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The Effects of Choice Making on Toy Engagement in Nonambulatory and Partially Ambulatory Preschool Students

Danielle R. Liso[1]

Abstract

This study evaluated the effects of an experimenter-delivered choice-making procedure. Three nonambulatory and partially ambulatory preschoolers were given access to six teacher-nominated preferred toys in two conditions: child choice and interventionist choice. Using an alternating treatment design and a 10-second momentary time-sampling procedure, results showed that children were comparably engaged with the toys in both conditions. Results are discussed in terms of implementing choice procedures with very young children with severe disabilities. Suggestions for further study of the effects of choice using comprehensive preference assessment strategies and considerations of individual participant characteristics are discussed.

Keywords

choice, young children, nonambulatory, alternating treatments design, toy engagement

The effects of choice-making interventions have been the topic of an impressive number of empirical studies across the complementary fields of special education (Kern et al., 1998) and self-determination (Mithaug, Mithaug, Agran, Martin, & Wehmeyer, 2003). In general, *choice* refers to the act of selecting between options at a given moment in time. Alternatively, *preference* has been defined as the individual's history of past choice patterns (Romaniuk & Miltenberger, 2001). The results of much of the previous research on choice making have involved using choice as part of a treatment package to affect positively such outcome areas as language development, daily living independence, accuracy of work task completion, and a wide range of challenging behaviors (Carter, 2001; Cole & Levinson, 2002; Cosden, Gannon, & Haring, 1995; Dunlap et al., 1994). Studying mostly older children and adults with disabilities, this body of work has supported the implementation of both antecedent and consequent choice-making treatments.

Perhaps one of the largest and most compelling categories of choice intervention studies has focused on using choice to decrease rates of challenging behavior. Many researchers have investigated this relationship (e.g., Cole & Levinson, 2002; Dunlap et al., 1994; Peck et al., 1996; Vaughn & Horner, 1997) and have indicated an overall positive relationship between choice and challenging behavior. Although results showed some variability, they brought to light the potential impact of motivation and the importance of preassessment of preference. Further, different results may occur when comparing different types of choices, such as within-versus between-activity choices. Participant compliance must also be considered when developing choice-making interventions, especially for individuals with a history of challenging behaviors. Overall, these studies indicate the relative effectiveness of choice as an intervention to decrease challenging behaviors when types and opportunities for choice making are individualized.

The potential relationship between task performance and choice making represents another area of study in the choice literature (e.g., Carter, 2001; Moes, 1998). The results of this group of studies suggest that the effectiveness of choice making on task performance has a great deal to do with the relative difficulty of the work and with the relative preference associated with the choice items. Furthermore, an individual's past history with choice surrounding task completion may have an impact, as individuals who have not had many opportunities to make choices in this context may not regard choice as a reinforcer for task performance. Nevertheless,

[1]Johns Hopkins University, Baltimore, MD, USA

Corresponding Author:
Danielle R. Liso, Johns Hopkins University, 2800 North Charles Street, Baltimore, MD, 21218, USA.
E-mail: liso@jhu.edu

performance gains have been noted, particularly when cognitive and language-processing abilities were considered. Offering choices in naturalistic settings may have the most potential for affecting the generalization and maintenance of task performance gains.

A third and equally important area of research has to do with the potential effects of choice making on overall engagement, a critical prerequisite skill for academic achievement and task performance (e.g., Harding, Wacker, Berg, Barretto, & Rankin, 2002; Kern, Mantegna, Vorndran, Bailin, & Hilt, 2001; Reinhartsen, Garfinkle, & Wolery, 2002). These studies indicate that although choice may help increase engagement, motivation and interest in the task in question are also important factors. Overall engagement may also increase as a result of the passage of time; participants may become more familiar with the task and, consequently, be able to engage with it for longer periods. In the same way, differential effects may result based on item preference and novelty, emphasizing the importance of preintervention assessments.

Next Steps in Choice-Making Research

Although several studies have investigated the impact of choice on young children with developmental disabilities and/or emotional disabilities, to date there have been no published empirical studies conducted with young children with motor impairments that inhibited their mobility. This population deserves special consideration, as young children who are unable to independently move around their environment may have fewer natural opportunities to make choices about their play materials. Instead, they may rely heavily on adults to bring materials to them. In addition to possibly having less opportunity to practice choice making in natural situations, it is unclear whether nonambulatory and partially ambulatory children are offered more discrete choices by adults to account for fewer natural choice opportunities.

The purpose of this investigation was to evaluate the effects of an experimenter-delivered choice-making intervention on the toy engagement of three young children, ages 2, 2, and 4. The three nonambulatory and partially ambulatory preschoolers were provided access to six teacher-nominated preferred toys in two 10-minute daily experimental sessions. Two experimental conditions, child choice and interventionist choice, were delivered in an alternating treatments design each day. A 10-second momentary time sampling procedure was used to assess the overall engaged and nonengaged time of each child participant across choice conditions and toys. Four research questions were posed: (a) Was engagement higher in choice versus no-choice conditions? (b) Was engagement higher in the first or second daily session? (c) Was engagement by toy higher in choice versus no-choice conditions? and (d) Was engagement higher in choice versus no-choice conditions for the two most preferred and two least preferred (but chosen) toys?

Method

Participants

The three participants were children at a university-affiliated inclusive preschool program. Children were identified for participation based on the following criteria: children (a) were between the ages of 14 and 59 months; (b) had an identified disability consistent with state requirements for receiving specialized services; (c) were identified by their teachers as needing to spend more time actively engaged in play with toys; (d) were identified by their teachers as having limited ambulatory skills (nonwalkers or noncrawlers); (e) were identified by their teachers as not having aggressive, disruptive, or tantrum behavior; and (f) were able to use at least one hand to manipulate materials. Children of any gender, racial group, or economic background were eligible for participation in the study. Children who met these criteria and were able to produce a signed caregiver consent form were enrolled in the study.

Holly was a Caucasian girl, 2 years and 1 month old, with hydrocephalus, severe hypotonia, feeding difficulties, and poor growth. She was unable to crawl or walk without support, relying on adult assistance when bearing weight on her legs and feet. At the time of this study, Holly had begun using a gait trainer at home and a walker at school. Holly's cognitive and receptive language abilities were just below age level. Weak trunk support made productive language difficult; because she did not have the strength to keep her upper body upright, she was unable to accumulate the breath she needed to consistently generate vocal language. Range of motion and fine-motor skills for her upper extremities, with the exception of evidence of low tone, were within normal limits.

Oliver was an African American boy, 2 years and 3 months old, with Down syndrome. Although he was able to crawl, Oliver spent most of his time seated at the table or on the floor, and he did not walk. He could occasionally pull himself to standing, although he was unable to remain standing for more than a few seconds. Oliver had limited productive language skills; he could spontaneously produce sounds but infrequently imitated sounds or made word approximations. He could follow some simple directions but was delayed across all developmental domains. He demonstrated purposeful fine-motor skills and was able to feed himself.

Tracey was an African American girl, 4 years and 8 months old, with cerebral palsy, global developmental

delay, epilepsy, hydrocephalus (including a VP shunt), strabismus, and possible mild hearing loss. Her receptive language skills were good, but her productive language skills were fair. Tracey was also hemiplegic; she was able to use only her left hand purposefully. Her right hand and arm were used for support only. She spent much of her time seated in her wheelchair or adaptive chair, both providing trunk support, or in a prone stander. Although she was not an independent self-feeder, Tracey was able to use her left hand to approximate some fine-motor skills including using utensils and writing implements.

Setting

All assessment and experimental procedures occurred in two classrooms in a university-affiliated inclusive preschool. Each classroom had a staff consisting of a lead teacher and an assistant teacher. In addition, therapists, instructional aides, and university practicum students were present on a rotating basis to provide additional support. On average, there were 8 to 10 children in each classroom on a given day, and child-to-staff ratios were consistent with state standards for early childhood care. Oliver and Holly were observed in their 15-×-27 classroom, and Tracey was observed in her 14-×-24 classroom. Oliver sat in a child-size chair by himself at a small group table, Holly sat at a similar table in her Leckey chair, and Tracey sat at a small group table in her adaptive chair. When staff and other children were present during study procedures, they were asked to limit or eliminate their interactions with the participants as much as possible. Any interactions between participants and staff members or peers were noted to assess the effects on measured behavior. Minimal interactions were noted for all three participants, as the children and investigator sat at a distance from the other activities taking place in the classroom during study procedures.

Toy Selection Procedures

During the preobservation phase of the study, and after each participant had been enrolled, the principal investigator met individually with each child's teacher to determine the child's toy preferences. Teachers were asked to name six toys representing the child's most preferred toys. Teacher responses were recorded in a research log notebook. Times of day during which the children were available for study procedures also were identified.

When the six toys were identified for each child, toys were assigned numbers 1 through 6 using a randomization procedure. The selected toys by participant are shown in Table 1.

Toy options for both the interventionist-choice and child-choice conditions were assigned randomly to Days 1 through 12. Each of the six nominated toys was offered every day in either the experimental interventionist-choice or child-choice condition, and no toy was made available more than once per day. Because the sequence of all possible pairings was rotated twice in 12 experimental days, each interventionist-choice pairing was unique every 6 days. Likewise, each child-choice pairing was unique every 6 days. With three exceptions, Toy 1 versus Toy 3, Toy 4 versus Toy 5, and Toy 4 versus Toy 6, which were only offered as pairs on one occasion, all possible combinations of toy pairings were offered twice. The randomized sequence of toy presentation and choice options by child are shown in Table 2.

Table 1. Toy Assignments for Each Child, Based on Random Assignment

Toy	Child 1: Holly	Child 2: Oliver	Child 3: Tracey
1	Interlocking puzzle	Bus	Knob puzzle
2	Play-Doh	Legos	Ball carousel
3	Books	Push car	Shaker
4	Blocks	Tambourine	Blocks
5	Crayons	Blocks	Baby doll
6	Ring stacker	Books	Sand

Table 2. Randomized Presentation of Toys (interventionist choice) and Choice Options (child choice)

	Interventionist		Child	
Days	Choice 1	Choice 2	Choice 1	Choice 2
1 and 7	Toy 3	Toy 6	Toy 4 vs. 1	Toy 2 vs. 5
2 and 8	Toy 5	Toy 4	Toy 1 vs. 2	Toy 6 vs. 3
3 and 9	Toy 2	Toy 1	Toy 6 vs. 4	Toy 3 vs. 5
4 and 10	Toy 6	Toy 3	Toy 5 vs. 1	Toy 4 vs. 2
5 and 11	Toy 4	Toy 2	Toy 1 vs. 6	Toy 5 vs. 3
6 and 12	Toy 1	Toy 5	Toy 3 vs. 4	Toy 6 vs. 2

General Procedures

The experimenter sat within reasonable distance of the child so that if the toy item fell off of the table at any time it could quickly be replaced. If the child dropped or threw a toy during any interval, the experimenter immediately replaced the toy on the table. If the toy was thrown or dropped a second time during that interval, the interval was allowed to elapse, and the child was coded as nonengaged for that interval. The interventionist then replaced the toy on the table at the start of the next interval. Throwing behaviors occurred infrequently and for Oliver and Tracey only, and they seemed to be associated with the reinforcing reaction of seeing and/or hearing the toy drop to the floor.

Despite the experimenter's relative proximity to the children, interactions between the two were minimal. No verbal prompting, praise, or other reinforcement for toy play was provided at any time. Eye contact was kept to a minimum.

To ensure that the children had the opportunity to access all six preferred toys each day, and because it is fairly unreasonable to expect a young child to remain engaged with the same toy for 8 minutes, a second choice was offered to each child. At 4 minutes, or after the first interval passed after minute 4 in which the child was not engaged with the toy, the experimenter offered a second pair of toys in the identical fashion as the first choice opportunity. Once the child made a choice of these two toy items, interval data collection resumed for the remainder of the 8-minute session.

Response Definitions and Measurement

Engaged. Intervals were recorded as engaged if the child was (a) touching the toy and (b) actively manipulating the toy and/or looking at it. The child was not recorded as being engaged if he or she was touching or holding the toy but visually attending to some other event. *Touching* was classified as contact with the object with one or both hands.

Nonengaged. Intervals were scored as nonengaged if the child did not have physical contact with the item and was not visually attending to it. Further, an interval was scored as nonengaged if the child had physical contact with the item but did not draw visual attention to it.

Teacher involvement. Intervals in which an adult or peer interacted or in any way disrupted the child participant were noted to ensure that interactions were limited.

Fussy or crying. Fussiness or crying was defined as whining, tears, squirming uncomfortably, or otherwise noting that the child was attempting to leave the table. As indicated in the consent forms, any child who was noted as fussy or crying during intervals on three consecutive sessions would be removed from the study.

Data on toy engagement were collected by direct observation using a momentary time sampling procedure. After the child selected a toy, the experimenter collected data for 8 minutes using 10-second intervals cued by a tape recorder and headphones. Every 10 seconds, the observer recorded the child's behavior as either engaged or nonengaged with the toy. Observations occurred for a total of 48 intervals, and rates of engagement were then translated into percentages by calculating a ratio between engaged intervals and total intervals (for engaged behavior) and nonengaged intervals and total intervals (for nonengaged behavior). Intervals in which the child was out of view of the observer were scored as such and reflected in the total number of observed intervals. This occurred on 1 of 432 intervals for Holly, 2 of 576 intervals for Oliver, and 6 of 576 intervals for Tracey.

Experimental Design

An alternating treatments design with two conditions was used (Barlow & Hayes, 1979; Holcombe, Wolery, & Gast, 1994). Children participated in two observational sessions each day, one with each experimental condition. Interventionist-choice and child-choice conditions were alternately assigned to two periods per day. On Day 1, Holly and Tracey's first observation sessions were child choice, followed by interventionist choice. On Day 2, Holly and Tracey's sessions began with interventionist choice, followed by child choice. This order was reversed for Oliver. Each of the two daily sessions consisted of 8 minutes of observation using a 10-second momentary time-sampling procedure. For each interval, the participants were observed as either engaged or nonengaged with the toy. Two toys, during the interventionist-choice condition, and two pairs of toys, during the child-choice condition, were offered during each condition. Time between the child-choice and the interventionist-choice conditions was at least 10 minutes.

Condition assignments alternated in this fashion for a minimum of 6 consecutive school days and a maximum of 12 consecutive school days. If a pattern of higher levels of active engagement was noted in one of the two conditions, then a third "superior-alone" condition (not alternating) was planned. The purpose of this additional condition was to evaluate whether the differentiated effects of one of the two treatment conditions (i.e., the condition that was associated with higher rates of engagement) maintained when the other, less effective, condition was suspended, thereby making a stronger case for the functional relation between the more "effective" condition and rates of engagement. This condition was intended to last for an additional 5 consecutive days, two sessions per day. This condition did not take place, however, because the criterion for superior performance was not met.

Child-choice condition. Each child participated in one child-choice condition daily. During this condition, the experimenter offered two of the child's preferred toys by extending them within equal arm's length and within the child's line of vision and asking, "What do you want to play with?" The two choices offered were dictated by the previously established toy randomization schedule (see Table 2). The child indicated his or her choice, usually by pointing or reaching toward one of the two objects. Occasionally, a child would use a verbal label or approximation to request one of the two items. If the child reached for both items, the experimenter briefly removed both items and re-presented them a few seconds later, once again asking the child to make a choice. Re-presentation of the two choice options was planned when the child's choice was unclear based on one of the above topographies of responding; however, this never occurred, as the children's choices were clearly

indicated each time. Once the child had chosen a toy, it was handed to him or her immediately. The nonchosen toy was placed out of sight and reach of the child.

Interventionist-choice condition. Procedures for this condition were identical to those used during the child-choice condition, with one major exception. At 0 and 4 minutes (as above), the interventionist handed the child one of his or her preferred toys, as dictated by the previously established randomization schedule (see Table 2). Data were collected in the same manner as in the child-choice condition, and no additional interactions between the child and observer took place.

Interobserver Agreement

The principal investigator, a special education doctoral student, served as the primary observer for this study. Another doctoral student in special education was responsible for collecting all interobserver agreement (IOA) data for Holly and Oliver, and a masters student in special education was responsible for all of Tracey's IOA data. Before data collection began, the IOA observers individually reviewed and discussed the data collection procedure, including written definitions of the target behaviors, with the principal investigator. During observation, the IOA observer independently, but simultaneously, collected IOA data using an earplug attached to the primary observer's tape recorder. The two observers sat at equal distance from the child, to ensure equal opportunity to observe; however, they sat at a distance from each other to ensure that they could not see what the other was recording. IOA data were calculated using point-by-point agreement for both occurrences and nonoccurrences and were set at 90%. Any sessions in which IOA was calculated as lower than 85% required retraining on the part of the IOA observers; however, this circumstance did not occur throughout the course of the study in either condition. All data were collected live in the participants' classrooms.

Results

IOA data were collected for an average of 33% of days (range: 25%–45%). The overall IOA across participants was 95.9% (range: 89.6%–100%). IOA was collected for Holly on Days 4, 7, and 9, or for 3 of 9 (33%) days. Overall IOA for Holly was 95.5%, with a range of 93.8% to 100%. More specifically, IOA for the interventionist-choice condition was 96.5% (range: 91.7–100%), and IOA for the child-choice condition was 94.5% (range: 89.6%–100%). For Oliver, IOA was collected on Days 6, 10, and 12, or 3 of 12 (25%) days. Overall IOA for Oliver was 97.2% (range: 91.7%–100%). IOA for the interventionist-choice condition was 98.6%, and the average IOA for the child-choice condition was 95.8%. Finally, for Tracey, IOA was collected on Days 6, 7, 8, 9, and 11, or 5 of 12 days (42% of days), with an overall IOA of 95% (range: 89.6%–100%). IOA data for both the interventionist-choice and child-choice conditions were 95%.

To ensure that the children were not distracted during the procedures, intervals in which peers or teachers interacted with the participants were noted. At no time did these outside interactions occur for more than 3 of the 48 intervals on any day (1 interval on Days 2, 3, 6, 7, 8, and 9 for Holly; 3 intervals on Day 1 for Oliver; 2 intervals on Days 3 and 10 for Tracey). No intervals of fussiness or crying were noted for Holly or Oliver; Tracey was noted as being fussy during 1 interval on Day 2.

Child Engagement

The engagement data for Holly, Oliver, and Tracey are shown in Figures 1, 2, and 3, respectively. These figures contain data for child engagement in both the interventionist-choice and child-choice conditions. Because data collection days ran the full time period for all three participants each day, all plotted points represent 8-minute days. Table 3 indicates the number of times each toy was chosen, percentage engagement with each toy, and range of engagement with each toy. Toys are listed from most to least often chosen.

Overall rates of engagement for all three participants were relatively high across both conditions: 79%, 71%, and 66.2% for Holly, Oliver, and Tracey, respectively. When comparing rates of engagement between the two choice conditions, overall percentages were comparable in both conditions. Holly's mean rates of engagement in the child-choice condition were 80.2% (range: 53.2%–95.8%) and 77.8% (range: 64.6%–89.6%) in the interventionist-choice condition. Holly was the only participant who showed slightly higher rates of engagement in the child-choice condition; both Oliver and Tracey showed slightly higher rates in the interventionist-choice condition. Oliver's mean rates of engagement in the child-choice condition were 68.1% (range: 27.1%–91.5%) and 73.9% (range: 58.3%–91.7%) in the interventionist-choice condition. Similarly, Tracey's mean rates of engagement were in the child-choice condition 64.3% (range: 54.2%–87.5%) and 68.1% (range: 41.7%–79.2%) in the interventionist-choice condition.

To determine whether differences in engagement were related to relative preferences among the six teacher-nominated toys, items were ranked for each child based on the number of times the toy was chosen, given the opportunity. The two items that were chosen most often were identified as the top two preferred toys. Holly's data indicated that out of her six teacher-nominated preferred toys, she played with five of them during the child-choice condition.

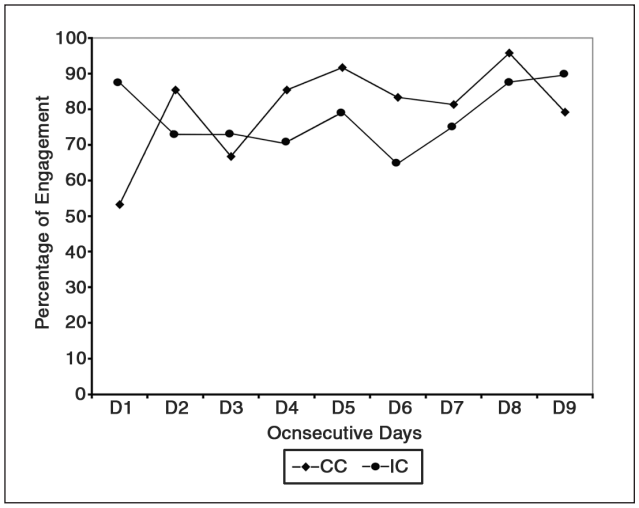

Figure 1. Percentage engagement for Holly across consecutive days for child-choice (CC) and interventionist-choice (IC) conditions.

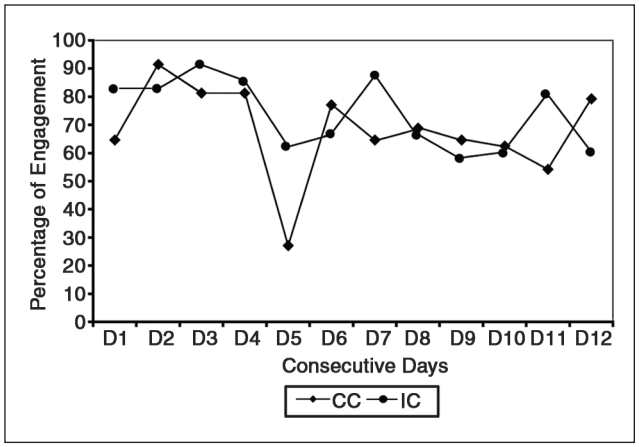

Figure 2. Percentage engagement for Oliver across consecutive days for child-choice (CC) and interventionist-choice (IC) conditions.

Although she never chose the ring stacker during any of the six times it was offered as a choice, she consistently chose the puzzle (4/6 times) and the Play-Doh (4/6 times). Oliver's choices ranged from choosing books only one of eight opportunities to Legos (6/8 times) and car (8/8 times) most frequently. Tracey chose sand only one of eight opportunities, but she consistently chose blocks (6/8 times) and puzzle (7/8 times) when they were offered as choices. Thus, it seems that even on days when both highly preferred, or favorite, items were selected during the child-choice condition, higher levels of engagement did not necessarily occur in relation to engagement with less preferred toys.

Overall engagement by session is represented in Table 4. Holly's data suggest that she was more engaged during the

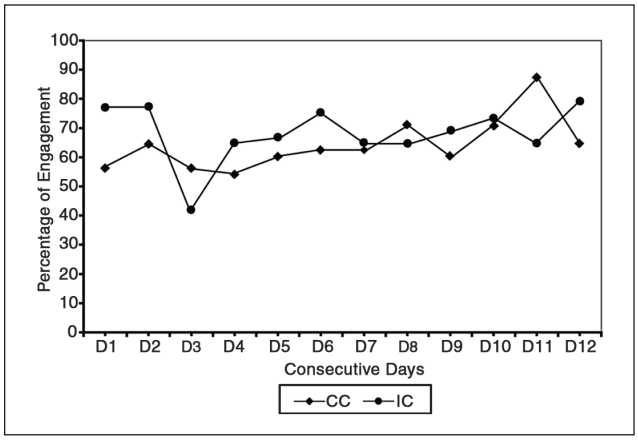

Figure 3. Percentage engagement for Tracey across consecutive days for child-choice (CC) and interventionist-choice (IC) conditions.

second session of the day on many occasions. Conversely, Oliver seemed to be slightly more highly engaged during the first session of the day. Engagement data for Tracey suggest no difference between the first and second session of the day.

Holly. Holly participated in study procedures for 9 days. Given 1 interval throughout the 9 days in which Holly's behavior was out of view, she was observed for a total of 431 intervals. She was engaged with a teacher or peer during 7 of those intervals, or 1.6% of the time, and there were no instances of crying or fussiness observed.

Holly began with the child-choice condition, followed by the interventionist-choice condition, on Day 1. After 9 days of observation, her overall engagement was fairly high across both conditions, with an overall mean of 79% engagement. Comparing the two conditions, Holly was slightly more engaged in the child-choice condition, averaging 80.2% engagement in this condition compared to 77.8% engagement in the interventionist-choice condition. Comparing the conditions across days, Holly was more engaged in the child-choice condition than the interventionist-choice condition on 6 of her 9 days of observation, or 66.7% of the time. However, these differences were slight in most cases. Comparing conditions based on their temporal order of presentation, Holly was more engaged during the first condition of the day on only 2 of the 9 (22.2%) days of observation.

Oliver. Oliver participated in a total of 12 days of observation. Accounting for 2 intervals during which he was out of view, he was observed for a total of 574 intervals across conditions. Oliver was interrupted by a peer or teacher during 4 of his 574 intervals, or 0.7% of the time. Like Holly, there were no observed instances of fussiness or crying.

Oliver began Day 1 with the interventionist-choice condition, followed by the child-choice condition. After 12 days

Table 3. Relative Toy Preferences and Rates of Engagement by Toy

		Child-choice condition		Interventionist-choice condition	
Child	Toy (overall engagement)	Number of times chosen/number of times offered	% Engagement (range)	Number of times used	% Engagement (range)
Holly	Puzzle (76.8)	4/6	76.6 (40.0–93.3)	3	77.0 (51.9–95.7)
	Play-Doh (82.5)	4/6	84.1 (68.2–95.6)	3	80.3 (52–95.7)
	Books (82.8)	3/6	94.9 (88.9–100)	3	70.7 (57.1–87.2)
	Crayons (78.8)	3/6	81.4 (73.9–88)	3	76.1 (64.0–83.3)
	Blocks (74.6)	3/6	66.9 (58.1–78.6)	3	82.2 (64.0–100.0)
	Ring stacker (85.1)	0/6	0 (0)	3	85.1 (81.5–88.9)
Oliver	Car (60.5)	8/8	52.0 (12.5–100.0)	4	77.5 (40.0–97.4)
	Legos (82.0)	6/8	81.9 (59.1–88.6)	4	82.1 (65.4–91.3)
	Bus (47.2)	4/8	36.9 (29.2–44.0)	4	57.6 (25.0–91.3)
	Tambourine (70.2)	3/8	78.3 (69.2–87.0)	4	64.2 (41.7–100.0)
	Blocks (79.6)	2/8	83.9 (76.0–91.7)	4	77.5 (68.0–95.8)
	Books (72.4)	1/8	92.9 (92.9)	4	67.2 (22.2–86.7)
Tracey	Puzzle (63.3)	7/8	63.3 (50.0–88.2)	3	63.3 (45.8–75.0)
	Blocks (63.3)	6/8	60.6 (50.0–69.6)	4	67.4 (63.0–72.0)
	Doll (75.9)	4/8	70.0 (50.0–85.7)	4	81.8 (58.3–91.0)
	Carousel (58.9)	3/8	60.8 (57.1–65.4)	4	57.4 (37.5–71.4)
	Shaker (69.6)	3/8	70.1 (66.7–72.7)	4	69.3 (52.9–87.5)
	Sand (69.6)	1/8	72.7 (72.7)	4	68.8 (41.7–85.7)

Toys are ranked from most to least often chosen during the choice condition.

of participation, his overall engagement across conditions was 71%, with the interventionist-choice condition resulting in slightly higher rates of engagement (M = 73.9% for the interventionist-choice condition vs. 68.1% in the child-choice condition). Of his 12 days of observation, the interventionist-choice condition resulted in higher rates of engagement on 6 of the 12 days, or 50% of the time. Oliver showed only slight differences in engagement between conditions on most days, although the data between conditions were somewhat variable. Comparing the temporal presentation of conditions showed that Oliver was more engaged during the first session of the day on 10 of the 12 days, or 83.3% of the time.

Tracey. Tracey also participated in 12 days of observation. Her behavior was scored as out of view on 6 occasions, yielding a total of 570 observed intervals. Tracey was engaged with a teacher or peer during 7 intervals, or 1.2% of the time. Tracey was observed as fussy during 1 of her 570 intervals, or 0.2% of the time. It is also important to note that Tracey experienced several petit mal seizures during observations, as noted by several moments of glazing over and immobility. Because these instances were considerably short in duration (less than 5 seconds), they did not affect Tracey's overall engagement in either condition.

Tracey's first session on Day 1 was the child-choice condition, followed by the interventionist-choice condition. At the end of her participation, her overall engagement across both conditions was fair (M = 66.2%), although it was not quite comparable to Holly's or Oliver's. Comparing conditions, Tracey showed slightly greater amounts of engagement during the interventionist-choice condition, averaging 68.1% versus 64.3% during the child-choice condition. Once again, these differences were slight. Of her 12 days of participation, the interventionist-choice condition produced greater rates of engagement on 9 of the days, or 75% of the time. Considering temporal effects, Tracey showed higher rates of engagement during the first session of the day on 7 of the 12 (58.3%) days of observation.

Discussion

Limitations and Implications for Future Research

The purpose of this investigation was to determine whether the opportunity to choose between preferred toys would positively affect toy engagement, as compared to a condition in which preferred toys were delivered by an interventionist. Although the three participants showed slightly higher rates of engagement in either the child-choice (Holly) or the interventionist-choice (Oliver and Tracey) conditions, in all three cases, the differences between the two conditions were slight and were not educationally relevant. Unlike the results of Reinhartsen et al.'s (2002) study, which showed that child choice resulted in higher

Table 4. Percentage of Engagement in the First and Second Session of the Day

Child	Day	Session 1	Session 2
Holly	1	53.2[a]	87.5
	2	72.9	85.4[a]
	3	66.7[a]	72.9
	4	70.8	85.4[a]
	5	91.7[a]	79.2
	6	64.6	83.3[a]
	7	81.3[a]	75.0
	8	87.5	95.8[a]
	9	79.2[a]	89.6
	Mean (range)	74.2 (53.2–91.7)	83.8 (72.9–95.8)
Oliver	1	83.0	64.6[a]
	2	91.5[a]	83.0
	3	91.7	81.3[a]
	4	81.3[a]	85.4
	5	62.5	27.1[a]
	6	77.1[a]	66.7
	7	87.5	64.6[a]
	8	68.8[a]	66.7
	9	58.3	64.6[a]
	10	62.5[a]	60.4
	11	81.3	54.2[a]
	12	79.2[a]	60.4
	Mean (range)	77.1 (58.3–91.7)	64.9 (27.1–85.4)
Tracey	1	56.3[a]	77.1
	2	77.1	64.6[a]
	3	56.3[a]	41.7
	4	64.6	54.2[a]
	5	60.4[a]	66.7
	6	75.0	62.5[a]
	7	62.5[a]	64.6
	8	64.6	71.1[a]
	9	60.4[a]	68.8
	10	73.3	70.8[a]
	11	87.5[a]	64.6
	12	79.2	64.6[a]
	Mean (range)	68.1 (56.3–87.5)	64.3 (41.7–77.1)

[a]Indicates the child-choice condition.

levels of engagement for all three participants, little differentiation between choice and no choice was evident for the three participants in this study. This conclusion holds some important implications for both research and practice.

To test whether access to particular toys influenced engagement rates, percentage engagement with each toy, overall and between the two choice conditions, was calculated. Engagement rates, calculated as percentages, can be seen in Table 3. Holly, whose top two preferred toys were puzzle and Play-Doh, showed highest levels of engagement with the books in the child-choice condition (94.9%) and with the ring stacker in the interventionist-choice condition (85.1%). It is interesting to note that given five opportunities to choose the ring stacker during the child-choice condition, Holly never chose to play with it. When it was offered during the interventionist-choice condition, however, she engaged with the ring stacker for longer than with any other toy in that condition. When accounting for overall engagement across toys, Holly was actually more engaged with the ring stacker than with any other toy, regardless of condition.

Oliver's top two preferred toys were car and Legos; however, his highest rates of engagement in the child-choice and interventionist-choice conditions were with books (92.9%) and Legos (82.1%), respectively. His highest level of engagement across conditions was also with Legos. It should be noted, however, that Oliver showed extremely wide ranges of engagement within toys, ranging from 12.5% to 100% with his most preferred toy, the car. Wide ranges such as these may mean that some of Oliver's average engagement rates are inaccurate representations of actual engagement with each toy. Tracey, whose top two preferred items were puzzle and blocks, demonstrated the most engagement with sand (72.7%) in the child-choice condition, although she only chose to play with sand once out of eight given opportunities. In the interventionist condition, she was most highly engaged with the doll (81.8%), a toy she only chose 50% of the time during the child-choice condition.

A possible explanation for the contrasting data between choice and engagement may be material affordance. The children manipulated some of the toys, such as the carousel and puzzle, within a restricted range of actions. Actions performed on the carousel, for instance, were generally limited to the pushing motion required to activate the toy. The children played with other toys, such as crayons and sand, using a much wider range of actions. It may be that some toys result in higher levels of engagement simply because they were more versatile for these participants. Children remained more engaged with these toys for longer periods because there was more they could do with them. A comparison of toy types across choice conditions would be an interesting question for future research.

Given the lack of differentiation between the two choice conditions, it may seem reasonable to assert that, for some individuals, access to preferred items may be more powerful than choice itself. If this is the case, it seems critical to investigate effective ways to identify preferences. In this study, definite preferences became evident in the summative analysis of toy choices. After accounting for the number of times each toy was chosen, it became evident that all three children had relative favorites among their six teacher-nominated preferred toys. Without formal preference assessment data, it is unclear whether the participants' patterns of choosing were an actual indication of preference or simply coincidence. Single presentation and paired stimulus

preference assessments may have resulted in more accurate identification of preferred items. However, it is important to note that even on days when both highly preferred, or favorite, items were selected during the child-choice condition, access to these items did not always result in higher levels of engagement as compared to sessions where less preferred toys were used. As I intended to conduct a post hoc assessment of preference among the six nominated toys, I chose not to conduct preliminary formal preference assessments in the present investigation. However, acknowledging the useful information these assessments can provide, and given the results, it seems clear that this oversight may have negatively affected the findings. Future investigations should consider using more formal preference assessment measures both before and during intervention.

Assuming a relationship between access to preferred (as opposed to chosen) items and engagement may be an incomplete explanation of these results. Indeed, higher engagement rates often were not demonstrated on days when the participants had access to their most highly preferred toys. In some cases, highest engagement occurred on days in which neither of the two most highly preferred items were chosen. This may be due to novelty effects; it is possible that when a "less preferred" preferred toy was accessed, engagement rates were higher because the child had not interacted with that particular toy in the recent past. It is also possible, however, that the rapid alternation of conditions used in the alternating treatments design was not sensitive enough to differentiate the two conditions. Furthermore, it is possible that preference and engagement are two completely different phenomena. A child might prefer a particular toy in relation to five others, but once that toy has been accessed, the child may not engage with it as long as she or he had engaged with other toys.

It is important to recognize that the children selected for participation in this study had very specific characteristics. In addition to being nonambulatory or partially ambulatory, they fell into a fairly narrow age range, 14 to 59 months, and all three attended the same well-staffed and well-supported inclusive preschool program. Moreover, all three participants were able to manipulate materials with at least one hand and did not exhibit high rates of any challenging behaviors. Given these specific requirements, it is difficult to know whether these results would generalize to children with other types of disabilities or of other ages, or those who exhibit challenging behaviors. As Moes (1998) suggested, specific child variables may be of particular importance when studying the effects of choice. Hence, further research is needed to identify participant variables, such as sociability, motor planning skills, general compliance, and presence of challenging behaviors that may influence choice-making interventions.

IOA requirements should be taken into account in future investigations as well. Although this study attempted to control for teacher involvement during study procedures by documenting the number of intervals in which a teacher or other adult interacted with the child participant, IOA data were not collected on this behavior. Furthermore, IOA data were not collected on instances of fussiness or crying behaviors. Although IOA data were not collected on these behaviors because they occurred at low rates across the intervention conditions, future investigations should consider increasing the frequency of IOA collection to account for such low-frequency behaviors.

In the preliminary stages of study preparation, the classroom teachers were asked to ensure that the toys identified for use in the study be made available to the children noncontingently throughout the day. The purpose in making this request was to ensure that natural free-play opportunities that would have been the baseline for that classroom remained intact during the study procedures. Although it was generally the case that when the interventionist arrived each day the nominated toys were found in child-accessible locations, measures were not taken to ensure that the toys were always available when the experimenter was not present. If it was the case that a toy item had not been regularly available to the child across days, engagement rates with that toy may have been influenced by novelty effects, as the less frequented toys available during free-play opportunities in the classroom may have produced higher engagement rates, regardless of their relative preference. Although the goal was to maintain the natural free-play environment, the decision to allow for noncontingent access to the toys may have influenced engagement results.

Similarly, if the child played with one of the toys at a high rate throughout the day, then familiarity may have also affected rates of engagement with that toy (Reinhartsen et al., 2002). This differentiation is particularly important with the partially ambulatory and nonambulatory population studied in this article. Because these children did not have the motor capabilities to move about the room freely, they were unable to have free access to classroom toys. Instead, they had to rely on adults to provide them with several options at their locations (e.g., a table, a play area). A specific measure of their access to and time engaged with each toy during free play is an important measure to consider in future investigations.

The procedures applied in this study took place over a relatively short period of time (12 days). Although fractionated data paths were not evident for any of the three participants, and therefore it was impossible to implement the intended superior-alone condition, it is possible that, given a longer intervention period, a trend may have emerged. Finally, I did not collect social validity data during the current investigation. It would be interesting, and important, to

learn whether teachers found the choice-offering procedures to be replicable in their classrooms, whether they felt the choice procedures were suggestive of actual opportunities posed in their classrooms, and whether they felt that the children's engagement was truly representative of the children's typical behaviors.

Implications for Teachers

Although the importance of methodological rigor is clear for the purposes of experimental control in research applications, recommendations for classroom application differ slightly. To start, one must ask, Why are choices important? Choices offer students the opportunity to practice their communication skills, helping to reinforce the notion of communication and its powerful influence over the environment. In fact, the choice exchange could be considered a miniature conversation: The adult offers the choice, the child indicates a selection, and the adult follows through by handing the child the indicated item. This process provides a natural consequence for communication, thereby reinforcing future communicative attempts. Furthermore, choices provide a way for a child to feel in control of his or her environment, and as we have seen in previous studies, this sense of control often manifests itself in decreases in challenging behavior and increases in task completion and cooperation. Finally, offering choices may help diminish the likelihood that children will develop learned helplessness (Guess, Benson, & Siegel-Causey, 1985).

Choices can be offered both between and within activities. Between-activity choices are those that occur when a teacher gives a student a choice between two different activities, such as painting or block building. Within-activity choices occur after an activity has been selected by the student (or assigned by the teacher). In these instances, the adult offers choices during the activity. In the painting example, choices might include what color paint to use, who to paint with, what to paint on, what to paint, where to paint, and so on. Both choice types have the potential to positively influence student engagement and cooperation in the completion of tasks.

It is important to remember that a child who selects only a small number of items or who continually gravitates toward the same few items may be demonstrating a lack of understanding of appropriate toy play. It is important then to assess a child's relative preference for toys through formal and informal preference assessments. This can be done simply by watching the child to determine what she or he gravitates to or by offering the child specific choices of toys and tracking which toys are selected and how often. After identifying items that are reinforcing to the child, teachers can expand a child's play in two ways. First, the teacher can show the child different motor actions to do with already preferred toys. For example, if the child regularly plays with blocks by lining them up, the teacher can model other play behaviors with the blocks, including building a tower or making and pushing a block train. Similarly, toy play can be expanded by incorporating new items with already preferred items. In the block example, this might involve making a fence for farm animals or making a garage for toy cars. When children have a wider repertoire of play behaviors with toys, they are likely to seek out new toys more frequently and stay engaged with their toys longer.

Conclusion

This study showed that young children with motor and cognitive disabilities were relatively equally engaged with preferred toys regardless of whether they were offered a choice of toy. Hence, the question of what makes choice powerful remains. It may be that choice is reinforcing simply because it results in access to preferred stimuli and not necessarily because it enables the individual to exert control over his or her environment. In the case of very young children, who may not have sufficient experience with choice making to understand that choices offer an opportunity to be in control, or who may not yet understand or value such control, choice making seems to have unclear effects. More research is needed to investigate whether and how offering choices to very young children may result in positive outcomes regarding engagement, academic progress, and behavior.

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Bio

Danielle R. Liso, PhD, BCBA-D, is an assistant professor of special education at Johns Hopkins University. Her current interests include the use of technology to support training for parents and professionals, the effect of training on parenting stress and quality of life, developing new programs to prepare preservice teachers in the instruction of children on the autism spectrum, and strategies to support international collaboration in special education.