

The Reducing Effects of Stability Balls and Music on Physical Stimming Behaviors in Children

with Autism Spectrum Disorder

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Autism Spectrum Disorder covers a wide range of symptoms for developmental problems in several areas including social communication and repetitive behaviors (Grandin, 2014). Often, self-stimming behaviors (e.g., head shaking, tongue clicking, gazing) are displayed by people with Autism Spectrum Disorder to overcompensate the sense of “boredom” produced during constant task conditions (Dunlap & Koegel, 1980). The evidence shows that children with autism seem most unresponsive while engaged in these ritualistic stereotyped behaviors (Koegel & Covert, 1972). These behaviors compete with daily life activities and acquisition of new behaviors. Koegel and Covert (1972) suggest that there needs to be no self-stimming behaviors present to learn new information. These behaviors interfere with learning; thus, it is important to research techniques that reduce the frequency and duration of self-stimming behaviors.

Some physical and occupational therapy researchers suggest that children with attention problems suffer from sensory modulation deficits (e.g., Mulligan, 2001) and move excessively to increase stimulation (Zentall, 2007). Dr. Grandin, author of the book “The Autistic Mind” (2014), also mentions individuals with autism experience alternative sensory reality and sensory overload. With attention and sensory deficit in mind, occupational therapists strive to provide people with Autism proper sensory processing strategies (Watling, Deitz, Kanny, & McLaughlin, 1999).

Over several years, researchers have tried to manipulate certain environmental stimuli in efforts to improve the behavior, attention, and motivation of children with Autism Spectrum Disorders (ASD) in educational instruction (Carr, Newsom, & Binkoff, 1976; Koegel, Dunlap, & Dyer, 1980). Some have documented the effectiveness of various sensory processing techniques

(e.g., Watling, Deitz, Kanny, & McLaughlin, 1999) (also called sensory modulation strategies) designed to provide learning disabled children with the sensory input needed to maintain effective arousal states. These types of strategies provided individuals with the sensory input needed to maintain arousal levels, which then lead to higher levels of attention in constant task conditions (Dunn, 2008; Kimball 1999). Increased attention has been linked to social skills and their relationship to learning disabilities. Seventy-five percent of students with learning disabilities (including ASD students) can be differentiated from their peers through measures of social competence (Kavale & Forness, 1996). Gresham and Elliott (1990) coined the term “self-control deficit” to describe aversive behaviors that interfere with the acquisition and performance of appropriate social skills. Thus, improved self-control deficits (i.e., self-stimming behaviors) increased social skills and, lead to higher attention levels for children with learning disabilities.

One sensory modulation technique that has shown some promise in improving attention, behavior, and some learning outcomes in children with attention or behavior problems such as Dyslexia or ADHD, is the use of stability balls in place of regular seats (Schilling, Washington, Billingsley, & Deitz, 2003; Horgen, 2009; Goodmon, Leverett, Royer, Hilland, Tedder, & Rakes, 2014). For example, Goodmon and colleagues (2014) studied the effect of stability balls on two fifth grade classes diagnosed with dyslexia on their focus and reading comprehension. In both fifth-grade classes, several undesirable behaviors (respond inappropriate, fail to raise hand, get out of seat, fidget, talk off topic, etc.) decreased (Goodmon et al., 2014). The researchers employed a time series with switching replications design like the present study in which two fifth grade classes participated. While one class used chairs, the other class sat on the stability balls. After 15 days, the classes switched conditions. The children participating showed

increased levels of focus and enjoyment while seated on the ball and in some instances the children preferred the ball over the chairs.

In addition to documented benefit for children with ADHD and children with Dyslexia, there is also some mixed research on the behavioral benefit of stability balls on children with Autism Spectrum Disorders (ASD) (Bagatell, Mirigliani, Patterson, Reyes, & Test, 2010; Schilling & Schwartz, 2004). For example, Schilling and Schwartz (2004) studied the effect of stability balls on boys in preschool diagnosed with autism. The researchers used a single-subject design and implemented the stability balls during specific activities within the classroom for a three-week period (2004). They found a positive correlation between in-seat behavior and engagement when they used the stability balls (Schilling & Schwartz, 2004).

Although Schilling and Schwartz (2004) found that the behavioral benefit of stability balls generalizes to children with autism, others have obtained mixed results. For example, Bagatell, Mirigliani, Patterson, Reyes, and Test (2010) extended Schilling and Schwartz (2004) research and found no real correlation between the use of stability balls and in-seat behavior in children with Autism. Using a single-subject design, Bagatell and colleagues (2010) observed in-seat behavior and engagement in six boys ranged from kindergarten to first grade with a baseline phase, intervention phase (on the ball), and ended with a choice phase (boys chose either chair or ball). Results were mixed in the effectiveness of stability balls. A majority of the six children displayed inconsistent in-seat behavior and engagement. However, half of the children displayed an increase on in-seat behavior with no children displaying a positive effect on engagement because of sitting on the ball. This study added to the research on the effectiveness of stability balls on children with autism while also validating the complex nature of the diagnosis. In both studies researchers gave the teachers a social validity questionnaire. While the teachers in

Schilling and Schwartz study responded with strongly supporting the use of stability balls for classroom seating (2004), Bagatell and colleagues (2010) found a negative response from their teachers in the study with them seeing no benefit for any of the students (2010). Yet, perhaps stability balls improve in-seat behavior because they provide children with the opportunity to move more actively and maintain a higher level of arousal (Schilling & Schwartz, 2004).

Past research focused on how stability balls improve sensory processing and in-seat behavior in children with ASD, however there has been little research on the effect of stability balls in reducing self-stimulatory behaviors. There is reason to believe that stability balls would have a positive impact on self-stimming behaviors. According to Dunlap and Koegel (1980), increasing levels of arousal should lower levels of “boredom,” thus decreasing the need for self-stimming behaviors. A pilot study done by Lynch and Braley (2016) looked to replicate the designs of Fedewa and Erwin (2011) and Goodman and colleagues (2014). In the study done by Lynch and Braley (2016), trained observers measured the children's rates of self-stimulatory behaviors (i.e., target behaviors) during therapy sessions throughout four observational periods:

1. A baseline period (i.e., when the children are seated in normal chairs),
2. An acclimation period (i.e., when the children are getting used to sitting on stability balls),
3. An intervention period (i.e., when the children are sitting on the stability balls), and
4. A post-intervention period (i.e., when the children return to sitting in regular seats).

Goodman, et al. (2014) noted that directing a behavior intervention is tricky because during the length of the study the children may mature (growing older and behavior getting better during the experiment) (2014). Therefore, the Lynch and Braley (2016) tested this maturity theory within their study by adding a post-intervention period. Both the initial baseline and acclimation

periods lasted a week each. The behavior intervention phase lasted three weeks. During the acclimation period and behavior intervention phase, the children performed tasks from their behavior plan while sitting on stability balls. After the three-week behavior intervention period, the children returned to sitting on chairs during the whole therapy sessions. They found trends in the data for the reduction of self-stimming behavior, but there is still research to be done to increase the power of the effect.

To increase the effect, the current researcher sought an enhancing agent for the stability balls. Another sensory modulation technique that has shown some promise in improving attention, behavior, and some learning outcomes in children particularly with ASD is the use of music within therapy sessions. Previous research studies observed patterns of greater attention in children with ASD with the presence of music rather than simple therapy or play therapy (Kim, Wigram, & Gold, 2008; Gattino, Riesgo, Longo, Leite, & Faccini, 2011). One study focused on attention behaviors of preschool children with ASD and found that music therapy was more effective at facilitating joint attention behaviors and nonverbal social communication skills in children than play, particularly with significantly more and lengthier events of eye contact and turn-taking in music therapy than play sessions (Gattino, Riesgo, Longo, Leite, & Faccini, 2011). With increased attention behaviors, the self-stimming behaviors are assumed to decrease as a result.

Therefore, the purpose of the current study was to determine if the benefits of stability balls and music generalize to a reduction in self-stimulatory behaviors, as well as supports the evidence for increased attention, in children with Autism Spectrum Disorder. Bagatell, et al. (2010) selected participants based on diagnosis instead of their pattern of sensory processing. Therefore, the current researcher selected three children diagnosed with autism that also display

self-stimming behaviors (rocking, scratching legs, screaming, biting lips, etc.). Finally, unlike several previous studies that focused on behavior within the context of a classroom, the researcher observed the effects of the stability ball intervention within the context of behavioral therapy sessions at an Applied Behavioral Analysis therapy office to generalize results from past studies to other settings. Based on research showing that there are cognitive and behavioral benefits (e.g., increased attention, on-task behavior, and in-seat behavior) from the use of therapy balls in place of regular chairs in the classroom and the use of music therapy on children with attention problems, such as ADHD, dyslexia, or those with autism (Goodmon, et al. 2014; Horgen, 2009; Fedewa & Erwin, 2011; Schilling & Schwartz, 2004; Kim, Wigram, & Gold, 2008; Gattino, Riesgo, Longo, Leite, & Faccini, 2011) it is hypothesized that children with autism spectrum disorder will exhibit a reduction in self-stimming behaviors (physical/verbal), as well as an increase in attention, while sitting on the therapy balls with the presence of background music during behavioral therapy sessions.

Methods

Participants

A total of three children (between the ages of 7 and 12) with Autism Spectrum Disorder participated in the study. The sample of one female (verbal) and two males (one verbal and one nonverbal) received therapy at the Holladay Childhood Developmental Services. The director and owner of the therapy clinic, Andrea Holladay, selected these three children for participation in the study. Each one of these children exhibit unwanted physical and verbal self-stimming behaviors (e.g., biting their lip and wrist, loud outbursts, throwing themselves on the floor, and stimming on objects), as well as inattention (e.g., any time the children looked away for more than three seconds at time).

Materials

Chairs. The children were seated in their regular chairs during the first week and last week of the study. Data was taken on the number of minutes self-stimming behaviors (physical, verbal) and inattention were observed over a 30-minute therapy session.

Stability Balls. The children were seated on the stability ball for a 2-week intervention period. Data was taken on their self-stimming behaviors (physical, verbal) and inattention for 30 minutes every therapy session. After the 30 minutes of data collection, the children returned to their normal chair for the remainder of the therapy session. An example of these can be found in Appendix B.

Music Player. A CD player with soothing, instrumental music was played on an appropriate volume for the room to act as background music during the times that the children were seated on the stability ball. An example of this can be found in Appendix C.

Data Sheets. The data sheets were used for each child to track the number of self-stimming behaviors observed during the 30-minute session. An example of these can be found in Appendix D.

Behavior Program Binders. Each child had their own behavior plan within a binder. Each therapy session consisted of the therapists having the children complete tasks from the binder. While data was being taken, the children completed table work tasks to effectively use the stability ball.

Social Validity Questionnaire. At the end of the study, the therapists were given a social validity questionnaire for each child. These questionnaires were used to see if the therapists feel that the stability ball and use of background music was beneficial and if they would use them again. An example of these can be seen in Appendix F.

Study Design

This study used a simple time series repeated measures design with switching replications to examine the effects of using a stability ball and background music on self-stimming behaviors (physical/verbal) and inattention in 3 children with autism over a 4-week period. Informed consent was obtained by their parents (seen in Appendix A) before the children participated in the study. The observation period occurred over a 4-week period during each child's therapy sessions. There were no more risks to the participants than those involved in everyday tasks. An A-B-A design was used; A represents the baseline phase and post-treatment phase at the end and B represents the treatment phase.

Procedure

Preparation Phase. Prior to participation, the researcher received institutional approval and then collected parental consent from the three children's parents at Holladay Childhood Developmental Services. The researcher met with the therapists and director at the Holladay Childhood Developmental services to explain the study and receive consent. During meetings, the researcher and therapists discussed how to fit the children for the stability ball and time allotted in each therapy session dedicated to data collection; it was agreed that data would be collected 30 minutes in every session. The director, Andrea Holladay, fitted each participant for the stability ball to ensure correct position of the feet and knees at 90 degrees. Prior experience with the stability balls allowed for the children to learn how to sit on the stability ball correctly.

Phase A: Baseline. During the baseline period, the children and therapists carried out a normal therapy session while the children were seated on a chair. The baseline period lasted 5 days (one school week). During this time, the researcher indicated 2-3

self-stimming behaviors the subject displays the most and collected data on the self-stimming behaviors and the children's inattention.

Phase B: Treatment. During the treatment period, the children were seated on the stability ball with music playing in the background for 30 minutes out of every therapy session while the therapists tracked data on the children's self-stimming behaviors and inattention. The therapists were directed to carry out a normal therapy session while the stability balls and music were implemented. The therapists carried out table work tasks from each child's behavior plan during data tracking. The children could bounce and move while on the ball if the therapists deemed it safe. The intervention period occurred over a 2-week period.

Phase A: Post- Treatment (Baseline). The post-treatment period indicated the children's return to only being seated on a chair. The therapists took data for 30 minutes out of every therapy session for 5 days (one school week) to see if the stability ball and music had a lasting decrease effect of self-stimming behaviors and inattention. The therapists then completed a social validity questionnaire at the end of this period that referred to their perception on the effectiveness of the stability balls for each child's self-stimming behaviors and attention.

Data Collection and Analysis. Therapists collected data daily for 30 minutes every therapy session over a 4-week period. The therapists and researcher tracked each specific self-stimming behavior and frequency of inattention lasting more than 3 seconds. The data collector indicated if the child partook in the specific self-stimming behavior or inattention each minute. The behaviors were all the original behaviors chosen from

baseline. When preparing to analyze results, the self-stimming behaviors were broken down into physical or verbal (seen in Appendix E).

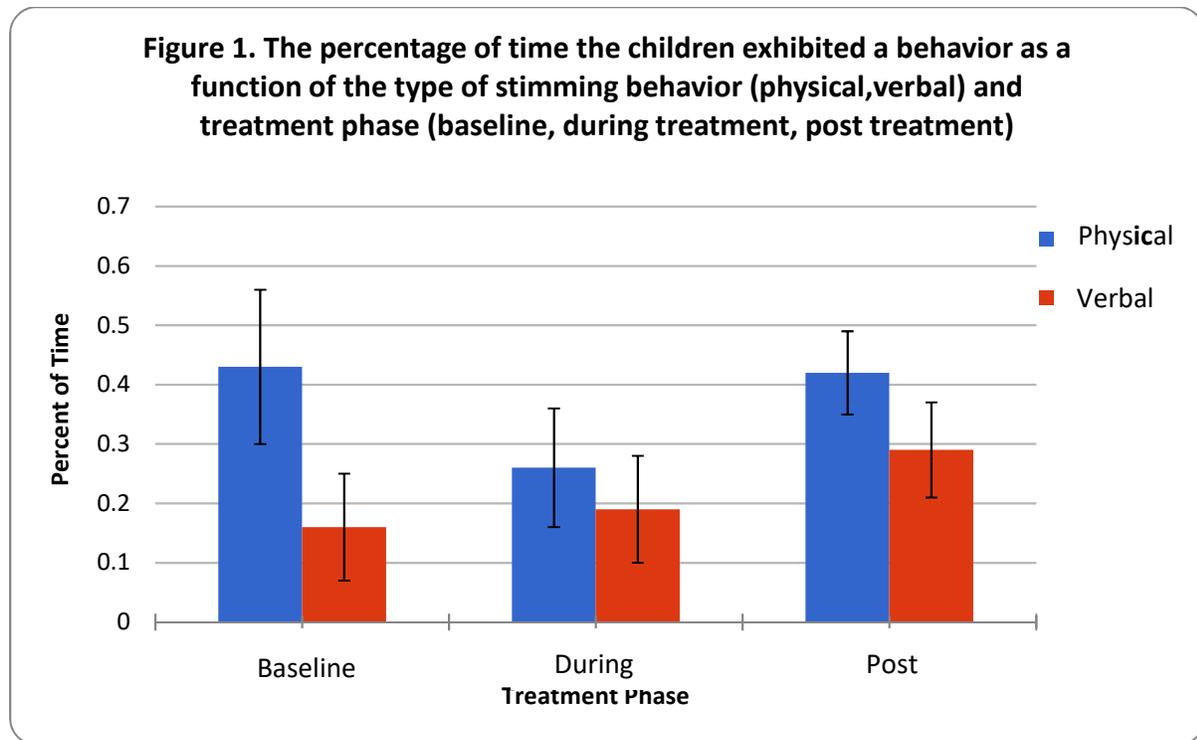
Results

The Effect of Stability Balls and Music on Self-Stimming Behaviors

A 2 x 3 repeated measures factorial ANOVA was conducted with type of stimming behavior (physical, verbal) and treatment phase (baseline, during treatment, post treatment) as the within subjects' factor and percentage of time the child engaged in that behavior. The main effect of type of stimming behavior approached significance, $F(1, 2) = 6.56, p = 0.13$. The children spent more time exhibiting physical stimming behavior than verbal stimming behavior. However, the marginally significant effective behavior was qualified by a type of stimming behavior by treatment phase interaction, $F(2, 4) = 33.12, p = 0.003$. As shown in Figure 1, subsequent pairwise comparisons were conducted and although they lacked power to detect significant differences, the pattern of results revealed that the treatment (sitting on the stability balls and listening to calming music) reduced the time spent exhibiting physical stimming behaviors, but not the time spent exhibiting verbal stimming behaviors. The children exhibited a decrease in the amount of time they engaged in the physical stimming behavior from baseline (when they were sitting in normal chairs) ($M = 0.43, SD = 0.13$) to the treatment phase ($M = 0.26, SD = 0.10$). However, paired sample t tests revealed no significant difference between these conditions, $t(2) = 1.48, p = 0.28$. There was also an increase in the percentage of time they exhibited the physical stimming behavior from the treatment phase to the post treatment phase when they returned to sitting in normal chairs ($M = 0.42, SD = 0.07$), $t(2) = -2.47, p = 0.13$, and paired sample t tests showed a marginally significant difference between these two conditions. A paired sample t test between the baseline and post treatment phases revealed that when the

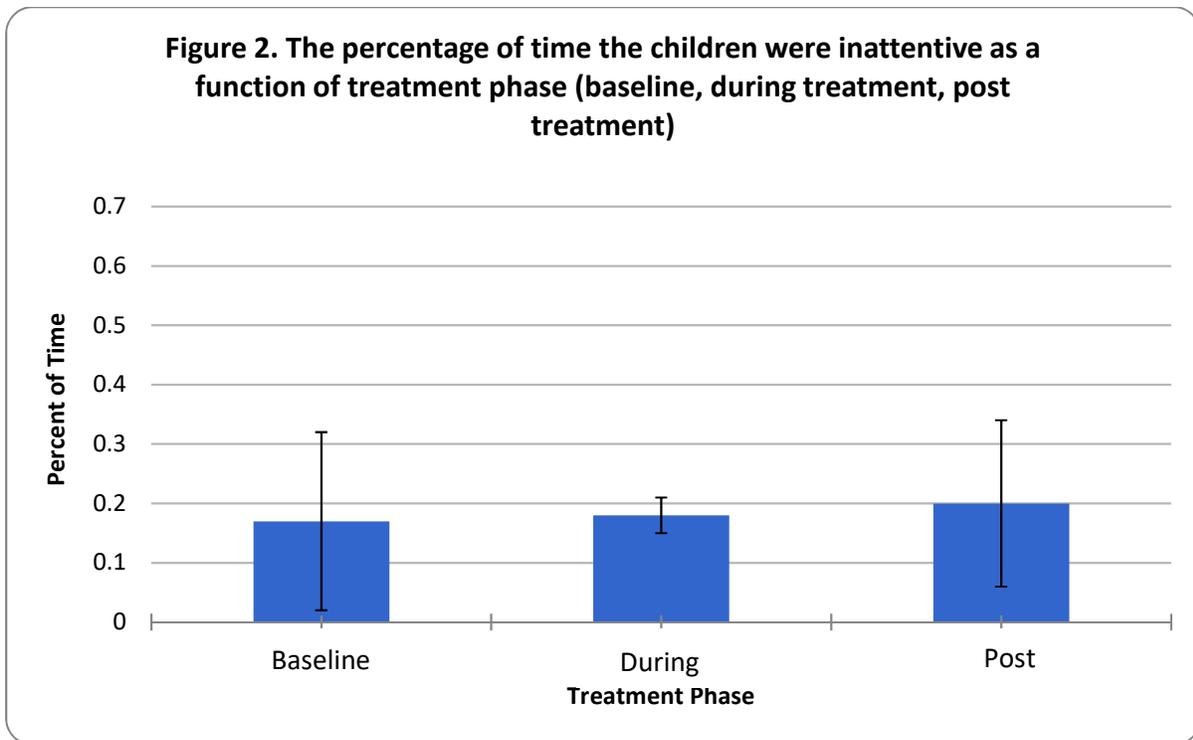
participants returned to normal chairs, the percentage of time they exhibited physical stimming behaviors returned to similar levels exhibited at baseline, $t(2) = 0.07, p = 0.95$.

The pattern of results for verbal stimming behaviors differed from the pattern of results for physical stimming behaviors. The children did not exhibit a decrease in the amount of time they engaged in the verbal stimming behavior from baseline (when they were sitting in normal chairs) ($M = 0.16, SD = 0.09$) to the treatment phase ($M = 0.19, SD = 0.09$). A paired sample t tests revealed no significant difference between these conditions, $t(2) = -0.29, p = 0.80$. There was also not an increase in the percentage of time they exhibited the verbal stimming behavior from the treatment phase to the post treatment phase when they returned to sitting in normal chairs ($M = 0.29, SD = 0.08$), $t(2) = -1.59, p = 0.25$, and paired sample t tests showed a marginally significant difference between these two conditions. A paired sample t test between the baseline and post treatment phases revealed that when the participants returned to normal chairs, the percentage of time they exhibited verbal stimming behaviors returned to similar levels exhibited at baseline, $t(2) = -2.26, p = 0.15$.



The Effect of Stability Balls and Music on Rates of Inattention

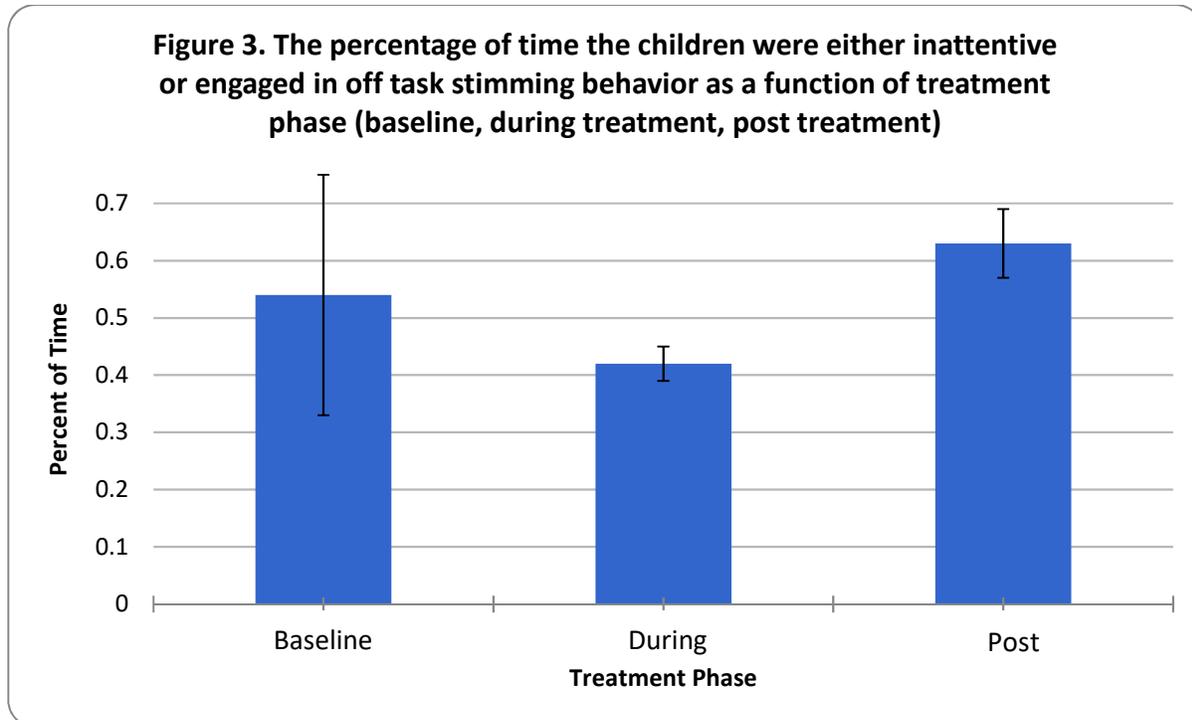
A univariate repeated measures ANOVA was conducted with treatment phase (baseline, during treatment, post treatment) as the within subjects' factors and percentage of time the child was inattentive as a dependent variable. As seen in Figure 2, there was no effect of treatment phase on percentage of time the child was inattentive, $F < 1$. The children did not exhibit a significant decrease in the percentage of time that they were inattentive while sitting on the therapy balls, ($M = 0.18$, $SD = 0.03$), compared to the baseline ($M = 0.17$, $SD = 0.15$), $t(2) = -0.09$, $p = 0.94$, and the post treatment phases ($M = 0.20$, $SD = 0.14$), $t(2) = -0.31$, $p = 0.79$.



The Overall Effect of Stability Balls and Music on Self-Stimming Behaviors (Physical/Verbal) and Inattention

A univariate repeated measures ANOVA was conducted with treatment phase (baseline, during treatment, post treatment) as the within subjects' factors and percentage of time the child was either inattentive or engaged in off task stimming behavior as a dependent variable. As seen in Figure 3, there was no effect of treatment phase on percentage of time the child was either inattentive or engaged in off task stimming behavior, $F(2,4) = 2.61, p = 0.19$. The children did not exhibit a significant decrease in the percentage of time that they were either inattentive or engaged in off task stimming behavior while sitting on the therapy balls, ($M = 0.42, SD = 0.03$), compared to the baseline ($M = 0.54, SD = 0.21$), $t(2) = 0.95, p = 0.44$. However, there was a significant increase in the percentage of time that they were either inattentive or engaged in off

task stimming behavior while sitting on the therapy balls compared to the post treatment phases ($M = 0.63$, $SD = 0.06$), $t(2) = -5.29$, $p = 0.03$. Their behavior after returning to chairs returned to baseline levels of percentage of time that they were either inattentive or engaged in off task stimming behavior, $t(2) = -1.01$, $p = 0.42$.



Discussion

The purpose of the current study was to determine the effect of stability balls and music on self-stimming behaviors and attention in three children diagnosed with autism spectrum disorder who attend an applied behavioral therapy center. The results only provide evidence to support the reduction of the physical self-stimming behavior. This is contrary to the previous research that found cognitive and behavioral benefits (e.g., increased attention, on-task behavior,

and in-seat behavior) from the use of therapy balls in place of regular chairs in the classroom and the use of music therapy on children with attention problems, such as ADHD, dyslexia, or those with autism in regards to the attention and on-task behaviors (Goodmon, et al. 2014; Horgen, 2009; Fedewa & Erwin, 2011; Schilling & Schwartz, 2004; Kim, Wigram, & Gold, 2008; Gattino, Riesgo, Longo, Leite, & Faccini, 2011). Patterns of inattention did not significantly change during the treatment phase, and the data for verbal self-stimming appears to have increased over the duration of the study.

The trend of the verbal self-stimming behaviors was not expected to increase over the duration of the study regardless of treatment phase. The nonverbal male participants' data carried this effect and the data that could have been affected by many factors. He recently went through multiple schedule changes, whether it was medication, sick days, or daily routine in his home life. Such schedule changes could have played a role in the child's screaming behaviors and his all-together demeanor within his therapy sessions, and thus lead to more verbal self-stimming. Another potential explanation would be the possibility that the child is developing more verbal skills to communicate in the future and the therapists do not want to discourage verbal growth by reducing those behaviors.

The results also found some significant interactions in the analysis of the percentage of time the children were either inattentive or engaged in off task stimming behavior. The trend in these results relied upon the physical self-stimming behaviors that produced significant differences. The trend of increasing verbal self-stimming behavior enhanced the increase in the percentage of time the children were either inattentive or engaged in off task stimming behavior from the treatment phase to the post treatment phase. Therefore, the overall benefit of the

intervention was better analyzed by focusing on the specific behaviors (physical stimming behaviors, verbal stimming behaviors, inattention).

A subsequent purpose was to measure the social validity of the study through therapist preference and opinion on the effect of the stability balls and music on reduction of self-stimming behaviors and increased attention (See Appendix F). The therapists perceived that two out of three participants benefitted from the presence of the stability ball and music. These two participants were the verbal male and female that received ABA therapy primarily for educational purposes. On a 1 to 5 Likert Scale of 1 being strongly disagree to 5 being strongly agree, the therapists collectively rated the verbal children a 4 (strongly agree) on the questions 1, 3, and 4. These questions asked about the general benefit of treatment, perception of increased focus, and would they recommend use of the stability balls and music in the future, respectively. Additionally, the therapists rated the verbal children a 5 (strongly agree) for question 2 on their perception of the reduction in self-stimming behaviors. While the data may not show a significant improvement, the therapists' perception of the intervention implied that there was some benefit for these specific children.

The nonverbal male that received ABA therapy for more skill building purposes was the participant not determined to receive any benefit from the treatment. The therapists rated the child a 2 (disagree) on questions 1 and 2 regarding benefit of the treatment and perception of the reduction in self-stimming behaviors, respectively. The therapists rated the nonverbal child a 1 (strongly disagree) on questions 3 and 4 regarding perception of increased focus and recommendation of using this treatment in the future, respectively. Therefore, the social validity questionnaire can be used to argue that the treatment did offer a perceived benefit for the verbal, school children and may indicate that the therapists will continue to use the stability balls and

music in their future therapy sessions. The observation of the verbal children being benefitted while the nonverbal child received no benefit will be addressed more in future directions.

Limitations

Due to the nature of the Applied Behavior Analysis clinic, there were several limitations to this study. The participant population that was available at Holladay Child Development Services was the first of these limitations. The clinic itself accepted children from all areas of the spectrum, meaning that not all the clients exhibited self-stimming behaviors, and therefore were ineligible to participate in this study. Furthermore, not all the clients that exhibited the behaviors that were targeted by this study attended ABA therapy on a regular enough basis to collect the data from those individuals. Of the original six clients that were potential participants, two of which ended up cutting down on hours attending therapy, and thus lost their eligibility. The third child was lost due to attrition from the therapists being unable to collect the baseline data as well as perform the client's therapy program.

Limitations continued with the three clients that participated. Participants' therapy sessions were cancelled on certain days throughout the available time for the study to be conducted due to insurance updates and therapist changes. The participants also missed therapy days, which reduced the amount of data collection days for the study, due to factors such as illness, doctor's appointments, and vacations. This caused for the study to be done with only 4 full weeks of data, instead of being carried out over a longer time for the stability balls and music to potentially have a greater effect with more acclimation.

Future Directions

This study can be expounded upon in several ways. The same participants could be used for further research to determine where the reducing effect was rooted. By separating the stability balls and use of the background music into different phases, as well as being paired together, the percentage of time the children exhibit physical self-stimming behaviors can be compared. In doing so, there could be a determination whether the reduction is coming more from the use of the stability balls, the music, or if they best work together to create the reducing effect observed in this study. Factors to consider while conducting this research would be to vary the order in which participants go through the phases to ensure the order in which they experience the treatments do not affect the reductions. This would also require more participants for significant and accurate results.

Increasing the sample size would also allow for a greater power to detect if there are significant differences in more than just physical self-stimming behaviors between phases. While the results could have easily been skewed by just one participant in a sample size of three, the results will not rely so much upon a single participant with a greater sample. This allows the results to be generalized to a greater portion of those with ASD. Furthermore, bringing the experiment to another clinical setting, other than Holladay Child Development Services, would also act as an agent to generalize the results to the greater population and to ensure that there were no other factors within the specific clinical setting contributing to the reduction of physical self-stimming behaviors.

Finally, after a critical look at the sample used within this study, it would be beneficial to use a larger sample size as mentioned above to incorporate a grouping variable such as verbal versus nonverbal or high functioning versus low functioning. The social validity questionnaire

answers from the children's therapists indicate that the treatment could mostly benefit those who are verbal, but without a larger sample that includes this grouping variable, there is no evidence to support that idea. Therefore, including multiple participants from various areas of the spectrum will allow for a better understanding of what children will benefit from the use of the stability balls and music within their therapy sessions. This will allow therapists to determine whether to incorporate this treatment plan into specific children's behavioral plans in the future.

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Appendices

Appendix A

Florida Southern College: Parent Consent Form

Project Title: Can Stability Balls and Music Act as an Effective Replacement for Self-Stimming Behaviors?

Principal Investigators: Andrea Holladay and Monika Mielecki

Florida Southern College Faculty Sponsor: Leilani B. Goodmon, Department of Psychology

Provider: Holladay Child Development Services, LLC
5302 S. Florida Ave, Suite 206
Lakeland, FL 33813, 863-937-8067

Dear Parent(s),

We are researchers at Florida Southern College and Holladay Child Development Services, LLC. Your child is invited to be a participant in an important research study on the possible benefits of sitting on stability (or therapy / bouncy) balls and soothing, instrumental music (such as music used in yoga sessions) during behavioral therapy sessions. The purpose of this study is to determine if sitting on the balls with background music playing can reduce specific self-stimming behaviors that your child exhibits.

If you give your consent for your child to participate in this study, then your child will be observed over the course of 6 weeks when the stability balls will be used in place of regular seats and integrated into various therapy sessions.

Neither you nor your child will be paid for taking part in this study. The only anticipated minimal physical risk might be if your child misuses the stability ball. However, we anticipate that any misuse will be unlikely based on the following reasons: 1. Your child already knows how to properly sit on the ball because he/she uses it regularly during free time. However, prior to introducing the stability ball during therapy sessions, Andrea Holladay or another Board-Certified Behavior Analyst (BCBA) (or Board Certified Assistant Behavior Analyst, BCaBA) will show your child how to properly sit on the ball during therapy sessions. 3. If needed, we can set the ball inside a specialized chair that will hold the ball in place and prevent falls. If a child is observed not sitting on the ball correctly, then the therapist will redirect the child to sit properly and non-compliance will result in the therapist removing the ball from that particular therapy session. If a child does happen to fall off of the ball, the therapist will conduct a body check to ensure that there are no injuries.

If the results of this study reveal a reduction in self-stimming behaviors, then we will share this information with others in the form of conference presentations or published manuscripts in journals. However, only group results will be reported and any published results will not include your child's name or any other information that would personally identify you or your child in any way. No records will be kept with your child's name and no records will be kept with your name of them *except* for this parental consent form, which will be stored in a locked cabinet separate from the collected data. Each child will be assigned a numeric code so that you can review any progress at any time. The gathered information will be saved for 5 years and be shredded or properly disposed after that time. However, certain people may need to see the study records, (including IRB officials) and, by law, anyone who looks at the data records must keep them completely confidential.

The decision for your child to take part in this study is completely voluntary. You are free to withdraw your child from the study at any time without penalty.

If you have any questions about this study, contact the Primary Investigator at the phone number or e-mail at the top of this form. If you have questions about your child's rights as an individual taking part in a research study, you may

contact the Chair of the Florida Southern College Institutional Review Board at (863-680-6205) or the FSC Vice President for Academic Affairs (863-680-4124).

I have read the Informed Consent Form and I give permission for my child to participate in the study. I understand that they can withdraw from this study at any time without penalty. I understand that I will not receive payment for my child's participation. Additionally, I understand that this form will be renewed annually for research projects lasting longer than one year.

Signature: _____ Date: _____

Relationship to Patient: _____

Provider Signature: _____ Date: _____

Appendix B



Appendix C



Appendix D

Interval Data Recording Sheets

We will administer observations prior to stability ball intervention, during stability ball intervention, and after stability ball intervention.

For tracking duration on-task, occurrence and non-occurrence of behaviors

Name: Child C **Observer:** _____ **Recording Method:** Momentary
 Time Sample Whole Interval **Length:**

Directions: Specify duration/length of interval for recording. During whole interval, during the entire specified interval the child must be on-task, if at any time during that interval they are not on-task, place a - in the interval. If for the whole interval the child is on-task place a +.

Date: _____

Behavior	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
Scream/ Yelling																															

Comments:

Date: _____

Behavior	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
Rocking																															

Comments:

Date: _____

Behavior	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
Scratch/ Rub legs																															

Comments:

Appendix F

Social Validity Questionnaire

On a scale from 1 to 5 with 1 being strongly disagree and 5 being strongly agree rate each question according to the stability ball's effectiveness for Child A.

1) Was the stability ball and music beneficial to Child A?

1 2 3 4 5

Explain how the stability ball and/or music was either effective or noneffective

2) Did you feel the using the stability ball as chair and music decreased the amount of Child A's self-stimming behaviors (screaming, biting lips, rocking)?

1 2 3 4 5

Did Child A replace any of his self-stimming behaviors with new behaviors?

3) Did you feel using the stability ball as a chair and music increase Child A's focus?

1 2 3 4 5

4) Overall would you recommend Child A use the stability ball in the future as a chair?

1 2 3 4 5