

EVALUATING PARENT IMPLEMENTATION ON DIFFERENTIAL REINFORCEMENT  
WITHOUT EXTINCTION ON COMPLIANCE DURING NAIL CLIPPING

---

A Thesis

presented to

the Faculty of the Graduate School

at the University of Missouri-Columbia

---

In Partial Fulfillment

Of the Requirements for the Degree

Master of Science

---

by

KYLA OWENS

Dr. Wesley Dotson, Thesis Supervisor

MAY 2023

The undersigned, appointed by the dean of the Graduate School, have examined the  
Thesis entitled

EVALUATING PARENT IMPLEMENTATION ON DIFFERENTIAL  
REINFORCEMENT WITHOUT ESCAPE EXTINCTION ON COMPLIANCE  
DURING NAIL CLIPPING

Presented by Kyla Owens,  
a candidate for the degree of Master of Science,  
and hereby certify that, in their opinion, it is worthy of acceptance.

---

Dr. Wesley Dotson

---

Dr. Jena Randolph

---

Dr. Lea Ann Lowery

## ACKNOWLEDGEMENTS

I would like to thank my advisor, Dr. Wesley Dotson, for his advice and guidance throughout my time as a student in the Applied Behavior Analysis program at the University of Missouri-Columbia. I am thankful for his dedication to this project and continued support, advice, and assistance. I would also like to thank Dr. Jennifer Weyman who provided tremendous help in the early development stages of this project. I would like to thank my committee members Dr. Jena Randolph and Dr. Lea Ann Lowery for the time they dedicated to this project as well. Next, I would also like to thank the BCBA's at the Thompson Center for their immense amount of support that they provided throughout this past year. Finally, I would also like to thank Kailee Bradshaw and Kaelyn Kovarik who provided continue support and willingness to help conduct sessions and collect data.

**Evaluating Parent Implementation on Differential Reinforcement Without Extinction on  
Compliance During Nail Clipping**

Kyla Owens  
University of Missouri

## TABLE OF CONTENTS

ACKNOWLEDGEMENTS .....	iii
LIST OF FIGURES .....	vii
ABSTRACT .....	viii
INTRODUCTION .....	1
Interventions to Address Resistance to Hygiene Routines and Medical Treatment .....	1
Escape Extinction and Treatment.....	3
Caregivers as Implementers .....	4
Summary & Purpose .....	6
METHOD .....	6
Participants and Setting.....	6
Response Definition and Measurement.....	7
Interobserver Agreement (IOA) and Procedural Fidelity .....	8
Experimental Design .....	9
PROCEDURES.....	10
Phase One: DRA Without Escape Extinction .....	11
Baseline .....	11
Treatment condition.....	11
Phase Two: Caregiver Implementation of Nail Clipping.....	12
Baseline. ....	12
Training. ....	12
Post-training.....	13
RESULTS .....	13
DISCUSSION.....	15
REFERENCES .....	22
APPENDICES .....	31

Appendix A: Operational Definitions .....	31
Appendix B: Procedural Fidelity.....	32
Appendix C: Procedural Fidelity.....	33
Appendix D: Procedural Fidelity .....	34
Appendix E: Caregiver Treatment Integrity.....	35

## LIST OF FIGURES

Figure	Page
1. Results from the MSWO with Aaron.....	24
2. Results from Phase 1 with Aaron for Successful Nail Cuts.....	25
3. Rate of Responding for Problem Behavior for Aaron .....	26
4. Results from the MSWO with Uriah.....	27
5. Results from Phase 1 with Uriah for Successful Nail Cuts.....	28
6. Rate of Responding for Problem Behavior for Uriah .....	29
7. Results from Phase 2 for Uriah’s Caregiver Performance on DRA Procedures.....	30

### **Abstract**

Many young children diagnosed with autism spectrum disorder (ASD) are resistant to tolerating a variety of personal hygiene tasks performed by caregivers or health professionals, leading to poor hygiene and overall health. Previous research conducted by Schmuamcher and Rapp (2001), Bishop et al. (2013) and Dowdy et al. (2018) evaluated hygiene tolerance interventions which included compliant-contingent positive reinforcement without escape extinction. The purpose of the current study was (1) to evaluate a differential reinforcement for alternative behavior (DRA) without escape extinction and (2) to evaluate behavioral skills training (BST) with two child-parent dyads to assess the effectiveness of the DRA without escape extinction procedure on increasing compliance to nail clipping routines. The results of this study indicated that the DRA procedure without escape extinction was an effective procedure for increasing compliance during nail clipping routines for one of the two participants. For the second participant, results also indicated that implementing BST with caregivers over the DRA procedures was an effective method to train parents to complete nail clipping routines.



### **Introduction**

Young children diagnosed with autism spectrum disorder (ASD) may display noncompliant or avoidant behavior in the presence of specific stimuli or events, especially if the event is aversive for the child (Schumacher and Rapp, 2001). Specifically, individuals may be resistant to tolerating personal hygiene tasks performed by caregivers, therapists, or other health professionals. Resistance to personal hygiene routines is likely to be reinforced by escape from aversive tactile stimulation. This can lead to overall poor hygiene, social stigma, and may affect personal health in children and adolescents diagnosed with ASD.

### **Interventions to Address Resistance to Hygiene Routines and Medical Treatment**

One essential personal hygiene routine for individuals with ASD is haircutting; however, this routine can pose potential risks if the individual engages in challenging behavior. Buckley et al. (2020) evaluated the effects of graduated exposure and compliance-contingent reinforcement without escape extinction for teaching students with ASD to tolerate haircutting. The experimenters exposed participants to the presence, contact, sound, and movement of hair clippers against their hair and scalp for increasingly longer durations. In addition, the experimenters used compliance-contingent positive reinforcement in which the participant received a preferred edible (identified via paired-stimulus preference assessment) contingent on completing the current step of teaching procedures with no interfering behaviors. Results showed both participants had an increase in compliance with hair clipping and interfering behavior (e.g., environmental disruption, motor agitation, self-injury, and aggression) occurred less frequently contingent on the delivery of edible items.

Similarly, Schumacher and Rapp (2001) extended previous research by increasing a child's compliance with being in proximity to scissors and remaining seated for specified periods

of time (up to 160 s) during haircuts. A changing criterion design was used to evaluate the effects of the reinforcement procedure (delivery of preferred edible item contingent on remaining seated for current sitting duration and allowing a break if the participant left the chair) on behavior while gradually increasing the period in which the participant was sitting during each trial. Results showed that the participant's compliance with sitting during haircuts increased and escape responding decreased when a preferred item was provided contingent on remaining seated for a specified criterion. These findings suggest that escape from the chair was no longer reinforcing in the presence of the preferred edible item.

Previous studies have also shown that individuals with ASD show fear or avoidance reactions to medical procedures. Shabani and Fischer (2006) attempted to treat needle phobia in a child with ASD by evaluating the use of stimulus fading plus differential reinforcement of other behavior (DRO) to allow appropriate monitoring of blood glucose levels. The experimenters taught him to place his hand and arm between an outline on a posterboard during medical monitoring procedures. The experimenters progressed from one fading step to the next, first starting with the lancet horizontally placed near participants finger to the nurse drawing blood from his arm. The DRO began with the participant immediately receiving their preferred food item if they kept their hand and arm between the outline on the posterboard for a 10-s interval. If they moved their arm or hand more than 3 cm away from the outline, the trial was immediately terminated. The experimenter would remove all materials and turn away from the participant for 10 s before representing the current step. Results showed that stimulus fading plus DRO was an effective intervention for reducing the participant's needle phobia and increased successful attempts of blood draws during follow-up visits. These findings suggested that procedures used to treat phobias with individuals who have less severe disabilities may also be

effective for individuals diagnosed with ASD and are important in addressing the challenges of treating phobias for individuals who are non-vocal.

### **Escape Extinction and Treatment**

Compliance with regular oral hygiene may be difficult for individuals with ASD and their caregivers due to problem behaviors associated with routine dental care. Bishop et al. (2013) extended previous research on stimulus fading without escape extinction on compliance with clinician implemented toothbrushing with children with ASD. A multiple baseline design across participants was used to measure compliance and physical avoidance during a 30-step stimulus fading hierarchy, as well as assessing generalization to caregiver implemented toothbrushing. The purpose of the stimulus fading hierarchy was to establish compliance with therapists implementing the toothbrushing step with the participant. A preferred edible item was delivered contingent on compliance with the current stimulus fading step. If participant engaged in a physical avoidance response, the stimulus fading trial was terminated for 30 s and all vocal behavior was ignored. The stimulus fading hierarchy began with increasing the proximity of the toothbrush, all the way to the last step of the participant brushing their teeth for 60 s. Once stimulus fading steps were mastered, procedures were implemented with caregivers. Results showed that both participants displayed an increase in compliance and a decrease in physical avoidance behavior after the implementation of stimulus fading by both clinicians and caregivers. These findings demonstrate an effective method for establishing compliance with clinician implemented toothbrushing and generalization to caregivers.

In most cases, escape extinction may not be an option to gain compliance with personal hygiene routines due to the heightened risk of participant injury during extinction bursts (Lerman & Iwata, 1995). Therefore, the delivery of positive reinforcement for compliant behavior may be

a feasible alternative to escape extinction for the treatment of escape-maintained behavior. Dowdy et al. (2018) evaluated the use of differential reinforcement without escape extinction on escape responding and compliance with nail cutting using two adolescents with ASD who forcefully resisted nail clipping. The experimenters evaluated the effects of reinforcement without extinction using a DRA. During treatment interventions, the therapist would tell the participant “For each nail I cut, you will earn a snack.” The therapist would deliver a preferred edible item contingent of each successful nail cut. Escape responses (i.e., participant pulling hand away from nail clippers or blocking therapist from cutting nail) produced a 5-s break from nail cutting before the reintroduction to the nail clippers. Results showed that delivering preferred edible items following compliance with nail cutting led to decreased rates of escape responses and increased levels of compliance. These findings suggest that preferred edible items may have diminished the value of escape as a reinforcer and simultaneously decreased the likelihood of responses that previously resulted in escape.

### **Caregivers as Implementers**

Another main concern for children diagnosed with ASD is food selectivity. Caregivers are often responsible for providing their child with most of their daily meals; however, descriptions for training caregivers to conduct feeding interventions are generally lacking. Seiverling et al. (2012) examined the effects of behavioral skills training (BST) on parent implementation of a food selectivity treatment package that consisted of repeated taste exposure, escape extinction, and fading. Researchers also included providing a training procedure for teaching parents to conduct the intervention and examined the effects of the intervention on children’s behavior. This procedure involved the experimenter reading the task analysis of the taste session to the caregiver and modeling a session with the child. Then, the caregiver

rehearsed the session with the experimenter, but without the child, and the experimenter gave feedback on their performance. Once each caregiver reached a treatment integrity score of 90% of task analysis steps, then training was considered complete. Results showed that parent performance following training increased their child's acceptance of bites and decreased disruptive behavior associated with mealtimes. These findings suggest that BST appears to be an effective training package for teaching parents how generalize this intervention into their home.

A barrier parents often encounter is the difficulty of obtaining applied behavior analysis (ABA) services for their child with ASD. One way to address this issue is to train parents to effectively implement treatments at home. Boutain et al. (2020) evaluated a telehealth program to teach parents of children with ASD to implement graduated guidance to teach their children to independently complete three important self-care skills (i.e., washing hands, washing face, and applying lotion). The goal of this study was to compare the effects of a parent training package delivered via telehealth versus a detailed written instruction task analysis on the development of producing positive behavior changes in their child's self-care routines. Experimenters evaluated the effects of graduated guidance implemented by caregivers using a 13-step instructional procedure. After parent's received training on implementing the 13 steps, the parent taught their child one self-care skill at a time. Parents initially used a hand-over-hand, full physical prompt through each step of the skill, then a partial prompts or "shadow" prompt, and gradually decreased the prompt used until the parent only had to present the initial instruction for the child to complete independently. Training was considered complete when the parent did not have to use any prompts for the child to complete the self-care skill independently for three sessions. Results indicated that the telehealth parent training program was more effective in teaching all parents to implement graduated guidance with near-perfect levels of fidelity compared to the

detailed written instruction. These findings suggest that BST procedures delivered via telehealth can be used to teach parents to correctly implement graduated guidance to teach children self-care skills.

### **Summary & Purpose**

Overall, previous studies by Schmuamcher and Rapp (2001), Bishop et al. (2013) and Dowdy et al. (2018) evaluated hygiene tolerance interventions which included compliant-contingent positive reinforcement without escape extinction. Rather than including escape extinction, experimenters allowed brief pauses during sessions when children displayed problem behavior or compliance to trials. However, in these studies, parents were not taught to implement the interventions. Therefore, the purpose of the present study was to replicate and extend procedures done by Dowdy et al. (2018) by evaluating a differential reinforcement for alternative behavior (DRA) without escape extinction procedure with two children diagnosed with ASD on nail clipping. The second purpose of this study is to evaluate BST with caregivers to see if a DRA procedure without escape extinction is effective for children tolerating nail clipping can be taught to and implemented by caregivers.

## **Method**

### **Participants and Setting**

The primary researcher recruited two child-adult dyads that attended a university-affiliated applied behavioral intervention clinic. To be included in this study, children had an ASD diagnosis and was referred to the study by the participant's Board-Certified Behavior Analyst (BCBA) whose caregivers indicated noncompliance to nail clipping routines. Criteria for inclusion to the study were that individuals must be between the ages of four to twenty-one and must engage in moderate to zero levels of problem behavior. Aaron was a 5-year-old male who

engaged in aggression and noncompliance. Caregivers reported that they had a hard time completing nail clipping routines due to him engaging in forms of escape responding (running away from them and pulling their hand away). The adult who worked with him was Grandma. Uriah was a 4-year-old male who engaged in noncompliance and escape responding. Caregivers reported he would not sit still and would pull his hand away when they attempted to cut his nails. His adult was Mom.

All sessions took place within individual therapy room at the clinical facility. Session rooms included chairs, a table, and any session materials needed to conduct a session. Session materials included nail clippers, preferred edible items, and data sheets. In addition, session rooms included an iPad with a camera for recording sessions. Sessions were conducted once a week and separated by an average of 2 weeks to ensure adequate time for nail growth. If therapists and/or caregivers were unable to successfully cut the participant's nail during baseline sessions, therapists conducted more sessions in a week until participants' nails were successfully cut to best utilize limited time to complete the study.

### **Response Definition and Measurement**

For Phase 1 of the study (DRA treatment evaluation), the dependent variable of this study included escape responses and the percentage of successful nail clippings. The independent variable was the presence or absence of the DRA without escape extinction treatment. The dependent variable for Phase 2 (caregiver training) were caregivers' treatment integrity scores. The independent variable was the BST training given to the caregiver.

Frequency data was collected on problem behavior (i.e., escape responses and aggression) and nail cuts. *Escape response* was defined as any attempt or success of participants pulling their hand away from the experimenter, blocking the experimenter to cut the target nail

using any other body part, running away from the experimenter, or saying “no” to the experimenter when seeing the nail clippers (Aaron only). *Aggression* was defined as any attempt or success of participants hitting, scratching, or kicking another person. For Aaron, aggression was also defined as placing another person’s body between his chin and his chest while pressing down with force. *Successful Nail Cuts* is defined as the therapist cutting the target nail entirely – no matter how many cuts were required to clip the nail – without the participant engaging in any form of escape responding (see Appendix A: Operational Definitions). The frequency of escape responses was converted to responses per minute by dividing the number of escape responses per session by the session duration (s) and then multiplying by 60 s. The frequency of nail cuts were converted to a percentage by dividing the number of successful nails cut per session divided by the total number of fingernails and then multiplying by 100.

### **Interobserver Agreement (IOA) and Procedural Fidelity**

Interobserver agreement was collected for a minimum of 33% for all phases of the study, distributed equally across baseline and treatment conditions. A second trained observer collected reliability data on the dependent variables. IOA was calculated by permanent product after the session was complete. Experimenters took a picture of each participants’ hands before and after session. Observers recorded a “+” if the experimenter was able to successfully cut each nail after the session was complete, or a “-” if they were not able to successfully cut each nail. Observers recorded data for all ten nails. IOA was calculated by taking the total number of agreements by both observers, dividing it by the total number of trials (nails) and multiplying by 100. In addition, IOA was calculated using continuous data collection on frequency of escape responses. Each session was divided into 10 s intervals, and observers recorded the frequency of escape



responses during each interval. At the end of the session, the total number of agreements between the two observers was divided by the total number of intervals and multiplied by 100.

To ensure that experimenters correctly implemented procedures in each condition of the study, procedural fidelity was assessed for a minimum of 33% of sessions for all phases of the study. Trained data collectors recorded procedural fidelity data during session or by reviewing recorded videos after the session. Data was recorded on a procedural fidelity checklist (see Appendix A-C: Procedural Fidelity). The data collected was evaluated by taking the number of yes responses divided by the total of yes and no responses and multiplied by 100. During the MSWO (described below), the mean IOA was 100% for Aaron and 100% for Uriah. During Phase 1, the mean IOA for successful nail cuts was 100% for Aaron, and 100% for Uriah. The mean IOA for problem behavior during Phase 1 for Aaron was 85% (range 60%-100%), and for Uriah was 88% (range 68%-100%). The mean IOA for procedural fidelity during Phase 1 was 97% (range 83%-100%) for Aaron, and 100% for Uriah. During Phase 2, the mean IOA for procedural fidelity during Caregiver BST was 100% for Uriah.

### **Experimental Design**

A nonconcurrent multiple baseline design across participants was attempted in the first phase of the study, which included baseline and DRA without escape extinction treatment conditions. This was used to evaluate the effects of reinforcement without extinction on compliance during nail cutting. In addition, a nonconcurrent multiple baseline design across caregivers was also attempted in the second phase of the study, which included baseline and post-training BST sessions. This design was used to evaluate the effectiveness of the BST procedures to teach caregiver-implemented DRA without extinction treatment procedures. For all conditions, sessions initially ended after 5 min or after all the participant's nails are cut,

whichever came first. During Uriah's sessions, procedures were modified to extend sessions to 10 minutes because researchers observed him taking more time to choose between which edible item he wanted to earn in between trials of successful nail cuts, leaving insufficient time to cut all his nails.

### **Procedures**

*Pre-experimental assessment.* Prior to the beginning of the study, a multiple stimulus without replacement (MSWO) preference assessment was conducted with each participant based on the procedures described by DeLeon and Iwata (1996). This assessment was used to identify a hierarchy of preferred edible items for each participant. Five to seven edible items were used during the MSWO, and items chosen was based off caregiver or clinician's report of participant's preferred foods. Three sessions of the MSWO were conducted with each participant, and the top two most-chosen edible items across three sessions were used during treatment sessions for that participant.

*Session order.* After conducting an MSWO with each participant, experimenters began conducting baseline sessions with caregivers. After caregiver baseline was complete, the experimenter began conducting baseline sessions with participants. Caregiver baseline and participant baseline were conducted prior to treatment conditions to reduce the potential for the participants to learn the contingency of treatment for successful nail cuts. Experimenters then conducted treatment conditions with each participant. Once participants' show effective responding during treatment, caregivers were then trained on procedures and implemented nail clipping routine.

**Phase One: DRA Without Escape Extinction**

**Baseline.** At the beginning of each session, the experimenter instructed the participant to sit in a chair in the therapy room. The experimenter told the participant, “It’s time to cut your nails”, and held, raised, and moved the nail clippers toward the participant’s target nail. Contingent on the participant engaging in an escape response, the experimenter provided a 10-s break. After the break, the experimenter re-presented the nail clippers toward the target nail. No reinforcement was provided to the participant following a successful nail cut. The session concluded after 5 min, or when all the participant’s nails are cut (if applicable), whichever came first.

**Treatment condition.** Following baseline, a DRA without escape extinction procedure was implemented with each participant. Prior to the beginning of the session, the experimenter presented the top two chosen edible items from the MSWO and provided the participant with a choice for which edible item they wanted to earn. After the participant chose, the experimenter provided the contingency, “For each nail I successfully cut, you will earn a piece of (preferred edible item)” prior to the beginning of session. The chosen preferred edible item was placed on the table and remained visible throughout the session. Contingent on compliance to nail cutting, the participant earned immediate access to one piece of the preferred edible item. After each successful nail cut, the experimenter represented the choice of edible item that the participant wanted to work for the next nail. Escape responses continued to produce a 10-s break from nail cutting.

For Aaron, modifications were made to the procedures throughout the treatment condition when data showed consistent, yet ineffective, results. The experimenter made the modification of giving a choice between tangible items the participant wanted to work for

(session 11), limiting the space around his desk to make it harder to leave his chair (session 12), and allowing noncontingent access to an iPad (session 13). Tangible items chosen for sessions were based on what items Aaron showed motivation for prior to the start of session. Items included the iPad, a ball, and a red lightning car. Even with these modifications, the DRA without escape extinction procedure showed that these procedures were unsuccessful in increasing compliance to nail clipping routines. Aaron was terminated from the study after session 13.

For Uriah, one modification was made to treatment procedures which included increasing the duration of session to last a maximum of 10 min (session 9). This was due to Uriah taking time to choose between which edible item he wanted to earn in between trials of successful nail cuts, leaving insufficient time to cut all his nails.

### **Phase Two: Caregiver Implementation of Nail Clipping**

**Baseline.** At the beginning of each session, the experimenter instructed the caregiver to prompt the participant to sit in the chair in the individual therapy room. Experimenters then provide a rule to the caregiver to cut their child's nails as they typically would. No other instruction was given to the caregiver. Data was collected on how many nails were successfully cut by the caregiver. Treatment integrity data was collected on caregiver implementation during baseline sessions (see Appendix E: Caregiver Treatment Integrity). Sessions were 5 min or until all the participant's nails are cut, whichever comes first.

**Training.** Following baseline sessions, the experimenter trained parents to implement nail clipping routine with the DRA without escape extinction procedures using BST. The BST consisted of instructions, modeling, rehearsal, and feedback between the caregiver and the experimenter. During training sessions, participants were not present in the room. Instructions

were provided to caregivers on how to respond to compliance and escape responses when clipping their child's nails. The experimenter then modeled the procedure with a confederate therapist on the procedures. The model given by the experimenter included all steps, except for the actual cutting of the confederate therapist's nail. Then, caregivers role-played with the confederate therapist using the procedures they were just given during a 1 min session. Experimenters collected treatment integrity on caregivers' performance on implementing the DRA procedure during their role-play. After session, the experimenter provided the caregiver with feedback on what they did well and/or what they need to improve. Training concluded once each caregiver implemented all procedures with 100% treatment integrity across three consecutive sessions (see Appendix D: Procedural Fidelity-Caregiver BST).

**Post-training.** After caregivers reached 100% treatment integrity for all steps of the treatment, experimenters evaluated caregivers' performance of implementing nail clipping procedures with the participant. Post-training conditions were identical to baseline, except for caregivers presenting the preferred edible item contingent on successful nail cuts. Observers continued to collect data on successful nail cuts completed by caregivers and treatment integrity data.

## Results

Figure 1 displays the results of the MSWO for Aaron. The top two chosen items across all three trials were Funyons and Ritz-Bitz. These two items were presented as a choice to Aaron for what he wanted to work towards during the "participant treatment" phase of the study.

Figure 2 displays the percentage of successful nail cuts for Aaron during Phase 1. Data in baseline sessions showed variability but moderate to low levels of successful nail cuts. After the DRA without escape extinction was implemented, data showed consistent near and at zero levels

of successful nail cuts. Modifications began at session 11, where choices of tangible items were presented to Aaron instead of edible items were done. Modifications for session 12 consisted of limiting access to available free space to escape to, and session 13 included noncontingent access to the iPad throughout the session. Data continued to show zero levels of successful nail cuts.

Figure 3 displays Aaron's rate of responding for problem behavior during Phase 1. During baseline sessions, Aaron engaged in variable and high rates of escape responding. Additionally, Aaron only engaged in aggression during one session in baseline. After the DRA without escape extinction was implemented, data showed an increasing trend in the rate of escape responses. Modifications were implemented at session 11, but data continued to show increasing rates of escape responding and aggression.

These data suggest that the DRA without escape extinction procedure was not effective for increasing compliance or decreasing problem behavior during nail clipping routines for Aaron. As a result, the experimenter was unable to move to Phase 2 for Caregiver training.

Figure 4 displays the results of the MSWO for Uriah. The top two chosen items across three trials were Nerds and Fruit Snacks. These two items were given as a choice to Uriah for what he wanted to work towards during the "participant treatment" and the "caregiver post-training" phases of the study.

Figure 5 displays that percentage of successful nail cuts for Uriah during Phase 1. Data in baseline sessions showed slight variability but relatively low levels of percentage of successful nail cuts. After the DRA without escape extinction was implemented, data show an increase in the percentage of nail cuts. At session 9, the experimenter modified the session duration to be a maximum of 10 min. After this modification, data showed consistent and 100% successful nail

cuts for Uriah. These results indicate that the DRA without escape extinction procedure was effective in increasing compliance during nail clipping routines.

Figure 6 displays Uriah's the rate of responding for problem behavior during Phase 1. During baseline sessions, Uriah engaged in high rates of escape responding. After the DRA without escape extinction procedure was implemented, data showed moderate levels of escape behavior, but a decreasing trend compared to baseline. When the session duration increased to 10 min, the rate of escape behavior continued to decrease to low levels. Even though behavior still occurred after the DRA without escape extinction was introduced, these results indicate that this is an effective procedure to decrease problem behavior during nail clipping routines.

Figure 7 displays Uriah's Caregiver performance on the DRA without escape extinction procedure during nail clipping routines. During baseline sessions, treatment integrity scores for Uriah's caregiver remained consistent (50%). After the caregiver received the BST over the DRA without escape extinction procedures, treatment integrity scores and percentage of successful nail cuts significantly increased compared to baseline (range: 82%-95%). These data suggest that training caregivers over the BST for nail clipping procedures was effective in increasing participant's compliance to nail clipping routines implemented by caregivers.

### **Discussion**

The purpose of the present study was to replicate and extend procedures done by Dowdy et al., (2018) by evaluating a DRA without escape extinction with two children diagnosed with ASD to increase compliance on nail clipping routines. The study also evaluated BST with caregivers to determine if the DRA without escape extinction procedure was effective for children tolerating nail clipping when implemented by caregivers. The study found that the

results of the DRA without escape extinction and BST with caregivers were effective for one of the two participants (Uriah) but not the other (Aaron).

For Aaron, the delivery of preferred edible items following successful nail cuts was not effective for increasing compliance to nail clipping routines. The rate of escape responses and aggression continued to increase when the DRA without escape extinction was implemented. When Aaron engaged in escape behavior, specifically leaving the designated area where the nail clipping routine was taking place (at the table), the experimenter would prompt Aaron to sit back down at the table after the 10-s break ended. If Aaron ran away from the experimenter in the transition back to the table, the experimenter would allow for another 10-s break. These re-prompting procedures continued, and the nail clipping routine would not resume until Aaron was seated at the table. However, data showed a continued increase in escape behavior and zero levels of percentage of successful nail cuts across multiple sessions, so the researcher determined that modifications were needed to be implemented. The first modification included offering tangible items in addition to edible items for reinforcement that Aaron wanted to work for during session. Tangible items that were used as a choice were items that Aaron showed motivation for before the session started. Items included an iPad, a ball, or a red lighting car. Aaron continued making choices to the reinforcements provided and showed motivation during each session. However, data continued to show that offering a tangible choice was not effective in increasing compliance to nail clipping routines.

The next modification that was made to the DRA without escape extinction procedure was to limit the amount of free space available for Aaron to escape to. During session, the experimenter moved the table closer to a cabinet located in the corner of the room. The experimenter sat next to Aaron, who was sitting closest to the wall. This arrangement made it



more difficult for Aaron to get up and run away from the table. If Aaron attempted to escape from the table at any point throughout the session, the experimenter moved and allowed him to leave the area. Data continued to show no improvements on successful nail cuts and increased rates of escape behavior. The final modification made to the procedures was providing Aaron with noncontingent access to the iPad. Data continued to show zero levels of successful nail cuts and high rates of escape behavior, which supported that the DRA without escape extinction was not effective in increasing compliance to nail clipping routines. Since Aaron continued to engage in escape away from the table, future recommendations would be to attempt to conduct the nail clipping routine on the floor during play.

For Uriah, delivering preferred edible items following successful nail cuts led to decreased rates of escape responding and aggression and increased levels of compliance. Even though the researcher continued to see escape responding when the DRA without escape extinction was implemented, rates of escape behavior and aggression was significantly lower compared to baseline. One observation that is important to note was that as treatment progressed, Uriah choose to mand for his preferred reinforcer using his augmentative and alternative communication (AAC) device. This observation provides a correlation to what occurs during his normal therapy sessions and helped solidify that the edible items used was truly what he was motivated for. These findings support those done by Dowdy et al. (2018) on escape-maintained problem behavior without the use of escape extinction to increase compliance during nail clipping routines.

Additionally, results from the parent training with Uriah's caregiver suggest that implementing BST to teach caregivers to implement the DRA without escape extinction procedures with Uriah's was effective in increasing Uriah's compliance during nail clipping

routines. A limitation of the Caregiver BST component of the present study was that the experimenter did not collect data on the participants escape responses during sessions. A future direction of this study should include taking data on the child's behavior in addition to the caregiver's behavior. Collecting data on the child's behavior during the Caregiver BST will help determine if the DRA without escape extinction procedure is effective in reducing escape and problem behaviors when nail clipping routines are implemented by caregivers.

One limitation found in the current study was that the design of the study did not demonstrate a strong experimental control. Procedures used in this study did not show to have the same effect on behavior between the two participants. This suggests that the DRA without escape extinction procedure could be effective for some participants, but not for all. Future recommendations would be for researchers to conduct a screening prior to determine if participants have the prerequisite skills needed before starting a DRA without escape extinction procedure to address nail clipping routines. Some prerequisite skills needed might include participants being able to remain in the same area for a specific amount of time, being able to tolerate the site of nail clippers, and the reinforcer must be valuable enough to overcome the other reinforcers maintaining escape behaviors.

Another limitation that was hypothesized with Aaron had competing contingencies in effect not related to the nail clipping routine. After talking with his BCBA, it was discussed that Aaron typically spends his sessions running and constantly moving around. During the study, Aaron would engage in escape behavior at the first sight of the nail clippers being introduced. Regardless of if or when the researcher began the nail clipping routine or not, Aaron would engage in a high frequency of escape responding during session. It may be that Aaron needed initial tolerance training around the clippers before the DRA treatment. Future research should

evaluate if implementing shaping procedures for tolerating nail clippers prior to the DRA without escape extinction procedure will increase subsequent compliance with nail clipping.

Additionally, a third limitation from the study was that there were no social validity components within the study. Anecdotally, participating caregivers indicated they were concerned about this skill, but it was not formally documented with a survey. For example, Aaron's caregiver asked that nail clipping be added to his clinical treatment plan when study procedures were not effective. It is recommended that future research focuses on asking open-ended questions regarding the social validity of the treatment. Questions that could be focused on include: "What behaviors are you most concerned about when clipping your child's nails?", "Are these procedures feasible for you to use when you're cutting your child's nails at home?", and "What constitutes a successful treatment for compliance to nail clipping routines?". Receiving these answers from caregivers will allow future research to help make modifications to future procedures and to help make modifications that are in the best interest of the participant and caregiver before starting treatment. Including a questionnaire regarding the social validity of treatment will also help start with a strong functional control.

Future research is needed to fade out the edible reinforcers (or replace them with more home-appropriate reinforcers such as earning TV time, specific foods or snacks found at home, or any activity participants like to do at home) in the parent training component once participants show 100% compliance and zero levels of problem behavior across multiple nail clipping routines. Fading out or relacing reinforcement will help make these procedures more feasible to caregivers when implementing at home, especially if they do not have the preferred edible items available. Researchers could also evaluate implementing other schedules of reinforcement (variable-ratio or fixed-ratio) in addition to the DRA without escape extinction procedure to fade

out the delivery of the preferred edible item with participants before moving to Phase 2 with caregivers.

Furthermore, the next steps for future research once participants master the DRA procedure should focus on teaching the participant to cut their nails independently without the presence of caregivers. Researchers should evaluate implementing BST with the participants to teach them how to cut their nails independently. This could include teaching them to cut fake fingernails in the beginning, and eventually transferring that skill to their own nails. Teaching participants to cut their own nails will build their overall independence but will also maintain a healthy personal hygiene routine.

Findings from the current study contribute to the current literature in that the delivery of a preferred edible item following compliance with nail clipping led to decreased rates of escape responses and increased rates of compliance for Uriah. These findings support previous studies (i.e., Bishop et al., 2013, and Schmuamcher & Rapp, 2011) that the DRA without escape extinction was an effective treatment for escape-maintained problem behavior without the use of escape extinction during an important personal hygiene routine for Uriah. Additionally, these findings also contribute to the current literature that implementing BST with caregivers was an effective method to increase their child's compliance to nail clipping routines. It is important for caregivers to be properly trained on effective treatment for nail clipping routines to help maintain low problem behavior and increase overall compliance to routines.

Overall, personal hygiene routines are not only essential for maintaining good health but are also important for the development of independent living skills for individuals diagnosed with ASD. Nail clipping routines pose risks to individuals with ASD who engage in escape behavior, so finding an effective treatment to reduce escape behavior and increase compliance is

essential for maintaining healthy nails. Findings from the current study suggest that using the DRA without escape extinction could potentially help increase compliance to nail clipping routines for children diagnosed with ASD. As a result, using BST to train caregivers over these procedures will positively impact participants compliance to personal hygiene routines.

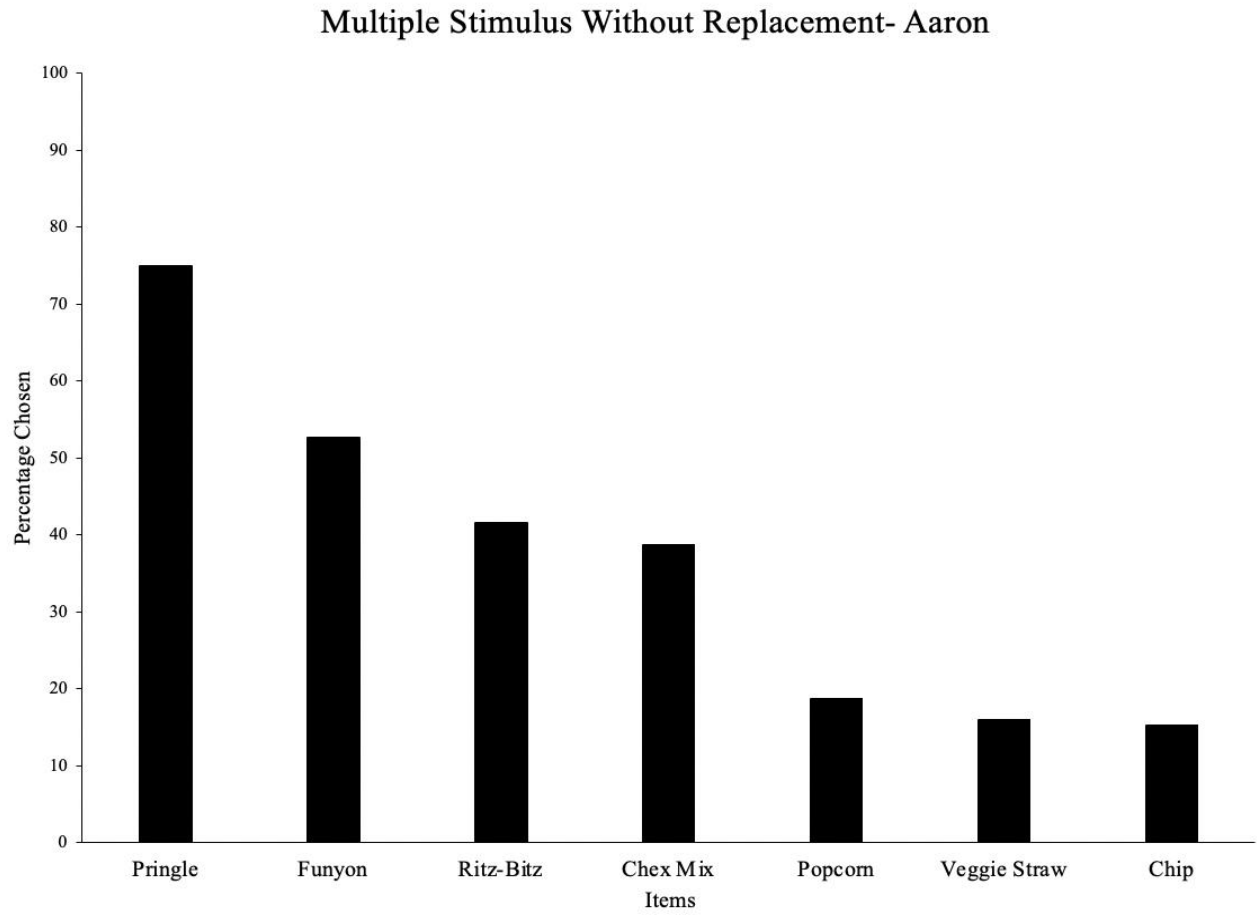
### References

- Bishop, M. R., Kenzer, A. L., Coffman, C. M., Tarbox, C. M., Tarbox, J., & Lanagan, T. M. (2013). Using stimulus fading without escape extinction to increase compliance with toothbrushing in children with autism. *Research in Autism Spectrum Disorders, 7*, 680-686. <http://dx.doi.org/10.1016/j.rasd.2013.02.004>
- Boutain, A. R., Sheldon, J. B., & Sherman, J. A. (2020). Evaluation of a telehealth parent training program in teaching self-care skills to children with autism. *Journal of Applied Behavior Analysis, 53*(3), 1259-1275. Doi:10.1002/jaba.743
- Buckley, J., Luiselli, J. K., Harper, J. M., & Shlesinger, A. (2020). Teaching students with autism spectrum disorder to tolerate haircutting. *Journal of Applied Behavior Analysis, 53*, 2081-2089. doi:10.1002/jaba.713
- Campos, C., Bloom, S., Weyman, J. R., & Garcia, A. R. (2020). Parent-implemented multiple schedules. *Behavioral Interventions, 35*, 524-541. <https://doi.10.1002/bin.1743>
- DeLeon, I. G., & Iwata, B. (1996). Evaluation of a multiple-stimulus presentation for assessing reinforcer preferences. *Journal of Applied Behavior Analysis, 29*(4), 519-533. <https://doi.org/10.1901/jaba.1996.29-519>
- Dowdy, A., Tincani, M., Nipe, T., & Weiss, M. J. (2018). Effects of reinforcement without extinction on increasing compliance with nail cutting: A systematic replication. *Journal of Applied Behavior Analysis, 51*(4), 924-930. doi:10.1002/jaba.484
- Lerman, D.C., & Iwata, B. A. (1995) Prevalence of the extinction burst and its attenuation during treatment. *Journal of Applied Behavior Analysis, 28*, 93-94. <https://doi.org/10.1901/jaba.1995.28-93>

- Seiverling, L., Williams, K., Sturmey, P., & Hart, S. (2012). Effects of behavioral skills training on parental treatment of children's food selectivity. *Journal of Applied Behavior Analysis, 45*(1), 197-203. <https://doi:10.1901/jaba.2012.45-197>
- Shabani, D. B., & Fischer, W. W. (2006). Stimulus fading and differential reinforcement for the treatment of needle phobia in a youth with autism. *Journal of Applied Behavior Analysis, 39*(4), 449-452. doi:10.1901/jaba.2006.30-05
- Schmuamcher, B. I., & Rapp, J. T. (2001). Increasing compliance with haircuts in a child with autism. *Behavioral Interventions, 26*, 67-75. doi:10.1002/bin.321

**Figure 1**

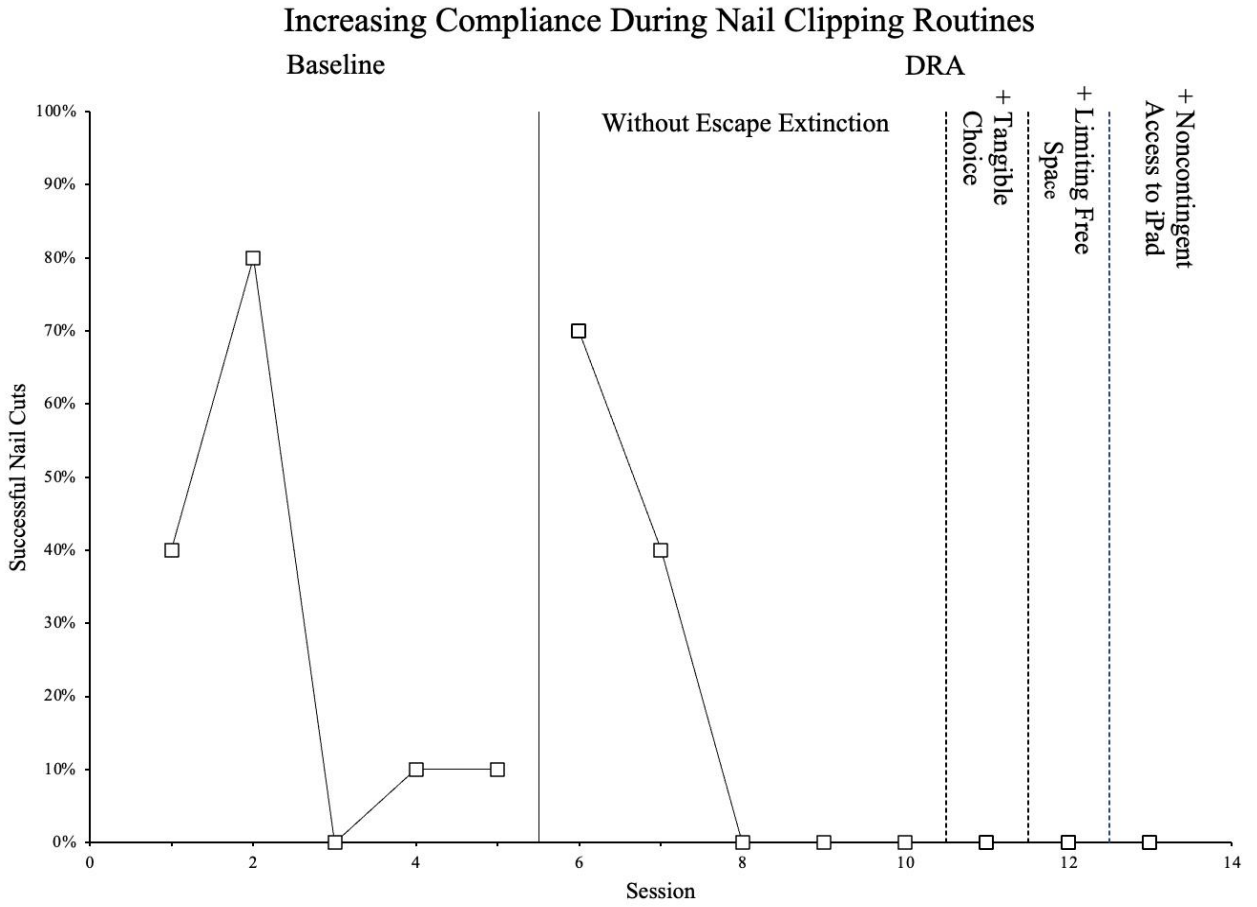
*Results from the MSWO with Aaron*





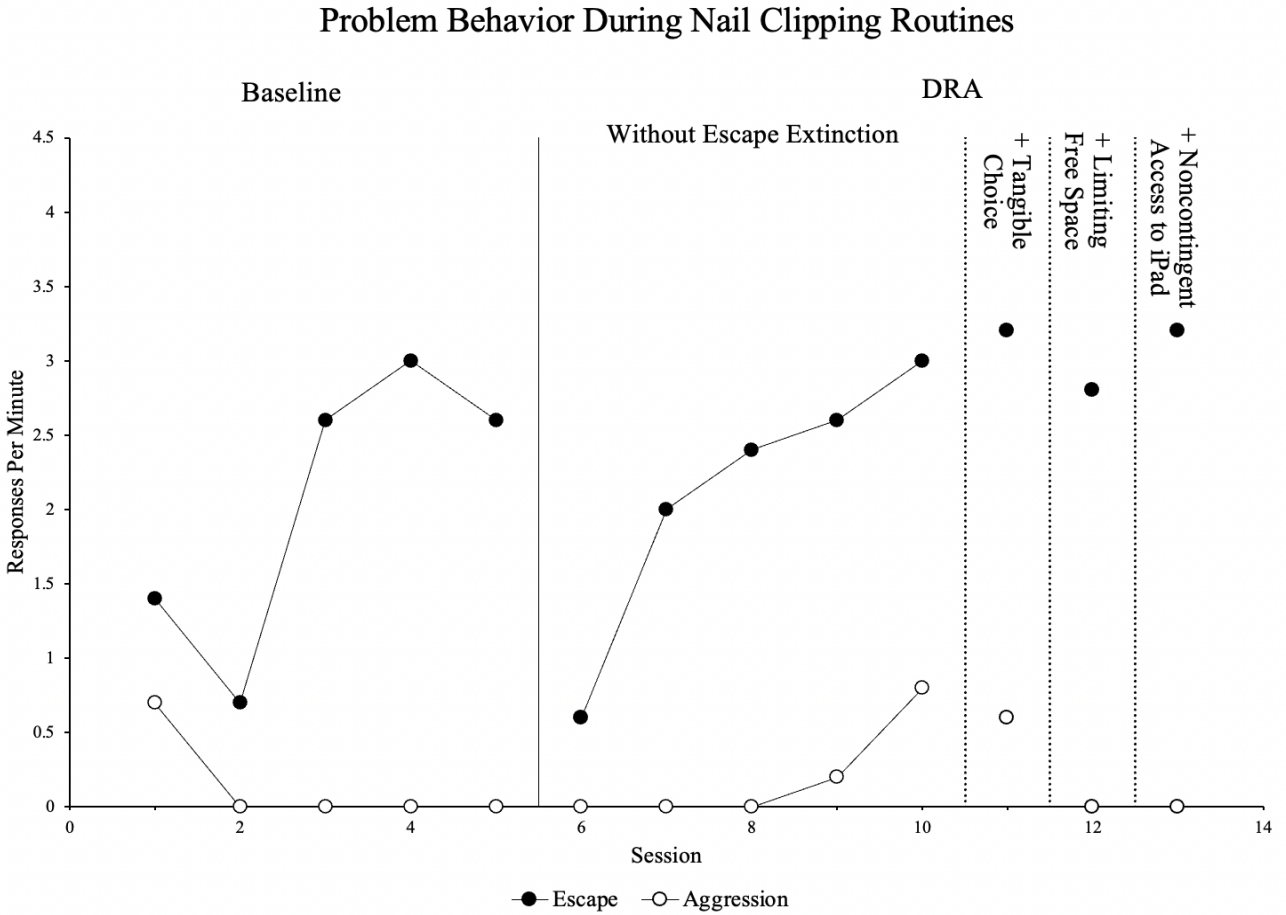
**Figure 2**

*Results from Phase 1 with Aaron for Successful Nail Cuts*



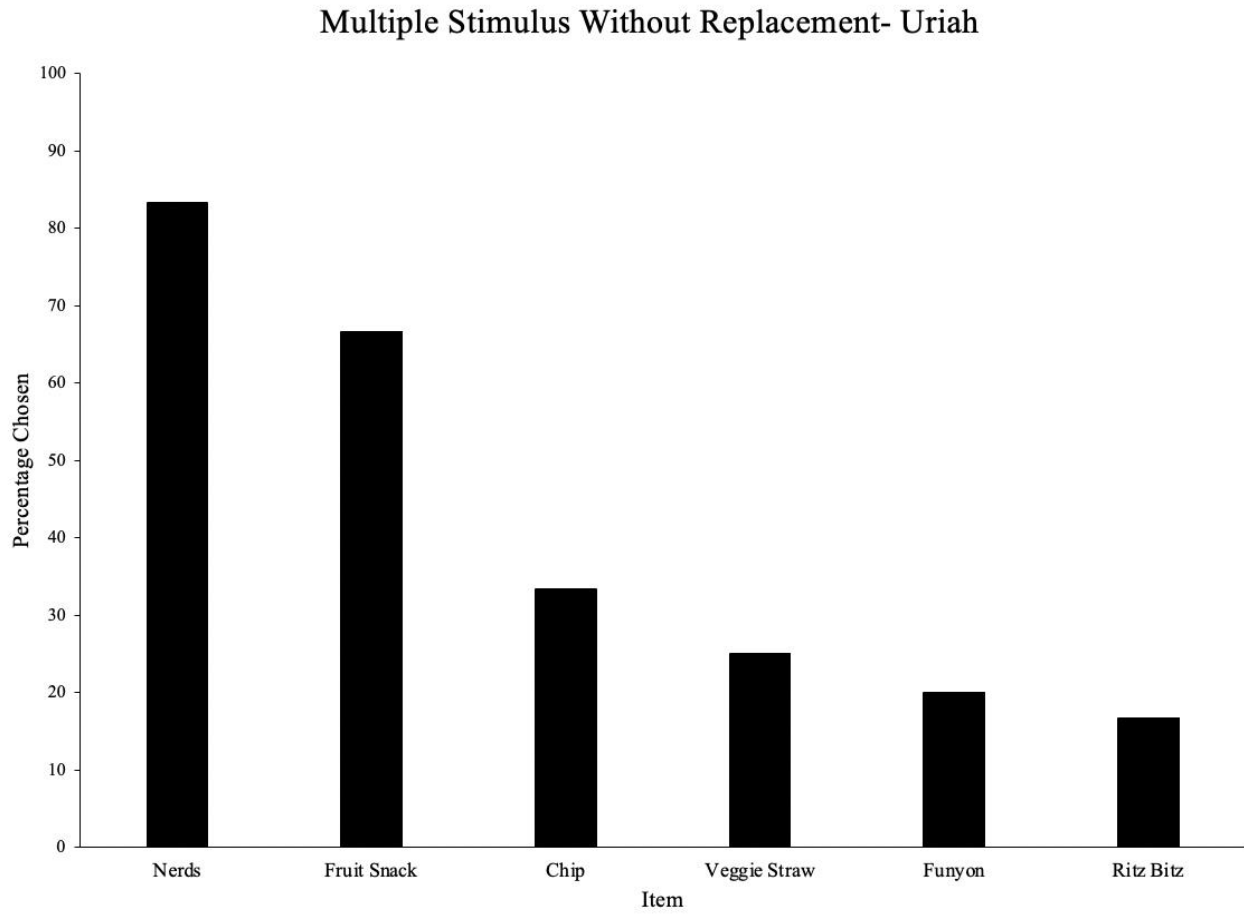
**Figure 3**

*Rate of Responding for Problem Behavior for Aaron*



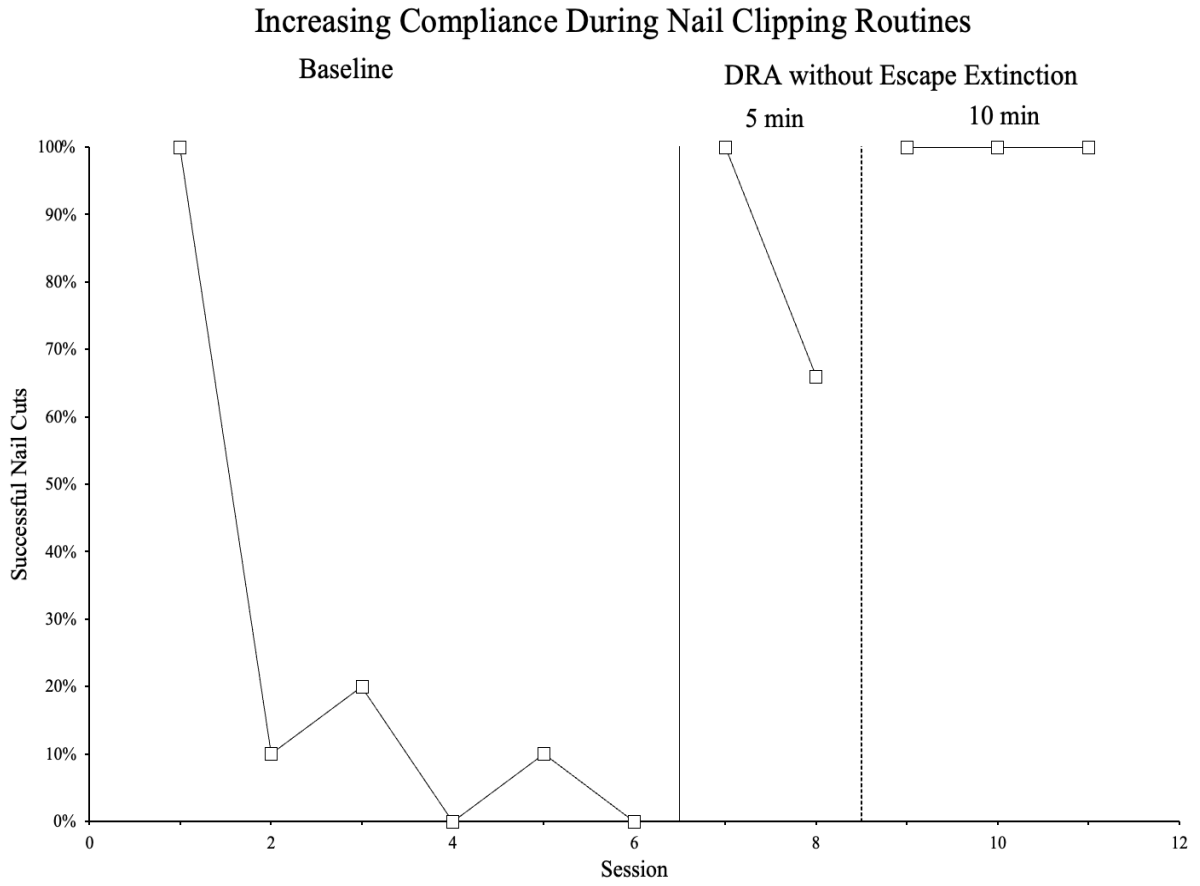
**Figure 4**

*Results from the MSWO with Uriah*



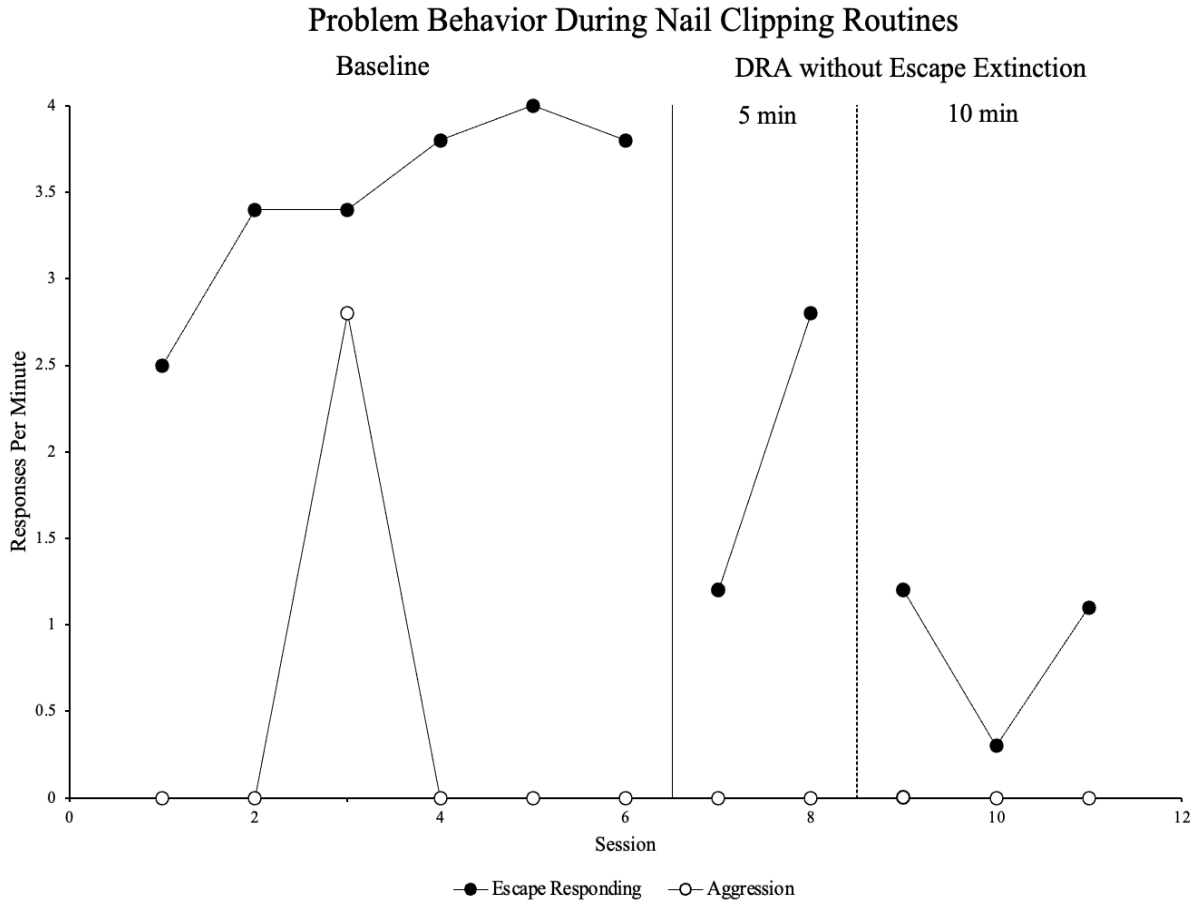
**Figure 5**

*Results from Phase 1 with Uriah for Successful Nail Cuts*



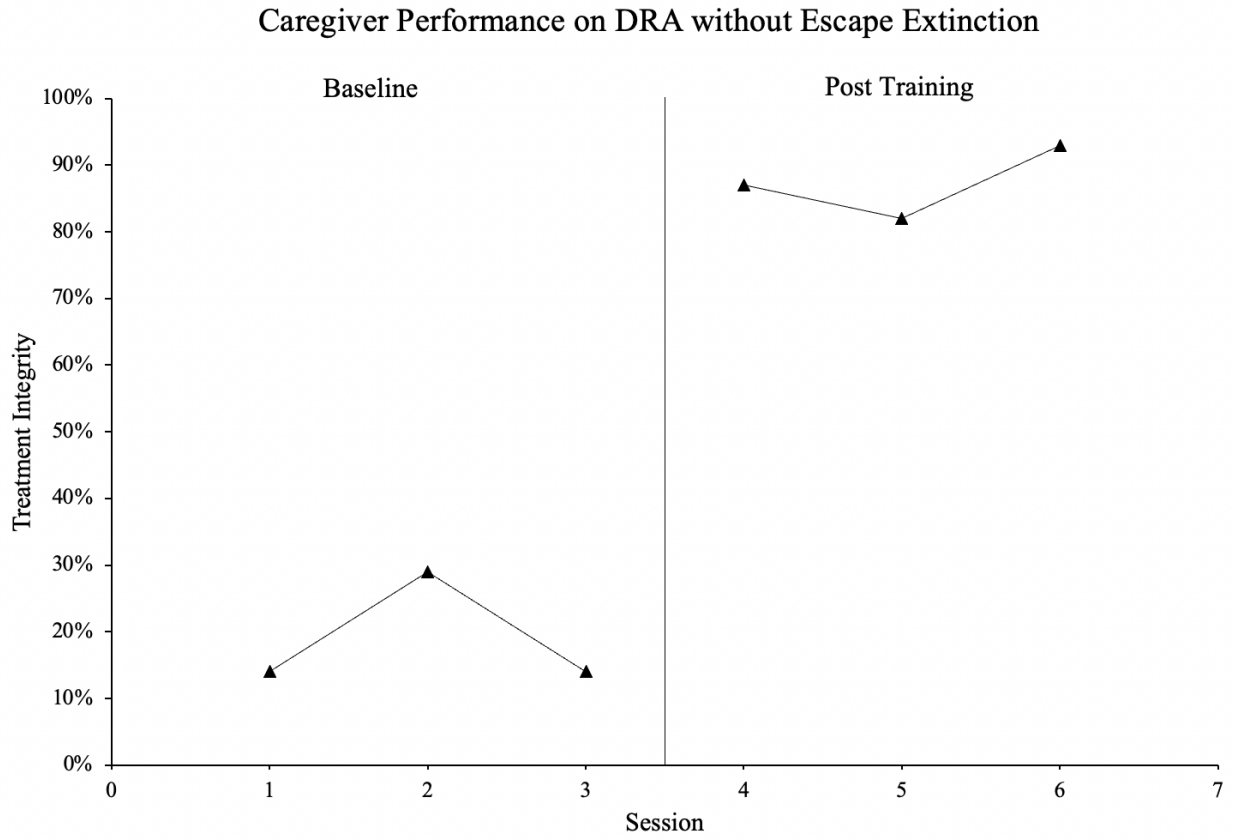
**Figure 6**

*Rate of Responding for Problem Behavior for Uriah*



**Figure 7**

*Results from Phase 2 for Uriah's Caregiver Performance on DRA Procedures*



**Appendices**

**Appendix A: Operational Definitions**

<b>Behavior</b>	<b>Operational Definition</b>
Escape	Any attempt or success of participants pulling their hand away from the experimenter, blocking the experimenter to cut the target nail using any other body part, running away from the experimenter or saying “no” to the experimenter when seeing the nail clippers (Aaron only).
Aggression	Any attempt or success of participants hitting, scratching, or kicking another person.  For Aaron: also included any attempts or successes of placing another person’s body between his chin and his chest while pressing down with force
Successful Nail Cuts	Therapists cutting the target nail entirely – no matter how many cuts were required to clip the nail – without the participant engaging in any form of escape responding

**Appendix B: Procedural Fidelity**

*Participant Baseline*

<b>Treatment Component</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>
Experimenter has all materials present (nail clippers)			
Experimenter tells the participant “It’s time to cut your nails” and showed participant nail clippers			
Experimenter did not deliver a piece of a preferred edible item following the success of a nail cut (complete)			
Experimenter provides a 10-s break if participant engages in an escape response (pulling hand away from therapist, blocking therapist from cutting nail, running away from therapist)			
After 10-s, the experimenter presented the instruction and showed the participant the nail clippers			
<b>(# correct) / (total) *100 = _____</b>			



**Appendix C: Procedural Fidelity**

*Participant Treatment*

<b>Treatment Component</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>
Experimenter has all materials present (nail clippers)			
Experimenter tells the participant “It’s time to cut your nails” and showed participant nail clippers			
Experimenter did not deliver a piece of a preferred edible item following the success of a nail cut (complete)			
Experimenter provides a 10-s break if participant engages in an escape response (pulling hand away from therapist, blocking therapist from cutting nail, running away from therapist)			
After 10-s, the experimenter presented the instruction and showed the participant the nail clippers			
<b>(# correct) / (total) *100 = _____</b>			

**Appendix D: Procedural Fidelity**

*Caregiver BST*

Treatment Components	Yes	No	N/A
Experimenter reviewed and explained the DRA procedure with caregiver			
Experimenter modeled procedure with confederate therapist			
Caregiver was given a chance to role-play procedure with confederate therapist			
Experimenter provided caregiver with specific feedback on strengths and areas of improvement based on performance			
(# correct) / (total) *100 = _____			

**Appendix E: Caregiver Treatment Integrity**

*Caregiver BST*

Treatment Components	Yes	No	N/A
Caregivers have all materials present (nail clippers and highly preferred edible item(s))			
Caregiver provided choice of edible items			
Caregivers tell the confederate, “First, I will cut your nail, then you can have (edible item)” (or something functionally similar)			
Caregivers did not provide attention to confederate when they engaged in escape behavior (pulling hand away or walking away from caregiver)			
Caregiver gave 10-sec break following escape responses from confederate			
After 10-sec, caregiver represented instruction and nail clippers			
Caregiver delivered one piece of a chosen edible item following the success of a nail cut (complete)			
(# correct) / (total) *100 = _____			