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Therapy Balls Provide Movement for Preschoolers:
The Effect on Active Engagement During Circle Time

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This scholarly project reflects individualized, original research conducted in partial fulfillment of the requirements for the Occupational Therapy Doctorate Program, The University of Toledo.
Abstract

We investigated the effects of providing movement with use of therapy balls to enhance engagement during circle time. This study used a repeated measure, A-B-A design in groups of typically developing preschool children (n=11) during the 15-minute circle time portion of a series of eight playgroup sessions. During A phases, the children used standard chairs, and during B phase, the children used therapy balls to sit on. Engagement was rated using five subscales of the Child Behavior Rating Scale (Mahoney & Wheeden, 1999), including attention, persistence, involvement, joint attention, and affect. The Sensory Profile (Dunn, 1991) and Conners’ Behavior Rating Scale (Conners, 2001) assessments were conducted to identify children with sensory issues, behavioral issues, inattention, or hyperactivity.

Results indicated that there was a significant difference in attention across the three phases; however, post hoc analysis did not reveal differences between any two phases. Visual inspection of the data suggests that attention in the first A phase and the B phase is not different, but there is decreased attention in the final A phase. This pattern held for children with typical Sensory Profile scores, but not for those with sensory seeking patterns. These children exhibited a steady decrease in attention across the phases.

We conclude that therapy balls may enhance engagement for some typically developing preschool children; however, those with sensory seeking needs may be too young to implement this type of modality while also maintaining attention. This suggests that occupations like circle time may need to be modified according to individual needs of children.
Therapy Balls Provide Movement for Preschoolers: The Effect on Active Engagement During Circle Time

“...the primary occupation, that is the normal daily activities of children, is that of student,” (p. 424) and those activities include playing, listening, exchanging ideas, and learning (Schilling and Schwartz, 2004).

Circle time within the preschool classroom environment is described as an opportunity for communication and interactions such as greetings, sharing, group activities, and announcements to take place. Circle time is implemented by the teacher and succeeds with the cooperation and participation of the student group (Bornstein & Bradley, 2007). Circle time is informal, yet structured, with its focus directed toward multisensory experience, multilevel instruction, and multiple opportunities to learn (Wald et al., 1996). Furthermore, circle time is a ritual that increases structure and decreases chaos for both children and teachers involved; participation during circle time provides both restriction and opportunity (Reich, 1993). Teachers are focusing strategies of repetition, planning, and disciplining; however, this focus may be directed towards the needs of the group rather than evaluating each child on an individual basis (Reich, 1993).

From a historical perspective, children were taught to behave, restrain themselves, and to sit still during circle time. If these demands were breached, the child would be asked to leave the circle and not participate in the activities (Reich, 1993). Circle time was designed to contribute to the development of personal identity, to increase self-awareness, and to create a sharing atmosphere, but for many children, the circle proved to be restrictive and controlling (Reich, 1993).
Contemporary approaches may need to modify the routine of circle time. Preschool aged children desire movement experiences that provide strong sensory input and may find it difficult to sit still (Case-Smith, 2001). To address this need, circle time may be centered around enhancing opportunities to learn without stress or restrictions on sensory experiences. Also, children may need opportunities to selectively channel this movement to develop attention and engagement skills. Sensory development is a normal process that occurs in every developing child (Young, 1987). Sensory modulation is the ability to regulate and organize reactions to sensory input, filter out unnecessary stimuli, while maintaining an optimal level of involvement (Bar-Shalita, Vatine, & Parush, 2008).

Winnie Dunn, noted author and expert in the field of sensory integration, emphasizes that early childhood professionals need to establish a common understanding of sensory processing in order to interpret child behaviors to adapt and support the child’s individual needs (Dunn, 2007).

Researchers define habituation as recognizing familiar stimuli that do not require additional attention. They further define sensitization as the enhanced awareness of important stimuli. Both of these actions are influential in neurological responsivity (Dunn & Daniels, 2002). Dynamic balance between habituation and sensitization may contribute to the benefits of engaging in a multisensory, complex activity. Dunn’s model of sensory processing discusses the relationship between a child’s nervous system and the ability to engage behaviors to regulate sensory input (Dunn, 2007). At all ages, there is variability in how individuals react to sensory stimuli through neurological threshold (Dunn, 2007). Kandel and colleagues describe a threshold as the amplitude of an incoming response from a stimulus that causes the nervous system to react. Another
factor that influences behavior with regard to sensory stimulation is self-regulation. Depending on the child, active or passive strategies may predominate. For children with active strategies, this may entail controlling the amount or type of input received (Dunn, 2007). Sensory patterns that occur within the threshold and self-regulation spectrum are further described in Dunn’s sensory processing model. These complex patterns include low registration, sensory sensitivity, sensation seeking, and sensation avoiding. Children with low registration tend to have a high threshold therefore do not always respond readily to stimuli nor does he/she seek out stimulation. Children may have sensory sensitivity if they tend to be more responsive to the environment but not engage in active strategies to reduce stimulation. Children with sensation seeking attributes have higher thresholds and seek more sensory input. Finally, when children with sensation avoiding patterns tend to withdraw from certain situations and sensations due to feeling overwhelmed (Dunn, 2007). By analyzing a child’s sensory patterns, early childhood professionals can better understand a child’s response to sensory events that occur in daily occupations. It is the responsibility of early childhood professionals to realize the spectrum of sensory processing in a child’s natural environment to increase a child’s success and participation.

Awareness of the function of sensory stimulation in the development in young children has expanded the research in this area. Early intervention professionals have long recognized that sensory processing is essential to the growth and development of young children and that there is a crucial connection between mind and body.

Movement Is Fun, a program developed by occupational therapist Susan B. Young, further suggested the need for children to move and enhance their sensory
processing abilities by using movement activities designed to increase tactile, vestibular, proprioceptive, postural, bilateral, and motor development skills (Young, 1987). Young created this program on the basis of Ayres theory (1972) indicating that sensory system formation is essential to develop prior to learning higher-level skills (Young, 1987). To support this theory, sensory experiences should be provided for children that seek sensory input. Movement through use of therapy balls is one of several approaches that may prove to be beneficial. In the program, Young states that therapists typically implement sensory integration techniques on an individual basis, however, small groups may be manageable using a therapeutic approach (Young, 1987); such as a small circle time setting.

Concentration, cooperation, and participation result from neurological function, but Dunn (2002) suggests that behavioral responses contribute as well. At extreme ends of the behavioral spectrum there are children who actively select and engage in an occupation and those that simply observe their environments without active engagement in occupations. Using the therapy ball during circle time may provide the former children with the stimulation they seek but also evoke engagement from latter.

It has been suggested that the use of therapy balls in the school system creates an active instructional environment and may provide the ideal stimulus to encourage engagement, attention, and appropriate behavior (Schilling & Schwartz, 2004). Several studies have provided evidence that children at risk for sensory processing deficits respond favorably to engagement and interaction within the classroom when seated on a therapy ball. Schilling and Schwartz (2004) specifically examined the use of therapy balls with four preschool-aged children with Autism Spectrum Disorder (ASD). In this
study, the use of therapy balls increased engagement and level of arousal to facilitate participation and attention (Schilling and Schwartz, 2004). Schilling and Schwartz’s study (2004) was further expanded by Bagatell and colleagues (2010) investigating the effect therapy balls have on engagement in relation to patterns of sensory processing with children with ASD that were enrolled in a kindergarten and first grade (Bagatell, Mirigliania, Patterson, Reyes, & Test, 2010). In this study, children described as seeking vestibular and proprioceptive input were reported to engage more during in-seat instruction compared to children with other patterns of sensory processing. The authors suggested that the complexity of sensory processing and ASD necessitates clinical reasoning and comprehensive assessments when suggesting therapy balls for specific children. Another study investigated (Schilling, Washington, Billingsley, & Deitz, 2003) the effects of therapy balls as a means to improve in-seat behavior and legible word productivity for children 9 years of age with Attention Deficit Hyperactive Disorder (ADHD). Evidence was shown that this strategy may help children stay on task (Schilling, Washington, Billingsley, & Deitz, 2003). Further confirmation is noted in occupational therapy literature that suggests the practice of sensory modulation strategies in classrooms for the purpose of improving the classroom performance of children with ADHD (Kimball, Kramer, & Hinojosa, 1999).

Sensory modalities, like therapy balls, have been shown to improve attention with children with a variety of diagnoses (Schilling, Washington, Billingsley, & Deitz, 2003; Schilling & Schwartz, 2004). There is a need however to demonstrate that many children could have underlying sensory deficits and with use of sensory strategies, such as therapy balls, could facilitate engagement and participation in classroom settings. It is the role of
the occupational therapist to analyze and observe a child in their natural setting and
determine whether the use of sensory modalities would increase students’ success.

Academic demands appear to be increasing in early education specifically when
transitioning from preschool to grade school (Blacher and McIntyre, 2006). Though
sensory modulation disorders and ADHD may not be reliably detected at this young age,
it may be inferred that preschool children, who have less mature nervous systems, may
benefit from the use of therapy balls within the classroom. Therefore, the purpose of this
study is to investigate the use of therapy balls within a typical preschool group
environment during circle time. We have compared the engagement using the Child
Behavior Rating Scale during circle time; and examining the subscales including
attention, persistence, involvement, joint attention, and affect while using this dynamic
seating as opposed to conventional classroom chairs.

Methods

Design

This study used repeated measure, A-B-A design in groups of typically
developing preschool children during the 15-minute circle time portion of playgroup
sessions. Circle time was conducted in a standardized, structured format throughout the
study period. Playgroups were held for eight sessions. Groups met approximately once
to twice a week depending on availability of participants. In phase A1 children sat on
standard age-appropriate seats for circle time. Phase B introduced the intervention of
therapy ball seating. In phase A2, children returned to sitting on standard chairs. Phases
A1 and B began with novelty sessions (session 1 and 4, respectively). Data from these
sessions were excluded from analysis as the children were becoming familiar with their
peers, environment, teacher, and seating equipment. Two sessions of data collection were held in conditions A1, B, and A2.

**Participants**

The participants consisted of 2 groups of 4 typically developing children and 1 group of 3 typically developing children, for a total of 11 participants. The children were from the Toledo, Ohio area and were preschool aged (having not yet begun kindergarten), their ages ranged from 3 to 5 years. The parents and children were asked to commit to attend all 8 sessions, barring family emergencies.

According to the Hollingshead Social Status Index (Hollingshead, 1975), the socioeconomic status of participants’ parents, as a group, can be described as working middle to upper class; the majority of the participants were living with both working parents that have attended college or graduate education. These scores are calculated by evaluating education or level of school completed, occupation, and marital status/living arrangement. The average score of the participants fall between the statuses of medium-major business and professional.

According to the Conners’ Parent Rating Scale- Revised (L) (2001, see below for description), participants did not exhibit ADHD tendencies that may contribute to lack of participation or inattention during circle time.

**Materials**

The materials used in the phases A1 and A2 were standard bright yellow plastic, four-legged chairs standing 11.5” in height. During the intervention phase (B), therapy balls were used for seating. Prior to the study, children tried out the therapy balls, measuring 14” diameter, to assure that they were the appropriate size. For purpose of this
study, this size was within acceptable limits because the children were able to sit with both feet flat on the floor while hips and knees were at right angles.

The room was designed to mimic a preschool classroom setting with materials including a rug, posters, frog-themed decorations, calendar, and art supplies on the table. During circle time, book materials, puzzles, and other educational materials were used. Across the sessions, the children observed development of live tadpoles in an aquarium. To further create a naturalistic environment the student investigator took on the role of the teacher for this study, a role familiar to her because of prior education and training as a special education teacher. In addition, video cameras were in the room to document the children’s behavior in the baseline and intervention phases.

**Procedure**

The student investigator conducted the procedures for this study. After giving consent, parents of the participants were asked to fill out a Sensory Profile (Dunn, 1991) and the Conners’ Parent Rating Scale- Revised (L) (Conners, 2001).

The Sensory Profile (Dunn, 1999) is a questionnaire consisting of 125 items that the parents and/or caretaker assessed the child’s responses to sensory processing events that the child may experience in daily life. The Sensory Profile consists of 3 sections that include sensory processing, modulation, and behavioral and emotional responses. Dunn (1997) hypothesized that there is a relationship between a person’s nervous systems operations and self-regulation strategies and that the interactions of these functions in sensory processing. Also, Dunn and colleagues found out that these patterns of sensory processing occur in all age groups and that people with disabilities have both distinctive and more intense patterns of sensory processing than peers without disabilities. The
validity of the Dunn’s model was evaluated by looking at a national population from infants to adults. In every age group researchers verified the existence of the 4 patterns of sensory processing hypothesized in Dunn’s model (Dunn, 1997). The reliability has been conducted through studies of children and adults with or without disabilities using age-appropriate questionnaires containing statements on how people respond to sensory stimulation and the frequency of occurrence (Dunn, 2007). Because the scores of the Sensory Profile follow a normal distribution (Dunn, 1997), it would be expected that in nearly any group of children some would have scores that fall outside of the mean. Sensory processing difficulties, however, are defined by disruption in everyday functioning and not by scores alone. No parents reported concern about daily functioning; therefore, the scores that fell outside of the mean were felt to reflect normal variation rather than sensory processing difficulty.

In the Conners’ Parent Rating Scale- Revised (L) (2001), the parent scales measure the child’s behavior at home where the parent has the opportunity to observe the child. The ADHD index is included in the Conners' Rating Scale (CRS-R) that can be helpful in noting those children who may merit a clinical diagnosis of ADHD (Conner, 1997). The CRS-R has three decades worth of research and is one of the most widely used research test instruments available. Internal reliability and test-retest reliability figures for the CRS-R meet all standards of test excellence. Also, the CRS-R has background in both clinical and academic research, therefore the psychometrics are a focus (Conners, 2001). These two assessments were conducted to identify students with any learning disabilities, sensory issues, hyperactivity, lack of concentration, or inattentiveness as they may respond to the use of therapy balls differently than typically
developing peers. Had the scores of the CRS-R indicated that the child may have impaired attention, the parents were to be informed in a private discussion and be encouraged to follow up with their primary care provider.

The researcher conducting circle time remained blind to the results of these assessments until after completion of data collection and analysis so as not to bias interactions with participants.

In the assessment session, children and parents were introduced to the playgroup facilities and procedures. Parents received weekly phone calls to remind them of the scheduled sessions. Researchers attempted to reschedule sessions as needed to ensure attendance of all children for the eight-session study.

Prior to arrival parents were reminded to take their children to the bathroom and make certain they had been properly fed so distractions did not occur during circle time. As children arrived and prior to circle time, the children parted from their parents and chose an activity that was readily available in the room. This time was referred to as “free play”; an example might be coloring a picture. The children were engaged in an activity for approximately 15-20 minutes prior to transitioning to the circle time area on the rug for the circle time session. At the first session, rules for behavior were established and communicated in child-friendly language (i.e. “no hitting” and “take turns”). These were reviewed at the beginning of each subsequent session.

A 15-minute circle time was conducted; these 15 minutes were structured in the same fashion in both phases. During this time, researchers recorded behavior using multiple standard video cameras to allow for offline analysis. Following the 15-minute circle time, children were given the opportunity to participate in a learning activity, for
example working in a personalized booklet on a letter-themed coloring page. The duration of the complete 1-hour session consisted of a 15-minute transition time of departing from parents, 15 minutes of free play, 15-minute circle time, and 15-minute post circle learning activity. Playgroups, including circle time, were focused on the theme of frogs, incorporating their life cycle, habitats, and feeding behaviors.

During the baseline and intervention phases circle time consisted of the following (see Appendix A for specific lesson plans):

a. Circle Time song, “Gather round”- Song
b. Welcome song, “Who is here today?” introductions, sharing
c. Discuss the rules, have children create them
d. “Open, Shut them”- Hand movement song
e. “What’s the weather?” “Oh Mr. Sun”- Songs about the weather, discuss the weather for the day
f. Calendar, “Days of the week”- Days of the week song and discuss the date.
g. “Five Green and Speckled Frogs” “Jump up and Down”- Movement songs
h. Frog theme learning activity for the week, (Frog Cycle, habitat, games, books)
i. The children were given a frog theme booklet to use before and after circle time.

Images used for the booklet were from [http://www.first-school.ws/index.htm](http://www.first-school.ws/index.htm)

Measurement

Young children are unlikely to respond to self-reporting measures of their sensory experiences, but rather assessments within this population are usually through observation of the child during natural or test conditions (Dickie, Baranek, Schultz, Watson, & McComish, 2009). The outcomes were measured using the Child Behavior
Rating Scale (Mahoney & Wheeden, 1999), for each 15-minute circle session. The CBRS consists of seven items; measuring two components of interactive behavior; Attention and Initiation. The seven items include attention to activity, persistence, involvement, cooperation, initiation, joint attention, and affect. (Mahoney & Wheeden, 1999). Each is rated on a 5-point Likert-type scale where higher scores are indicative of greater engagement. The CBRS was used to measure the student’s engagement during circle time and only 5 of the 7 items were used to evaluate each child’s participation and attention during circle time. The 5 subscale items included attention, persistence, involvement, joint attention, and affect. Cooperation and initiation were not evaluated because each child would be instructed to partake in circle time during each session if in attendance that day. Research has shown that evaluating these elements of child’s behavior during instruction, or in this study, circle time, are sensitive to the effects of teacher interaction on children’s engagement (Mahoney, Wheeden, & Perales, 2004). The author of the scale recommends that the rating scheme be individualized according to the specific setting and study (G. Mahoney, personal communication, October 17, 2008). Therefore, scales were modified to allow accurate ratings of low and high engagement in circle time for this study (see Appendix B).

**Data Analysis**

The CBRS data was coded for periods b-g of the session outline above. Video tapes were rated by the researcher according to the CBRS. An interrater was trained on a subset of 4 videos until her rating demonstrated 85% agreement with the student researcher. The interrater then rated a separate, random subset of 30% of the videos. The interrater was blind to the hypothesis of the study. Interrater reliability was assessed
through calculation of a linearly weighted Kappa statistic. Kappa statistics were as follows: attention, 0.88; persistence, 0.88; involvement, 0.82; joint attention, 0.86; and affect 0.83.

In order to obtain a measurement of behavior reflective of each child’s engagement in circle time regardless of other differences in his/her day, we averaged CBRS subscale and total scores from two consecutive sessions in the same condition. Novelty sessions, i.e. the first overall session (1) and the first session using balls (4) were excluded. In the case of absence, we utilized an intention to treat approach in which the data from the previous session was carried forward into the missed session. CBRS scores from the first chair sessions (A1), ball sessions (B), and second chair sessions (A2) were used for analysis. Some CBRS subscale scores were not normally distributed, so non-parametric assessments were utilized. Kruskal-Wallis tests were used to assess for differences in CBRS subscale and total scores according to between subject factors of age, gender, Conners’ Global and ADHD scores, and Sensory Profile categorization (typical, probable difference, definite difference) in sensory seeking, sensory registration, sensory sensitivity, and sensory avoiding. Friedman’s ANOVA was used to assess CBRS scores across the seating conditions (A1, B, A2) with Wilcoxon signed ranks test used for post-hoc comparisons. Significance was determined at the $\alpha=0.05$, 0.0167 after Bonferroni correction for post hoc tests. Effect sizes reported (r) are the Z statistic divided by the square root of n (Field, 2009).

**Results**

In each condition (A1, B, A2), CBRS subscale and total scores did not differ according to gender, age, Conners’ Global and ADHD scores, or Sensory Profile
categorization in any quadrant. In assessing for the effect of the type of seating for circle time, a significant effect of the condition was detected for the CBRS subscale Attention (A1 3.82±0.6, B 3.95±1.0, A2 3.27±0.2, $\chi^2(2)=6.89$, p=0.032, see Figure 1a). Direct comparisons between conditions, however, did not demonstrate significant differences upon correction for multiple comparisons (A1:B $z=-0.952$, p =0.34, r=-0.3; A1:A2 $z=-2.165$, p=0.03, r=-0.65; B:A2 $z=-1.751$, p=0.08, r=-0.53). Visual inspection of the data suggests that attention during circle time was similar in the first chair sessions (A1) and the ball sessions (B), but lower in the second chair sessions (A2). Though difficult to interpret given the results of statistical testing, perhaps introduction of the ball seating staved off a decline in attention. Other subscales and the total of the CBRS showed similar patterns across the conditions (see Figure 1b and c) though without significance.

We next assessed the effect of the condition was selective to any subgroup of participants. We divided the sample according to characteristics of age (3, 4, and 5 years old), gender, and categorization (typical or different) of Sensory Profile scores in each quadrant (Sensory Seeking, Sensory Registration, Sensory Sensitivity, and Sensory Avoiding). The Participants whose scores for Sensory Seeking were typical (n=7) demonstrated a similar pattern of attention scores across the three conditions as was seen within the whole sample (A1 4.0±0.6, B 4.4±0.6, A2 3.4±0.7, $\chi^2(2)=10.571$, p=0.005, see Figure 2). Direct comparisons between conditions, however, did not demonstrate significant differences upon correction for multiple comparisons (A1:B $z=-1.890$, p =0.59, r=-0.95; A1:A2 $z=-2.070$, p=0.038, r=-1.11; B:A2 $z=-2.226$, p=0.08, r=-1.03). In contrast, participants whose scores for Sensory Seeking were indicative of sensory processing difficulties showed a steady decline in attention scores across the conditions.
and no significant effect of condition (A1 3.5±0.2,  B 3.25±0.65, A2 3.13±0.30.23, \(\chi^2(2)=0.133, p=0.9\), see Figure 2). This may suggest that the effect of introducing ball seating to participants with typical sensory seeking behaviors may have prevented a decline in attention that was seen, regardless of the ball in participants with sensory seeking patterns. Analysis according to other characteristics did not reveal any significant results.

**Discussion**

For the preschool children with typical sensory processing with respect to sensation seeking behaviors in this sample, the introduction of the ball seating may have positively influenced attention. For those with sensory seeking needs, it may have been too demanding for them to meet their sensory needs through movement provided by the ball while also being expected to attend and engage with the teacher. As the results suggest, personal sensory needs are individualized among young children. Attention scores for children with typical sensory seeking scores indicated that they maintained their attention through the sessions using ball seating; this attention seemed to fade as repeated sessions continued after the return to standard seating. Children with scores indicative of sensory seeking demonstrated a steady decline in attention as sessions continued. Dunn explains that every child has an individualized pattern of sensory processing and varies between the amount of sensory input that is needed to reach optimal arousal (Dunn, 2007). Each child may responds differently to sensory events that occur throughout their day (Dunn, 2007). Furthermore, additional factors such as a child’s behavior that particular day, distracters in the environment, the success they feel
on the ball, and performance during circle time all should be considered when interpreting a child’s performance patterns in daily occupations (Dunn, 1997).

With this study and previous studies, occupational therapists are exploring the best interventions to adapt a child’s environment to increase success in the classroom. In some studies, use of therapy balls has been shown to increase participation, engagement, and attention during school related activities. Schilling and colleagues (2003) provided evidence that therapy balls improved in-seat behavior and legible word productivity for children with Attention Deficit Hyperactive Disorder and found that this strategy may help children stay on task. Schilling and Schwartz (2004) reported positive results with use of therapy balls to improve both in-seat behavior and engagement with young children with Autism Spectrum Disorder. Bagatell and colleagues (2010) expanded the research findings in Schilling and Schwartz (2004) investigating the effect of therapy balls on in-seat behavior, engagement, and types of sensory patterns that respond best to the use of therapy balls. The results of the current study are comparable to Bagatell’s study (2010) reporting mixed results. Bagatell and colleagues (2010) investigated the several factors that may have impacted the results including patterns of sensory processing, complexity of engagement, and social validity. Bagatell and colleagues (2010) concluded that due to the complex nature of young children and the manner in which they learn, the use of higher clinical reasoning skills is needed when making recommendations. Further, the importance of choosing classroom strategies to improve participation on the basis of sensory processing and not diagnosis is discussed (Bagatell, Mirigliani, Patterson, Reyes, & Test, 2010). Engagement and attention can depend on an
array of environmental factors, the ability to process information, and the ability to perform the task (Bagatell, Mirigliani, Patterson, Reyes, & Test, 2010).

Children at young ages may require novelty in numerous learning opportunities to maintain participation and engagement. It may be logical to state that structured and sedentary circle time activities may be too restricting for children to attend to over repeated sessions. In this study, the opportunity for movement may have counteracted distraction and increased overall attention; however, it is possible that any novel feature could be introduced to obtain this effect. Is it also important to recognize that the expectations set for preschool children may be too high in regards to sitting and attending for minutes at a time. The development stages between children vary highly in the age range between 3 and 5 and maintaining attention throughout the entire group time may be unrealistic.

Limitations

Limitations of the study include the sample size, particularly when dividing according to characteristics; this could also lead to the risk of the Type II error. Even though the research room was designed to profile a preschool classroom, it did not demonstrate the typical natural environment that these children were accustomed. Furthermore, some children attended a preschool classroom and were familiar with the process of circle time while for others this experience was completely novel. Although the age range was limited to children between the ages of 3-5; there appeared to be differences in attention skills across this age range that were not captured by statistical tests (perhaps due to insufficient statistical power). This age range may have affected children’s attention if one child was more disruptive then others. Throughout the 3
groups and multiple sessions the teacher/student investigator was required to follow a specific protocol and analyze the same footage among the 3 groups. Due to the strict protocol and the methods used during the presentation, the teacher may have additionally account for the student’s loss of interest based upon these restrictions. It should be noted that many contributing factors may have influenced a child’s attention with and without the use of dynamic seating. Finally, though the CBRS demonstrated high interrater reliability, it may not have adequately captured engagement, as this is a complex construct.

**Future Studies**

Due to the short duration of the groups (4 weeks, 8 sessions); it would be useful to study the use of therapy balls over a longer period in a naturalistic setting; such as a typical preschool classroom. The difference in protocol and learning opportunities should also be studied; children may have lost interest considering the same theme was consistent throughout the 4 weeks. Future studies also have the option to create larger sample sizes, groups in closer age groups, and use of control groups for comparison. Finally, due to the fact that children respond differently to various sensory stimuli it would be beneficial to study other sensory modalities to introduce novelty and to investigate if attention and participation could be enhanced.

**Implications for Occupational Therapy**

Therapy balls may be helpful for some preschool children by providing movement during stationary activities like circle time. However, they may be counterproductive for children seeking to meet sensory needs through their use during circle time. It is the responsibility of the occupational therapist to observe and to adapt a
child’s environment to increase their performance in his/her natural setting; sensory modalities may meet this need.

**Conclusion**

Current research suggests that young children may not be at a developmental level for a structured circle time. Early education may be creating higher expectations for preschool children to sit and attend for several minutes at a time. This study suggests that therapy balls could be one technique used to enhance attention however, several other modalities and strategies should be applied throughout classroom activities. It may be necessary to modify several aspects of circle time to address contemporary educational demands as well as individual needs of children; otherwise there are indications that this group time may become an occupation of the past. Even though circle time has a rich history, interventions that provide children with opportunities to obtain higher level of performance in the preschool curriculum may be worthy of consideration.
References


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Appendix A

Session 1 (Novelty week)- Phase A

Suggested Time: 15 minutes

Overview:
Circle time will consist of introducing the children to the room (the children have had one previous visit) and to each other. The lesson will be an overview of what frogs are, what they look like, color, eat, and where they live (habitat). The lesson will include a book on: “Frogs” by Gail Gibbons.

Objectives:
Introducing children to research room and to each child building a comfort and trust in the room.
After Introduction of frog unit children will have basic understanding of what a frog is and their habitat.

Materials: Chairs, Calendar, Weather wheel, “Frogs” book, frog booklet, crayons, video camera

Prior to Circle Time: Frog booklet, color a picture of a frog

Circle Time:
I. Invite the students to gather round the circle rug. “Circle Time” Song
II. Welcome song “Hello Song”
III. Discuss “typical” circle time rules, guide children to create them
V. Discuss weather and calendar. Ask children about the weather and what it was like today. Sing, “What’s the Weather?” Invite a child to choose the weather for the day using the weather wheel. Transition into the “Calendar Song.” Discuss the day of the week and count as a group together for the date.
VI. Transition into introduction of frog unit. Ask “Does anyone know what a frog is?” “What they look like?” “Eat?” “Live?”
VIII. Conclude and transition into post- circle activity

Post- Circle activity:
Frog Booklet- Color and create picture of frog habitat.
Session 2 - Phase A

Suggested Time: 15 minutes

Overview:
Circle Time will consist of discussing a frog’s habitat (previous circle time) and expand knowledge by discussing the different types of habitats. Then, the children will play a game with frog figures that demonstrate that frogs can come in different sizes and color.

Objectives: Children will understand that frogs come in many different shapes and sizes.

Materials: Chairs, Frog figures, Calendar, Weather wheel, Paper bag, “eyes”, red paper (tongue), glue, green crayons/markers

Prior Circle Time: Frog Booklet

Circle Time:

I. Invite the students to gather round the circle rug. “Circle Time” Song
II. Welcome song “Hello Song” Count how many “friends” there are today, then sing a song about 4 frogs “4 Green and speckled frogs”
III. Revisit previous circle time, ask children where frogs live, what they look like or eat.
V. Discuss weather and calendar. Ask children about the weather and what it was like today. Sing, “What’s the Weather?” Invite a child to choose the weather for the day using the weather wheel. Transition into the “Calendar Song.” Discuss the day of the week and count as a group together for the date.
VI. Spread out 20 different types of frogs, ask the children if they are different, how are they different. Engage the students in categorizing the frogs in different ways. Explain how frogs and their habitat can be different too.
VII. Conclude and transition into post-circle time activity.

Post Circle Time: Paper bag frog
Session 3-Phase A

Suggested Time: 15 minutes

Overview:
The children will be introduced to the frog cycle beginning with egg to frog. The children will also be shown a live tadpole, discuss how we need to take care of it so the tadpole can grow into a frog.

Objectives: The children will have a basic understanding of the frog cycle, also the students will know learn and know the term tadpole. The children will demonstrate sequence by putting the frog cycle in the correct order.

Materials: Chairs, Frog cycle set (includes eggs, tadpole, growing frog, grown frog) Live tadpole, frog booklet, crayons/markers, calendar, weather wheel, video camera

Prior Circle Time: Frog Booklet

Circle Time:
I. Invite the children to gather round the circle rug. “Circle Time” Song
II. Welcome song “Hello Song”
III. Ask children, how frogs move, Engage students in song “Jump up and down.”
IV. Discuss weather and calendar. Ask children about the weather and what it was like today. Sing, “What’s the Weather?” Invite a child to choose the weather for the day using the weather wheel. Transition into the “Calendar Song.” Discuss the day of the week and count as a group together for the date.
V. Introduce children to frog cycle. Discuss how the children have grown since they were a baby, then expand knowledge by discussing how frogs grow too. However frogs start life as egg→tadpole→frog. Demonstrate frog cycle using frog cycle kit. Invite the student to put it into the correct sequential order.
VI. Show students live tadpole- discuss how they will need to be careful with the tadpole so it can grow into a frog. Engage students on how it will grow, what it eats, and how we will observe the growth.

Post Circle Time: Color Frog Cycle worksheet, observe and watch tadpole

Session 4- phase B
Suggested Time: 15 minutes

Overview:
The children will observe the tadpole and continue the lesson on frog cycle. The children will be introduced to phase B, the therapy balls. The children will create rules for the therapy balls. The children will be engaged in “From tadpole to Frog” Book and discuss throughout the stages of the frog cycle.

Objectives: The students will engage in use of therapy balls and further understand the frog cycle.

Materials: Therapy balls, Live tadpole, “From Tadpole to Frog” book, crayons, paper plate, glue, eyes, construction paper, frog booklet, calendar, weather wheel, video camera

Prior Circle Time: Observe live tadpole, document and draw what a tadpole looks in frog booklet

Circle Time:
   I. Invite the students to gather round the circle rug. “Circle Time” Song
   II. Welcome song “Hello Song”
   III. Introduce and bring out therapy balls, discuss and create rules for the therapy balls with the children.
   V. Discuss weather and calendar. Ask children about the weather and what it was like today. Sing, “What’s the Weather?” Invite a child to choose the weather for the day using the weather wheel. Transition into the “Calendar Song.” Discuss the day of the week and count as a group together for the date.
   VI. Engage the students in new book by discussing cover and author. Read “From Tadpole to Frog” by Wendy Pfeffer. Engage students in book by discussing pictures and asking question. After completion of book talk about what children have learned and further expand understanding of frog life cycle.
   VII. Conclude and transition into post- circle activity

Post Circle Time: Paint and create Lily Pads

Session 5- Phase B
Suggested Time: 15 minutes

Overview:
The children will observe any change in their live tadpole and further discuss the frog cycle. The children will continue use of the therapy balls while engaging in songs and circle time activities. The children will participate in a matching frog to lily pad activity.

Objectives: The students will practice matching techniques, matching the correct color frog to lily pad. The students will engage in song and movement while sitting on their therapy balls.

Materials: Therapy balls, scissors, glue, crayons, Frog figures and lily pads (matching activity), calendar, weather wheel, video camera

Prior Circle Time: Cut and place frog on lily pad (post circle time activity of previous session)

Circle Time:
I. Invite the students to gather round the circle rug. “Circle Time” Song
II. Welcome song “Hello Song”
III. Discuss weather and calendar. Ask children about the weather and what it was like today. Sing, “What’s the Weather?” Invite a child to choose the weather for the day using the weather wheel. Transition into the “Calendar Song.” Discuss the day of the week and count as a group together for the date.
IV. Transition into pretending the four students are frogs, “jump up and down” song
V. Recall the students making their lily pads and frogs, spread out lily pads and frogs and discuss how we can match them. Invite the student to match the correct colored frog to lily pad.
VI. Conclude and transition into post- circle activity

Post Circle Time: Observe live tadpole, Paper frog craft

Session 6- Phase B
**Suggested Time:** 15 minutes

**Overview:**
Circle time will consist of song engagement and will include the book “Five Green and Speckled Frogs.” Observer live tadpole and continue discussing frog life cycle.

**Objectives:** The students will sing and engage themselves in counting up to five.

**Materials:** Therapy Balls, Book “Five Green and Speckled Frogs”, stickers, water colors, frog booklet, calendar, weather wheel, video camera

**Prior Circle Time:** Water Colors, paint picture of frog

**Circle Time:**
I. Invite the students to gather round the circle rug. “Circle Time” Song
II. Welcome song “Hello Song”
III. Transition song, “Open, Shut Them.”
IV. Discuss weather and calendar. Ask children about the weather and what it was like today. Sing, “What’s the Weather?” Invite a child to choose the weather for the day using the weather wheel. Transition into the “Calendar Song.” Discuss the day of the week and count as a group together for the date.
V. Count friends at circle time, sing “4 Green and Speckled Frogs.”
VI. Engage the students in new book by discussing cover and author. Read “Five Green and Speckled Frogs” by Constanza Basaluzzo. Engage students in book by singing along. After completion of book talk about what children have learned using guided questions. Compare the previous song to the book; notice we added a frog.
VII. Conclude and transition into post-circle activity

**Post Circle Time:** Frog Stickers

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**Session 7- Phase A**
Suggested Time: 15 minutes

Overview:
The students will learn that the word frog begins with the letter F. Talk about the F sound and engage in songs during circle time. The students will return to sitting in typical chairs.

Objectives: The students will understand that the term frog begins with the letter F. Have a basic understanding that the letter F has a sound; practice the sound

Materials: Chairs, Calendar, weather wheel, large “letter F”, video camera

Prior Circle Time: Complete paper frog craft (previous session)

Circle Time:
I. Invite the students to gather round the circle rug. “Circle Time” Song
II. Welcome song “Hello Song”
III. Transition song, “Open, Shut Them.”
IV. Discuss weather and calendar. Ask children about the weather and what it was like today. Sing, “What’s the Weather?” Invite a child to choose the weather for the day using the weather wheel. Transition into the “Calendar Song.” Discuss the day of the week and count as a group together for the date.
V. Introduce the letter F. Talk about the sound of the letter F (just like in Frog)
VI. Sing “Letter F.”
VII. Conclude and transition into post-circle activity

Post Circle Time: Frog Booklet- tracing the letter F

Session 8- Phase A
Suggested Time: 15 minutes

Overview:
Circle time will consist of concluding sessions. Explain to children that this will be the last session. The book the Icky Sticky Frog will be included.

Objectives: The students will engage in song and story.

Materials: Chairs, calendar, weather wheel, video camera, crayons, the book “Icky Sticky Frog”

Prior Circle Time: Observe live tadpole, note any changes and draw the stage of life cycle

Circle Time:
I. Invite the students to gather round the circle rug. “Circle Time” Song
II. Welcome song “Hello Song”
III. Allow children to choose song of choice
IV. Sing “Four Green and Speckled Frogs”
V. Discuss weather and calendar. Ask children about the weather and what it was like today. Sing, “What’s the Weather?” Invite a child to choose the weather for the day using the weather wheel. Transition into the “Calendar Song.” Discuss the day of the week and count as a group together for the date. Discuss that this will be the last day of circle time.
VII. Conclude and transition into post-circle activity, discuss and reflect on circle times and sessions, frog cycle

Post Circle Time: Activity of choice, goodbyes

Appendix B
Child Behavior Rating Scale

1. **Attention:**

   This scale assesses the extent to which the child attends to activities during circle time. While the child may or may not be actively involved in the activity, the child rated as demonstrating high attention remains in the activity for an extended duration. A child rated as low in attention may briefly participate in an activity and then physically remove herself from the group or engage briefly in another activity. A child receiving a low rating in attention may frequently change or avoid activities, never seeming to attend to an activity for more than a few minutes at a time.

   **Very Low (1):** The child never attends to during circle time for more than a few minutes at a time. He or she may be completely inactive, avoidant of the activities, or may constantly change activities.

   **Low (2):** The child can be described as generally inattentive throughout circle time. Although the child sometimes participates, she is more often inactive, avoidant of the activities, peers in her group, or leader of group.

   **Moderate (3):** The child attends to the activities during circle time about as often as she does not. She has extended periods of time in which she participates in the activity as well as periods in which she is engaged in avoiding or changing activities.

   **High (4):** The child "stays with" the activities during the majority of the session. She may have periods in which she is inattentive but these are short-lived and limited in number.

   **Very High (5):** The child "stays with" the activities throughout the session. The
child participates in the activities without periods of inattention.

2. **Persistence: (Practice/Problem Solving)**

   This scale measures the degree to which the child makes an effort to participate in activities. A child scoring high on persistence, makes several attempts at tasks when interacting with the adult and peers in group. Persistence also reflects the extent to which the child practices actions and vocalizations. A child receiving a high score is continuously engaged in circle time. A child scoring low on the scale makes little effort to participate in the activities. He or she rarely practices behaviors or vocalizations and when encountering difficulty during an activity quickly gives up.

   **Very Low (1):** The child never demonstrates repetition of a behavior. The child who is very low in persistence may never attempt to engage with his peers or adult during circle time, gives up easily.

   **Low (2):** The child infrequently demonstrates repetition of a behavior. She may occasionally make a second attempt to engage.

   **Moderate (3):** The child has extended periods in which he or she seems to be practicing behaviors, but just as often has periods in which he does not practice. Similarly, there may be periods in which the child continues to try when having difficulty about as often as there are periods in which she quickly gives up.

   **High (4):** Although the child has some periods in which she quickly gives up or during which repetition of behavior is rarely seen, in general, the child can be describe as
high in persistence. She is often observed to practice behaviors or make second and third attempts when having difficulty.

**Very High (5):** The child frequently practices vocalizations or activities. He also may make repeated attempts at tasks when having difficulty. The child's persistence is a highlight of his behavior throughout the session.

3. **Involvement- Distractibility – (Looking Around).**

This scale reflects the intensity with which the child is involved in the activity.

The child who is high in involvement is actively involved throughout the majority of the activity. This child appears to be highly motivated to engage in the activities regardless of whether they are adult or child initiated. He or she is intent on participating in the activities and seems to derive satisfaction from the activities. The child who is low in involvement is either passively involved during the activity, attempts to avoid participation, or is highly distractible during the activity. This child may "stay" with the activity but seems to derive little satisfaction from his or her involvement. This child may frequently look at the camera or leave the area.

**Very Low (1):** This child obviously does not derive satisfaction from his involvement in the activities. The child shows a great deal of neutral affect as well as some distress or avoidance of the activity. When the child does participate in the interaction, he seems to be "going through the motions" rather than actively participating. This child may be greatly distracted by other activities in the classroom.

**Low (2):** This child, for the most part, does not derive satisfaction from his
participation in the activities. He may show largely neutral affect and may appear passive during the interaction. His behavior may appear to be largely "rote" during the activities. Or this child may subtly or overtly demonstrate uninvolved by being distracted during the majority of the session.

**Moderate (3):** The child derives some satisfaction from the activities. There are sustained periods in which he seems intent on what he is doing or uses gestures or vocalizations to express satisfaction with the activity. There are also extended periods in which the child seems to be "going through the motions" or is disinterested in the activities.

**High (4):** The child can be described as highly involved. During the majority of the session, the child appears to derive satisfaction from his participation in the activities.

**Very High (5):** The child is highly involved throughout the session. This child appears to be highly motivated to engage in the activities regardless of whether they are adult or child initiated. He or she derives a great deal of satisfaction from participating in the activities.

4. **Joint Attention:**

The extent to which the child initiates interaction with the adult is measured using this scale. The child receiving a high rating is frequently engaged with sharing behaviors such as vocalizations. This child tries to engage the adult by taking turns, or by using vocalizations, gestures and facial expressions. A child scoring low in attention to adult may rarely focus on the adult or engage the adult by taking turns or through vocalizations or gestures.
**Very Low (1):** He or she never focuses on the adult or peer talking, vocalization or attempts to engage the adult by answering questions or participating.

**Low (2):** The child occasionally attends to the adult or peer by demonstrating eye-contact. For the most part, however, the child does not attempt to share experiences with the adult.

**Moderate (3):** The child attends to the adult approximately half of the time. He or she demonstrates periods of eye-contact or other sharing behaviors with peers, but equally demonstrates periods of inattention.

**High (4):** The child attends to the adult for the majority of the session. He or she is often observed to actively share experiences and vocalization.

**Very High (5):** The child frequently is focuses on the adult or peer talking. He or she often vocalizes while looking at the adult or attempts to share experiences by showing or offering toys or materials or otherwise initiating activities with the adult. The child is characterized by his frequent attempts to involve the adult.

5. **Affect:**

This scale reflects the child's general emotional state during the interaction. A child receiving a high score overtly demonstrates positive affect and enjoyment whether it is directed toward the adult or activity itself. This child may frequently smile, laugh or vocalize with the adult or peer during the activity. A child scoring low on this scale frequently demonstrates anger or distress during the interaction. He may cry or throw materials.
Very Low (1): The child demonstrates a great deal of distress during the interaction. He or she may cry or throw materials.

Low (2): While the child does not demonstrate distress throughout the interaction, there are several sustained periods in which the child is distressed.

Moderate (3): The child, in general, displays low intensity enjoyment. Or this child can be generally characterized as sober or neutral in affect.

High (4): For the most part, the child can be described as happy. He or she shows some neutral affect, but most often appears to be happy during the session.

Very High (5): The child often vocalizes, laughs or smiles when interacting with the adult and peers. He or she never demonstrates negative affect.
Figure 1. Engagement in Circle Time Varies with Seating

A. The mean CBRS scores (n=11) for engagement during circle time in each of the three conditions (A1, with standard chairs, B with ball chairs, and A2 with standard chairs). There was a significant effect of condition on the subscale Attention ($\chi^2(2)=6.89$, p=0.032) though no differences in direct comparisons of means were detected. B. The remaining subscales of the CBRS showed similar patterns across conditions, though not significant. C. The total CBRS scores showed a similar pattern across conditions, though not significant.
Figure 2. Effect of seating on engagement in circle time according to sensory seeking patterns

For participants whose Sensory Profile scores for sensory seeking were typical (n=7) the effect of seating was significant (χ²(2)=10.571, p=0.005) though no differences in direct comparisons of means were detected. There was no significant effect of seating condition for participants whose Sensory Profile scores were indicative of Sensory Seeking patterns (n=4).