The Effects of Self-Monitoring on Children with Attention-Deficit/Hyperactivity Disorder Who Are Receiving Pharmacological Interventions

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ABSTRACT

A MULTIPLE BASELINE DESIGN WAS EMPLOYED FOR THIS STUDY TO ASSESS THE EFFECTS OF USING A SELF-MONITORING PROCEDURE TO ENHANCE ON-TASK BEHAVIOR OF STUDENTS WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER WHO WERE ALREADY RECEIVING PHARMACOLOGICAL TREATMENT. THREE MALE SUBJECTS IN A PUBLIC SCHOOL, AGES 8 TO 11, WERE SELECTED FOR THE STUDY BECAUSE OF THEIR FREQUENT OFF-TASK AND INATTENTIVE BEHAVIORS IN THE CLASSROOM, DESPITE THEIR RECEIVING PSYCHOSTIMULANT MEDICATION. THE SUBJECTS WERE CLASSIFIED AS HAVING EMOTIONAL/BEHAVIORAL DISORDERS ACCORDING TO CRITERIA ESTABLISHED BY THE STATE OF GEORGIA. INTERVENTION INVOLVED TRAINING IN SELF-MONITORING PROCEDURES. A FUNCTIONAL RELATIONSHIP WAS ESTABLISHED BETWEEN INDEPENDENT AND DEPENDENT VARIABLES: ALL 3 SUBJECTS DEMONSTRATED AN INCREASE IN ON-TASK BEHAVIOR WHEN SELF-MONITORING WAS UTILIZED. A COMBINATION OF PHARMACOLOGICAL INTERVENTION AND SELF-MONITORING PROCEDURES ENHANCED THE STUDENTS' ON-TASK BEHAVIOR.

ATTENTION-DEFICIT/HYPERACTIVITY DISORDER (ADHD) is a neurobiological disability that causes developmentally inappropriate levels of inattention, impulsivity, and hyperactivity (American Psychiatric Association, 1994). The number of children and youth with ADHD has increased in recent years (Barkley, 1990; McBurnett, Lahey, & Pfiffner, 1993). According to Children and Adults with Attention Deficit Disorders (CHADD), a parent advocacy organization, there are 3.5 million children and 2 million to 5 million adults who have some type of attention-deficit disorder (CHADD, 1993).

In school settings, 80% of the children with ADHD are codiagnosed as having behavioral disorders or learning disabilities, and thus these students receive special education services (Reid, Maag, Vasa, & Wright, 1994). In addition to special education placements (DaVilla, Williams, & MacDonald, 1990), numerous school districts have begun to serve students with ADHD in general education classrooms. Consequently, although pharmacological treatment is already in place for many students, general education teachers are expected to provide educational modifications, as required by Section 504 of the Rehabilitation Act of 1973 (Reid & Katsiyannis, 1995; Reid et al., 1994). Because of this increase in general education placements for students with ADHD, educational treatment approaches that focus on attention problems are needed.

Pharmacological Interventions

The most commonly used intervention for students with ADHD is medication. Psychostimulant medications such as methylphenidate (Ritalin), d-amphetamin (Dexedrine), and pemolin (Cylert) are frequently prescribed (Swanson, 1993). Barkley (1990) stated that there are more children receiving medication to control ADHD symptoms than any other childhood disorder. Because of this wide use of

psychostimulant medication treatment, as well as its effectiveness, some teachers and parents have begun to depend on the medication treatment as the primary intervention, rather than utilizing additional interventions to further enhance the child's ability to learn in the classroom.

Approximately 70% of children with ADHD respond favorably to stimulant medication treatments (Swanson, 1993). Of course, that leaves 30% of children who do not respond positively and require other types of assistance in order to function successfully in the classroom. Also, although medications treat inattention, impulsivity, and hyperactivity of children with ADHD, the effects are often temporary (Swanson, 1993). Even among the children who respond positively to medication, only a small number of children actually demonstrate sufficient improvement for their behavior to fall entirely within the normal range, and thus most children receiving methylphenidate also require other types of interventions (Pelham, 1993).

Educational Interventions

Clearly, general education teachers must be equipped with other strategies to assist children with attention problems in the inclusive learning environment, even though these students may be receiving medical interventions (Bender & Mathes, 1995). Frequently utilized educational strategies include behavioral techniques in the classroom, parent training in behavior management skills, cognitive–behavioral training, and a combination of these treatments.

Cognitive–behavioral treatments represent one of the most recent treatment approaches. This approach involves intervention for overt behavior through the manipulation of covert thought processes (Hallahan & Sapona, 1983). The cognitive–behavioral intervention strategies are created to assist students in becoming more aware of their own responses to academic tasks and social problems. Cognitive–behavioral intervention strategies are different from traditional treatment methods in that they emphasize having children participate actively in the treatment process.

Self-monitoring is one cognitive–behavioral strategy that has been recommended for students with attention problems (Harris, Graham, Reid, McElroy, & Hamby, 1994; Webber, Sheuermann, McCall, & Coleman, 1993). One such self-monitoring strategy, created by Hallahan, Lloyd, and Stoller (1982), includes the use of an audiotape that plays musical tones at random intervals and a self-monitoring sheet. The child listens to the tape during seatwork, and, at the sound of each tone, the child is trained to ask himself or herself, "Was I paying attention?" The child then records the answer by marking "yes" or "no" on the monitoring sheet. After recording the response, the child goes back to work until he or she hears the next tone. This type of child-managed intervention has resulted in improved on-task behavior for students with learning disabilities and/or behavioral problems (De Hass-Warner, 1991; Prater, Hogan, & Miller, 1992; Prater, Joy, Chilman, Temple, & Miller, 1991). However, among the researchers who have studied the effects of self-monitoring procedures, very few have investigated the combined effects of self-monitoring interventions and psychostimulant medication.

Prater et al. (1992) investigated the effectiveness of a self-monitoring procedure similar to the one Hallahan and his colleagues introduced. The subject for the study was a 14-year-old male student who had a history of learning problems, acting out, and impulsive behavior, and who was diagnosed as having learning disabilities and behavioral disorders. The subject was receiving a daily dosage of Ritalin. The results indicated that self-monitoring improved the subject's on-task behavior and academic performance. The mean percentages of his on-task behavior during baseline in the resource room, general math class, and general English class were 18%, 28%, and 40%, respectively. Once intervention was applied, the student's on-task behavior improved in each setting to a mean of 99%, 90%, and 84%, respectively.

However, a number of other studies have failed to show significant improvements resulting from a combination approach of methylphenidate and cognitive–behavioral treatments (Brown, Borden, Wynne, Schleser, & Clingerman, 1986; Brown, Wynne, Borden, Clingerman, Geniesse, & Spunt, 1986). For example, Brown, Borden, et al. (1986) studied the effects of methylphenidate, cognitive therapy, and a combination approach on children with ADHD. Subjects were 28 boys and 7 girls between ages 5 and 13. In a laboratory setting, these subjects were randomly assigned to four treatment conditions—cognitive training with methylphenidate, no training with methylphenidate, cognitive training with placebo, and no training with placebo. The dependent variables included measures of academic achievement and ratings of behavior, attention, and impulse control. Cognitive training involved teaching the subjects to gain awareness of the importance of planning, to initiate a recognition of the causal relationship of the child's own behavior and environmental consequences, and to develop general strategies to solve a variety of tasks. The results indicated that no significant treatment effects were observed among the groups as a result of this cognitive intervention beyond the effects of the medication. However, the procedures utilized in this study seem to have focused on developing awareness of causal relationships between the child's behavior and consequences, rather than providing step-by-step procedures to lead children to change their behaviors. The latter type of cognitive intervention—a more intensive intervention— may be more effective. Nevertheless, because of equivocal results in this body of literature, some have concluded that there is little evidence that a combination of self-monitoring procedures and psychostimulant intervention enhances the attentive behavior of children with ADHD beyond medication treatment alone (Swanson, 1993).

Other problems in the literature have also been noted. Most of the studies on self-monitoring involving students with ADHD in the current literature took place in laboratory settings or treatment facilities rather than general and special education classrooms in public schools (Brown, Borden, et al., 1986; Brown, Wynne, et al., 1986; Hall & Kataria, 1992; Hinshaw & Melnick, 1992). Fiore, Becker, and Nero (1993), for example, found that only 21 out of 137 studies reporting on interventions for children with ADHD were conducted in public school classrooms. This is of concern because interventions for children with ADHD conducted by clinical psychologists, neuropsychologists, and physicians in laboratory settings may not generalize well to public school classes.

With these issues in mind, the present study investigated the efficacy of a combined treatment approach. Specifically, the purpose of this investigation was to document the efficacy of an intensive cognitive–behavioral intervention coupled with a pharmacological treatment plan in actual classroom settings.

Method

Subjects and Setting

Subjects were 3 elementary school boys with ADHD selected by their special education teacher. The investigators of the study received verbal verification from the parents of these boys that their physicians had diagnosed them as having ADHD. Prior to the study, the students were experiencing moderate to severe problems in their general and special education classrooms in spite of their pharmacological treatment. The problems were reported by both general and special education teachers, and included high rates of disruptive behavior, failure to complete assigned tasks, frequent inappropriate talking in class, noncompliance with teacher requests, and daydreaming.

As indicated earlier, school-age children and youth with ADHD are often codiagnosed as having behavioral disorders or learning disabilities, and they may be placed in special education programs (Reid et al., 1994). The subjects in this study were classified as having behavioral disorders (BD) in addition to the ADHD diagnosis. All subjects had IQ scores in the low to average range. The students were in Grades 3, 4, and 5, and ranged in age from 8 to 11 years.

Student 1, age 11 years and 9 months, was served in the BD classroom one period per day. He was receiving methylphenidate (10 mg twice a day). Student 2, age 8 years and 10 months, was served in the room four periods per day, and was also receiving methylphenidate (20 mg time-release in the morning and 10 mg at noon). Student 3, age 10 years and 3 months, was served in the BD classroom two periods daily. He was also diagnosed as having learning disabilities (LD) and was served in an LD classroom one period per day. He was receiving pemoline (37.5 mg in the morning).

The study was conducted in the resource classroom setting. The classroom was managed by a teacher certified in special education and a paraprofessional. Each resource class contained no more than 8 students per period. Given that all subjects were male, the pronoun *he* is used to refer to each student in this article.

Materials/Equipment

A self-monitoring tape and self-monitoring sheet were made prior to training sessions according to the instructions provided by Hallahan and his colleagues (Hallahan et al., 1982; as described previously). To produce self-monitoring cues, the special education teacher recorded tones on an electronic keyboard by hitting a particular key. Hallahan et al. suggested that the tone should be unexpected (i.e., the intervals between each tone and the next should vary). Therefore, the tones were recorded in random intervals averaging 45 seconds over a 20-minute time period. These types of materials, inexpensive and easily made, are well-suited for teachers' use. Besides the tape and self-monitoring sheet, a tape recorder and a set of headphones were obtained for the students.

Dependent Variables

An interval observation system was used, and the primary dependent variable was the percentage of observed intervals of on-task behavior during each 10-minute observation session. On-task behavior was defined as looking at the appropriate lesson materials, which included worksheets, the blackboard, the self-monitoring sheet, or the teacher when appropriate (DiGangi, Maag, & Rutherford, 1991; McCarl, Svobodny, & Beare, 1991). Looking at the blackboard was counted as on-task behavior if a particular task was written on the board (Osborne, Kosiewicz, Crumley, & Lee, 1987). In addition, the student had to demonstrate the eye contact behavior while he was seated. Any other behavior was counted as off-task. This definition is consistent with other research in the field (e.g., Carr & Punzo, 1993; DiGangi et al., 1991; McCarl et al., 1991; Prater et al., 1991).

Measurement Procedure

A 10-minute observation of on-task behavior in the resource room was completed daily using a whole-interval observation procedure. Each observation session was divided into 60 equal 10-second intervals of 10 seconds each. This recording procedure requires that the behavior (on-task) be present throughout the entire interval if it is to be considered an occurrence. The observers recorded a "+" if on-task behavior was observed during the entire interval, or a "–" if off-task behavior was observed. The percentage

of intervals of on-task behavior was calculated by dividing the number of + intervals by the total number of + plus – intervals, and multiplying the result by 100 (Cooper, Heron, & Heward, 1987).

In addition, the results from the students' self-monitoring sheets were tabulated. The students monitored their own on-task behavior by checking the self-monitoring sheet, and the percentage of "yes" answers on the sheet was calculated. Although Hallahan and Lloyd (1987) have suggested that accuracy by the subject on his or her self-monitoring is not always necessary in order for the self-monitoring procedure to work, the data on the students' self-monitoring are presented below as a reference point.

Observer Training

The first author, a doctoral student who was the teacher in the resource room, was the primary observer, and the paraprofessional in the class was the secondary observer for the study. The teacher conducted three 1-hour training sessions for the paraprofessional on how to observe and collect data on the dependent measure. During the training, the observers discussed the observation code and the definition of on-task behavior. Modeling and role playing of on-task and off-task behavior were included in the observation training sessions. A recording procedure was also introduced and demonstrated during training.

Procedure

Baseline Procedures. Observation took place during the subjects' seatwork each day for 10 minutes. Seatwork involved the subject reviewing previously learned skills by answering questions from the textbook or on worksheets. This definition of seatwork remained consistent throughout the study. The baseline data were gathered until stable data were observed. The teacher did not use any behavior support systems to reinforce the target behavior during the baseline period other than the support systems used for all students in the class. Each subject attended the resource class during different periods. Therefore, the subjects did not see others participating in the self-monitoring interventions.

Training and Intervention. Each student was trained to self-monitor according to procedures developed by Hallahan et al. (1982). First, the student received training on self-monitoring on the first day of the intervention phase. The teacher introduced the self-monitoring procedure by discussing her desire to assist him to improve his attentive behavior. The teacher talked about keeping track of when the student was paying attention and when he was not. The teacher also discussed how beneficial self-monitoring could be for the student in terms of helping him finish his work. The teacher then presented a tape recorder, a set of headphones, a cuing tape, and a self-monitoring sheet. The student was told to ask himself the question, "Was I paying attention when I heard the tone?" He was then instructed to check the self-monitoring sheet under "yes" or "no" and return to work. Next, on-task and off-task behaviors were clearly defined, and examples of those behaviors were modeled by the teacher. The teacher showed the student how to use the self-monitoring sheet. The student was asked to give examples of attentive behaviors and to demonstrate the self-monitoring procedure by listening to the tones on the tape recorder. The training session was conducted for 15 minutes on the first day of the intervention. The student then practiced self-monitoring for several minutes and observation data were recorded. The self-monitoring procedure was reviewed by the teacher and student on each of the 2 days following the initial training, as recommended by Hallahan et al. (1982). The definitions of on-task and off-task behaviors and the recording procedures were also briefly reviewed.

On the first few days of the intervention phase, feedback was provided when the student did not appear to discriminate between on-task and off-task behaviors. Hallahan et al. (1982) indicated that the purpose of self-monitoring was not to make students highly accurate recorders, but rather, to make them think about when they are on- and off-task (Hallahan et al., 1982).

Fading. The fading phase took place after 10 days of intervention. During this phase, the student no longer used the cuing tape. He did use the self-monitoring sheet. During the first fading phase, the teacher told the student that he was doing so well that he did not need to use the cuing tape anymore. The student was instructed to ask himself the question, "Was I paying attention?" whenever he thought about it and to record his answer, to praise himself if the answer was "yes," and to return immediately to work. This phase lasted for 3 days.

Next, the second fading phase was implemented after stable data were established for the first fading phase. The student was congratulated on his ability to stay on-task without using the cuing tape, and the self-monitoring sheet was removed. At this point, the student was guided to ask himself the question, "Was I paying attention?" whenever he thought about it. The teacher encouraged the student to give himself a pat on the shoulder and/or say, "Yes, I'm paying attention and doing great!" and then return to work.

Reversal. After the second fading phase, a second baseline was conducted for the first 2 students. Student 3 did not participate in the last three phases due to time restrictions. During this phase, the students did not have the cuing tape or a self-monitoring sheet. Also, the teacher did not remind the student to use self-monitoring or reprimand the student for being inattentive and distractible. After stable baseline data were established, a self-monitoring sheet was given to the student (i.e., the same as the first fading phase).

Reliability

Interobserver agreement was used to measure the accuracy of observation and recording. Both observers, independently and simultaneously, recorded on-task behaviors of the same student. Every observation during the first 4 days of baseline was a joint observation. The point-by-point method was used to calculate the interobserver agreement. The percentage of agreement ranged from 88% to 98% with a median interobserver agreement of 94% during the baseline phase.

Reliability checks were also taken randomly on 25% of the observations conducted throughout the remaining phases of the study. The interobserver agreements ranged from 92% to 100% throughout the rest of the project.

Data Analysis

Observational data were graphed daily. Two data points were recorded for each subject; the percentages of intervals of on-task behavior were represented by dots and the results of the students' self-evaluation of on-task behavior using self-monitoring sheets were represented by triangles. The split-middle method (White & Haring, 1980) was utilized to provide visual evaluation of the graphed data. A split-middle line of progress was used to estimate the trend of the graphed data path for each phase.

RESULTS

On-task behavior of all 3 subjects improved significantly once the intervention was applied and remained high throughout the other intervention phases, as shown in Figure 1. The percent intervals of on-task behavior during baseline were 40%, 38%, and 37% for Students 1, 2, and 3, respectively. The data presented in Figure 1 show a positive change in the percentages of intervals of on-task behavior with the introduction of the self-monitoring procedures. During the first phase of intervention, these measures of attention behavior increased to 97%, 87%, and 94%, respectively. During all subsequent fading and intervention phases, percentages of on-task behavior remained much higher than in the baseline phase. These data demonstrate that self-monitoring is a very effective procedure for increasing attentional behavior above and beyond the gains typically associated with pharmacological interventions.

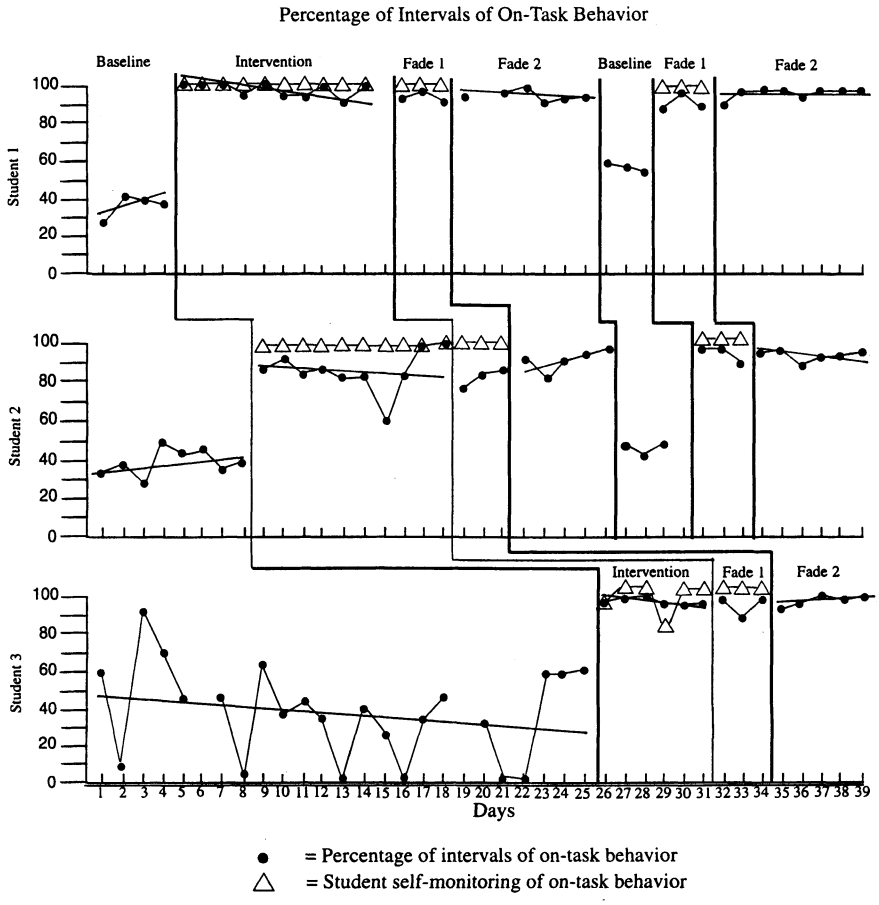

FIGURE 1. Percentage of intervals of on-task behavior.

Student 1 showed significant improvements in all intervention and fading phases according to the trend lines. When the intervention was applied, the data path indicated a large and abrupt change in response level, showing a functional relationship between independent and dependent variables. During the first fading phase, after the cue to record was withdrawn, the student continued to show high percentages of on-task behavior with a mean percentage of 95% and a stable trend. The introduction of the second fading phase (i.e., the student did not use either the cuing tape or self-monitoring sheet) resulted in a stable, slightly decelerating trend, and he averaged 96% on-task. However, the teacher did remind the student to self-monitor during this phase.

A second baseline was initiated on Day 26 for Student 1. The mean percentages of on-task behavior for Student 1 decreased dramatically to 60% with a slightly decelerating trend. However, this rate of on-task behavior is still considerably higher than that in the initial baseline, suggesting some habitual learning of on-task skills. Snider (1987) noted this phenomenon in her review of self-monitoring. She stated that if cognitive change is the focus of an experiment, it is less likely for the target behavior to return to baseline levels of behavior after the implementation of intervention. Thus, if the self-monitoring of attention is effective, the subject will become cognizant of his or her attending behavior without being reminded to self-monitor, and self-monitoring skills may became habitual.

After the second baseline, the procedure was reintroduced. This involved the reminder to self-monitor and the use of the student recording sheet. Once the procedure was reintroduced, the average percent of intervals of on-task behavior for Student 1 increased to an average of 92%. The second fading phase (removal of self-monitoring sheet) was reapplied, and it resulted in a stable trend with a high percentage of his on-task behavior, with a mean score of 99% during this final phase of the study.

Student 2 also showed significant improvements in all intervention and fading phases, with an exception of a slight variability during the first intervention. Although some variability was observed during the intervention phase, the last 2 data points indicate a stable trend. During the first fading phase, the student's mean percentage decreased slightly to 83%. During the second fading phase, Student 2 showed high percentages of on-task behavior, and the mean percentage was 96% with an accelerating trend. A second baseline was initiated on Day 27, and the student's on-task behavior declined to an average of 46%. Once the self-monitoring procedure was reintroduced, the mean percentage of his on-task behavior increased to 97%. He kept the high mean percentage of 97% for the final phase with a stable trend.

Data for Student 3 showed a long and unstable baseline; this was attributed to an inconsistent pharmacological treatment. The variable data during the baseline condition raised the issue of whether or not the student was actually receiving the medication. The teacher spoke with the mother and found that the medicine ran out on Day 8. She was not able to get a prescription from the student's pediatrician until Day 19. Pelham (1993) stated that pemoline requires 2 consecutive days of dosing before maximum effects are obtained. Due to this unexpected circumstance, the baseline session was prolonged until the data showed stability. Student 3 started to receive medication again on Day 20, and intervention was begun on Day 26. The last 3 data points during baseline indicate a stable trend. Once the intervention started, Student 3 increased his on-task behavior to a mean percentage of 94%. During the first fading phase, the student continued to show high percentages of on-task behavior, and the mean percentage was 93%. During the second fading phase, the final phase for Student 3, the subject continued his high level of performance on his on-task behavior, and the mean percentage of his on-task behavior was 96%. Figure 1 shows an accelerating trend for this phase.

Social Validity

Social validity was examined by interviewing each subject and his general education teacher. All 3 subjects felt that the self-monitoring procedures helped them in improving their on-task behavior. Their responses were very similar; they felt "good" because they were getting into less trouble. The students' general education teachers also had some positive comments on their behaviors. The teachers indicated that they noted improvements, varying from slight to significant, on the on-task behaviors of these students. For example, Student 2 made significant improvements on decreasing his attention-seeking behavior in the general education classroom; his teacher chose him as Student of the Week in her class.

Interestingly, the students' recording demonstrated a fair level of accuracy on self-monitoring. These data are presented in Figure 1. However, reliability on students' self-monitoring was not checked, and the relationship between the increase in students' on-task behavior and the fair level of accuracy on self-monitoring should be considered as tentative. The self-monitoring procedures presented by Hallahan et al. (1982) seemed to be highly motivating to the students. They seemed to enjoy doing the procedures, as if they were playing a game that would help them to pay attention better. In their study, McCarl et al. (1991) indicated that the intervention seemed to have a "contest aspect" in which the students tried to stay on-task so they would not be caught by the cues from the tape recorder for being off-task, and that phenomenon may have been present here.

According to these social validity data, this project was effective. The goal for the study, to increase on-task behavior of the students with ADHD, was socially important in the students' environment. The self-monitoring procedures implemented were age appropriate for the students and were a practical tool for the teachers. The effects of the intervention were significant to the students in

increasing their on-task behavior in the classroom, and each student's positive behavior change was noted by his teacher.

Discussion

The results of the study indicate the positive effects of utilizing self-monitoring on students with ADHD who are already receiving psychostimulant medication. There was a clear, functional relationship between the self-monitoring intervention and the marked improvement in the percentage of intervals of on-task behavior for all 3 subjects. These subjects also maintained high percentages of intervals of on-task behavior throughout the fading phases.

The positive outcomes of the present study concur with the results demonstrated by Prater et al. (1992), in which the effects of the combined use of a self-monitoring intervention and psychostimulant medication was observed. Prater et al. used a self-monitoring procedure similar to Hallahan's with 1 student with ADHD-related behaviors, in combination with methylphenidate treatment. The intervention took place in the subject's resource room and two general education classrooms. Once the intervention was applied in each setting, the percentage of intervals of on-task behavior improved significantly. The results indicated that the intervention was more effective in improving on-task behavior of the subject when both the cognitive–behavioral and pharmacological interventions were used than when methylphenidate treatment was used alone.

This successful demonstration of the combined approach may be due to the nature of the self-monitoring strategy used in these studies. The self-monitoring procedures investigated in the study by Prater et al. (1992) and the present study used self-monitoring strategies that required intense daily student involvement. In these studies, the students were trained to monitor their own on-task behavior and record it with some training/intervention each day. This level of involvement may have resulted in increased student output, thus increasing the intrinsic motivation of students. Further, the treatment herein resulted in successful maintenance of improved on-task behavior even after the cuing materials were completely removed from the students.

On the other hand, other studies that used different types of cognitive–behavioral interventions failed to demonstrate the efficacy of a combination approach on children with ADHD (Brown, Borden, et al., 1986; Brown, Wynne, et al., 1986). For example, Brown, Borden, et al. (1986) focused on developing awareness of causal relationships between numerous behaviors and consequences rather than training children to monitor one specific target behavior, and failed to demonstrate the efficacy of a combined treatment. In contrast, the students in the present study were trained to specifically differentiate on-task behavior from off-task behavior and to self-monitor only on-task behavior. They were given descriptions of appropriate behavior and involved in a role play of appropriate and inappropriate behaviors during the training. Providing this level of specificity of the target behavior also seemed effective in improving on-task behavior.

The positive results of this study were also supported by the social validation questionnaire completed by teachers. The teachers anecdotally indicated that they had noted more on-task behavior and increased percentages of accuracy on the students' work during the intervention phases throughout the study. However, this must be regarded as a tentative conclusion because reliability was not established on the measuring accuracy of the students' work.

Because the present study was conducted in an actual classroom setting, these results may be more convincing and appealing to teachers than studies that took place in laboratory or artificial settings. The present study involved a teacher in a public school as the program implementor, and the self-monitoring procedures utilized in this study are very user friendly. These procedures are intended to be used by teachers in public schools, in both general and special education classrooms.

There are several limitations of this study. First, the researchers were unable to control the medication application for Student 3 during baseline. The variability during baseline was assumed to be caused by irregular intake of the medication. In the future, frequent phone calls should be made to parents in order to monitor a subject's daily medication intake, and using students who are on the same medication with similar medication schedules is recommended.

Further, the present study did not provide extensive measures of maintenance over a long period of time. Although positive maintenance effects for self-monitoring with students with learning disabilities have been noted (Hallahan & Sapona, 1983), future research should measure the long-term effects of this treatment for students with ADHD.

In addition, although some researchers have demonstrated the effective use of self-monitoring strategies implemented by general education classroom teachers on students with learning disabilities (DiGangi et al., 1991; Prater et al., 1991), studies in which students with ADHD have used self-monitoring in general education settings are limited. Clearly, researchers should conduct research on self-monitoring by students with ADHD in mainstream classrooms.

This type of intervention needs to be implemented in inclusive classroom settings in order to assess generalization to the inclusive classroom. Bender and Mathes (1995) stated that general education teachers have multiple role responsibilities, and they need a clear understanding of the array of strategies available in working with students with ADHD. The self-monitoring intervention used here is one of the techniques that can be easily implemented by general education teachers as they work with students with ADHD. This technique is time efficient in that a great deal of preparation is not necessary, once the procedure has

been used with 1 student (i.e., the student self-monitoring sheet, instructions, and cuing tape can be used with others). Another practical point is that this procedure is a student-directed strategy. The self-monitoring procedure does not interfere with teachers' lessons or require constant teacher involvement in managing students' inattentive behaviors.

Finally, the present study demonstrated the desirability of self-monitoring interventions even for children who are receiving medication. The efficacy of combination treatments suggests that teachers may at some point be considered remiss in their responsibilities if self-monitoring or some other cognitive–behavioral strategies are not routinely attempted for students with ADHD. This information should be made available to teachers to assist in their planning effort for students with ADHD (Bender & Mathes, 1995). ■

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