DOES USING DIFFERENTIAL REINFORCEMENT OF INCOMPATIBLE BEHAVIORS REDUCE PROBLEM BEHAVIOR DURING TRANSITIONS FOR STUDENTS WITH AUTISM?

by

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(Under the Direction of Jessica Torelli)

ABSTRACT

This study examines the effectiveness of Differential Reinforcement of Incompatible Behavior (DRI) in reducing problem behaviors in students with autism spectrum disorder (ASD). The participants were two preschool students with ASD who exhibited difficulties during transitions. A withdrawal design was implemented to evaluate whether differential reinforcement resulted in a reduction of problem behavior during transitions. Additionally, a multi-treatment design was used to compare the effects of DRI combined with rotating edibles to DRI alone on problem behavior.

INDEX WORDS: Differential Reinforcement, Autism, Transitions

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TABLE OF CONTENTS

Page

LIST OF FIGURES

Page

CHAPTER 1

INTRODUCTION

Transitions are a routine part of daily life for everyone whether it's moving from one activity to another, shifting between different environments, or adjusting to a change in routine. For most individuals, these transitions are relatively seamless, with minimal disruption to their daily lives. However, for individuals with autism spectrum disorder (ASD), transitions can present a unique set of challenges that are often more pronounced and complex. These challenges make transitions a critical area of focus in both educational and therapeutic settings. Struggling with transitions, particularly engaging in problem behavior during these times, is a significant issue for children with ASD as it restricts educational settings and limits independence. One common type of difficult transition is from high preferred to less preferred activities (Wilder et al., 2006). Transitioning from an activity an individual enjoys to one they do not prefer can cause distress and make future transitions even more challenging.

During the school day, children are required to transition independently between activities, involving the termination of a high preferred activity to begin a low preferred activity (Cote et al.,2005). Resistance to transitioning from play to schoolwork may result in more time spent on disruptive behaviors and reducing focus on academics. Brewer et al. (2014) stated time spent by teaching staff trying to cope with the behavior of one child or a small number of children during transitions within the classroom consumes valuable instructional time for all students. Previous research has shown that difficulties with transitions can increase transition times (Sterling-Turner & Jordan, 2007). This can reduce the time available for academic activities and limit attention to the

needs of other students in the classroom. Problematic behavior during transitions may further extend these delays. Transitions during school can take 20-35% of class time from one activity to the next (Ferguson et al., 2004).

The ability to transition between activities, adjust to changes in routine, or shift focus from one task to another can be challenging for children with ASD. These children often struggle with flexibility, and even minor disruptions to their expected routine and can cause significant distress. Difficulties transitioning from a highly preferred to low preferred activity can create problems, including safety concerns. Transitions can be particularly challenging for children with ASD, as they often have difficulty adjusting to changes in routine or environments (Sterling-Turner & Jordan, 2007). Children with ASD often experience challenges during transitions due to the need of consistent and the inability to communicate. Research shows that individuals with autism have a greater need for predictability in their environments than individuals who are not diagnosed with autism (Sterling-Turner & Jordan, 2007). To reduce problematic behavior and ease the uncertainty of transitions, it is essential to provide support at strategies that are catered to each child's specific needs.

Problems during transitions can result in disruptive behaviors such as tantrums, aggression, self-injury, elopement, and noncompliance which not only impede learning but can also pose safety risks to the child and others around them (Sterling-Turner & Jordan, 2007; Lequia et al., 2014). In addition to the disruptive behaviors, the problem behaviors can create an unsafe environment for staff, students and peers within the classroom. Teachers and staff may need to dedicate a lot of time to managing these behaviors, diverting their focus from teaching and supporting students. Elopement during

transitions can present a serious risk because an individual may try to leave a designated area or activity and may end up in an unsafe environment (e.g., leaving the school building to cross a busy street). For many students, transitioning between tasks or environments can be overwhelming, leading them to try to escape or avoid the situation by running away. By implementing individualized plans and consistently applying interventions across different settings, the likelihood of elopement is reduced, helping to create a safer and more structured environment for the student.

Ferguson et al. (2004) stated independently transitioning between activities without problem behavior is often a prerequisite skill for placement in general education settings. The ability to transition smoothly between activities without engaging in disruptive behavior is a crucial skill, particularly when determining if a student is ready for placement in a general education setting. Mastering this skill ensures that the student can handle the demands and expectations of a general education classroom without becoming overwhelmed or disruptive. For students with autism or other disabilities, transitioning independently with minimal problem behavior can therefore increase their access to less restrictive educational settings (Ferguson et al., 2004). Mastering independent transitions with minimal problem behavior can improve the chances of students being placed in less restrictive educational settings. Their ability to manage transitions on their own demonstrates that they can function in a general classroom environment, which reduces the need for specialized or separate programs.

Differential Reinforcement of Incompatible Behavior

One intervention strategy for teaching children with ASD is the use of differential reinforcement of incompatible behavior (DRI). According to Luiselli et al. (1980), DRI

involves delivering reinforcement for a behavior that is incompatible with the target behavior. DRI helps reduce challenging behaviors during transitions by consistently reinforcing alternative behaviors that cannot occur at the same time as the problem behavior. By reinforcing these alternative behaviors, which are incompatible with the undesirable behavior, DRI decreases the problem behavior and encourages the use of a more appropriate substitute. Because the behavior being reinforced cannot coexist with the problem behavior, DRI is more likely to eliminate the problem behavior rather than simply reduce it (Luiselli et al., 1980).

Use of Preferred Items During DRI

Previous research has shown that incorporating preferred items during transitions can help reduce problem behaviors (Cote et al., 2005). Allowing individuals to choose their next activity or destination promotes greater engagement, as they are selecting the option they prefer. The use of antecedent interventions, such as offering the individual a choice of which toy to transition with, has been shown to increase compliance and reduce challenging behaviors (Cote et al., 2005). Allowing individuals to make choices during transitions, like picking a toy to bring along, increases the likelihood that they will engage willingly, resulting in a smoother transition.

Purpose

This study aimed to evaluate the effects of DRI in reducing problem behaviors for children with ASD and difficulty with transitions. Specifically, I applied DRI in which children received edible reinforcers during transitions without problem behavior. This study extends the research on treating problem behavior during transitions by applying DRI using an arbitrary, edible reinforcer, rather than using a function-based approach.

The research question I addressed was: Does using DRI reduce problem behavior during transitions for students with autism when implemented by researchers in a special education classroom.

CHAPTER 2

METHOD

Participants

Two five-year-old elementary school students who displayed problem behaviors during transitions participated in the study. I recruited the participants from a university-run clinic and a university-run preschool classroom, both of which served students with intensive academic needs. The inclusion criterion to participate was engaging in problem behavior during transitions, according to teacher report.

Daisy, a five-year-old Black female diagnosed with ASD, communicated using PECS. During transitions, she engaged in aggression and dropping. Her preferred snack was Doritos. According to teacher's report, she engaged in problem behavior when transitioning back to the classroom from the playground.

Logan, a five-year-old Black male diagnosed with ASD, communicated using a Picture Exchange Communication System book (PECS) (Charlop-Christy et al., 2002). He displayed problem behavior, including aggression, self-injurious behavior, and dropping on the ground during transitions. His preferred snacks were chips and Oreos. Logan displayed difficulties with transitions to and from the bathroom and after nap.

Setting and Arrangements

Daisy attended sessions at a university-based behavior analysis clinic located in Georgia. The clinic was Daisy's assigned school placement on her individualized education plan due to the severity of her problem behavior. The clinic had a classroom designed to resemble a traditional classroom, measuring 15 ft x10 ft. Like Logan's setting, the teaching staff consisted of two BCBAs and eight to ten master's level

students working toward BCBA certification. Daisy's classroom measured approximately 5 ft x 4 ft and contained age-appropriate tables, chairs, and toys with which she could interact.

Logan's classroom measured approximately 30 ft x 30 ft and included age-appropriate tables, chairs, and a center area with a variety of toys. The classroom included a carpeted area at the front of the room with a projector and screen, tables in the middle of the room for whole group, two centers on the side of the classroom where students engaged in with various toys throughout the day with their classmates, and two small-group tables in the back of the classroom. The teaching staff consisted of two Board-Certified Behavior Analysts (BCBAs) and six to eight graduate students in an Applied Behavior Analysis (ABA) program. Transitions for each participant included going to and from the bathroom, to and from the playground, and from centers to a location in the classroom and a location in the classroom to centers.

During Logan's out-of-classroom transitions, he traveled through a hallway that measured 2 ft x 11 ft. Three transitions each day involved going outside the classroom, where Logan encountered several open doors and other individuals in the hallways. In contrast, Daisy transitioned outside near a parking lot, through the lobby of a separate building, and down an elevator. She followed the same path to and from the playground. During transitions, the rest of the class engaged in activities at play centers. Teachers regularly pulled students from centers to work on academic tasks using one-on-one instruction, then returned them to the centers afterward. Staff members staffed each center and instructional activity, with one or two staff per area.

Experimental Design

For Daisy, I applied a withdrawal design (Gast et al., 2018) to evaluate whether differential reinforcement resulted in a decrease in problem behavior during transitions. The two phases included baseline and intervention, where an edible reinforcer was used when Daisy completed each checkpoint independently. I used visual analysis to determine when to move to the next phase. The decision to move from baseline to intervention was made due to the increased levels of problem behavior. I applied a multi-treatment design (Wolery et al. 2018) for Logan to evaluate the effects of DRI + Rotating Edible relative to DRI on problem behavior. I used visual analysis to determine when to move to the next phase due to the increased levels of problem behavior and data variability in the data.

Response Definitions and Measurements

I measured the occurrence of dropping to the ground during transitions as the dependent variable. I measured dropping by recording instances of the participant dropping to the ground throughout transitions using a paper/pencil data sheet in which I recorded a plus (+) if there was problem behavior at each checkpoint during the transitions and a minus (–) if there was no problem behavior during the transitions. Throughout the session, a second staff member marked a plus (+) if there was problem behavior during the transition and a minus (–) if there was no problem behavior.

CHAPTER 3

INTEROBSERVER AGREEMENT

IOA was collected for 100% of sessions across participants to assess the reliability of the dependent variable measurement. Two independent observers recorded the occurrence of problem behavior during each session. For both participants, IOA was calculated using a trial-by-trial method by dividing the number of trials with agreement by the total number of trials and multiplying by 100%. An agreement was defined as an instance where both observers recorded the same behavior in the same trial, while a disagreement was defined as any instance where the observers recorded different behaviors.

For Daisy, the average IOA across conditions was 100%. For Logan, mean IOA during baseline was 81% (Range, 80%–90%), 89% (Range, 83%–95%), 94% (Range, 90%–100%), 100% (Range, 90%–100%), 93% (Range, 90%–100%), 88% (Range, 85%–96%) for classroom to bathroom transitions, bathroom to classroom transitions, classroom to playground transitions, playground transitions, centers to location transitions, and location to center transitions. During the intervention phase, the mean IOA was 92% (Range, 88%–98%), 88% (Range, 70%–90%), 98% (Range, 90%–100%), 99% (Range, 90%–100%), 96% (Range, 90%–100%), and 88% (Range, 83%–100%) for classroom to bathroom, bathroom to classroom transitions, classroom to playground transitions, playground to classroom transitions, centers to location centers transitions, and location to centers transitions. For the rotating edible condition, the mean IOA was 90% (Range, 90%–100%), 96% (Range, 90%–100%), 100% (Range, 90% –100%), 100% (Range, 90%–100%), 99% (Range, 90%–100%), 97% (Range, 90%–100%) for classroom to bathroom,

bathroom to classroom transitions, classroom to playground transitions, for playground transitions, for centers to location transitions, and for location to centers transitions.

Procedural Fidelity

Procedural fidelity was assessed across conditions and participants to verify that the procedures were implemented as planned. Observers used a checklist outlining each step of the intervention to measure fidelity. The primary researcher carried out the intervention while an observer independently assessed whether each step was implemented correctly. Fidelity was calculated by dividing the number of correctly executed steps by the total number of steps and then multiplying by 100.

For Daisy, procedural fidelity was collected for all sessions. During baseline, the mean procedural fidelity was 92.5% (Range, 88%–98%). During intervention, average procedural fidelity was 99% (Range, 90%–100%).

Fidelity for Logan was collected for all sessions. During baseline, mean procedural fidelity was 92.5% (Range, 86%–96%). In DRI, the mean fidelity score was 98.5% (Range, 90%–100%). For phases involving DRI + Rotating Edible, the mean fidelity was 99.5% (Range, 90%–100%).

CHAPTER 4

PROCEDURES

General Procedures

Throughout the study and during all experimental conditions, the students followed a daily visual schedule. They traveled through the same hallways during all transitions, accompanied by the same staff members. Staff members began each transition by saying, “It’s time to check your schedule.” If the students engaged in problem behavior during transitions, staff members implemented a three-step prompt hierarchy: a vocal prompt ("stand up"), a gestural prompt ("stand up like me"), and a physical prompt ("this is how you stand up, stand up, stand up like me, this is how you stand up"). Staff members implemented the programmed procedures across all transitions during the school day. Both the schedule and the prompts to check the schedule remained consistent throughout baseline and intervention phases. Staff members implemented the intervention from the time the participants arrived at school until the end of the school day.

Baseline

The typical routines and structure of the classroom environment were maintained. Sessions began when the student was instructed to check their schedule. If problem behavior occurred, the staff member applied a three-step prompt hierarchy until the transition was completed. If no problem behavior occurred, the staff member provided verbal praise, saying, “Great job walking!” No edible reinforcers were used during these sessions. Baseline continued until the data were stable, as determined via visual analysis. When it was time for Daisy to return to class, staff members would state, “Daisy, it is

time to go back to class." and walk her to the gate of the playground. Staff members used physical prompting to exit her from the playground if she engaged in aggression or elopement. When she began walking on her own, Daisy would walk next to the staff member back to the classroom.

Intervention: Differential Reinforcement of Incompatible Behavior

The students' daily schedule, the three-step prompt hierarchy, and the use of descriptive praise remained unchanged from the baseline. During the intervention, the therapist provided a single bite of a snack (edible) at each checkpoint throughout the transition. When it was time to transition, staff would inform the students it was time for them to check their schedule. If the student displayed problem behavior during the transition, the therapist would remind them that walking independently earns reinforcement ("Remember, when you walk, you can earn a reward"). Upon reaching the correct location without problem behavior, the therapist offered verbal praise ("Great job walking to the playground!") and provided an edible reward at each checkpoint.

DRI + Rotating Edible

This condition was used exclusively with Logan because staff members hypothesized, he had become satiated with the edible because he regularly dropped the edible on the ground and did not eat it. In this phase, staff members presented Logan with a choice of two edibles to earn during transitions to decrease the probability of satiation. The procedures were the same as DRI, except before each transition, the staff members offered Logan a choice between working for chips or an Oreo. The staff member used that selection as the reinforcer for that transition.

CHAPTER 5

RESULTS

The results of Daisy's performance are reported in Figure 3. During baseline, problem behavior was elevated, ranging from 0%–40% with an average of (M= 15.3%). During the intervention, Daisy's problem behavior showed an immediate decrease in level ranging from 0%–20% with an average of (M = 2.5%). The lower level of problem behavior remained during the return to baseline phase. Due to sustained low levels of problem behavior, I did not reintroduce intervention. Based on these data, I determined a functional relation could not be established because the intervention was not reintroduced.

Results for Logan are presented in Figures 1 and 2. Outside the classroom transitions showed high levels of problem behavior in baseline ranging from 20%–45% with an average of (M = 15.2%*).* When DRI was implemented, levels remained variable with problem behavior ranging from 10%–50% with an average of (M= 6.7%). When DRI was withdrawn, I observed an increase in the level and variability of problem behavior ranging from 50%–75% with an average of *(*M = 26%*).* When DRI was reintroduced, dropping remained variable but with a lower level relative to baseline ranging from 10%–30% with an average of (M = 10.5%*).* The introduction of the DRI + Rotating Edible showed slightly lower levels of problem behavior ranging from 0%–10% with an average of (M= 6%*).* Removing the DRI + Rotating Edible increased levels of problem behavior ranging from 30%– 50% with an average of (M = 8%). The last phase of DRI + Rotating Edible continued to display variable data with a range of 20%–50% and with an average

of (M = 5.2%). Based on these data, I concluded there was not a functional relation between the DRI + Rotating Edible intervention and a reduction in problem behavior.

Figure 2 represents Logan's results for inside the classroom transitions. During the first baseline phases, problem behavior remained variable with a range of 20%– 60% with an average of (M = 8.9%). After introducing DRI, problem behavior decreased, with levels ranging from 0%–60% with an average of (M = 5.8%). When DRI was withdrawn, Problem behavior returned to baseline levels with a range from 20%–60% with an average of (M = 10.6%). In the second phase of DRI, levels remained variable, with a reduction of problem behavior with a range of 0%– 40% with an average of (M = 9.8%). Introducing the DRI + Rotating edible, levels of problem behavior reduced with a level remaining at zero with one elevated point at 60% with an average of (M=1.3%). Returning to the DRI, levels of problem behavior remained low with a range of 0%– 20% with an average of (M=7.3%). The last phase of the DRI + Rotating edible condition resulted in an increase of problem behavior with a range of 20%–60% with an average of (M= 3.8%). Based on these data, I concluded there was not a functional relation in which the DRI + Rotating Edible reduced problem behavior during in class transitions.

Figure 3 represents Logan's progress by school day, rather than by transition. This graph was not used to make phase change decisions. During baseline, levels of problem behavior were variable, but generally high. During DRI, dropping reduced from baseline levels. During DRI + Rotating Edible, dropping was lower compared to DRI. Based on these data, I concluded there was a weak functional relation in which DRI+ Rotating Edible decreased problem behavior relative to DRI alone.

CHAPTER 6

DISCUSSION

The purpose of this study was to evaluate if differential reinforcement of alternative behavior reduced problem behaviors during transitions for students with autism in special education classrooms. For Logan, I used a multitreatment design to compare the effects of DRI with and without a rotating edible on dropping, as well as baseline conditions This evaluation indicated that there was a weak functional relation between the DRI+ Rotating Edible intervention and the reduction of problem behavior. For Daisy, I used a withdrawal design to assess the effectiveness of the intervention compared to baseline. Because Daisy's behavior did not return to baseline levels in the return to baseline phase, I concluded that the behavior was not dependent on the intervention, but the intervention did contribute to the reduction of problem behavior.

One interesting observation during this study was the significant variability in Logan's dropping behavior during transitions, both within individual school days and across different days. This variability suggests that while the intervention may influence the occurrence of dropping behavior, other factors could also play a role. I hypothesized factors that might have also influenced Logan's behavior included his emotional state, the specific context he was transitioning to (e.g., inclusion of non-preferred demands), recent absences from school, and which staff member was working with him. Changes in Logan's mood or levels of fatigue may have also contributed to the fluctuations in dropping behavior observed throughout the day.

A second interesting finding was that during DRI, it appeared Logan became satiated with chips because he did not take the edible from the therapist or dropped it on

the ground after taking it. To address this issue, researchers implemented DRI + Rotating Edible, to provide Logan with a choice of two edibles for each transition. DRI+ Rotating Edible was more effective during in-class transitions than using DRI with one edible in reducing problem behavior. These data suggest providing a choice of edible reinforcers that contribute to reducing problem behavior during transitions.

Toward the end of the study, toilet training was introduced (see Figures 1-2), which increased the number of transitions to and from the bathroom. I hypothesize this addition contributed to increased problem behavior for Logan because it increased the number of transitions and the unpredictability of when he would be going to the bathroom. Transitions from the bathroom to the classroom were not favorable due to demands placed while in the bathroom. As a result, problem behavior would carryover during the transitions back to the classroom.

Several limitations occurred throughout the study occurred for Logan. A significant factor was his frequent absenteeism from school, which affected his familiarity with the classroom schedule. His absences anecdotally seemed to lead to increased problem behavior when he returned to school. Following a return to school, Logan encountered changes in the classroom schedule compared to when he left.

Furthermore, Daisy's behavior remained low throughout the return-to-baseline phase, which suggests that the improvement may have been due to her learning new skills outside of study. Throughout the study, Daisy likely developed more effective strategies for managing transitions, such as her tolerance for change and realizing that transitions can happen without the need for problem behavior. As she became more familiar with the school environment and the expectations set by the staff members and classroom

management, her overall problem behavior decreased. The structured environment and clear expectations helped her understand what was required, leading to a reduction in problem behavior across the school day. As a result, these skills may have contributed to a more stable and lasting change in her behavior, even after the intervention was removed. Daisy's school attendance played a key role in reducing her problem behavior. By being in school, she was able to develop new skills that supported her success in a classroom environment with her peers. The consistent daily schedule helped reduce the unpredictability of upcoming activities, making it easier for Daisy to manage transitions. Additionally, class-wide instruction increased her independence and provided opportunities to enhance her social skills.

In conclusion, this study aimed to evaluate the effectiveness of differential reinforcement of alternative behavior in reducing problem behaviors during transitions for students with autism in a special education classroom. For Logan, the study revealed a weak functional relation between the DRI + Rotating Edible intervention and a reduction in problem behavior. Using a rotating edible reinforcer proved more effective in reducing problem behavior than using a single reinforcer. For Daisy, the absence of problem behavior during the return to baseline suggests the change in her behavior may not have been due to the intervention, but potentially instead due to her consistently attending school. Throughout the school day, Daisy was present and engaged which offered her structure and opportunities to develop skills outside of the intervention. Regular school attendance contributed to improved routines, peer interactions, and exposure to consistent expectations, all of which have positively influenced her behavior.

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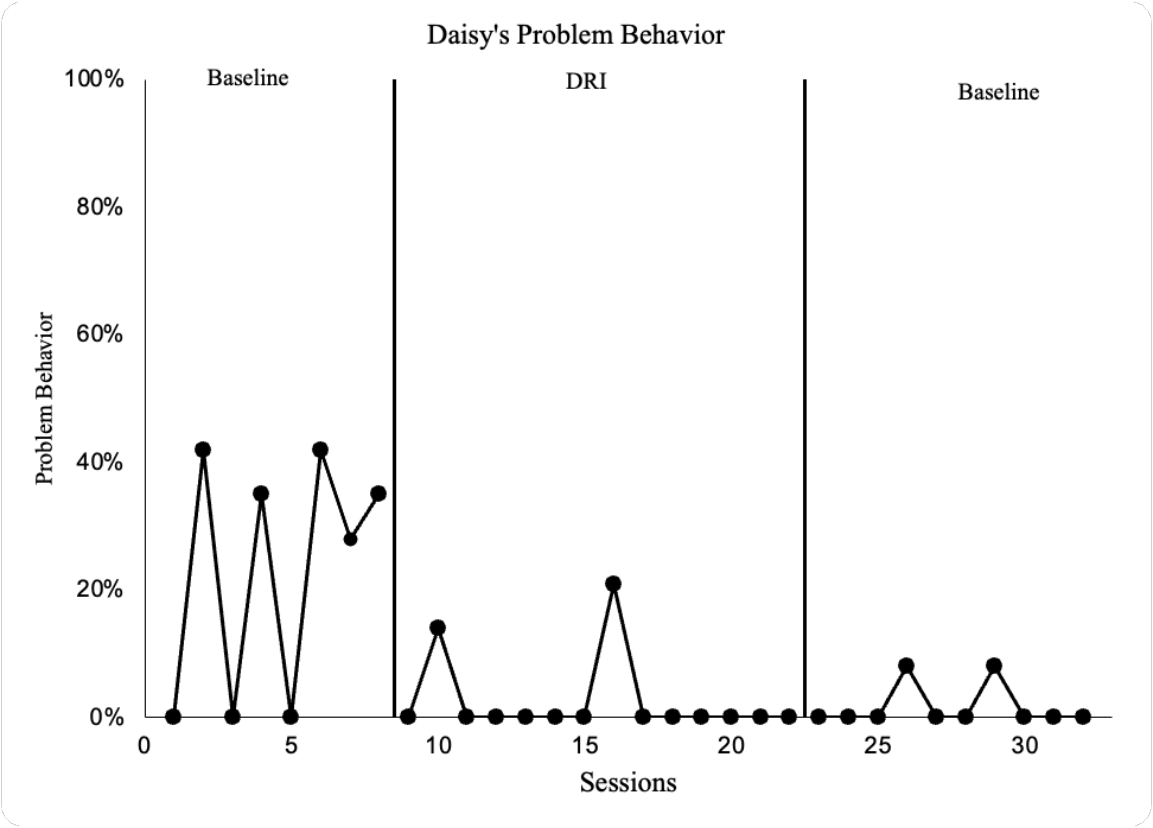
FIGURES

Figure 1

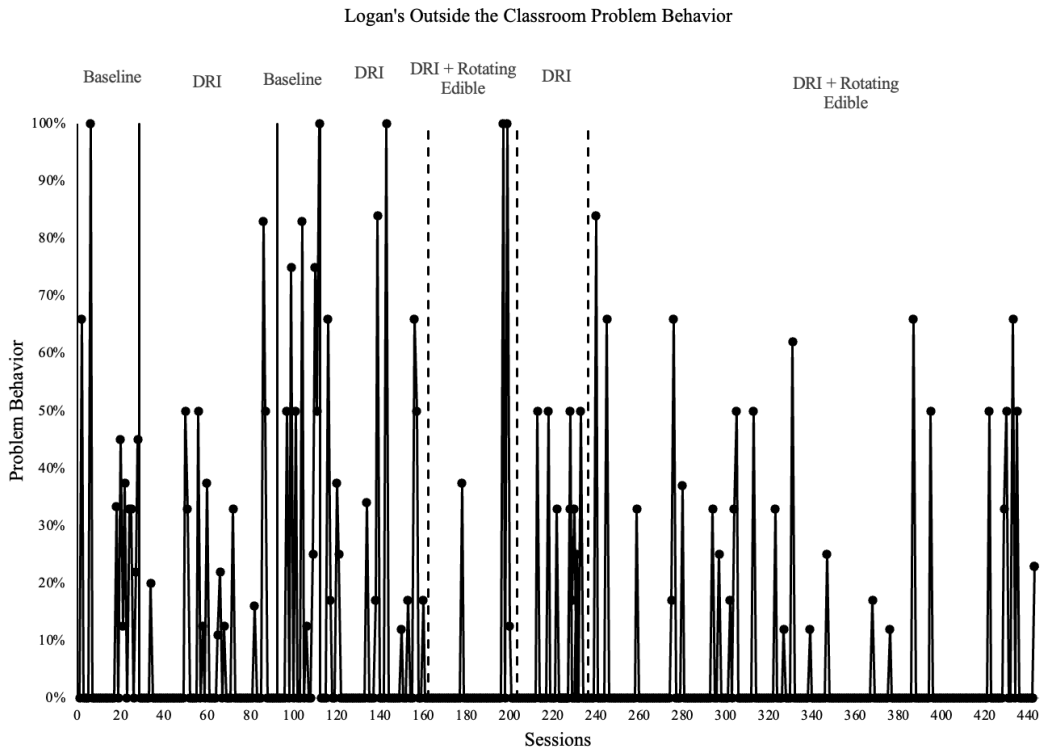
Daisy's Problem Behavior



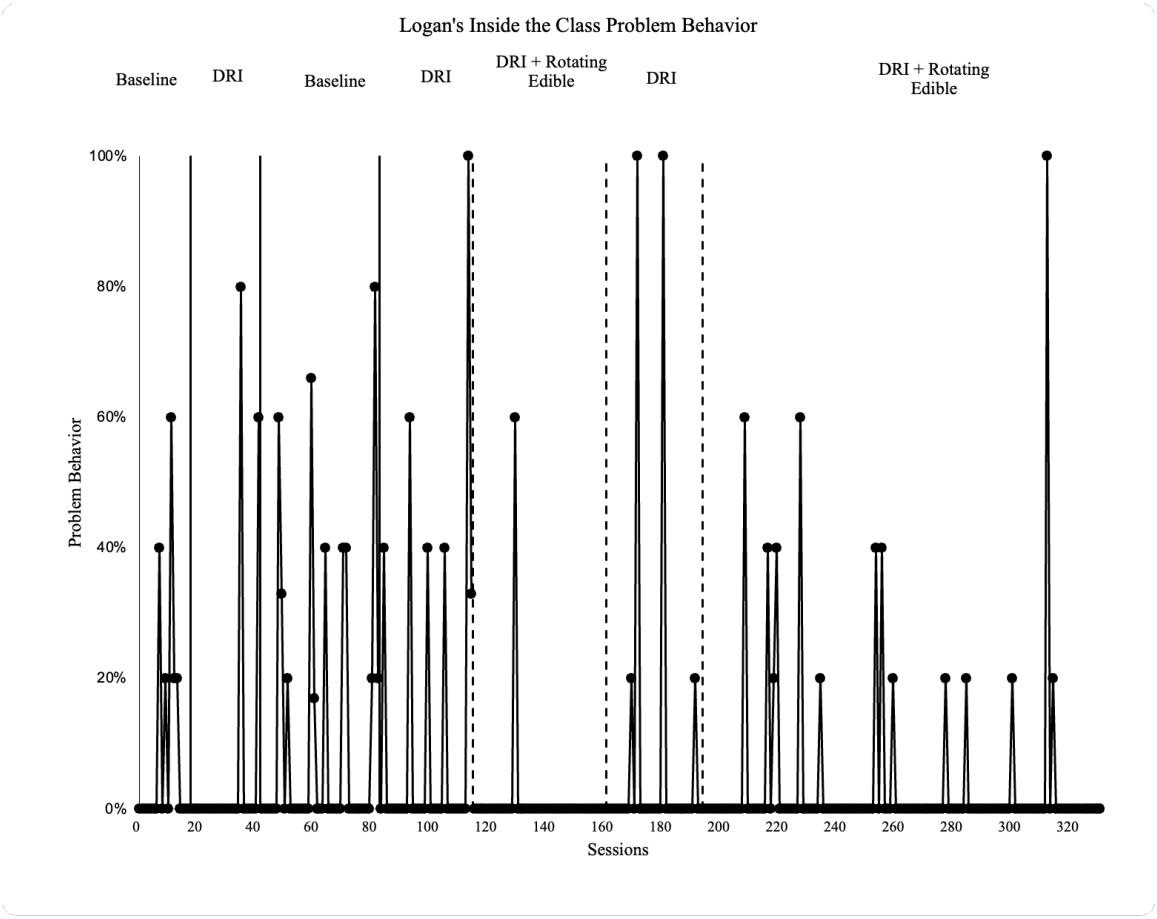
Levels began high throughout baseline, low levels of problem behavior remained consistent once the intervention was implemented.

Figure 2

Logan's Outside and Inside the Class Problem Behavior



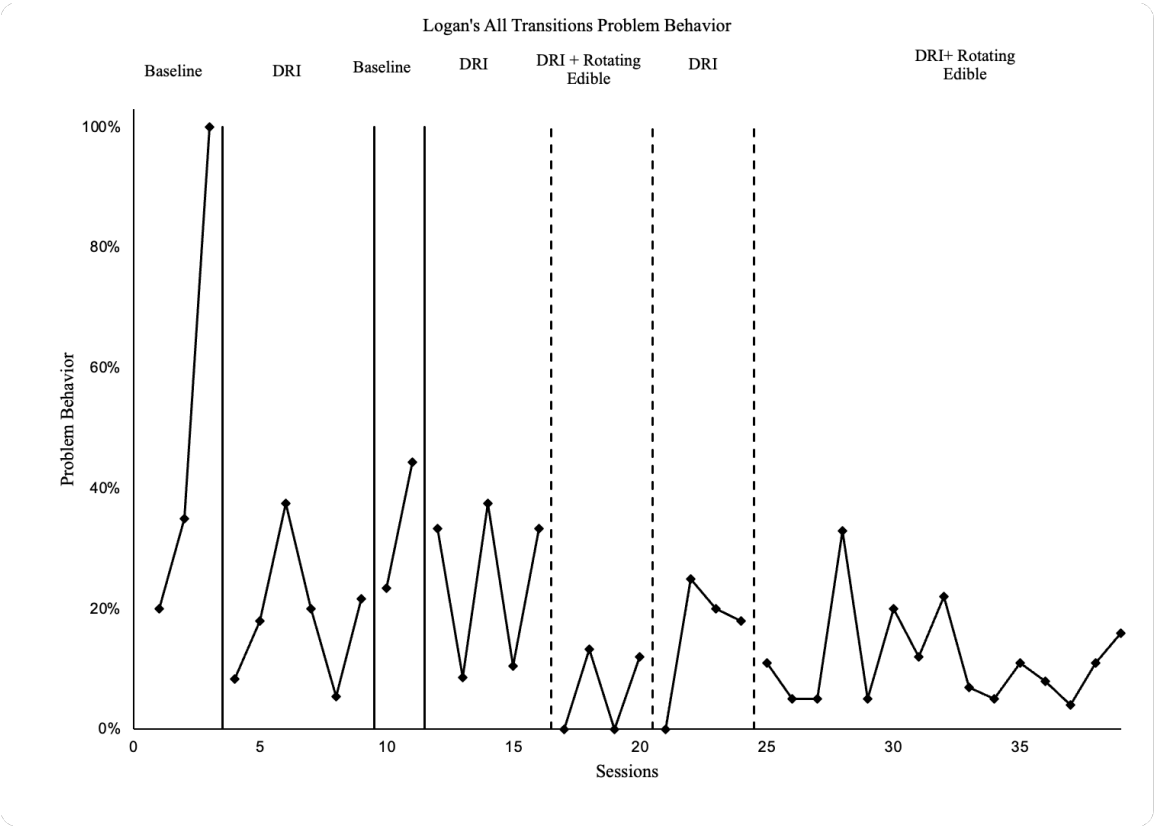
Levels remain high through the entirety of the session. Variability in the data points remained consistent throughout the study. Toilet training began at session 272.



Elevated levels are expressed for inside the classroom transitions. Data remained variable throughout the entirety of the study. Toilet training began at session 215.

Figure 3

Logan's All Transitions Problem Behavior



This graph depicts problem behavior across all sessions throughout the study. Behavior levels remained variable throughout the entirety of the study but did decrease. This graph was not used to make data-based decisions. Toilet training began at session 28.