

# Using a Self-Monitoring Intervention to Improve Students' On-task Homework Behavior at an After-School Program

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## Abstract

The current study examined the effectiveness of a self-monitoring intervention for four sixth grade students engaging in high levels of off-task behavior during an after-school program's homework time. The self-monitoring intervention involved students using a vibrating device over the course of 6 or 7 sessions to tactilely cue them to record their on- and off-task behavior and earn a small reward for accurate recording of behavior. For all participants, on-task behavior improved significantly during the intervention when compared to baseline levels. These findings are consistent with the existing literature on the effectiveness of self-monitoring interventions for on-task behavior during homework time. The results extend the literature by demonstrating that a self-monitoring intervention can produce positive results in the context of an after-school program's homework time.

**Keywords:** self-monitoring, behavioral intervention, off-task behavior, children

## 1. Introduction

Giving students homework is a common practice among teachers in the United States. Defined as tasks that teachers assign students outside of school, homework can serve many purposes including reinforcing content and skills learned during the school day, developing study and organizational skills, and enhancing self-discipline (Cooper, Robinson, & Patall, 2006). Meta-analytic research has suggested that homework is positively associated with academic performance in the classroom and performance on standardized achievement tests (Dawson, 2008). However, the actual amount of time students spend on homework appears more strongly associated with achievement than the amount of homework teachers report assigning students (Cooper, Valentine, Nye, & Lindsey, 1999). This last point is not surprising given research indicating increased on-task behavior during homework time can lead to increased submission of homework assignments (Axelrod, Zhe, Haugen, & Klein, 2009). Students who turn in homework assignments are more likely to develop academic content knowledge and skills compared to peers who often fail to complete school assignments at home.

Despite its name, homework does not always occur at home. For example, formal after-school programs, such as Boys and Girls Clubs and the YMCA, often have required homework periods. While after-school programs can vary greatly in their aim and scope, supervision of children is generally considered a consistent function (Cosden, Morrison, Albanese, & Macias, 2001). Given increases in single-parent and dual-employed families, caring for children after school has become a primary role of many after-school programs. Consequently, after-school programs have added to their role the provision of academic support, usually through homework assistance, to students in their care. Setting aside time for homework in a structured setting and providing support to those students struggling are typical components of an after-school program's homework time (Cosden et al., 2001). Research has formally evaluated the relationship between participation in after-school programs with homework components and academic achievement. Students participating in after-school programs designed to provide homework assistance often fail to demonstrate improved academic performance when compared to peers not in after-school programs

(Cosden, Morrison, Gutierrez, & Brown, 2004). However, homework assistance in after-school programs has shown to help prevent a decline in academic skills, especially for student at-risk for school failure (Tucker et al., 1995).

Several factors appear to influence the effects of homework assistance provided within after-school programs. First, regular attendance at the after-school program affects students' academic achievement. For example, Cosden et al. (2001) found that elementary age students attending at least 77% of sessions (the high dosage group) across 3 years had higher reading, math, and language standardized test scores than those students who attended fewer than 77% of sessions (the low dosage group). Second, specific student characteristics might influence academic achievement for those students participating in an after-school program's homework assistance component. For example, elementary age students at-risk for school failure are more likely to benefit academically from after-school programs that include homework assistance than their peers (Cosden et al., 2004). Finally, the quality of the homework assistance component likely impacts the academic achievement of participating students. Specifically, students are more likely to benefit from homework assistance time within an after-school program when staff are specially trained to help students (Cosden et al., 2001).

The literature on effective homework practices might provide some insight into the limitations of after-school program homework assistance components. Active adult involvement through monitoring student homework completion and providing distraction-free areas to work are two frequently recommended strategies for homework time (Dawson, 2008; Walker, Hoover-Dempsey, Whetsel, & Green, 2004). Unfortunately, after-school program staff have many students to supervise during homework assistance time, making monitoring student on-task behavior, productivity, and accuracy challenging. Moreover, homework assistance components of after-school programs are often group-based, allowing for easy peer distraction leading to off-task behavior. These factors are of even greater significance for students with attention problems, as these students often struggle completing homework assignments under optimal conditions given their difficulties with sustained attention, completing work independently, and poor self-regulation skills leading to impulsive behavior and problems delaying gratification (Axelrod et al., 2009).

An individual's self-regulation skills generally change across childhood and adolescence. For example, adolescents are better able to pay attention than children, resulting in an increased ability to complete difficult tasks and understand difficult material (Steinberg, 2011). Research has suggested that self-regulation skills emerge and stabilize in late childhood and early adolescence. Raffaelli, Crockett, and Shen (2005) found that levels of self-regulation, including attention, increased from the primary grades to the upper elementary grades but not from the upper elementary grades to middle school. However, a child's attention capacity fluctuates with time of day, day of the week, time of the year, activity or task, and different lifestyles of the child (e.g., sleep quality and quantity, diet, exercise) making determining an average attention span, even by developmental level, virtually impossible (Batejat, Lagarde, Navelet, & Binder, 1999). Furthermore, neuropsychological processes that assist in regulating an individual's behavior, such as executive functioning and control, can vary widely between

and within individuals (Barkley, 1998). Consequently, an individual's self-regulation skills are likely influenced by multiple factors and amenable to intervention.

Self-regulation interventions, or interventions designed to teach students to maintain control over their own behavior, have targeted students' academic productivity and on-task behavior. Self-monitoring, a type of self-regulation strategy, involves the multistep process of observing and then recording one's own behavior (Epstein, Mooney, Reid, Ryan, & Uhing, 2005). In some cases, students are rewarded for accurate recording in an effort to encourage students to be truthful in their self-evaluations (see Axelrod et al., 2009). In educational settings, self-monitoring interventions have been shown to improve on-task behavior, academic productivity, and overall behavior (Reid, Trout, & Schartz, 2005; Stage & Quiroz, 1999). For example, Gureasko-Moore, DuPaul, and White (2006) trained three students with Attention Deficit Hyperactivity Disorder (ADHD) to self-monitor and evaluate newly acquired classroom preparation skills (e.g., arriving on time, having the required classroom materials). Results suggested that the self-monitoring intervention improved the classroom preparation skills of all three participants and gains were maintained after the intervention was withdrawn. Research has also found self-monitoring interventions to be socially acceptable. Axelrod and colleagues (2009) implemented a homework self-monitoring intervention with five students with attention and behavior problems residing in a residential care setting. The students and residential care staff reported the intervention improved homework completion and grades, and the intervention's procedures were easy to implement.

Although self-monitoring interventions within school settings have strong empirical support, research on their use with homework is somewhat limited. Olympia, Sheridan, Jenson, and Andrews (1994) reported marked improvements in student homework completion and accuracy following the implementation of a student-managed homework completion intervention. More recently, Tony, Kelly, and Lanclos (2003) found that both parent and student monitoring of homework time resulted in less homework refusal and fewer careless mistakes. Taken together, these studies suggest homework interventions that rely on self-management and -monitoring hold promise for those students struggling to complete homework. However, much of the research on self-monitoring interventions targeting homework is single case design research and most of the individual studies call for future research to attempt to replicate findings. Furthermore, the setting for these studies has typically been the student's home. To our knowledge, there is no published research on the use of self-monitoring interventions for students participating in homework assistance components of after-school programs. Given the increasing number of students currently served by after-school programs, finding effective interventions that target on-task behavior during homework time in these settings becomes critical to student academic success. Finally, the current study employed an electronic device, called the MotivAider®, that attaches to an individual's belt or waistband and vibrates at pre-selected intervals (e.g., every 1-min). Self-monitoring interventions have traditionally employed aural (e.g., a tape recorder with a prerecorded tone, kitchen timer) or verbal prompts from the teacher to indicate when students should monitor their own behavior. However, these methods are conspicuous, distracting, and require a high level of adult involvement. The MotivAider®, a device that provides a tactile

cue, is private, quite, and requires little to no adult involvement. While research on the effectiveness of the MotivAider® is positive (e.g., Amato-Zech, Hoff, & Doepke, 2006; Moore, Anderson, Glassenbury, Lang, & Didden, 2013), there are only a few published single case experimental design studies that use such a device. The current study's purpose was to address the aforementioned gaps in the literature on self-monitoring interventions for homework completion in non-home settings. Specifically, we sought to extend the self-monitoring research by examining the use of the MotivAider® with 4 students referred because of problems with off-task behavior while completing homework during an after-school program.

## **2. Method**

### *2.1 Participants and Setting*

Participants included four sixth grade students enrolled in a large after-school program in a medium-sized Midwestern city. Program staff referred the participants because of problematic off-task behavior occurring during the program's homework time. All participants were male and spoke standard English. Eliot was 12-years-old at the time of the study. According to program staff, he was diagnosed with ADHD and was prescribed Ritalin LA to manage the symptoms. Charlie was 11-years-old at the time of the study. According to program staff, he was diagnosed with a specific learning disability in mathematics and received special education services at school. Jordan and Tre were both 12-years-old at the time of the study. According to program staff, neither student had a disability, was prescribed medication, or was diagnosed with a disorder. Elliot was of mixed ethnicity, while the other three participants were Caucasian.

The after-school program provided 1 hr of homework time as part of the regular schedule, Monday through Thursday. The first half of the hour was optional, while the second half was mandatory. Homework time was scheduled from 3:45 to 4:45 pm. The afterschool program ran from 3:00 to 6:00 for elementary aged students, and 3:00 to 8:00 for middle school and high school aged students. During homework time, participants sat at tables with peers in a commons area and worked independently on homework assignments. Homework assignments included reading passages and answering comprehension questions, completing language arts and math worksheets, and writing brief paragraphs on assigned topics. Staff judged all homework assignments to be at each participant's instructional level. There were no concurrent treatments in place at the time of the study. The majority of staff were unpaid college students from the local university, many of whom were enrolled in pre-service teacher education programs.

### *2.2 Dependent Variable*

On-task behavior was the primary dependent variable for analysis. On-task behavior was defined as actively or passively attending to assigned work including writing, reading silently, asking staff relevant questions about homework assignments, or attending to staff responses to a question about homework. Off-task behavior was defined as engaging in behaviors unrelated to homework tasks (e.g., talking to others, playing with a cell phone or other

electronic device) or being out of one's seat. Two graduate school psychology graduate students were trained to collect observational data relevant to the current study. The training involved a 30 min session including discussion on the definitions of on- and off-task behavior and practice collecting data using a paper-and-pencil recording system. During the training, the second author provided graduate students feedback to ensure accurate recording. Each participant's on-task homework behavior was observed using a 30-s partial interval recording method. Percentage of intervals on-task was calculated for each participant during each condition by dividing the number of intervals on-task by the total number of intervals and multiplying by 100.

### 2.3 Procedures

Homework time for the study was 30 min in length and generally involved written work. We chose to study 30 min rather than the full 60 min of homework time because the 4 participants rarely elected to work on homework during the optional portion. Participants completed their homework at tables with at least one peer who was not participating in the study. In addition to the observer, at least one staff member was present. Data were collected consecutively for 15 min, beginning 5 min into the homework period to allow the participants time to organize their needed materials, move to the homework area, and begin working. We only collected data for 15 min because the 4 participants rarely had enough homework to complete the full 30 min. After baseline data were collected, each participant was exposed to the intervention condition. Participants used the MotivAider® to cue self-monitoring during the intervention condition. The MotivAider® can be purchased for between \$47.50 and \$59.50, depending on model, at [www.habitchange.com](http://www.habitchange.com). Participants wore the MotivAider® on their belt or waistband. Along with the MotivAider®, participants utilized a paper-and-pencil recording system to indicate whether they were on-task at the time the MotivAider® vibrated. Each participant was trained by the second author to observe and record on-task behavior using the MotivAider® and paper-and-pencil recording system. The training sessions were approximately 5 min in length and involved didactic instruction that included definitions of on- and off-task behavior and practice using the MotivAider® and recording behavior. Staff had their own MotivAider® and similar recording system to conduct accuracy checks.

#### 2.3.1 Baseline

Participants were observed during the normal homework period without any changes to the existing homework assistance component of the after-school program.

#### 2.3.2 Self-Monitoring Intervention

Each participant recorded his on- or off-task behavior after a 3-min fixed interval. Simultaneously, the observing staff member separately recorded whether the participant was on- or off-task. The MotivAider® cued the participant and staff member. Participants earned small rewards (e.g., candy) if their self-observations matched the staff member's observations with at least 80% accuracy.



### 2.3.3 Follow-Up

The follow-up condition was similar to the baseline condition. Only data collection procedures were implemented.

### 2.4 *Experimental Design, Interobserver Agreement, and Treatment Fidelity*

A reversal design (i.e., ABA) embedded within a multiple baseline across participants design was used to evaluate the effects of the intervention condition on the on-task behavior of each participant. Following baseline, each participant was exposed to six or seven intervention sessions followed by one, two, or three follow-up sessions. Program staff determined when to withdraw the intervention by reviewing each individual participant's data. For two participants (Eliot, Charlie), baseline consisted of one session each that resulted in notably low levels of on-task behavior. These data were consistent with staff reports and the referral concerns, and resulted in a decision by the research team to immediately begin the intervention without establishing a stable baseline. For Jordan, the research team chose to start the intervention following two baseline sessions that resulted in very low levels of on-task behavior (less than 5% of intervals on task). For Tre, baseline data were collected until stable.

Interobserver agreement (interval-by-interval agreements divided by agreements plus disagreements and multiplied by 100%) was calculated for 20% of all sessions (i.e., baseline, self-monitoring, follow-up). To assess interobserver agreement, one of the authors served as the second observer. The average interobserver agreement value was 91.54% (range: 81.95% - 100%). Treatment integrity was assessed for 20% of self-monitoring sessions. The second observer recorded the presence or absence of each intervention step. Treatment integrity was 100% during the observed sessions.

## 3. Results

Figure 1 represents participants' on-task behavior during baseline, intervention, and follow-up conditions. During baseline, the mean percentage of on-task behavior was 10%, 10%, 1.67%, and 37.67% for Eliot, Charlie, Jordan, and Tre, respectively. Each participant displayed higher levels of on-task behavior during the self-monitoring condition when compared to both baseline and follow-up conditions. The mean percentage of on-task behavior during the intervention condition was 68.57%, 65.5%, 90%, and 78.83% for Eliot, Charlie, Jordan, and Tre, respectively. Immediate, noteworthy improvements in on-task behavior were noted for three of the participants (Eliot, Charlie, Jordan) following the introduction of the self-monitoring intervention. For Tre, a modest improvement in on-task behavior was observed immediately following the introduction of the self-monitoring intervention. All participants' on-task behavior returned to near baseline levels following the withdrawal of the self-monitoring intervention.

Percentage of nonoverlapping data points (PND) were calculated using the percentage of data points from the self-monitoring condition that were above the highest data point during the baseline condition (Riley-Tillman & Burns, 2009). Scruggs and Mastropieri (1998) provided the following guidelines when interpreting PND scores: scores greater than 90% represent

very effective interventions, scores between 70% and 90% suggest effective interventions, scores between 50% and 70% indicate questionable effectiveness, and scores below 50% suggest ineffective interventions. PND scores for the self-monitoring intervention condition were 100% for all participants indicating the intervention was highly effective at increasing on-task behavior when compared to baseline levels.

#### **4. Discussion**

The primary purpose of the current study was to investigate the application of a 15 min self-monitoring intervention for students with attention problems completing homework during an after-school program's structured homework period. Specifically, the study incorporated a simple self-monitoring strategy involving observing and recording one's own on- and off-task behavior every 3 min during an after-school program's homework time. Self-monitoring interventions are intended to enhance students' self-regulation by teaching them to maintain control over their own behavior through improved self-awareness of behavior. Participants displayed marked improvements in on-task behavior during the self-monitoring condition when compared with baseline levels of on-task behavior. The results are consistent with previous research and add to the growing body of literature supporting the use of self-monitoring interventions for students with attention problems (Amato-Zech et al., 2006; Gureasko-Moore et al., 2006; Moore et al., 2013; Reid et al., 2005; Stage & Quiroz, 1997). The current study's findings also lend additional support for the use of self-monitoring interventions for students who struggle with high levels of off-task behavior during homework time. Many students, including students with disabilities (e.g., emotional and behavioral disorders, learning disabilities), exhibit high rates of off-task behavior during homework time and, as a result, have difficulty completing homework assignments. Educators, equipped with effective strategies that are easy to implement, are in a better position to consult with others (e.g., parents, after-school care providers) regarding students' homework problems.

The results also add to the literature suggesting self-monitoring interventions targeting on-task behavior can be implemented successfully in non-school settings (e.g., residential treatment facilities; Axelrod et al., 2009). To our knowledge, the current study is the first to investigate a self-monitoring intervention within the context of an after-school program's structured homework time. After-school program staff are often required to supervise many students during a program's homework time. Furthermore, after-school programs frequently conduct group homework assistance periods that are not likely distraction-free. Taken together, students with attention problems or students who frequently engage in off-task behavior during an after-school program's homework time are especially prone to experiencing problems completing homework assignments. Staff report self-monitoring strategies are easily to implement in non-school settings supporting the intervention's social acceptability (Axelrod et al., 2009). After-school program staff can be easily trained by educators to implement self-monitoring interventions and collect outcome data. This might be particularly important for students who fail to receive homework assistance at home, as after-school homework assistance is more beneficial to those students when trained staff help with homework (Cosden et al., 2001).



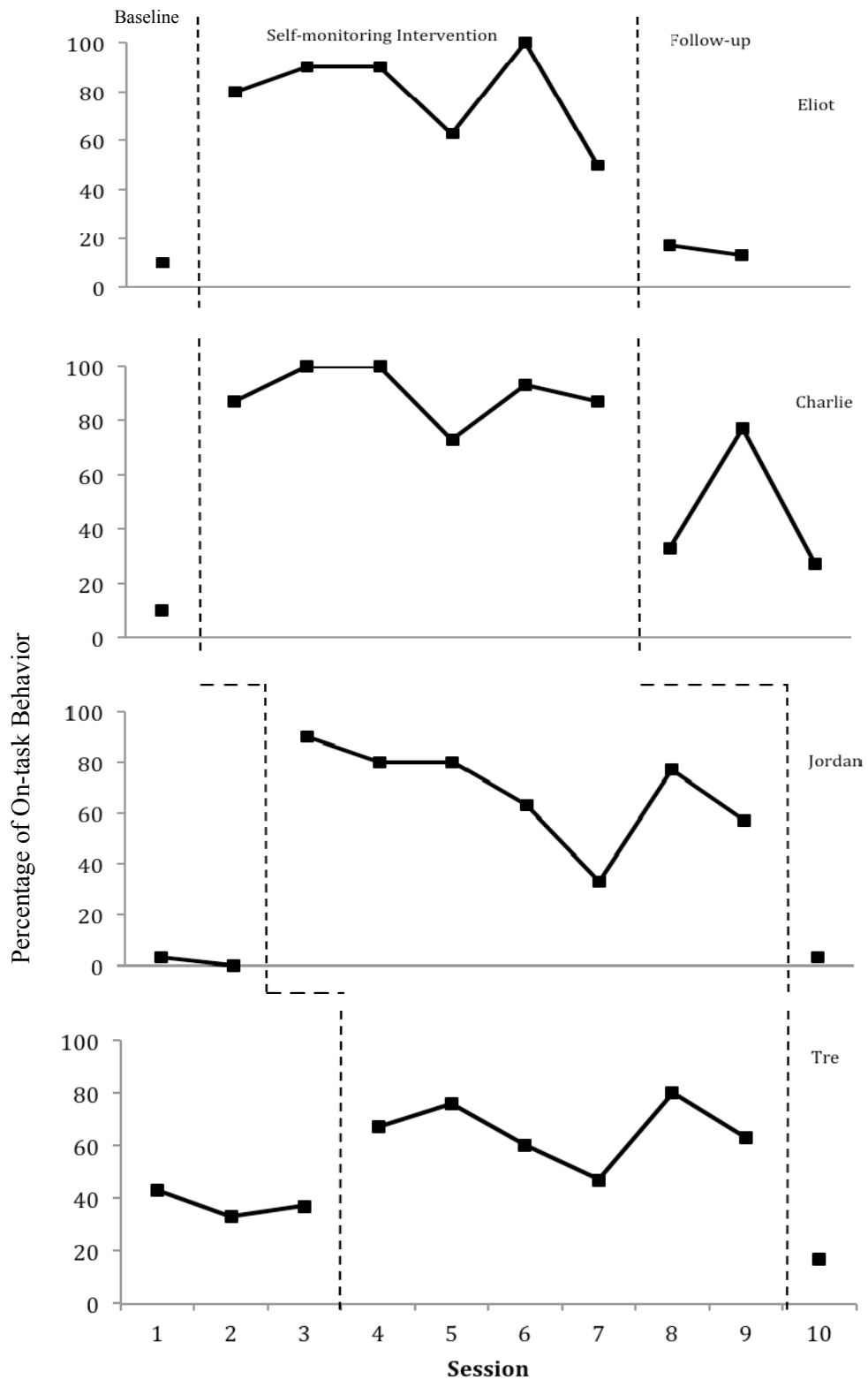


Figure 1. Participants' percentage of on-task behavior during baseline, intervention, and follow-up conditions

The results are encouraging for two additional reasons. First, the results provide additional empirical support for the effectiveness of a vibrating electronic device to tactily cue students to self-monitor. Several studies have demonstrated the effectiveness of this technique in prompting students to self-monitor on- and off-task behavior while completing academic tasks such as math and spelling (e.g., Farrell & McDougall, 2008; Legge, DeBar, & Alber-Morgan, 2010; Rafferty, Arroyo, Ginnane, & Wilczynski, 2011). However, few studies have investigated the use of tactile cues within a self-monitoring intervention targeting on- and off-task behavior during homework. Traditionally, self-monitoring interventions have relied on aural or verbal prompts from the teacher or other adult to indicate when students should self-assess their behavior. These methods, while reported to be effective in the literature, can be conspicuous and, as a result, have the potential to be distracting to others. In addition, adult verbal prompts require a high level of adult involvement. In group settings, such as an after-school program's homework assistant time, a less noticeable cueing method might be ideal. Furthermore, interventions that require a high degree of adult involvement might be met with resistance resulting in poor implementation fidelity (Axelrod et al., 2009). The methods outlined in the present study required little adult involvement (e.g., 5-min training on using the MotivAider®, conducting accuracy checks) to obtain positive outcomes. Educators, consulting with parents and professionals, might consider recommending an intervention protocol that utilizes a vibrating device to prompt students who exhibit high levels of off-task behavior to self-monitor, especially in group settings or where adult involvement is limited.

Second, the self-monitoring procedures described in the current study are generally considered proactive. Contrasted with reductive behavioral procedures (e.g., response cost) that rely on the student to engage in the problem behavior before a consequence is applied, proactive interventions do not require the student to engage in the problem behavior. In the case of self-monitoring, students provide themselves feedback about their own immediate past behavior. Awareness of one's own behavior and an accurate self-evaluation of that behavior are critical to effective self-regulation (Barkley, 1998). Furthermore, accurate self-appraisal of immediate past behavior enables students to alter ineffective patterns of future behavior (Reid et al., 2005). Self-monitoring interventions have the potential to establish self-regulation skills of students with extremely inattentive and off-task behavior. Educators are frequently referred students with poorly developed self-regulation skills and self-monitoring interventions offer these professionals a proactive approach to teaching self-regulation skills in naturalistic settings.

The study's results would have been more noteworthy if the positive effects observed during the self-monitoring condition would have carried over to the follow-up condition. All four participants exhibited low levels of on-task behavior when the intervention was withdrawn. However, the results are not surprising given the length of the sessions (i.e., 15-min) and intervention condition (i.e., 6 -7 sessions). Several studies have demonstrated maintenance of participant gains in on-task behavior following a self-monitoring intervention implemented over more sessions. For example, Trammel, Schloss, and Alper (1994) found that homework completion remained high in the follow-up condition when a self-monitoring intervention

lasting more than 45 days was implemented with eight students with learning disabilities. The current study's findings might suggest students' limited exposure to the self-monitoring intervention did not generate enough repetitions to facilitate generalization. Despite the lack of maintenance, the study's results did show that all four participants responded immediately when the self-monitoring intervention was implemented and the improvements in their on-task behavior remained high through the entire intervention condition.

#### *4.1 Limitations and Future Research*

Although the findings are encouraging, there are several limitations. First, the current study employed a self-monitoring plus reward procedure, where the reward was provided to participants for accurate self-recording of on- and off-task behavior. While the literature often recommends using a reward to ensure accurate self-recording (see Reid et al., 2005), it is possible that the changes in on-task behavior were as a result of the reward itself. Related, participants' on-task behavior may have been reinforced by the increased adult attention received as a result of the study's procedures. Future research should consider testing self-monitoring interventions without a reward component and investigating the differential effects of various levels of adult attention provided through the intervention's procedures.

Second, data on participants' homework completion were not collected. While other studies have found self-monitoring interventions to improve both on-task behavior and percentage of homework assignments completed (e.g., Axelrod et al., 2009), it is impossible to know whether the current study's intervention procedures improved participants' homework completion. Future research using self-monitoring procedures implemented in after-school programs should include measures of homework completion and homework completion accuracy to help establish the intervention's social significance.

Third, the 15-min intervention sessions were relatively short periods of time. It would be important to replicate the study's findings using longer homework periods, especially given that most students spend more than 15 minutes completing homework. Related, longer session periods would aid in determining if the positive results were a function of students being more on-task during the beginning of the homework time.

Fourth, the limited baseline condition (1 – 3 sessions) made it difficult to establish stable baseline trends. This is particularly true for two participants (Elliot, Charlie) who were exposed to only one baseline session. Although their baseline data points were exceptionally low (i.e., 10% of intervals on-task) and consistent with staff reports, it is possible that baseline data would show varying trends with more observations. Finally, the study is limited by its small sample size and participant characteristics. It is difficult to establish an intervention's effectiveness with a small sample. Replication of the study's procedures with additional participants would aid in helping the field better understand self-monitoring interventions within the context of after-school programs.

### **5. Conclusion**

Despite the limitations, the current study's results provide additional evidence for the effectiveness of self-monitoring interventions that use tactile prompts for students engaging

in off-task behavior while completing homework. Furthermore, the study's findings are promising for educators looking for effective, easy to implement interventions for students experiencing homework completion problems within after-school program settings. Educators are increasingly being asked to provide consultation to parents, teachers, and community service providers regarding students' problem behavior. They are encouraged to consider self-monitoring strategies that employ a tactile prompt when working with this population.

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