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# Efficacy of A Self-Monitoring Intervention for Decreasing Off-Task Behavior Exhibited by a Second Grader with ADHD

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**Abstract:**
Self-monitoring interventions show promise in helping to remediate academic and behavioral challenges for students with attention-deficit/hyperactivity disorder (ADHD). The current study used an ABAB reversal single-case research design to evaluate the effectiveness of a self-monitoring intervention for decreasing off-task behavior exhibited by a second grader with ADHD. The student was taught to self-monitor her task engagement using a MotiveAider™, an electronic device that vibrates at predetermined intervals (MotiveAider™, 2000). Results indicated that upon the implementation of the self-monitoring intervention, the student's off-task behavior decreased from a mean of 53% to less than 10% in all the intervals observed. The results indicated that the self-monitoring procedure was associated with a decrease in talking to peers and being distracted with learning materials. However, the intervention was least effective in decreasing out-of-seat behavior. Limitations, implications, and future directions are discussed.

**Keywords**: self-monitoring, ADHD, off-task behavior, task engagement.

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## Introduction:

The Diagnostic and Statistical Manual of Mental Disorders (5th ed., DSM-5) defines ADHD as "a persistent pattern of inattention and/or hyperactivity-impulsivity that is more frequently displayed and more severe than is typically observed in individuals at comparable levels of development" (American Psychiatric Association, 2013, p. 61). Students with attention problems might be easily distracted, make careless mistakes, have difficulty organizing and completing tasks, lose things (e.g., books and school materials), or daydream (American Psychiatric Association, 2013). Students who have symptoms of hyperactivity and impulsivity might fidget in their seats, be talkative, have difficulty sitting still, blurt out answers, have difficulty waiting for their turn, or interrupt conversations and others' activities (American Psychiatric Association, 2013). All these behaviors disrupt classroom activities, waste valuable instruction time, and negatively affect students learning and social development.

ADHD increases students' risk of poor academic and social-behavioral outcomes, including high rates of disruptive behavior and poor social relationships with peers (Barkley et al., 2006; DuPaul & Stoner, 2003). Students with ADHD are more likely than their peers to have lower grades, be retained by at least one grade level, and be suspended and or expelled from school (Achilles et al., 2007; Barkley et al., 2006; Bowman-Perrott et al., 2011). Additionally, around one-third of adolescents with ADHD fail to graduate from high school (Barkley et al., 2006). Many students with ADHD will have other emotional or behavioral difficulties. Strine et al. (2006) investigated the emotional and behavioral challenges and impairments in everyday functioning in children with ADHD, using a nationally representative sample. Their findings indicated that children between ages 4 and 17 with a history of ADHD were six times more likely than their peers without ADHD to experience emotional, conduct, and peer problems. While these symptoms tend to increase in rate and severity if left untreated, improved outcomes can be achieved with effective management of ADHD (Barkley, 2008).

Educators understand that ADHD symptoms do not result from defiant behavior or lack of understanding (Rivera-Flores, 2015). Students with ADHD need tools to help them cope with the symptoms (Alsalamah, 2017). Over the years, various interventions have been developed to address ADHD symptoms and improve students' academic and behavioral outcomes. Self-monitoring intervention is a promising intervention that can be used effectively with students from diverse backgrounds, ages, and abilities (Rafferty, 2010). While self-monitoring interventions can be helpful for the general population, they can be very useful specifically for students with ADHD, because they teach students to self-assess their behavior and record whether they were engaged in the target behavior (e.g., staying on task, completing all steps to finish a task). Moreover, the intervention consists of two components: measurement and evaluation (Loftin et al., 2005). First, the student measures and records his/her behavior. Second, the student compares his/her behavior to a standard. Self-monitoring can take many forms. For example, a student might rate her study skills using a paper form at the end of a reading class or evaluate her ability to stay on-task during instruction time using audible cues at predetermined intervals to cue the student to evaluate her task engagement.

Several empirical studies demonstrate the effectiveness of self-monitoring procedures to address students' behavioral and academic outcomes. For example, Mathes and Bender (1997) examined the effects of self-monitoring procedures to improve on-task behavior of three elementary students with ADHD and emotional and

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behavioral disorders. All three students received medication for their ADHD. Results indicated that self-monitoring intervention, when combined with medication, enhanced on-task behavior in all three students. Harris et al. (2005) conducted a study to compare the effects of two types of self-monitoring (self-monitoring of attention versus self-monitoring of performance) on the on-task and spelling behavior of six elementary students with ADHD. The authors found that improvements in on-task behavior were similar across the two types of self-monitoring. However, the self-monitoring of attention resulted in more improvement in spelling study behavior compared to its improvement in on-task behavior.

In a review of 16 studies that utilized self-monitoring procedures, Sheffield & Waller (2010) reported that self-monitoring interventions are positive behavioral interventions that are demonstrated to be effective whether used alone or with other interventions. Regular classroom teachers can use this approach to reduce several problematic behaviors in the classroom setting. In more recent studies, authors evaluated the effects of technology-based self-monitoring in enhancing student outcomes. For example, Vogelgesang et al. (2016) evaluated the effects of a (SCOREIT) iPad application for self-monitoring on the academic engagement of three fifth graders with or at risk of ADHD. The authors also aimed to measure the social validity and the practicality of the intervention. Results showed significant improvement in academic engagement and teachers rated the intervention favorably.

A study conducted by Amato-Zech et al. (2006) investigated the effectiveness of using self-monitoring procedures using the MotiveAider™™ device to increase on-task behavior in 3 elementary students with different disabilities. The MotiveAider™ is a small electronic device (like a pager) that can be placed in the student's pocket and can be programmed to vibrate at predetermined intervals to cue the student to self-monitor and record his or her behavior. The intervention resulted in an increase in on-task behavior during writing class from a mean of 55% to above 90% of the observed intervals. Similarly, Farrell and McDougall (2008) used the same device (MotiveAider™) to teach five students with various disabilities including ADHD to self-monitor their pace of answering math problems during individual math practice. Every time the device vibrated, the participants asked themselves, "Am I on pace, behind pace, or a head of pace?" They self-recorded onto the math worksheet which math problem they were working on when the device vibrated. Results indicated that the intervention increased the students' math fluency substantially to rates comparable to those of their typical classmates.

In another study, McDougall et al. (2012) evaluated the effects of a self-monitoring intervention in improving academic productivity during mathematics individual tasks for a 10th grader with ADHD. The self-monitoring intervention consisted of using the MotiveAider™ device. The device was programmed to vibrate at fixed intervals to cue the student to pause and ask himself if he was doing his work. The student checked "yes" on a self-monitoring form if the device vibrated while he was doing his work and checked "no" if he was distracted when the device vibrated. The results indicated that self-monitoring increased the number of math responses the student provided by three times.

Given the difficulties students with ADHD face in remaining on-task and the higher risks of school failure and other negative outcomes associated with their off-task behavior, more research is needed to evaluate the effectiveness of self-mentoring interventions that target the core symptoms of ADHD. In addition, the research is limited in evaluating the effectiveness of using new self-monitoring devices such as MotiveAider™ to help students with ADHD self-monitor their behaviors and stay on task. To Date, only three studies have evaluated the effects of the MotiveAider™ device to enhance task engagement. Two of them included students with different disabilities and only one study (McDougall et al., 2012) focused on participants with ADHD solely. Thus, there is a need to examine the effects of self-monitoring interventions to enhance the academic and behavioral outcomes for this particular population (Alsalamah, 2017).

The current research aims to fill in the gaps in the self-monitoring literature by investigating the use of tactile self-monitoring cues using the MotiveAider™ device to decrease off-task behavior exhibited by a second-grade student with ADHD in the typical classroom setting. Specifically, the study aims to answer the following questions:

1. Can self-monitoring intervention be effective in decreasing the overall off-task behavior, exhibited by a second-grade student with ADHD during math individual practice time?
2. Can self-monitoring intervention be effective in decreasing different intensity levels of off-task behavior, exhibited by a second-grade student with ADHD during math individual practice time?

**Method**

The study was conducted in a second-grade classroom, located in a public elementary school in Texas that serves around 580 students in grades kindergarten through five. Most of the students at the school were Hispanic and from low socioeconomic status. The classroom teacher was bilingual in English and Spanish, has 8 years of experience in teaching, and holds a master's degree in school management. The classroom consists of 19 students and the classroom teacher used different behavior management strategies



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such as calling the student's name and asking him/her to pay attention in addition to implementing the coin economy system. However, none of the previous interventions proved to be successful.

The study was conducted during the daily scheduled 60-90 minutes Mathematics workshop since the participant's off-task behavior peaked then. Instructions in mathematics consisted of direct teacher instructions followed by independent seatwork. The classroom's teacher modeled solving 2-3 mathematical problems before the students started working independently to solve the remaining math problems. The duration of direct instructions and independent seat works were consistent throughout the study.

**Procedures**

**Selecting the Participant**

Salina (a pseudonym) is a second-grade student (female, Hispanic, 7-year-old) diagnosed with ADHD. She was nominated to participate in the study by her classroom teacher based on her high rates of problem behaviors that interfere with learning and her academic performance. Behavioral problems displayed by Salina ranged from difficulties in initiating academic tasks, staying on-task, finishing her work, and getting out of her seat several times to check on her work. In addition, the student has asthma and might pretend that she cannot breathe sometimes during independent math seatwork sessions to be sent to the nurse's office to avoid doing math. The classroom teacher complained mainly about Salina's off-task behavior during individual work time. Her problem behavior is constant and occurs on a daily bases and interferes with her work completion and accuracy. The classroom teacher expressed concerns regarding the student's functioning below grade level expectations and might be retained in second grade if she did not focus in class and make enough academic improvements. Furthermore, her teacher identified off-task behavior as the target behavior in this study. Off-task behavior was defined as "fidgeting with objects (pencils or learning materials) or talking to other children and moving out of the seat to ask classroom teacher without his permission." Replacement behavior was identified as on-task behavior and was defined as "attending to task without talking to others or playing with learning materials and asking for teacher's permission before leaving her seat." Prior interventions consisted of changing seating locations and providing incentives (stickers) or using the token economy system. However, none of the previous interventions proved to be effective or produced long-term effects.

**Intervention**

The intervention consisted of teaching Salina self-monitoring skills using a MotiveAider™™ device (MotiveAider™, 2000). The procedure was adopted from Rafferty's (2010) article. Salina was provided with the MotiveAider™™ device and a self-monitoring card (see Appendix A) and was asked to use the self-monitoring cards to indicate if she was on-task or off-task by placing a checkmark in the right place each time the device vibrates. The device was set at 30-second intervals for the whole individual seatwork period (15-30 minutes). The intervention required two brief training sessions (see procedure section).

**Self-monitoring Intervention Training**

The researcher discussed with the participant the importance of enhancing on-task behavior and trained the subject to use the MotiveAider™ device and how to distinguish between on-task and off-task behaviors. In addition, the participant was trained to record her on-task/off-task behavior at the end of each 30-second interval. The researcher modeled the whole steps for the student and then asked the student to model back each step.

**Research Design**

An ABAB reversal design was used to evaluate the effectiveness of the intervention over the period of 10-12 weeks. Data were collected twice a week for both the baseline and intervention phases. Each phase lasted for 2-3 weeks (see Figure 1). During Baseline (phase A) observations were conducted during the daily scheduled 60-90 minute mathematics workshop and no intervention was implemented. During the intervention (Phase B), the participant was provided with the self-monitoring device and the recording sheet. The participant turned on the device immediately when she received the mathematics worksheet and before she started solving the problems. At the end of each 30-second interval, the participant placed a check mark to indicate if she was on-task or off-task.

**Measurement**

Off-task behavior was measured using 30-second partial interval recording procedures. The participant recorded her on-task/off-task behavior using a self-monitoring card (Appendix A) in 30-second partial intervals with the assistance of the MotiveAider™ ™ device. The researcher used 30-second partial intervals recording sheet to record Salina's task engagement (See table 1. below). A (0 to 4) measurement scale was used to determine the intensity levels of the participant's off-task behavior. Table 1 shows an abbreviated version of the recording instrument used to collect the data and provide a qualitative picture of the subject's off-task behavior.

**Table 1**

Abbreviation of the Off-task Recording Sheet Used to Rate and Record Off-Task Behavior



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| Interval | Behavior | Interval | Behavior | Interval | Behavior | Interval | Behavior |
|---|---|---|---|---|---|---|---|
| 1 | | 4. | | 7. | | 10. | |
| 2 | | 5. | | 8. | | 11. | |
| 3 | | 6. | | 9. | | 12. | |

| 1 | 2 | 3 | 4 |
|---|---|---|---|
| - Staring at teacher<br>- Doodling<br>- Drinking water<br>- Holding the pen, looking at paper but not writing.<br>- Playing w/nose, lips, fingers, and pens while setting. | - Whispering, talking to self, or singing silently<br>- Smiling or waving.<br>- Turning to others or anything with upper body. Ex: leaning toward others.<br>- Flips paper. | - Talking to others.<br>- Calling out answers<br>- Covering face w/paper<br>- Anything w/lower body<br>-Playing w/ things 30cm away from her desk | - Moving out of seat.<br>- Standing up. |

The frequency of intervals of the target behavior (off-task behavior) was measured to determine the effectiveness of the intervention. Additional measures were collected on the intensity levels of off-task behavior exhibited by the participant. Furthermore, the researcher kept daily anecdotal notes regarding changes in the classroom environment. Data were collected twice a week using 30 seconds partial interval procedures. Inter-rater reliability was obtained during 20% of the sessions, resulting in above 85% inter-rater agreement.

Data Analysis

To determine the effectiveness of the self-monitoring intervention, the researcher analyzed the data visually and statistically. Visual and statistical analyses were conducted on the frequency of off-task behavior intervals in general and the frequency (intensity) of each type of off-task behavior on a 1-4 rating scale. Visual analysis was conducted by examining the mean difference between phases, data overlap, and intercept gap. Simple mean shifts (SMS) regression analysis was used to visually compare the subject's performance after controlling for positive phase A trend using the Allison et al. model. Tau-U was used to statistically calculate effect size and correct for positive phase A trend on both of the measures.

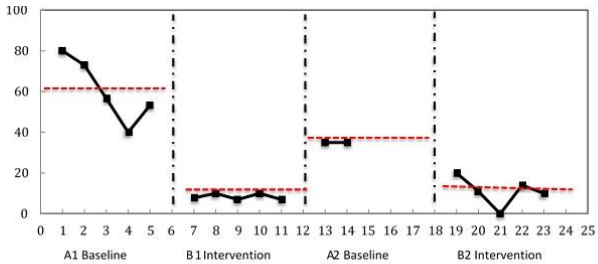
Results

The study evaluated the effectiveness of self-monitoring interventions for decreasing off-task behavior exhibited by a 7-year-old female with ADHD and at risk of school failure. The participant's off-task behavior peaked during the mathematics period and consisted of fidgeting with materials, talking to her peers, and leaving her seat repeatedly to ask her teacher to confirm her answers. The participant's frequent off-seat behavior interrupted the classroom's instruction time. The intervention consisted of teaching the participant to self-monitor her behavior using a small electronic device that vibrated at predetermined intervals (MotiveAider™) to cue the participant to evaluate and record her task engagement.

The frequency of off-task behaviors was measured using a 30-second partial interval recording. The first research question focused on evaluating the effectiveness of self-monitoring intervention in decreasing the overall off-task behavior exhibited by a second-grade student with ADHD during math individual practice time. The first research question was answered using visual and statistical analysis (see Figure.2).

Figure 2

The Simple Mean Shift for Frequency of Off-Task Behavior




First, visual analysis of the graph allowed comparison between each baseline and intervention phase and guided the statistical analysis used in the study. SMS analysis showed a pre-existing positive baseline (A1) that poses a threat to the study's conclusion validity. One possible solution for the positive phase (A) trend is less than 10% in the following intervention phase (B1). SMS analysis between the first two phases yielded an R2 effect size of .882, which indicated the quality of the two-phase mean lines in describing the data, compared to not having the two mean lines. Thus, the R2 of .882 suggests that the difference in the mean level between phase A and B explains 88% of the overall variability in the data. In addition, the ANOVA p-value of .001 suggests that with this data, the possibility of obtaining an R2 this large by chance alone would be only 1 out of 1000. The p-value indicates that the calculated effect size is statistically significant, beyond a p= .05 level.

Statistical analysis using Tau-U (Parker et al., 2011) was used to examine the changes between the baseline and intervention phases. Tau-U is a non-overlap-based method related to earlier NAP (non-overlap of all pairs) that indicates the "percent of non-overlapping data" (Parker & Vannest, 2009). Tau-U is the percentage of data that shows improvement over time. One of the benefits of using Tau-U to analyze data is its ability to control for positive phase (A) trends. Tau-U ranges from 0-1 and can be a positive number to indicate



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improvement or a negative number to indicate deterioration (Parker et al., 2011).

Tau-U indicated a 68% decrease in off-task behavior from phase (A1) to phase (B1), with a non-significant p-value of .075. Ninety percent confidence intervals for Tau-U are -1.310<>-.050. A possible explanation for the positive phase (A) trend might be due to collecting the baseline data before spring break, where the participant was encouraged to do her best to be able to join a family trip. Extending the first phase line for an additional week after spring break could reduce the positive trend.

On the other hand, visual analysis for changes in the mean levels between the second baseline (A2) and the second intervention phase (B2) showed a decrease in off-task behavior means from 35% to 10.2% and yielded a moderate R2 of .472 with a non-significant p-value of .0881. Tau-U between the second intervention phase A2 and the second phase of intervention B2 indicated that 100% of the data showed improvement between the second baseline and intervention phase with a non-significant p-value of 0.053. Ninety percent confidence intervals for Tau-U are -1.849<>-0.151.

The second research question focused on measuring the effectiveness of the self-monitoring intervention in decreasing different types or intensities of off-task behavior, as exhibited by a second-grade student with ADHD. The question was answered using the same visual and statistical analysis used to answer the first question (SMS and Tau-U).

A summary of the results is provided in the following table:

**Table 2**

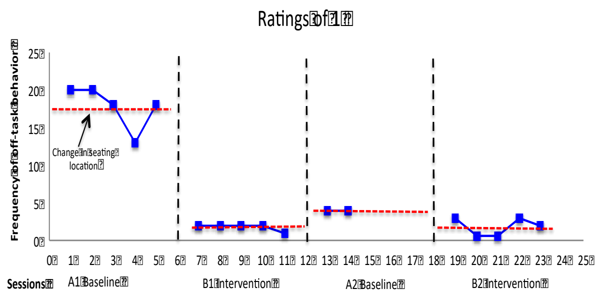
Effect Sizes and Probability Values for First Two Phases with Simple Mean Sift (SMS) Model and Tau-U

| | A1 vs. B1 | | | A1 vs. B1 | |
|---|---|---|---|---|---|
| Rating scale | $R^2$ | p-value | | Tau-U | p-value |
| 1 | .917 | .000 | | . 760 | .047 |
| 2 | .526 | .017 | | .480 | .210 |
| 3 | .779 | .001 | | .100 | .210 |
| 4 | .614 | .117 | | .400 | .400 |

The first type of off-task behavior consisted of minor distraction levels such as doodling, drinking water, and playing with learning materials silently while the participant was sitting in her seat. Visual analysis showed a mean decrease from a mean of 17.8% to a mean of 1.8% and the SMS after correcting the positive phase (A) trend yielded a high R2 of .917 with a significant p-value of .000. In addition, Tau-U showed a 76% decrease in the first type of off-task behavior with a statistically significant p-value of .047. The comparison between the second baseline and intervention phase showed a decrease in means from 4% to 1.6% and yielded a large R2 of .866 with a non-significant p-value of 055. Tau-U indicated a 100% decrease in the first type of off-task behavior between the second baseline and the second intervention phase with a non-significant p-value of .053.

Figure 3

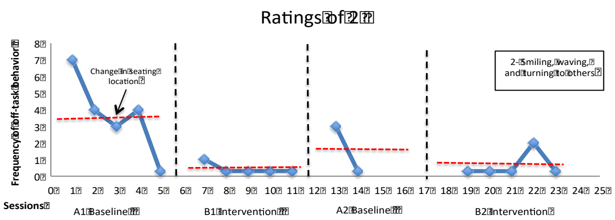
Simple Mean Shift for Frequency of the First Type of Off-Task Behavior




The second type of off-task behavior included whispering or waving to friends. Visual analysis showed a mean change from 3.6% to 0.2%. The SMS after correcting the positive phase (A) trend yielded an R2 that could explain around 50% of the variability between the two phases (R2 = .526) with a significant p-value of .017. Tau-U indicated that 100% of the second type of off-task behavior (whispering and waving) decreased over time with a non-significant p-value of. 210. R2 was better in explaining the variability between A2 vs. B2 (R2 =. 821) with a significant p-value= .005. However, the second comparison yielded a 30% Tau-U effect size with a non-significant p-value of .561 and a decrease in mean levels from 1.5% to .4% (see Figure 4).

Figure 4

Simple Mean Shift for the Second Type of Off-task Behavior




For the third type of off-task behavior, which consisted of talking to others and calling out answers during



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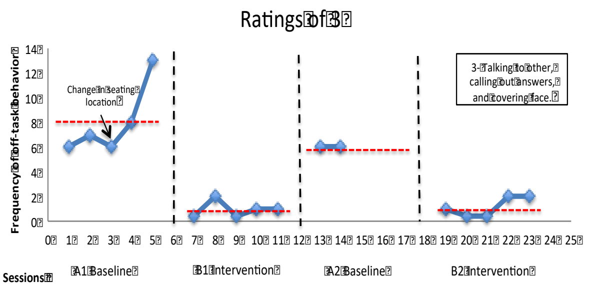
instruction time, mean levels changed from 8% to 0.8%. Also, resulted in an R2 effect size of 0.7788 and a significant p-value of 0007. In addition, Tau-U indicated that 100% of the data improved between the two phases. The comparison between the next baseline and intervention phase (A2 vs. B2) showed a 5% decrease in mean levels and yielded a high effect size of 89.83% and a Tau-U that showed a 100% improvement of all data between the second baseline and intervention phase (see Figure 5).

**Figure 5**
Simple Mean Shift for the Third Type of Off-Task Behavior




The fourth type of off-task behavior consisted of leaving her seat to ask the teacher during instruction time, which yielded a .614 R2 effect size and a Tau-U that indicates only a 40% improvement between the first two phases and a mean change from 1.6% to 0%. Both R2 and Tau-U have corrected for a positive phase A trend. A comparison of the next two phases yielded the lowest effect size of 16% and a low Tau-U of 40% improvement. However, the visual analysis indicated that the mean of off-task behavior increased from 0% to 1.2% between the second baseline and intervention phase.
Figure 6
Simple Mean Shift for the Fourth Type of Off-Task Behavior

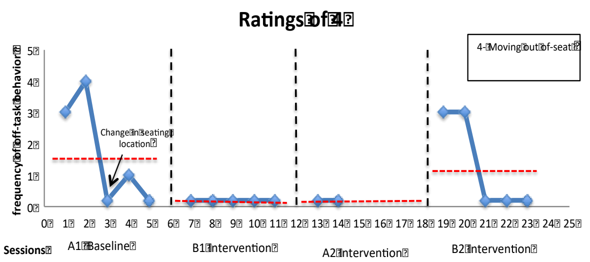



Table 3
Effect Sizes and Probability Values with Simple Mean Sift (SMS) Model and Tau-U

| | A2 vs. B2 | | | A2 vs. B2 | |
|---|---|---|---|---|---|
| Rating scale | $R^2$ | p-value | | Tau-U | p-value |
| 1 | .866 | .055 | | .100 | .053 |
| 2 | .821 | .005 | | .300 | .561 |
| 3 | .899 | .001 | | .100 | .053 |
| 4 | .160 | .374 | | .400 | .439 |

## Discussion

A reversal ABAB design was utilized to evaluate the effectiveness of monitoring intervention for decreasing off-task behavior exhibited by a second grader with ADHD. The participant often engaged in off-task behaviors during the mathematics individual practice time. Self-monitoring intervention using a MotiveAider™ device was used to prompt the participant to self-monitor her task-engagement behavior. Results indicated a significant decrease in overall off-task behavior. The data also demonstrate that self-monitoring intervention using the MotiveAider™ tactile cueing device is effective in decreasing off-task behavior in students with ADHD who are at risk of academic failure. In addition, the intervention proved to be most effective in decreasing the third intensity level of off-task behavior (talking to friends and calling out answers) and least effective in decreasing out-of-seat behavior and whispering or talking to self (second and fourth levels of off-task behavior). A possible explanation for the limited effects of the intervention in reducing out-of-seat behavior is that the classroom teacher positively reinforces out-of-seat behavior by answering the students' questions. Thus, the participant is more likely to leave her seat since leaving her seat always results in gaining the teacher's attention.
These findings are consistent with prior self-monitoring literature and provide additional support for the effectiveness of using self-monitoring procedures for reducing off-task behaviors for students with ADHD in classroom settings. According to Rafferty (2010), self-monitoring strategies are flexible and can be differentiated to meet the needs of students with different needs and abilities. The findings of this study are consistent with the results obtained from Amato-Zechet al., (2006) study. The researchers suggested that tactile self-monitoring prompts using the same device used in the current study (MotiveAider™) successfully



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increased on-task behavior intervals by 35% for students with learning difficulties and behavioral challenges. Also, the results are consistent with McDougall et al. (2012) study, which utilized the same tactical device MotiveAider™ device to successfully increase academic productivity in algebra individual work from a mean of 21% to a mean of 66% in a 10th grader with ADHD.

In the classroom setting, self-monitoring strategies are recommended for several reasons, including being flexible, easy to implement, and cost-effective (Rafferty, 2010). In addition, self-monitoring strategies increase the students' awareness of their behavior (Rock, 2005). Furthermore, they provide immediate feedback to the students regarding their behavior, compared to waiting for the teacher to evaluate their behavior (Rock, 2005). It helps students take responsibility for their learning and increases students' self-efficacy, motivation, and academic achievement (Zimmerman, 2002). Finally, since self-monitoring can be done individually without having the teacher constantly asking the student to remain on task, self-monitoring interventions are less invasive and do not interrupt classroom instructions. Contrary to the prior traditional self-monitoring methods used in classrooms, this device is practical, small, and does not draw any attention to the person who uses it. For students with ADHD, self-monitoring interventions have been successful in increasing on-task behavior, academic productivity, and accuracy, which are the areas with which this group of students struggles most (Reid, 1996). Additional benefits to using tactile self-monitoring interventions are that it does not require prior knowledge or intensive training, and the intervention does not demand changes in a classroom environment.

The results of the current study contribute to the limited literature on the effects of using this specific MotiveAider™ device as a tactile means to prompt students with ADHD to self-monitor their behaviors. Furthermore, using the MotiveAider™ device addresses some of the limitations in other traditional methods of self-monitoring. Several critiques have been posed about using audible cues, such as kitchen timers or iPad applications to cue the students to monitor their behavior. Some studies indicated that traditional methods of self-monitoring procedures like using kitchen timers or audio recorders with headphones might be impractical, infeasible, or disruptive in certain classroom settings. Because these audible cures are noticeable, they might stigmatize the students who rely on them and distract the other students (Amato-Zech et al., 2006). Audible cues might draw other students' attention to the student who is using the self-monitoring intervention, thus singling out the student. As a result, researchers evaluated the effects of less intrusive self-mentoring tools that don't draw attention to the student using it or interfere with classroom instructions, such as the MotiveAider™ device

The findings suggest that the MotiveAider™ device is suitable for classroom use and beneficial for students with ADHD. Yet, the current study is not without limitations. The study could be strengthened by replicating the study with additional students, which would enhance the validity of the study's conclusion. Second, it would be informative to observe the students at different academic periods, such as reading or science, to measure the students' ability to transfer the acquired self-monitoring skills to other academic subjects. Third, a further study could add a maintenance phase in which the MotiveAider™ intervals increase gradually, until the interval lasts for the whole math period. Thinning the intervention gradually would increase the study's maintenance. Due to the significant results in decreasing the student's off-task behavior, the intervention should be maintained for a longer period of time and then thinned gradually, until the student remains on-task for a long period of time with minimum self-monitoring prompts.

Future research might focus on the long-term effects of using self-monitoring procedures such as the transfer and maintenance of self-monitoring interventions over time and in other settings. Moreover, additional research is needed to investigate the effects of using the MotiveAider™ device in regular classroom settings with typical students who exhibit different types of challenging behaviors. Additionally, more research is needed to identify the critical and most effective components of self-monitoring, like whether using other technology-based tools such as iPad or smartphone applications produced better results when compared to traditional self-monitoring checklists.

Finally, educators need to be trained in effective strategies to support students with ADHD. More than 75% of general education teachers and around 40% of special education teachers reported that they received limited or no in-service training in dealing with ADHD symptoms (Martinussen et al., 2011). Thus, it is important to train teachers to implement reliable interventions. Also, teachers might explore new and attractive tools such as the MotiveAider™, iPad, and smartphone applications to help student monitor their academic and behavioral outcomes.



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