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Abstract

This pilot study evaluated the effectiveness of using an activity mini-schedule which divided a circle time activity into four sub-activities with four preschoolers who were deaf and had received cochlear implants. Often preschoolers with cochlear implants display difficulty directing attention to appropriate stimuli during large group activities (Chute & Nevins, 2003). It was hypothesized that the use of an activity mini-schedule would decrease inattention. Using a multiple baseline design across participants, an activity mini-schedule was introduced to each participant sequentially by a paraeducator who sat behind the children during circle time. Participants' behaviors were videotaped and coded. The introduction of an activity mini-schedule decreased inattention in all participants, yet individual outcomes varied. Although this study offers some evidence that activity mini-schedules may positively impact attention in young children, more research is needed.

Keywords: Mini-Schedules, Evidence-Based Practice, Preschoolers, Cochlear Implants, Hearing Loss, Attention

Children who use cochlear implants demonstrate a variety of educational challenges which require effective modifications, accommodations, and teaching strategies from educators and speech-language therapists (Chute & Nevins, 2003). With appropriate remediation, these children have the potential to develop speech perception skills, articulation skills, receptive and expressive language

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skills, and cognitive skills (Edwards, Kahn, Broxholme, & Langdon, 2006; Horn, Davis, Pisoni, & Miyamoto, 2005; McKinley & Warren, 2000; Mitchell & Maslin, 2007; Quittner, Smith, Osberger, Mitchell, & Katz, 1994; Smith, Quittner, Osberger, & Miyamoto, 1998; Tharpe, Ashmead, & Rothpletz, 2002; Tiber, 1985). In order to develop these skills, a cochlear implant user must first learn how to direct and sustain attention during various academic and social activities (Ertmer, 2002).

From early in development, the auditory and visual systems work in conjunction so that a tight coupling develops between what a child hears and where they look as they visually localize sound (Mitchell & Maslin, 2007; Smith et al., 1998). This coupling helps a child with typical hearing to adapt to the environment, perceive and process incoming stimuli, and adjust focus without having to interrupt a task (Edwards et al., 2006; Horn et al., 2005; Quittner et al., 1994; Smith et al., 1998). With reduced access to auditory information, the child with hearing loss increases dependence on the visual system so that it assumes more attentional responsibilities, including trying to focus on the current task while monitoring events elsewhere in the environment (Chute & Nevins, 2003; Mitchell & Maslin, 2007). When the visual system assumes increased attentional functions, the result is a reduction in sustained visual attention, decreased task engagement, and distractibility (Mitchell & Maslin, 2007; Tiber, 1985). A prelingual child who is deaf and who uses a cochlear implant must learn to adjust and respond to auditory information that is now accessible through the implant so that a balanced relationship between the auditory and visual system can develop. As more auditory cues become available, dependence upon visual attention decreases and listening demands increase (Chute & Nevins, 2003). Consequently, it may be useful for early childhood educators to facilitate language processing and task engagement by supplementing verbal information with some visual supports.

Visual supports have been found to be an effective way to facilitate language processing and increase task engagement (Bevill, Gast, Maguire, & Vail, 2001; Breitfelder, 2008; Bryan & Gast, 2000; Massey & Wheeler, 2000; Morrison, Sainato, Benchaaban, & Endo, 2002; Stromer, Kimball, Kinney, & Taylor, 2006; Tissot & Evans, 2003). There are many ways to use this remedial technique. Two common techniques used in preschool and school-aged programs are activity schedules and activity mini-schedules (Stromer et al., 2006; Breitfelder, 2008). Some empirical evidence supports the use of activity schedules in increasing task engagement of preschoolers diagnosed with developmental disabilities (Bevill et al., 2001; Hall, Krantz, & McClannahan, 1995;

Krantz, MacDuff, & McClannahan, 1993; Massey & Wheeler, 2000; MacDuff, Krantz, & McClannahan, 1993; Pierce & Schriebman, 1994). Other research has shown that picture activity schedules can increase on-task or task engagement behaviors in older students, particularly those with autism spectrum disorder (ASD) (Bevill et al., 2001; Bryan & Gast, 2000; Hall et al., 1995; Krantz et al., 1993; MacDuff et al., 1993; Pierce & Schriebman, 1994). A second type of visual support is an activity mini-schedule in which a scheduled activity is sub-divided into its component parts. For young children, the subcomponents of a single activity are represented by a drawing or picture and/or words, with an accompanying label. It is assumed that a mini-schedule for an activity will increase cue saliency of the individual components for the children involved (Breitfelder, 2008). A review of the experimental literature indicates no research demonstrating the effectiveness of activity mini-schedules on task engagement, although this strategy is reported to be used in many classrooms (Lentini, Vaughn, & Fox, 2008). Teachers have shared the effectiveness of their use but this observation needs to be supported empirically. Further, there is no research which has examined the effectiveness of using activity mini-schedules with preschool-aged children with deafness. To address these needs, this study evaluated the efficacy of using an activity mini-schedule during circle time on the inattention of young children with hearing loss who had received cochlear implants and who displayed a range of communication abilities. It was hypothesized that an activity mini-schedule would decrease inattention during a full group circle time activity.

Method

Participants

Four preschool children with hearing impairments who had received cochlear implants, three boys and one girl, participated. The participants attended a public school Oral Communication (OC) preschool program in a southeastern state which served 6 children. The students came from a range of socio-economic backgrounds with the majority from lower-middle income families. The participants were included because they met the following selection criteria: (a) their classroom teacher identified them as being distractible during opening group circle time, and (b) they displayed delayed or limited expressive and receptive language. Prior to initiation of the study, three days observing circle time revealed these inattention behaviors: (a) looking around the classroom, (b) laying down on a carpet square, (c) touching or talking to a peer when the teacher was talking, and (d) leaving the circle before it was ended. Increasing engagement in large

group activities was an objective identified by the classroom teacher and the speech-language pathologist who served the children.

Debbie was a 4 year 6 month old Caucasian female diagnosed at birth with a bilateral severe to profound hearing loss. She began wearing hearing aids at 2 months of age and received her cochlear implant when she was 3 years old. At the time of the study, she wore a hearing aid on her right ear and a Cochlear America's Nucleus cochlear implant on her left ear. She wore glasses to improve her vision. Before the study, she scored a total language age equivalent of 2-6 (auditory comprehension SS: 67, age equivalent 2-8; expressive communication SS: 58, age equivalent 2-4) on the *Preschool Language Scale-4 (PLS-4). The Carolina Curriculum for Preschoolers with Special Needs* revealed that she was age-appropriate in fine and gross motor skills. She received speech-language therapy services twice a week in the preschool, as well as private speech-language therapy once a week.

Nate was a 4 year 4 month old Caucasian male diagnosed at birth with bilateral profound hearing impairment, and hypotonia. He began wearing hearing aids at 10 months of age and received his cochlear implant when he was 2-years, 10 months old. He wore a hearing aid on his left ear and a Cochlear America's Nucleus cochlear implant on his right ear. According to results on the *Preschool Language Scale-4 (PLS-4)*, given at the onset of the study, his total language age equivalent was 1-7 (auditory comprehension SS: 50, age equivalent 1-8; expressive communication SS: 50: age equivalent 1-9). The *Carolina Curriculum for Preschoolers with Special Needs* showed he was age-appropriate in fine and gross motor skills. He received speech-language therapy services twice a week in the preschool.

Carl was a 4 year 0 month old Caucasian male diagnosed with a bilateral profound hearing impairment when he was 1 year 2 months of age. He received his Advanced Bionics cochlear implant in his left ear when he was 1-year 8 months old and one in his right ear when he was 3 years old. According to results on the *Preschool Language Scale-4*, given at the onset of the study, his total language age equivalent was 2-6 (auditory comprehension SS: 67, age equivalent 2-8; expressive communication SS: 58, age equivalent 2-4). The *Carolina Curriculum for Preschoolers with Special Needs* showed he was age-appropriate in fine and gross motor skills and he received speech-language therapy services in the preschool, as well as once a week private Auditory Verbal Therapy.

David was a 2 year 5 month old African-American male who was diagnosed at 2 months of age with bilateral profound hearing impairment and a heart condition. He had heart surgery at 15 months of

age. He received his Cochlear Americas Freedom implant in his right ear when he was 2-years old. On the *Rossetti Infant Toddler Language Scale*, given before the study, he scored solid at the 6-9 month level in expressive and receptive language and presented scattered and emerging skills at the 9-12 month level. The *Cottage Acquisition Scales for Listening, Language, and Speech: Pre-verbal Level (CASLLS*) revealed milestones from 9-12 months in cognition and play; 9-12 months in social; and 6-9 months in listening, emerging meaning and vocal expression. In general, his expressive language comprised of a few random vocalizations with little to no communicative intent. The *Carolina Curriculum for Preschoolers with Special Needs* showed he was age-appropriate in fine and gross motor skills. He received speech therapy services twice a week in the preschool, and private Auditory Verbal Therapy once a week. A summary of participants' characteristics are shown in Table 1.

Each participant's parent/guardian gave permission for participation in the research and approval was obtained through a university's institutional review board. The classroom teacher was a 10-year teaching veteran who held a master's degree in Deaf Education, with approximately 6 years' experience working with preschool-aged children who were deaf implementing an Oral Communication Approach. She also held a Listening and Spoken Language (LSLC AVEd) certification from AG Bell. Although the teacher agreed to follow the research team's suggestions regarding implementation of the research protocol, she and the two paraeducators in the classroom were blind to the study's research questions. Moreover, according to the classroom teacher, neither she nor the children had previous experience with activity mini-schedules. It should be noted that a picture schedule was used daily for scheduled routines so the participants were experienced at using visual information to anticipate daily events.

Experimental Design

A single subject multiple baseline design (Kennedy, 2005) across participants was used to evaluate the effectiveness of using mini-schedules to decrease inattention behaviors. Consistent with single subject methodology, visual inspection of graphed data was the primary method of analysis. In addition, the calculation of means by condition was completed to determine variations between experimental phases as well as a trend line and PAND analyses were conducted. The study was conducted concurrently for 18 weeks, with baseline sessions ranging from 8 to 21 and intervention sessions ranging from 7 to 31 sessions because of the design.

Table 1
Participant Characteristics

Participant	Gender	Age	Ethnicity	Auditory & Visual Supports	Receptive & Expressive Language Characteristics
Debbie	Female	4-6	Caucasian	Hearing aid on right ear and cochlear implant on left; wore glasses	Delayed receptive language skills characterized by difficulty in understanding basic concepts and following complex directions. Expressive language characterized by unintelligible and intelligible one-word utterances.
Nate	Male	4-4	Caucasian	Hearing aid on left ear and cochlear implant on right	Delayed receptive language skills characterized by difficulty identifying common objects and recognizing actions in pictures. Expressive language characterized by a small repertoire of single words, echolalic utterances, babble, and unintelligible utterances.
Carl	Male	4-0	Caucasian	Cochlear implant on left and right ears	Delayed receptive language skills characterized by difficulty following directions and identifying common concepts. Expressive language characterized by intelligible utterances and telegraphic prosody.
David	Male	2-5	African-American	Cochlear implant on right ear	Delayed receptive language skills characterized by difficulty responding to speech or environmental sounds and following directions. Expressive language characterized by vocalizations with little to no communicative intent.

Setting and Materials

The oral preschool class was structured to provide intensive auditory-verbal instruction to 2-5 year old children with hearing loss whose families desired an oral approach. Participants attended the preschool from 9:30 to 12:30, 5 days a week. The classroom had activity centers, a kitchen area, a snack/work area with tables and chairs, a free play area, and a group activity area which was used for circle and story time. The circle time area was approximately 16 feet x 14 feet. During circle time, each participant sat on assigned carpet squares facing the teacher who was seated on a low stool in front of the children, while the two paraeducators sat behind the children assisting as needed.

Data were collected using a VHS video recorder. The camera was turned on at the beginning of circle time and turned off when it ended. The camcorder was placed on a small tripod on the carpet beside the teacher so the children were visible, but the teacher was only partially visible on the videotapes. One activity mini-schedule was made for each participant and introduced to a participant only when he/she entered the intervention phase. Each activity mini-schedule was made from 11 x 12 inch formboard that had four Velcro strips glued to it that displayed the four sub-activities of circle time. Each label on the activity mini-schedule had a picture symbol and the words for the activity next to it. The content taught in circle time varied slightly from day to day, depending on the theme for the week and the child-specific skills that were being taught even though the sub-activities remained the same across the study. The teacher used the following sub-activities: (a) greeting (i.e., saying hello to everyone and singing the morning song, etc.); (b) listening activity (i.e., reproducing target phonemes, words, sentences, etc.); (c) language activity (i.e., introduction of vocabulary for weekly themes, activities designed to expand sentence lengths, story comprehension, etc.); and (d) movement activity (i.e., following directions to songs, using specific and full body movement, vocal/verbal/motor imitation, etc.).

Due to inclusion with a preschool class for children with typical hearing and speech therapy scheduling, the classroom teacher held circle time only 3 days a week. Each participant was included in circle one to three days a week. Circle time ranged from 23-30 minutes, depending on the children present and the content taught. At times, two other children in the class, who were not participants in the study, were present.

Data Collection and Recording Procedures

Because it was easier to quantify inattention behaviors, inattention rather than attention was coded and served as the dependent

variable. Inattention was defined as a participant's loss of attention in an activity, material or what the teacher was saying or requesting during circle time by displaying the following: (a) looking away from the activity, materials or teacher for longer than 3 seconds; (b) engaging in inappropriate behavior such as self-stimulatory behavior, tantrums, physical, verbal/vocal or nonverbal refusals, walking away from the circle area, standing at the area when sitting was expected; and/or (c) producing off-topic vocalizations or verbalizations to the teacher or peers. Although the entire circle time was videotaped, only the first 20 minutes were used for data analysis. The frequency of inattention in partial-interval recordings of 10 seconds each for the 20-minute observations was coded. The total number of intervals was determined by subtracting the number of intervals of inattention from the total number of intervals recorded. Each episode of inattention had to occur for a minimum of 3 seconds to be recorded on the data sheet. If a second episode of inattention occurred in the same interval, it was not counted. "No code" was recorded when a child's behavior could not be identified on the videotape because the coder could not adequately see or hear the child's behavior. The group sessions permitted two to four activity changes to occur.

Prior to the initiation of the study, the teacher and paraprofessional did not verbally or physically interact with a child when inattention, inappropriate behavior, or off-task behaviors occurred during circle time. Because of this, the teacher was directed to continue to use ignoring for these behaviors during baseline and intervention when the study began. The independent variable was the introduction of an activity mini-schedule to each participant sequentially.

Procedures

Pre-baseline Phase. The video camera was used for three days prior to the initiation of the study to accustom the children and staff to its use. The videotapes collected during this time were used for training the two coders and to establish interrater reliability. The coders were trained together for three days in how to identify inattention as defined by the operational definition. Training continued until the coders achieved a minimum of 85% interobserver agreement for two, 20-minute sessions. At that point, baseline was initiated for all four participants.

Baseline Phase. During the baseline phase, the teacher maintained her typical circle time routine. Circle time began with the teacher requesting the children to find their assigned carpet square. Once seated, the teacher gained the children's attention by saying "Now, it is circle time" and then she turned on the video camera.

After this announcement, the teacher provided verbal instructions and prompts to facilitate the four mini-activities. The teacher introduced each sub-activity, but did not use an activity mini-schedule. The two paraeducators sat behind the children and assisted them when needed. General statements of praise were delivered by the teacher and paraeducators when the children participated appropriately as was typical in this setting. As stated, participants' inattention behaviors were ignored by the teacher and the paraeducators which was the practice in this classroom.

Intervention Phase. Prior to beginning the intervention phase, the paraeducators were trained according to the research protocol in how to introduce an activity mini-schedule. A member of the research team modeled how to present and withdraw the activity mini-schedule to minimize disruption to the circle time activities. Specifically, the paraeducators were trained to complete the following steps: (a) sit behind the target child; (b) carefully reach around the child and place the activity mini-schedule in the visual field of the target child; (c) point to the first picture and name label on the activity mini-schedule that was about to occur and then remove the mini-schedule from the child's view; and (d) at the completion of the sub-activity, show the child the mini-schedule, remove the velcro label for the completed activity, then point to the picture and name label of the next activity on the mini-schedule. The paraeducators were instructed to remain silent during this process but were advised that they could answer a question if a child asked one, but after answering they were to redirect the child's attention back to the teacher who was running the group. Training continued until the paraeducators could present and remove the activity mini-schedule with 100% accuracy, for two consecutive training sessions. At that point, intervention was implemented with the first child, Debbie.

The order in which participants received intervention was determined by a random draw. Because the teacher's full attention was needed to maintain the group, only the paraeducators showed the activity mini-schedules to a participant during his/her intervention phase. Circle time was run the same way it had been during baseline with the teacher using prompts to facilitate participation, offering general statements of praise when the children participated appropriately, and the teacher and paraeducators ignoring inattention behaviors. The only difference between baseline and intervention phases was that during intervention when a sub-activity was introduced, one of the paraeducators showed a target child his/her activity mini-schedule while pointing to the label for that activity, and then presented it again at the end of the sub-activity when the label for that

activity was removed. Then, the paraeducator pointed to the next activity label for the upcoming sub-activity. This process was followed for all sub-activities for all participants. When Debbie had participated in baseline for at least 5 days and showed stability, intervention was introduced. Intervention was introduced to subsequent participants when the preceding participant had received intervention for at least four sessions.

Results

This study evaluated the impact of using an activity mini-schedule on inattention during a circle time activity. Participants displayed minimal to no distraction when the activity mini-schedule was shown to a classmate. Because a multiple baseline design was employed, the number of baseline and intervention sessions varied. Figure 1 shows the frequency of 10-second intervals of inattention for the four participants during the baseline and intervention conditions. Scheduling conflicts with inclusion, speech services, and participant and teacher illnesses made consecutive sessions difficult. Debbie participated in 8 baseline and 30 intervention sessions. The mean episodes of inattention during baseline for her was 11.00 (range = 4-18) and for intervention the mean was 6.20 (range = 0-27), a 43.6% decline over the baseline mean. Nate participated in 9 baseline sessions and 11 intervention sessions. The mean during baseline for Nate was 15.88 (range = 1-32) and the mean for intervention was 9.90 (range = 0- 29), representing 37.6% less inattention when compared to baseline behaviors. Carl participated in 12 baseline and 10 intervention sessions. The baseline mean for Carl was 12.58 (range = 2-24) and the mean for intervention was 10.20 (range = 5-19). This participant's inattention declined 18.9% from the baseline mean. Finally, David participated in 17 baseline and 7 intervention sessions. The mean for baseline for this child was 17.76 (range = 0-33) and for intervention was 12.42 (range = 7-22), representing a 30% decrease in inattention over the baseline mean.

A best-fit-line approach was used to assess the trend of data for each participant. For Debbie, a small, negative trend with high variability was found within the baseline phase, and a small-moderate negative trend with low variability was found in the intervention phase, indicating a decrease in inattentive behaviors. For Nate, a small, negative trend with high variability was found within the baseline phase, and a moderate negative trend with high variability was found in the intervention phase. Although his baseline shows a downward trend, the trend line for the intervention phase ended at a lower level than the baseline phase. For Carl, a flat trend with moderate variability was found in the baseline phase, and a small negative trend

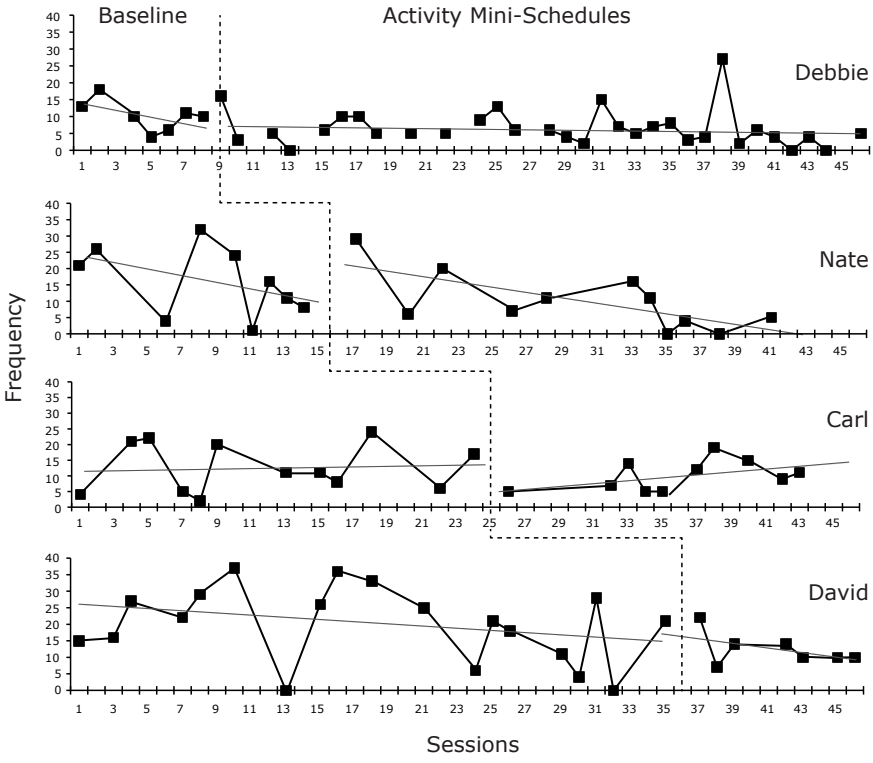

Figure 1. Frequency of 10-second intervals of inattention for the four participants during the baseline and intervention conditions.

with moderate variability was found in the intervention phase. Even though the initial introduction of intervention decreased inattentive behaviors, this participant's change was slight and inconsistent. He ended with fewer inattention behaviors than the baseline mean. For David, a moderate negative trend with high variability was found in the baseline phase, and a small negative trend with slight variability was found during intervention. Overall, there was a reversal in trend for inattention behaviors. The stability of data based on the criterion of plus or minus 50% of the mean found mild variability in data across all phases and participants. In summary, all participants displayed a decrease in inattention, with Debbie, Nate and David making the most decreases, and Carl making only slight changes.

Estimate of Effect Sizes

Percentages of all nonoverlapping data (PAND; Parker, Hagen-Burke, & Vannest, 2007) were used to evaluate the consistency of

experimental effects across participants and to provide an estimate of effect sizes. The usefulness of PAND has been demonstrated as suitable for single subject designs employing at least 20 data points, such as the multiple baseline design utilized in this study (Parker et al., 2007). The PAND calculations indicated that the activity mini-schedule intervention produced small to moderate effects in all participants. Overall, PAND calculations were 23.7% for Debbie, 47.4 % for Nate, 55.5% for Carl, and 73.1% for David. Since a reduction in inattentive behaviors was the desired goal, a lower calculated percentage indicates positive experimental effects. Debbie displayed moderate-high effects; Nate and Carl moderate effects, and David showed low-moderate effects.

Interrater Reliability

Interrater reliability was determined on 29% of videotaped sessions. Interrater agreement was determined by dividing the total number of agreements by the number of disagreements plus agreements and multiplying by 100 (Kennedy, 2005). Point-by-point agreements were determined for each participant. The mean interrater agreement for baseline and intervention for Debbie, Nate, Carl, and David were 91% (range = 90-100%), 93% (range = 88-100%), 89% (85-100%), and 90% (range = 86-100%) respectively. The interrater agreement for all participants was 91% (range = 86-100%).

Procedural Fidelity

Procedural fidelity was taken on 30% of the sessions. Random fidelity checks were made to determine if the intervention was being implemented as originally trained. Two fidelity raters used a checklist of the steps necessary to follow the baseline and intervention research protocol (e.g., showing the activity mini-schedule appropriately to a child, using ignoring for inattention behaviors, etc.). Procedural fidelity was calculated by dividing the number of steps in which there was compliance, by the number of steps in which compliance with the protocol was not followed, and multiplying by 100 (Byran & Gast, 2000). The mean procedural compliance for Debbie, Nate, Carl, and David were 92%, 93%, 90% and 97% respectively (range = 80-100%). In cases in which all steps were not followed, the paraeducators were retrained until 100% fidelity was achieved before the next session. Data revealed that the order in which sub-activities were taught in circle time remained constant throughout the study.

Social Validity

Social validity data were collected from the teacher and the two paraeducators at the end of the study. Social validity was measured

by an 18 question survey which involved nine questions that used a Likert-type Scale (l - *strongly disagree*; 2 - *disagree*; 3 - *do not agree or disagree*; 4 - *agree;* 5 - *strongly agree*), and 8 open-ended questions to determine these individuals' view of the research questions. The mean for the survey was 4.5. The three professionals reported that they found the mini-schedule effective ("strongly agree"), that they believed that the children benefited from the intervention ("strongly agree"), and that the research goals were relevant and important to them ("strongly agree"). However, there were differing opinions regarding which participant may have benefited the most. Despite the fact that David displayed a significant decrease in inattention with the use of the activity mini-schedule, both paraeducators reported that they thought he was the least likely to have found the mini-schedule useful because they did not believe he was able to make the association between the labels and pictures on the mini-schedule with circle time activities since his receptive and expressive language skills were merely emerging. However, David's data suggested that he understood the purpose of the activity mini-schedule and that this understanding improved his attention, even though he received only seven intervention sessions, the lowest number of all participants.

Discussion

The introduction of an activity mini-schedule during circle time resulted in a decrease in inattention in four preschoolers with deafness. Three of the children displayed a low-to-moderate decrease (Debbie, Nate, and David) and one manifested a slight decrease in inattention (Carl). The results of this pilot study suggest that the use of an activity mini-schedule may have assisted the children in identifying the current sub-activity and related activities, which had the effect of improving their attention, or task engagement, during the circle time routine. This finding is consistent with previous research that used activity schedules (Bevill et al., 2001; Bryan et al., 2000; Hall et al., 1995; Massey & Wheeler, 2000), but not activity mini-schedules, with children who had been diagnosed with autism spectrum disorder. However, caution should be exercised when interpreting these results since the effects were moderate to slight, gradually achieved, and because Nate demonstrated decreases before intervention began which make it difficult to attribute changes to only the activity mini-schedules for this participant.

The literature suggests that children with cochlear implants face many learning challenges in their effort to attain speech and acquire preschool-aged concept skills (DesJardin, Ambrose, & Eisenberg, 2008; Ertmer, Leonard, & Pachuilo, 2002; Robbins, 2003). The philosophy of

avoiding the use of visuals to supplement communication and attention in these children is common among some listening and spoken language professionals. However, a brief visual support such as an activity mini-schedule may be sufficient to enhance comprehension and anticipation, and consequently, increase attention in some young children with hearing loss. This study suggests that the use of an activity mini-schedule may offer a convenient way for educators and speech-language pathologists to guide these children's focus to critical auditory stimuli within a noisy classroom. The types of inattention displayed by the children suggested they were having difficulty maintaining their auditory attention to the task That is, there was a high rate of looking away, using materials in inappropriate ways, leaning off their carpet squares, talking while an adult was talking, or talking or babbling without regard for another child's turn. The observed improvements in attention occurred slowly suggesting that these children who had delayed communication, and in one case with no speech (David), needed a good deal of experience with this strategy in order to benefit from it. All participants also displayed a high rate of variability during baseline and intervention. Interestingly, Debbie showed a decrease in variability after intervention was begun and her level of inattentive behaviors remained low, even when inattention in the other participants, who are not in intervention yet, tended to increase. She made the most dramatic decrease in inattention among the four children, but she was also the first to be introduced to the mini-schedule and, therefore, seemed to have benefitted by having the longest time using it (30 sessions). If other participants had more time with the mini-schedule, their improved outcomes may have been more robust.

Interestingly, David, the youngest child in the study at 2 years 5-months, and who had only had his cochlear implant for five months, predictably manifested the highest rate of inattention prior to intervention. This is not surprising since he lacked communicative intent and produced no meaningful speech. Despite this, he showed improvements in attention when the activity mini-schedule was used for only seven sessions (See Figure 1). The visual cues of the activity mini-schedule seemed to particularly support his participation. For example, on the third day of his intervention, he began to look at the picture/word symbols on the activity mini-schedule and then immediately toward the materials that would be introduced which were placed beside the teacher. This occurred even though it seemed clear that he had limited comprehension of what the teacher and paraeducators were saying.

It was the intent of this study to measure the impact of activity mini-schedules within a natural classroom environment. Consequently, no effort was made to control the content that was introduced

during circle time. Because of this, there may have been occasions during circle time in which the activities and materials presented may not have been as engaging as topics and activities on different days.

It should be noted that the intensity of the intervention was compromised due to only three opportunities per week for the circle time routine, a high rate of absences, scheduling conflicts, and the fact that some participants were involved in the circle time activity only once a week for some weeks. Using an activity mini-schedule each day, as most teachers and speech-language pathologists would do, may have increased its impact and may have produced more consistent, robust outcomes. Similarly, because the activity mini-schedule was introduced to each child separately, instead of to the entire class as teachers and speech-language pathologists would do, a child's attention was briefly directed to the side of them, not to the teacher, as the activity mini-schedule was shown. It is recommended that activity mini-schedules be used with the entire group at the same time to maximize their functionality.

A number of limitations were encountered in this study and should be acknowledged. First, the within phase variability among participants and the downward trend in baseline for Nate make it challenging to assess intervention effects for this child. Second, the results are restricted to the diverse communication abilities, age, and auditory and verbal skills of the participants, making it difficult to predict how other children with different communication levels and cochlear implants may respond. The challenges of applied research in classroom settings undoubtedly impacted the outcomes. Clearly, more research is needed. It is hoped that future research will address these issues. Third, as stated earlier, if circle time had been offered daily, the power of the intervention may have been clearer. And fourth, maturation may be a possible threat to validity since the study was conducted over a period of 18 weeks. Future research should address the efficacy of using activity mini-schedules with a larger sample of children and children with other developmental and communication needs. Although more research is needed, this pilot study offers tentative support for the usefulness of employing activity mini-schedules in improving attention in preschool-aged children.

Activity mini-schedules are an inexpensive, low-tech instructional support that can be easily adjusted to any routine and activity. They can be used for large or small group activities so children are cued to current and upcoming activities, and consequently, cued to appropriate vocabulary and the task demands of those sub-activities. They may also be useful in preschool classrooms that use centers since centers permit individual children to choose their tasks, and for this

reason, may be challenging for children with limited communication and self-control. Since the incidence of inappropriate and off-task behavior is continually rated as a top concern of professionals serving young children, activity mini-schedules have the possibility of being one more simple addition to a teacher's toolbox for directly addressing these issues.

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