INCREASING ON-TASK BEHAVIOR IN THE CLASSROOM:
EXTENSION OF SELF-MONITORING STRATEGIES
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We examined the effectiveness of a tactile self-monitoring prompt to increase on-task behaviors among 3 elementary-aged students in a special education classroom. Students were taught to self-monitor their attention by using the MotivAider (MotivAider, 2000), an electronic beeper that vibrates to provide a tactile cue to self-monitor. An ABAB reversal design was used for each participant. Results indicated that upon implementation of the self-monitoring intervention, students increased on-task behavior from a mean of 55% to more than 90% of the intervals observed. Additionally, teachers and students provided high ratings of treatment acceptability of this self-monitoring intervention. Limitations, implications, and future directions of these findings are discussed. © 2006 Wiley Periodicals, Inc.

Self-monitoring among children has been examined extensively as a way to improve attention, academic productivity, and decrease off-task behavior in the classroom (Cole, Marder, & McCann, 2000; Shapiro & Cole, 1994). Self-monitoring involves two processes: self-observation and self-recording. Self-observation requires students to pay attention to a specific aspect of behavior, and discriminate whether the behavior being monitored has occurred. For example, students may be taught to ask themselves “Am I paying attention?” in response to a specific prompt (e.g., when a prerecorded tone sounds). Next, the student records whether the behavior being monitored has occurred (Nelson & Hayes, 1981).

Self-monitoring is an appealing strategy for promoting behavior change. Researchers have demonstrated that students with and without disabilities can learn to use self-monitoring to regulate their own behavior and enhance independent activity (McDougall & Brady, 1998; Shapiro & Cole, 1994). Self-monitoring procedures can decrease reliance on external agents (e.g., teachers, parents, peers) for behavior change, thus facilitating generalization to untrained settings and maintenance of acquired skills (McLaughlin, Krappman, & Welsh, 1985). Further, self-monitoring interventions are easy to use and can be implemented with minimal demands on teacher time or curricular modifications, making them optimal for use in schools (Shimabukuro, Prater, Jenkins, & Edelen-Smith, 1999).

Numerous investigations demonstrate the effectiveness of school-based self-monitoring interventions (Gardner & Cole, 1988; Hughes, Korinek, & Gorman, 1991; McDougall, Farrell, & Hoff, 2004; Shapiro & Cole, 1994). The majority of this research has focused on self-monitoring of attention-to-task, and demonstrates that self-monitoring of attention is effective in decreasing disruptive behavior (e.g., Lam, Cole, Shapiro, & Bambara, 1994) and increasing on-task behavior (e.g., Dalton, Martella, & Marchand-Martella, 1999; Dunlap et al., 1995; Reid, 1996). Collateral effects of self-monitoring of attention also are apparent, in that self-monitoring of attention is associated with positive changes in academic performance such as academic productivity and academic accuracy (e.g., Harris, Graham, Reid, McElroy, & Hamby, 1994; Maag, Reid, & DiGangi, 1993). Finally, self-monitoring procedures are effective across diverse populations and settings. In

Although research clearly supports the effectiveness of self-monitoring interventions, self-monitoring procedures can be impractical, infeasible, or disruptive in certain classroom settings. To date, the majority of self-monitoring interventions have relied on overt audio cues to prompt students to self-monitor their behavior (McDougall et al., 2004). For example, a tape recorder emits a prerecorded tone, and this audible cue prompts a student to record whether they were paying attention (Hallahan et al., 1981). Other audible methods of prompting students in self-monitoring procedures include using a tape recorder with headphones for students to hear the cue, a kitchen timer, or verbal prompts from the teacher (Cole & Bambara, 2000). Although effective, these audible prompts have some potential disadvantages. Noticeable cues (e.g., wearing headphones or audible cues which others can hear) may be perceived as stigmatizing or aversive to the target student participating in the intervention and might be distracting to other students in the classroom who are not directed to self-monitor. Similarly, verbal prompts from a teacher can prove distracting, and requires the teacher to interrupt his or her lesson to provide the prompt. Self-monitoring methods that are perceived as aversive by students or difficult or distracting for teachers (i.e., low social validity) may reduce the chance that self-monitoring methods will be employed in the classroom (Reid, 1996). Finally, the use of a more stationary self-monitoring prompt may not be portable outside of the classroom (e.g., recess), thus limiting the situations in which the prompt can be used.

Recently, an alternative self-monitoring procedure has emerged that is less intrusive and may prove more practical and feasible for classroom use than traditional aural or verbal prompts. The MotivAider (MotivAider, 2000) is an electronic beeper that vibrates to provide a tactile prompt to self-monitor. The MotivAider attaches to the student’s waistband and can be programmed to emit a cue for any desired length of time and on a continuous or intermittent schedule. Although self-monitoring procedures using the MotivAider are promising and have high intuitive appeal, research has not evaluated the efficacy of using the MotivAider for self-monitoring. As such, this is the first known study to analyze the effectiveness of the MotivAider for increasing on-task behavior in the classroom. We sought to extend the self-management literature by examining the use of a tactile self-monitoring cue and contribute to the applied knowledge base by exploring an alternative self-monitoring strategy for the classroom.

Method

Participants

Participant selection was based on teacher referral of students with low levels of on-task behavior. Prior to inclusion in the project, these reports were confirmed by the researchers through direct observations in the classroom, with observations indicating that levels of on-task behavior occurred on less than 55% of the intervals observed for all participants.
Three fifth graders participated in this study. Jack and David were both 11-year-old boys who had been given multiple diagnoses of speech and language impairment and specific learning disabilities. Allison was an 11-year-old girl who had been given a diagnosis of emotionally disturbed and speech and language impairment. Each of the students was enrolled in the same self-contained special education classroom.

Setting
The study took place at an elementary school located in the Midwest United States. The classroom was a self-contained, multi-age classroom that included seven students: three third graders and four fifth graders. This self-contained program was a new addition to the continuum of services that existed within the district and was in its first year of implementation. A teacher and a full-time teacher assistant initially staffed the classroom; however, a long-term substitute replaced the teacher midway through the project (i.e., the fifth session of the return to baseline phase for all participants).

Experimental sessions were conducted during a regularly scheduled 45-min period in Reasoning and Writing. Instruction in Reasoning and Writing consisted of direct instruction on language reasoning skills and writing skills and independent seatwork on related materials. The length of time students spent in direct instruction and independent seatwork was consistent throughout the study. During the initial baseline phase and the initial intervention phase, all students received instruction in Reasoning and Writing at a round table. During the return to baseline phase and throughout the rest of the study, students were sitting at desks during instruction.

Materials
The MotivAider was used for the cue to self-monitor throughout the intervention phase. The MotivAider looks like a pager and attaches to a belt or a waistband. It emits a pulsing vibration, which was used as the cue for participants to self-monitor their behavior. In addition to the MotivAider, all participants used a paper-and-pencil recording system to record whether they were paying attention at the time the MotivAider vibrated.

Measures
On-task behavior. Direct observation data were collected for on- and off-task behavior using categories from the Behavioral Observation of Students in Schools (BOSS) structured observation code (Shapiro, 1996). On-task behavior was defined as the student actively or passively attending to instruction or assigned work and the absence of off-task behavior during the observed interval. Three possible categories of off-task behavior were recorded: off-task motor, off-task verbal, and off-task passive behaviors. Off-task motor behaviors were defined as any motoric movement that occurred that was not associated with the academic task at hand (e.g., randomly flipping pages in a textbook or out of seat). Off-task verbal behaviors were coded whenever the student made any audible verbalizations that were not relevant to the assigned task or not permitted during the assigned task (e.g., talking to peers, humming, or calling out answers). Off-task passive behaviors occurred whenever there was passive disengagement for a period of at least 3 consecutive seconds (e.g., looking away from assigned material).

Data were collected using a 15-s partial interval recording system. If the student engaged in off-task behavior at any time during the interval, the student’s behavior was recorded as off-task rather than on-task for that interval. Direct observations were conducted for 15 min per day, two to three times per week for each student. The first author served as the primary data collector, and the teacher’s assistant collected interobserver agreement data.
Interobserver agreement data were collected for 18% of the total sessions observed. Interobserver agreement was calculated by dividing total interval agreements by total intervals observed (Kazdin, 1982). The mean percentage of overall agreement was 96% (range = 92–100%). Additionally, occurrence agreements were calculated on an interval-by-interval basis by dividing the agreements by the total number agreements and disagreements and multiplying by 100. The mean interobserver reliability for the occurrence of off-task behavior was 81% [range = 0 (which occurred when there was only one off-task behavior observed during the session and agreement was not reached)–100%].

Treatment integrity. Treatment integrity was assessed with a five-item checklist detailing specific steps of the intervention. The primary investigator conducted measures of treatment integrity for 46% of the intervention sessions. Adherence to all steps in the intervention occurred 100% of the time.

Treatment acceptability. Questionnaires were completed at the end of the study to assess treatment acceptability and feasibility of the self-monitoring intervention using the MotivAider. The classroom teacher, the teacher’s assistant, and the long-term substitute completed the Intervention Rating Profile-20 (IRP-20; Witt & Martens, 1983). This questionnaire consists of 20 items rated on a Likert scale ranging from 0 (strongly disagree) to 6 (strongly agree). Students were administered a seven-item questionnaire adapted from the Children’s Intervention Rating Profile (Turco & Elliot, 1986). This questionnaire consists of seven items rated on a Likert scale of 1 (indicating that the student disagrees with the statement) to 6 (indicating agreement).

Experimental Design and Procedures

An ABAB reversal design was used for each participant in the study, with an extended baseline for the third participant. The specific experimental phases are described next.

Baseline. Initial baseline observations of student behavior were conducted in Reasoning and Writing as well as Math settings. During baseline, self-monitoring procedures were not in place, and teachers were instructed to use their typical procedures for classroom management (e.g., praising appropriate behavior and redirecting off-task behavior). Additionally, all students in the class participated in a classroom-wide point system, which was in place throughout the study. With this system, each child earned stamps throughout the day for working on his or her personal behavioral goal, and exchanged the stamp sheets at the end of the week for a small incentive. This system was used throughout the course of the study and was not linked to the self-management procedures.

Student training. Participants were trained to observe and record (i.e., self-monitor) their on-task behavior during two group-training sessions and two practice sessions in the classroom. The training sessions were 30 min in length and were conducted by the first author in her office at the school. During student training, students were taught to identify on- and off-task behaviors using the SLANT strategy (Ellis, 1991). SLANT is an acronym that stands for Sit up, Look at the person talking, Activate thinking, Note key information, and Track the talker. Off-task behavior was defined as the absence of one or more SLANT behaviors. Next, within the training session, students practiced self-monitoring of their on-task behavior, first with an overt audio cue (to ensure they were self-recording accurately and to better provide performance feedback) and then using the MotivAider. Following the two student-training sessions, each student practiced using the MotivAider in the classroom during the 45-min Reasoning and Writing instruction period until they could use the self-monitoring procedures without assistance, as demonstrated by self-recording at the end of each 2-min interval for one entire class session. On the second day of
training, all participants were able to self-monitor their on-task behavior and to begin intervention implementation.

**Self-monitoring intervention.** All participants self-monitored their on- and off-task behavior during Reasoning and Writing instruction. Students wore the MotivAider, which elicited electronic vibrations to cue self-monitoring. When the MotivAider vibrated, students recorded whether they were paying attention at that moment in time by checking “yes, I was paying attention” or “no, I was not paying attention” on a self-monitoring form. After each session, the students returned their completed self-monitoring forms and MotivAider to the classroom teacher. The self-monitoring forms were collected on a weekly basis. After the initial student-training sessions, the classroom teacher was responsible for managing the intervention (e.g., distribution of MotivAiders and self-monitoring forms).

For all participants, the MotivAider was set at 1-min fixed intervals for the first week of the intervention phase; however, at the beginning of the second week of the intervention, the classroom teacher expressed a concern stating that she felt the 1-min cue was too intrusive. After consultation with the teacher about an acceptable cueing interval, the MotivAider was programmed to emit a vibration every 3 min throughout the duration of the study (i.e., the remaining intervention phase and final return to the second intervention phase).

**Generalization.** Generalization probes were conducted for 10 to 12% of the sessions (i.e., once during each experimental phase). Generalization probes were conducted in a second academic setting (Math) identified by the teacher. The MotivAider was not used in the generalization setting. A direct instruction curriculum (Connecting Math Concepts) was used during this class period.

**Results**

**On-Task Behavior**

Figure 1 displays the percentage of intervals of on-task behavior for the three participants. In general, similar results were obtained for each participant in the study. During initial baseline observations, Jack, David, and Allison displayed low levels of on-task behavior (i.e., less than 60% of intervals observed). During the initial intervention phase, participants’ on-task behavior increased and reached above 90% at the end of the phase. When the intervention was discontinued (i.e., return to baseline conditions), there was a steady decrease in on-task behavior. Upon reinstatement of the intervention, on-task behavior immediately improved to more than 90% of the intervals observed and remained stable. Specific results of participants are described next.

**Jack.** Jack’s mean percentage of on-task behavior during baseline occurred for 53% of the intervals (range = 47–61%). His on-task behavior showed a slight increasing trend during baseline; however, the final 3 points in baseline were stable. During the self-monitoring phase, Jack’s on-task behavior increased to a mean of 79% of intervals observed (range = 65–95%). When the intervention was discontinued, Jack’s on-task behavior displayed a decreasing trend and a mean of 74% of intervals observed (range = 65–81%). When the intervention was reintroduced, Jack’s rate of on-task behavior quickly improved to a mean occurrence of 91% intervals observed (range = 85–100%).

The percentage of nonoverlapping data points was calculated to summarize intervention effects. Results indicated that the percentages of nonoverlapping data points between the initial baseline phase and the initial intervention phase, as well as the initial baseline phase and the return to intervention phase, was 100%, suggesting the intervention was consistently associated with behavior change. The percentage of nonoverlapping data points between the initial intervention phase...
and the return to baseline phase was 54%. The overlapping points between the return to baseline phase and the initial intervention phase consist of the first few data points collected during the intervention, suggesting the intervention did not have an immediate dramatic effect on behavior. Finally, the percentage of nonoverlapping data points between the return to baseline phase and the return to intervention phase was 100%.

Generalization data for Jack indicate his on-task behavior occurred for 55% of the intervals observed during the initial baseline phase. During the self-monitoring phase, Jack’s off-task behavior in Math increased to 87% of intervals observed. When the intervention was returned to baseline,
Jack’s on-task behaviors in Math remained stable, occurring for 85% of the intervals observed. Upon reintroduction of the intervention, Jack’s off-task behaviors again remained stable at 85% of the intervals observed.

David. Results indicate that David’s on-task behavior during baseline occurred an average of 55% of intervals observed (range = 43–62%). When the self-monitoring intervention was introduced, his on-task behavior showed an increasing trend with a mean of 79% intervals observed (range = 68–93%). When the intervention was discontinued, David’s on-task behavior decreased to a mean of 76% intervals observed (range = 70–80%). Upon reinstatement of the intervention, David’s on-task behavior increased to an average of 93% of the intervals observed (range = 87–97%).

The percentage of nonoverlapping data points between the initial baseline phase and the initial intervention phase was 100% for David, as well as for the initial baseline phase and the return to intervention phase. The percentage of nonoverlapping data points between the initial intervention phase and the return to baseline phase was 22%, suggesting that the intervention did not have an immediate effect on on-task behavior but instead led to a gradual decrease in on-task behavior. Finally, the percentage of nonoverlapping data points between the return to baseline phase and the return to intervention phase was 100%.

Generalization data for David indicate that David’s on-task behavior in Math during the initial baseline phase, intervention phase, return to baseline phase, and reimplementation of the intervention occurred for 60, 88, 70, and 90% of the intervals, respectively.

Allison. During the initial baseline phase, Allison’s on-task behavior occurred at a mean rate of 56% of the intervals observed (range = 45–67%) and displayed a flat trend. Upon introduction of the self-monitoring intervention, Allison’s on-task behavior increased to a mean of 89% of the intervals observed (range = 73–98% of the intervals observed). When the intervention was discontinued, Allison’s on-task behavior displayed a steady decreasing trend with a mean of 84% intervals observed (range = 75–91%). When the intervention was reintroduced, Allison’s on-task behavior immediately increased to a mean rate of 96% of intervals observed (range = 88–98%).

The percentage of nonoverlapping data points between the initial baseline phase and the initial intervention phase was 100%, as well as for the initial baseline phase and the return to intervention phase. The percentage of nonoverlapping data points between the initial intervention phase and the return to baseline phase was 60%, suggesting that the intervention had a gradual impact on increasing levels of on-task behavior. Finally, the percentage of nonoverlapping data points between the return to baseline phase and the return to intervention phase was 88%. When examining the overlapping data points, there was a single dip in Allison’s level of on-task behavior during one intervention session that accounts for the overlap.

Generalization data for Allison indicate that her on-task behavior in Math during the initial baseline phase, intervention phase, return to baseline phase, and reimplementation of the intervention occurred for 67, 95, 83, and 90% of the intervals, respectively.

Treatment Acceptability

Results of the treatment acceptability ratings by classroom personnel were high. The classroom teacher, the teacher’s assistant, and the long-term substitute reported total acceptability scores of 115, 102, and 98, respectively, where 120 of 120 indicates the most acceptable score possible. Specifically, results indicated that all teachers strongly agreed on factors such as intervention procedures being beneficial to the student (i.e., two ratings of 5 and one rating of 6), intervention procedures being easy to implement without a lot of training (i.e., two ratings of 6 and...
one rating of 5), and that overall, the teachers would be willing to use the self-monitoring inter-
vention in the classroom setting (i.e., two ratings of 5 and one rating of 6).

Total acceptability scores on the Children’s Intervention Rating Profile for Jack, David, and 
Allison were 33, 31, and 36 of 42, respectively, where 42 of 42 indicates the most acceptable score 
possible. All students strongly agreed that they liked the intervention (i.e., three ratings of 6), felt 
that the intervention would help them in school (i.e., two ratings of 6 and one rating of 5), and did 
not think there were better ways to help their inattentive behavior (i.e., three ratings of 6).

**Discussion**

This is the first known investigation of the use of self-monitoring with the MotivAider for 
increasing the on-task behaviors of elementary-aged students in a special education classroom. 
Upon implementation of the self-monitoring intervention, students increased levels of on-task 
behavior from a mean of 55% to more than 90% of the intervals observed. These findings are 
consistent with prior self-monitoring literature and provide additional empirical support of the 
effectiveness and acceptability of self-monitoring in the classroom. The data also demonstrate that 
students with learning and behavioral challenges can effectively use a tactile self-monitoring 
prompt for behavior change.

The results of this study have several practical implications for use in schools. First, self-
monitoring using the MotivAider was easy and relatively time effective. Because the students 
were responsible for monitoring and recording their own behavior, the intervention was easy to 
implement and placed few demands on the teachers’ time. These are important factors to consider, 
as interventions requiring low amounts of teacher time are likely to lead to increased follow-
through and higher rates of treatment acceptability compared to time-intensive interventions or 
interventions that take away from classroom instruction (Frith & Armstrong, 1986). Second, stu-
dents’ on-task behaviors increased despite the absence of tangible rewards for doing so (i.e., no 
complex reinforcement program was required). These results are similar to prior research findings 
indicating that self-monitoring can produce positive gains without backup consequences (Halla-
han & Sapona, 1983; Shimabukuro et al., 1999). These results also are consistent with prior 
theories indicating that self-monitoring leads to heightened awareness of a target behavior and 
subsequent behavior change (i.e., reactivity; Kanfer, 1970) and that self-monitoring appropriate 
behavior can take on motivational properties, providing reinforcement for behavior change (Nel-
son & Hayes, 1981). The absence of an external reinforcement program can make this intervention 
more acceptable and less intrusive in the classroom as well as facilitate generalization to untrained 
settings and skills (McLaughlin et al., 1985). Although these preliminary findings are promising, 
further research is necessary to explore whether the positive results would maintain over time 
without additional reinforcement.

Also encouraging were the high intervention acceptability ratings provided by the teachers 
and the students. Teachers indicated that the intervention was highly acceptable and easy to imple-
ment, and responded that they would use the self-monitoring intervention again for a similar 
problem. Likewise, high ratings of student acceptability revealed that students viewed the Moti-
vAider as a tool to help them stay on task, did not feel the intervention was intrusive in the 
classroom, and reported that wearing the MotivAider was “cool.”

**Limitations**

Although we obtained positive results using the MotivAider, there are several limitations to 
this study worth noting. First, we did not see a complete return to initial baseline levels when the 
MotivAider was removed. One possible explanation of this observation is that students were 
learning to self-manage their behavior; if this were the case, we would not expect a reversal to
baseline conditions. Nonetheless, data for all participants clearly demonstrated a decreasing trend of on-task behavior once the MotivAider was removed. Thus, it would appear that students still relied on the MotivAider for behavior change to some extent. It remains to be explored empirically if over time, students can control on-task behavior on their own, without reliance on external prompts, or whether the reactive effects of self-monitoring are more short term and disappear when self-monitoring is discontinued (Nelson, 1977).

Finally, our generalization data must be interpreted with caution, as only one observation per phase was conducted. When examining these limited data, however, it is surprising to note that for two participants, Allison and David, the generalization probes generally correspond with the data collected during each phase of the study. For example, during the initial baseline phase, Allison’s on-task behaviors in Reasoning and Writing occurred for a mean of 55% of the intervals observed and for 67% of the intervals in the generalization setting (Math). Upon implementation of the intervention, Allison’s on-task behaviors increased in the intervention setting and generalization setting, where the MotivAider was not being used. It would be interesting to explore whether generalization data collected on a more consistent basis would yield the same results.

**Future Directions**

As this is the first published study that has explored the use of the MotivAider for self-monitoring, future research should include attempts to replicate the results obtained with the use of the MotivAider. Additionally, issues related to long-term use of self-monitoring, such as generalization and maintenance of self-monitoring with the MotivAider across settings and over time, warrant further investigation. Research examining what age ranges and for what behaviors the MotivAider might be most useful would add to the current knowledge base. Finally, future research should explore commensurate changes in academic performance and social acceptance of children using the MotivAider.

In conclusion, self-monitoring using the MotivAider appears to be an effective and practical intervention for increasing on-task behavior for students with learning difficulties and behavioral challenges. Additional research is needed to replicate and extend the findings of this study and to explore ways for students to become an active participant for behavior change.

**References**


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