more likely to have taken an ADHD-specific class as an undergraduate than regular education teachers or teachers in the “other” category (e.g., specialty teachers, such as art). The only teacher characteristic variable related to having had ADHD mentioned in an undergraduate class was type of teacher [$\chi^2(2) = 6.68; p < .05$], as teachers who taught special education classes were more likely to have reported that ADHD was mentioned during an undergraduate class than regular education or “other” teachers.

Reading books about ADHD was significantly related to education level [$\chi^2(2) = 7.4; p < .05$], such that teachers with a Master’s degree were more likely than teachers with a Bachelor’s degree to have read a book about ADHD. Reading books about ADHD also was significantly related to type of teacher [$\chi^2(2) = 13.8; p < .01$], such that regular education teachers were less likely than special education teachers to have read a book about ADHD. Older teachers and teachers who had been teaching for more years were also more likely to have read a book about ADHD [$r(122) = .28, p < .01$ and $r(130) = -.19, p < .05$, respectively].

Having attended an ADHD in-service was significantly related to both education level [$\chi^2(2) = 12.0; p < .01$] and class type [$\chi^2(2) = 8.0; p < .05$], such that teachers with a Bachelor’s degree and regular education teachers were less likely to have attended such an in-service than teacher’s with advanced degrees, special

education teachers, and “other” teachers. Special education teachers were more likely than regular education or “other” teachers to have attended such an in-service.

Relationships among Teacher Characteristics and Outcome Measures

Analyses (*t*-tests for continuous variables and χ^2 goodness-of-fit tests for categorical variables) were conducted to examine potential teacher characteristic differences between the immediate in-service and waitlist control groups on teacher characteristics such as gender, ethnicity, grade taught, type of teacher, years teaching, and education level. (See Table 2.)

Most of the teacher characteristic variables did not differ between the immediate in-service and waitlist control groups. There were no differences between Treatment Groups at pre in-service intervention on measures of ADHD knowledge, use of classroom behavior management strategies, and stress related to a child with ADHD. Differences between the two groups were found, however, on gender of teacher [$\chi^2 (1) = 3.90; p < .05$] and number of teachers teaching special education classes [$\chi^2 (2) = 7.86; p < .05$]. There were more males and special education teachers in the waitlist control group than in the immediate in-service group.

Table 5 contains the characteristics of those teachers who were randomly selected to be observed and those not chosen for observation. Significantly fewer of the observed teachers designated their type of classroom to be one “Other” than regular or special education [$\chi^2 (2) = 6.8; p < .05$]. There were no significant differences between teachers who were and were not observed on the pre-treatment measures of ADHD knowledge [$t(126) = .656, p > .05$], use of classroom behavior management techniques [$t(120) = -1.57, p > .05$], or stress [$t(128) = -.67, p > .05$].

Correlations among Pre In-service Intervention Outcome Variables

Consistent with past research (Barbaresi & Olsen, 1998), correlational analyses were conducted to examine the relationships between the pre in-service outcome variables of ADHD knowledge, teacher stress related to a child with ADHD, and self-reported use of classroom behavior management techniques. These correlations are presented in Table 6. No significant correlations between these variables were found.

Correlations between Pre In-service Intervention Outcome Variables and Teacher Characteristics

Pre-treatment in-service ADHD knowledge was not significantly related to teacher characteristics including ethnicity, age of teacher, number of years teaching, or number of children taught with ADHD, teacher education level, or type of teacher. Reported use of behavior management techniques at pre-treatment was significantly related to education level [$r(119) = -.30, p < .01$], such that teachers with a lower education level (i.e., Bachelor's degree) reported using more classroom behavior management techniques than those with advanced degrees. Upon further analysis, teacher education and grade taught were significantly associated, such that Bachelor's-level teachers were more likely to teach lower grades [$\chi^2(2) = 9.09; p < .05$]. To examine whether both grade taught and education level significantly predicted use of behavior management techniques, they were entered into a regression model as independent variables. When both were in the model, education level significantly predicted use of behavior management techniques ($B = -.27; p < .05$), but grade taught did not ($B = -.09; p > .05$).

Reported use of classroom behavior management techniques at pre-treatment was not significantly related to teacher age, number of years teaching, gender, ethnicity, or type of teacher. Likewise, ADHD-related teacher stress at pre-treatment was not significantly related to any teacher characteristics. Although not statistically significant, there was a trend for grade taught to be negatively related to reported use of classroom behavior management strategies at pre in-service intervention [$r(120) = -.18, p < .053$], such that teachers of lower grades used somewhat more behavior management than teachers of higher elementary grades.

Correlations among Observed Classroom Behaviors

Correlational analyses were conducted to examine the relationships between teachers' reported versus observed use of two classroom behavior management techniques (labeled praise and direct commands) for the entire classroom, both at pre in-service and post in-service time points (See Table 7). Descriptive comments were not measured by the self-report measure, so the correlation between self-reported and observed could not be examined. Time out and ignoring minor misbehaviors could not be examined due to the low frequency of observed behavior. No significant correlations between either reported and observed labeled praise *or* reported and observed direct commands were found at either time point, indicating that teachers' reported use of classroom behavior management strategies for the entire classroom was not significantly related to the brief observations of their behavior with the entire classroom using the DPICS coding system.

Intent-to-Treat Analyses

The intent-to-treat mixed model analyses were conducted using data from all participants, including those who dropped out. As stated previously, a mixed model analyses uses maximum likelihood procedures to examine the distribution of the data that is available, make inferences about how the missing data would fit into the parameters of that distribution, and then test the effects in the model (Rubin, 1976; Little, 1995). Table 8 presents an overview of the main and interaction effects for the ADHD knowledge, reported use of classroom behavior management techniques, and teaching stress.

Reported ADHD Knowledge

For ADHD knowledge, significant, “small-to-medium” main effects were found for Treatment Group and Time, such that at both time points the immediate in-service group had more ADHD knowledge than the waitlist control and all teachers in both groups knew more about ADHD at post in-service intervention than at pre in-service intervention. The Treatment Group X Time interaction was also significant for ADHD knowledge, indicating that the immediate in-service group improved their knowledge from pre to post in-service intervention while the waitlist control group did not significantly change from pre to post in-service intervention (see Figure 2).

Post hoc *t*-tests revealed that the means of the two Treatment Groups did not differ at pre in-service intervention [$t(185) = .57, p > .05$], but the means of the two Treatment Groups were significantly different at post in-service intervention [$t(201) = 3.8, p < .01$], such that the immediate in-service intervention group held more ADHD knowledge than the waitlist control group at the post in-service intervention

assessment point. Further, the immediate in-service group knew significantly more about ADHD at post in-service intervention than at pre in-service intervention [$t(108) = -4.5, p < .01$], while the waitlist control group did not [$t(109) = .35, p > .05$].²

Reported Use of Classroom Behavior Management Strategies

For reported use of classroom behavior management strategies, main effects for neither Treatment Group nor Time were significant (Refer to Table 8). The Treatment Group X Time interaction for reported use of classroom behavior management strategies was also non-significant (See Figure 3).

To examine only those behaviors on the self-report measure that were directly reviewed during the in-service, an abbreviated score on the reported use of classroom behavior management strategies measure was calculated, comprised of only 5 items (i.e., planned ignoring, appropriate commands, labeled praise, time out, and daily report card). Cronbach's α on these items were .31 at pre in-service intervention and .38 at post in-service intervention. The main effects for Treatment Group [$F(1, 119) = .08, p > .05$] and Time [$F(1, 99) = 2.1, p > .05$] and interaction effect [$F(1, 99) = .95, p > .05$] on these selected items all remained non-significant.

Reported Stress

For teaching stress, the main effects of Treatment Group and Time were non-significant, as was the interaction between Treatment Group and Time (See Figure 4).

Observations of Teacher Use of Behavior Modification

Mixed model ANOVAs also were conducted to examine Treatment Group X Time interactions for 3 of the 5 main behavioral observations of techniques taught

² As there were 4 post hoc test conducted for this outcome measure, $\alpha = 0.05$ was adjusted with a Bonferroni correction. Therefore, $\alpha = .0125$ was considered significant for all post hoc tests.

during the in-service: attending, labeled praise, direct commands (See Appendix G for definitions of these observational categories). The other 2 main behavioral observation categories, time-out warnings and ignoring minor misbehaviors could not be examined due to the low frequency of observations in these categories. Table 8 contains the effects and effect sizes for these analyses.

For descriptive comments, significant effects were not found for Treatment Group, Time, or the Treatment Group X Time interaction (See Figure 5).

For labeled praise, the main effect of Treatment Group and the interaction effect were not significant, although there was a trend for the interaction to be significant ($p = .053$; Refer to Figure 6). However, there was a “large” significant main effect of Time, such that labeled praise increased overall from pre in-service intervention to post in-service intervention for both groups. See Table 8 for these effects. Subsequent post hoc t -tests revealed that at each time point, individuals within the immediate in-service group and within the waitlist control group did not differ on labeled praise ($ps > .05$). Further, the immediate in-service group did not significantly change their use of labeled praise from pre in-service intervention to post in-service intervention [$t(49) = -1.98, p > .05$]. However, the waitlist control group increased their use of labeled praise over time [$t(48) = -4.96, p < .001$].

As seen in Table 8, for direct commands, there were “medium-to-large” significant main effects for Treatment Group, Time, and the interaction (See Figure 7). Post hoc t -tests revealed that the two groups did not differ on their use of direct commands at pre in-service intervention [$t(91) = 2.98, p > .05$], but did differ at post in-service intervention [$t(92) = -3.52, p < .01$]. The waitlist control group increased

their use of commands from pre in-service intervention to post in-service intervention [$t(48) = -3.09, p < .001$], while the immediate in-service group did not [$t(49) = -.05, p > .05$].

Concomitant Variable Analyses

Reported ADHD knowledge

Further analyses were conducted to examine the addition of teacher characteristic variables as independent variables in the ANOVA models. Mixed model ANOVAs were conducted in which those teacher characteristic variables on which the treatment groups differed at pre in-service intervention (i.e., Gender, Type of Teacher) were included as additional independent variables to see whether including these variables changed the main outcomes.

For ADHD knowledge, when gender was added into the mixed model ANOVA as an independent variable, there was no significant main effect of Gender [$F(1, 114) = 1.16, p > .05$] and no significant interaction effects for Gender X Treatment Group [$F(1, 114) = .13, p > .05$], Gender X Time [$F(1, 100) = .159, p > .05$], or Gender X Treatment Group X Time [$F(1, 100) = .25, p > .05$].

When Type of Teacher (i.e., regular education versus special education) was added in to the mixed model ANOVA as an independent variable, there was no significant main effect for Type of Teacher and no significant interactions for Type of Teacher X Treatment Group, Type of Teacher X Time, or Type of Teacher X Treatment Group X Time (see Table 9).

As there was a trend for grade taught to be negatively related to reported use of classroom behavioral strategies at pre in-service intervention, grade taught (as a

categorical variable: early vs. late elementary school) also was examined as a concomitant variable in the mixed model with Treatment Group and Time (See Table 10). In these analyses of ADHD knowledge, there was not a significant main effect for Grade Taught, such that early elementary school teachers did not differ on their overall ADHD knowledge from late elementary school teachers. There were no significant interactions for Grade Taught X Time, Grade Taught X Status, or Grade Taught X Treatment Group X Time.

Reported use of classroom behavior management strategies

For reported classroom behavior management strategies, when Gender was added into the model, there was no significant main effect for Gender [$F(1, 153) = 1.02, p > .05$] and no significant interactions for Gender X Treatment Group [$F(1, 153) = .40, p > .05$], Gender X Time [$F(1, 140) = .29, p > .05$], or Gender X Treatment Group X Time [$F(1, 140) = .73, p > .05$].

When Type of Teacher was added to the model, there was a “small,” significant main effect for Type of Teacher on reported classroom behavior management strategies, such that special education teachers reported using more behavioral strategies than regular education teachers. See Table 11 for a source table of these effects. The main effects of Treatment Group and Time on reported classroom behavior management strategies were non-significant. The 2-way interaction of Type of Teacher X Time was not significant. However, there was a “medium” significant interaction effect for Treatment Group X Time, such that the immediate in-service group increased in their use of behavioral strategies over time, while the waitlist control group did not. Also, there was a “small” significant

interaction effect for Type of Teacher X Treatment Group, such that the special education teachers in the immediate in-service intervention group reported using more classroom behavioral strategies at both time points than regular education teachers within the treatment group and all of the teachers in the waitlist control group at both time points. For reported use of classroom behavior management strategies, there also was a “small” significant interaction for Type of Teacher X Treatment Group X Time. To examine this effect, the Treatment Group X Time interactions were examined in each group of teachers, regular and special education, separately. Among regular education teachers, the Treatment Group X Time interactions was non-significant [$F(1, 86) = 1.3, p > .05$]. Among special education teachers, there was a large significant Treatment Group X Time interaction [$F(1, 16) = 11.8, p < .05, \eta^2_p = .42$], such that special education teachers in the immediate in-service group increased reported using significantly more behavioral strategies from pre in-service intervention to post in-service intervention, while special education teachers in the waitlist control group did not.

In the analysis of grade taught as a concomitant variable, there were no significant main effects of Grade, Treatment Group, or Time ($ps > .05$). The only significant interaction was Grade Taught X Treatment Group, such that early elementary school teachers in the immediate in-service group reported using fewer behavioral strategies overall than early elementary school teachers in the waitlist control group. Late elementary school teachers in the immediate in-service group reported using more behavioral strategies overall than those late elementary school

teachers in the waitlist control group. Table 12 contains a summary of the effects and effect sizes for these analyses.

Reported Stress

For stress, when Gender was added into the model, there were no significant main effects for Treatment Group [$F(1, 119) = .03, p > .05$], Gender [$F(1, 119) = .35, p > .05$], or Time [$F(1, 104) = .004, p > .05$] on reported stress. No significant interactions resulted for Gender X Treatment Group [$F(1, 119) = .49, p > .05$], Gender X Time [$F(1, 104) = .48, p > .05$], or Gender X Treatment Group X Time [$F(1, 104) = .14, p > .05$].

When Type of Teacher was added into the model, no significant effects emerged for Treatment Group, Type of Teacher, or Time on teacher stress. No significant interactions emerged for Type of Teacher X Treatment Group, Type of Teacher X Time, or Type of Teacher X Treatment Group X Time. Table 13 summarizes the effects for these analyses.

In the analysis of Grade Taught as a concomitant variable, there was not a significant main effect of Grade Taught on stress, indicating that early elementary school teachers did not differ on their overall stress level from late elementary school teachers. No interactions were significant ($ps > .05$). Table 14 summarizes the effects for this analysis.

Observations of Teacher Use of Behavior Management Strategies

Gender, Type of Teacher, and Grade Taught were all examined as concomitant variables with observed descriptive comments. Most effects were non-significant; however there was a significant interaction effect for Gender X Treatment

Group X Time (See Table 15). However, this interaction effect could not be further analyzed due to the small number of male teachers within some of the cells.

In the analysis of the effect of type of teacher on descriptive comments, there were no significant effects for Type of Teacher [$F(1, 37) = .38, p > .05$], Type of Teacher X Treatment Group [$F(1, 37) = 3.33, p > .05$], Type of Teacher X Time [$F(1, 37) = .38, p > .05$], or Type of Teacher X Treatment Group X Time [$F(1, 37) = .03, p > .05$].

As there was a trend for grade taught to be negatively related to reported use of behavioral strategies, grade taught was examined for its effect on descriptive comments. There were no significant effects for Grade [$F(1, 37) = 1.73, p > .05$], Grade X Treatment Group [$F(1, 37) = .12, p > .05$], Grade X Time [$F(1, 37) = 2.17, p > .05$], or Grade X Treatment Group X Time [$F(1, 37) = 1.22, p > .05$].

Gender, type of teacher, and grade taught were each examined in a series of mixed model analyses with labeled praise. In the analysis of the effect of gender on labeled praise, there were no significant effects for Gender [$F(1, 38) = .32, p > .05$], Gender X Treatment Group [$F(1, 38) = .31, p > .05$], Gender X Time [$F(1, 38) = .34, p > .05$], or Gender X Treatment Group X Time [$F(1, 38) = .09, p < .05$].

In the analysis of the effect of type of teacher on labeled praise, there were no significant effects for Type of Teacher [$F(1, 37) = .02, p > .05$], Type of Teacher X Treatment Group [$F(1, 37) = .73, p > .05$], Type of Teacher X Time [$F(1, 37) = .40, p > .05$], or Type of Teacher X Treatment Group X Time [$F(1, 37) = .04, p > .05$].

In the analysis of the effect of grade taught on labeled praise, there were no significant effects for Grade, Grade X Treatment Group, or Grade X Time (See Table

16). There was a significant interaction for Grade Taught X Treatment Group X Time. To investigate this interaction further, Treatment Group X Time interactions were examined separately for early elementary teachers and late elementary teachers. Among early elementary teachers, all teachers increased their labeled praise from pre in-service intervention to post in-service intervention, regardless of treatment group [$F(1, 27) = 31.86, p < .001$]. Among late elementary school teachers, teachers in the immediate in-service intervention group did not change their labeled praise, while teachers in the waitlist control group increased their use of labeled praise. See Figure 8.

Gender, type of teacher, and grade taught also were each examined in a mixed model analysis with direct commands. In the analysis of the effect of gender on direct commands, there were no significant effects for Gender [$F(1, 38) = .08, p > .05$], Gender X Treatment Group [$F(1, 38) = .26, p > .05$], Gender X Time [$F(1, 38) = .01, p > .05$], or Gender X Treatment Group X Time [$F(1, 38) = .98, p < .05$].

In the analysis of the effect of type of teacher on direct commands, there were no significant effects for Type of Teacher, Type of Teacher X Time, or Type of Teacher X Treatment Group X Time (See Table 17). There was a trend toward significance for Type of Teacher X Treatment Group [$F(1, 37) = 3.75, p = .06$], such that special education teachers in the waitlist control group used more direct commands than special education teachers in the immediate in-service group and more direct commands than the regular education teachers in the waitlist control group at both time points. See Figure 9.

In the analysis of the effect of grade taught on direct commands, there were no significant effects for Grade, Grade X Treatment Group, or Grade X Time (See Table 18). There was a marginally significant interaction for Grade X Treatment Group X Time [$F(1, 37) = 3.56, p = .07$], such that late elementary teachers in the waitlist control group significantly increased their use of observed direct commands from pre in-service intervention to post in-service intervention more than late elementary teachers in the treatment group and more than all of the early elementary teachers in either group. See Figure 10.

Immediate in-service group only analyses

Exploratory analyses were repeated using only the immediate in-service group to see whether particular groups of teachers (e.g., special education teachers) benefited more from the in-service than others. For these analyses, the total number of subjects is smaller than expected (n should be 66 for all teachers in the immediate in-service group), as some teachers did not indicate specific teacher characteristic information. These analyses were conducted for the outcome measure of ADHD knowledge only, given the significant interaction effect for group x time in the main analyses.

First, Gender was examined for its effect on ADHD knowledge. Within the immediate in-service group, there was no significant main effect for Gender [$F(1, 53) = 1.11, p > .05$] or Gender X Time interaction [$F(1, 48) = 1.17, p > .05$]. There was a significant main effect for Time [$F(1, 48) = 7.92, p < .01$] as the post in-service intervention mean was significantly higher than the pre in-service intervention mean for both males and females in the immediate in-service group.

When type of teacher was examined for its effect on ADHD knowledge within the immediate in-service group only, there was not a significant main effect for Type of Teacher [$F(1, 45) = 1.21, p > .05$] or a significant interaction effect for Type of Teacher X Time [$F(1, 39) = .00, p > .05$]. There was a significant main effect for Time [$F(1, 39) = 6.59, p < .05, \eta^2_p = .19$] as the post in-service intervention mean was significantly higher than the pre in-service intervention mean for “other” teachers, regular education teachers, and special education teachers. That is, all teachers in the immediate in-service group, regardless of type of teacher, increased in knowledge of ADHD from pre in-service intervention to post in-service intervention.

Within the immediate in-service group, an additional exploratory analysis was conducted to see whether grade taught accounted for a significant proportion of the variance within ADHD knowledge. Grade taught was first examined as a variable with values from zero to six, with zero being pre-kindergarten or kindergarten and six being sixth grade. There was no significant main effect for Grade [$F(7, 44) = 1.83, p > .05$] or the Grade X Time interaction [$F(7, 37) = .35, p > .05$] on ADHD knowledge. There was a “large” significant main effect for Time [$F(1, 39) = 11.30, p < .01, \eta^2_p = .22$], such that knowledge for both the immediate in-service intervention and the waitlist control groups increased from pre in-service intervention to post in-service intervention. Grade taught was then examined as a dichotomous variable as being either an early elementary school teacher (up to grade 3) or being a late elementary school teacher (4th – 6th grade). All findings with this method remained non-significant ($ps > .05$), except for the main effect of Time [$F(1, 41) = 25.4, p <$

.001, $\eta^2_p = .38$], suggesting that teachers increased their knowledge as a result of the in-service regardless of grade level taught.

Completer Analyses

For the 129 teachers who completed measures at both time points, some measures were missing at one time point (e.g., some teachers completed all measures except the ITS (at post in-service intervention). Therefore, for the completer analyses below, it is important to note the following sample sizes: ADHD knowledge (54 immediate in-service teachers, 52 waitlist control teachers), classroom behavior management strategies (55 immediate in-service teachers, 46 waitlist control teachers), stress (52 immediate in-service teachers, 55 waitlist control teachers).

Reported ADHD knowledge

Table 19 lists the main and interaction effects for ADHD knowledge, reported use of classroom behavior management strategies, and stress for the completer analyses. For ADHD knowledge, significant main effects were found for Treatment Group and Time, such that teachers in the immediate in-service intervention group had more knowledge at both time points than waitlist control teachers, and all teachers generally improved in their knowledge from pre to post in-service intervention. A significant Treatment Group X Time interaction was found for ADHD knowledge, such that the immediate in-service group had a higher mean than the waitlist control group, which increased from pre in-service intervention to post in-service intervention.

Reported Classroom Behavior Management Strategies

For reported use of classroom behavioral techniques, the main effects for Treatment Group and Time were not significant. There was a significant Treatment Group X Time interaction for reported use of classroom behavioral techniques with an identified child. Subsequent post hoc *t*-tests (α set at .0125) revealed that, when considering only those teachers who completed the study, there was a trend for the immediate in-service group to increase their use of classroom behavior management strategies pre in-service intervention to post in-service intervention [$t(100) = -2.18, p = .03$]. The immediate in-service intervention and the waitlist control groups did not differ on their use of strategies at pre in-service intervention [$t(173) = -1.87, p > .05$] or at post in-service intervention [$t(173) = .55, p > .05$]. The waitlist control group did not increase their use of strategies from pre in-service intervention to post in-service intervention [$t(100) = .97, p > .05$].

Reported Stress

For reported stress, the main effects for Treatment Group and Time were not significant. The Treatment Group X Time interaction for teacher stress was also non-significant.

Observations of Teacher Use of Behavior Modification

Mixed model ANOVAs again were conducted to examine whether teachers in the immediate in-service group improved in their use of observed behavior management strategies in the classroom over those in the waitlist control group (see Table 19). For descriptive comments, significant effects were not found for Treatment Group, Time, or the Treatment Group X Time interaction.

For labeled praise, the main effect of Treatment Group was not significant. However, there was a “large” significant main effect of Time on labeled praise, such that the overall mean at pre in-service intervention was significantly different than the overall mean at post in-service intervention. Additionally, there was a trend for the interaction effect on labeled praise. Subsequent post hoc *t*-tests ($\alpha = .0125$) revealed that the means of the two Treatment Groups did not differ at pre in-service intervention or post in-service intervention ($p > .0125$). The immediate in-service group did not significantly change their use of labeled praise from pre in-service intervention to post in-service intervention ($p > .0125$), but the waitlist control group significantly increased their use of labeled praise [$t(48) = -4.95, p < .001$].

For direct commands there were significant main effects for both Treatment Group and Time. Additionally, there was a significant Treatment Group X Time interaction effect. Post hoc *t*-tests ($\alpha = .0125$) conducted showed that the two groups did not significantly differ at pre in-service intervention ($p > .0125$), but did differ at post in-service intervention [$t(90) = -3.54, p < .001$]. Again, the immediate in-service group did not significantly change their use of direct commands from pre in-service intervention to post in-service intervention ($p > .0125$), but the waitlist control group did [$t(48) = -3.90, p < .001$].

Treatment Satisfaction

Overall, teachers reported that the in-service was very helpful ($M = 4.1, SD = 1.7$). Additionally, they reported that they felt the in-service was very applicable to them ($M = 4.3, SD = 1.6$). Teachers felt the in-service leader presented the material

very well ($M = 4.9$, $SD = 1.4$), and they would likely recommend the in-service to other teachers ($M = 4.8$, $SD = 1.5$).

Chapter 5: Discussion

The current study was the first randomized controlled study of the efficacy of brief ADHD in-service training for elementary school teachers. This study examined whether brief in-service training in evidence-based assessment and treatment for ADHD effectively improves teacher knowledge about ADHD, use of effective classroom behavior management techniques, and teaching stress. Overall, teachers in this study reported having little prior training related to ADHD, with regular education teachers reporting less training than special education teachers. However, our in-service training program, which was delivered in a manner that can be easily applied in real-world school settings, had “small-to-medium” effects on teacher knowledge about ADHD. The ITT analyses showed that there were non-significant effects of the in-service on reported use of classroom behavior management strategies with an identified child. However, when only treatment completers were considered, teachers in the immediate in-service group increased both their ADHD knowledge and their reported use of classroom behavior management strategies from pre to post in-service intervention. Unfortunately, the brief 10-minute observations of teacher classroom behavior did not suggest increases in the use of effective behavior management techniques following the intervention for teachers in the immediate in-service group. Likewise, the in-service was not effective in reducing teacher stress based on the abbreviated form of the Index of Teaching Stress used here. Each of these findings will be discussed in turn.

Prior ADHD Training

Similar to that reported in previous literature (e.g., Jerome et al., 1994), teachers in this study overall reported having little training about ADHD prior to the current in-service. However, results indicated that regular education teachers had less training than special education or “other” teachers. That is, regular education teachers were less likely to have taken an ADHD-specific class, read a book about ADHD, heard ADHD mentioned in their undergraduate studies, or attended an ADHD-specific in-service. Given that, on average, at least one child per 20-student classroom has been diagnosed with ADHD and that most children with ADHD are housed in their regular education classrooms (Reid et al., 1994), this finding speaks to the need to provide regular education teachers with more ADHD training.

Pre In-service Intervention Correlations

The lack of correlations on the pre in-service intervention outcome measures represents an additional limitation. In the current study, it was predicted that ADHD knowledge would be related to the use of classroom behavior management strategies and lower levels of teaching stress. However, none of these relationships were found in the current study, at either time point. Barbaresi & Olsen (1998), who examined only ADHD knowledge and stress, also did not find a significant association between the two constructs at pre in-service intervention. Their explanations include their small sample size and their unvalidated measure of ADHD knowledge. In the current study, the difficulties with the measure of ADHD knowledge have been discussed, including the low variability on this measure (i.e., most teachers performed well). The stress and the behavior measure did not correlate well with each other, even though

there was adequate variability on each of these measures. However, a relationship between low teacher stress and increased use of behavioral strategies has not yet been explored in the teacher literature.

Knowledge about ADHD

The in-service was modestly effective in increasing teacher knowledge about ADHD in the immediate in-service group relative to the waitlist control group. This finding of increased knowledge following brief in-service training is consistent with the Barbaresi and Olsen (1998) uncontrolled study upon which this examination was modeled. The current study extends the previous finding by utilizing a waitlist control group and teachers from multiple schools.

Post-hoc analyses were conducted to examine whether perhaps certain teachers, such as special education teachers, benefit more from an ADHD in-service than others in terms of increased ADHD knowledge. No teacher characteristics were identified that would point to specific groups of teachers benefiting more from the in-service in terms of ADHD knowledge over others. This illustrates that even though the immediate in-service and waitlist control groups differed at pre in-service intervention on a few teacher characteristics, such as gender and type of teacher, teachers in the immediate in-service group improved their knowledge about ADHD (relative to the waitlist control group) even when these characteristics were taken into account.

It is important to note that the immediate in-service group averaged only a 1 point increase in their mean knowledge score. Although analyses resulted in a statistically significant change, the clinical significance of this small increase is

questionable. Indeed, the partial eta-squared was .09, indicating that only 9% of the overall variance was explained by the interaction.

One likely explanation for the small increase in knowledge is the already high mean at pre in-service intervention for both the immediate in-service and waitlist control groups. Specifically, the immediate in-service group on average answered 78% of their questions correctly at pre in-service intervention, while the waitlist control group answered 76% correctly (Refer to Table 4). These means leave little room for improvements in knowledge, decreasing the likelihood of finding a treatment effect. These high means are concurrent with previous literature in that Barbaresi and Olsen (1998) reported an initially high mean at pre-treatment (78% questions correct). Even though they did not conduct a treatment study, Jerome and colleagues (1994) also reported that teachers obtained high means on their true/false measure of ADHD knowledge for Canadian (78% questions correct) and American (77% questions correct) teachers. Therefore, while teachers participating in this study did seem to have a high level of initial knowledge about ADHD as measured by the high average of items correct, this seems to be consistent with existing studies.

At pre in-service intervention, correct scores on some items indicated that some commonly-held myths about ADHD may have been debunked. For instance, while past research has indicated that teachers believe ADHD to be caused by sugar (e.g., Barbaresi & Olsen, 1998; Jerome et al., 1994), over 90% of the teachers in the current study knew that it is not. Further, over 92% of the teachers knew that, before receiving the intervention, ADHD was not caused by poor parenting, a finding that differs from previous literature. Thus, while some questions on the ADHD knowledge

questionnaire were chosen to be similar to past research, it seems that educational efforts by the American Psychological Association and CHADD in the past 10 years may have helped to educate the general public more about an important childhood disorder.

At the same time, teachers in our sample remained unaware of important facts regarding ADHD in that many teachers held false beliefs about how to treat ADHD (e.g., the efficacy of one-on-one counseling) and the cause of ADHD (e.g., whether poor parenting causes ADHD). One possible reason for the finding of a high pre in-service intervention average on the knowledge measure that was considered is the population of highly educated Washington, D.C. metropolitan teachers used in this study. However, the U.S. Department of Education (2006) reported that, from 2003-2004, the percentage of teachers obtaining the highest degree of a Bachelor's was 51.9%, of a Master's was 40.6%, and of a degree higher than a Master's was 7.1%, indicating that the current sample was comparable to a national sample of teachers. Therefore, similar to those findings from Jerome and colleagues (1994), it may be that teachers, in fact, know more about ADHD than is currently perceived, at least as measured by the knowledge tests employed in existing studies.

Another potential explanation for the significant but small change in knowledge is the use of true/false tests in measuring teacher knowledge. True/False questions may not be ideal for a knowledge questionnaire, because teachers who do not know the answer have a 50% chance of merely guessing the correct answer at pre- and post-treatment. Therefore, the dichotomous scoring may have been too easy for the participants and therefore did not generate enough variability in the scores

(Cohen, 1983). Evidence for the simplicity of the measure was evident in the percentages of teachers obtaining items correct at pre and post in-service intervention (see Table 4). Most of the 25 items resulted in more than 50% of the teachers obtaining correct answers at pre in-service intervention, which is the percentage correct expected by chance alone. In fact, there were a number of questions on which over 90% of teachers obtained correct answers at pre in-service intervention (i.e., Items #2, 4, 6, 10, 14, 15, 20, 23, and 25), indicating that these were poor questions for the measure. Also, these poor questions indicate information that perhaps did not need to be covered in the time-limited in-service, as teachers already seemed to know these facts. Despite the fact that the current ADHD knowledge measure was modeled to reflect questions used previously in this literature, the percentages of teachers answering correctly lend support for the argument that the measure was likely not challenging enough.

Another problem with the measure lies with the items that were too difficult. There were three questions on which few immediate in-service teachers obtaining correct answers at both pre in-service intervention and post in-service intervention (i.e., Items #3, 8, and 18). These items covered the topics of the percentage of children with ADHD, the need for impairment in two environments for diagnosis, and response to medication as proof of a correct diagnosis. The poor performance of teachers on these questions at both time points may possibly point to limited coverage of these points during the in-service. If teachers did not learn the information, then they again answered incorrectly at the post in-service intervention time point. Future studies on the current in-service should improve the explanation of this information.

Then, the items may be examined again to see whether the post in-service intervention performance improves.

Additionally, future research should aim to improve the psychometric properties of this knowledge measure. Research has suggested that the reliability of a measure may be better on multiple-choice measures rather than true/false measures (e.g., Feldt, 1993; Frisbie, 1974). The internal consistency of the ADHD knowledge measure was poor at both pre in-service intervention (i.e., $\alpha = .33$) improved at post in-service intervention (i.e., $\alpha = .54$). This increase in internal consistency from pre-treatment to follow-up may represent the teacher's increased knowledge about ADHD. For example, they perhaps guessed less often at follow-up because they were more familiar with the information, therefore increasing the internal consistency of the measure at that time point. However, this poor reliability is not surprising given the decreased variability in scores and restricted range. Thus, by improving the structure of the measure and therefore the variability in scores, reliability may improve.

Additional psychometric analyses may prove useful in improving this measure of teacher knowledge about ADHD. While it was deemed clinically useful to know many of the questions on the measure, many items were too easy for teachers. Those questions that were too easy for teachers might be thrown out and more difficult items constructed (Feldt, 1993). True/false questions have a .5 difficulty level or above as teachers have a 50/50 chance of at least guessing the correct answer. Items that have more than a 0.5 difficulty level do not discriminate well between the lower and upper groups (i.e., those obtaining few items correct and those obtaining many items

correct; Sax, 1989; Ebel & Frisbie, 1991). Therefore, this measure may not have well distinguished between teachers of different knowledge levels.

Teacher Use of Classroom Behavior Management Strategies

There are five main findings with regard to teacher use of classroom behavior management strategies. First, we found a lack of significant change in reported use of behavioral techniques following the intervention in our main ITT analyses. There are several possible explanations for this. Research on the generalizability of information taught during professional development programs, such as in-services, has shown that the length of a program (i.e., total number of contact hours as well as the span of time over days) is positively associated with the amount of change teachers display (Desimone, Porter, Garet, Birman, & Yoon, 2002; Garet, Porter, Desimone, Birman, & Yoon, 2001). Longer in-services allow for a more detailed discussion of the information. They also allow for teachers to obtain clarification about any confusing information. As the instructional portion of this in-service was only approximately an hour long, research on teacher training has indicated that it was likely not long enough to result in actual behavior change among teachers.

Additionally, similar to most in-services provided in the real-world, our in-service was a “one-shot deal.” There was no follow-up and there were no additional consultation services provided months later, as teachers might have begun to use the strategies and had questions. Researchers (e.g., Shields, Marsh, & Adelman, 1998; Weiss, Montgomery, Ridgway, & Bond) have criticized such one-time-only programs, stating that, to affect behavior change in teachers, there is a need for follow-up assistance and the systematic assessment and planning of these programs.

In an effort to stay comparable to real-world continuing education activities and workshops for teachers, the current in-service did not provide such follow-up training. Possibly as a result, this effort resulted in a lack of behavior change in teachers in the treatment group. Although Wade (1984) reported in a meta-analysis of in-service research that the length of one intervention over another (i.e., shorter over longer) is not related to its effectiveness, other researchers have disagreed (e.g., Desimone et al., 2002, Garet et al., 2001). The results of this study suggest that continuous teaching and support for teachers may be essential in order to affect teacher behavior change. Such continuous support would allow for teachers to practice the skills in the classroom and to return for feedback and troubleshooting. This may be especially needed for the regular education teachers who both had less prior ADHD training and did not evidence a change in reported classroom behavior.

In fact, as discussed earlier, Webster-Stratton's (2001) in-service program is one such program that is very successful and longer in duration than the current in-service. Webster-Stratton's program includes continuing education credits for teachers who attend and provides substitute teachers to encourage participation in the training (Webster-Stratton, Reid, & Hammond, 2004). Additionally, the program is able to provide intensive teacher training over a period of several days (i.e., 32 hours in total). In one study, Webster-Stratton and colleagues (2004) also provided additional individual support for teachers following the intensive training. Teachers have been found to be less harsh and inconsistent and used more classroom behavior management skills following the program (Webster-Stratton et al., 2001). The success of this program for child behavior problems in the classroom, despite the potential

difficulties transporting it to real-world settings, supports claims that longer in-services may be necessary to bring about teacher behavior change.

An important next step for future studies would be to adapt Webster-Stratton's successful program to be more applicable to the real world. It is simply not feasible that all schools would be able to provide substitute teachers and allow teachers to be out of the classroom for multiple days of training. Several possible adaptations are shorter after-school teacher training sessions and teacher compensation such as continuing education credits or certification in teaching students with ADHD. These adaptations may allow for an overall longer duration of training (i.e., shorter sessions over several days) and increased attendance (due to compensation).

The in-service utilized in the current study also did not relate the information provided to specific needs of the teachers in attendance, which may have also contributed to the lack of behavior change. In other words, participating teachers did not specifically state that they wished to have more training related to ADHD. Based on the literature stating that teachers generally want more information about ADHD and the principals' expressed interest in the in-service, this need for more training was inferred; however, this specific sample of teachers never stated they wanted to obtain this knowledge. This is important, as in-services that fail to identify relevant teacher needs and priorities are not as effective as those in-services that have such a focus (Guskey, 1986). By focusing on what teachers want and need, teachers may develop a sense of responsibility and ownership of the material which may then translate to the classroom. Korinek, Schmid, and McAdams (1985) have stated that teacher training programs that have the sole purpose of transmitting information affect little behavior

change in teachers. Therefore, it is not enough that information was attempted to be transferred, but also the needs and wishes of the teachers must be taken into consideration if behavior change is the ultimate goal.

The waitlist control group was observed to increase their use of behavioral techniques with their entire classroom over the immediate in-service group. Given all of the analyses conducted in this study, it is possible that this finding represents noise in the data or Type I error. In particular, the Type I error rate is increased for group-administered treatments, such as the one in this study (Baldwin, Murray, & Shadish, 2005). Therefore, the finding that the waitlist control group may have increased their use of behavioral strategies over the immediate in-service group may not be a true finding.

There are several limitations to the design of the study that may explain increase in waitlist control observed teacher behaviors. First, it is a limitation of the design of this study that teacher behavior with the self-identified problem child was not observed. Rather, observers recorded teacher behavior with all students in the classroom rather than the identified child. Individual children with ADHD, however, were the focus of the in-service, and teachers were taught strategies that would be helpful with these children in particular. Therefore, it is unknown whether the treatment resulted in an observable change in teacher behavior with the identified child. From the observational data, it is only known that, in the classroom overall, the waitlist group was observed to use more labeled praise and direct commands over time than the immediate in-service group. However, given that the observers did not observe teacher behavior with the identified child, one must be careful not to draw

firm conclusions about any possible effect (or the lack thereof) that the in-service may have had on teachers' effective management of ADHD.

Observations of entire classroom behavior did not correlate well with teacher reports of their entire classroom behavior. This finding is consistent with poor correlations between observational and self-report methods found in adult (e.g., Melby, Conger, Ge, & Warner, 1995) and child literatures (e.g., Northup, Jones, Broussard, & George, 1995; Mikami, Chi, & Hinshaw, 2004; see Cone, 1999 and Jacob, Tennenbaum, and Krahn, 1987 for reviews). For instance, Melby and colleagues (1995) found that observed marital behavior poorly correlated with reported marital behavior. Northup and colleagues (1995) discovered that children with ADHD report different reinforcers for their behavior than those found by direct observations, and Mikami and colleagues (2004) found that staff ratings of child behavior did not correlate well with observations of externalizing behaviors. Thus, it is not unusual for self-report ratings to differ from observations in the literature.

The current study's poor correlations between reported and observed teacher behavior may have reflected the low variability on the self-report measure on the individual items. On the classroom behavioral strategies measure, a 0-4 Likert was used. For most of the individual behaviors, teachers obtained a score of 3 or 4, indicating that they used the behavior sometimes or frequently. For labeled praise, for instance, all teachers obtained a score of 3 or 4 on this item, resulting in a mean of 3.89 and standard deviation of .32. Such low variability on the individual items prevented an examination of the correlations by treatment group. Thus, the 0-4

Likert-scale on the self-report measure did not allow for enough variability in teacher item responses to examine relationship to observed behavior.

Also, behaviors on the self-report questionnaire may not have been defined well (e.g., “appropriate commands”; See Appendix E). Therefore, teachers’ own definitions of these strategies may not have matched the DPICS definitions of these strategies. This may be particularly true at pre in-service intervention for the immediate in-service group and at either time point for the waitlist control group, as teachers had not yet been trained on what constitutes an “appropriate command.”

Future studies that utilize the DPICS as a coding scheme with teachers should either attempt to design a self-report measure of classroom behavior that better correlates with the behaviors coded or provide more extensive definitions of the behavioral strategies than those currently on the current measure. This is likely the most efficient course of action as teachers largely disliked the classroom behavior measure used in this study. Many teachers stated that they found it repetitive and tedious. It may be that a shorter and more appropriately-worded measure (i.e., with examples of each behavior explicitly listed or more extensive definitions for each behavioral strategy provided) may better measure teacher behavior. Also, social desirability questions may need to be added as teachers may have inflated their reported use of behavior management techniques to appear as better teachers.

Additionally, the behavioral observations were very brief. Although the coders uniformly observed the teachers in the mornings, the 10 minutes of behavior coded may not have been representative of teachers’ overall classroom behavior. Evidence for the possible insufficient time frame for the coding scheme used in

schools is that two of the main behaviors coded were not even observed: time-out and ignoring minor misbehaviors. The short length of time was chosen to be unobtrusive to the busy teachers and was consistent with other observational studies using the DPICS (Webster-Stratton, 1985; Webster-Stratton & Eyberg, 1982). However, a longer observation period has been used in other studies of teacher behavior in the classroom (e.g., Filcheck et al., 2004) and most likely would have resulted in more representative samples of teacher behavior.

The type of interaction chosen to observe may have influenced the lack of teacher behavior observed during this time. Teachers were observed during an instructional period, in an effort to capture the most teacher behavior to code during the 10 minute period. This decision was consistent with the literature, as analogue parent-child interactions often include an instructional (e.g., clean-up) segment, where the parent must instruct the child, while parent and child behavior is coded (Wells et al., 2006). Such structured tasks are typically more sensitive to treatment effects than unstructured tasks (e.g., Pffifner, Jouriles, Brown, Etscheidt, & Kelley, 1990; Roberts & Powers, 1990). However, teachers could have been observed during an independent work period for the child, which is another common segment of parent-child interactions (Wells et al., 2006). Children with ADHD have difficulty staying on-task and working alone (Vile Junod, DuPaul, Jitendra, Volpe, & Cleary, 2006). Therefore, if observed during independent work, the observational coders may have had more opportunity to see more teacher responses to off-task child behaviors, perhaps in the form of giving more direct commands and labeled praise. Therefore, by observing the teachers during an instructional portion of the day, there may have

been less problem behavior from the students, which may not have elicited many of the teacher behaviors captured by the observational system.

Some of the results indicated that special education teachers may have benefited more from brief in-service training in terms of reported use of classroom behavior management strategies than other type of teachers (e.g., regular education, “other”). Special education teachers reported more use of classroom behavior management strategies at both time points, and those teachers in the immediate in-service group significantly increased their use from pre to post in-service intervention.

There are several possible explanations for the finding that special education teachers may have benefited more from the in-service. As special education classrooms are full of children with more behavioral difficulties (Bussing et al., 1998), these teachers receive more prior training (i.e., before beginning their job as a special education teacher) in behavioral strategies than other teachers (MacPherson-Court, McDonald, & Sobsey, 2003). If special education teachers more often receive training on these strategies, perhaps they are more motivated and open to using them, and may see this information as more applicable to them.

Regular education teachers, who do not usually receive this type of training, did not increase their use of strategies to the same degree as the special education teachers. These teachers may not have felt the information was important for them. It may be the case that regular education teachers, who have had less prior training about ADHD, may need more intensive training to change their reported behavior.

Still, effect sizes were small, which suggests that brief in-service training had only modest effects for all teachers, regardless of type of class taught. Future studies might include involvement of a school representative to help design the in-service to be more interesting and salient to the needs of specific teachers at the school, with a particular emphasis on why the information is important for regular education teachers to know.

Teacher Stress

Teachers in the immediate in-service group did not evidence significant change in stress related to teaching a child with inattention, hyperactivity, or impulsivity following the in-service compared with teachers in the waitlist control group. This finding is in contrast to that of Barbaresi and Olsen (1998) who found that teachers reported a significant decrease in stress related to a teacher-identified child with ADHD 1-month following the in-service. Our findings are also inconsistent with the parent training literature that consistently shows that teaching parents to effectively manage the behavior of their ADHD children reduces parenting stress (e.g., Anastopoulos et al., 1993). No significant effects were found with relation to gender or teacher type in the models with stress.

Methodological reasons, such as the identification of a child who may not have met full DSM-IV criteria for ADHD, but with inattention, hyperactivity, or impulsivity, may help to explain this finding. In the Barbaresi & Olsen study (1998), they asked teachers to complete the measure “based on a child they identified as a problem and with whom they had taught for at least 1 month” (Barbaresi & Olsen, 1998, p.95). Similarly, in the current study, children with ADHD were not identified

or diagnosed by the researcher, but rather the teachers identified children they believed were inattentive, hyperactive, and/or impulsive. Upon examination of the raw data, teachers in both groups reported means and standard deviations on the ITS lower than the published norms on the ITS for teacher stress related to a child diagnosed with ADHD, but higher than the reported norms for teachers reporting on their stress related to a child without ADHD. Thus, teachers in the current study may have identified sub-threshold children, thereby possibly explaining the lower levels of stress found in this sample.

The finding that the in-service did not help to decrease stress in the immediate in-service teachers stands in contrast to those findings in the parent training literature regarding parent stress following an intervention (e.g., Anastopoulos, Shelton, DuPaul, & Guervremont, 1993; Kazdin, Siegel, & Bass, 1992; Miller & Prinz, 1990). However, a major difference between parent training studies and the current study is the length of the intervention. In those studies, the parent intervention may occur across many sessions and be as long as 10 times the length of the current teacher in-service. Having multiple sessions, as is done in the parent training studies, allows the clinician to brainstorm with the parent and further target maladaptive child behaviors. With the current study, the in-service was a one-time session with approximately an hour of actual instruction presented. Therefore, the current intervention may not have been lengthy enough to decrease teacher stress.

Finally, the entire Index of Teaching Stress was not administered to teachers as was done in the Barbaresi & Olsen study (1998), and thus, teachers may have answered questions in a different way than if the whole measure had been used. For

instance, authors of other measures have found that the internal consistency and construct validity of shortened measures are often not as high as in the original long version (e.g., Freyer et al., 2006). However, this is not always the case (e.g., Carpenter et al., 1998; Gustafson & Norlander, 1996), as many researchers have found that shortened versions have good psychometric properties compared with the original version. Nevertheless, while the Barbaresi & Olsen study found change in level of stress, the authors only examined overall stress on the ITS, rather than stress as measured by the ADHD subscale. Therefore, it is unknown whether their study resulted in change on this particular subscale, which was a focus of the current study.

Limitations

Several important limitations of the current study exist. First, as discussed, the knowledge measure was constructed for this study, utilized a true/false format rather than a multiple choice format, lacked extensive test construction analyses, and had only adequate pre-test internal consistency. In the current study, the measure was constructed from questions from existing knowledge measures and questions about in-service content.

If this study were to be repeated, more formal test construction methodology should be employed. The first step is item generation (Hinkin, 1995). Item wording should be checked to ensure that the language is appropriate for the audience (e.g., is it more appropriate to say medical test or biological test?). Items also should be able to be classified into different content areas according to the theoretical concept the scale is to measure. Each content area should be adequately represented by items on the measure. Sometimes, this can be tested by having a sample of respondents attempt

to classify each item into the content areas and then examining which items were not matched to the content area intended (Hinkin, 1995). This procedure helps to establish the content validity of the measure.

Next, the scale must be constructed by integrating all of the items together, so that the items are not grouped by content area (Hinkin, 1995). This step also entails deciding how to scale the items. As mentioned earlier, a multiple choice format most likely would allow for more variability in item response than the dichotomous (true/false) format used in the current study.

The final step is to evaluate the scale by testing it with samples of teachers (Hinkin, 1995). In future studies, it is necessary to examine the use of the questions on this measure in a different format, such as multiple choice and to repeatedly administer the measure to teachers for fine-tuning of the measure. This should be done by analyzing which questions may be too easy or too difficult according to a set criterion, eliminating those questions, and then re-administering the measure without those questions as discussed earlier. Also, the wording of the questionnaire may change depending upon any questions that teachers deem confusing or which may use language that they do not understand.

Another limitation is that the in-service may have not mapped well to the knowledge measure. In terms of percent of time spent on a topic during the in-service, the questionnaire contained more questions related dedicated to causes, assessment, subtypes, and associated problems than time spent reviewing these topics during the in-service. In other words, 40% of the information-providing portion of the in-service (including the practice session) was spent reviewing those topics; however, those

topics represented 48% of questions on the measure. Also, the study had no measures with which convergent or divergent validity would have been able to be examined for the knowledge measure. Therefore, as stated earlier, further analyses examining the validity and reliability of this measure, including an examination of item difficulty, may provide additional support for its use as a measure of teacher ADHD knowledge by improving its internal consistency.

A further limitation of this study is the manner in which observations were conducted. The observations were very brief samples of teacher behavior that may not have been representative of their 6-7 hour school day. Additionally, no observations of child behavior were collected, therefore failing to take into account the contribution of child behavior to teacher use of behavior modification. That is, without measuring child behavior, it is difficult to know whether the teachers' low usage of behavioral techniques was appropriate to manage their classrooms. For instance, the teachers who did not use many behavioral techniques may have had children in the classroom who were relatively well-behaved and did not require much behavioral intervention from the teachers. Due to the labor and monetary restrictions of the current study, child observations were not feasible. For such a methodological decision, parental consent would also be needed in addition to teacher consent. Parental involvement in the study would take more time, effort, and perhaps monetary support to first collect consent from parents and then possibly to compensate parents. Future studies should examine observed teacher behavior following the in-service in reference to observed child behavior. Such studies would allow the research to gauge whether the teacher is behaving appropriately in response to the child's behavior.

In the current study, teachers were not asked about their past experience with applied behavior analyses. Had this information been collected, it may have yielded potentially interesting input into whether those teachers with less behavioral training benefited more from this in-service and whether those who had already been trained in such principals benefited at all in terms of changing their classroom behavior. It is a limitation of this study that this was not measured.

Another limitation to this study is the lack of information on those teachers who refused to participate. As principals informed their teachers in different manners about the research study, it is impossible to know how many teachers decided not to attend the consent meeting for the in-service. This is an important limitation as treatment refusers and dropouts have been found to differ from completers in important ways (Kendall & Sugarman, 1997). For instance, in a review of the anxiety treatment literature, Kendall and Sugarman found that refusers and dropouts were more likely to be from lower income households, be ethnic minorities, and report less symptomatology. Therefore, it may be that treatment refusers and dropouts considered themselves to know more about ADHD already and declined further participation. However, it is encouraging that the ITT analyses still revealed significant findings that were consistent with results from completer analyses.

Future Directions and Significance of the Current Study

Research has shown that children with ADHD typically display more problematic behavior in the classroom than children without attentional or behavioral problems (e.g., Abikoff et al., 2002; Miller et al., 1997), and that these problems result in functional impairment in the school setting. These problems impair not only

the child's functioning, but also consume teachers' time and school psychologists' caseloads (Demaray et al., 2003; Fabiano et al., 2003; Raggi, Evans, Hackethorn, & Thompson, 2003;). Although efficacious classroom interventions exist (Pelham et al., 1998), most teachers are not specifically trained in evidence-based behavior management of ADHD, possibly due to the time and money required to carry out this training (e.g., Barbaresi & Olsen, 1998; Bussing et al., 2002). Indeed, many, if not most, teachers do not receive any education regarding ADHD, and this is particularly true for regular education teachers. Teacher in-service training, while likely insufficient for providing advanced training in behavioral and functional analytic intervention techniques, seems an important first step in helping teachers to more accurately perceive and control the behavior of children with ADHD using evidence-based approaches. The in-service utilized in the current study easily fits into a school staff training schedule, increasing the external validity and exportability of the intervention (Weisz & Hawley, 1998). Additionally, as explanations of behavior may be a barrier to the acceptance of behavior analysis techniques (Skinner & Hales, 1992), this intervention had the important result of also changing teacher misperceptions about the diagnosis more generally.

It is important to note that teachers were very satisfied with the current intervention. They felt they would recommend the in-service to their peers. Thus, the in-service not only successfully changed teacher knowledge about ADHD, teachers (regardless of whether they completed the study) felt the in-service was worthwhile.

Finally, little data exist on the effectiveness of educational in-services for ADHD. Barbaresi and Olsen (1998) began this line of specific research, but did so in

an uncontrolled fashion using teachers from a single school. Due to the main objective of examining whether the in-service results in improvements in teacher knowledge about ADHD, use of classroom behavioral techniques, and teacher stress, this study aids clinicians in judging whether these in-services are valuable intervention techniques. Also, researchers are now able to study whether the length of the ADHD in-service may need to be increased to affect behavior change or whether follow-up sessions are necessary to bring about teacher behavior change. The results of this study have important implications for teachers, clinicians, and researchers and provide a useful basis for future research into the specific components of the in-service that account for behavior and cognition change.

One important next step for researchers may involve assessing, prior to the in-service, teachers' knowledge and behavioral skills. This assessment would allow the researcher to then tailor the in-service according to the knowledge of the specific group of teachers. Also, it would be possible to study only those with low levels of skill and whether the in-service increases their knowledge and use of behavioral strategies in the classroom. Given the already high level of knowledge found in this study and others, such a strategy would allow only those teachers who truly need the in-service to be targeted with an intervention that is maximized with only information not already known.

Teachers who are observed may benefit from receiving feedback from the clinician on what techniques they are using well versus not using at all. This method was employed during the Multimodal Treatment Study for ADHD (MTA Cooperative Group, 1999). During the delivery of the school intervention, intensive behavioral

treatment in the classroom, clinicians observed teachers and provided subsequent feedback about their use of empirically-supported behavioral strategies with the child with ADHD. Such feedback may in part explain the improved classroom productivity and rule-following found in children who received the behavioral treatment (MTA Cooperative Group, 1999). Thus, research utilizing a feedback-approach and more extensive assistance from the clinician would provide valuable data on whether teachers need more intensive help in order for behavior change to occur.

In conclusion, this study expanded previous research on ADHD in-service training for teachers by being the first to examine the efficacy of an ADHD-specific in-service in a randomized and controlled fashion. This in-service successfully improved teacher knowledge about ADHD, and special education teachers reported using more classroom behavioral strategies from the in-service than regular education teachers, illustrating the need to improve the in-service for regular education teachers. Nevertheless, teachers were very satisfied with the in-service and would recommend it to others. As such, this study is a useful addition to the ADHD in-service literature and provides a springboard for future research into further interventions intended to educate teachers about ADHD.

Table 1. List of the DSM-IV Symptoms of ADHD

Inattentive Symptoms	Hyperactive/Impulsive Symptoms
Often fails to give close attention to details or makes careless mistakes	Often fidgets with hands or squirms in seat
Often has difficulty sustaining attention in tasks or play activities	Often leaves seat in classroom or in other situations in which remaining seated is expected
Often does not seem to listen when spoken to directly	Often runs about or climbs excessively in situations in which it is inappropriate
Often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace	Often has difficulty playing or engaging in leisure activities quietly
Often has difficulty organizing tasks and activities	Is often “on the go” or often acts as if “driven by a motor”
Often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort	Often talks excessively
Often loses things necessary for tasks or activities	Often blurts out answers before questions have been completed
Is often easily distracted by extraneous stimuli	Often has difficulty awaiting turn
Is often forgetful in daily activities	Often interrupts or intrudes on others

Note. DSM-IV is the abbreviation for the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition. ADHD is the abbreviation for Attention-Deficit/Hyperactivity Disorder.

Table 2. Teacher Characteristics in Total Sample and Each Treatment Group

Teacher Characteristic	Total Sample (<i>n</i> =142)	Immediate In-service Group (<i>n</i> = 74)	Wait-list Control Group (<i>n</i> = 68)
Age (in years)	37.12 (12.45)	36.35 (11.54)	37.67 (13.33)
Years Teaching	11.34 (10.40)	10.18 (9.42)	11.98 (11.03)
Grade Taught	3 rd	3 rd	3 rd
Gender, % female	92	97	88
Race/ Ethnicity			
%Caucasian	57	61	52
%African American	33	27	39
% Latino/a	4	3	5
% Other	6	8	3
Education Level			
% Bachelor's	58	59	59
% Master's	40	35	42
% Doctoral	2	3	2
Type of Teacher			
% Regular education	70	77	62
% Special education	17	8	26
% Other	13	15	12
ADHD mentioned during an undergraduate class, % yes	72	66	77
Took an ADHD-specific class as an undergraduate, % yes	28	23	32
Has read book(s) about ADHD, % yes	50	46	53
Has attended an ADHD-specific in-service, % yes	34	34	35

Note. ADHD = Attention-Deficit/Hyperactivity Disorder.

Table 3. Teacher Characteristic Variables in Participants and Dropouts

Teacher Characteristic	Participants (<i>n</i> = 74)	Dropouts (<i>n</i> = 13)
Age (in years)	36.75 (12.26)	38.77 (13.34)
Years Teaching	10.76 (10.12)	12.58 (10.19)
Grade Taught	3 rd	3 rd
Gender, % female	91	100
Race/ Ethnicity		
%Caucasian	58	50
%African American	32	50
% Latino/a	4	0
% Other	5	0
Education Level		
% Bachelor's	58	63
% Master's	40	31
% Doctoral	2	6
Class Taught		
% Regular education	69	75
% Special education	17	12
% Other	14	13
Prior ADHD Training		
ADHD mentioned during an undergraduate class, % yes	69	94
Took an ADHD-specific class as an undergraduate, % yes	19	29
Has read book(s) about ADHD, % yes	50	44
Has attended an ADHD-specific in-service, % yes	33	44

Note. ADHD = Attention-Deficit/Hyperactivity Disorder.

Table 4. Percentage Change of Teachers Answering Individual Items Correctly on ADHD Knowledge Measure

Item Number	Percentage of Immediate In-service Teachers Correct			Percentage of Waitlist Control Group Teachers Correct		
	Pre	Post	Difference	Pre	Post	Difference
1	62	97	35	72	78	6
2	94	97	3	94	90	-4
3	39	40	1	45	37	-8
4	100	100	0	95	100	5
5	64	90	26	50	57	7
6	97	97	0	92	98	6
7	74	78	4	55	57	2
8	17	19	2	27	26	-1
9	79	92	13	83	76	-7
10	91	93	2	82	86	4
11	82	88	6	73	74	1
12	32	48	16	29	32	3
13	80	86	6	82	72	-10
14	96	88	-8	91	95	4
15	96	98	2	94	91	-3
16	50	66	16	65	62	-3
17	70	54	-16	44	48	4
18	41	62	21	81	78	-3

19	89	98	9	98	88	-10
20	92	65	-27	98	93	-5
21	82	93	11	83	80	-3
22	82	82	0	73	82	9
23	96	98	2	94	89	-5
24	82	91	9	84	80	-4
25	92	100	8	87	91	4

Note. ADHD = Attention-Deficit/Hyperactivity Disorder. Pre = pre in-service intervention percentage of teachers answering correctly. Post = post in-service intervention percentage of teachers answering correctly. Difference = Post - Pre. Positive numbers represent positive change over time (i.e., more teachers obtaining correct answers on the item at post than at pre). Negative numbers represent negative change (i.e., fewer teachers obtaining correct answers on the item at post than at pre).

Table 5: Teacher Characteristic Variables by Observational Status

	Percentage of Observed Teachers (<i>n</i>)	Percentage of Non-observed Teachers (<i>n</i>)
Gender		
Female	78 (40)	90 (82)
Male	4 (2)	9 (8)
Race/ Ethnicity		
Caucasian	33 (17)	63 (57)
African American	37 (19)	28 (25)
Latino/a	6 (3)	2 (2)
Other	4 (2)	4 (4)
Education Level		
Bachelor's	53 (27)	54 (49)
Master's	29 (15)	40 (36)
Doctoral	0 (0)	3 (3)
Type of Teacher		
Regular ed.	67 (34)	64 (58)
Special ed.	14 (7)	17 (15)
Other	2 (1)	19 (17)

Note. *ns* = non-significant. Ed.= education. Nine observed teachers were missing teacher characteristic information.

Table 6. Correlations between Pre In-service Intervention Outcome Measures

Outcome Measure	1.	2.	3.
1. Knowledge about ADHD	X	-.07	-.16
2. Reported Use of Classroom Behavior Management Techniques		X	.13
3. Stress			X

Note. ADHD = Attention-Deficit/Hyperactivity Disorder.

Table 7. Correlations Between Reported and Observed Classroom Behaviors

	Labeled Praise, pre observations	Labeled Praise, post observations	Direct Commands, pre observations	Direct Commands, post observations
Labeled Praise, pre self-report	.26	-.17	.23	.09
Labeled Praise, post self-report	-.01	.22	.13	.03
Direct Commands, pre self-report	-.10	-.14	.27	.17
Direct Commands, post self-report	.14	.00	.00	.11

Note: pre observations = pre in-service intervention observations. post observations = post in-service intervention observations. pre self-report = pre in-service intervention self-report. post self-report = post in-service intervention self-report.

Table 8. Main Outcomes in the Intent-to-Treat Analyses

Measure	Immediate In-service Group (<i>n</i> = 66)		Waitlist Control Group (<i>n</i> = 66)		Treatment Group Effect		Time Effect		Treatment Group X Time Effect	
	Pre	Post	Pre	Post	<i>F</i>	η^2_p	<i>F</i>	η^2_p	<i>F</i>	η^2_p
Knowledge about ADHD	19.5 (1.9)	20.4 (1.8)	18.9 (2.1)	19.0 (2.4)	6.45*	.05	8.83**	.08	11.50**	.10
Reported Use of Classroom Behavior Management Techniques	47.9 (6.7)	49.4 (6.8)	50.4 (5.0)	49.3 (6.0)	.54	.00	.89	.01	3.62	.03
Stress	47.8 (13.6)	47.5 (14.3)	54.3 (16.8)	54.3 (15.6)	2.58	.02	.00	.00	.35	.00
Observations										
Descriptive comments	2.19 (1.25)	1.81 (1.97)	1.81 (1.52)	1.88 (1.68)	.33	.01	.60	.01	1.53	.03
Labeled praise	2.19 (2.58)	3.38 (2.42)	.65 (.94)	4.31 (3.77)	.10	.00	23.37***	.32	3.75	.07
Direct commands	9.81 (5.11)	11.24 (4.09)	11.24 (4.09)	17.50 (10.09)	5.96*	.10	7.24*	.16	6.89*	.13

Note. ADHD = Attention-Deficit/Hyperactivity Disorder. Pre = pre in-service intervention. Post = post in-service intervention.

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 9. Source Table for ITT Analysis of ADHD Knowledge with Type of Teacher as a Concomitant Variable

Effect	<i>F</i>	<i>p</i>	η^2_p
Treatment Group	1.15	<i>ns</i>	.01
Type of Teacher	.33	<i>ns</i>	.00
Time	4.19	.05	.04
Treatment Group X Time	8.38	.01	.08
Type of Teacher X Time	1.10	<i>ns</i>	.00
Type of Teacher X Treatment Group	.02	<i>ns</i>	.01
Type of Teacher X Treatment Group X Time	.47	<i>ns</i>	.00

Note. ITT = Intent-to-treat. ADHD = Attention-Deficit/Hyperactivity Disorder. *ns* = non-significant ($p > .05$). η^2_p = partial eta-squared.

Table 10. Source Table for ITT Analysis of ADHD Knowledge with Grade Taught as a Concomitant Variable

Effect	<i>F</i>	<i>p</i>	η^2_p
Treatment Group	2.34	<i>ns</i>	.01
Grade Taught	1.62	<i>ns</i>	.03
Time	11.71	.001	.02
Treatment Group X Time	8.23	.01	.08
Grade Taught X Time	.39	<i>ns</i>	.02
Grade Taught X Treatment Group	.19	<i>ns</i>	.04
Grade Taught X Treatment Group X Time	.37	<i>ns</i>	.01

Note. ITT = Intent-to-treat. ADHD = Attention-Deficit/Hyperactivity Disorder. *ns* = non-significant ($p > .05$). η^2_p = partial eta-squared.

Table 11. Source Table for ITT Analysis of Reported Classroom Behavior Management with Type of Teacher as a Concomitant Variable

Effect	<i>F</i>	<i>p</i>	η^2_p
Treatment Group	1.18	<i>ns</i>	.01
Type of Teacher	3.46	.05	.03
Time	5.64	.05	.05
Treatment Group X Time	6.49	.05	.06
Type of Teacher X Time	4.27	.05	.03
Type of Teacher X Treatment Group	2.17	<i>ns</i>	.04
Type of Teacher X Treatment Group X Time	4.12	.05	.04

Note. ITT = Intent-to-treat. *ns* = non-significant ($p > .05$). η^2_p = partial eta-squared.

Table 12. Source Table for ITT Analysis of Reported Classroom Behavior Management with Grade Taught as a Concomitant Variable

Effect	<i>F</i>	<i>p</i>	η^2_p
Treatment Group	.28	<i>ns</i>	.00
Grade Taught	.00	<i>ns</i>	.03
Time	.29	<i>ns</i>	.00
Treatment Group X Time	2.39	<i>ns</i>	.02
Grade Taught X Time	.19	<i>ns</i>	.02
Grade Taught X Treatment Group	5.54	.05	.05
Grade Taught X Treatment Group X Time	.08	<i>ns</i>	.00

Note. ITT = Intent-to-treat. *ns* = non-significant ($p > .05$). η^2_p = partial eta-squared.

Table 13. Source Table for ITT Analysis of Stress with Type of Teacher as a Concomitant Variable

Effect	<i>F</i>	<i>p</i>	η^2_p
Treatment Group	4.03	.05	.03
Type of Teacher	1.38	<i>ns</i>	.02
Time	.50	<i>ns</i>	.00
Treatment Group X Time	.52	<i>ns</i>	.00
Type of Teacher X Time	2.47	<i>ns</i>	.02
Type of Teacher X Treatment Group	1.05	<i>ns</i>	.04
Type of Teacher X Treatment Group X Time	2.06	<i>ns</i>	.04

Note. ITT = Intent-to-treat. *ns* = non-significant ($p > .05$). η^2_p = partial eta-squared.

Table 14. Source Table for ITT Analysis of Stress with Grade Taught as a Concomitant Variable

Effect	<i>F</i>	<i>p</i>	η^2_p
Treatment Group	.96	<i>ns</i>	.01
Grade Taught	3.16	<i>ns</i>	.03
Time	.45	<i>ns</i>	.00
Treatment Group X Time	.77	<i>ns</i>	.01
Grade Taught X Time	.05	<i>ns</i>	.00
Grade Taught X Treatment Group	.58	<i>ns</i>	.00
Grade Taught X Treatment Group X Time	.33	<i>ns</i>	.00

Note. ITT = Intent-to-treat. *ns* = non-significant ($p > .05$). η^2_p = partial eta-squared.

Table 15. Source Table for ITT Analysis of Descriptive Comments with Gender as a Concomitant Variable

Effect	<i>F</i>	<i>p</i>	η^2_p
Treatment Group	.00	<i>ns</i>	.00
Gender	.12	<i>ns</i>	.00
Time	.03	<i>ns</i>	.00
Treatment Group X Time	5.64	.05	.13
Gender X Time	.23	<i>ns</i>	.01
Gender X Treatment Group	.27	<i>ns</i>	.01
Gender X Treatment Group X Time	4.70	.05	.11

Note. ITT = Intent-to-treat. *ns* = non-significant ($p > .05$). η^2_p = partial eta-squared.

Table 16. Source Table for ITT Analysis of Labeled Praise with Grade Taught as a Concomitant Variable

Effect	<i>F</i>	<i>p</i>	η_p^2
Treatment Group	.26	<i>ns</i>	.01
Grade Taught	.21	<i>ns</i>	.01
Time	25.55	.001	.41
Treatment Group X Time	6.62	.05	.15
Grade Taught X Time	.82	<i>ns</i>	.01
Grade Taught X Treatment Group	.49	<i>ns</i>	.02
Grade Taught X Treatment Group X Time	10.23	.01	.22

Note. ITT = Intent-to-treat. *ns* = non-significant ($p > .05$). η_p^2 = partial eta-squared.

Table 17. Source Table for ITT Analysis of Direct Commands with Type of Teacher as a Concomitant Variable

Effect	<i>F</i>	<i>p</i>	η^2_p
Treatment Group	6.70	.05	.15
Type of Teacher	.01	<i>ns</i>	.00
Time	1.94	<i>ns</i>	.05
Treatment Group X Time	.53	<i>ns</i>	.01
Type of Teacher X Time	3.75	<i>ns</i>	.00
Type of Teacher X Treatment Group	.08	<i>ns</i>	.09
Type of Teacher X Treatment Group X Time	.00	<i>ns</i>	.00

Note. ITT = Intent-to-treat. *ns* = non-significant ($p > .05$). η^2_p = partial eta-squared.

Table 18. Source Table for ITT Analysis of Direct Commands with Grade Taught as a Concomitant Variable

Effect	<i>F</i>	<i>p</i>	η^2_p
Treatment Group	4.25	.05	.10
Grade Taught	.00	<i>ns</i>	.00
Time	9.18	.01	.19
Treatment Group X Time	4.45	.05	.10
Grade Taught X Time	.43	<i>ns</i>	.00
Grade Taught X Treatment Group	.10	<i>ns</i>	.01
Grade Taught X Treatment Group X Time	3.56	<i>ns</i>	.09

Note. ITT = Intent-to-treat. *ns* = non-significant ($p > .05$). η^2_p = partial eta-squared.

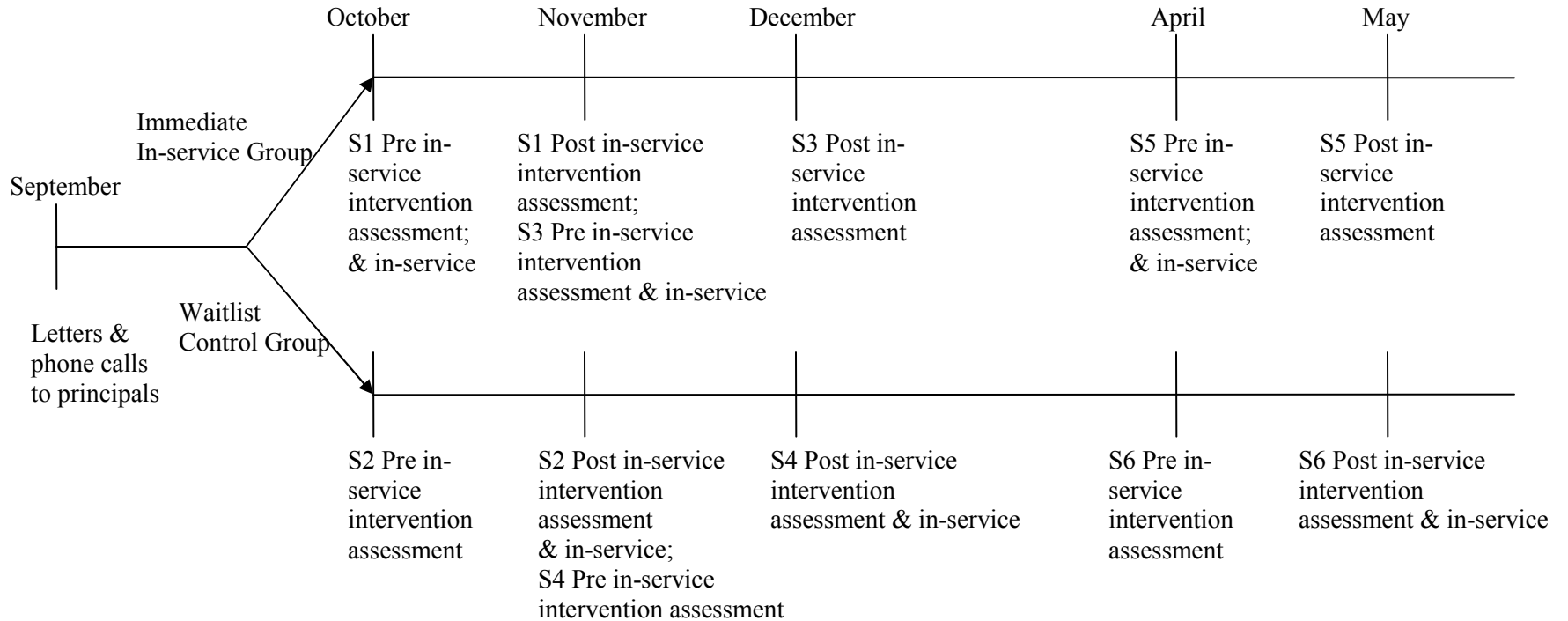
Table 19. Main Outcomes in Treatment Completer Analyses

Measure	Immediate In-service Group (<i>n</i> = 66)		Waitlist Control Group (<i>n</i> = 66)		Treatment Group Effect		Time Effect		Treatment Group X Time Effect	
	Pre	Post	Pre	Post	<i>F</i>	η^2_p	<i>F</i>	η^2_p	<i>F</i>	η^2_p
Knowledge about ADHD	19.5 (1.9)	20.4 (1.8)	18.9 (2.1)	19.0 (2.4)	8.77*	.08	8.31**	.07	8.81**	.08
Reported Use of Classroom Behavior Management Techniques	47.9 (6.7)	49.4 (6.8)	50.4 (5.0)	49.3 (6.0)	.63	.01	.59	.01	4.82*	.05
Stress	47.8 (13.6)	47.5 (14.3)	54.3 (16.8)	54.3 (15.6)	4.14	.00	.03	.00	.12	.00
Observations										
Descriptive comments	2.19 (1.25)	1.81 (1.97)	1.81 (1.52)	1.88 (1.68)	.54	.01	.85	.02	1.93	.04
Labeled praise	2.19 (2.58)	3.38 (2.42)	.65 (.94)	4.31 (3.77)	.15	.00	22.22***	.32	4.01	.08
Direct commands	9.81 (5.11)	11.24 (4.09)	11.24 (4.09)	17.50 (10.09)	6.29*	.14	7.55**	.12	6.45*	.14

Note. ADHD = Attention-Deficit/Hyperactivity Disorder. Pre = pre in-service intervention. Post = post in-service intervention. η^2_p = partial eta squared for the effect. η^2_p is not reported for non-significant effects.

* *p* < .05, ** *p* < .01, ****p* < .001

Figure 1. Study Timeline



Note. Assessments included the completion of rating forms and the observations. S=school

Figure 2. Treatment Group by Time Effect for Reported ADHD Knowledge

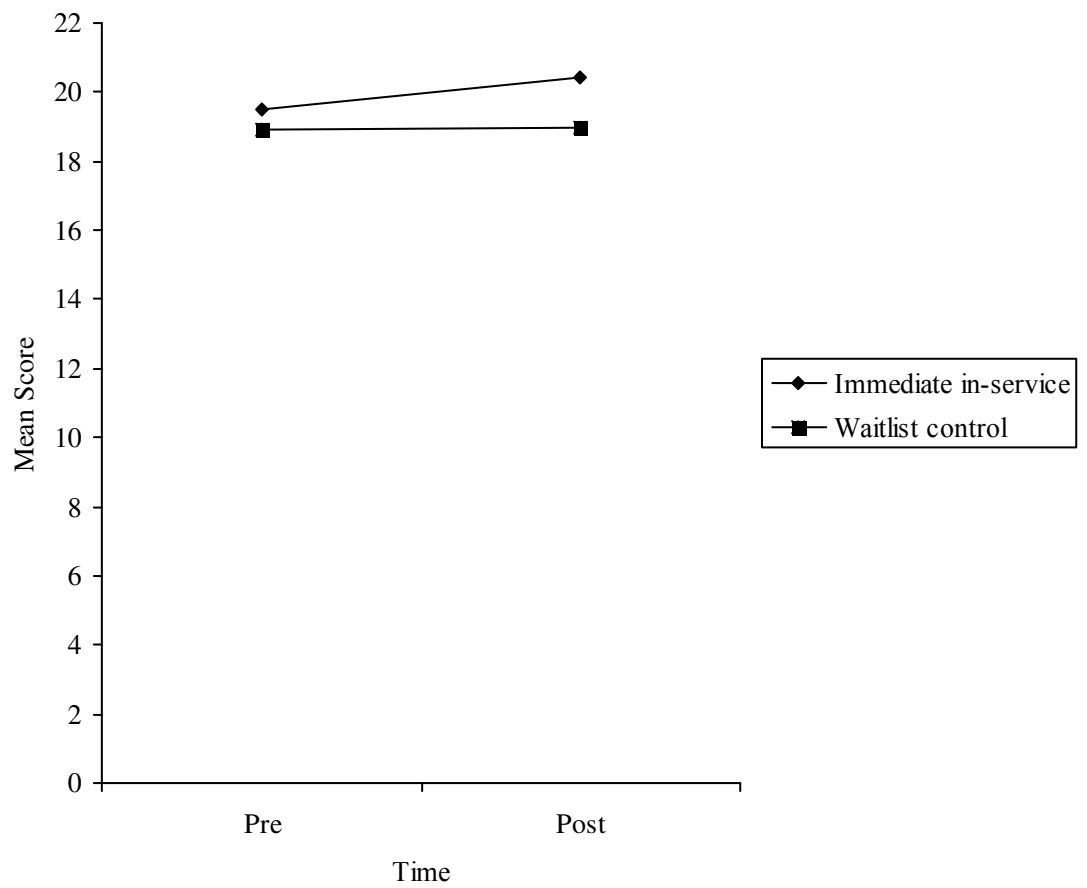


Figure 3. Treatment Group by Time Effect for Reported Classroom Behavior Management Techniques

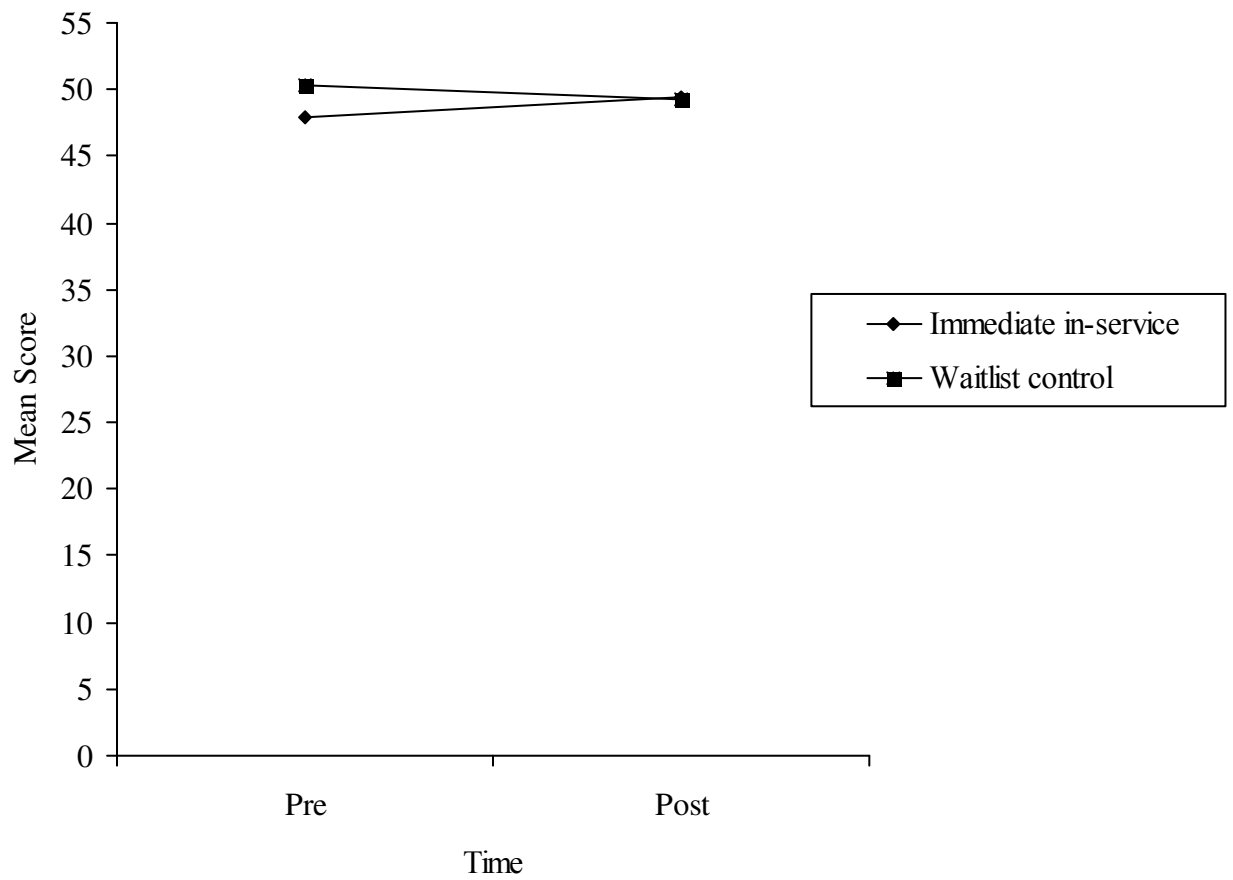


Figure 4. Treatment Group by Time Effect for Reported Stress

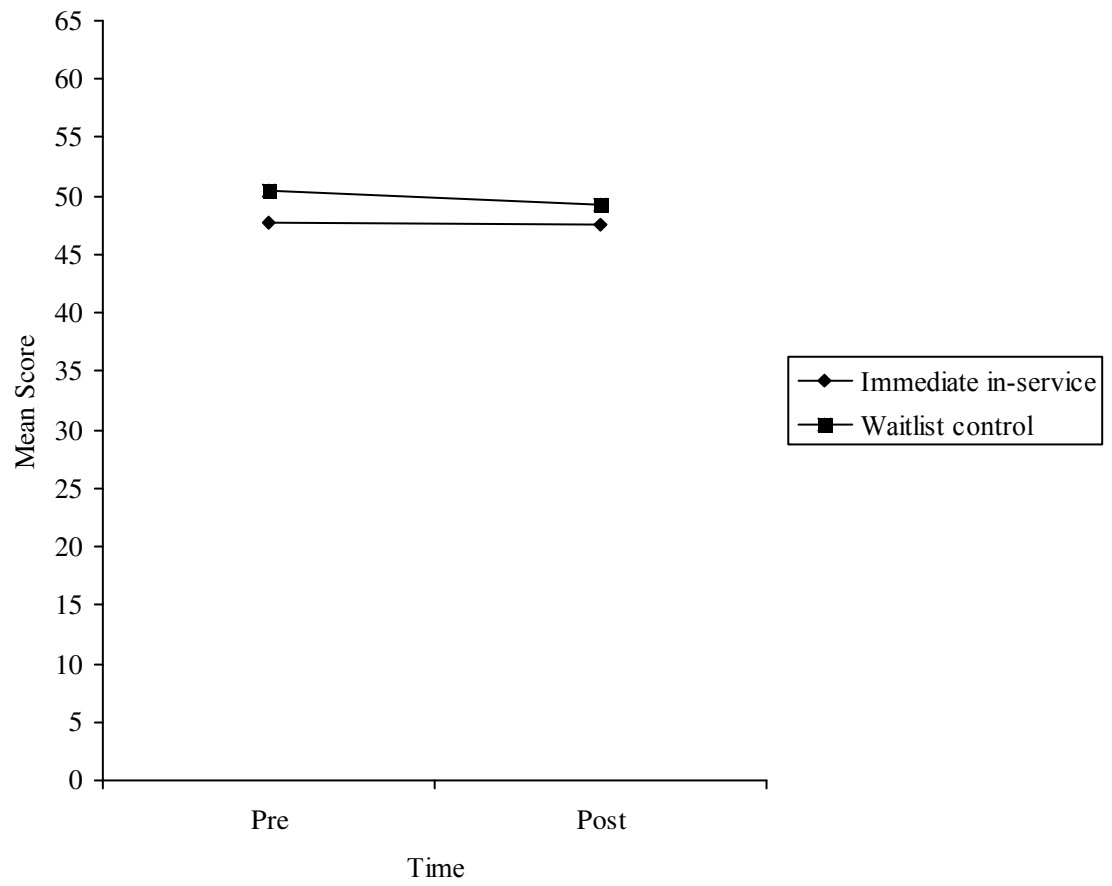


Figure 5. Treatment Group by Time Effect for Observed Descriptive Comments

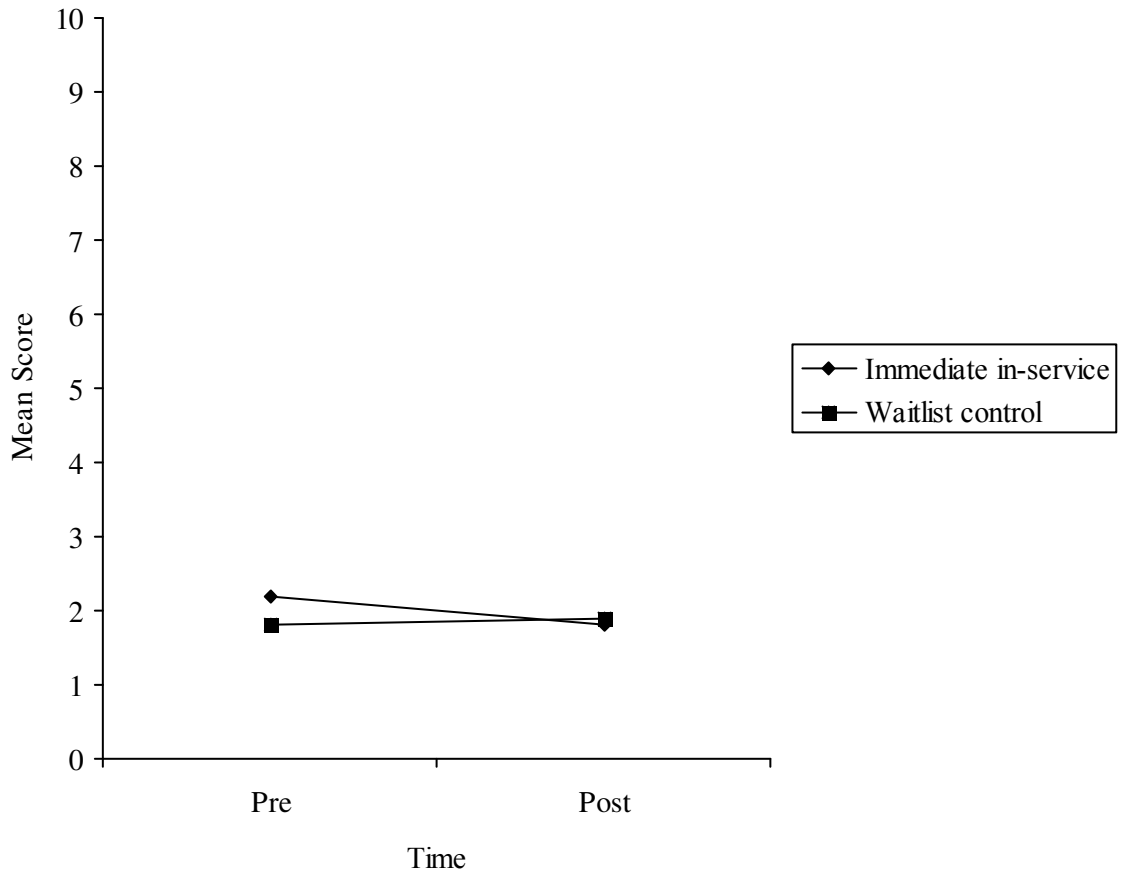


Figure 6. Treatment Group by Time Effect for Observed Labeled Praise

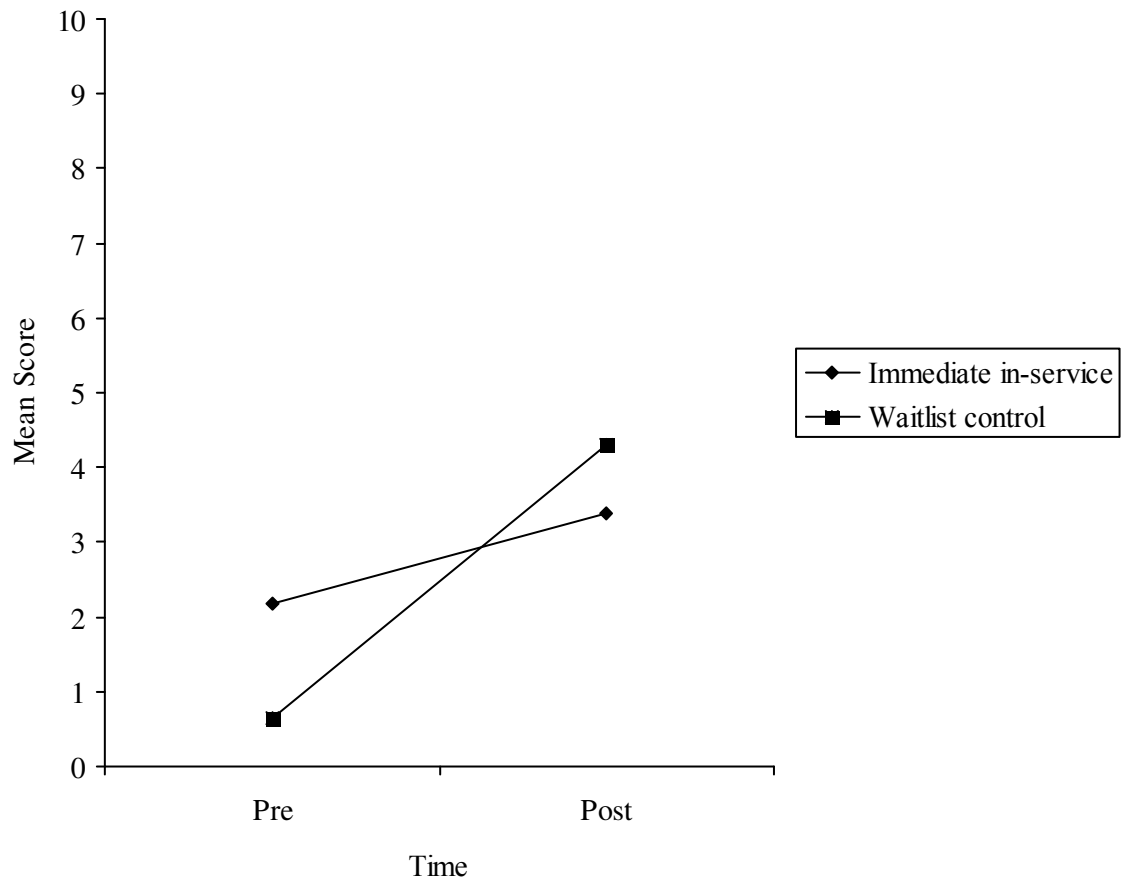


Figure 7. Treatment Group by Time Effect for Observed Direct Commands

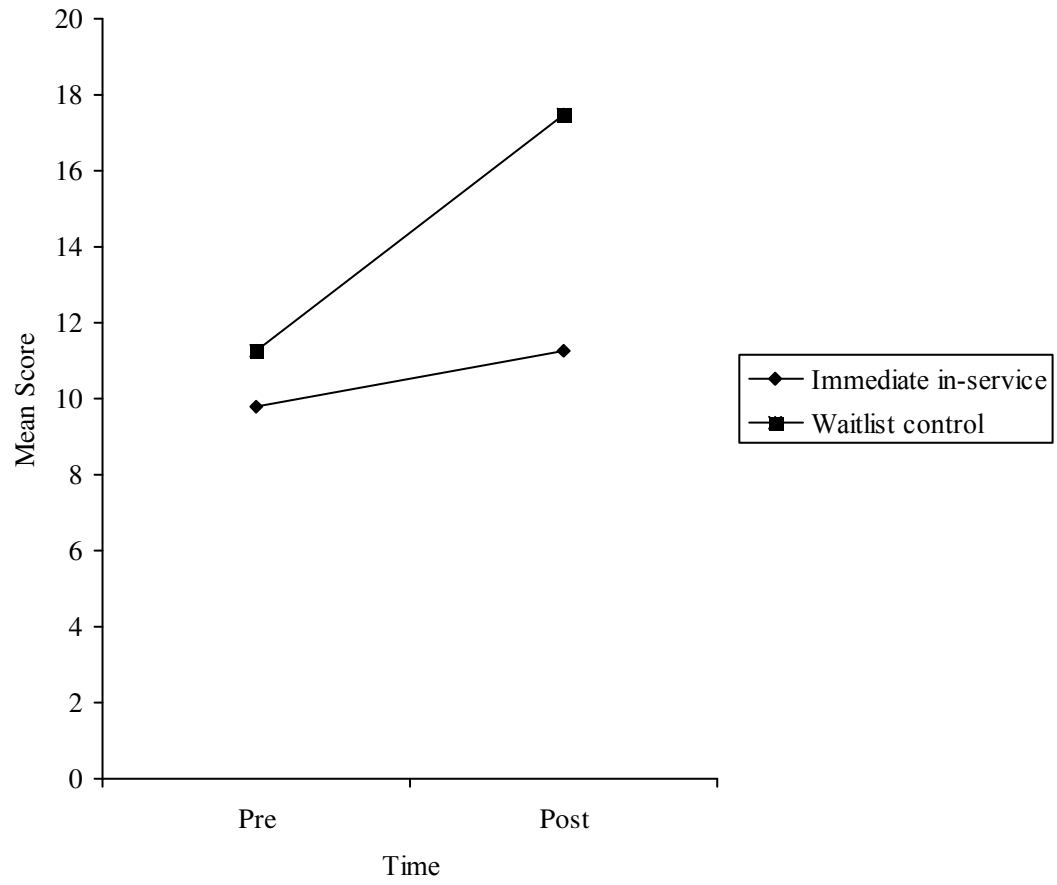


Figure 8. Grade by Treatment Group by Time Effects for Labeled Praise

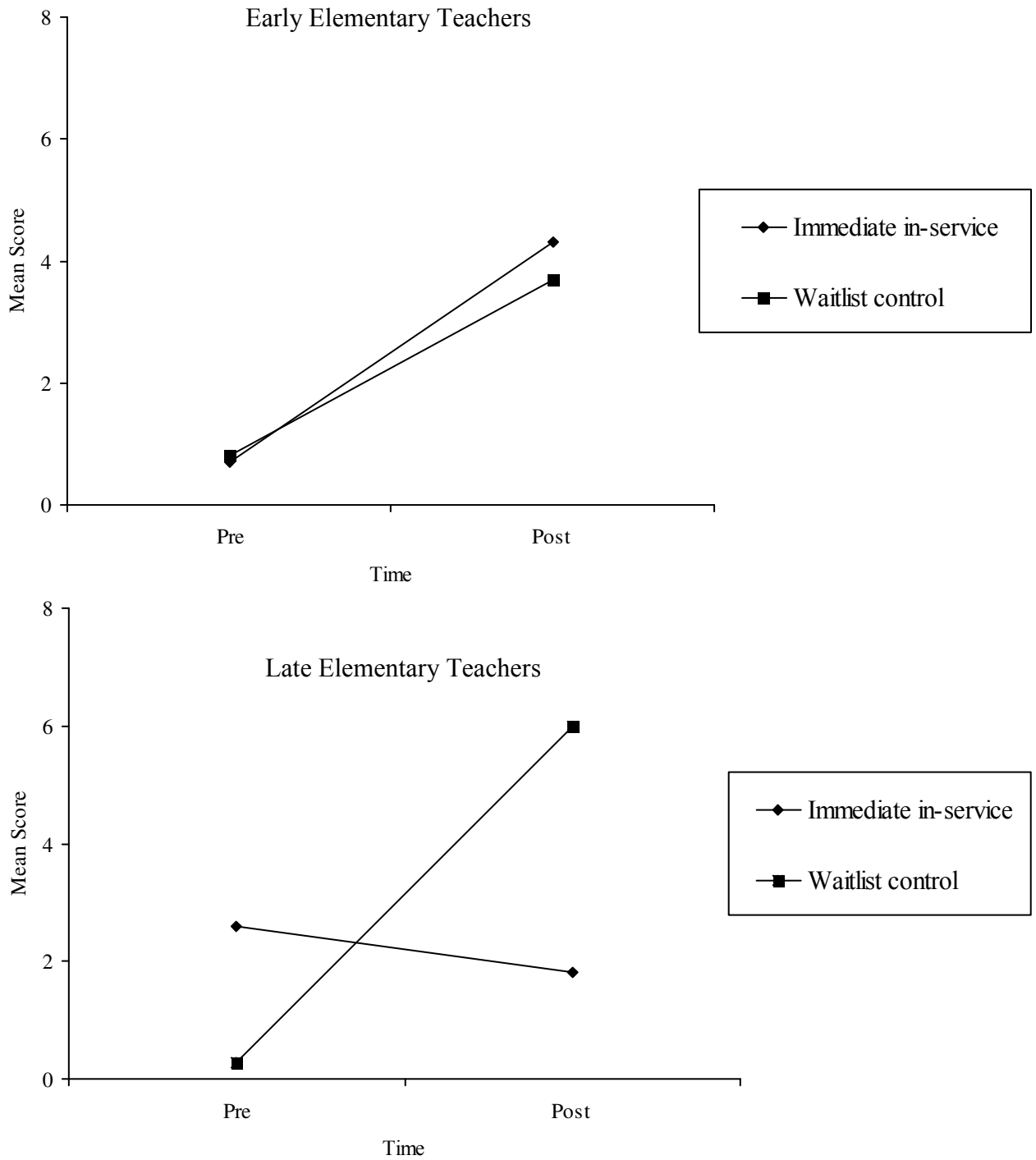


Figure 9. Teacher Type X Treatment Group Effect for Direct Commands

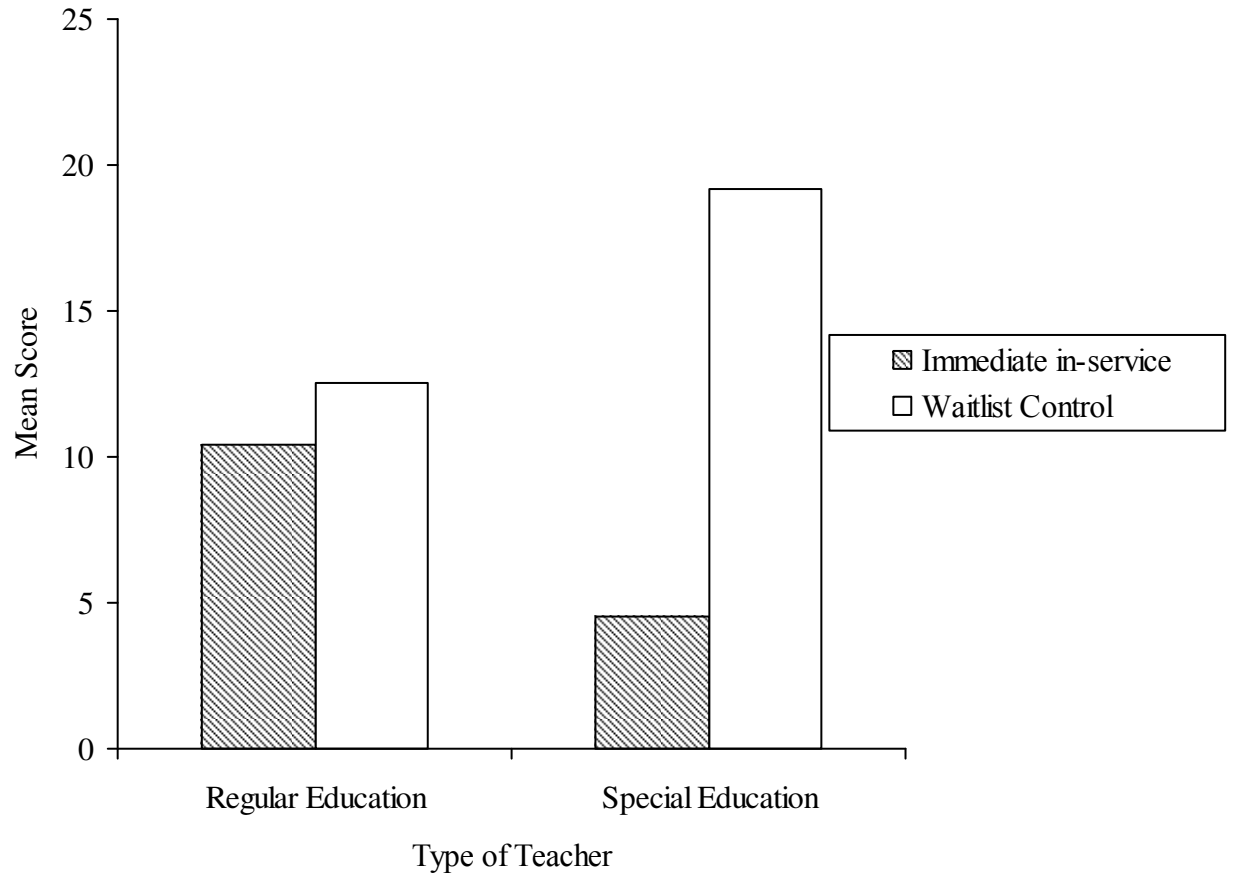
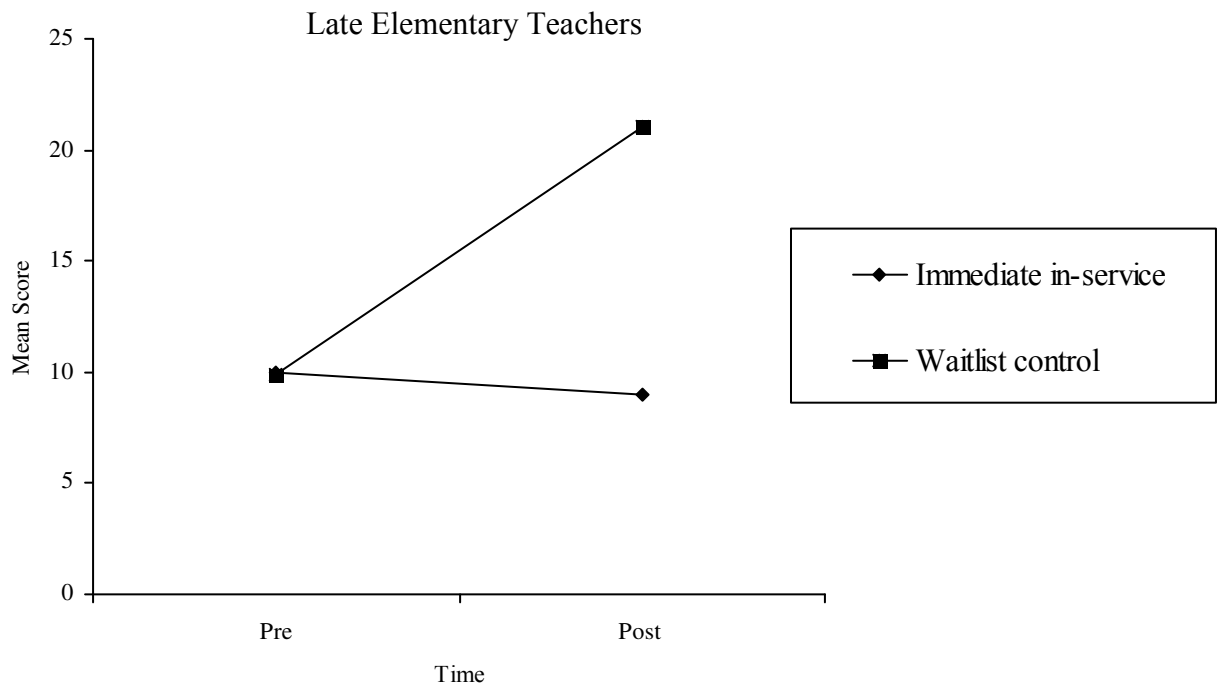
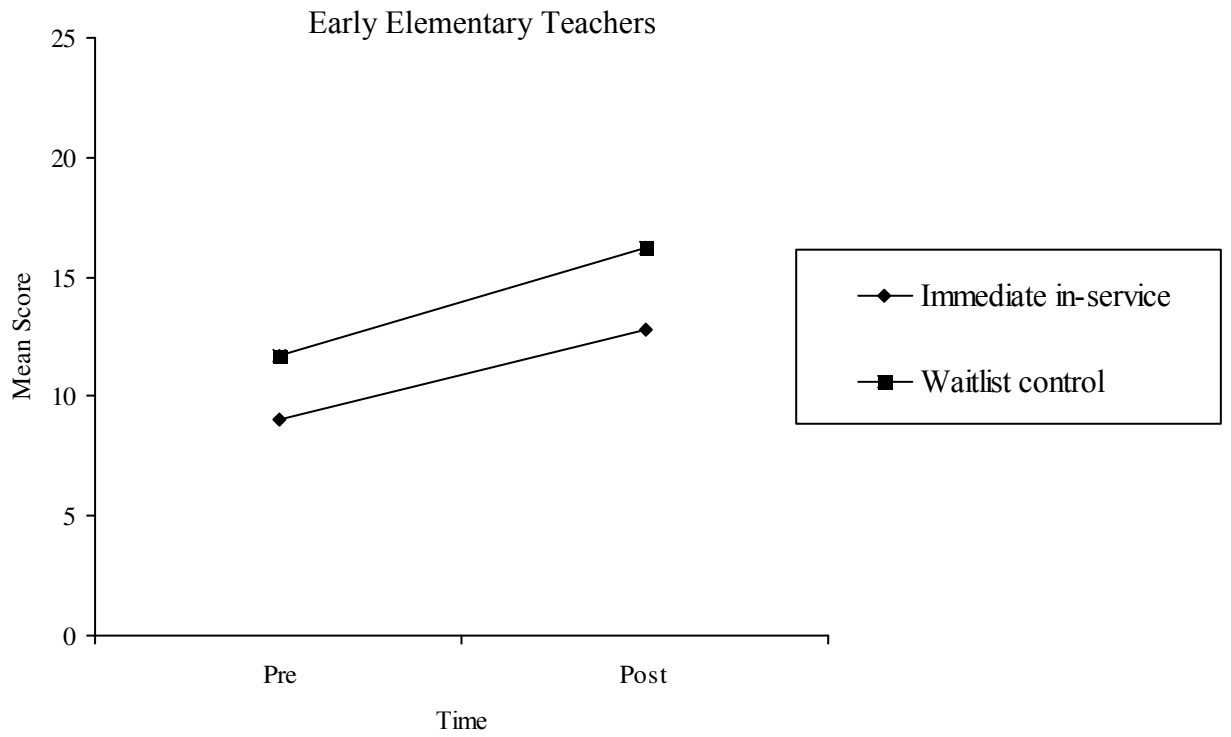


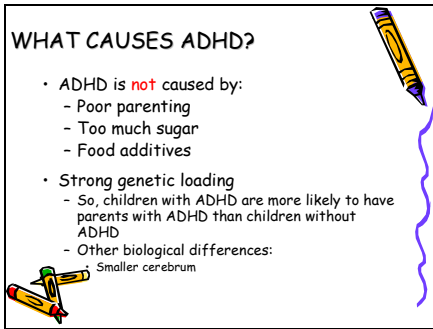
Table 10. Grade by Treatment Group by Time Effect for Direct Commands



Appendix A. In-service Slides

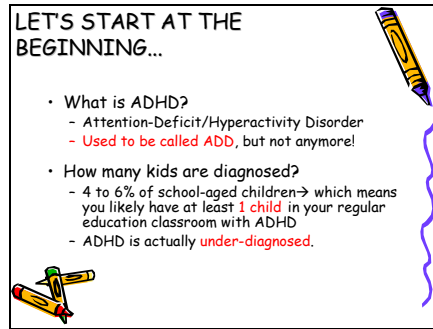
WHAT CAUSES ADHD?

- ADHD is **not** caused by:
 - Poor parenting
 - Too much sugar
 - Food additives
- Strong genetic loading
 - So, children with ADHD are more likely to have parents with ADHD than children without ADHD
- Other biological differences:
 - Smaller cerebrum



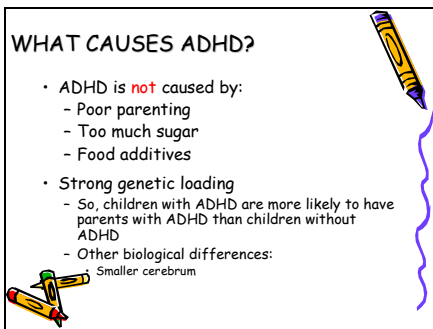
LET'S START AT THE BEGINNING...

- What is ADHD?
 - Attention-Deficit/Hyperactivity Disorder
 - **Used to be called ADD**, but not anymore!
- How many kids are diagnosed?
 - 4 to 6% of school-aged children → which means you likely have at least **1 child** in your regular education classroom with ADHD
 - ADHD is actually **under-diagnosed**.



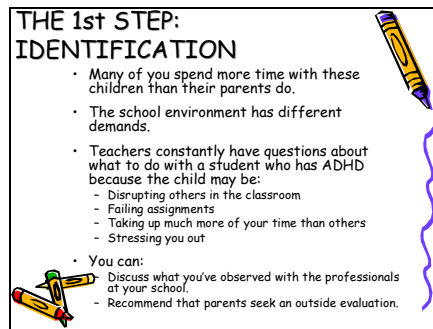
WHAT CAUSES ADHD?

- ADHD is **not** caused by:
 - Poor parenting
 - Too much sugar
 - Food additives
- Strong genetic loading
 - So, children with ADHD are more likely to have parents with ADHD than children without ADHD
- Other biological differences:
 - Smaller cerebrum



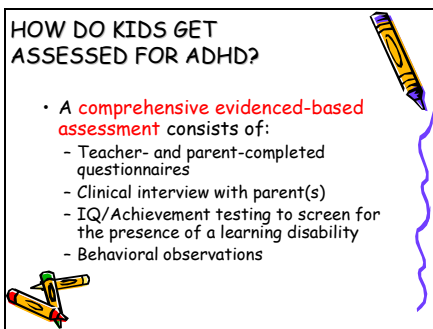
THE 1st STEP: IDENTIFICATION

- Many of you spend more time with these children than their parents do.
- The school environment has different demands.
- Teachers constantly have questions about what to do with a student who has ADHD because the child may be:
 - Disrupting others in the classroom
 - Failing assignments
 - Taking up much more of your time than others
 - Stressing you out
- You can:
 - Discuss what you've observed with the professionals at your school.
 - Recommend that parents seek an outside evaluation.



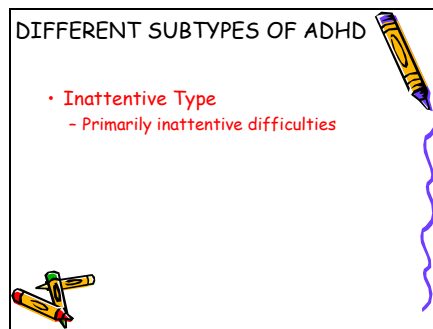
HOW DO KIDS GET ASSESSED FOR ADHD?

- A **comprehensive evidenced-based assessment** consists of:
 - Teacher- and parent-completed questionnaires
 - Clinical interview with parent(s)
 - IQ/Achievement testing to screen for the presence of a learning disability
 - Behavioral observations



DIFFERENT SUBTYPES OF ADHD

- **Inattentive Type**
 - **Primarily inattentive difficulties**



INATTENTIVE SYMPTOMS

- Doesn't pay close attention or makes careless mistakes
- Has difficulty sustaining attention
- Doesn't seem to listen
- Doesn't follow through on instructions or finish schoolwork
- Has difficulty organizing
- Avoids/dislikes tasks that require sustained effort
- Loses things necessary for activities/tasks
- Is easily distracted
- Is often forgetful



DIFFERENT SUBTYPES OF ADHD

- Inattentive Type
 - Primarily inattentive difficulties
- Hyperactive/Impulsive Type
 - Primarily hyperactive/impulsive difficulties



HYPERACTIVE/IMPULSIVE SYMPTOMS

- Has difficulty playing quietly
- Is always "on the go"
- Talks excessively
- Runs or climbs
- Fidgets or squirms
- Leaves seat
- Blurts out answers to questions before the question has been completed
- Have difficulty waiting in line or awaiting turn
- Interrupts/intrudes on others



DIFFERENT SUBTYPES OF ADHD

- Inattentive Type
 - Primarily inattentive difficulties
- Hyperactive/Impulsive Type
 - Primarily hyperactive/impulsive difficulties
- Combined Type
 - Both inattentive and hyperactive/impulsive difficulties



GETTING A DIAGNOSIS

- Children have to meet certain criteria:
 - 6 symptoms of inattention OR 6 symptoms of hyperactivity/impulsivity OR 6 symptoms of each
 - Difficulties present before age 7
 - Impairment is social, academic, or occupational
 - Impairment in more than 1 setting
 - Symptoms are not due to another disorder (e.g., depression)



TYPES OF IMPAIRMENT

- Impairment at home
 - With siblings, parents, other relatives, babysitters
- Impairment at school
 - With you, peers, other instructors
 - Academic or behavioral problems
- Impairment during leisure activities
 - With coaches, friends



PROBLEMS THAT ARE ASSOCIATED WITH ADHD

- Peer problems
- Family dysfunction/parental issues
- Low self-esteem
- Oppositional and aggressive behavior
- Learning disorders



UNFORTUNATELY...

- There is **no medical screen, cognitive test, or brain imaging technique** that can detect ADHD.
- Also, many children with ADHD can focus long enough to play a videogame or sit still at the doctor's office.



WHAT HAPPENS NEXT: TREATMENT

- Recommendations are given to parents and teachers for modifications at home and/or school
- Should be continuous as **ADHD is chronic**
- Should be "empirically-supported"



WHAT DOES EMPIRICALLY-SUPPORTED MEAN?

- It means that the recommendations **should be backed by solid research**, not just something pulled out of the blue.
- There are **3 empirically-supported treatments** for children with ADHD
 - Stimulant medication
 - Behavior management at home and in the classroom
 - A combination of both of the above



STIMULANT MEDICATION

- Extensive research has shown that stimulants:
 - Are a highly effective short term treatment
 - Decrease disruption in the classroom
 - Increase academic productivity and on-task behavior
 - Improve teacher ratings of behavior
- Different types may work best for different children (e.g., Ritalin, Concerta, Adderall)
- Common side effects: insomnia, decreased appetite




HOWEVER...

- If used, stimulants should **always be combined with behavior management**.
- Most children who begin taking stimulants do not continue through adolescence.
- Stimulants may reduce symptoms, but do not improve all areas of impairment.
- Stimulants do not work for everyone and are **not a cure**.




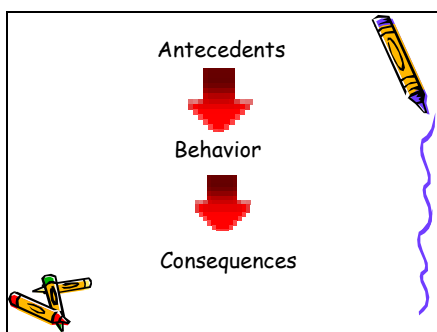
BEHAVIOR MANAGEMENT

- Shares many of the benefits of stimulants
- Main Aspects:
 - **Clear and explicit** expectations & commands
 - **Consistent** positive and negative consequences
 - Should be implemented in **all** settings in which child experiences impairment (e.g., home, school, day care)




BEHAVIOR MANAGEMENT IN THE CLASSROOM

- Seating the child closer to you/the blackboard
- Using more visual aids
- Using verbal and physical prompts
- Using an assignment notebook
- Checking on him/her after you have given a command (especially for independent seatwork)


BEHAVIOR MANAGEMENT IN THE CLASSROOM

- Ways of interacting w/a child with ADHD
 - Attends (consequence)
 - Rewards (consequence)
 - Ignoring (consequence)
 - Effective Commands (antecedent)
 - Removing Privileges (consequence)




WAYS OF SEEING THE BEHAVIOR YOU LIKE

- Attending:
 - Neutral comments made about the child that narrate what s/he is doing
 - Give the child attention for good or neutral behavior without having to praise them for everything
 - E.g., "John is sitting still." "Melissa is raising her hand quietly."



WAYS OF SEEING THE BEHAVIOR YOU LIKE

- Rewarding:
 - Praise
 - Positive comments made about the child
 - Give the child attention for good behavior
 - Rewards should be given when you see a behavior of which you want to see more
 - E.g., "I like the way that John is sitting still." "Melissa is doing a good job raising her hand quietly."
 - Labeled praise (e.g., "Great job standing in line") is better than unlabeled praise (e.g., "Great").
 - Other rewards such as being line leader, extra time on the computer, etc.



WAYS OF SEEING THE BEHAVIOR YOU LIKE

- Ignoring
 - Mildly inappropriate behaviors can be ignored.
 - What are some examples of these?
 - Sitting half on the seat.
 - Wiggling in the chair.



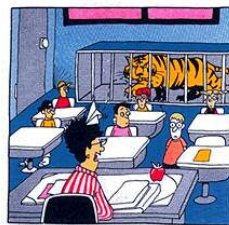
WAYS OF SEEING THE BEHAVIOR YOU LIKE

- Effective Commands for children with ADHD:
 - Direct commands are specific, short, and to the point
 - "Please write your name on the paper."
 - Indirect commands ask the child, use "let's" or "we", or are vague
 - "Will/can you please..."
 - "Let's put your papers away"
 - "Behave"



WAYS OF SEEING THE BEHAVIOR YOU LIKE

- Effective Commands for children with ADHD:
 - Attach a positive or negative consequence
 - "When you put your papers away, then you may line up for lunch."
 - "Finish your worksheet or you will not go outside for recess."
 - Tell the child what "to do" instead of what "not to do"
 - "Walk in the hallway," instead of "Stop running."



"Well, Timmy, it looks like you've just earned yourself 10 minutes with Mr. Whiskers."



WAYS OF SEEING THE BEHAVIOR YOU LIKE

- Remove a privilege:
 - Take away recess time, free time, etc.
 - Before you take it away:
 - Make sure you have told the child clearly about this consequence for misbehavior
 - Follow through with your commands.
 - When you take it away:
 - Remind the child why the privilege is being taken away



USING A DAILY REPORT CARD

- Used to monitor observable target behaviors
- Daily and weekly rewards used as reinforcement for "Yeses"
- Way of increasing communication between home and school
- Sample classroom rewards
 - Daily
 - Being the line leader
 - 15 minutes computer time
 - Weekly
 - Feeding the classroom pet
 - Special activity with teacher (e.g., lunch)




SAMPLE DAILY REPORT CARD


Date: _____

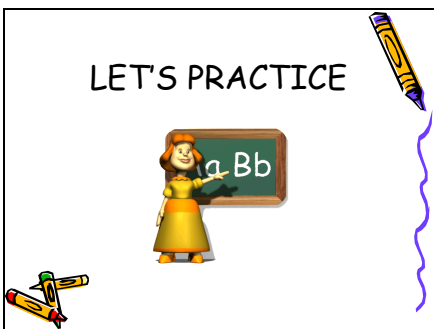
1. Has 8 or fewer instances of whining	Yes	No
2. Interrupts adults less than 5 times/day	Yes	No
3. Completes math assignment with 80% accuracy.	Yes	No


Comments: _____


Teacher Signature: _____




- ### HOW TO ESTABLISH A DRC
1. Select the goals to be achieved
 2. Determine how the goals will be defined (target behaviors)
 3. Gather a baseline to determine problem severity
 4. Decide on behaviors and criteria
 5. Explain the Daily Report Card to the child
 6. Establish a reward system at home or at school.
 7. Monitor and modify the program
 8. Trouble-shoot the Daily Report Card
 9. Consider other treatments if DRC is not effective
- 



- ### MEET DAVID....
- 6 year old boy in 1st grade
 - Hyperactive/Impulsive: gets out of seat every 5 minutes
 - Speaks out in class
 - Hits other children
 - Cannot sit still
- 

- ### GROUP BRAINSTORMING SESSION
- Ways that David's teacher can help him using evidenced-based behavior management strategies
 - Target behaviors for his daily report card
- 

- ### WHAT CAN DAVID'S TEACHER DO TO HELP HIM?
- She could:
 - Use positive reinforcement (e.g., praise)
 - Ignore minor, irritating behaviors
 - Use direct commands
 - Remove privileges for aggressive behaviors
 - Use a Daily Report Card (DRC)
- 

WHAT SHOULD DAVID'S DRC TARGETS INCLUDE?

- Remaining in seat
- Raising hand before speaking
- No hitting

- Are these goals **realistic**?
- How many **reminders** should David have?



DAVID'S DAILY REPORT CARD

Child Name: _____ Date: _____

- | | | |
|---|-----|----|
| 1. Stays in seat with no more than 2 reminders. | Yes | No |
| 2. Raises hand before speaking with no more than 7 reminders. | Yes | No |
| 3. Did not hit other children. | Yes | No |

Comments:
Teacher Signature: _____



WHY MIGHT DAVID'S DRC NOT BE WORKING?

- Goals may be too difficult or too many or poorly defined
- Rewards may not be frequent enough, reinforcing enough, etc.
- DRC may not be monitored or rewards may not be given consistently
- Child may be reinforced for negative behavior



MEET MOLLY....

- 10 year old girl, 5th grade
- Problems began in 3rd grade
- Disorganized, inattentive, careless
- Does not complete schoolwork
- Mother helps with homework, but Molly does not hand in
- Concerns about transition to middle school



MORE BRAINGSTORMING...

- Ways that Molly's teacher can help her using **evidenced-based behavior management strategies**
- **Target behaviors for her daily report card**



WHAT CAN MOLLY'S TEACHER DO TO HELP HER?

- He could:
 - Help her to organize her materials
 - Have her use an assignment notebook w/checks
 - Use rewards for completing work accurately
 - Possibly recommend a Learning Disorder assessment?
 - Help her work toward greater autonomy
 - Use a Daily Report Card (DRC)




MOLLY'S DAILY REPORT CARD


Name: _____ Date: _____

1. Completes classwork with 80% accuracy.	Yes	No
2. Writes down assignments correctly.	Yes	No
3. Turns homework in.	Yes	No

Comments:
Teacher Signature: _____




ANY QUESTIONS?



THANK YOU FOR YOUR TIME

- Right now, please complete the:
 - Teacher Inservice Satisfaction Survey
 - Inservice Check



Appendix B. Manipulation Quiz

Consider whether the following issues were reviewed during the in-service. Please circle “Y” for yes or “N” for no.

- | | | |
|--|---|---|
| 1. How to assess a child for Attention-Deficit/Hyperactivity Disorder (ADHD) | Y | N |
| 2. The presentation of depression in adolescents | Y | N |
| 3. The criteria for a diagnosis of ADHD | Y | N |
| 4. Stimulant treatment for ADHD | Y | N |
| 5. How to conduct play therapy with children with ADHD | Y | N |
| 6. Prevalence of autism in children | Y | N |
| 7. Treatment for anxiety disorders in children | Y | N |
| 8. Behavior management techniques that are effective in children with ADHD | Y | N |
| 9. The use of a daily report card (DRC) & small group discussion | Y | N |
| 10. The probable genetic and neurobiological basis of ADHD | Y | N |

Appendix C. Teacher Characteristics Form

1. Age: _____

2. Gender:
Female: _____ Male: _____

3. Ethnicity/Race (please check one):
Asian/Pacific Islander: _____ Black/African American: _____
Hispanic/Latino: _____ Native American/Alaska Native: _____
White/Caucasian: _____ Other: _____

4. Level of Education:
Bachelor's Degree or equivalent: _____
Master's degree or equivalent: _____
Doctoral degree or equivalent: _____

5. What type of class do you currently teach (please check one)?
Regular education: _____
Special education: _____
Other (please specify): _____

6. What grade(s) do you currently teach? _____

7. Prior Attention Deficit/Hyperactivity Disorder (ADHD) Training (please check all that apply):
I have taken an ADHD-specific class during undergraduate training. _____
ADHD was mentioned in class(es) during undergraduate training. _____
I have read books about ADHD. _____
I have attended a specific teacher training session about ADHD. _____

8. How many children with ADHD have you taught in your whole career? _____

9. How many children with ADHD have you taught (in your whole career) who have been taking medication to treat the ADHD? _____

10. How many years have you been teaching in total (include this year)? _____

Appendix D. Teacher Knowledge about ADHD

The purpose of this questionnaire is to help me better understand your knowledge about Attention Deficit Hyperactivity Disorder (ADHD). It consists of a series of true-false statements. Circle *T* if you believe the statement is true or right. Circle *F* if you think the statement is false or wrong.

1. The disorder that is now called ADHD has had different names over the years including Attention Deficit Disorder (ADD). T F
2. Children with ADHD can be OK in some situations (like playing video games) and can be distractible and disruptive in others (like doing homework). T F
3. ADHD occurs in about 15% of the population. T F
4. ADHD is caused by too much sugar. T F
5. Children with ADHD are more likely to have a parent with ADHD than children without the disorder. T F
6. There is reliable evidence that ADHD is often caused by poor parenting. T F
7. There is a medical test that is very effective in identifying children with ADHD. T F
8. In order for a child to receive a formal diagnosis of ADHD, there has to be evidence of impairment in only one of the child's environments (e.g., at home). T F
9. Noncompliance is one difficult behavior problem associated with ADHD. T F
10. Poor peer relationships during childhood have no relationship with the quality of relationships during adulthood. T F
11. ADHD is a chronic disorder (i.e., person may have some inattentive or hyperactive difficulties all of his life). T F
12. Traditional one-on-one therapy has been shown to be an effective treatment for ADHD. T F
13. Behavioral school interventions have not been shown to be effective treatments for ADHD. T F

14. ADHD symptoms can only be alleviated with medication. T F
15. The combination of a behavioral treatment in addition to medication may be more effective in treating some children with ADHD than either one alone. T F
16. Stimulant medications have not been extensively studied in children. T F
17. Punishment procedures are almost always needed in addition to rewarding procedures in order to improve the behavior of a child with ADHD. T F
18. When a child responds well to medicine for ADHD it proves that the diagnosis is correct. T F
19. In general, behavioral strategies do not need to be used consistently in order for the child's behavior to change. T F
20. Noncompliant behavior the classroom should be ignored. T F
21. Even though other students are able to sit still without rewards, praising a hyperactive child with ADHD for sitting still may increase his "sitting-still" behavior in the future. T F
22. If a child's ADHD is interfering with his academic progress, parent training with the child's parents is usually enough to help the child behave better at school. T F
23. Part of behavioral treatments in the classroom involves instructing the teacher in identifying the antecedents and consequences of the child's behavior. T F
24. Most studies of children with ADHD have shown that taking medicine for ADHD can increase the risk of drug abuse in their teenage years. T F
25. Typically, children with ADHD behave better when there is more structure in their environment than when there is less structure. T F

Appendix E. Classroom Behavior Management Strategies

Please think of a child in your classroom with demonstrated attention, hyperactive, or impulsive problems. If there is more than one, please complete this questionnaire in relation to the child that comes first on your roster.

Please read each classroom management technique and check off the box that indicates how often you use this technique to manage *this child's behavior*. If you use a technique, check the box that indicates how effective each technique is for *this specific child*.

	Use				Effectiveness			
	I use this regularly	I use this sometimes	Might be worth trying	This would not fit well with my teaching	Very effective	Moderately effective	Somewhat effective	Not effective
1. Structure (e.g., child is seated near front of class)								
2. Ignoring minor inappropriate behaviors (e.g., fidgeting)								
3. Praising appropriate behaviors (e.g., "I like the way you're working quietly")								
4. Giving appropriate commands (e.g., "Bobby, stand quietly with your hands at your side" – appropriate vs. "Stop fidgeting." - inappropriate)								
5. Reprimands for inappropriate behavior (e.g., put child's name on the board, verbal reprimands)								
6. Instructional procedures (e.g., individual seatwork assignments given in a folder at beginning of day, small group instruction, modified materials and/or curricula)								
7. Homework assignment book (e.g., daily agenda)								
8. Daily Home Note								
9. Weekly Home Note								
10. Daily report card with target behaviors/goals and feedback on meeting the goals								
11. If . . . then contingencies (e.g., If you finish your seatwork, then you may have free time)								
12. Point or token reward system (e.g., child receives								

stickers for appropriate behavior).								
13. Response-cost system (e.g., lose 5 minutes of recess for each homework assignment not completed)								
14. Time out								
15. Send to principal/disciplinarian's office								
16. Taped behavioral reminders on the student's desk (e.g., "Stay in seat" written on a card taped to the student's desk)								
17. Perceptual/sensory stimulation (e.g., provide balls, toys, clay for child to use when exhibiting negative behaviors)								
18. Does this child has a 504 plan?	YES	NO	Don't Know					
19. Does this child have an Individualized Education Plan (IEP)?	YES	NO	Don't Know					
20. Are any of the procedures above part of his/her 504 plan?	YES	NO	Don't Know					
21. Are any of the procedures above part of his/her IEP?	YES	NO	Don't Know					

Now, please read each classroom management technique and check off the box that indicates how often you use this technique to manage *your whole classroom*. If you use a technique, check the box that indicates how effective each technique is for *your whole classroom*.

	Use				Effectiveness			
	I use this regularly	I use this sometimes	Might be worth trying	This would not fit well with my teaching	Very effective	Moderately effective	Somewhat effective	Not effective
22. Structure (e.g., children with attention or behavior problems are seated near front of class)								
23. Ignoring minor inappropriate behaviors (e.g., fidgeting)								
24. Praising appropriate behaviors (e.g., "I like the way you're working quietly")								
25. Giving appropriate commands (e.g., "Bobby, stand quietly with your hands at your side" – appropriate vs. "Stop fidgeting." – inappropriate)								
26. Reprimands for inappropriate behavior (e.g., put children's names on the board, verbal reprimands)								
27. Instructional procedures (e.g., individual seatwork assignments given in a folder at beginning of day, small group instruction, modified materials and/or curricula)								
28. Homework assignment book								
29. Daily Home Note								
30. Weekly Home Note								
31. Daily report card with target behaviors/goals and feedback on meeting the goals								
32. If . . . then contingencies (e.g., If you finish your seatwork, then you may have free time)								
33. Point or token reward system (e.g., children receive stickers for appropriate behavior).								
34. Response-cost system (e.g., lose 5 minutes of recess for each homework assignment not done)								
35. Time out								
36. Send to principal/disciplinarian's office								
37. Taped behavioral reminders on the student's desk								

(e.g., "Stay in seat" written on a card taped to the student's desk)								
38. Perceptual/sensory stimulation (e.g., provide balls, toys, clay for child to use when exhibiting negative behaviors)								

Appendix F. Coding Sheet

Valence _____

A	D	Teacher Behaviors	Total Observed
		Descriptive comment/Question	
		Labeled praise	
		Teacher ignore	
		Direct command	
		Time-out	

Date of observation: _____

Time of observation: _____

Name of observer: _____

Circle one: Pre-inservice/ Post-inservice

Please observe the teacher for 10 minutes of classroom instruction and use tick marks to count the number of teacher behaviors in each category. Do not talk to the children. Be sure to thank the teacher for his/her time when you leave.

Appendix G. Definitions of Coded Observations³

Attending:	A statement or phrase that describes what the child is doing
Labeled praise:	Any specific verbalization that expresses a favorable judgment upon an activity, product, or attribute of the child
Direct commands:	A clearly stated order, demand, or direction in a declarative form.
Ignoring:	Deviant behavior is ignored when the teacher remains silent, maintains a neutral expression, avoids or breaks eye contact with the child and makes no movement in response to the child, except to turn away. It must last a minimum of five seconds to be an obvious ignore.
Time Out:	A statement in which the teachers directs the child to go to Time Out (a designated place separated from other children).

³ Taken from current version of DPICS

Appendix H. Teacher Stress Index, ADHD Index Questions

Rate these items from 1 (Not Stressful) to 6 (Very Often Stressful)

1. This student distracts other students in my class.
12. It is much harder to keep this student on a routine than others in my class.
13. I have found that getting this student to follow directions is much harder than for most students.
14. This student is much more of a problem than most of my other students.
15. This student makes more demands on me than most of my other students.
16. This student is so active it exhausts me.
17. This student is disorganized and easily distracted.
18. When this student wants something, he/she persists in getting it.
19. Compared to most, this student has more difficulty concentrating and paying attention.
20. This student often cannot stay occupied with an activity or project for more than 10 minutes.
21. This student wanders around the classroom more than most others.
22. This student is much more active than most others.
23. This student squirms and fidgets a great deal.
27. Compared to the average student, this student has a great deal of difficulty adjusting to changes in the class schedule.
28. This student misbehaves when left with a substitute.
29. This student easily notices and overacts to loud noises and bright lights.

Appendix I. Satisfaction Questionnaire

Instructions: Please complete the following questions based on the ADHD inservice you received today. Please be as honest as possible. We will use your feedback to improve our future presentations. You may write any additional comments about your participation in the study on the back of this form. Thank you!

1. Overall, how helpful did you find the Teacher Inservice?

0	1	2	3	4	5	6
Not at all Helpful			Somewhat Helpful			Extremely Helpful

2. Overall, how well did you feel that the inservice applied to you?

0	1	2	3	4	5	6
Not at all Well			Somewhat Well			Extremely Well

3. How effective was the group leader in presenting the material to you?

0	1	2	3	4	5	6
Not at all Effective			Somewhat Effective			Extremely Effective

4. Would you recommend this inservice to other teachers of students with ADHD?

0	1	2	3	4	5	6
Definitely Not			Impartial			Definitely Yes

Appendix J. 95% Confidence Intervals for η^2_p for Non-significant Effects

Effect	η^2_p	Lower Limit	Upper Limit
Main Intent-to-Treat Analyses			
Reported use of classroom behavior strategies			
Treatment Group	.004	.0	.054
Time	.008	.0	.068
Treatment Group X Time	.031	.0	.115
Reported stress			
Treatment Group	.020	.0	.090
Time	.0	.0	.0
Treatment Group X Time	.003	.0	.054
Descriptive comments			
Treatment Group	.007	.0	.112
Time	.012	.0	.129
Treatment Group X Time	.031	.0	.170
Labeled praise			
Treatment Group	.002	.0	.078
Treatment Group X Time	.073	.0	.236
Concomitant Analyses			
ADHD knowledge			
Gender	.010	.0	.074
Gender X Treatment Group	.001	.0	.042
Gender X Time	.016	.0	.093
Gender X Treatment Group X Time	.003	.0	.055
Type of Teacher	.003	.0	.052
Type of Teacher X Treatment Group	.010	.0	.073
Type of Teacher X Time	.0002	.0	.010
Type of Teacher X Treatment Group X Time	.005	.0	.064
Grade Taught	.027	.0	.087
Grade Taught X Treatment Group	.035	.0	.113
Grade Taught X Time	.022	.0	.079
Grade Taught X Treatment Group X Time	.005	.0	.046

Effect	η^2_p	Lower Limit	Upper Limit
Concomitant Analyses			
Reported use of classroom behavior strategies			
Gender	.007	.0	.054
Gender X Treatment Group	.003	.0	.041
Gender X Time	.002	.0	.041
Gender X Treatment Group X Time	.005	.0	.053
Type of Teacher X Time	.038	.0	.118
Grade Taught	.031	.0	.092
Grade Taught X Time	.025	.0	.082
Grade Taught X Treatment Group X Time	.004	.0	.038
Reported stress			
Gender	.003	.0	.051
Gender X Treatment Group	.004	.0	.056
Gender X Time	.0	.0	.001
Gender X Treatment Group X Time	.002	.0	.049
Type of Teacher	.022	.0	.084
Type of Teacher X Treatment Group	.038	.0	.113
Type of Teacher X Time	.019	.0	.083
Type of Teacher X Treatment Group X Time	.037	.0	.116
Grade Taught	.028	.0	.086
Grade Taught X Treatment Group	.005	.0	.094
Grade Taught X Time	.0	.0	.076
Grade Taught X Treatment Group X Time	.003	.0	.070
Descriptive comments			
Gender	.003	.0	.109
Gender X Treatment Group	.007	.0	.131
Gender X Time	.006	.0	.126
Type of Teacher	.020	.0	.133
Type of Teacher X Treatment Group	.083	.0	.272
Type of Teacher X Time	.020	.0	.133
Type of Teacher X Treatment Group X Time	.001	.0	.035
Grade Taught	.045	.0	.217
Grade Taught X Treatment Group	.003	.0	.113
Grade Taught X Time	.055	.0	.234
Grade Taught X Treatment Group X Time	.032	.0	.195

Effect	η^2_p	Lower Limit	Upper Limit
Concomitant Analyses			
Labeled Praise			
Gender	.008	.0	.136
Gender X Treatment Group	.009	.0	.137
Gender X Time	.008	.0	.135
Gender X Treatment Group X Time	.002	.0	.085
Type of Teacher	.001	.0	.023
Type of Teacher X Treatment Group	.019	.0	.169
Type of Teacher X Time	.011	.0	.146
Type of Teacher X Treatment Group X Time	.001	.0	.037
Grade Taught	.006	.0	.126
Grade Taught X Treatment Group	.022	.0	.174
Grade Taught X Time	.013	.0	.153
Direct Commands			
Gender	.002	.0	.082
Gender X Treatment Group	.002	.0	.078
Gender X Time	.007	.0	.133
Gender X Treatment Group X Time	.026	.0	.183
Type of Teacher	.0003	.0	.012
Type of Teacher X Treatment Group	.091	.0	.284
Type of Teacher X Time	.002	.0	.081
Type of Teacher X Treatment Group X Time	.0	.0	.0
Grade Taught	.0	.0	.0
Grade Taught X Treatment Group	.011	.0	.148
Grade Taught X Time	.003	.0	.095
Grade Taught X Treatment Group X Time	.086	.0	.276

Effect	η^2_p	Lower Limit	Upper Limit
Immediate In-service Intervention Group Only			
Analyses			
ADHD knowledge			
Gender	.021	.0	.142
Gender X Time	.024	.0	.157
Type of Teacher	.036	.0	.151
Type of Teacher X Time	.011	.0	.093
Grade Taught	.024	.0	.098
Grade Taught X Time	.021	.0	.092
Completers Analyses			
Reported use of classroom behavior strategies			
Treatment Group	.006	.0	.069
Time	.006	.0	.068
Reported stress			
Treatment Group	.004	.0	.059
Time	.0003	.0	.013
Treatment Group X Time	.001	.0	.044
Descriptive comments			
Treatment Group	.011	.0	.127
Time	.017	.0	.143
Treatment Group X Time	.039	.0	.184
Labeled praise			
Treatment Group	.003	.0	.095
Treatment Group X Time	.077	.0	.242

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