

Spring 2017

## The Impact of Therapy Balls on In-Seat Behavior for Students with ADHD

Rebecca Boston  
*California State University, Monterey Bay*

Follow this and additional works at: [https://digitalcommons.csumb.edu/caps\\_thes\\_all](https://digitalcommons.csumb.edu/caps_thes_all)

---

### Recommended Citation

Boston, Rebecca, "The Impact of Therapy Balls on In-Seat Behavior for Students with ADHD" (2017).  
*Capstone Projects and Master's Theses*. 131.  
[https://digitalcommons.csumb.edu/caps\\_thes\\_all/131](https://digitalcommons.csumb.edu/caps_thes_all/131)

This Master's Thesis (Open Access) is brought to you for free and open access by the Capstone Projects and Master's Theses at Digital Commons @ CSUMB. It has been accepted for inclusion in Capstone Projects and Master's Theses by an authorized administrator of Digital Commons @ CSUMB. For more information, please contact [digitalcommons@csumb.edu](mailto:digitalcommons@csumb.edu).

The Impact of Therapy Balls on In-Seat Behavior for Students with  
ADHD

Rebecca Boston

Thesis Submitted in Partial Fulfillment of the Requirements for the  
Degree of Master of Arts in Education

California State University, Monterey Bay

May 2017

©2017 by Rebecca Boston. All Rights Reserved

THE IMPACT OF THERAPY BALLS ON IN-SEAT BEHAVIOR

The Impact of Therapy Balls on In-Seat Behavior for Students with  
ADHD

Rebecca Boston

APPROVED BY THE GRADUATE ADVISORY COMMITTEE

---

Kerrie Chitwood, Ph.D.  
Advisor and Program Coordinator, Master of Arts in Education

---

Casey McPherson, Ph.D.  
Advisor, Master of Arts in Education

---

Erin Ramirez, Ph.D.  
Advisor, Master of Arts in Education

---

Kris Roney, Ph.D. Associate Vice President  
Academic Programs and Dean of Undergraduate & Graduate Studies

# THE IMPACT OF THERAPY BALLS ON IN-SEAT BEHAVIOR

## **Abstract**

Students with attention deficit hyperactivity disorder (ADHD) often exhibit hyperactivity-impulsivity, inattention and have difficulty remaining seated. The use of a therapy ball as a seating option may allow students with ADHD to receive the movement they seek during classroom activities when staying seated is desired. The purpose of this study was to determine if the use of therapy balls increased in-seat behavior for 2<sup>nd</sup>-3<sup>rd</sup> grade Special Day Class students with an ADHD diagnosis during a 30-minute math activity. The participants were two second graders and one third grader with an ADHD diagnosis. The three participants were chosen because they each exhibited out-of-seat behavior consistently throughout the day (i.e., standing up, wandering the classroom, laying on desk, and going under the desk). This study used a single-case A-B-A-B interrupted time design. The results from this study indicate that therapy balls are an intervention that may increase in-seat behavior for students with ADHD. Therapy balls are a practical intervention that can be an effective way to increase in-seat behavior for students with ADHD.

*Keywords:* special day class (SDC), attention-deficit/hyperactivity disorder, in-seat behavior, therapy ball

# THE IMPACT OF THERAPY BALLS ON IN-SEAT BEHAVIOR

## **Acknowledgements**

I would like to thank Dr. Chitwood, Dr. McPherson and Dr. Ramirez for all their constant re-readings, pages of feedback and overall guidance through the Master's thesis process. Thank you! I would also like to thank my family and friends who helped encourage me and their gracious donations to provide funding for the class set of therapy balls that made this study possible. You guys are awesome!

# THE IMPACT OF THERAPY BALLS ON IN-SEAT BEHAVIOR

## Table of Contents

Abstract.....	iii
Acknowledgements.....	iv
Literature Review.....	1
Methods.....	9
Research Question.....	9
Hypothesis.....	9
Research Design.....	9
Setting and Participants.....	10
Measures.....	11
Intervention.....	12
Procedures.....	13
Ethical Considerations.....	14
Social Validity.....	15
Results.....	16
Discussion.....	19
Limitations and Future Research.....	21
Conclusion.....	22
References.....	23
Appendix A.....	27
Appendix B.....	28
Appendix C.....	29

The Impact of Therapy Balls on In-Seat Behavior for Students with  
ADHD

**Literature Review**

Attention Deficit Hyperactivity Disorder (ADHD) is one of the most common childhood neurological disorders, and the diagnosis often lasts until adulthood (Facts about ADHD, 2016; Fulton, et al., 2009). As reported by parents, more than 1 in 10 of school-aged children in the United States have received an ADHD diagnosis by a health care provider (The National Resource on ADHD, 2015). Many students with ADHD fidget frequently as a way to receive the movement-based sensory input that they need (Hinklin-Lauderdale, 2014). The constant need to fidget can make learning difficult for a student with ADHD (Hinklin-Lauderdale, 2014).

ADHD is defined as an individual exhibiting a frequent pattern of hyperactivity-impulsivity and inattention (ADHD Educational Institute, 2016; Arns, de Ridder, Strehl, Breteler, & Coenen, 2009). In order to be diagnosed with ADHD, the individual must also exhibit these symptoms in more than two different settings, i.e., at home, school, work, when with friends, or family members and have a negative impact on the individuals social, academic or occupational functioning (ADHD Educational Institute, 2016; Arns et al., 2009). In order to qualify for an ADHD diagnosis, many of the symptoms must be present before the individual reaches 12 years of age (ADHD Educational Institute, 2016; Arns, et al., 2009).

**Types of ADHD**

ADHD can present in three different ways: inattentive-type, hyperactive/impulsive-type, or combined-type (i.e., both inattentive and hyperactive/

impulsive; ADHD Educational Institute, 2016; Arns, et al., 2009). Typical symptoms of inattention can include: avoiding tasks or difficulty sustaining attention during activities that demand a sustained mental effort, distraction by extraneous stimuli, difficulty following directions and tend to fail to complete tasks (ADHD Educational Institute, 2016; Arns, et al., 2009). Hyperactivity is classified, but not limited to: fidgeting frequently with hand or feet or squirming in-seat, leaving seat often in the classroom or when situations where remaining in-seat is expected, and constantly on the go or acting as if they are driven by a motor. Impulsivity can be classified, but not limited to interrupting and intruding on others, blurting out before questions are asked, and difficult waiting turns (ADHD Educational Institute, 2016; Arns et al., 2009).

In addition to the three different presentations of ADHD, there are three levels of severity: mild, moderate, or severe (ADHD Educational Institute, 2016). An individual with a mild form of ADHD may experience a few symptoms past the requirement for an ADHD diagnosis and thus experience only a minor impairment in school, social or work settings. An individual with a severe form of ADHD may experience many symptoms past the requirement for an ADHD diagnosis thus experience a high impairment in school, social, and work settings. Therefore, an individual with a moderate form of ADHD may experience symptoms that range between both mild and severe forms of ADHD (The National Resource on ADHD, 2015). The Individuals with Disabilities Education Act (IDEA; 2004) states that in cases where ADHD impairs a student's learning, he/she may qualify for special education services. Students with more severe ADHD may benefit from Special Day Class (SDC) because of the differences in the classroom set-up, smaller class sizes, increased classroom support, modified curriculum,



specially trained teachers, and individualized instruction for the students (Freeman, & Alkin, 2000).

### **Impact of ADHD**

It is common for students with ADHD to have difficulty remaining seated. Exhibiting out-of-seat behavior regularly can have an impact on a student's education (ADHD Educational Institute, 2016). When a student is out of his/her seat, it can disrupt the learning environment for all the other students. Out-of-seat behavior can come in mild to more severe forms. A mild form of out-of-seat behavior could include wandering the room not disrupting the other students. A more severe form involves engaging in dangerous and distracting behaviors such as throwing objects and shouting out (Patterson & Rowlett, 2009). A student getting out of his/her seat frequently interferes with the learning process and student engagement in the lesson (Guardino & Fullerton, 2010). The expected behaviors students should exhibit in the classroom are to listen attentively, follow directions, control their temper and produce correct schoolwork (Lane, Pierson & Givner, 2004). Students with ADHD are expected to sit quietly in their chairs and listen even though it is challenging for them. Instead of working with the students and adapting the classroom to help increase their focus, many students are expected to fit that perfect student mold (i.e., sit quietly and listen) with minimal outside support to help sustain their attention.

Students exhibiting challenging behaviors has been increasing in the classroom setting (Conroy, Davis, Fox & Brown, 2002). A survey conducted in 2004 found that 75% of teachers expressed that if they had less disruptive behaviors, they would be able to spend more time teaching effectively (Guardino & Fullerton, 2010). In addition to

spending much of what could be learning time dealing with classroom behaviors, teachers presented the challenge of finding proactive classroom management strategies that are easy to implement, prevent disrupting behaviors and overall do not distract the classroom environment (Guardino & Fullerton, 2010).

**Interventions for students with ADHD.** ADHD medication has been available since the 1950's and is a common treatment for individuals with ADHD (Castle, Aubert, Verbrugge, Khalid & Epstein, 2007). Findings from a 2005 national survey suggest 56% of children with an ADHD diagnosis ranging from ages 4 to 17 take medication (Castle et al., 2007; Fulton et al., 2009). There are many different interventions recommended for students with ADHD that are non-pharmacological and can be implemented in the classroom setting. Some environmental and instructional considerations for students with ADHD include, but are not limited to: task duration, task difficulty, direct instruction, structure and organization, clear and direct instructions, rule reminders and visual cues, active versus passive involvement, productive physical movement, and providing opportunities for movement or providing a therapy ball (Brock, Puopolo, Cummings & Husted, 2004; Grove, Villasenor, & Searls, 2010).

Task duration is defined as the amount of time a student engages in classwork for one given activity. Large and lengthy tasks may be difficult for a student with ADHD. Breaking a task into smaller chunks or allowing frequent breaks may be helpful (Brock et al., 2004; Grove et al., 2010). Task difficulty refers to what assignment is given compared to the students' academic level. If the task is too difficult, a student with ADHD may be likely to give up quickly. Controversy, if the task is too simple, the student may easily become bored (Brock et al., 2004; Grove et al., 2010). Direct

instruction refers to the student learning directly from the teacher as opposed to completing seatwork independently (Brock et al., 2004). Structure and organization in the classroom can be as simple as allowing predictability in day-to-day routines and procedures. A visual schedule and advanced notice of any changes can allow students with ADHD to respond better to daily activities (Brock et al., 2004; Grove et al., 2010). In addition, explicitly teaching the student different strategies to stay organized can also be beneficial. These strategies may include checklists, and desk/backpack organization (Brock et al., 2004; Grove et al., 2010). Clear and direct instruction refers to the way directions are given to the student. Very short, precise, and clear instructions may increase student understanding and engagement. The teacher may also need to repeat the directions as necessary and offer frequent checks of understanding (Brock et al., 2004). Rule or refocus reminders and visual cues that are specific and frequently reinforced reminders of rules and appropriate behaviors. Visual cues are common around the classroom or at student's desk and can be referenced easily and frequently. Visual cues provide students with feedback on daily behaviors (Brock et al., 2004).

Active versus passive involvement allows students who are hyperactive to channel his/her energy in a beneficial way. An example of active involvement may be asking the student to write or point to words on the board instead of merely sitting and listening (Brock et al., 2004). Providing opportunities for movement is described as incorporating physical movement into a lesson to improve the student's attention and involvement in the lesson. Examples of allowing extra movement could be assigning the student with the job of passing out materials, collecting materials, cleaning the whiteboard or taking items to the office (Brock et al., 2004; Grove et al., 2010). Productive

physical movement focuses on the hyperactive symptoms that students with ADHD may experience. Sitting for a long amount of time can be difficult. Improvement of in-seat behavior may be experienced by providing students with ADHD increased physical movement during the day and between learning instruction (Brock et al., 2004).

Providing a therapy ball to take the role of a chair may also be beneficial to students with ADHD. It allows more opportunities for movement for students with ADHD while they bounce or roll (Brock et al., 2004; Grove et al., 2010).

Although there are many recommendations to improve classroom behavior for students with ADHD, the focus of the present study is on productive physical movement into the classroom setting. More specifically, active sitting and the use of therapy balls. Since students with ADHD may have an increased difficulty in sitting still, providing opportunities for all students in the class to move and engage in physical activity can allow students with ADHD to not only feel a part of the class, but also engage in positive movement. This movement will allow the student to get his/her fidgets out in a positive and structured way (Helping the Student with ADHD in the Classroom, 2015). Sitting in a chair and attending to tasks for a long period does not allow students with ADHD the movement they are seeking during classroom instruction. Studies suggest that students with ADHD can benefit from increased movement in the classroom to optimize their learning (Brock et al., 2004; Fwdewa & Erwin, 2013; Grove et al., 2010; Hinklin-Lauderdale, 2014; Ketcham & Burgoyne, 2015; Schilling et al., 2003).

### **Physical Movement and Active Sitting**

Physical movement that can be utilized in the classroom to incorporate movement and physical activity is active sitting (O'Sullivan, O'Sullivan, O'Keeffe, O'Sullivan, &

Dankaerts, 2013). Active sitting helps avoid tight muscles by keeping the body constantly moving. Instead of passively relaxing into a backrest of a chair, active sitting allows the body to stay in increased and constant motion all day long (O'Sullivan, et al., 2013; What is Active or Dynamic Sitting, 2001). Therapy balls can be used in the classroom as a type of active seating for children with trouble sitting still or students with ADHD. When a student sits on a therapy ball, they are able gently bounces in place, getting the sensory input they need to focus on their lessons and listen attentively in the classroom setting (Hinklin-Lauderdale, 2014).

### **Therapy balls**

One way to provide students with active sitting in the classroom is through the use of therapy balls. Studies have been conducted on the use of therapy balls and the effects it has with students with ADHD (Fedewa & Erwin, 2013; Ketcham & Burgoyne, 2015; Schilling et al., 2003). When students with ADHD sat on a therapy ball as opposed to a chair, there was an increase of in-seat behavior (Fedewa & Erwin, 2011; Ketcham & Burgoyne, 2015; Schilling et al., 2003).

Schilling and colleagues were the first to systematically examine the impact of therapy balls on in-seat behavior and legible word productivity for students with ADHD (2003). This study found an increase of in-seat behavior as well as an increase in word productivity when seated on therapy balls for the three participants with ADHD. These findings suggest that therapy balls may lead to an increase of in-seat behavior and word productivity among students with ADHD (Fedewa & Erwin, 2011; Ketcham & Burgoyne, 2015; Schilling et al., 2003). Further examining the findings of Schilling and colleagues, Fedwa and Erwin evaluated the effects stability balls have on in-seat and on-

task behavior with students who have attention and hyperactivity (i.e., ADHD like characteristics) and also suggest that the use of a therapy ball may increase in-seat behavior and overall classroom behavior (2011). A more recent study done in 2015, further investigated the use of therapy balls to see if sitting on a therapy ball would help improve students focus and classroom performance. Therapy balls created more opportunities for sensory stimulation increased on observed on-task behavior (Ketcham, & Burgoyne, 2015). Based on the various studies, research suggests that therapy balls may improve in-seat behavior, on-task behavior and work productivity (Schillings et al., 2003; Fedewa & Erwin, 2011; Ketcham & Burgoyne, 2015).

Although these studies were conducted in inclusive settings, there is limited research in regards to the use of therapy balls and its effect on in-seat behavior for students with ADHD in a more restrictive SDC (Fedewa & Erwin, 2011; Shilling et al., 2003). Due to this limitation, the present study will look at three 2<sup>nd</sup>-3<sup>rd</sup> grade students with an ADHD diagnosis in a SDC. A single subject interrupted time design will be used to determine if the use of therapy balls during a 30-minute math activity will increase in-seat behavior for second and third grade students with ADHD in a SDC setting.

### **Purpose**

The purpose of this study is to determine if the use of therapy balls increases in-seat behavior for students with ADHD. For the purposes of this study, in-seat behavior is defined as any portion of the student's bottom in the chair and all four chair legs on the ground. Students sitting in their seat is important because it allows the student to be sitting and more likely to be listening while a teacher is giving instructions and teaching.

If a student is out of their seat, they are more likely distracted and not focused on the teacher and learning.

## **Method**

### **Research Question**

Does the use of a therapy ball increase in-seat behavior for 2<sup>nd</sup>-3<sup>rd</sup> grade students with ADHD in a mild/moderate SDC during a 30-minute math activity with no teacher refocus reminders?

### **Hypothesis**

Based on research (Fedewa & Erwin, 2011; Ketcham & Burgoyne, 2015; Schilling et al., 2003), it was hypothesized that using a therapy ball would increase in-seat behavior for 2<sup>nd</sup>-3<sup>rd</sup> graders with ADHD during a 30-minute math activity with no teacher refocus reminders.

### **Research Design**

This study used an A-B-A-B single-subject design across three participants using an interrupted time series design. A single-subject design was implemented because each participant served as their own treatment and control (Schilling et al., 2003). An interrupted time series was used because data was collected before and after the intervention to determine if the intervention had a significant increase on in-seat behavior.

**Independent variable.** The independent variable was a therapy ball. Each ball was individually fitted for each student in the classroom for a diameter that assured the student sat comfortably with his/her feet flat on the floor with knees and hips flexed at 90

degrees. The therapy ball selected had molded feet to prevent the ball from rolling away (Fedewa & Erwin, 2011; Schilling et al., 2003).

**Dependent variable.** The dependent variable was in-seat behavior. When using a chair, in-seat behavior (i.e., sitting in a chair) was defined as any portion of the participants' bottom in contact with the chair and all four chair legs on the floor. When using a therapy ball, in-seat behavior (i.e., sitting on a therapy ball) was defined as any portion of the participants' bottom on the ball and at least one foot on the floor (Schilling et al., 2003).

### **Setting and Participants**

The setting for this study is a public elementary school in central California. According to the National Center of Education Statistics, (2016) student population consists of 48% female students and 52% male students. Furthermore, 27% are English Language Learners and 41% of the student population is Hispanic of which 19% classify as two or more races: 17% White, 16% Filipino, Asian or Pacific Islander, 6% Black, and 0% American Indian/Alaskan Native. This study takes place in a SDC for students with mild/moderate disabilities at an elementary school classroom that serves 13 students. A convenience sample of the researcher's class that includes 11 males and 2 females with disabilities that include ADHD, Autism, Specific Learning Disabilities and Speech/Language Impairments. Demographics for this classroom include: 23% white, 62% Hispanic, 7.5% Filipino, and 7.5% Pacific Islander. Three students with an ADHD diagnosis participated in this study.

Even though only three students participated, all 13 students in the classroom used the therapy balls as chairs. If therapy balls were only given to the select students in



the classroom, they would be a distraction to other students and identify certain students who are participating in the study. By having each student use a therapy ball during the intervention weeks, all students engaged in the same experience and participants did not know they were being observed (Schilling et al., 2003).

Two second graders and one third grader with an ADHD diagnosis participated in this study. All three participants exhibited out-of-seat behavior consistently throughout the day (i.e., standing up, wandering the classroom, laying on desk, and going under the desk). These participants all required verbal and visual picture refocus reminders from teacher and aides throughout each lesson. Each participant was given a pseudonym to ensure confidentiality and anonymity.

**Trevor.** Trevor is a Caucasian, English speaking 7-year-old male. Trevor is currently in 2<sup>nd</sup> grade in a SDC setting. Trevor has a doctor diagnosis of ADHD. Trevor qualifies for special education under Other Health Impairment and Speech and Language Impairment.

**Isaac.** Isaac is a Filipino, English speaking 8-year-old male. Isaac is currently in 3<sup>rd</sup> grade in a SDC setting. Isaac has a doctor diagnosis of ADHD. Isaac qualifies for special education under Other Health Impairment and Speech and language impairment.

**Martin.** Martin is a Hispanic, English Language Learner, 8-year-old male. Martin is currently in 2<sup>nd</sup> grade in a SDC setting. Martin has a doctor's diagnosis of ADHD. Martin qualifies for special education under Other Health Impairment and Speech and Language Impairment.

## **Measures**

To measure in-seat behavior, a data-recording sheet was utilized by two raters. Two classroom instructional aides were the raters for this study. Raters used a recording sheet to record in-seat and out-of-seat behavior in 30-second intervals for 30 minutes four times a week (i.e., 60 observations per participant per session).

**Validity.** To address internal validity, all data were collected during a 30-minute math activity (Zearn.org) at the same time four days out of the week. All raters were trained on how to collect data and had a reference sheet that clearly defined in-seat and out-of-seat behavior (Appendix A). All raters had practice collecting data before the study began to compare and ensure inter-rater reliability. To avoid content as a factor towards student affect towards a specific subject, Zearn, an online math program was the only time when data on in-seat and out-of-seat behavior was collected. To address external validity, the researcher only used students that meet the criteria of second/third grade students with a doctor diagnosis of ADHD.

**Reliability.** To establish reliability, this study used a third observer who came in 20% of the time (i.e., 3 days) and observed concurrently with the other raters (see Appendix B). Before collecting any data, the researcher met with the raters and inter-raters and went over all operational definitions (e.g., in-seat and out-of-seat behavior). Raters were trained on what behavior to look for and how to document the behaviors using the interrupted time design. Reliability was established at 80% or higher for at least 20% of the sessions (Fedewa & Edwin, 2011; Schilling et al., 2003).

### **Intervention**

The intervention for this study was the use of a therapy ball instead of a chair in an attempt to assist students with ADHD increase in-seat behavior. A 5-week study was

used in the A-B-A-B single-subject design. Each week consisted of four days i.e., Tuesday-Friday. Mondays were eliminated in data collection due to two consecutive Monday holidays during the 5-week study. Replicating past studies, a novelty week was added before any data were collected (Fedewa & Edwin, 2011; Schilling et al., 2003). No data were collected during the novelty week to eliminate any novelty effects the therapy balls may have on the participants and its effect on in-seat behavior (Fedewa & Edwin, 2011; Schilling et al., 2003). Baseline data (Phase A) were collected while students were sitting in chairs and intervention periods (Phase B) intervention data were collected while students were sitting on therapy balls.

### **Procedures**

During baseline phases, participants and all other students in the class used chairs during a 30-minute whole group math activity (Zearn.org). During the intervention phase, participants and all other students sat on therapy balls during a 30-minute whole group math activity (Zearn.org). The math activity Zearn was selected because it occurred at the same time four days out of the week, the students were familiar with the online math program, and the program structure was similar day to day.

Each student in the class was individually fitted for a therapy ball using the height measurements given by a trained representative from WittFitt™. Wittfitt, is a company that designs and sells various types of active seating that supports the idea that physical aerobic movement improves thinking and learning. More specifically, a few benefits of active seating may include optimizing student attention and concentration, waking up the mind and increasing circulation to the body and brain (O'Sullivan, O'Sullivan, O'Keeffe, O'Sullivan, & Dankaerts, 2013).

Further, a number was placed on the bottom of each ball, and each student was assigned a number to make sure each student was using the correct size therapy ball. Students were introduced to the therapy ball, established rules were created, and unlimited time was given for students to ask questions. After all questions were answered, students had approximately 10 minutes to explore the balls independently before using them in an academic setting. Prior to data collection for Phase A, students had one-week using therapy balls with no data collection to eliminate any novelty effects. Throughout the study, students did not receive any positive or negative feedback when using the therapy ball. The teacher and aides only intervened if a student was exhibiting behavior that was dangerous or destructive (Schilling et al., 2003)

**Data collection.** A single-subject A-B-A-B interrupted time design was used with three second/third grade students by collecting data every 30 seconds for a 30-minute time period (Fedewa & Edwin, 2011). Raters used a data form to record whether the student was exhibiting in-seat or out-of-seat behavior (Appendix A). An interrupted time design served to make observations more valid and representative of the child's behavior throughout the baseline and observation periods (i.e., therapy balls vs. chairs).

**Fidelity.** In order to verify the enacted intervention was consistent with the intended intervention, daily logs were used to collect the data using an interrupted time design (see Appendix B). The two raters were in the classroom during times of data collection for both chairs and therapy balls leading to 100% procedural fidelity.

### **Ethical Considerations**

One ethical consideration was that students could fall and hurt themselves. To alleviate this issue, students were instructed beforehand on the purpose of the stability

ball and that it is not a toy. Students had time to explore the therapy ball and ask questions. During any point in the study where a student exhibited dangerous behavior, the researcher or an aide intervened to ensure student safety (Schilling et al., 2003). Finally, to protect confidentiality, pseudonyms were used.

**Validity threats.** Replicating a study done by Schillings and Colleagues (2003) all data collection occurred at the same time each day to alleviate validity threats. Mondays were not a part of data collection due to two consecutive Monday holidays during the allotted time for the study. Since the researcher conducted the study using her own students, independent observers were in the classroom during all points of data collection to eliminate researcher bias and ensure the therapy balls were not used when it was not the intervention phase of the study.

### **Social Validity**

At the completion of the study, the teacher and two raters completed a four-point Likert scale (i.e., 1 = strongly disagree to 4 = strongly agree) social validity questionnaire (see Appendix C). The questionnaire, adapted from Berger, Manston and Ingersoll (2016), consisted of seven questions designed to understand the perceived usefulness, significance and satisfaction with the implemented intervention (Kennedy, 2005). Participant responses were kept confidential and descriptive statistics were conducted to gain insights regarding the intervention. On the questionnaire, the teacher and both instructional aides agreed that treatment of the therapy balls were an effective treatment, acceptable for increasing the student's skills, quickly improved student's skills, would be willing to carry out this intervention to increase a student's skills, and would suggest the use of this treatment on other individual. The teacher and both instructional aides

disagreed that using therapy balls as a treatment improved skills across multiple contexts (e.g., home, classroom, community) and that the student's skills would remain at the improved level even after the treatment ends.

### **Results**

Figure 1 displays the results for Isaac. The x-axis displays the days in which data were collected and the y-axis depicts the percentage of time the participant demonstrated in-seat behavior when sitting on a chair. Finally, the dotted line indicates changes between baseline and intervention phases.

In baseline, when seated in a chair, Isaac exhibited in-seat behavior an average of 27% of the time. His in-seat behavior ranged from 7%-40% during the 30-minute math lesson. During the first intervention phase, when seated on a therapy ball, Isaac exhibited in-seat behavior for an average of 58.36% of the time. His in-seat behavior ranged from 60%-88% during the 30-minute math lesson. In the second baseline phase, when seated on a chair, Isaac exhibited in-seat behavior for an average of 32.25% of the time. His in-seat behavior ranged from 12%-63% during the 30-minute math lesson. During the second intervention phase, when seated on a therapy ball, Isaac exhibited in-seat behavior for an average of 84.75% of the time. His in-seat behavior ranged of 73%-98% during the 30-minute math lesson. Overall, across all baseline phases, Isaac exhibited in-seat behavior for an average of 29.63% of the time. When seated on a therapy ball, Isaac exhibited in-seat behavior for an average during 71.56% of the math activity.

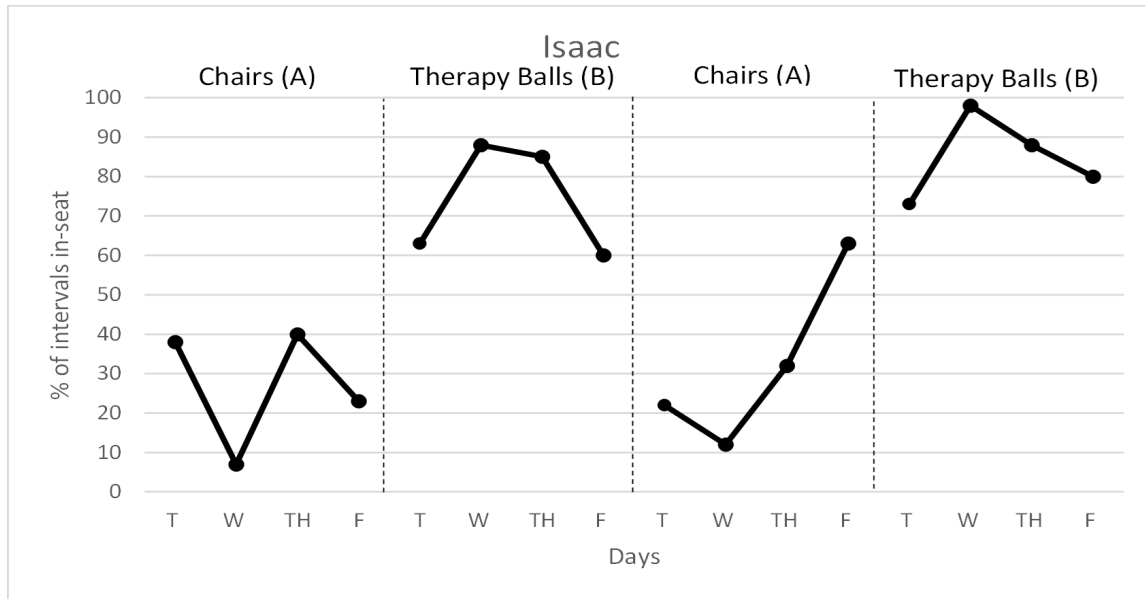


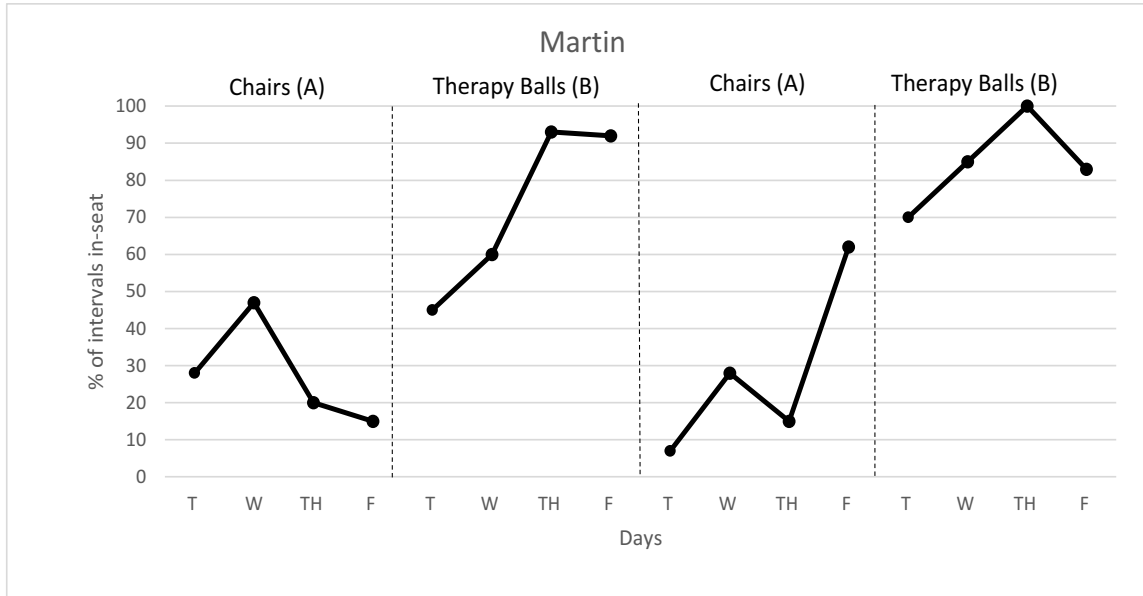
Figure 1. Baseline and therapy ball intervention (A-B-A-B) phase data for Isaac.

Figure 2 displays the results for Martin. The x-axis displays the days in which data were collected and the y-axis depicts the percentage of time the participant demonstrated in-seat behavior when sitting on a chair. Finally, the dotted line indicates changes between baseline and intervention phases.

In the first baseline phase, when seated on a chair, Martin exhibited in-seat behavior for an average of 27.5% of the lesson. His in-seat behavior ranged from 15%-47% during the 30-minute math lesson. During the first intervention phase, when seated on a therapy ball, Martin exhibited in-seat behavior for an average of 72.5% of the lesson. His in-seat behavior ranged from 45%-93% during the 30-minute math lesson. In the second baseline phase, when seated on a chair, Martin exhibited in-seat behavior for an average of 28% of the lesson. His in-seat behavior ranged from 7%-62% during the 30-minute math lesson. During the second intervention phase, when seated on a therapy ball, Martin exhibited in-seat behavior for an average of 84.5% of the lesson. His in-seat

behavior ranged from 70%-100% of time in-seat during the 30 minute math lesson.

Overall, across all baseline phases, Martin exhibited in-seat behavior for approximately 27.75% of the math activity. Across intervention phases, Martin exhibited in-seat behavior for approximately 78.5% of the math activity.



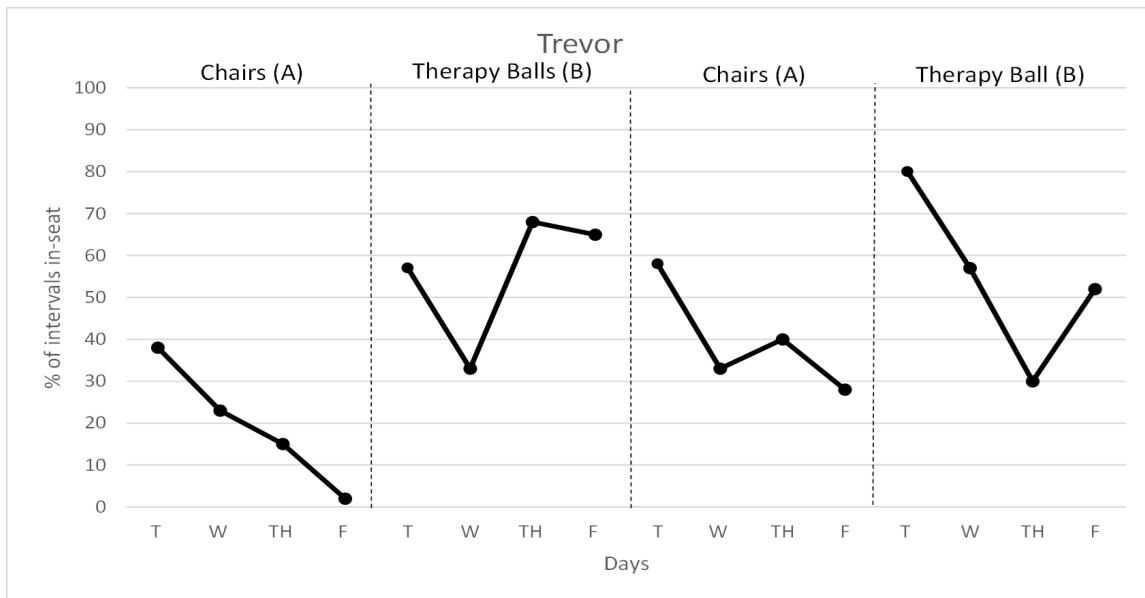
*Figure 2.* Baseline and therapy ball intervention (A-B-A-B) phase data for Martin.

Figure 2 displays the results for Martin. The x-axis displays the days in which data were collected and the y-axis depicts the percentage of time the participant demonstrated in-seat behavior when sitting on a chair. Finally, the dotted line indicates changes between baseline and intervention phases.

In the first baseline phase, when seated on a chair, Trevor exhibited in-seat behavior for an average of 19.5% of the lesson. His in-seat behavior ranged from 2%-38% during the 30-minute math lesson. During the first intervention phase, when seated on a therapy ball, Trevor exhibited in-seat behavior for an average of 55.75% of the



lesson. His in-seat behavior ranged from 33%-68% during the 30-minute math lesson. In the second baseline phase, when seated on a chair, Trevor exhibited in-seat behavior for an average of 39.75% of the lesson. His in-seat behavior ranged from 28%-58% during the 30-minute math lesson. During the second intervention phase, when seated on a therapy ball, Trevor exhibited in-seat behavior for an average of 54.75% of the lesson. His in-seat behavior ranged from 30%-80% during the 30-minute math lesson. Overall, across all baseline phases, Trevor exhibited in-seat behavior for an average of 29.63% of the time. Across all intervention phases, Trevor exhibited in-seat behavior for an average of 55.25% during the math activity.



*Figure 3.* Baseline and therapy ball intervention (A-B-A-B) phase data for Trevor.

## Discussion

The purpose of this study was to determine if the use of therapy balls for three students with ADHD would increase in-seat behavior. It was hypothesized that using a

therapy ball would increase in-seat behavior for second/third graders with ADHD during a 30-minute math activity with no teacher refocus reminders. Isaac displayed a 49% increase on average in-seat behavior when seated on a therapy ball. Approximately 88% of the data were non-overlapping, which can be interpreted as moderately effective. Given this, a functional relationship was evident when looking at Isaac's data. When Isaac was sitting on the therapy ball, his in-seat behavior was much higher and more consistent than when he was sitting in a chair.

Additionally, Martin displayed a 51% increase of in-seat behavior when seated on a therapy ball. Approximately 75% of the data were non-overlapping, which can also be interpreted as moderately effective. Therefore, a functional relationship was evident. Finally, Trevor displayed a 25% increase on average of in-seat behavior when seated on a therapy ball. Approximately 66% of the data were non-overlapping, which can be interpreted as minimally effective. A functional relationship was not evident when looking at Trevor's data due to the high percentage of overlapping data points. However, it is important to note that Trevor experienced the most severe form of ADHD out of the three participants. Despite this, Trevor still displayed an overall increase of in-seat behavior when sitting on a therapy ball.

The current study supports the use of therapy balls as an intervention for students with ADHD to increase in-seat behavior. Furthermore, the current study demonstrated similar findings to previous studies (Fedewa & Erwin, 2011; Ketcham & Burgoyne, 2015; Schilling et al., 2003). These studies suggest that the use of a therapy ball may lead to an increase of in-seat behavior and word productivity among students with ADHD (Fedewa & Erwin, 2011; Ketcham & Burgoyne, 2015; Schilling et al., 2003).

In contrast to previous studies which were conducted in a general education classroom (Fedewa & Erwin, 2011; Ketcham & Burgoyne, 2015; Schilling et al., 2003), the current study included participants within a SDC setting. Typically, students in this setting experience more severe forms of ADHD. Being able to stay in-seat is important for students as it allows access to academic whole group learning and discussions. Further, being able to stay seated can allow these students in an SDC opportunities to attend inclusion time with their general education peers. Ultimately, the goal is to get students in a SDC setting into the least restrictive environment possible (i.e., general education classroom with no supports). If a student with ADHD is able to self-regulate their hyperactivity and impulsivity by bouncing on a therapy ball when needed, it is a step toward students being able to attend inclusive classrooms where staying seated is expected.

### **Limitations and Future Research**

The results of this study indicated that the use of therapy balls as alternative seating was useful for some students with ADHD, however, limitations of this study must be acknowledged. A convenience sample of three participants was used for this study, therefore limiting the generalizability due to its small sample size. Future studies should include more participants from a variety of grades and educational settings. Furthermore, students with a range of ADHD severity should be included in future therapy ball research. In addition, 4-weeks may not have been long enough to gather sufficient data on the effectiveness of therapy balls and in-seat behavior. A longer study with more participants using random selection would help with generalization.

A logistical limitation that was not anticipated when preparing for this study was the type of desk used. Students sat on a desk that contained a bar across the desk where students could rest their feet. During this study, it was common that the students would be sitting on the therapy ball, but had both feet off the floor and resting on the desk bar near foot area. If students were sitting at tables that did not contain a bar near the foot area, it may have improved in-seat behavior more than what the data represents.

Another limitation was student adherence to prescribed ADHD medication. It became known that during at least one day of data collection Trevor did not take his medication as his mom had to go pick up the new prescription. Being inconsistent with medication may contribute to the variability in results. Finally, all students when asked for bathroom breaks were allowed to go. This resulted in being marked out-of-seat for the duration of the bathroom break for both chairs and therapy ball data collection periods. Based on the findings of this study, there should be continued research on in-seat behavior for students with ADHD, but in various classroom settings (e.g., SDC, co-teaching model and general education) with participants along the three different levels of severity: mild, moderate, and severe.

### **Conclusion**

This study supports the use of therapy balls as a form of active classroom seating. Furthermore, teachers may want to explore this strategy for students who have difficulty remaining seated and specifically for students with ADHD. This intervention can be used class wide or used with a select number of students who need increased amount of movement in the classroom. Therapy balls are simple, yet can be an effective way to increase in-seat behavior for students with ADHD.

### References

- ADHD Educational Institute. (2016). National Institute of Mental Health- NIMH. Attention Deficit Hyperactivity Disorder. Bethesda, MD.
- Arns, M., de Ridder, S., Strehl, U., Breteler, M., & Coenen, A. (2009). Efficacy of neurofeedback treatment in ADHD: The effects on inattention, impulsivity and hyperactivity: a meta-analysis. *Clinical EEG and Neuroscience*, *40*(3), 180-189. doi: 10.1177/1550059409404000311.
- Berger, N. I., Manston, L., & Ingersoll, B. (2016). Establishing a scale for assessing social validity of skill building interventions for young children with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, *46*, 3258-3269. doi: 10.1007/s10803-016-2863-9
- Brock, S. E., Puopolo, M, Cummings, C., & Husted, D. (2004). ADHD: Classroom interventions. In A. S. Canter, L. Z. Paige, M. E. Roth, I Romero, & S. A. Carroll (Eds.), *Helping children at home and school III: Handouts for families and educators* (pp. S8: 25-28).
- Castle, L., Aubert, R. E., Verbrugge, R. R., Khalid, M., & Epstein, R. S. (2007). Trends in medication treatment for ADHD. *Journal of Attention Disorders*, *10*(4), 335-342. doi: 10.1177/1087054707299597
- Conroy, M. A., Davis, C. A., Fox, J. J., & Brown, W. H. (2002). Functional assessment of behavior and effective supports for young children with challenging behaviors. *Assessment for Effective Intervention*, *27*(4), 35-47. doi:10.1177/073724770202700405

- Facts About ADHD (2016). Center for Disease Control and Prevention- CDC. Attention-Deficit/Hyperactivity Disorder. Atlanta, GA.
- Fedewa, A. L., & Erwin, H. E. (2011). Stability balls and students with attention and hyperactivity concerns: Implications for on-task and in-seat behavior. *American Journal of Occupational Therapy, 65*, 393-399. doi:10.5014/ajot.2011.000554
- Freeman, S. F., & Alkin, M. C. (2000). Academic and social attainments of children with mental retardation in general education and special education settings. *Remedial and Special Education, 21*(1), 3-26. doi:10.1177/074193250002100102.
- Fulton, B. D., Scheffler, R. M., Hinshaw, S. P., Levine, P., Stone, S., Brown, T. T., & Modrek, S. (2009). National variation of ADHD diagnostic prevalence and medication use: Health care providers and education policies. *Psychiatric Services, 60*, 1075-1083. doi: 10.1176/ps.2009.60.8.1075
- Grove, B., Villaseñor, D., & Searls, M. (2011). *Strategies for Success: Classroom interventions for students with ADHD*. Lap Lambert Academic Publishing.
- Guardino, C. A., & Fullerton, E. (2010). Changing behaviors by changing the classroom environment. *Teaching Exceptional Children, 42*(6), 8-13.
- Helping the Student with ADHD in the Classroom: Strategies for Teachers. (2015). LD Online. The Educators' Guide to Learning Disabilities.
- Hinklin-Lauderdale, J. (2014, August 11). *Active Seating in the Special Needs Classroom*.
- Kennedy, C. H. (2005). *Single-case designs for educational research*. Boston, MA: Allyn and Bacon.

- Ketcham, C.J., & Burogyne, M.E. (2015). Observation of classroom performance using therapy balls as a substitute for chairs in elementary school children. *Journal of Education and Training Studies*, 3(4), 42-48. doi:10.11114/jets.v3i4.730
- Lane, K., Pierson, M., & Givner, C. (2004). Teacher expectations of student behavior: Which skills do elementary and secondary teachers deem necessary for success in the classroom? *Education and Treatment of Children*, 26, 413-430.  
doi: 10.1177/00224669040380020401.
- National Center for Education Statistics. (2016). Common core of data-public school data, 2014-2015 school years. Sacramento, CA: U.S. Department of Education.
- O'Sullivan, K., O'Sullivan, P., O'Keeffe, M., O'Sullivan, L., & Dankaerts, W. (2013). The effect of dynamic sitting on trunk muscle activation: A systematic review. *Applied Ergonomics*, 44, 628-635. doi: 10.1016/j.apergo.2012.12.006
- Patterson, S. T. (2009). The effects of teacher-student small talk on out-of-seat behavior. *Education and Treatment of Children*, 32(1), 167-174.  
doi:10.1353/etc.0.0048
- Schilling, D. L., Washington, K., Billingsley, F. F., & Deitz, J. (2003). Classroom seating for children with attention deficit hyperactivity disorder: Therapy balls versus chairs. *American Journal of Occupational Therapy*, 57, 534-541.  
doi:10.5014/ajot.57.5.534
- The National Resource on ADHD. (2015). Children and Adults with Attention-Deficit/Hyperactivity Disorder-CHADD. Lanham, MD.
- What is Active or Dynamic Sitting. (2001). *Health and Fitness News Article*- TheraGear Article Resource.

What Is ADHD. (2015). National Resource Center for ADHD: A program of CHADD.

Lanham, MD.



**Appendix A**

Interval Recording Sheet

**Student:** \_\_\_\_\_ **Interval length:** Every 30 seconds for 30 consecutive minutes

**Behavior:** In-seat Behavior

**Baseline (Chair)**

**Intervention (Therapy Ball)**

<p>(Chair) In-seat behavior defined as:</p> <ul style="list-style-type: none"> <li>○ Any portion of the participants' bottom in contact with the chair and</li> <li>○ All four chair legs on the floor.</li> </ul>	<p>(Therapy Ball) In-seat behavior defined as:</p> <ul style="list-style-type: none"> <li>○ Any portion of the participants' bottom on the ball and</li> <li>○ At least one foot on the floor.</li> </ul>
--	---

**How to record: Partial Interval Recording:**

(+) participant exhibited in-seat behavior for the whole 30 second interval.

(-) participant exhibited out-of-seat behavior at any point during the 30 second interval.

Observation Date: \_\_\_\_\_ Beginning time: \_\_\_\_\_ Ending Time: \_\_\_\_\_

0-.30	.30-1	1-1.30	1:30-2	2-2.30	2:30-3	3-3.30	3:30-4	4-4.40	4.30-5
5-5.30	5.30-6	6-6.30	6.30-7	7-7.30	7.30-8	8-8.30	8.30-9	9-9.30	9.30-10
10-10.30	10.30-11	11-11.30	11.30-12	12-12.30	12.30-13	13-13.30	13.30-14	14-14.30	14.30-15
15-15.30	15.30-16	16-16.30	16.30-17	17-17.30	17.30-18	18-18.30	18.30-19	19-19.30	19.30-20
20-20.30	20.30-21	21-21.30	21.30-22	22-22.30	22.30-23	23-23.30	23.30-24	24-24.30	24.30-25
25-25.30	25.30-26	26-26.30	26.30-27	27-27.30	27.30-28	28-28.30	28.30-29	29-29.30	29.30-30

**Appendix B**

## Fidelity Check List

<b>Date</b>	<b>Treatment/Control</b>	<b>Initial</b>
Friday, February 24, 2017	Control	RH
Thursday, March 2, 2017	Treatment	RH
Tuesday, March 14, 2017	Treatment	RH

### Appendix C

#### Social Validity Questionnaire

Questions:		1 Strongly disagree	2 Disagree	3 Agree	4 Strongly Agree
1	This treatment was effective				
2	I found this treatment acceptable for increasing the student's skills				
3	Using the treatment improved skills across multiple contexts (home, classroom, community)				
4	I think the student's skills would remain at an improved level even after the treatment ends				
5	This treatment quickly improved the student's skills				
6	I would be willing to carry out this treatment myself if I wanted to increase the student's skills				
7	I would suggest the use of this treatment to other individuals				