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Increasing Engagement and Academic Performance of Children with Autism Spectrum Disorder and Attention Difficulties: Do Fidget Spinners Help?

by

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A thesis submitted in partial fulfillment
of the requirements for the degree of
Master of Science in Applied Behavior Analysis
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University of South Florida

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DEDICATION

This manuscript is dedicated to all those who encouraged and supported me for the past six years. From my first exposure to behavior analysis up to the completion of this thesis, I have had an incredible team of supporters that deserve so much credit for helping me reach this point in my education and career.

First, to Tolland county schools for opening my eyes to the field of behavior analysis and inspired the subject of this thesis. Next, to my professors at Eastern Connecticut State University including Dr. Sandy Jin, Dr. Joseph Dracobly, and Dr. James Diller for taking the time to entertain my curiosities, for spending ample time mentoring me and for forging my path into the field and into graduate school. I attribute my success in graduate school largely to the extensive course sequence at this amazing institution. It would be remiss of me to overlook the never ending, albeit unconventional, support of my father and other family members. For this reason, I would like to directly thank my father, Edward Byrne, for the support, encouragement, and love I have felt even from thousands of miles away. I also need to thank my professors, and specifically my advisor, at the University of South Florida for the knowledge and support given over the course of this graduate program. And finally, my support team in Florida that has become more like a family to me. Ashley Knochel, the Hasbroucks, and all those who extended a hand in kindness, specifically, are genuinely the reason I have succeeded. This achievement is as much mine as it is yours and I am forever grateful to have such incredible people in my corner. No accolade is ever achieved in isolation and for this reason, my manuscript is dedicated to the incredible team I have that has supported me every step of the way

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ABSTRACT

Children with varying exceptionalities including ADHD, Autism Spectrum Disorder, and other learning disabilities often struggle with attention deficits. The persistence of alternative non-behavioral approaches in classrooms to address this deficit presents the need for more research and education about these interventions. Specifically, the fidget spinner is a newer intervention which currently has no empirical evidence to support its use in the classroom setting. The purpose of this study was to examine the effects of fidget spinners on increasing engagement and academic comprehension in a whole classroom environment. A multiple baseline across participants design was used with six children with varying diagnoses who struggled with attention deficits. Results showed that fidget spinners were ineffective at increasing engagement or academic comprehension and that self-monitoring was effective at increasing both engagement and academic performance.

CHAPTER ONE:

INTRODUCTION

Children with learning differences often struggle in a classroom because they have lower levels of engagement and on-task behavior than their peers, specifically during passive activities such as listening or reading silently (Imeraj et al., 2013; Junod, DuPaul, Jitendra, Volpe, & Cleary, 2006; Wiener & Daniels, 2016; Zendarski, Sciberras, Mensah, & Hiscock, 2017; Tarver & Hallahan, 1974). Learning disabilities including Autism Spectrum Disorder (ASD) and Specific learning disabilities (SLD) have high rates of comorbidity with Attention Deficit Hyperactivity Disorder (ADHD) although ADHD often goes undiagnosed as the severity of the learning disability increases (Al-Khudairi, Perera, Solomou, & Courtenay, 2018). As learning disabilities often include attention difficulties, they present similarly and are often treated in similar ways. This inattention and off-task behavior is often associated with fidgeting (Carierre, Seli, & Smilek, 2013). Children with attention difficulties and learning disabilities are less likely to achieve academic success and to have opportunities in the future (Birchwood & Daley, 2012; Zablocki & Krazmien, 2012). Attention deficits are often accompanied by many problematic behaviors and it is important to find ways to remedy these issues in a classroom setting.

A very popular approach to remedy these issues is using stimulant medication (Prasad et al., 2013). Both stimulants and antipsychotics are used to treat ADHD and learning disabilities. Stimulant medications are more commonly used to address the inattention problems. Most of the research pertaining to stimulant medications is performed with children specifically diagnosed with ADHD, although it is worth noting that these medications are used to address broader

challenges including academics, social deficits, and behavioral issues (Prasad et al., 2013). Three of the most commonly prescribed medications are: methylphenidate, amphetamine, and dexamphetamine (Kortekaas-Rijlaarsdam, Luman, Sonuga-Barke, & Oosterlaan, 2018). Stimulants improve children's productivity by increasing the duration of seatwork but not necessarily the accuracy of work completed (Kortekaas-Rijlaarsdam et al., 2018; Prasad et al., 2013). Although methylphenidate has empirical evidence that demonstrates effectiveness in increasing on-task behavior, there are many side effects associated with the drug. Anywhere from 13.7% to 100% of children observed with the drug experienced side effects such as irritability, crying, staring, anxiety, and sadness (Konrad-Bindl, Gresser, & Richartz, 2016). Although stimulant medications have had success with certain aspects of attention deficits, accuracy of work has not been addressed and side effects are very prevalent.

A second method of treating attention deficits is a behavioral approach. Within this approach, there are consequent-based and antecedent-based interventions that have been tested with children with ADHD and related diagnoses. Consequent-based interventions are function-based approaches that are implemented following behavior. One method is sending notes home as was examined by Jurbergs, Palcic, and Kelley (2007). In this case, on task behavior increased when teachers sent home a note with the student that rated their overall in class behavior including how well they completed classwork and how well they used class time on a three-point scale. Unfortunately, these effects did not sustain for all students at follow up. Positive reinforcement and extinction are other consequence-based methods often used for children with attention deficits. Positive reinforcement for on-task behavior along with extinction for off-task behavior has successfully increased on-task behavior in students with ADHD and other learning

disabilities as an individual intervention (Flood, Wilder, Flood, & Masuda, 2002) as well as part of a multicomponent intervention (Cho & Blair, 2017; Stahr, Cushing, Lane, & Fox, 2006).

Within the context of a multi-component design, Cho and Blair (2017) successfully utilized reinforcement and extinction. Praise statements were delivered when the participants were on-task and problem behaviors were completely ignored. Praise and extinction were delivered by the teacher and help was not provided contingent on being off-task. Results indicated engagement increased and problem behaviors decreased during intervention, although it is impossible to say if this is due only to the use of positive reinforcement and extinction. Additionally, engagement scores were relatively high during baseline which makes results less convincing. Stahr et al. (2004) addressed the needs of a child with ADHD along with other learning disabilities with a multi-component intervention which included planned ignoring. Teachers and other adults in the room were trained to completely ignore the behavior of the participant at all times unless he used communication cards to verbalize his needs. No praise component was used, and although on-task behavior increased, results were variable and engagement scores were still not as high as those of his typically developing classmates. Based on these studies, several conclusions about consequent based interventions can be made. First, when reinforcement and extinction are used alone, the intervention does not reduce off task behavior to zero and may also require a contingency component (Flood et al., 2002). Additionally, sending notes home, positive reinforcement, and extinction have increased on task behavior but not necessarily up to the level of typically-developing peers.

Antecedent-based interventions are the second type of behavioral interventions that have been effective with increasing on task behavior. One of the most common antecedent interventions for children with ADHD and other learning disabilities is self-monitoring. Self-

monitoring can consist of pre-printed response cards on a child's desk with questions such as "am I on task" that a child can check in with during work periods (Rafferty, Arroyo, Ginnane, & Wilczynski, 2011; Stahr et al., 2006), teaching the child to set their own goals (Cho & Blair, 2017) or using an auditory cue to prompt the child to get back on task (Rafferty et al., 2011; Wills & Mason, 2014). In some cases, this strategy has been effective at increasing on task behavior to near 100% of observed intervals (Cho & Blair; Wills & Mason). While Rafferty et al. (2011) did not achieve levels of near 100% on-task behavior, the on-task behavior of participants increased to that of their peers with the help of pre-printed self-monitoring cards.

Hart, Massetti, Fabiano, Pariseau, and Pelham (2011) found that levels of on-task behavior in children with attention difficulties vary across contexts. Specifically, on-task behavior is highest in small group settings, second best during independent work, and the lowest during whole group instruction. Due to these differences, it is important to understand research in terms of what learning contexts were utilized. Rafferty et al. (2011) implemented self-monitoring in the context of independent work so results must be interpreted specifically in this context. Wills and Mason (2014) implemented intervention in the context of both whole group instruction and individual work with no clear distinction between the two in measurement. This may be problematic in that it may over- or under-represent on-task behavior depending on which context was in place during observation. Neither Cho and Blair (2017) nor Stahr et al. (2006) directly reported in which context work took place thus it is impossible to gauge what effect, if any, the context had on behavior. In terms of academic contexts, the literature shows that self-monitoring was effective across several academic subjects including science, math, English, and spelling (Cho & Blair, 2017; Rafferty et al., 2011; Stahr et al., 2006; Wills & Mason, 2014). Overall,

future research needs to more closely address the context in which research is being conducted as it is a variable that has affected the independent variable in the past.

One important reason to increase engagement is ultimately to increase comprehension and academic success for students. However, only Rafferty et al. (2011) took measures on academic success, thus, although on-task behavior was increased, it is unclear whether this change had any effect on the students' success or comprehension of material in other studies (Cho & Blair, 2017; Stahr et al., 2006; Wills & Mason, 2014).

Another antecedent manipulation strategy is incorporating visual stimuli into tasks. Lee and Zentall (2002) found increasing visual stimulation within a math facts computer program led to an increase in problems completed when compared with a math facts program that did not have visual stimulation. This procedure was repeated with competing visual stimulation in the form of a second computer screen with graphics. This competing stimulation, however, led to a decrease in problems completed, most likely because attending to the second screen could not happen concurrently with answering math problems.

Although research shows that behavioral manipulations are effective at increasing on-task behavior, many non-behavioral interventions persist in classrooms and are very popular for kids with learning disabilities and attention difficulties. The National Institute of Health (NIH) reports several alternative, non-behavioral treatments for ADHD. The National Institutes of Health (2017) does not report alternative treatments for learning disabilities apart from special education services but alternatives listed for ADHD have also been used to treat learning disabilities and the inattention that comes with it. Special diets which range from restricting sugar intake to increasing fatty acids have not been found to affect attention deficits and may present risks to the child such as liver damage (Millichap & Yee, 2012).

Biofeedback is an expensive intervention designed to increase self-awareness and help children with ADHD and other learning disabilities control their responses. The research that has been conducted on biofeedback is insufficient and unclear thus ruling it experimental (Linden, Habib, & Radojevic, 1996). Finally, hypnotherapy, which includes deep breathing and visualization, may be effective with helping sleep and certain tics but has not been successful with inattention or impulsivity (Alternative Treatments, 2003). Regardless of the lack of research or support for these interventions, these nonbehavioral interventions remain popular based predominantly on anecdotal reports. This may be in part due to the potential side effects that come with medication and the ease with which many of these interventions can be implemented. No research has been found to reveal why parents prefer or continue to utilize alternative methods that lack empirical evidence.

One of the newer interventions for students with attention problems and learning disabilities is the fidget spinner. A fidget spinner is a small, plastic device that can be spun in the user's hand. Fidget spinners gained popularity in early 2017, hitting a high point in google searches in May 2017 (Weise, 2017). At the same time, however, schools began banning the toys. Spinner List (2018) suggests fidget spinners are not meant to be played with and the misuse of these gadgets as toys instead of as tools to increase focus has led to the ban. Fidget spinner websites such as Fidget Land and Spinner List report fidget spinners increase attention, academic performance, and help people break bad habits while reducing stress and anxiety, but provide no scientific rationale as to why this occurs. Both sites use testimonials and personal experience to explain the success of fidget spinners (Burns, 2018; Spinner List, 2018). An article in livescience.com reported that there was no literature on the effectiveness of fidget spinners and

proposed that they are more likely to be distracting than helpful with increasing attention (Pappas, 2017).

Theoretically, fidget spinners may be consistent with a scientific approach. It is possible that they may serve as a competing stimulation for the stimulation produced by being off-task, fidgeting, or wandering around the room. Lee and Zentall (2002) found that students with attention difficulties were more on task and more accurate when the task was highly stimulating and that a stimulating screen was chosen over a non-stimulating screen consistently, although this research excluded children with other learning disabilities. If a highly stimulating item, such as a fidget spinner, is used in conjunction with a lesson, it is possible that the student will be more engaged in the lesson. No research thus far has been conducted to test this theory.

The purpose of this study was to address the lack of research on the use of the fidget spinner for attention problems and learning disabilities. This study examined engagement and academic comprehension of children who struggle in whole group settings as the research on this context is lacking but has been identified as promoting the lowest amount of on-task behavior. Specifically, the purpose of this was to determine whether or not fidget spinners were effective at increasing engagement and academic comprehension for children in a classroom setting. When fidget spinners did not result in improvements, a self-monitoring program was implemented in the same context.

CHAPTER 2:

METHOD

This study was implemented in a private clinic-based school classroom in south Florida. All lessons took place in a standard sized classroom with students seated in a semi-circle facing a white board. The class varied in size ranging from six to ten students. All data were collected during the social skills blocks that occurred during regularly scheduled group clinic sessions. During the session, the teacher lectured, conducted a group activity, or read a story. During the school year, sessions were conducted during the after-school group sessions. Once the school year ended, all participants attended a day camp held at the same clinic in which social skills blocks remained the same. Inclusion criteria for participants was a teacher referral of attention deficits during whole group instructions and a learning disability. Exclusion criteria included high rates of problem behaviors including physical aggression and property destruction that would disrupt the lesson.

Participants initially included eight students who received regular services at the clinic at the time of the study. During the teacher interview, all eight students were referred for having attention deficits during whole group instruction by the teacher. Two students, Robb and Theon, did not complete the study as their rates of engagement were too high. Robb was a 10-year old boy with a primary diagnosis of Disruptive Mood Dysregulation Disorder (DMDD). Although he was referred for the study for struggling during academic periods, he did not fit inclusion criteria and thus was discontinued from the study. Theon was a 9-year-old boy with a primary diagnosis of Oppositional Defiance Disorder (ODD). Theon initially met inclusion criteria but after several

baseline sessions, exhibited levels of engagement higher than 75% consistently and thus was discontinued from the study.

Sam was a 10-year-old boy with an ASD diagnosis. Sam struggled with socialization and was language impaired but could vocalize wants and needs. Sam's social skills were limited, and he preferred to play by himself. At the time of the study, he had been receiving behavioral therapy at the clinic for three years. Peter was a 15-year-old boy with a primary diagnosis of ASD who had been receiving services for 2 years at the time of the study. He mainly struggled with social interactions, self-stimulation, and daily living skills. In terms of social skills, Peter struggled to play collaboratively with adults and almost never interacted with peers. Jamie was an 11-year-old boy with a primary diagnosis of ASD and a secondary diagnosis of ADHD. Jamie was strong academically but struggled socially. He was able to communicate wants and needs at an age appropriate level and had been with the clinic for less than 6 months. Jamie preferred to play alone but would socialize with peers given support. Rickon was a 7-year-old boy with a primary diagnosis of ASD. Rickon struggled with high levels of stimulation and expressing emotions but was able to communicate wants and needs at an age appropriate level. He would interact with adults when prompted but struggled to interact with peers. Brandon was a 10-year-old boy with a primary diagnosis of ASD. Brandon struggled with his intraverbal repertoire, which mostly consisted of scripting and self-stimulation. Brandon was strong academically when receiving individualized assistance and had been with the clinic for 6 months. Brandon did not socialize well with others and often instigated or perpetuated arguments and problem behaviors in peers. Finally, Jon was a 9-year-old boy with a primary diagnosis of ASD. Jon predominantly struggled socially and with expressing and controlling his emotions. He had also been receiving

services for 6 months. Jon would play collaboratively with select peers but when playing competitive games, would often tantrum and disengage from the group.

The selected participants were reported to exhibit off task behaviors in whole group settings. The recruited teacher was a certified teacher in the state of Florida and an employee of the clinic. She regularly taught group social skills classes and all participants were familiar with her. In the event that she was unavailable or sick, a substitute teacher led the prepared lesson. In total, the substitute led the lesson a total of 3 times: once when all participants were in intervention, once when participants were in all four phases, and once when participants were in fidget spinner and self-monitoring.

Materials

Data collection required a timer that signaled when to collect data, a data sheet, and a pencil. The timer used had a one sec delay for the onset of engagement. The datasheet (see Appendix A) was prepared ahead of time by the researcher. Other required materials included a fidget spinner (see Appendix B), and a self-monitoring sheet (see Appendix C). Four research assistants collected IOA and treatment fidelity data throughout the course of the study. All research assistants had at least 2 years of experience in ABA and were attending or had completed a masters in ABA program. Research assistants were trained by the primary investigator by showing them videos of behaviors similar to the target behaviors available online. Research assistants were allowed to collect data once they scored videos correctly at least 90% of the time.

Target Behavior and Data Collection

Academic engagement and academic performance. Academic engagement was recorded as the primary dependent variable. Active engagement was defined as directly participating in

assigned work including reading, writing, or performing an assigned task. Passive engagement was defined as attending to the assigned task such as listening to a story or lecture or looking at worksheets. For the purpose of this study, both passive and active engagement were recorded as engagement in general. Off-task behaviors, which encompassed all behaviors not included in the engagement definition, included looking away, getting out of seat, manipulating objects, and talking to peers for all participants. Off-task behaviors were not directly measured, however, a measure of off-task behaviors was obtained in every session by subtracting the duration of engagement from the total duration of the observation. Peter had an additional problem behavior in which he would appear to be engaged but was instead self-stimulating. This was evidenced by smiling and laughing at inappropriate times, along with looking without purpose, as was defined in his behavior plan. Upon realizing that this behavior was very specific and hard to identify, only research assistants who had specifically worked with the student were asked to collect IOA for Peter.

Engagement was measured in duration. A timer was started when the target student was engaged, paused when the student was off-task, and resumed when they were again engaged for at least 1 sec. The total time out of the duration of the observation was recorded in the datasheet at the end of the observation. Percentage of time spent engaged was determined by dividing engagement duration by the total duration of observation. Percentage of time off task was calculated by subtracting engagement duration from total observation time and then dividing this number by observation length. The length of data collection was based on the already existing classroom schedule which was determined during the teacher interview and varied from five to fifteen min. Observations took place up to four times per day, five days a week.

Additionally, rate of teacher prompts and praise was recorded These behaviors were recorded as a control for the study. In the event that student behavior changed as a response to teacher behavior, prompts and praise were recorded to identify any correlations. If the teacher made a comment regarding the student's problem behavior or reprimanded the student, a tally mark was recorded under teacher prompt. If the teacher delivered praise about appropriate behaviors or a lack of problem behaviors, a tally mark was recorded under teacher praise. Following data collection, total number of praise statements or prompts was added up and divided by the duration of data collection in minutes to produce a rate of response per min.

Academic comprehension was measured with a four-question comprehension worksheet that was provided following the group instruction period. All comprehension questions were prepared in advance by the teacher in conjunction with the primary investigator to assure a consistent difficulty level prior to the start of observation. Questions were open-ended, requiring two or three-word answers and tested recall. Questions not answered were scored as incorrect. The scores on comprehension worksheets did not affect the student's grade or data in the clinic.

Interobserver Agreement

Interobserver agreement (IOA) was scored an average of 37.5% of observations across all phases using total agreement IOA. Each observer scored academic engagement and academic performance independent of one another. IOA for academic engagement was calculated by dividing the smaller duration of engagement by the larger duration of engagement and multiplying by 100%. IOA for engagement as well as for off-task behavior was calculated. A breakdown of averages and ranges of IOA calculations per participant across phases can be found in Table 1. Academic comprehension IOA was calculated by taking the lower of the two scores for each worksheet and dividing it by the higher score, then multiplying by 100%.

Comprehension IOA was scored in 35% of comprehension checks for Sam, 36% for Rickon, 30% for Peter, 33% for Jamie, 33% for Brandon, and 36% for Jon across all phases. 100% agreement was obtained for all participants.

Social Validity

A social validity questionnaire was distributed to teachers and students following the intervention phase to assess the acceptability of the intervention. The teacher questionnaire included 10 questions such as "I feel that the use of fidget spinners helped increase engagement" on a five-point Likert scale ranging from strongly disagree to strongly agree with a section to leave comments (see Appendix D). The student social validity questionnaire included 4 questions such as "Using a fidget spinner helped me pay attention" and "I liked the self-monitoring sheet" on a three-point Likert scale of disagree, maybe, and agree with a section to leave comments (see Appendix E). Surveys were distributed to all six participants, the primary teacher, and the substitute teacher who conducted several lessons throughout various phases of the study.

Experimental Design

A multiple baseline across participants design was used. For each participant, four phases were conducted: baseline, baseline prime, noncontingent access to a fidget spinner, and self-monitoring. Experimental control was shown for the self-monitoring phase. Graphs were re-staggered during data collection to show experimental control for this phase, alone, after it became clear that fidget spinners showed no effect on behavior. For this reason, some of phase change lines stagger to the left instead of the right which is not traditional in a multiple baseline design. However, all phase change lines stagger to the right when entering self-monitoring which is where the change in behavior is apparent.

Procedures

Baseline. Baseline consisted of the teacher implementing group instruction with no other instruction or prompting during the targeted academic period. This academic period was always determined to be social skills which involved discussing a specific social skill, going over applied examples, or reading a story pertaining to social skills. The student received no fidget spinner. The teacher would first instruct all students to sit in their chairs and then presented the class lesson. The teacher gave no specific instructions regarding the delivery of praise or reprimands during lessons. Instead, the teacher conducted class as usual and the frequency of praise and prompts was recorded by the data collector. The data collector sat at least 10 ft away from the class, keeping the target student within view. Data collectors provided no prompting or feedback.

Baseline prime. Baseline prime mirrored baseline with the addition of a comprehension worksheet. Following the group lesson, the primary investigator read the comprehension worksheet to the target student as each participant received this accommodation in the school setting. No hints or prompts were given and their answers were recorded on the comprehension sheet. Students were not given praise or feedback for correct or incorrect answers. If the students took longer than 5 minutes to answer the questions, their completed answers were recorded and blank questions were marked as incorrect.

Noncontingent access to a fidget spinner. Teachers gave a fidget spinner to the participant at the beginning of the targeted academic period and said “this is for you to hold during the lesson but pay attention please. Please don’t share it with friends.” No praise was delivered for engagement or other appropriate behaviors. If the student was off-task, there was no specific procedure to follow, instead the teacher responded to the behavior as he or she typically did

(same as baseline). If the student misplaced or threw the fidget spinner, he was allowed to retrieve it, but this did not count as being engaged. Fidget spinners were dropped predominantly by Jamie and Brandon and it occurred across sessions. If another student took or was given the fidget spinner, the teacher told the student to return it to the target student and reminded them not to share with friends. Brandon and Peter shared with friends twice each, but no more than once per lesson. After the lesson, the teacher asked for the fidget spinner back and presented the student with the comprehension worksheet. The procedures for completing the comprehension worksheet were the same as in the baseline prime phase.

Self-monitoring Training. Self-monitoring was implemented when both engagement and academic performance levels did not increase to 80% or higher when fidget spinners were provided. Prior to the group lesson, the primary investigator instructed the child how to use the self-monitoring sheet (See Appendix C) through modeling, rehearsal, and feedback. First, the primary investigator read the self-monitoring worksheet to the participant. Training procedures were adapted from Rafferty et al. (2011). Next, the investigator told the student what engagement looked like, provided examples such as paying attention to the teacher, writing on the self-monitoring sheet, and asking the teacher questions, and modeled these behaviors. Next, the investigator defined, exemplified, and modeled off-task behaviors such as looking around the room, talking to friends, and getting out of their seat without permission. The investigator then showed the participant how to use the self-monitoring sheet through demonstration. The participant then verbally explained how to use the self-monitoring sheet and rehearsed. Correctly using the self-monitoring sheet was praised while errors were corrected until the participant scored 100% three consecutive times.

Self-monitoring. At the beginning of the targeted academic period, the teacher gave the student a self-monitoring worksheet with questions including "Am I listening to the teacher?" and "Is my body still?" The teacher then told the student "fill this out during the lesson". The student held a vibrating timer that prompted them to answer yes or no to these questions every 30 sec. Following the academic period, the teacher asked the student for their self-monitoring sheet. Regardless of if the student had completed the sheet or not, the teacher took the sheet without providing feedback. The comprehension questions were then asked and recorded.

Treatment Integrity

Treatment integrity was collected by the primary investigator in 15 of the 32 sessions for a total of 46.9% across all phases using a provided task analysis (see Appendix F) which was also provided to the teacher ahead of time. Baseline consisted of 2 steps, baseline prime consisted of 9 steps, non-contingent fidget spinner and self-monitoring training were both 13 steps, and self-monitoring was 14 steps. Steps were scored as either not occurring or occurring. Integrity was calculated by dividing occurrences by total steps and multiplied by 100. Treatment integrity for baseline, baseline prime, fidget spinners, and self-monitoring was 100%. Integrity for self-monitoring training was collected in 33% of sessions by a research assistant and yielded a score of 96%.

CHAPTER THREE:

RESULTS

Results showed that fidget spinners did not increase engagement or comprehension for any of the study participants and led to decreases for some participants. No significant gains were shown from baseline to baseline prime, suggesting that the intdroduction of questions alone did not lead to increases in engagement levels. When fidget spinners were introduced, engagement decreased for Rickon and Sam. No visual differences for comprehension or engagement were shown for Jon or Brandon between baseline and fidget spinner conditions. Both Peter and Jamie had variable, but comparable levels of engagement and comprehension when fidget spinners were introduced. Effects of self-monitoring could be seen immediately for Jon, Peter, and Jamie, and within three sessions for Rickon and Brandon. Although Sam's engagement levels showed moderate increases in engagement as compared to baseline, his comprehension scores greatly increased once self-monitoring was implemented. Overall, there was no real change in either engagement or academic comprehension for all participants until self-monitoring was implemented. All participants showed increases in their rates of engagement and comprehension as compared to their baseline scores.

Teacher prompt and praise data yielded no significant patterns. Averages of prompts and praises were calculated per phase across participants. The average rate of praise per min was .43 in baseline, 1.1 in baseline prime, .84 in non-contingent fidget spinner, and .72 in self-monitoring. Although there is an increase during baseline prime, this increase did not seem to correlate with higher rates of engagement or comprehension. For average rate of prompt per min

across participants, the teacher delivered .65 in baseline, .81 in baseline prime, .50 in non-contingent fidget spinner, and .41 in self-monitoring. Again, the highest rate occurred during baseline prime although this is not reflected in student behavior. Even with varying rates of prompts and praise, student behavior did not significantly change until self-monitoring was implemented. There did not appear to be a correlation between prompts or praise with engagement or comprehension.

Social validity questionnaires were collected from both teachers and students. Results found that teachers one and two scored both the acceptability of fidget spinners and self-monitoring a 5. Although teacher one had no opinion on the ease of use and effectiveness, teacher two scored use as a 4 and ease as a 5. Both teachers scored the disruptiveness of the fidget spinners as a 2, meaning they did not find them disruptive. Both teachers scored 5 for use and acceptability of self-monitoring. The two teachers' scores again mirrored each other in regard to future use. Both scored 4 for using fidget spinners in the future and 5 for using self-monitoring. In the general comments section, teacher one simply remarked that everything was great. Based on these results, both fidget spinners and self-monitoring had social validity among teachers, though self-monitoring was rated slightly higher.

For the students, all six completed questionnaires. Five students agreed that they liked fidget spinners and one had no opinion. Three agreed, two disagreed, and one had no opinion on whether the fidget spinner was useful. Similarly, five students agreed to liking self-monitoring while one disagreed. Four students agreed that self-monitoring helped them pay attention and two disagreed. Overall, both fidget spinners and self-monitoring were acceptable by teachers

and students. Fidget spinners and self-monitoring were also reported to be useful though self-monitoring scored higher in this area for both teachers and students.

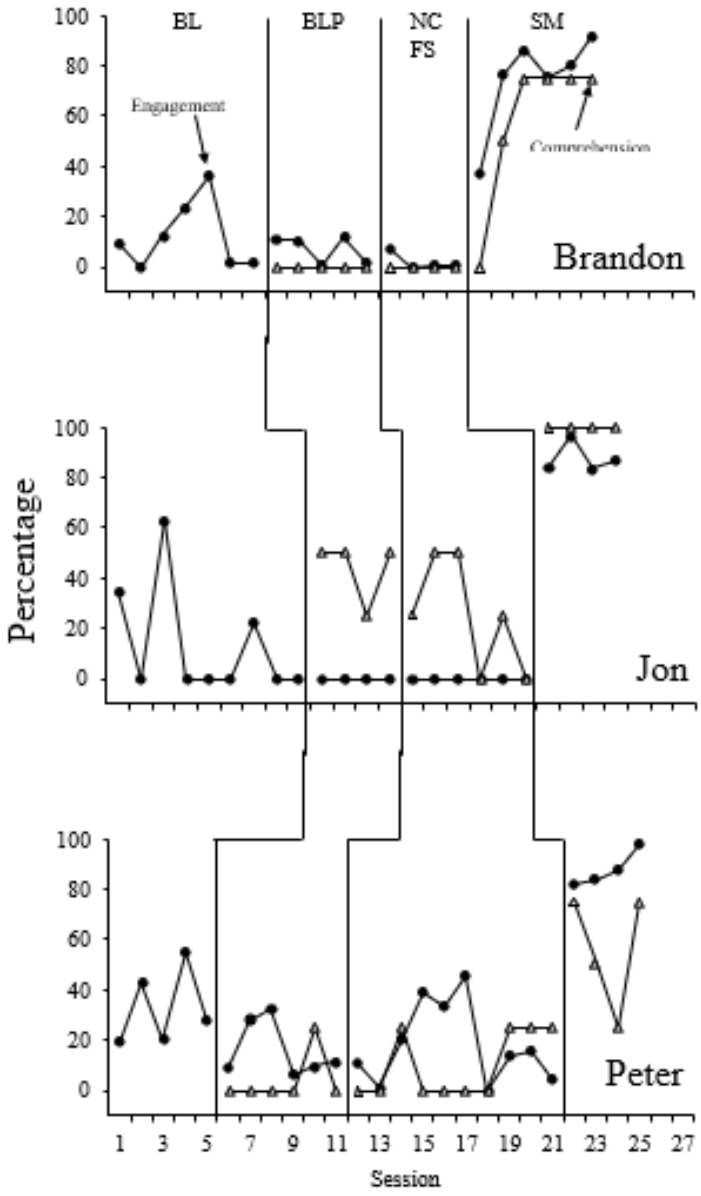

Figure 1. Figure 1 shows results for three participants. Percentage of total duration in which participants were engaged along with their percentage correct in comprehension checks across sessions.

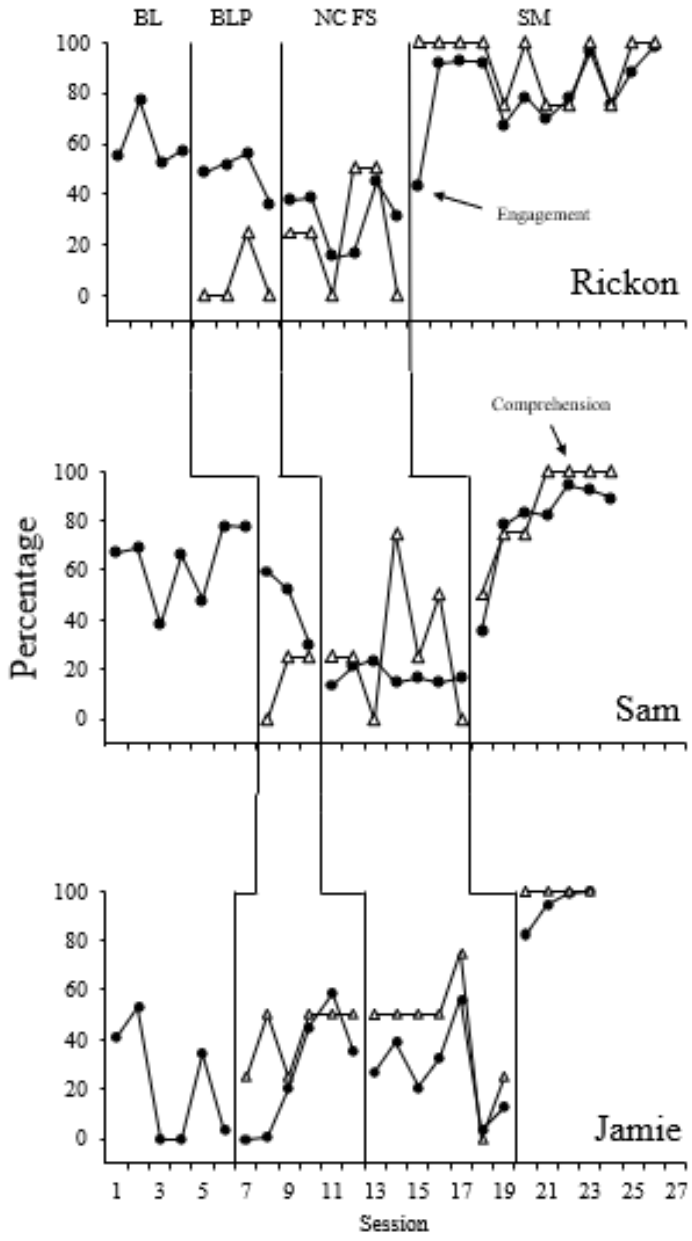

Figure2. Figure 2 shows results for three participants. Percentage of total duration in which participants were engaged along with their percentage correct in comprehension checks across sessions.

CHAPTER 4

DISCUSSION

The purpose of this study was to examine whether or not fidget spinners increased engagement and comprehension for students with learning disabilities and attention deficits in a whole classroom setting. Results found that fidget spinners were not effective and led to a decrease in engagement for some participants. Self-monitoring did result in improvements for all six participants which is in line with previous studies (Rafferty, Arroyo, Ginnane, & Wilczynski, 2011; Stahr et al., 2006; Cho & Blair, 2017). It is also important to note that comprehension scores were greater when engagement was higher suggesting a correlation between the two.

Unfortunately, fidget spinners seemed to cause disruptions in the classroom throughout the course of the study. Students not included in the study often complained that some were able to use the fidget spinners and almost all students requested a fidget spinner at least once. When participants moved to self-monitoring, they often requested the fidget spinner instead of the self-monitoring sheet. One participant, Jamie, brought a fidget spinner from home but both he and his parent reported that he had not previously used one in school. Fidget spinners were thrown, stolen, and dropped during lessons when in use. Largely, it appeared as though fidget spinners served as a competing stimulus to the lesson and led to less engagement, which is in line with the findings of Lee and Zentall (2002). Instead of fidget spinners becoming a stimulating part of the lesson, they became more of a distraction to the participants and to those around them.

Self-monitoring may have been effective for reasons not otherwise indicated in the literature due to the unconventional ways in which participants used the sheets. Rickon, for

example, did not check off boxes on his sheet but did frequently look at it and reset the timer. For Rickon, the sheet may have served more as a visual prompt and less as a checklist. It is worth noting that Rickon achieved criterion engagement and comprehension scores in session 18, his fourth session in self-monitoring but when data collection continued, these scores came down. In this time period, he also went on vacation for a week. When he returned, the primary investigator provided him with booster sessions for use of self-monitoring but it was not until his third session back that he fully utilized the sheet and his engagement levels again increased to criterion level. Brandon would often fill out all of the boxes in the beginning or end of the lesson, suggesting that he did not use the sheet in the conventional way. Sam would question the primary investigator as to what he was supposed to do throughout the session, despite exhaustive training efforts prior to him using the sheet in the classroom. For example, he would look away from the lesson and ask 'stop the timer?' when it went off. No cues were given from the primary investigator and reminders were provided before and after the lessons. Although he appeared less than fluent on the use of the sheet, he was successful at staying on-task and recalling information from lessons.

One of the indirect effects of self-monitoring for Jon was that he began sitting in his chair. At the beginning of every lesson, all students were instructed to sit in their chairs. In almost all sesssions, Jon refused to sit in his chair and thus was non-compliant and not on-task for the entirety of the lesson. When given the clipboard with the self-monitoring sheet, he sat in his chair in order to better use the timer and clipboard. Jon anecdotally used the sheet as intended and was fluent in the skills.

Because this research took place in a clinic-based school, it is important to highlight factors that might be different from a public school setting. First, each participant had a one-to-

one therapist on site. Although all therapists not included in data collection were asked to stay in the back of the room and to not prompt students, the use of prompts or redirection happened about three times during various phases. Also, observation periods were often very short, with the shortest session being 5 min. Participating in whole group instruction was a struggle for all participants and the initial target time for them was 5 min. As seen in the data, most participants were not able to stay on-task for even this amount of time. It is also worth noting that the teachers had working relationships with most or all of the participants and students. One way this affected the study is that the teacher worked directly with Peter and would often call on him if she saw him self-stimulating. This could have resulted in an inflated duration of engagement that was not seen when Peter was not prompted or called on more than other students. After the first session in which this occurred, the primary investigator spoke with the teacher about calling on students equally. The teacher was understanding but, anecdotally, the bias somewhat persisted. Finally, due to the size of the clinic, the whole group lessons were conducted with up to 9 students at a time which, while larger than small group activities, may account for behavior differences when compared with a larger, public school classroom.

Data collection for this study did not lend itself to high levels of IOA. Because data were collected on duration of on-task behavior, variable and low rates of on-task behaviors yielded variable levels of IOA. Non-agreement scores were calculated after agreement scores were found to be low. However, there is not necessarily one set way that is better for all participants. This is because of how variable student behavior was and the sensitivity of the data collection method. For example, if the primary investigator scored Brandon as on-task for 2 sec, and the research assistant scored him as on task for 1 sec, the IOA score would be 50%, even though they were

only off by one second. In the case of Peter, it was hard to capture off-task behaviors objectively as most of his self-stimulation was covert.

Further research on this subject is needed to support or refute the results of this study as it is the first known study of its kind. Research should extend to settings beyond clinic schools because public schools are where fidget spinners gained popularity and where they were subsequently banned. Many participants and students enjoyed fidget spinners so it might be researched to use as a reinforcer in the future. Finally, there is a wide variety of fidget toys on the market beyond the scope of fidget spinners. Although these specific versions of fidget toys did not prove effective, it is important to note that variations may have benefits or drawbacks separate from those examined in this study.

Overall, fidget spinners in this study served predominantly as a distraction and less as an aid to keep students on task. One empirically supported intervention for students with learning disabilities and attention deficits is self-monitoring, which did result in substantial improvements for students when fidget spinners did not in the current study. Although fidget spinners may be preferred by students and often capture the attention of young minds, it may be best to use other methods to promote engagement, comprehension, and overall academic success.

Table 1. Table 1 displays the averages and ranges of interobserver agreement for each participant across phases.

Sam		Baseline	Baseline Prime	Fidget Spinners	Self-monitoring
Occurrence	Average %	85.59	81.57	46.73	83.73
			70-87	-	71-99
	Range	79-92			
Non-occurrence	Average %	48.83	72.32	77.2	72.14
	Range	13-85	39-94	-	34-95

Rickon		Baseline	Baseline Prime	Fidget Spinners	Self-monitoring
Occurrence	Average %	93.25	76.09	73.51	86.42
	Range	91-95	75-78	-	81-96
Non-occurrence	Average %	91.57	73.4	75.61	71.25
	Range	88-95	66-81	-	59-89

Peter		Baseline	Baseline Prime	Fidget Spinners	Self-monitoring
Occurrence	Average %	73.45	64.42	55.54	97.56
	Range	-	42-87	18-96	-
Non-occurrence	Average %	87.1	89.98	84.95	90
	Range	-	87-93	43-99	-

Brandon		Baseline	Baseline Prime	Fidget Spinners	Self-monitoring
Occurrence	Average %	35.61	61.62	0	89.36
	Range	0-92	45-78	-	80-99
Non-occurrence	Average %	93.78	97.83	96.33	62.26
	Range	92-95	97-98	-	39-85

Table 1. (Continued)

Jon		Baseline	Baseline Prime	Fidget Spinners	Self-monitoring
Occurrence	Average %	97.54	100	100	83.67
	Range	90-100	-	-	-
Non-occurrence	Average %	95.20	100	100	54.44
	Range	82-100	-	-	-

Jamie		Baseline	Baseline Prime	Fidget Spinners	Self-monitoring
Occurrence	Average %	96.85	67.16	55.71	97.3
	Range	91-100	-	39-64	-
Non-occurrence	Average %	96.71	60	76.09	33.33
	Range	90-100	-	60-95	-

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APPENDICIES

Appendix A:

Record the duration of the observation period along with the duration of time spent engaged.

Engagement is defined as directly participating in assigned work including reading, writing, or performing an assigned task or attending to the assigned task such as listening to a story or lecture or looking at worksheets.

Date	Duration of observation	Duration of engagement	Percentage of time engaged

Teacher Prompts	Teacher Praise

Appendix B: Fidget Spinner

Appendix C: Self-monitoring Sheet

1	Am I listening to the teacher?	
	Is my body still?	

2	Am I listening to the teacher?	
	Is my body still?	

3	Am I listening to the teacher?	
	Is my body still?	

4	Am I listening to the teacher?	
	Is my body still?	

5	Am I listening to the teacher?	
	Is my body still?	

6	Am I listening to the teacher?	
	Is my body still?	

7	Am I listening to the teacher?	
	Is my body still?	

8	Am I listening to the teacher?	
	Is my body still?	

9	Am I listening to the teacher?	
	Is my body still?	

Appendix D: Teacher Social Validity Questionnaire

Social Validity Questionnaire

Please circle a number for each statement regarding your experience with this research study

Strongly disagree	Disagree	No Opinion	Agree	Strongly Agree
1	2	3	4	5

1. I found the use of fidget spinners acceptable in my classroom	1	2	3	4	5
2. I feel that the use of a fidget spinner was helpful in increasing engagement	1	2	3	4	5
3. I found it easy to use a fidget spinner in the classroom	1	2	3	4	5
4. The fidget spinner was disruptive to other students	1	2	3	4	5
5. Other students complained about not having a fidget spinner	1	2	3	4	5
6. I found the use of self-monitoring acceptable in my classroom	1	2	3	4	5
7. I feel that the use of self-monitoring was helpful in increasing engagement	1	2	3	4	5
8. I found it easy to use self-monitoring in the classroom	1	2	3	4	5
9. I will likely use fidget spinners in the future	1	2	3	4	5
10. I will likely use self-monitoring in the future	1	2	3	4	5

11. Please provide any other comments or feedback:

_____

_____

Appendix E: Student Social Validity Questionnaire

Social Validity Questionnaire

Circle the number based on how much you agree with the statement

Disagree No Opinion Agree

1 2 3

1. I liked having a fidget spinner during lessons 1 2 3
2. Using a fidget spinner helped me pay attention 1 2 3
3. I liked the self-monitoring sheet 1 2 3
4. Using the self-monitoring sheet helped me pay attention 1 2 3
5. Please leave any comments:

_____

_____

_____

Appendix F: Treatment Integrity

Date	Trial	Phase	Step
		BL	**Gather class on carpet**
			Conduct lesson
		BLP	**Gather class on carpet**
			Conduct lesson
			Deliver comprehension worksheet
			Say "finish this worksheet first, then bring it to me"
			Check on progress after 5 minutes
			Say "finish this please"
			Ignore all behaviors
			Check on progress after 5 minutes
			Collect comprehension sheet
		NC fidget spinner	**Give student fidget spinner**
			Say "this is for you to hold during the lesson, but pay attention please. Please don't share it with friends
			Gather class on carpet
			Conduct lesson
			Prompt students to return fidget spinner
			Remind student not to share
			Deliver comprehension worksheet
			Say "finish this worksheet first, then bring it to me"
			Check on progress after 5 minutes
			Say "finish this please"
			Ignore all behaviors
			Check on progress after 5 minutes
			Collect comprehension sheet
		Self-monitoring training	**Define engagement**
			Give at least two examples of engagement (listening to the teacher, filling out self-monitoring sheet, asking questions)
			Model engagement
			Define off-task behavior

			Give at least two examples of off-task behavior (doodling, looking around the room, talking to friends)
			Model off-task behavior
			Model using the self-monitoring sheet
			Say "tell me how to use the sheet"
			Provide reinforcement for correct responses
			Correct errors
			Say "show me how to use the sheet"
			Provide praise for correct behaviors
			Provide feedback on incorrect behaviors
		Self - monitoring	**Give the student self-monitoring sheet and timer**
			Say "fill this out during the lesson"
			Gather class on carpet
			Conduct lesson
			Collect self-monitoring sheet
			Give self-monitoring sheet to data collector
			Deliver comprehension worksheet
			Say "finish this worksheet first, then bring it to me"
			Check on progress after 5 minutes
			Say "finish this please"
			Ignore all behaviors
			Check on progress after 5 minutes
			Collect comprehension sheet
			Write note home