

Participation of a Preschooler with Visual Impairments on the Playground: Effects of Musical Adaptations and Staff Development

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The purpose of this study was to evaluate the adaptations of a playground, and subsequently staff development, on the participation of a 3-year-old boy with congenital blindness. A single-subject design with three conditions (baseline, adaptations of the playground, and staff development) was used. The playground adaptation involved adding musical stations in strategic locations on the playground and connecting them with a "path" that provided auditory feedback. The staff training involved the music therapist providing individualized instruction to the staff who supervised the child. The child's participation was measured in terms of social interaction with peers or adults, play and engagement with materials, movement on the playground, and stereotypic behaviors. The playground adaptation resulted in no changes in the child's social interactions with peers or adults, increases in engagement, no change in movement on the playground, and a decrease in stereotypic responses. Staff training resulted in increased but variable interactions with adults and peers, in additional increases in engagement, less movement, and similar levels of stereotypic behavior. The findings suggest that musical adaptations of physical environments may be helpful but not sufficient for promoting desired outcomes.

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Many preschool children are enrolled in out-of-home group-care arrangements. It is estimated that from 3 to 5 million children are enrolled in center-based care (Willer et al., 1991). Recommended practices for such programs are that children have daily opportunities to spend large blocks of time in outdoor play (Bredenkamp & Copple, 1997). Although most child care programs were designed for children without disabilities, many report enrolling at least one child with a disability. From a national survey of randomly selected child care programs accredited by the National Association for the Education of Young Children (NAEYC), approximately three-fourths of them reported enrolling at least one child with disabilities (Cryer, Hurwitz, & Wolery, 1999). Such child care programs can serve as inclusive sites for providing early intervention and provide families with the needed care while they work or go to school.

Children with visual impairments, particularly congenital blindness, need assistance in managing large, undefined spaces (Warren, 1994). Thus, to ensure the time spent on child care playgrounds promotes the development of children with severe visual impairments, the children may need adaptations and support. Children with severe visual impairments also often engage in stereotypic behaviors—sometimes called blindisms (i.e., repetitive responses that appear to provide sensory input to the performer) (Gourgey, 1998). In addition, a goal of intervention for young children with visual impairments is to increase the frequency of their interactions with peers to reduce social isolation. Despite the fact that many young children with disabilities, including those with visual impairments, are enrolled in child care programs, no studies in the early intervention/special education literature could be found related to promoting desirable outcomes on child care playgrounds for preschoolers with severe visual impairments.

For individuals with visual impairments, their hearing and tactile senses are the primary sources for connecting with, and understanding, their social and physical environments. Given the importance and early development of the auditory system as a bridge to the social world, music and sound potentially can be used therapeutically with children who have visual impairments as it is with children who have other disabilities (Nordoff & Robbins, 1995). For example, group music therapy may be used to promote social interactions and relationships between children with and without visual impairments. Toys and musical instruments that provide au-

ditory feedback when acted upon can provide children with severe visual impairments with meaningful play. Also, sound can be used to provide feedback on children's location within large spaces, and potentially can be used for promoting independent locomotion from one place to another. Thus, music therapy has a role in the early intervention of children with severe visual impairments (Gourgey, 1998; Salas & Gonzalez, 1991).

Guidelines have been proposed for constructing safe playgrounds (Taylor & Morris, 1996; U.S. Consumer Product Safety Commission, 1997) and for promoting play and interaction (Stine, 1997; Wortham & Wortham, 1989). Some attention has been given to constructing playgrounds so they are accessible to young children with disabilities (Ministry of Education, 1990), and a small amount of research has focused on promoting interactions between children on playgrounds (Hundert & Hopkins, 1992). Recent advances in early intervention suggest that, when possible, specialized therapies (e.g., speech-language therapy, occupational therapy) and specialized instruction be implemented in the context of ongoing class activities and routines (McWilliam, 1996; Wolery & Wilbers, 1994). The rationale for this integrated approach is two-fold (a) to minimize the stigma and isolation of the child receiving treatment, and (b) to capitalize on naturally occurring learning opportunities. However, the early intervention research literature on integrated therapy has not included music therapy despite its recognized status as a related service (Warlick, 2000). As a result, one purpose of this study was to consider the application of music therapy on playgrounds using an integrated therapy approach. This was done because the child care schedule involves large blocks of time outdoors, playgrounds are often large and undefined spaces, and children with severe visual impairments may have difficulty engaging with materials and interacting with others during these times.

The specific study purpose was to evaluate the effects of adapting a child care playground for a young boy with congenital blindness. The adaptations were based on two assumptions. First, the playground should include several stations with musical instruments that could be used independently by the child with blindness as well as other children. These stations involved constructing musical instruments (Martini, 1993) and situating them in meaningful locations on the playground. Second, a permanent "path" connect-

ing the various stations was needed so the child with visual impairments could move independently from one to another (Uslan, Russell, & Weiner, 1988). The research questions were: Will adding musical stations and a "path" connecting the stations (to allow independent mobility between them) result in (a) increases in the interactions between the child with blindness and peers, (b) increases in interactions with adults, (c) increases in play and engagement, (d) increases in movement, and (e) decreases in stereotypic behaviors (i.e., blindisms)?

Method

Participant

A 40-month-old, African-American boy, David, with congenital blindness served as the participant. David was born with bilateral congenital anophthalmia/microphthalmia, or very small, non-functioning eyes. This condition resulted in no functional vision, and, in fact, there appeared to be no light perception. In addition to his blindness, his developmental abilities also were compromised. At 40 months of age, the *Wisconsin Behavior Rating Scale* (Song & Jones, 1980) was administered through clinical observation and family report by an evaluator not associated with the child care program. David received the following age estimates (in months): gross motor 21, fine motor 28, expressive language 27, receptive language 19, play skills 9, socialization 24, domestic activities 17, eating 22, toileting 18, dressing 21, grooming 36, and overall age equivalent 23 months. David attended a university affiliated child care program that enrolled young children with and without disabilities. He had attended the program since he was about one year of age.

His grandmother (primary caregiver) described David as loving to listen to television and music and as playing with toys that make sounds or music. She also reported that he used music to calm himself. However, on the child care playground, David often appeared fearful and was dependent upon the adults for guidance and interaction. He interacted primarily with adults, when they initiated to him. Peer interactions on the playground rarely occurred; his peers often ignored him. He rarely was engaged with materials and played little on the playground. Because of his blindness, he was unable to find objects and did not appear interested in materials

other than the water table during summertime. During most of the initial observations, he would walk holding a teacher's hand. He sometimes pushed a toy shopping cart on a concrete track for riding tricycles. When he bumped into an object, he could not correct his direction, often stopped, and frequently cried. He sometimes sat on the ground and remained there for several minutes until someone purposefully caused him to move. He engaged in frequent stereotypic behaviors on the playground, including shaking his head back and forth, bumping his head lightly on objects or adults, and rocking his torso when sitting on the ground. Because he was not involved with materials or others meaningfully while on the playground, it was selected for study.

Setting

All experimental observations occurred on the playground of David's childcare program. The playground (35 by 47 m) contained three sandboxes, climbing equipment in the center of the largest sandbox, a wooden playhouse, a concrete track (41 by 2 m with loops on each end) for riding tricycles, two large and two small trees, and three raised flower/garden beds. The playground was bounded by the building and a 2 m chain-linked fence. One corner of the playground was divided into a smaller playground by a 1 m chained-linked fence to provide a separate area for toddlers and infants. The playground contained several tricycles, wagons, large building blocks, sand toys, balls, hoops, large toy trucks, and other common playground toys. A map of the playground is shown in Figure 1.

Response Definitions and Measurement Procedures

Five categories of behavior were measured using a 30-second momentary time sampling recording procedure. Each observation lasted approximately 20 minutes per day, and started when he entered the playground. The momentary time sampling system was employed as follows: (a) the observer used a wrist watch to cue her to the time for observation/recording; (b) at each 30-second point, the observer made a judgment about the occurrence of each category of child performance at that instance; and (c) the observer recorded the results for each category on a specially designed data sheet.

The definitions for the five categories were as follows. *Social interaction with peers* was defined as initiating or responding to a peer by

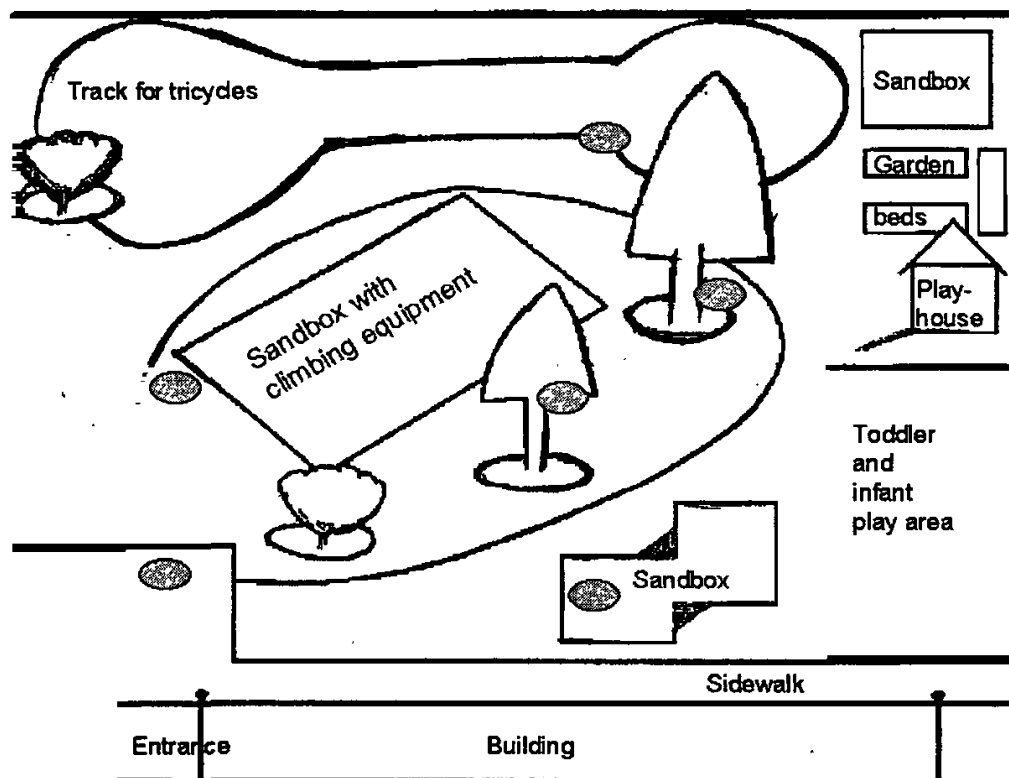


FIGURE 1.

Map of the playground. The shaded areas indicate the location of music stations that were added as well as the "path" connecting the stations.

talking, giving/taking an object, reaching for or touching a peer (did not include riding in a wagon with a peer, unless one of the above occurred). *Social interaction with adults* was defined as initiating or responding to an adult by talking, giving/taking an object, reaching for or touching an adult (did not include being held by an adult, unless one of the above occurred). *Play and engagement* was defined as actively manipulating a material (e.g., digging in the sand, bangs with a stick), riding a trike, pulling—but not riding in—a wagon, climbing on an apparatus, walking purposefully to a given location, pushing a cart or other toy. *Movement on the playground* was defined as walking, crawling, or pushing a toy (e.g., cart) without adult assistance, although an adult may be calling to him. *Stereotypic behavior* was defined as rocking his body or swinging his head back and forth.

Experimental Design

A within-subject experimental design was used to evaluate the effects of adapting the playground and subsequently the delivery of staff development. The design progressed through three condi-

tions: Baseline, adaptation of the playground (adding musical stations and a "path" connecting them), and delivery of staff development. Data collection occurred over 7 months.

Baseline condition. Data were collected during the morning when David's class was on the playground. No instructions were given to the teachers to change their interactions and no playground adaptations were made. Because the child care program is affiliated with a university, observers and visitors were a daily occurrence.

Playground adaptations. As noted, two adaptations of the playground were made: musical stations were added as was a "path" connecting them. Data collection continued as in the baseline condition; and teachers were given no instruction about using the musical stations.

Six musical stations were added to the playground at meaningful locations. All instruments were accessible to children, were attractive to them, each was easy to play, and each complied with playground safety regulations. The stations were designed to be multisensory with different types of materials and different shapes and colors being used. The ideas proposed by Snoezelen (Hulsege & Verheul, 1998) for indoor multisensory stimulation rooms were integrated into the design of the stations. All musical instruments were hand-made from donated scrap materials.

The first station was situated near to the entrance to the playground; it consisted of bamboo xylophone, jingle bells, rain maker, and a second set of jingle bells and bamboo xylophone. It was set up so that it was a mirror image of itself. The second musical station was a wood xylophone about 1 m in length with wooden mallets for playing it. This station was located near the large sandbox and several meters from the first musical station. The third station was a "taxi stand." It had a bench, a bicycle bell, and horn with a rubber end that when squeezed activated the sound. This musical station was located near the tricycle track to attract peers and increase the probability of social interactions. The fourth musical station included seven copper sound pipes attached to the trunk of a tree with wooden mallets to activate the sound. This tree had a wooden bench around it and was a place where teachers and children often congregated to converse and interact. The fifth station consisted of two large triangles hung from the branches of a second tree. This allowed the wind to activate them, but a metal mallet also was attached to the triangles so that they could be rung. The sixth station was three bucket drums attached between four wooden posts in one of the sandboxes.

The musical stations were connected to one another through the use of a 10 cm drainage pipe. The pipe had ridges on it (i.e., as a guiro) producing sound when a stick is rubbed on it. The pipe created a path between the stations and stopped near each to cue David that a musical station was near. About two-thirds of the pipe was submerged into the ground and was secured with large spikes. This pipe (109 m) created a path from one musical station to another and looped the central portion of the playground as depicted in Figure 1. To assist David in navigating the path, a push cart was constructed. This cart had four wheels, and a handle for him to hold and push. A rubber flap was attached to the back axle of the cart to create a sound when it was pushed along the submerged drainage pipe. A wooden mallet was attached to the cart with a string so that David could act on the instruments at the musical stations.

Staff development activities. The staff development activities involved three major components. First, a verbal orientation of the musical stations with hands-on experiences was presented to the teachers. Second, songs were composed for each musical station and the path, recorded on CDs, and given to the staff. They were encouraged to use the songs during circle time in the classroom. Third, specific instructions were given verbally to the staff on how to involve David in the musical stations and how to help him move from one station to another. These included telling them to take David to the first musical station at the beginning of outdoor play, to involve him in using those instruments, to encourage communication with him through use of the instruments, to assist him in moving to the next station by using the song written about walking on the path, and to interact with him and involve peers in the play. General feedback was given to the staff, often in the form of additional suggestions.

Results

The purpose of this study was to assist David when he was on the playground to interact more with peers and adults, to play more with materials and equipment, to increase his movement, and to reduce the frequency of his stereotypic behaviors.

Social Interactions

As shown in Figure 2, during the baseline condition, David rarely engaged in social interactions with peers—all data points are 5% or

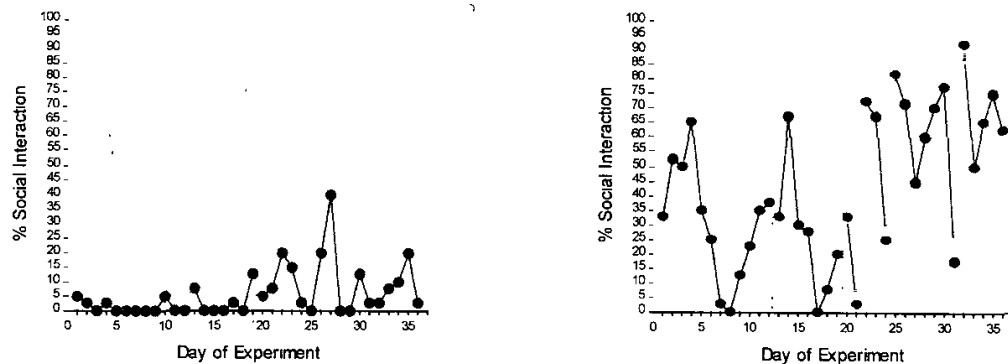


FIGURE 2.

Percentage of intervals of social interactions with peers (left panel) and adults (right panel) across the three conditions; baseline, playground adaptations, and staff development.

less, and on many days no interactions with peers were observed. The playground adaptations produced little change in David's social interactions with peers. Although on 2 of 7 observations, his percentage of intervals of peer social interactions was greater than 5%; 4 of 7 observations resulted in no peer interaction. The staff development resulted in an increase in peer social interactions, although it was variable across days. On 9 of the 17 observations, social interactions with peers occurred on more than 5% of the intervals. On only 3 of the 17 observations were no interactions with peers noted.

For adult social interactions (Figure 2), the data during the baseline were quite variable—ranging from a low of no interactions to a high of 56% of the intervals. Half of the observations, however, had values between 20 and 35% of the intervals. The variability in interactions with adults continued in the playground adaptation condition—ranging from a low of no interactions to a high of 65% of the intervals, with a majority of the observations occurring between 20 and 35% of the intervals. The staff development condition also resulted in variability across days, however, there was a marked increase over the previous conditions; a majority of the observations in this condition were above 40% of the intervals.

Thus, it appears that social interactions with peers occurred infrequently during the baseline and during the adaptation of the playground conditions. The staff development condition, however, resulted in more peer interactions. Similarly, adult interactions—though variable—appeared similar across the baseline and playground adaptation condition. The staff development condition,

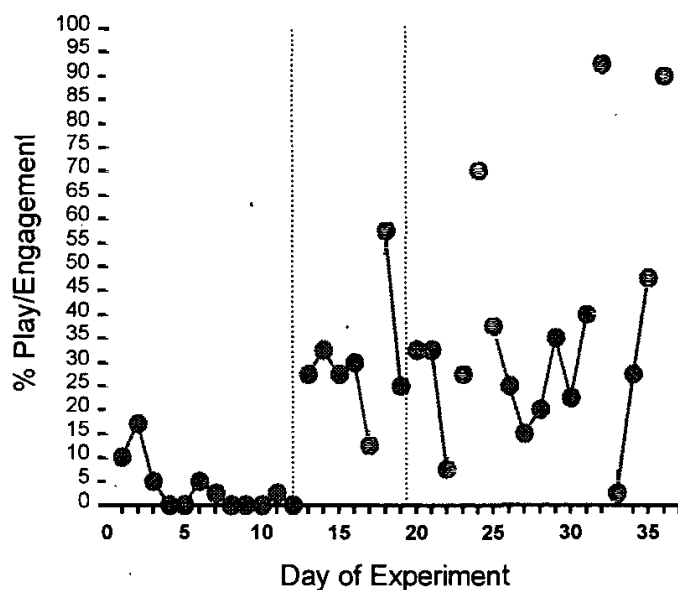


FIGURE 3.

Percentage of intervals of play/engagement with materials across the three conditions: baseline, playground adaptations, and staff development.

however, produced an increase in interactions with adults, although the variability continued. Thus, adaptation of the playground did not produce meaningful changes in social interactions with peers and adults; however, the staff development activities did.

Play/Engagement with Materials

As shown in Figure 3, David's play/engagement was quite low during the baseline condition. For all baseline observations the data were below 20% and on 6 of the 12 observations, there was 0% engagement. The playground adaptations condition resulted in a sharp increase in the level of David's play/engagement to about 30%. The staff development condition resulted in an increase in the variability of play/engagement and the highest levels of all observations. However, the majority of the observations during the staff development condition for play/engagement were within the range of the playground adaptation condition.

Movement

As shown in Figure 4, David's baseline movement ranged from about 20 to 75% of the intervals, with the majority of observations between 30 and 60%. The playground adaptations condition resulted in no apparent change in the percentage of intervals of

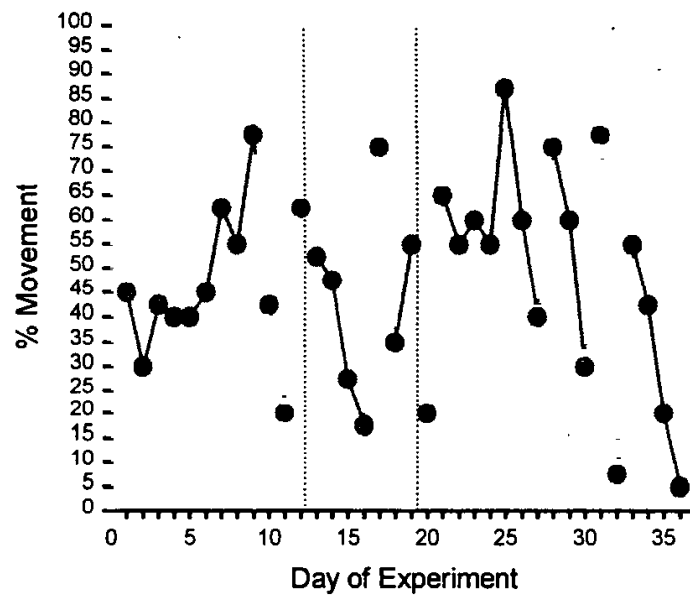


FIGURE 4.

Percentage of intervals of movement across the three conditions: baseline, playground adaptations, and staff development.

movement; specifically, most values were within the range of the baseline condition. The staff development condition resulted in increased movement with a considerable amount of variability and a decreasing trend as the condition progressed.

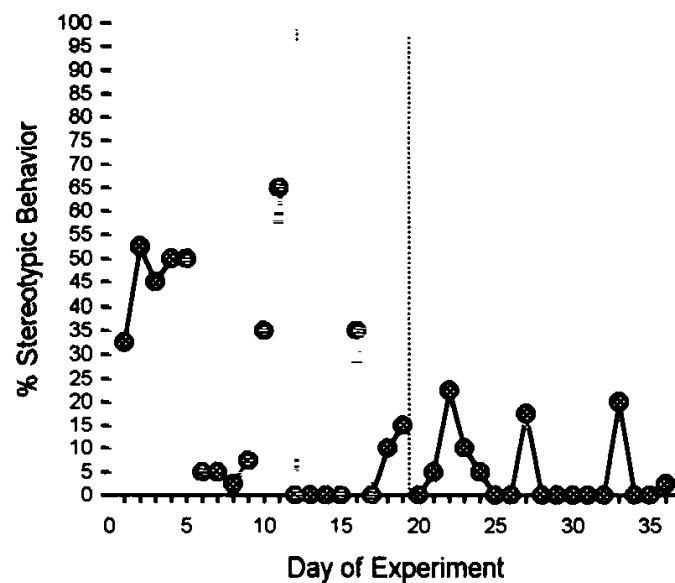


FIGURE 5.

Percentage of intervals of stereotypic behavior across the three conditions: baseline, playground adaptations, and staff development.

Stereotypic Behavior

As shown in Figure 5, David's stereotypic behavior in the baseline condition was quite variable—ranging from a low of no stereotypic behavior to a high of 65% of the intervals. Further, on some observations (e.g., observations 2–5, observations 6–9) the data were stable but at very different levels. During baseline, 1 of 12 observations resulted in no stereotypic behavior. The playground adaptations condition resulted in lower levels of stereotypic behavior, with the highest observation being less than 35%. In 4 of 7 observations (57%), no stereotypic behavior occurred. The staff development condition produced similar levels of stereotypic behavior. The highest observation was less than 25%, and 10 of 17 observations (58%) resulted in no stereotypic behavior.

Discussion

This study was designed to evaluate the effects of adding musical stations and a path between them to a childcare playground and subsequently staff development activities on David's social interactions, engagement with materials, movement, and blindisms. From this study, three findings are apparent. First, during baseline, the data indicate that David was not meaningfully involved in play with materials or in social interactions with others, particularly peers. These data clearly indicate that intervention on the playground was needed. Second, adaptation of the playground as in this study produced some therapeutic effects. Specifically, he engaged in more play with materials and in less stereotypic behaviors; however, no changes occurred in social interactions with adults or with peers. Although the data indicate little change in the percentage of intervals of movement, he used the cart to explore more areas of the playground. Third, the addition of staff development activities resulted in increases in interactions with adults and peers, slightly more engagement with materials, less movement, and perhaps less stereotypic behaviors. Thus, at least for this participant, the combination of playground adaptation with musical stations and path as well as staff development was needed to obtain the desirable therapeutic outcomes. This conclusion occurs in other studies of classroom modifications; that is, staff training and adaptations to the environment are often necessary to get desired outcomes (Filla, Wolery, & Anthony, 1999). These findings add support for the assertion that music therapy has a role in the early intervention of

children with disabilities. Specifically, this child benefited in meaningful ways from the services of a music therapist.

In terms of qualitative statements about these measures, the following are relevant. The quality of David's play changed with the introduction of the musical stations. Specifically, he explored the musical instruments and their sounds. This allowed him to engage in more advanced play that may have facilitative effects on cognitive, social, emotional, and motor development. Sometimes when at one of the musical stations (e.g., xylophone), he became involved in communicative exchanges with adults. They would imitate his words while playing the xylophone, he would imitate them, and they would expand his statements. This occurred only after the staff development activities. The introduction of musical stations, path, and cart were associated with what looked like more purposeful and more persistent movement. He went to more areas of the playground, he continued to move even when he ran into people and objects, and he explored more materials. Social interactions with peers and adults, however, did not change dramatically until after staff development. The peers sometimes interacted with him in relation to the musical stations; for example, they walked along the path and sang the song about walking along the pipe with him. Other interactions with peers involved them taking and returning his cart. The peers asked him for turns using the cart, talked with him when returning the cart, and sometimes retrieved the cart for him. They often would put his hands on the handles of the cart. Adult interactions were influenced by several factors. For example, some staff were more skilled and apparently more comfortable in engaging David with the musical stations. The interaction styles of some adults, influenced David's play. For example, some followed his lead in play with the musical stations, and these episodes seem to engage him more and to result in meaningful communication with him. Other staff attended less to what he was doing and tried to direct his play with the stations. Likewise, they were more apt to interact with him when the child to staff ratio on the playground was low. Some of the episodes of adult interaction would last for several minutes and others were more fleeting. Increases in play and movement tended to be associated with less stereotypic behavior. Thus, rather than develop a management system to reduce the stereotypic behavior (e.g., Koegel & Covert, 1972), reductions occurred when he became more involved in

meaningful activities. This may have occurred because he had sensory input from the outside world; thus, he did not need to supply self-stimulation by rocking or shaking his head.

Clinically, the adaptations to the playground and staff development appeared to have some unmeasured effects on David. He appeared more alert, was more responsive to adults, expressed likes and dislikes verbally more often, and appeared to be in a better mood. He seemed to understand turn-taking more clearly which is an important accomplishment toward greater socialization (Gourgey, 1998) showing an awareness of the external social environment. He also seemed more willing to take risks and seemed less fearful; for example, continuing to make the cart move even when he ran into objects. Further research should measure these clinical impressions more directly.

A potential implication of this study is that providing musical stations and a path between them may not be adequate to ensure appropriate play and interactions with peers. For these teachers and this child, staff training was necessary. Part of that training, however, needs to focus on the dynamic personal relationship between the child and the adult, music therapist or teachers. As shown, the interactions with peers increased after training, and often the teachers guided those interactions. Thus, simply constructing a playground with musical stations was not sufficient to produce the desired effects.

In this study, the music therapist designed the musical stations and trained the teachers with therapeutic goals in mind to provide the environment in which the child's development could emerge. The role of the therapist, however, was different from direct music therapeutic sessions only. In a sense this raises the question of what constitutes the role of music therapists in early intervention. Clearly, music therapists have a role in conducting individualized therapeutic sessions; however, the role may well be expanded to include other activities such as training and consultation. For example, helping teachers apply principles and guidelines involved in therapy in their usual activities on the playground and in the classroom may be beneficial to children as it was in this study. Other therapeutic disciplines (e.g., speech-language therapy, occupational therapy) also have faced the issue of whether to expand their role to have a greater involvement in early intervention (Wilcox & Shannon, 1996). Speech-language pathologists often view their role as occurring on a continuum from direct therapy (i.e., individual or group therapy sessions) only, to a mix of direct and con-

sultative therapy, to consultative therapy only. The early intervention/special education discipline is likely to be more welcoming of music therapy if such a model is used.

This study has specific limitations. For example, only one participant was involved. Clearly replication with other young children who are blind would be desirable. The data were not collected on a daily basis because of several reasons (e.g., child absences, inclement weather, field trips, winter holidays); thus, the study extended over several months.

From this study, several issues should be addressed in future studies. For example, more studies are needed on the practices that make child care playgrounds meaningful and accessible to children with disabilities. The child care program in which this study occurred also enrolled children with other disabilities (e.g., mental retardation, physical disabilities, autism). These children also used the musical stations, and future studies should evaluate the effects of such adaptations to their playgrounds. Also, future studies should investigate the effects of adding musical stations to playgrounds on the interactions, engagement, and development of all children, not just those with disabilities. Informal observations during this study showed that children without disabilities became involved in playing at the musical stations; however, their interactions and engagement with each other were not measured directly. Further, studies are needed which apply music therapy to playgrounds and in early intervention programs.

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