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Effects of Choice of Reinforcement on the On-Task Behavior of Kindergarten Students with Developmental Delays

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Effects of Choice of Reinforcement on the On-Task Behavior of Kindergarten Students with Developmental Delays

A high degree of external control is maintained in classrooms serving students with behavioral and developmental disabilities. However, decision making is an important developmental objective related to personal control and dignity (Dunlap et al., 1994). Choice making and discriminating preferred over less preferred outcomes is an important skill that is seldom taught to students with developmental disabilities (Fisher, Thompson, Piazza, Crosland, & Gotjen, 1997). Previous research includes studies conducted in clinical settings or with populations with severe disabilities (Fisher et al. 1997; Lerman, Rainville, Adelinis, Crosland, & Kogan, 1997).

Table 1 presents a summary analysis for studies on the effect of choice and preference of reinforcers and tasks. As you can see in Table 1, the Dyer, Dunlap and Winterling (1990) study examined the effects of choice making on the disruptive (e.g., property destruction), aggressive (e.g., biting, hitting, kicking) and self-injurious (e.g., face slapping, self-hitting, head banging) behavior of students with severe disabilities. Three participants ranging in age 5 to 11 with developmental and intellectual disabilities were selected. All three participants were institutionalized in a residential facility due to the severity of their behavior. Sessions were conducted in a small room with a one-to-one teacher participant ratio. A within-subject reversal design was selected to evaluate choice and no-choice treatment conditions. In the choice conditions, the participant was able to choose academic tasks (e.g., completing a puzzle, sorting by color, inserting coins into a bank) as well as available reinforcers. In the no-choice conditions the teacher selected the task as well as the reinforcer for each participant. There were consistently reduced levels of problem behavior in the choice condition across all three participants. This study shows the effect of choice opportunities in a treatment facility but does not extend to an academic setting.

Preference for a task or a reinforcer may be important when evaluating the effectiveness of choice making opportunities for some individuals. For example, Lerman et al. (1997) evaluated the effects of choice on task performance with six participants ranging from 4 to 39 years- old, assigned to facilities for the treatment of behavior disorders including self-injury and aggression. High preference stimuli were identified for each participant with stimulus preference assessments. A free-operant response was selected for each participant. Responses included pressing a microswitch, stamping the date on paper, and placing chips in a Connect Four game. Participants were exposed to choice and no-choice conditions that were alternated within reversal and multielement designs. During choice sessions, participants were permitted to select between two preferred stimuli contingent on responding. During no-choice sessions, the therapist delivered a single item contingent on responding. All participants exhibited similar rates of responding in both the choice and no-choice conditions. The researchers suggested that access to choice of reinforcers for participants with severe disabilities may not produce consistent outcomes when highly preferred reinforcers are already incorporated into the treatment program. Yet this study does not indicate the effects of choice opportunities for participants who don't have access to high preference stimuli built into their treatment programs; nor does it reflect the effects of choice opportunities in an academic setting.

As shown in Table 1, the Fisher et al. (1997) study suggests the effects of choice are overridden when a no-choice option incorporates highly preferred reinforcers. This study included three participants with mild to moderate intellectual disabilities and clinical diagnoses of attention deficient hyperactivity disorder (ADHD) assigned to treatment for destructive behavior or feeding disorders. Prior to initiating the experiment, structured interviews with caregivers resulted in lists child-preferred stimuli for each participant. A paired choice stimulus preference assessment (Fisher et al., 1992) was then conducted with each participant to develop a hierarchy of preferred items. Ten min sessions were conducted in an observation room. Participants were asked to press one of three microswitches that

randomly provided access to reinforcers. One switch gave the participant choice between two reinforcers; a second switch offered access to a therapist-selected reinforcer; and a third switch offered no choice (control) access to the same reinforcer in a previous session. The experiment was conducted with a high preference phase (HP) and a low preference phase (LP) using the hierarchy of reinforcers. Upon completing each session, the frequency of switch presses was recorded. Frequency of responses increased when participants were given the opportunity to choose between two low preference reinforcers, or when the no-choice option offered a higher preference reinforcer. Again, as previously mentioned, this study does not examine the effects of choice opportunities with students with developmental delays in the academic setting.

However, one study by Waldron-Soler, Martella, Marchand-Martella and Ebey (2000) was conducted in the academic setting using choice of reinforcers and participants with developmental disabilities. As shown in Table 1, this experiment included five preschool-aged participants. Three participants exhibited delays in cognitive, social, adaptive and language development. The remaining two were typically developing students. A paired-choice stimulus preference assessment was conducted prior to the experiment for each participant and three of the five less preferred stimuli were presented. Reinforcers included both consumable (e.g., popcorn, lemonade) and nonconsumable items (e.g., stickers, toys). Rate of responding measurements were taken using a color and shape matching game during each 10 min session. Responses involved selecting and matching six colored shape cards and placing the matching cards on the corresponding spaces on the game board. The number of game board completions per min for each session was determined by dividing the number of completions by session length. A combined alternating treatments and a multiple baseline across participants design was used to compare the reinforcing effects of choice and no-choice of stimuli. The rate of responding increased during choice conditions for the two typically developing participants. There was no change from choice to no-choice conditions for the remaining participants. The researcher suggested that when

preference is held constant across conditions and with a single operant arrangement, opportunity for choice becomes less desirable. This study used less preferred stimuli but did not evaluate the effect of choice of high preference versus low preference stimuli on task performance.

Dunlap et al. (1994) examined the effect of choice of assigned task rather than choice of reinforcer in an academic setting. They found choice did increase on-task behavior and decrease disruptive behavior of two 11-year-old participants with emotional disorders in a self-contained fifth grade classroom. Data was collected on both on-task and disruptive behavior during two regularly scheduled periods of independent seatwork: spelling and English. The classroom contained nine students, a teacher, a full-time aide and two behavioral consultants that served as data collectors. Researchers conducted two observation sessions per day during English and spelling for 15 min or until the assigned task was completed. In the no-choice conditions, the participants were given academic assignments selected by the teacher and were expected to complete them independently. In the choice conditions, the participants were given a list of academic activities specific to the subject matter which they could choose from. The list was developed by the teacher and was drawn from the standard range of assignments in the no-choice condition. A reversal design was used with both participants to evaluate the influence of choice making on both disruptive and on-task behavior. As reflected in Table 1, the researchers demonstrated that when given the choice of academic assignment, on-task behavior increased and disruptive behavior decreased. Whereas this study was conducted in the academic setting, it did not include kindergarten age participants; nor did it evaluate the effects of choice of reinforcement on task performance.

Previous research supports the value of choice options for students when high preference stimuli are presented in programs where they are typically lacking (Lerman et al., 1997; Waldron-Soler, et al., 2000). However, the current literature does not include research examining the effects of choice of reinforcer on the on-task behaviors of Kindergarten- aged students with developmental delays.

The purpose of the present study is to extend the current literature on the effect of choice of reinforcer on the on-task behavior of Kindergarten students with developmental delays, but to systemically replicate the Fisher et al. (1997) study in a kindergarten setting. This study may further support the influence of opportunity to choose reinforcers for students with developmental delays and could help teachers incorporate similar strategies into their existing behavior incentive programs. This investigation will explore the effectiveness of choice of both high preference and low preference reinforcers on the on-task behavior of kindergarten students with developmental delays in a classroom setting. Specifically, researchers will examine whether choice of reinforcer increases the on-task behavior of kindergarten students with developmental delays.

Method

Participants and Setting

Two, 5-year-old students participated in this study. Both are in a self-contained special education alternative kindergarten classroom that serves 10 students with developmental disabilities. Carl, a Caucasian male, is classified as Developmentally Delayed (DD) and has a medical diagnosis of Attention Deficit Disorder (ADD). He is currently not receiving medication. Maya, a Caucasian female, is also classified as Developmentally Delayed (DD) with a recent medical diagnosis of Attention Deficit Hyperactivity Disorder (ADHD). She is currently not receiving medication. Both Carl and Maya are described by their teacher as being easily distracted, with high levels of off-task behavior, and require multiple verbal prompts to complete tasks.

This study was conducted in a self-contained kindergarten classroom where all subjects are taught. The room was arranged in uniform rows of individual student desks where the students remain for large group instruction and independent seatwork. A Time Timer (Onion Mountain Technology, 2008-2009), a 20x20 cm clock that shows remaining minutes blocked in red, served as a visual cue for time management during independent seatwork for both Carl and Maya. Data was collected during

scheduled independent seatwork for 15 min each day for each participant. Data sessions for Carl were during math from approximately 9:00-9:15. Curriculum placement assessments were administered to identify the instructional level of each participant. On the *Math Expressions* grade level assessment Carl scored 30/58 on Number Sense and Operations, 9/13 in Algebra, 3/9 in Geometry, 3/8 in Measurement and 12/12 in Data Analysis. All math assignments administered to Carl fell within his instructional level range. Data sessions for Maya were during language arts from approximately 10:00-10:15. On the *My Sidewalks Early Reading Intervention* assessment Maya scored 19/26 Letter names and Sounds, 5/5 on the First Sounds in Words subtest, and 5/10 on the Letter Sound Test. All language arts assignments administered to Maya fell within the range of her instructional level. During these activities the classroom included a researcher to implement the treatments and collect IOA data, a paraeducator to assist students during seatwork sessions, and a second paraeducator to be the primary data collector.

Task Assignments and Materials

A variety of curriculum based math assignments were delivered during the math data collection session. These included writing in missing numbers on a number line, computing simple addition math facts with numbers less than five, counting items and writing in the corresponding number. The language arts assignments were a variety of tasks including matching beginning letter sounds with pictures, tracing consonant, vowel, consonant (CVC) words, and matching rhyming words (e.g., bee and tree).

Preassessment Data

Prior to conducting the study a paired-choice preference stimulus assessment (Fisher et al., 1992) was conducted for each participant to develop a hierarchy of high preference and low preference items. Lists of 16 items including tangibles (e.g. legos, small cars, small plastic figures, etc.) as well as attention supported options (e.g. one on one teacher time, peer leader for recess, etc.) were developed. Attention supported stimuli were represented by picture icons during the preference assessment and

subsequent treatment conditions. The items were presented to the participants in randomized pairs. Each item was paired with each remaining item resulting in 120 paired presentations. The item that the participant did not initially approach was removed. The top three ranked items were selected as the high preference stimuli for use as reinforcers in the high preference choice and no-choice conditions. For both Carl and Maya the high preference items were access to an ipad, taking a walk with the teacher, and playing with toy cars. The three lowest ranked items were selected as the low preference stimuli for use as reinforcers in the low preference choice and no-choice conditions. For Carl, the low preference items were legos, playdough, and beanie babies. The low preference items for Maya were beanie babies, small farm animal figurines, and plastic dinosaurs. The preference assessment was repeated midway through the study to ensure high and low preference reinforcers were identified. Both preference assessments resulted in similar high and low preference choices.

Response Measurement and Interobserver Agreement

Data was collected on the on-task behavior of the participants. On-task was defined as the student remaining seated in their chair, with their feet flat on the floor and the with the chair legs in continual contact with the floor (e.g. not rocking back or sideways). Both participants were provided with supports to assist with appropriate sitting (e.g., a wiggle seat on student chair to provide sensory feedback as well as a block used as a foot stool/rest). The student was to be positioned at their desk writing on paper and producing task-initiated responses. This did not include unrelated drawing on paper with pencil or crayon (e.g. scribbling, doodling).

One paraeducator (referred to as paraeducator 1) conducted sessions. Paraeducator 1 engaged with all students offering assistance when requested during independent seatwork sessions. A second paraeducator (referred to as paraeducator 2) was the primary data collector. Both paraeducator 1 and 2 were kept blind as to the treatment condition. That is, neither paraeducator was notified of the randomized daily selection of treatment condition prior to each seatwork session; nor were they in close

proximity while the researcher implemented the treatment with each participant prior to each seatwork session. Using a random selection procedure described later, the researcher determined the treatment condition each day. The researcher also acted as the second observer during intervals in which interobserver agreement was calculated. Partial interval recording was used to approximate the amount of time each student engaged in on-task behavior. The first 10 s of the interval was for observation and the remaining 5 s was to record data. Intervals were cued by a tape recording that observers heard through earphones.

Prior to conducting the experiment the observers practiced with the behavioral definitions during nonexperimental observations. Data collection training included practice with videotaped sessions until interobserver agreement (IOA) was 90% and then continued with live sessions until IOA was 90% or greater across three consecutive observational sessions. During the sessions that were assessed for IOA, separate earphones were used by the two observers. The earphones were connected to the same tape player with cords that were long enough to insure independent data recording. Interobserver agreement was assessed during 25% of the sessions. The reliability sessions were distributed across experimental sessions. All intervals were scored with either a "+" or a "–". A "+" indicated an interval in which the participant was on task for at least part of the interval. Agreements between observers were defined as intervals scored in an identical manner by both observers. Disagreements are those intervals in which the second observer scored the interval in a manner differing from the first observer. Percentage agreement was calculated by the number of agreements divided by the number of agreements plus disagreements and multiplying by 100. During the study, if IOA dropped below 80% an automatic retraining with primary data collector would have been conducted until IOA was again at 90%. Total interobserver agreement for Carl averaged 93%, with a range of 91%-96%. Total interobserver agreement for Maya averaged 91%, with a range of 85%-96%.

Treatment integrity

The researcher implemented the treatment by following a pre-made checklist of five steps. Prior to each scheduled seatwork session the researcher 1) identified the student by name, directing them to the back of the room 5 m away from desk area and paraeducators, 2) dictated availability of access to the reinforcers, 3) stated the designated instruction to the student, 4) ended the session at the designated time, 5) delivered the reinforcer immediately following the session. Student was redirected to the back of the room to access the reinforcer upon completion of the seatwork session.

Research Design

An alternating treatments design (Cooper, Heron, & Heward, 2007) was used to evaluate the influence of choice of high preference and low preference reinforcement on the on-task behavior of both participants. This design was selected for a number of reasons. First, it allowed for the rapid implementation of different interventions without requiring phases of steady state responding necessary with variations of the ABAB reversal design. Participants easily discriminated between treatments by verbal instructions given by the researcher. Confounding factors were counterbalanced by the randomization of treatments for each participant prior to each session. Therefore, changes in behavior corresponding to each treatment are discernible, allowing for a direct comparison between conditions. Secondly, this design offers within study replication, strengthening the confidence of the results of the research. Replication of the functional relation between the choice of reinforcement and on-task behavior can be achieved by evaluating each successive data point for respective treatments as well as across participants.

A reversal design would be more desirable if evaluating the effects of a single condition on the target behavior. A multiple treatment reversal design could be used for this study but was deemed less appropriate primarily due to the length of time and resources necessary to recapture baseline and control for confounding conditions such as sequence effects when manipulating multiple conditions (Cooper, Heron & Hewrad, 2007).

A multiple baseline across participants design was also considered for this study but it was not chosen for a number of reasons. Primarily, a multiple baseline design (MBD) requires a longer baseline phase for one participant that ultimately outweighs the benefit of the design for this particular study. The researcher and teacher involved with the participants believe on-going off-task behavior in the classroom should be addressed as quickly as possible rather than delaying intervention for one participant in order to meet the criteria for a MBD. Also, within study replication and demonstration of the effectiveness of the independent variable become more convincing when the multiple baseline design consists of three to five tiers (Cooper, Heron, & Heward, 2007). There is much less confidence in the results of data that a functional relation exists if the study involves only two participants. Therefore, the alternating treatments design was determined to be best suited for this particular study as well as similar studies in existing research (Waldron-Soler et al., 2000).

Experimental Procedures

For each participant there was a daily random selection of treatment condition qualified by no more than 2 of the same condition in a row. The researcher carried out this procedure each day. Treatment conditions were high preference no-choice, high preference choice, low preference no-choice and low preference choice.

High preference no- choice. In the high preference no-choice condition the researcher randomly selected one item from the three highest ranked items from the preference assessment prior to each session. The researcher pulled the student aside and said, “If you work on your assignment until our time is up, you can have this for 3 min”. The researcher pointed to the Time Timer showing 15 min blocked off in red. No further prompting was delivered. Data collection intervals began when the participant was given the assignment.

High preference choice. Prior to each student receiving the assignment for the independent seatwork sessions, the researcher pulled the student aside and offered a choice of reinforcement. She

showed all three of the high preference stimuli for each participant and said, “Today you get to choose what you want to do or play with for 3 min after you work on your assignment until our time is up”. She pointed to the Time Timer showing 15 min blocked off in red. She waited 5 s for the participant to make a selection. When the selection was made, the researcher withdrew the remaining two stimuli and verbalize the participant’s choice, “Today you will get this for 3 min if you work on your assignment until our time is up”. No further prompting was delivered. Data collection intervals began when the participant was given the assignment. If the participant did not make a selection within the 5 s, the researcher would have repeated the prompt and allowed an additional 5 s. If the participant failed to respond on the second prompt, the researcher would have randomly selected a reinforcer for the participant and said, “Today you will get this for 3 min if you work on your assignment until our time is up”. The researcher would then point to the Time Timer showing 15 min blocked off in red. There were no incidences where either participant failed or refused to choose a reinforcer when given the opportunity to do so.

Low preference no- choice. In the low preference no-choice condition the researcher randomly selected one item from the three lowest ranked items from the preference assessment prior to each session. The researcher pulled the student aside and said, “If you work on your assignment until our time is up, you can have this for 3 min”. The researcher pointed to the Time Timer showing 15 min blocked off in red. No further prompting was delivered. Data collection intervals began when the participant was given the assignment.

Low preference choice. Prior to each student receiving the assignment for the independent seatwork session, the researcher pulled the student aside and offered a choice of reinforcement. She showed all three of the low preference stimuli for each participant and said, “Today you get to choose what you want to do or play with for 3 min if you work on your assignment until our time is up”. She pointed to the Time Timer showing 15 min blocked off in red. She waited 5 s for the participant to make

a selection. When the selection was made, the researcher withdrew the remaining two stimuli and verbalized the participant's choice, "Today you will get this for 3 min if you work on your assignment until our time is up". No further prompting was delivered. Data collection intervals began when the participant was given the assignment. If the participant did not make a selection within the 5 s, the researcher would repeat the prompt and allow an additional 5 s. If the participant failed to respond on the second prompt, the researcher would have randomly selected a reinforcer for the participant and said, "Today you will get this for 3 min if you work on your assignment until our time is up". The researcher would then point to the Time Timer showing 15 min blocked off in red. Data would not have been collected if a participant refused to make a choice during either of the choice conditions. However as previously noted, neither participant refused to make a selection during either choice conditions.

The data collectors were seated in the classroom approximately 1.5 m from each participant. Independent seatwork across all conditions began after instruction and whole group practice with sample problems. The second paraeducator stayed in close proximity to individual student desks offering positive praise statements for on-task behavior and assistance when requested. The reinforcer for Carl was delivered immediately following the math independent seatwork session when assignments were collected. The reinforcer for Maya was delivered immediately following the language arts independent seatwork session when assignments were collected.

Results

Figure 1 presents the percentage of on-task behavior across treatments for Carl. Table 2 presents mean percentages for each treatment for Carl. In the high preference choice condition, intervals of on-task behavior ranged from 26-83% with a mean of 63.28%. In the high preference no-choice condition, the range of intervals of on-task behavior ranged 29-83% with a mean on 52.85% of intervals of on-task behavior. In the low preference choice condition the range was 30%-78% of

intervals of on-task behavior with a mean of 45.7%. Finally, with the low preference no-choice condition the range of intervals of on-task behavior was 42%-90% with a mean of 58.57%.

Figure 2 presents the percentage of on-task behavior across treatments for Maya. Table 3 presents mean percentages for each treatment for Maya. For the high preference, choice treatment, there was a range of 42%-88% with a mean of 71.57% of intervals of on-task behavior. In the high preference no-choice condition, on-task behavior ranged from 63%-93% with a mean of 75.83% of intervals of on-task behavior. In the low preference choice condition, intervals of on-task behavior ranged from 69%-98% with a mean on 83.44% of intervals of on-task behavior. In the low preference no-choice condition, intervals of on-task behavior ranged from 56%-79% with a mean of 73.71% of intervals of on-task behavior.

As anticipated, the highest mean of on-task behavior for Carl occurred during the high preference choice condition at 63.28% (see Table 2). The low preference choice condition resulted in the lowest mean of intervals of on-task behavior at 45.7%, whereas both no-choice conditions fell in between at 52.85% and 58.57%.

Although there is no clear difference between treatments, the highest mean measurement of on-task behavior for Maya occurred during the low preference choice condition at 83.44% (see Table 3), resulting in a very slight increase of on-task behavior when compared to her no-choice conditions (HPNC 75.83%, LPNC 73.71%).

Discussion

In this study there was no overall difference in on-task behavior shown between choice and no-choice of reinforcer for either participant. Dyer, et al. (1990) showed similar results. Choice conditions in that study showed decreases in problem behavior, yet no effects on the rates of responding with instructional tasks. The Lerman et al. (1997) study suggested that rates of responding did not increase in

choice conditions because participants already had access to highly preferred items incorporated into their instructional programs. Maya and Carl did not previously have immediate access to reinforcers following seat work sessions, however little differences between choice and no-choice conditions could have occurred simply by having access to any stimuli following task completion. Results of this study could also be explained by the reinforcing effects of teacher attention prior to each data collection session overriding the effects of choice of high or low preference reinforcers. An additional consideration would be escape-maintained behavior. If either Carl or Maya engaged in off-task behavior to escape the instructional demand, choice of reinforcer would be ineffective if the reinforcer did not offer a similar function. Romaniuk, et al. (2002) used choice of task opportunities to evaluate the effects with students with escaped maintained behavior. Researchers showed that choice of task increased task performance when the problem behavior was escape-maintained behavior. However, students that engaged in attention-supported problem behavior showed very little difference across choice and no-choice of task conditions.

This study is limited to two students in a self-contained classroom with developmentally delayed peers. Inferences cannot be extended to students with developmental delays placed in the regular education setting, or students of other age groups or developmental levels. Also, this study is limited to choices of stimuli supporting attention-maintained behavior, but did not include escape-maintained problem behavior (e.g. reduced assignment length, etc). An additional potential limitation of this study is that it does not evaluate teacher interactions with participants when measuring on-task behavior. For example, a measure that demonstrated consistent positive praise statements or teacher interactions during all conditions and across participants should be considered as a potential confounding variable when interpreting results.

This study is further limited as it used partial interval recording for data collection as opposed to whole interval recording. The participants needed to be on-task for any portion of the interval in order

to be scored on-task which often results in inflated measures of actual behavior (Cooper, Heron, & Heward, 2007). Whole interval recording would require the participant be on-task for the entire interval in order to be scored as on-task resulting in a more accurate measurement. Although the data paths were possibly elevated, there was still no difference between treatments. However, different outcomes might have been captured had a measure for contingent reinforcement been included in the study, as well as a measurement for additional prompting to be provided to participants during independent seatwork sessions. At present, participants received access to the reinforcing stimuli regardless of on-task performance and additional prompting was not provided. Students with ADHD and ADD often need frequent prompts to remain focused and attentive to the task at hand. This should have been included along with a measure of frequency of prompts provided so that it can be controlled for across conditions. A contingency should have been in place so that the reinforcer was only accessible if the participant was on-task for a minimal predetermined percentage of intervals, or a minimal predetermined number of minutes during the independent seatwork session.

An additional limitation of this study is that it did not include baseline data, or an element demonstrating pre and post treatment academic performance. Albeit encouraging, seeing a generalized increase of on-task performance for both participants means very little if academic progress is not achieved. Increased measures of on-task behavior in the academic setting need to lead to increased academic performance. Without a pre and post treatment measure, this study does not demonstrate academic achievement in the curriculum content areas of math and language arts.

If this study were to be repeated, many factors might be considered. The inclusion of baseline data as well as pre and post treatment measures would be necessary to demonstrate the effects on on-task behavior and also changes in academic performance. A contingent reinforcement would be necessary to ensure task performance in order to access the reinforcer. A measure for teacher interaction and additional prompting would be necessary in order to accurately interpret data. For

example, there may be an increase of on-task behavior only when additional prompting is in place. Evaluations of data need to reflect additional changes in the independent variable (prompting added to choice of reinforcer) and its relation to the dependent variable (on-task behavior). In addition, it would be important to consider increasing the immediacy of reinforcement by shortening the seatwork session length and increasing the schedule of reinforcement. In retrospect, it is clear that the delay in the delivery of the reinforcement may have weakened the independent variable in this study.

Future research might include studies evaluating the effects of choice of reinforcer versus choice of task for escape-maintained behavior as well as for attention-supported problem behavior. In addition, as suggested by Fisher, et al. (1997), future research might be directed toward determining whether reinforcing effects correlate with age or developmental level. This current study evaluates behavior of young participants with developmental disabilities. This is consistent with the Waldron-Soler et al. (2000) study, which found that rates of responding increased for typically developing pre-school aged students across both choice and no-choice conditions, whereas there was no change for students with disabilities.

Future research could also examine the effects of choice-making with other populations such as secondary students in self-contained or regular education settings. Research could further be expanded to include the effects of choice-making for students with emotional or behavior disabilities in classroom settings. Lastly, future research should consider teacher interactions with participants when evaluating the on-task behavior of participants in the classroom setting.

On a final note, videotaping was done during the training of the primary data collector for this study. It was rather surprising that much of what was actually occurring in the classroom the teacher was not cognizant of until reviewing videotaped sessions. It was very clear how beneficial it would be to use periodic videotaping has a tool to capture and review, attend to, and reinforce student behavior

accordingly. In addition, the use of token economy systems, self-monitoring strategies, and increased schedules of contingent reinforcements, should be used in the teaching practice of kindergarten students with developmental disabilities.

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Table 1

An Analysis of the Studies on Choice

Study	Disability	Age	DV	IV	Main Finding(s)
1. Dyer et al. (1990)	Dev. and intellectual disabilities	5-11	disruptive, aggressive & self-injury behavior	choice vs. no-choice of task and reinforcer	Choice reduced problem behavior. No difference across conditions in rate of responding.
2. Lerman et al. (1997)	Severe disabilities	4-39	task performance	choice vs. no-choice of reinforcer	Same rates of task performance for choice and no-choice conditions.
3. Fisher et al. (1997)	Mild/mod. intellectual disabilities	8-13	task performance	choice vs. no-choice of high and low preference stimuli	Choice is overridden when no-choice condition is correlated to highly preferred reinforcer.
4. Waldron-Soler, Martella, Marchand-Martella and Ebey (2000)	Dev. disabilities and typical dev.	5	task performance	choice vs. no-choice of reinforcer	Rate of responding increased for typically dev. participants but there was no difference between conditions for dev. delayed participants.
5. Dunlap et al. (1994)	Emotional disorders	11	problem behavior and task performance	choice of assigned task	Choice decreased problem behavior and increased task performance.

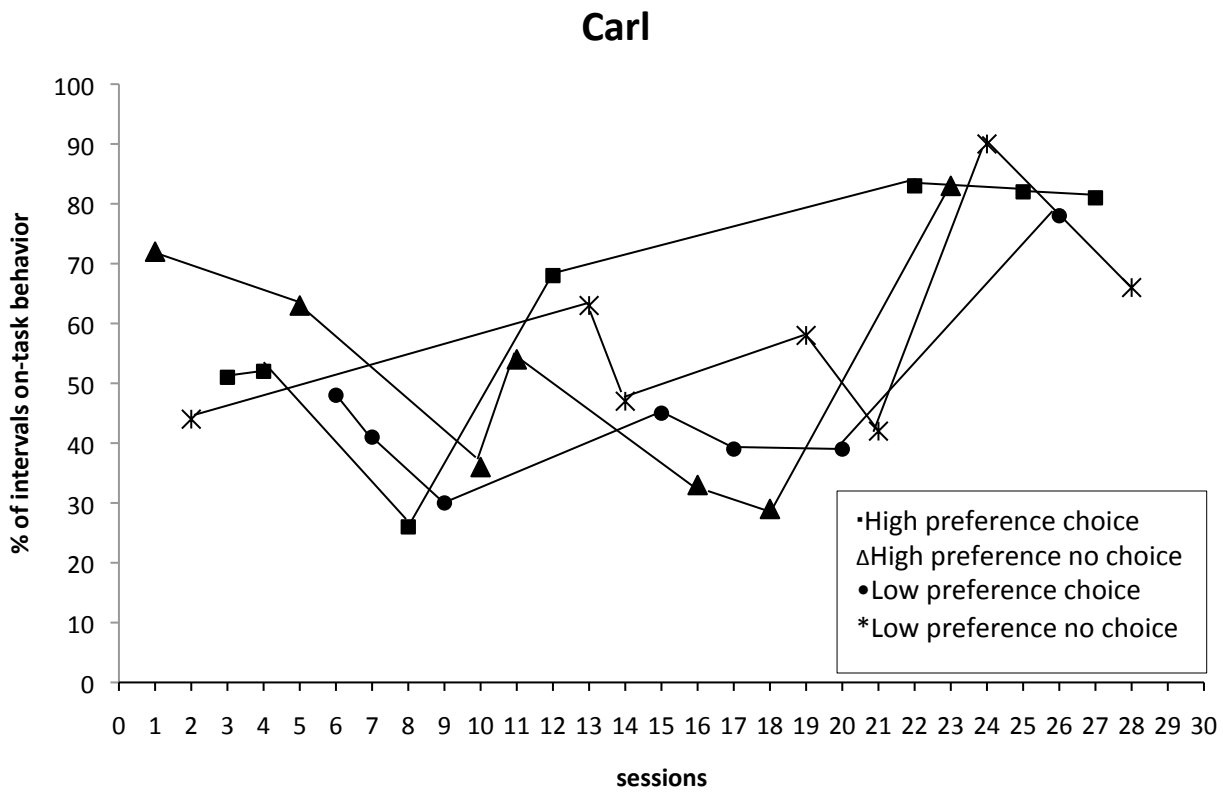

Figure 1. Percentage of intervals of on-task behavior for Carl

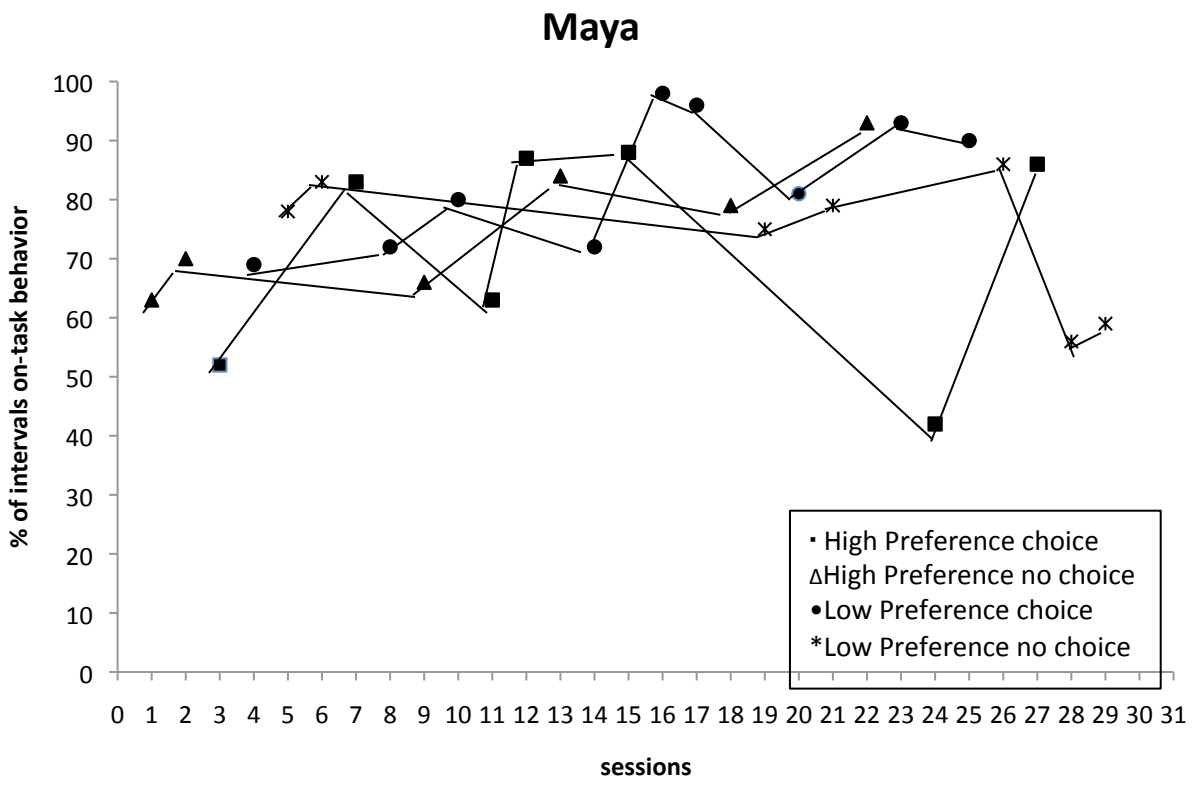

Figure 2. Percentage of intervals of on-task behavior for Maya.

Table 2

Mean % of intervals of on-task behavior for Carl

	Low Preference	High Preference
Choice	45.70%	63.28%
No-choice	58.57%	52.85%

Table 3

Mean % of intervals of on-task behavior for Maya

	Low Preference	High Preference
Choice	83.44%	76.50%
No-choice	73.71%	75.83%