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Intensive toilet training targeting defecation for a child with Autism Spectrum Disorder

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ABSTRACT

Independent toileting is a critical functional life skill. Unfortunately, acquisition of this skill is often delayed in children with Autism Spectrum Disorder. Interventions based on behavioural principles are often used to toilet train children. Methods that incorporate behavioural components, including systematic prompting and reinforcement contingencies, have yielded positive results for teaching toileting skills to children with disabilities. The purpose of the present study was to determine whether selected procedures based upon a behavioural model would be effective in teaching an 8-year-old boy with autism independent toileting skills, including in-toilet defecation. A secondary goal of the intervention was to reduce interfering behaviours associated with toileting. In-toilet defecation increased as a result of the intervention.

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KEYWORDS
Autism Spectrum Disorder; independent toileting skills; in-toilet defecation; rapid toilet training

Independent toileting is a critical life skill that has profound implications for children's independence, social relationships, community inclusion, and overall quality of life (Cicero & Pfadt, 2002; Kroeger & Sorensen-Burnworth, 2009). However, the acquisition of independent toileting skills is often delayed in children with developmental and intellectual disabilities. In a sample of 33 parents of children with autism spectrum disorder, up to 82% reported difficulties in toilet training their child (Whiteley, 2004).

In 1971, Azrin and Foxx developed what is now the most cited and comprehensive toilet training procedure, Rapid Toilet Training (Cicero & Pfadt, 2002). The components of Rapid Toilet Training include: (a) scheduled toileting opportunities; (b) increasing fluid intake; (c) contingent reinforcement of elimination in the toilet; (d) graduated guidance prompting procedures; and (e) punishment for voiding accidents (e.g., positive-practice over-correction procedures; Rinald & Mirenda, 2012). Rather than utilising over-correction, more recent Rapid Toilet Training studies often utilise positive practice in which children are required to complete appropriate behaviours following an accident (e.g., going to the bathroom and sitting on the toilet) (Cicero & Pfadt, 2002; LeBlanc, Carr, Crossett, Bennett, & Detweiler, 2005).

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Several studies have demonstrated that Rapid Toilet Training procedures result in the acquisition of in-toilet urination across clinical populations, including those with intellectual disabilities (e.g., Smith, 1979), multiple sensory impairments (Lancioni, 1980), and autism (Ando, 1977), and a recent review suggests that the most commonly used approaches for toileting training children with developmental disabilities are most derived from Rapid Toilet Training.

To date, research has focused primarily on teaching in-toilet urination and little is understood about the most effective strategies for teaching in-toilet defecation. Children who do not acquire bowel continence may be at increased risk for associated gastrointestinal problems (Hyman et al., 2006) and, if continence is not established, these problems can persist into adolescence and adulthood (Bongers, van Wijk, Reitsma, & Benninga, 2010; Bower, Sit, & Yeung, 2006).

The present study evaluated the effectiveness of a variation of Rapid Toilet Training procedures in teaching an 8-year-old boy with autism independent toileting skills, including in-toilet defecation. The aims of the study were to (a) increase in-toilet defecation; (b) decrease defecation accidents; and (c) reduce interfering behaviours associated with toileting.

Method

Participant and setting

Joseph was an 8-year-old boy with a clinical diagnosis of autism, who was non-vocal. At 5 years of age Joseph was taught to use a speech-generating device in order to support his expressive communication (i.e., basic requests). At the commencement of the study, Joseph had an age-equivalent score of 8 months on the expressive language and 1 year on the receptive language subdomains of the Vineland Adaptive Behavior Scales Second Edition (VABS-II; Sparrow, Cicchetti, & Balla, 2005), and 1 year 5 months on the personal, 10 months on the domestic, and 11 months on the community subdomains of the VABS-II. Joseph attended a special education unit at a mainstream school and also received approximately six hours of home-based applied behaviour analysis therapy per week.

Joseph had previously participated in a toilet training study by McLay, Carnett, van der Meer, and Lang (2015). In this study, video modelling, a schedule-based toileting routine, prompting, and reinforcement were successfully used to teach Joseph the steps in the toileting sequence, including in-toilet urination. However, he did not master in-toilet defecation. At the start of this study, Joseph was still having difficulty mastering in-toilet defecation and frequently had defecation accidents. He did not initiate going to the toilet, and therefore still needed to be taken at scheduled times to prevent accidents.

The toilet training program was implemented in Joseph's home by the researchers (i.e., all of the authors except McLay) and his parents. During scheduled toileting opportunities, Joseph would sometimes engage in challenging behaviours when required to sit on the toilet. This included elopement, hitting, grabbing his mother, and engaging in repetitive behaviours (e.g., tapping his hands on the wall, toilet, or other hard surface). The frequency of defecation accidents and challenging behaviour were putting his family under severe stress and were affecting his toileting independence.

Experimental design, data collection, and inter-observer agreement

An A-B-C design was used to evaluate the effects of intervention (Gast & Ledford, 2009). This design involved the following sequence of phases: (a) baseline; (b) intervention; and (c) follow-up. Pre-assessments were conducted to assess for preferences of reinforcers and informally assess for precursor behaviours.

Each day, family members, school staff, and researchers collected data on toileting accidents and emissions in the toilet. The frequency of related challenging behaviour was also recorded as a secondary dependent variable. Challenging behaviour was defined as hitting, grabbing towards others, and engaging in self-stimulatory behaviour (e.g., tapping his hands on the wall or toilet). Frequency rather than duration and intensity of challenging behaviour were collected due to the intensity of the toilet training program and the need for simplistic data collection.

To assess the reliability of data collection or inter-observer agreement, an independent observer (one of the researchers or Joseph's parents) simultaneously collected data on in-toilet defecations, defecation accidents, and challenging behaviour. A percentage of agreement between the instructor and independent observer was calculated using the formula: [Agreements / (Agreements + Disagreements)] x 100. During the intervention phase, inter-observer agreement data were collected on 23% of practice opportunities and 45% of opportunities during follow-up. The mean percentage of agreement was 99% (range 89% to 100%).

To assess procedural integrity, the same independent observer completed a checklist of the procedural steps and recorded whether or not the instructor had applied each step correctly. During treatment, procedural integrity was assessed on 23% of the opportunities and the mean percentage was 96% (range 88% to 100%).

Indirect assessment

Prior to starting the current toilet training intervention, Matson, Dempsey, and Fodstad's (2010) Profile of Toileting Issues (POTI) assessment was administered. The POTI is a 56-item scaled checklist (i.e., 0 = *no problem present*; 1 = *problem present*) that consists of 4 sections: (i) toileting; (ii) accidents; (iii) social/emotional problems; and (iv) physical problems. This screening tool is used to identify toileting problems that are common among those with intellectual disabilities and can help to identify issues associated with toileting such as constipation and challenging behaviour. Higher scores indicate more significant toileting problems (Matson, Horovitz, & Sipes, 2011). Results of the POTI confirmed that Joseph scored high in the areas of toileting accidents and problem behaviours.

Preference assessment

A stimulus preference assessment was conducted prior to intervention to identify highly preferred activities, toys, and edibles. First, Joseph's mother and the applied behaviour analysis therapists were asked to provide a list of preferred edible items appropriate for the intervention. The eight most highly preferred items were then selected for a direct stimulus preference assessment and conducted using the Preference and Reinforcer Assessment application on an Apple iPad®. Results indicated that chocolate, chocolate

biscuits, Tic Tacs®, and Pringles® were his four most preferred items. These items were used as reinforcement for successful in-toilet defecation. Moderately preferred items were also identified (e.g., crackers, popcorn, or raisins) and verified via the preference assessments. These were used as reinforcement during dry-checks. To ensure Joseph continued to be motivated by identified reinforcers, stimulus preference assessments with new items were administered regularly throughout each study phase.

Assessment of precursor behaviours

Pre-assessment of Joseph's behaviours suggested that he consistently displayed several precursor behaviours when he needed to defecate. This included squatting, walking on tiptoes, hiding behind furniture, or increased intensity of stereotypic behaviours (e.g., running, flapping, banging, vocalisations, and body squeezing).

Baseline

Baseline data were collected for five days. Baseline procedures involved taking Joseph to the toilet approximately every three hours (i.e., his normal toileting routine) and recording the frequency of in-toilet eliminations and accidents. Additionally, the frequency of Joseph's challenging behaviours was collected each time he sat on the toilet during his routine.

During baseline, dry-checks were also conducted every 15 minutes. Dry-checks consisted of the researchers or Joseph's parents approaching him, gaining his attention, and asking if he was dry (i.e., "Joseph are you dry?"). Joseph was also prompted as necessary to check the front and back of his underwear for dryness. During dry-checks, Joseph received a low-level reinforcer and praise for being dry. Outside of scheduled toileting visits and dry-checks, Joseph was free to walk around the house or engage in available activities (e.g., swing, play on the iPad®, play outside). Baseline data were used to identify Joseph's frequency and timing of elimination and thereby inform the intervention schedule (Azrin & Foxx, 1971).

Intervention

At the start of intervention, Joseph was kept home from school. Initially, five days of intensive intervention were implemented. On days 1 and 2 at least two researchers were in Joseph's home throughout the day and evening. On days 3 to 5 the researchers monitored morning and evening times at his home, as baseline data indicated these were the only times that Joseph consistently defecated. From day 6, Joseph's parents began implementing the intervention procedures without the presence of a researcher. The researchers explained the intervention to the parents in person and modelled procedures for each parent until they were able to implement each of the steps in the procedure with 100% accuracy (two rehearsals each). Between days 6 and 16, researchers continued to monitor every few days by collecting inter-observer agreement data. On day 17, Joseph went back to school and resumed his usual school toileting routine. The school staff adopted a 15-minute dry-check schedule to help monitor for dryness. The intervention procedures were continued at home in the mornings and evenings; times of defecation. Joseph's toileting related to urination, followed his normal schedule.

When precursor behaviours were observed and during times of day in which defecation was likely (morning and evening), an intensive schedule of intervention began (see

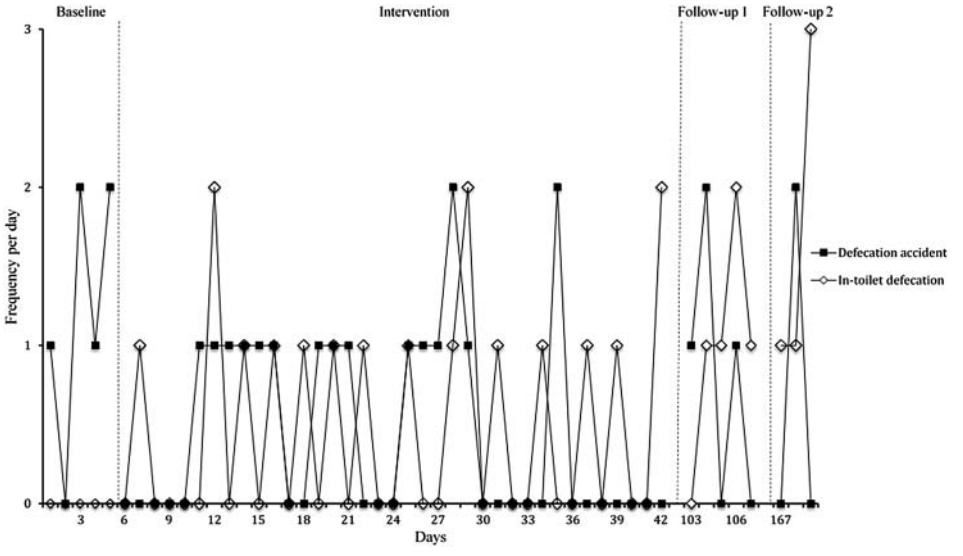

Figure 1. Frequency per day of defecation accidents and in-toilet defecation across each day and phase of the toilet training program for Joseph.

Figure 1). During these targeted times Joseph was taken to the toilet immediately. He independently completed initial steps of his toileting routine (undressing by removing trousers and underwear and sitting down on the toilet). He was then required to remain seated on the toilet for 10 minutes. While seated on the toilet Joseph was given a brief preference assessment from an array of items identified in the direct preference assessment to determine the item that would be used to reinforce in-toilet defecation. He was required to sit on the toilet with a calm body, defined as sitting still with hands placed on legs or in a neutral location (the absence of tapping or banging on the toilet seat or walls, or touching of self), with a quiet voice (the absence of vocal stereotypy), and feet resting on the ground (the absence of tapping or bouncing) to manage and reduce interfering behaviours. A timer was placed on Velcro next to the toilet. Each time Joseph engaged in a behaviour that did not meet the calm body criteria, the timer was held up to him, the stop button was pressed, and a verbal (i.e., "You need a calm body to start the timer") or partial physical (gentle touch on his shoulder to prompt him back down onto the toilet) prompt, or both, was provided to ensure a calm body before the timer started again.

If Joseph did defecate in the toilet, he was verbally praised and given access to his selected high-level reinforcer. He then independently completed the remaining steps of his toileting routine (pulling up underwear and trousers, flushing toilet, and washing hands).

If Joseph did not defecate in the toilet and his behaviour indicated that he was likely to engage in defecation or wanted to stay on the toilet, he was asked: "Do you want to stay on the toilet for five more minutes?" If Joseph answered "yes" with his speech-generating device, a new 10-minute interval began. If Joseph did not defecate during the 10-minute interval, and did not indicate that he wanted to remain on the toilet, the researcher held up his reinforcer and said: "You will earn X for getting poos in the toilet." He was then

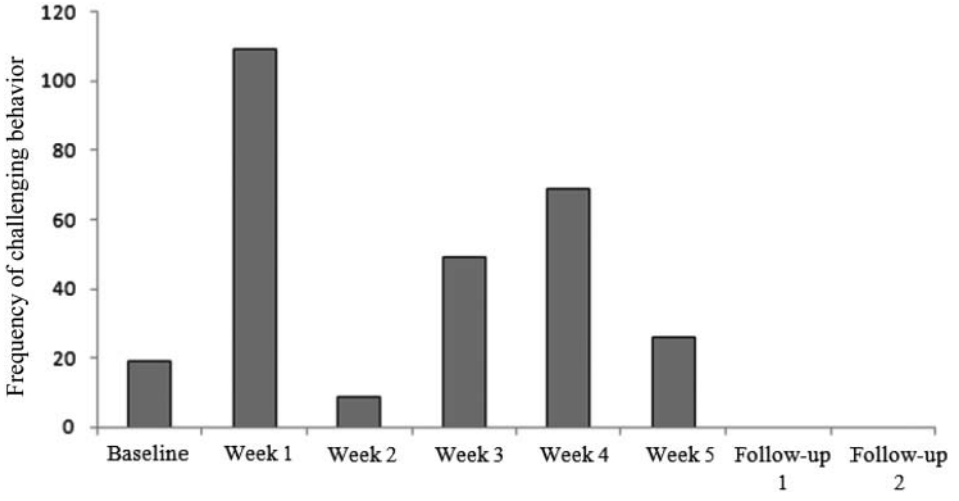

Figure 2. Frequency of challenging behaviour for baseline, intervention (weeks 1–5), and the two follow-up phases of the toilet training program for Joseph.

able to get off the toilet and complete the rest of the routine. He was then taken back to the toilet every 15 minutes until he defecated.

When Joseph was not on the toilet but continued to show precursor behaviours, he was restricted to a small area of the house to allow for continuous monitoring and dry-checks were completed every five minutes. During the initial intensive intervention, Joseph wore underwear and a shirt to help monitor accidents. When Joseph successfully defecated in the toilet or at times when he did not show any precursor behaviours he was put on to a 15-minute dry-check schedule and taken to the toilet every 2 hours.

When accidents occurred (see Figure 2), a positive-practice over-correction procedure was implemented. This consisted of Joseph independently changing his clothing, helping to clean the environment, walking to the bathroom, and being given a verbal reminder about defecating in the toilet. If the accident was small and Joseph continued to show signs of an urge to defecate, he completed his toileting routine of sitting on the toilet for 10 minutes and then cleaned up as needed in an attempt to prevent further accidents.

The time between dry-checks was systematically thinned each time Joseph stayed dry for three consecutive days. The time of dry-check intervals was extended from 5 to 15, then 30, and finally 45 minutes. After the time between dry-checks was extended, the quality of reinforcer was also thinned. Edible reinforcement was provided on a variable schedule (i.e., approximately every third dry-check Joseph received an edible paired with social praise). Verbal praise remained on a fixed schedule for each successful dry-check occurrence. If Joseph displayed precursor behaviours of needing to defecate, he was taken to the toilet. If he did not defecate, the intensive schedule of intervention would begin (i.e., 5-minute dry-checks and taken to the toilet every 15 minutes). When Joseph did not show any precursor signs of needing to defecate he was given unrestricted access to the house, with supervision.

Follow-up

Follow-up data were collected eight weeks after the acquisition criterion was met (zero accidents for seven consecutive days). During this time Joseph's parents continued to implement less intensive intervention procedures. Specifically, Joseph was only directed to the bathroom when he showed precursor behaviours or when his parents noticed he had not been for a while.

A variation to the positive-practice procedure was implemented because Joseph's parents reported continued defecation accidents prior to follow-up. Joseph was taken to the toilet after an accident as a reminder for in-toilet defecation and he was required to help his parents to change his clothes and clean up.

Results

During baseline (see Figure 3) Joseph had 1–2 defecation accidents on 4 out of the 5 days with a mean of 1.2 accidents per day. He did not demonstrate in-toilet defecation during baseline. During the toilet training phase, his accidents were reduced to a mean of 0.5 accidents per day. He showed increases in in-toilet voids with a mean of 0.5 per day. For the last seven days of intervention he showed zero rates of accidents. During follow-up he showed some resurgence of accidents (i.e., 1 occurrence) with a mean of 0.8 per day. However, he did show increases in levels of in-toilet voids with a mean of 1 per day.

Anecdotally, Joseph's mother reported that since receiving the intensive intervention his accidents typically only occurred during the night and if he did have an accident during the day it was in the bathroom near the toilet. She also noted that he was initiating wanting to go to the toilet (e.g., making a request using his speech-generating device) more or taking himself independently, which he had not done before the present study.

Challenging behaviour occurred 19 times across baseline. When the intervention commenced, Joseph's challenging behaviour (see Figure 4) increased compared to baseline levels. In the second week, challenging behaviours decreased but increased again in the third and fourth weeks. In week 5 he showed decreases in challenging behaviour from 69 (week 4) to 26 occurrences. During follow-up Joseph had zero occurrences of challenging behaviour.

Discussion

The current research focused on teaching in-toilet defecation to an 8-year-old boy with autism who was non-responsive to conventional interventions. Joseph took 39 days to meet acquisition criteria for defecation, which was longer than the number of days he took to meet the acquisition criteria for in-toilet urination (i.e., 29 days; see McLay et al., 2015). This is consistent with previous research that suggests that defecation may be a much harder skill to master (Dalrymple & Ruble, 1992) due to infrequent opportunities; lack of motivation; difficulty recognising and interpreting the sensation of a full bladder; motor, communication, and social skill deficits; anxiety; and negative previous experiences (Radford & Anderson, 2003). It is plausible that any or all of the above issues may have impacted on the acquisition of in-toilet defecation for Joseph.

A major benefit of the current study was the individualisation of the procedures selected. As discussed, Joseph did not show generalisation to in-toilet defecation in the

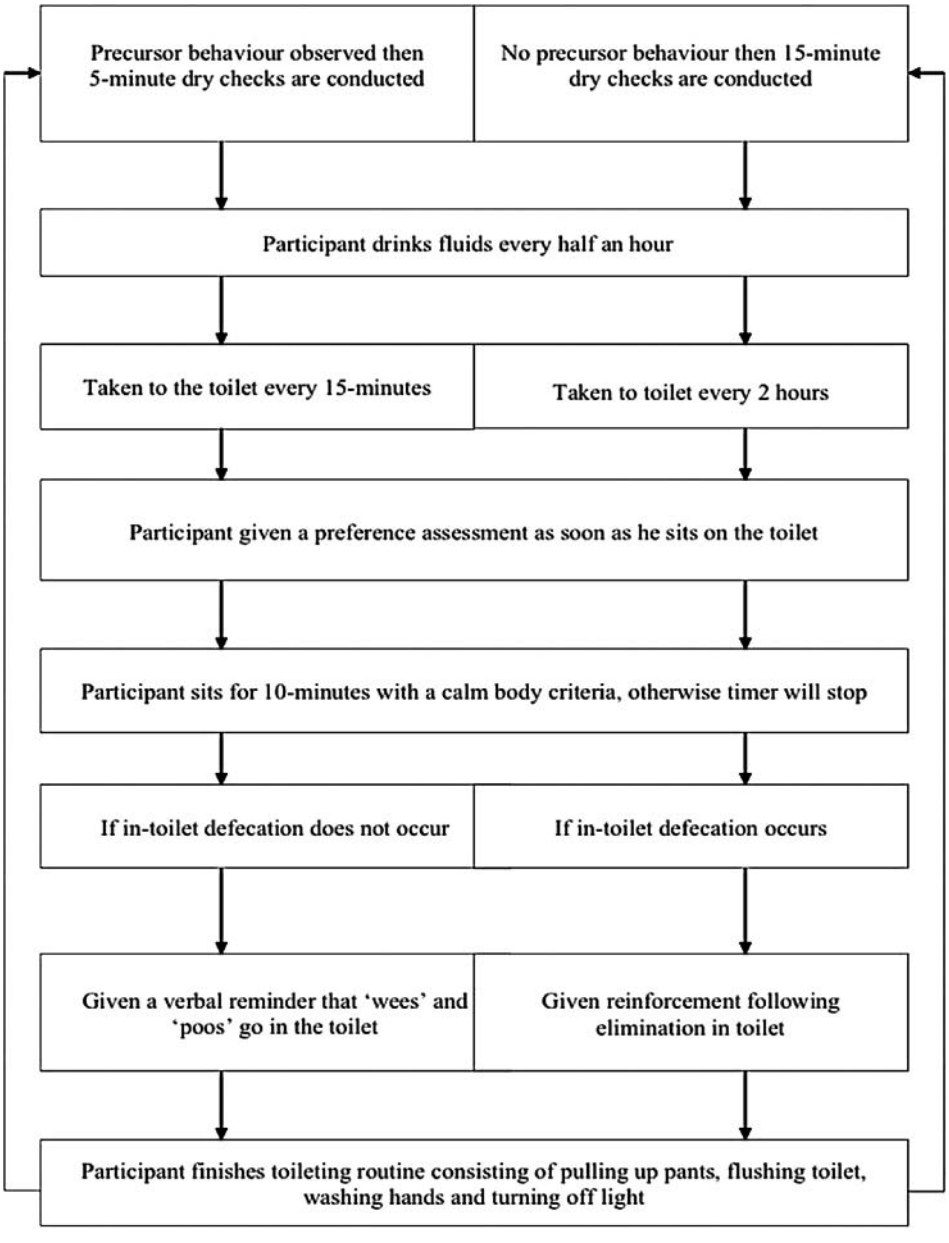

Figure 3. Outline of intervention procedures when precursor behaviours are observed or not observed.

first study (McLay et al., 2015) and was reported to be inconsistent with reinforcer preferences, resulting in issues with motivation. Thus, the procedures selected aimed to address Joseph's need for an intensive program while attempting to provide a feasible treatment option for his parents. A multi-component intervention was used with Joseph. This included the use of an over-correction procedure. Although some researchers caution the use of over-correction procedures, especially when there is a potential to incite challenging behaviour (Cicero & Pfadt, 2002), this procedure was selected due to Joseph's inconsistent

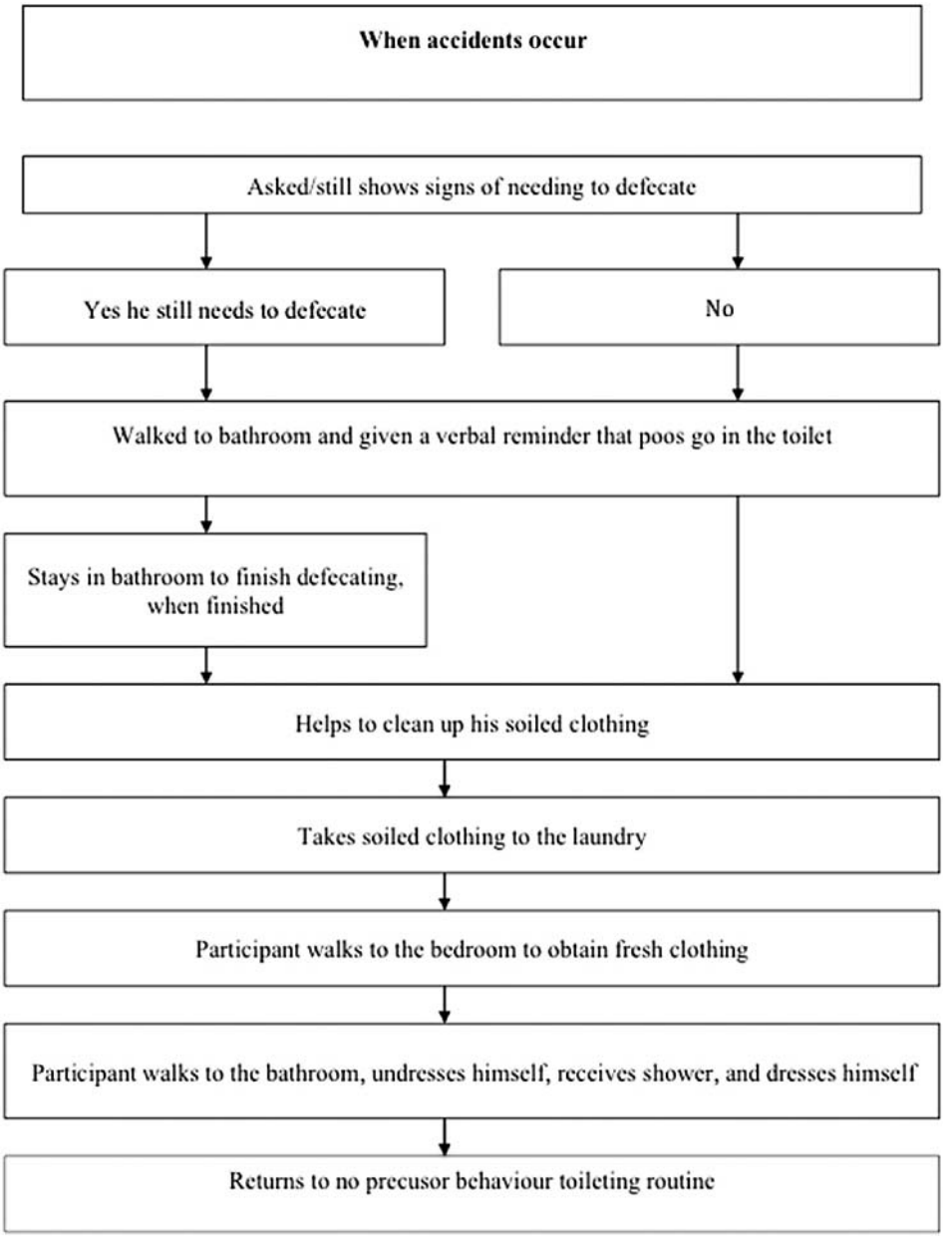

Figure 4. Outline of procedures when defecation accidents occur.

preference and overall lack of motivation. Further research is needed to determine which treatment components were most effective for supporting independent toileting and eliminating accidents. Furthermore, replication in similar cases is necessary to determine effectiveness of the individual procedures. Nonetheless, together these procedures did result in increased and maintained in-toilet defecation, decreased defecation accidents, and a reduction in challenging behaviour (i.e., follow-up data were collected at two and four months after intervention).

There are several practical implications to consider as a result of these findings. First, clinicians should evaluate whether children have the necessary prerequisite skills that are essential to successful training (e.g., remaining dry for more than two hours, sitting for three minutes, showing interest in the toilet, following instructions). Researchers suggest that before beginning toilet training, prerequisite skills should be assessed and taught (Greer, Neidert, & Dozier, 2016; Kroeger & Sorensen, 2010). This would also include addressing any challenging behaviours that could potentially interfere with learning the routine or engaging in the toileting behaviours.

Second, with any new skill, it is important to ensure generalisation to naturally occurring contingencies. LeBlanc et al. (2005) suggest that when parents provided too many prompts to use the toilet they removed the opportunity for children to experience a full bladder and therefore the opportunity for self-initiations.

Third, when presented with issues of motivation, or when introducing a toileting program, it is important to conduct reinforce preference assessment and the use of reinforcement hierarchies. With regard to previous research, behavioural approaches seem to be the most successful when they are based upon an assessment of the individual's preference for reinforcers (Chung, 2007). Although individuals' preferences can be quite unstable, this can be overcome by reassessing preference regularly as was achieved for Joseph.

Lastly, it is important to evaluate the effect of the intervention on behaviour change and to problem solve when sufficient progress is not being made. This is especially important for the thinning of reinforcement schedules, extending the time between elimination, and generalising the skill to different people, environments, or naturally occurring contingencies.

The present case emphasises that the acquisition of independent toileting for children with autism is complex and requires various sub-skills. Furthermore, the Rapid Toilet Training procedure often needs to be modified to fit the child, with age and functioning level identified as important factors. The results of this study provide some evidence to support the use of Rapid Toilet Training as a procedure to teach in-toilet defecation. Further research should aim to: (i) examine collateral behaviours pivotal to successful toilet training, including communication, self-initiation, and bowel movement training; (ii) evaluate age and functioning limits (e.g., how young to train and how cognitive ability might impact toilet training); and (iii) review necessary prerequisite skills suggested to be present before initiating toilet training. Such research will help delineate best methods for toilet training children with complex presentations, including previously unsuccessful attempts at toilet training.

Disclosure statement

The authors report no conflicts of interests and are solely responsible for the content and writing of this article.

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