

Toileting Program for a Child with an Autism Spectrum Disorder: A Sequential Withdrawal Comparison of Cueing and Reinforcement

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The purpose of this study was to teach toileting skills to a 5-year-old boy with an Autism Spectrum Disorder. After taking a baseline data on successful use of the toilet and number of bathroom accidents each day, a treatment package, which included cueing and reinforcement components, was implemented. The cueing and reinforcement components were sequentially withdrawn to determine which part of the package was most effective. As a result of this treatment, the client showed an increase in the number of times he eliminated urine or feces into the toilet and showed a reduction of eliminations of urine or feces into his underwear or pants.

Keywords: toileting, autism spectrum disorder, positive reinforcement, cueing

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Toileting is an important milestone in every child's life. The transition from using diapers to using the toilet demonstrates an increase in autonomy and control over one's body. Typically developing children generally begin toileting between the ages of 18 months and 3 years of age (Walsh, 2014). Many children with autism spectrum disorder (ASD) may present as developmentally younger than neurotypical peers (Webmd.com, 2014), therefore it is common for children with ASD to begin the toilet training process later than typical peers (Brighttots.com, 2014). Children with ASD may not be as motivated by social praise and may have a different sensory awareness of their bodies that make toilet training a more intensive process (Schaaf & Miller, 2005). This process may require extrinsic reinforcement such as edibles or time with high preference toys to obtain mastery, which can later be faded to social praise or intrinsic motivation to stay dry (LeBlanc et al., 2005).

A number of different methods have been used to teach toilet training to children with developmental disabilities. For example, a study by Kroeger and Sorenson (2010) used a combination of positive and negative reinforcement to toilet train 2 participants with autism spectrum disorders. The participants were a 4-year-old boy and a 6-year-old boy. The researchers conducted a preference assessment on each participant, which determined that possible reinforcers included popsicles and computer time for one boy and swinging and playing outside for the other boy. The intervention occurred in the boys' individual homes and was implemented by the children's parents following training from the researchers.

After taking baseline data, the researchers put a treatment plan in place that included increasing the number of fluids consumed by the participants; scheduled sitting on the toilet, positive reinforcement in the form of one of the items or activities determined to be high preference during the preference assessment, negative reinforcement in the form of being able to leave the toilet before the timer goes off due to having a successful elimination of waste into the toilet, redirection for accidents which included bringing the child to the toilet to sit, and scheduled sitting on a chair which was

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placed next to the toilet to increase self-initiations. The chair sitting included placing the chair next to the toilet so that the child could immediately be prompted to sit on the toilet if he began to have an accident while sitting in the chair. The chair was slowly moved further away from the toilet as the study progressed. The researchers continued the intervention until the child had one or fewer accidents a day and self-initiated going to the toilet more than 50% of the time. Once the children reached this criterion, the intervention was generalized to other bathrooms in the children's homes, and then it was generalized to familiar bathrooms in the community. The researchers took follow-up data two weeks after the end of the study, 6 months after the end of the study, and 3 years after the end of the study. They found the children retained the skill of self initiating at least 50% of the time and having no more than one toileting accident a day.

A study by Keen, Brannigan, and Cuskelly (2007) found cueing, reinforcement, and video modeling to be an effective way to increase rates of bathroom success for five children aged 4 to 6 years old with ASD. The researchers found these interventions to be effective procedures, yet none of the children in the study stopped having urinary or fecal accidents in their pants completely by the end of this study, which suggests the need for more intensive interventions for those with autism spectrum disorders.

A study by LeBlanc et al. (2005) investigated the use of scheduled sitting (10 minutes on the toilet, 5 minutes off the toilet), communication training, positive reinforcement for eliminating waste into the toilet or for telling an adult they needed to use the bathroom, a urine sensor and alarm, and positive practice for accidents, which entailed stating, "No wet pants" in a firm voice, then escorting the child to the toilet, having the child sit briefly, changing the child's clothes, taking the child back to the location of the accident and again saying, "No wet pants" and taking them into the bathroom. They conducted a multiple baseline across participants design for three children ranging in ages from 4 years and 1 month old to 4 years and 11 months old. All three children decreased the daily number of bathroom accidents and showed improvement in their ability to self-initiate. These results maintained throughout the 60-day follow-up that was done by researchers. The results of this study suggest that a combination of positive reinforcement for eliminations and initiations, scheduled sitting, positive practice overcorrection, and a urine sensor and alarm are effective ways to teach a child with an autism spectrum disorder to use the bathroom.

Simon and Thompson (2006) conducted a study with 5 neurotypical participants aged 21 months through 30 months of age in which they replaced the children's diapers with underwear and increased their fluid intake to determine if these changes would increase their bathroom success. Two children showed improvement, two children showed no change, and one child showed some improvement in terms of using the toilet more frequently, but the number of bathroom accidents remained stable. These results suggest that some children have success with toileting when put in underwear because they have an increased awareness of being wet or dry and being wet makes them uncomfortable. The other children in the study may not have been developmentally ready to potty train and therefore the underwear was not effective. Taking a potty training readiness questionnaire may help parents decide if a child is developmentally ready to start potty training, (Brown, 2008).

In the current study, a sequential withdrawal design with cueing and reinforcement was implemented to teach a 5 year old boy with an autism spectrum disorder to successfully initiate going to the bathroom, eliminate waste into the toilet, and reduce toileting accidents. It was hypothesized that the treatment package would yield the most effective results, but that cueing only without reinforcement or reinforcement only without cueing would be more successful than baseline, but not as effective as the full treatment package.

Method

Participants and Setting

The participant of this study was a 5-year-old boy diagnosed with ASD. The participant was nonverbal and communicated using pictorial icon exchange. At the time of the study, the participant received consulting and case management services from a local non-profit mental health agency and had a one-on-one para-educator who served him throughout the school day. He also received occupational therapy twice a month for 30 minutes, speech language pathologist services twice a week for 30 minutes, and physical therapy twice a week for 30 minutes.

The procedures described in this study were implemented across all environments throughout this participant's day including school, home, and at his personal care attendant's home, although data was collected only during the school day, which was from his arrival at school at 9:00 a.m. until his departure at 3:00 p.m. Before beginning this study, the parents were given a potty training readiness questionnaire (See appendix A), (Brown, 2008), to determine if their child was developmentally ready to start potty training. The results of this questionnaire indicated that the participant had the readiness skills to start toilet training.

Materials

The materials used in this study were a timer, M&Ms as reinforcement (M&Ms were used as reinforcement based on both a preference and reinforcer assessment), 2" by 2" icons depicting a toilet that read "bathroom" (See appendix B), and a 8" by 3.5" visual depicting "dry pants gets M&M" (See appendix C).

Measurement

The target behaviors of interest in this study were bathroom success and bathroom accidents. Bathroom success was defined as the child eliminating fecal or urinary waste into the toilet. Bathroom accidents were defined as the child eliminating fecal or urinary waste into his underwear or pants. Both of these measures were taken based on visual inspection. A second observer collected data during 11% of sessions. Interobserver agreement (IOA) was calculated by the exact count-per-interval method. Interobserver agreement averaged 100% for all sessions.

Procedure

Phase A: baseline.

During the baseline phase of this study, the para-educator or the parents of the participant verbally directed the participant to go into the bathroom between 2-4 times daily and prompted him to sit on the toilet with his pants down. Graduated guidance was used if he did not comply with the verbal direction alone. If the participant successfully

eliminated urinary or fecal waste into the toilet, he was praised. The client had no clear way of communicating that he had to use the bathroom. He wore diapers during this phase.

Phase B: Treatment package.

During the second phase of the study, the participant wore underwear instead of diapers, and the treatment package was implemented including both the cueing and reinforcement components according to the procedures described below:

Cueing.

The cueing procedure consisted of bathroom icons (See appendix B) being placed in various locations the participant's home, school, and at his personal care attendant's home. Icons were placed in such a way that the participant was within 10 feet of an icon at all times. A timer was set to beep once every hour (e.g. 8:00am, 9:00am, 10:00am). When the timer went off, the child was physically guided to the nearest bathroom icon and physically prompted to hand the icon to the adult. The adult then said, "Oh, do you need to use the bathroom?" The participant was then given a choice to use the bathroom. If the participant began physically moving towards the bathroom, the adult accompanied him to the bathroom, prompted him to pull down his pants and sit on the toilet. If the participant did not start physically moving towards the bathroom, he was not physically guided into the bathroom and was allowed to refuse to go to the bathroom. Regardless of whether he successfully went to the bathroom, the adult reset the timer for one hour and repeated the cueing procedure when the timer went off.

Reinforcement.

Following the cueing procedure, if the child placed the icon in the adult's hand (with or without prompting), the adult acknowledged the communication (e.g. "Oh! You need to go the bathroom?") and reinforced the child with one M&M. If the participant went into the bathroom and eliminated urinary or fecal waste into the toilet, he was praised (e.g. "Nice job going to the bathroom," "You earned an M&M for going to the bathroom,") and immediately given one M&M. If he failed to eliminate waste, he was not given an M&M, but he was told, "Let's try again later." On the first day of this phase, the participant handed the bathroom icon to his para-educator three times in a row while refusing to attempt to go to the bathroom hence reinforcement for handing over the icon was eliminated at this point.

The participant also received reinforcement for refraining from having bathroom accidents (See measurement section for operational definition). This reinforcement was also an M&M and was delivered if the participant could demonstrate that he had "dry pants." In order to do this part of the procedure, a second timer was set to beep once every hour to alert the adult that it was time to do a dry pants check. This occurred on the opposite schedule as the cueing procedure. For example, the cueing procedure occurred at 8:00 a.m., 9:00 a.m., and 10:00 a.m., and the dry pants check occurred at 8:30 a.m., 9:30 a.m., and 10:30 a.m. For the dry pants checks, the adult told the participant, "It is time to check your pants." The adult then used hand over hand guidance to get the participant to feel the front of his pants to determine if they were wet or dry. If his pants were dry, he was shown a dry pants visual (See appendix C), given an M&M, and praised (e.g. "Nice job having dry pants," "You're pants are dry so you earned an M&M"). If the adult noticed

during the dry pants check or at any time of the day that the participant's pants had urine or fecal matter in them, he/she said, "You have wet pants, it's time to go to the bathroom." He was then physically guided to the bathroom at which point the adult helped him change his clothes.

Phase C: Reinforcement only.

For Phase C: Reinforcement only, the cueing process was withdrawn, while the reinforcement procedure remained in place. The adults no longer cued the participant to use the bathroom. The icons remained available for the participant to use to request to go to the bathroom if he so chose. If he successfully eliminated waste into the toilet during this phase, he received an M&M and praise for doing so. The dry pants checks remained in place, once every hour, and if his pants were dry at the time of the dry pants check, he received an M&M and praise for having dry pants. As with the last phase, if at any point the adult noticed that the participant's pants were wet, the adult brought him into the bathroom to help him change his clothes.

Phase D: Treatment package (same as phase B).

During Phase B, the full treatment package was put back in place including both cueing and reinforcement procedures. This phase was conducted exactly as the first phase B was conducted.

Phase D: Cueing only.

During Phase D, the tangible reinforcement procedure was withdrawn, while the cueing procedure remained in place. The participant was cued to hand over the bathroom icon (physically prompted if necessary) to the adult every hour at which point the adult asked him if he needed to use the bathroom. If the participant successfully eliminated waste into the toilet, he received praise, but no M&M. Dry pants checks continued to occur once every hour. If the participant had "dry pants" at the time of the dry pants check, the participant was praised for having dry pants, but was not provided with an M&M.

Results

Throughout the study, the participant displayed a decreasing trend in the amount of urinary or fecal accidents (See Figure 1) as well as an increase in successful eliminations of urine or fecal matter into the toilet (See Figure 2). By the end of this study, the client completely refrained from eliminating urinary or fecal waste into his underwear or pants. During Phase A (Baseline), the client averaged 1.2 bathroom accidents a day at school (Approximately 6 per school week). During Phase B (Treatment package), the client showed a decrease in bathroom accidents averaging 0.2 accidents a day at school (Approximately one per school week). During Phase C (Reinforcement only) the client averaged one accident a day, however, this phase only lasted one day as the client failed to eliminate waste into the toilet during this phase, had a urinary accident in his pants, and began to show atypical challenging behaviors such as yelling, screaming, bolting out of the classroom, and aggression. During Phase D (Return to treatment package), the client again showed a decrease in the number of bathroom accidents averaging 0.2 accidents a day (Approximately one per school week). During Phase D (Cueing only), the client continued to show a decrease in bathroom accidents averaging zero accidents per day, which is zero per school week (See Table 1).

Phase		Average # of accidents per school day	Average # of accidents per school week
A	Baseline	1.2	6
B	Treatment package	0.2	1
C	Reinforcement only	1	5
B	Treatment package	0.2	1
D	Cueing only	0	0

Table 1: Average # of bathroom accidents per school day and per school week

Phase		Average # of eliminations into the toilet per school day	Average # of eliminations into the toilet per school week
A	Baseline	0.6	3.2
B	Treatment package	3	15.2
C	Reinforcement only	0	0
B	Treatment package	4	20
D	Cueing only	3.4	17.1

Table 2: Average # of eliminations into the toilet per school day and per school week

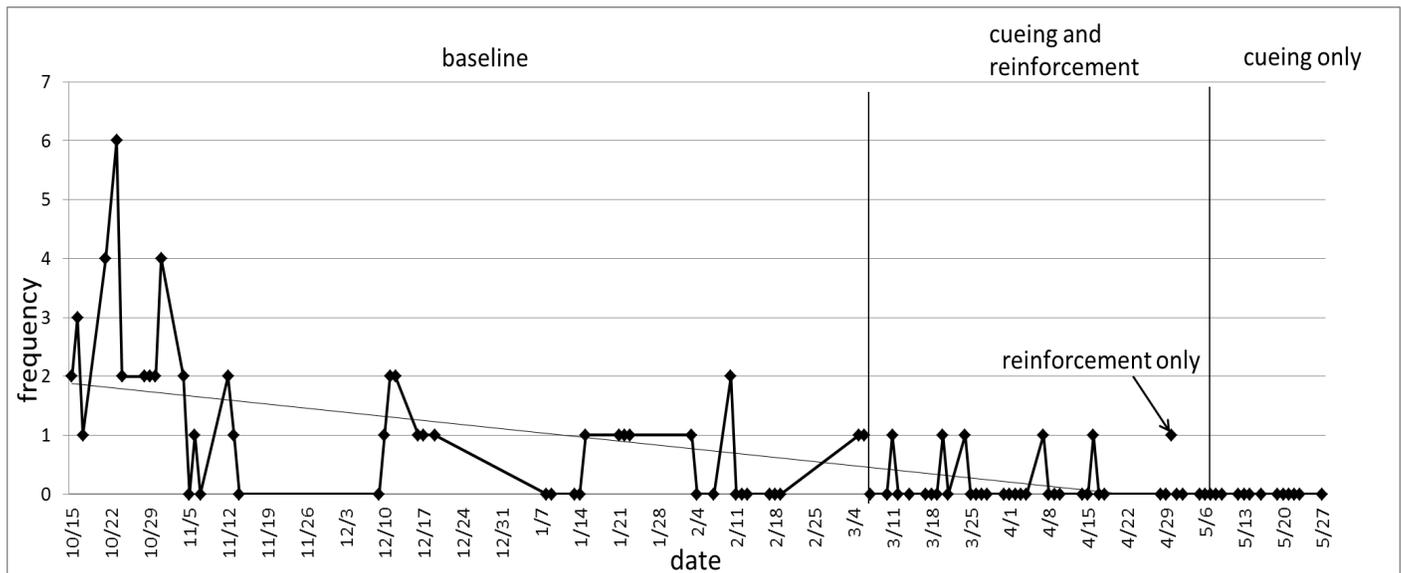


Figure 1: Eliminations of urinary or fecal waste into underwear or pants

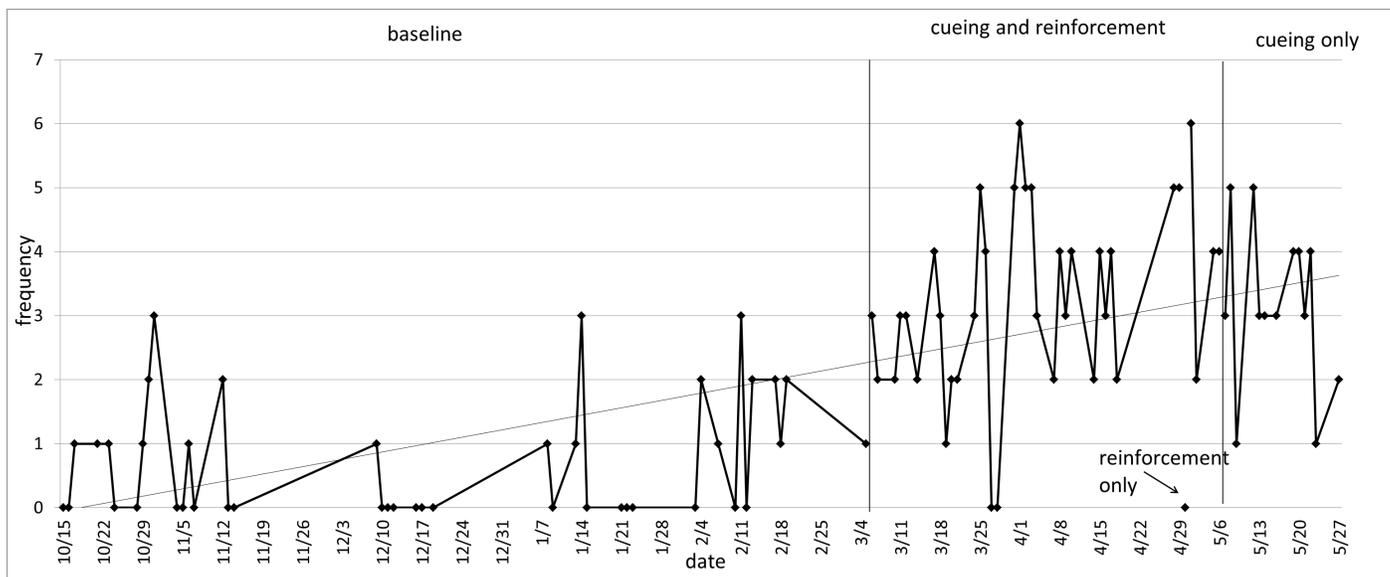


Figure 2: Successful eliminations of urine or feces into the toilet

The participant also showed an increase in bathroom success as a result of the treatment package. During Phase A (Baseline) the client averaged 0.6 eliminations into the toilet a day at school (Approximately 3.2 per school week). During Phase B (Treatment package) the client showed an increase in eliminations into the toilet averaging three a day at school (Approximately 15.2 per school week). During Phase C (Reinforcement only), the client averaged zero eliminations a day at school (Approximately zero per school week). When the treatment package was returned, the client again showed an increase in eliminations into the toilet averaging 4 a day at school (Approximately 20 per school week). During Phase D (Cueing only) the client showed a slight decrease averaging 3.4 eliminations into the toilet a day at school (Approximately 17.1 a school week) (See Table 2).

Discussion

Toilet training a child diagnosed with ASD can be an intensive and time consuming process, but if toilet training is successful, it can have many long-term benefits. Some of the long-term benefits of learning to use the toilet are saving parents and caretaker's time because they no longer have to change diapers. This extra time can also increase a child's access to their environment because they no longer have to spend time having their diaper changed. Disposable diapers can be costly hence eliminating the need for them can save money as well. This skill is also important to learn because it is socially significant. The majority of children are potty trained by the time they enter preschool. A child that is not potty trained could be underestimated in terms of intelligence or ostracized for being different. Some methods of teaching children with autism to eliminate waste into the toilet are positive reinforcement and cueing the child to use the bathroom.

In the current study, the child was given positive reinforcement in the form of M&Ms and social praise and was cued to use the bathroom. The child in this study successfully learned to eliminate waste into the toilet and stopped eliminating waste into his underpants or pants over the course of this study.

The treatment package of cueing and reinforcement successfully decreased the number of bathroom accidents the child had throughout his school day. This may be due to the reinforcing value of the M&Ms. The M&Ms may have helped increase his motivation to use the toilet and to refrain from bathroom accidents in order to obtain the M&M. This may also be due to the cueing, which may have helped increase the child's awareness of his own body sensations and worked to function as a discriminative stimulus to go use the bathroom. When the cueing was removed while the reinforcement remained in place, the child was not successful at using the bathroom, and he had a urinary accident in his pants. He also showed an increase in challenging behaviors such as bolting, aggression, refusal, and tantrumming. The treatment package was returned at this point and the child was once again successful, averaging one accident a school week. When the reinforcement was removed while the cueing remained in place, the child remained successful, averaging zero accidents a week. Because the child remained successful after reinforcement was removed, this suggests that the cueing was the most important factor of the treatment package. The M&M most likely aided in strengthening the rate of bathroom success, but the child did not regress when the M&M was removed because by this time, the behavior had been learned. This also suggests that the act of staying dry and using the bathroom became intrinsically motivating to the child because he was able to maintain the behavior with cueing alone in the absence of tangible reinforcement.

Some limitations of this study were data was only taken during the school day, yet the procedure occurred across environments. By having the data across the child's whole day, a more accurate picture of the child's behavior could have been shown. Another limitation of this study was the phase lengths. Several of the phases were lengthy (several weeks long); therefore by the time the reinforcement was removed, the child did not show a difference in behavior suggesting that he had already learned the behavior. If the reinforcement were withdrawn earlier in the study before the child had mastered the behavior, it would have been more discernable whether the M&M was a necessary component of this intervention. Future studies may want to take the form of an alternating treatment design to ascertain the relative importance of each factor of the treatment package. Future research may also want to study how to fade toileting procedures and maintain steady rates of behavior as well as how to get children to effectively self-initiate when they need to use the bathroom.

Conclusion

The focus of this study was to teach a 5-year-old boy diagnosed with ASD to eliminate urinary or fecal waste into the toilet. The second purpose of the study was to decrease the number of urinary or fecal eliminations into his pants. The child successfully started using the toilet to eliminate waste and decreased the number of accidents in his pants over the course of this study suggesting that a combination of reinforcement and cueing can be a successful way of toilet training those with autism spectrum disorders.

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Appendix A: Potty training readiness questionnaire

Potty training readiness scale (Brown, 2008). The participant's parents' answers are in bold.

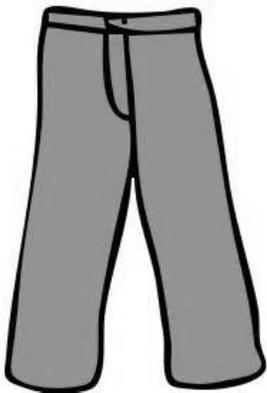
- 1) Can he follow simple directions? **Yes.**
- 2) Can he stay dry for over two hours? **Yes.**
- 3) Does he hide when he is going to the bathroom in his diaper? **Sometimes he goes behind the couch.**
- 4) Can he pull his pants up and down? **Yes, with some assistance.**
- 5) Does he notice when he is wet or seem uncomfortable when wet? **Not really.**

Appendix B: Toileting icon



Bathroom

Appendix C: Dry pants visual



Dry pants



M & M