



Effectiveness of a modified rapid toilet training workshop for parents of children with developmental disabilities

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ABSTRACT

Individuals with developmental disabilities often experience challenges in acquiring toileting skills, which highlights a need for effective toilet training strategies that can be readily disseminated to caregivers. The purpose of this multiple baseline study was to evaluate the effectiveness of a modified rapid toilet training workshop provided to the parents of six children with developmental disabilities. In the workshop, parents were taught to implement an instructional protocol that included increased fluid intake, positive reinforcement for correct toileting, scheduled toilet sittings, scheduled chair sittings to teach initiation, neutral redirection for accidents, and procedures to enhance maintenance and generalization. Following the workshop, parents implemented the toilet training protocol at home with their children for 5–8 days, with telephone support from a researcher. Results indicate that the workshop resulted in increased in-toilet urination and defecation and decreased accidents for the five children who completed the study. The results are discussed in relation to previous and future research and implications for practice.

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A lack of toileting competence is a significant barrier to overall quality of life for individuals both with and without developmental disabilities. In a review of the literature in this area for typically developing children, [Vermandel, Van Kampen, Van Gorp, and Wyndaele \(2007\)](#) noted that late toilet training may be associated with hygiene problems, skin irritation, high expense, parental stress, frustration, social embarrassment, excessive parental dependence, and preschool inadmissibility. For individuals with developmental disabilities, persistent incontinence can also mean limited socialization, restricted residential and vocational placements, and stigmatization ([Kroeger & Sorensen-Burnworth, 2009](#)).

In a recent review of 28 data-based studies aimed at teaching toileting skills to individuals with developmental disabilities, [Kroeger and Sorensen-Burnworth \(2009\)](#) found that most published approaches retain many of the key components of rapid toilet training (RTT), a procedure developed by [Azrin and Foxx \(1971\)](#). RTT incorporates multiple features to achieve continence, including: (a) establishing a data-based schedule for toilet sittings; (b) provision of increased fluid intake; (c) positive reinforcement for in-toilet elimination; (d) the use of graduated guidance to teach self-initiation; and (e) punishment (e.g., overcorrection, verbal reprimands) for toileting accidents. Interestingly, some type of punishment procedure for toileting accidents is used in almost all toilet training studies to date. Only 4 of the 28 studies in the Kroeger and Sorensen-Burnworth review included no punishment at all ([Luiselli, 1994, 1996, 1997](#); [Post & Kirkpatrick,](#)

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2004), although several others used only mild punishment procedures such as verbal redirection to the toilet when an accident occurred (e.g., Cicero & Pfadt, 2002; Keen, Brannigan, & Cuskelly, 2007). Since that review, one additional study has also utilized verbal redirection as the only consequence for accidents, to train two boys with autism who had a history of failed training attempts (Kroeger & Sorensen, 2010). This trend toward non- or minimally aversive procedures is consistent with Cicero and Pfadt's (2002) observation that "changes in educational practices have led to greater reliance on proactive teaching procedures rather than on consequence-based behaviour reduction procedures" (p. 321).

It is interesting to note that, to date, only five toilet training studies that have involved participants with developmental disabilities have mentioned parent participation as a component of the intervention. Four of these five studies involved parents as collaborators, to various degrees. Taylor, Cipani, and Clardy (1994) implemented a modified version of RTT with a 10-year-old boy with autism whose father conducted the intervention with in vivo support at home from a researcher. Cicero and Pfadt (2002) described a procedure with three young children with autism in a school setting, where teachers were trained as the primary interventionists. The children's parents received a letter that described the training procedures used at school and provided reports on their child's toilet training successes and difficulties at home. Keen et al. (2007) taught the parents of five boys with autism and their teachers to implement a video-modeling, reinforcement-based intervention. Parents completed a reinforcer assessment and were provided with verbal and written explanations of the procedures to be used at home. LeBlanc, Carr, Crossett, Bennett, and Detweiler (2005) taught parents to toilet train three children with autism using a modified RTT procedure. The parents first observed a researcher implement the procedures in an outpatient clinic, and then gradually started implementing the protocol themselves in the clinic, with researcher feedback. By the end of one day, all parents were able to implement the procedure with fidelity and proceeded to do so at home over two more days, with researcher visits for 2 h/day. Following this, the procedures were implemented at school as well.

Kroeger and Sorensen (2010) were the first to incorporate parent training as a primary focus, by involving the parents of two children with autism as the main interventionists rather than as collaborators. At the beginning of the first training day, the researcher explained a modified RTT procedure to each child's parents and then modeled implementation with each child for 3 h in his or her home. Parents were then coached to implement the procedure over 3 additional hours, with researcher oversight and feedback. Following these 6 h of training, the researcher no longer visited the families' homes; rather, parents were instructed to contact her by phone with any questions that arose as they continued to implement the procedure. One family phoned 4 times and the other phoned 5 times over 4 days of intensive implementation of the RTT procedure. Results indicated that both parents taught their children to achieve urinary continence within a 4-day period, and the children remained continent 3 years later. Kroeger and Sorensen suggested the need for additional research examining methods for teaching toilet training skills to parents, including a workshop-based approach.

A workshop-based approach to parent toilet training has the potential to be both cost- and time-efficient for all involved. Indeed, a number of studies have documented the ability of parents to learn to implement other types of interventions with their children with developmental disabilities in a workshop format. Perhaps the best example is the Triple P Parent Training Program, a parent-training protocol with a substantial research base that aims to address a variety of concerns related to parent-child interactions. Whittingham, Sofronoff, Sheffield, and Sanders (2009) conducted a randomized control trial of Triple P's "Stepping Stones" variant to evaluate its effectiveness in teaching positive parenting practices to the parents of children with autism. The majority of instruction occurred in a group workshop format, although the participating parents were also observed working with their children and received feedback from clinicians. Results indicated significant reductions in both child behaviour problems and dysfunctional parenting styles, with decreases in problematic parenting practices such as verbosity and over-reactivity maintained at 6 month follow up. Additional examples of effective workshop-based parent training include studies aimed at (a) comparing the effectiveness of risperidone plus parent training versus risperidone alone for remediating behaviour problems in 125 children with autism spectrum disorders (Aman, Mcdougle, Scahill, Handen, Arnold, & Johnson, 2009) and (b) teaching parents of 17 children with autism to implement pivotal response training (Minjarez, Williams, Mercier, & Hardan, 2010). Results of both studies indicated that parents learned the target procedures in a workshop format and were then able to implement them to achieve the desired child outcomes. Parent training techniques in these examples included direct instruction, group discussions, modeling, role-playing, practice activities/worksheets, and videotaped examples and non-examples of the target procedures.

It is clear that the acquisition of continent toileting can be challenging for families of children with developmental disabilities and that toilet training is consistently rated by parents as an area of significant concern. Non- or minimally-punitive toilet training protocols that are derived from Azrin and Foxx's (1971) RTT approach have been shown to be successful in teaching continent toileting to individuals with a wide range of abilities. However, only five studies to date have included parent involvement and none have taught parents to toilet train their children in a workshop format. Additionally, only a few studies to date have specifically mentioned defecation training as a target (e.g., Dalrymple & Angrist, 1988; Richmond, 1983)—an omission that leaves a substantial gap in the toilet training literature for people with developmental disabilities. Hence, the present study was designed to address the following questions: (1) Is there an association between a workshop-taught, parent-implemented modified RTT intervention and the acquisition of urinary continence in children with developmental disabilities? (2) Does the parent-implemented modified RTT intervention result in generalization to defecation continence without additional focus on this area?

1. Method

1.1. Inclusion/exclusion criteria

This study was approved by the Behavioural Research Ethics Board at the University with which the authors are affiliated. Parent and child participants were recruited through agencies that provide early intervention services to young children with disabilities in a Western Canadian province. Parent inclusion criteria were as follows: (a) English language competence that was sufficient to understand and participate in a workshop conducted in that language; (b) willingness to attend a one-day workshop on toilet training, along with other parents in the study; (c) availability to implement a toilet training program at home with their child for at least 8 consecutive hours/day for 5–8 consecutive days following the workshop; and (d) willingness to report daily data on their child's elimination patterns to a researcher by telephone throughout the toilet training period. Child inclusion criteria were as follows: (a) diagnosis of a developmental disability; (b) between 30 and 72 months of age at the time of intervention; (c) regular consumption of age-appropriate amounts of food and drink, resulting in regular patterns of elimination; (d) by parent estimate, in-toilet urination that occurred no more than 10% of the time in the previous month; and (e) by parent estimate, urination in a diaper no more often than hourly. Children were excluded if they showed evidence of: (a) a neuromotor impairment that affected use of the lower extremities (e.g., cerebral palsy); (b) a seizure disorder, medical condition, or medication that might interfere with the acquisition of continent toileting (e.g., a physical disability affecting bladder control); (c) major problem behaviours when presented with demands required for the toileting protocol, such as requests to enter the bathroom or sit on the toilet; and/or (d) a history of failed toilet training attempts that might interfere with implementation of the toilet training protocol.

1.2. Participants

All six families who contacted the researcher met the inclusion criteria, as did their children. [Table 1](#) summarizes the participating parents' age, family status, and occupation/education; and children's age, diagnosis and communication skills, previous toilet training attempts, and toileting prerequisite skills. The latter were based on the prerequisites for toileting recommended by [Brazelton, Christophersen, Frauman, Gorski, Poole, and Stadler \(1999\)](#).

1.3. Settings and materials

Two identical parent training workshops were provided as the basis for the study. One occurred in a meeting room at a community center that was convenient for three of the families; and the other occurred a week later in a classroom at the authors' University, which was convenient for the other three families. The workshop was presented by the first author, a graduate student with experience in parent training and toilet training for persons with disabilities. The training consisted of a Powerpoint® presentation and corresponding handout outlining the steps of an RTT-derived toilet training protocol (described in detail in Procedures). A flexible child-sized mannequin, weighing approximately 10 kg and with a height of 1 m, was used during the workshop by the researcher for demonstrations of toilet training techniques and by participating parents during role plays. In addition, parents were given small erasable whiteboards and markers on which to respond as a group to 'quiz' questions presented throughout the workshop. When a question was presented, parents recorded their responses on individual whiteboards and then held them up to share their answers with the group. This type of group

Table 1
Parent and child participants.

Parent	Parent age/ ethnicity	Family status	Occupation/ education	Child	Child age (years; months)	Diagnosis/ communication skills	Previous training attempts?	Pre-reqs ^a
Janice	38; Chinese	Married, 2 children	Tutor; 2 B.A. degrees	Rebecca	3;3	Autism; no speech, gestures	No	2, 3
Ava	36; El Salvadorian	Single, 1 child	Unemployed; high school	Lucy	3;11	Autism; no speech, gestures and PECS	No	4
Chana	38; Algerian	Married, 2 children	Nurse; college	Amir	3;5	Intellectual disability; 5 spoken words, gestures	Some; little success	1, 2
Leanne	45; Canadian	Single, 1 child	Investor; college	Andy	3;7	Autism; no speech, gestures	No	2, 3
Mark	40; Canadian	Married, 2 children	Investigator; B.A.	Jack	3;9	Down syndrome; few words, 200 signs	Some, moderate success	3, 5
Sandra	36; Chinese-Canadian	Married, 2 children	Homemaker; college	Jamie	5;11	Autism; no speech, gestures	1 yr, intermittent success	2, 7

^a [Brazelton et al.'s \(1999\)](#) prerequisites, as reported by parents, are coded by number as follows: (1) stays dry for at least 2 h at a time, (2) has a regular bowel movement schedule, (3) follows simple instructions, (4) demonstrates discomfort with dirty diapers, (5) asks to use the toilet, (6) requests to wear underwear, and (7) pulls pants up and down independently.

responding allowed the presenter to evaluate, at a glance, whether participants understood each concept as it was presented. Parents were also provided with detailed sheets for data collection at the workshop.

Toilet training implementation that followed the workshop required parents to collect a number of additional materials in their homes as well. The researcher provided a list of these items and reviewed it with each parent during a pre-workshop visit. The materials included: (a) a variety of foods or toys that were highly preferred by the child, for use as reinforcers for in-toilet elimination (parents were asked to limit their child's access to these items for at least 3 days prior to the workshop); (b) a variety of enjoyable activities in which the child could participate while sitting on the toilet (e.g., looking at books, watching DVDs, colouring in books, etc.); parents were told to select activities that were enjoyable, but not as highly preferred as those selected as reinforcers); (c) a variety of each child's favourite beverages, in large amounts; (d) a variety of salty or otherwise thirst-inducing snacks; (e) a kitchen timer; (f) multiple pairs of underwear; (g) a soft, comfortable toilet seat insert; and (h) a footstool to support children's feet while sitting on the toilet.

1.4. Measurement

Three dependent variables were examined in the study for both urination and defecation: in-toilet elimination initiated by an adult, in-toilet elimination initiated by the child, and non-toilet elimination. Parents were taught to classify, identify, and record data on all three variables as part of the workshop, using data sheets provided by the researcher. Social validity was also examined as a secondary variable.

1.4.1. In-toilet elimination (adult- and child-initiated)

In-toilet elimination was defined as urination or defecation in the toilet. If the child emitted any amount of urine or feces into the toilet, the parent recorded a success on the appropriate data sheet, noting the time that it occurred. Parents also noted whether an in-toilet elimination was initiated by the parent or child. Toilet trips were scored as child-initiated if a child independently requested to use the toilet, alerted a parent of the need to use the toilet (i.e., by gesturing toward it), or approached the toilet without a prompt to do so. Toilet trips were scored as parent-initiated if a parent told the child to use the toilet or physically prompted the child to approach the toilet or if elimination occurred during a parent-implemented scheduled toilet sitting.

1.4.2. Non-toilet elimination

Non-toilet elimination was defined as urination or defecation that occurred in any location other than the toilet. If a child emitted any amount of urine or feces in a location other than the toilet, the parent recorded the elimination as unsuccessful on the data sheet, noting the time that it occurred. If a child began to urinate or defecate somewhere other than the toilet but finished urinating/defecating in the toilet, the parent scored the event as both an in-toilet and a non-toilet elimination.

During baseline, each wet or soiled diaper was scored as a non-toilet elimination. However, parents were not required to check diapers on a regular schedule during baseline, so it is possible that multiple urination/defecation episodes may have occurred prior to each diaper check. Thus, the number of non-toilet eliminations that were recorded in baseline may be lower than the actual number.

1.4.3. Social validity

Social validity was measured via a questionnaire that used a 5-point Likert-type scale to assess the importance of the goals, procedures, and outcomes of the training program from the parents' perspective. Several questions were also included to assess the parents' perception of self-efficacy following the workshop and intervention implementation.

1.5. Inter-observer agreement (IOA)

Data sheets designed for the study asked parents to record, for each period of toilet sitting, the child's fluid consumption, urination/defecation (in or out of toilet and child- or adult-initiated), parent response to accidents, and reinforcers provided (if any) for correct urination. Because parents implemented the intervention independently in their homes, inter-observer agreement could not be measured *in vivo*. In addition, the sensitive and private nature of the intervention target (i.e., independent toileting) prevented the researcher from videotaping the intervention as it was implemented, for ethical reasons (i.e., the likelihood that children would be videotaped in a semi-clothed state). However, as noted by Cicero and Pfadt (2002), both the transparency of the operationally defined target behaviours (i.e., urination/defecation in/out of the toilet) and the high IOA reported in previous toilet training studies suggested that point-by-point reliability data were not essential. Nonetheless, the researcher visited the families in their homes 2 weeks after the intervention period in order to confirm that the children were indeed using the toilet for elimination, when parent-reported data indicated that this was the case.

1.6. Research design

A multiple-baseline design across two groups (each with three parents and their children) was used to assess the impact of the independent variable. The design had three phases: baseline, a modified-RTT parent training workshop, and parent implementation of the RTT procedures at home. Baseline data were collected by families in Group 1 for 4 days prior to the

workshop. Following the workshop, Group 1 implemented the intervention at home while Group 2 continued to collect baseline. After 11 days of baseline, Group 2 participated in the workshop and proceeded to implement the intervention at home. Follow-up data were collected by phone 2 and 4 weeks after the implementation period.

1.7. Procedure

1.7.1. Initial home visit

During an initial home visit, parents provided demographic information about themselves, their family, and their child, including a detailed toilet training history. In addition, parents were provided with a list of items to either purchase (e.g., drinks, underwear) or gather/plan (e.g., enjoyable activities in which the child could engage while on the toilet), in preparation for the toilet training intervention. The researcher discussed each item with the parents and gave examples as needed. If requested, the researcher assisted the parent to gather the necessary items and/or helped to identify appropriate items to purchase. During this visit, parents were also assisted to make a number of decisions that were relevant to the study, including which parent(s) and/or caregiver(s) would be involved in the training, where in their homes toilet training would occur, and whether their child would wear underwear or nothing from the waist down during training. Diapers or pull-ups were not allowed during the daytime but parents could use them at night, as night time training was not included in the workshop.

1.7.2. Baseline

At the initial home visit, operational definitions for in-toilet and non-toilet elimination were provided, along with written procedures for collecting baseline data and the required data sheets. Parents were told to keep their children in diapers or pull-ups and continue with the usual toileting routine at home during this phase. Baseline duration was longer for Group 2 parents than for Group 1, as described previously.

1.7.3. Parent training workshop

The workshops took place over approximately 4 h plus snack and lunch breaks (provided by the researcher). During the workshop, for each component of the modified-RTT protocol, parents received (a) a written and verbal description, (b) a videotaped demonstration, implemented by the researcher with a child-size training doll, (c) opportunities to role play with the doll and receive feedback from the researcher, and (d) a short quiz in which the researcher provided several videotaped models with the doll and the parents determined whether the component was conducted correctly or incorrectly. If one or more parents had difficulty learning any part of the intervention, additional time was spent discussing and role-playing that component. Participants were encouraged to ask questions and respond actively throughout the workshop. All parents were provided with a copy of the Powerpoint[®] slides used for the training to take home as a reference, as well as multiple copies of the data forms required for implementation.

The components of the toilet training workshop were modified from Azrin and Foxx's (1971) RTT protocol. The protocol included scheduled toilet sittings, increased fluid intake, positive reinforcement for correct toileting, a non-punitive accident procedure, and a protocol of scheduled chair sittings to teach the child to initiate trips to the toilet, as per Kroeger and Sorensen (2010). The sole focus of the workshop was on urination training; defecation training was never mentioned. During the training period, children either wore regular underwear or nothing from the waist down, and parents kept their children home from preschool or school so that they could train for at least 8 h/day.

Parents were taught to sit their children on a toilet for predetermined amounts of time, starting with 30 min intervals. While on the toilet, children were provided with enjoyable activities that helped them to remain seated (e.g., reading books, playing on a laptop computer, watching television). If the child eliminated in the toilet while sitting, the parent provided a 5-min break before starting the next scheduled sitting. Sitting time on the toilet was decreased by 5 min and the break for a successful elimination was increased by 5 min after every three consecutive successful eliminations on the toilet (i.e., phase 1: 30 min on the toilet and a 5 min break; phase 2: 25 min on the toilet and a 10 min break; phase 3: 20 min on the toilet and a 15 min break). In addition, parents were taught to provide as much of one or more preferred liquids as their child would consume readily, with the goal of having the child drink at least 4–6 ounces of liquid per hour. Parents were taught to offer sips of preferred drinks frequently but not to force drinking at any time. Parents did not specifically measure the amount of liquid the child consumed. Parents were also encouraged to offer their children salty snacks or foods during the study, so that drinking would be more likely.

When a child eliminated in the toilet, the parent was taught to provide immediate positive reinforcement in the form of lavish praise and food or items that the parents assumed would function as reinforcers, based on their children's history of preferences. If a child eliminated anywhere other than the toilet, the parent was taught to move the child to the toilet quickly so that some urine was deposited in the toilet. This was to be done with neutral affect and no verbal input. If any urine was deposited in the toilet, the incident was treated as a success and was followed by immediate reinforcement and a break from the toilet. If the child finished urinating somewhere other than in the toilet, the parent was taught to clean the child and change his or her clothes quickly and quietly with neutral affect, without talking about or drawing any attention to the accident.

After a child had three consecutive in-toilet eliminations during phase 3 of scheduled toilet sittings (i.e., 20 min on the toilet, 15 min break after successes), parents were taught to implement scheduled chair sittings if the child had not already

started to approach the toilet independently for elimination. A chair was placed 2 ft away from the toilet and the child was seated on the chair, using the same schedule of intervals as in scheduled toilet sittings. If the child did not move from the chair to the toilet when he or she began to eliminate, the parent prompted the child to do so using the least intrusive prompt possible. Once the child moved from the chair to the toilet and eliminated completely without prompts on one occasion, the chair was moved 2 ft further away from the toilet. After each child-initiated success, the chair was moved 2 ft further from the toilet until it was 20 ft away, at which time the chair was removed completely.

After the child finished the schedule of toilet sittings and, if necessary, chair sittings, parents were taught to provide opportunities to use other toilets in their own home or in familiar locations, while still providing reinforcers for successful elimination. Parents were also instructed to fade reinforcers over time by switching to one reinforcer at the end of the day for an “accident free” day or by providing a reinforcer after every 3, then 5, then 10 successes on the toilet. Several options for fading reinforcers were provided at the workshop, and parents were invited to select the one they felt would be most effective for their child.

1.7.4. Parent-implemented intervention

Beginning the day following the workshop, parents implemented the modified-RTT procedure in their homes with their children for at least 8 h/day. Throughout the intervention period, parents were invited to contact the researcher by telephone at any time if they had any questions or concerns about implementing the protocol. Parents were reminded frequently that the researcher was prepared to provide in vivo support in the family home or by telephone, as often as needed.

1.8. Data collection and analysis

Parents recorded data on their child’s urination and defecation during implementation, using the data forms provided to them during the workshop. The researcher telephoned parents for data reports daily during the intervention period. The effectiveness of the workshop was assessed by visual inspection of the data reported by parents, following the rules of evidence for single subject research methodology. Changes in the frequency of in-toilet elimination across phases were used to determine the impact of the intervention.

Social validity data were collected by the researcher during a visit to each family’s home 2 weeks after the intensive intervention was complete. Parents were given the option to review the questionnaire and mail it to the researcher or complete it immediately and hand it back to the researcher. All parents chose to fill out the questionnaire immediately and give it back to the researcher.

2. Results

The first research question in this study was: Is there an association between a workshop-taught, parent-implemented modified RTT intervention and the acquisition of urinary continence in children with developmental disabilities? Fig. 1 displays data related to urination.

One parent and child in Group 1 (Ava and Lucy) discontinued participation after 7 days of implementation because Ava required a medical procedure that was unrelated to the study. Another parent (Chana) took a 2-day break during intervention, in order to send her child (Amir) to preschool; she then resumed training after the break. Nonetheless, as can be seen in Fig. 1, a dramatic change in level from baseline to intervention was apparent for all participants, although the patterns of acquisition and behaviour change varied considerably.

Table 2 displays the range of urination incidents per day in baseline, intervention, and follow-up for all participants.

Table 2 provides evidence that (a) urination episodes increased dramatically during the intervention period, when increased fluid intake was in effect; and (b) at follow-up, when increased fluid intake had been discontinued, in-toilet urinations occurred at approximately the same rate as had out-of-toilet urinations during baseline.

The second research question was: Does the parent-implemented modified RTT intervention result in generalization to defecation continence without additional focus on this skill area? Table 3 displays data related to this question across the six participants.

As was the case for urination, a dramatic change was reflected in the data across phases, although the patterns of acquisition and behaviour change varied widely across participants. At baseline, almost all instances of defecation occurred out of the toilet; in contrast, during intervention, most occurred during adult-initiated toileting episodes. Across the 2-week and 1-month follow-up probes, none of the children had defecation accidents and, except for Rebecca, all children initiated toilet use for defecation at least some of the time.

The secondary research question in the study was: How do parents rate the social validity of the intervention and their perceptions of its effect on their self-efficacy? All parents except for Ava (the parent who withdrew) completed the brief social validity survey. All five parents rated “My child’s ability to use the toilet properly is important to me” and “I am confident that I will be able to use the strategies I learned to address toilet training problems in the future” as 5 (strongly agree) on a 5-point scale. Four of the five rated “The strategies I learned were helpful for toilet training my child” and “My child’s ability to use the toilet increased as a result of the strategies I learned” as 5 and the remaining parent rated both statements as 4.

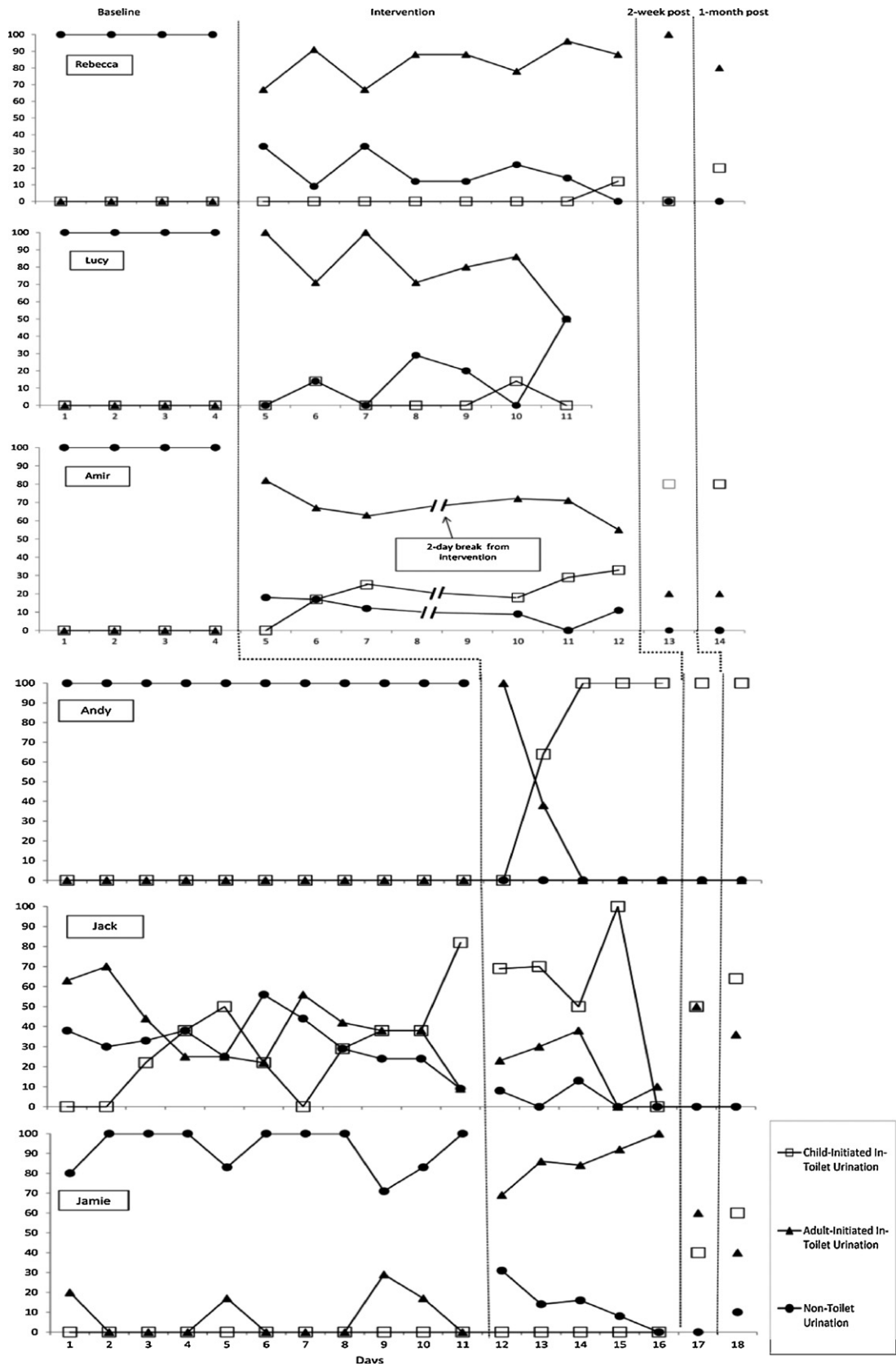


Fig. 1. Results of toilet training intervention on urinary continence.

Table 2
Range of daily urination episodes.

Parent (child)	Baseline (all out-of-toilet)	Intervention (both in- and out-of-toilet)	Follow-up (all in-toilet)
Janice (Rebecca)	3–6	6–14	4–5
Ava (Lucy)	4–5	7–10	n/a
Chana (Amir)	3–5	10–18	4–6
Leanne (Andy)	3–7	13–19	4–5
Mark (Jack)	6–10	11–18	7–8
Sandra (Jamie)	4–6	6–12	5–6

Table 3
Percentage of non-toilet, adult-initiated, and child-initiated defecations across phases.

Child	Non-toilet			Adult-initiated			Child-initiated		
	Baseline	Intervention	Follow-up	Baseline	Intervention	Follow-up	Baseline	Intervention	Follow-up
Rebecca	100	37.5	0	0	62.5	100	0	0	0
Lucy	100	0	n/a	0	100	n/a	0	0	n/a
Amir	100	0	0	0	83.3	16.7	0	50	50
Andy	100	40	0	0	23.5	0	0	36.5	100
Jack	81.8	0	0	18.2	70	75	0	30	25
Jamie	100	33.3	0	0	66.7	0	0	0	100

None of the parents requested *in vivo* support at home from the researcher at any time. However, data were recorded on the number and content of phone calls to the researcher for additional advice or support, and Table 4 summarizes this information. The daily phone call initiated by the researcher for data collection was included in Table 4 if a parent asked a question or indicated a need for other support during this call.

The content of researcher assistance by phone varied widely across parents. Several parents sought to verify their understanding of the intervention plan, particularly at phase change points (i.e., from scheduled toilet sittings to scheduled chair sittings). Some parents had concerns about the potency of reinforcers and/or the extent to which they could use a variety of reinforcers. Several parents asked for periodic encouragement or reassurance from the researcher that they were following the procedures correctly. One parent called because she was concerned about her son “dribbling” urine in the toilet rather than emptying his bladder completely. The researcher suggested placing a disposable aluminum baking pan in the toilet to make the urination more audible (Miranda, 2006) and to then provide reinforcement only for audible instances; this resolved the “dribbling” problem within 2 days. Another parent reported that the child appeared to be initiating toilet use to get out of non-preferred activities. Together with the researcher, this parent decided to take the child to the toilet only if (a) it was likely that he needed to empty his bladder, based on his past urinary patterns and (b) he was not engaged in a non-preferred activity from which escape to use the toilet might be motivating. Finally, one parent struggled with the self-initiation phase of training, and she and the researcher modified the plan for this phase accordingly.

Finally, although parents did not record specific data on generalization to new toilets, all five who completed the study reported that their children had used toilets in other settings (e.g., relatives’ homes, schools, public places) at least once by the 2-week follow up, and none reported concerns with generalization to new toilets.

3. Discussion

Previous research indicates that RTT-derived toilet training protocols are effective at teaching continence to individuals from a variety of populations (Kroeger & Sorensen-Burnworth, 2009). By teaching parents to implement the non-punitive RTT toilet protocol developed by Kroeger and Sorensen (2010), this study serves as an extension of their work. However, while Kroeger and Sorensen trained parents to implement the protocol with *in vivo* support, the current study differs in two ways: (a) parents were taught to implement the procedure in small group workshops and (b) no *in vivo* implementation

Table 4
Number of parent requests (phone calls) for researcher advice/support during implementation.

Parent (child)	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Total
Janice (Rebecca)	2	1	2	1	1	1	2	1	11
Ava (Lucy)	1	1	0	0	0	0	n/a	n/a	2
Chana (Amir)	1	1	0	Break	Break	1	0	0	3
Leanne (Andy)	1	1	0	0	0	0	0	0	2
Mark (Jack)	1	1	0	0	0	0	0	0	2
Sandra (Jamie)	1	1	1	1	0	1	0	0	5

support was provided. The results demonstrate an association between an RTT-derived workshop and increased toileting behaviours in participating children, and contributes to the small body of toilet training research involving parents.

A unique contribution of the present study was the use of a workshop format to teach parents to toilet train their children. Although the level of fidelity with which the parents implemented the procedures they learned at the workshop was not measured, the data they reported provide evidence that they were able to toilet train their children after attending the workshop. The success of the workshop can be attributed to the fact that it incorporated several evidence-based training techniques, such as role playing with feedback (Whittingham et al., 2009) and evaluation of video examples (Aman et al., 2009). The workshop also included definitions of all toilet training components, modeling with a life-sized doll, opportunities for parents to respond actively, and quizzes that had to be 'passed' before moving on, all of which are features of effective behavioural skills training (e.g., Minjarez et al., 2010).

3.1. Initiation training

Initiation training, which was taught using scheduled chair sittings, was the most challenging component of the modified-RTT protocol for some parents. In each toilet training workshop group, one or more parents asked the researcher to review the scheduled chair sittings component and to provide more role play examples. It is interesting to note that, during the workshops, 3 of the 6 parents commented that they did not believe that their children would learn to initiate. However, all 5 children who completed the study demonstrated at least some urination initiation by the time of the one-month follow-up. For 2 of the 5 children (Amir and Jamie), initiation did not occur more than 50% of the time until follow-up; and for one participant (Rebecca), initiation had only occurred a few times at the 1-month follow-up. Similar issues with initiation training were not documented in Kroeger and Sorensen's (2010) study, in which both participants were initiating within the first 4 days of intervention.

The main difference between this study and that of Kroeger and Sorensen (2010) has to do with the timing of instruction for self-initiation. Parents in the present study were taught all of the toilet training techniques they would need in a workshop prior to implementation, whereas Kroeger and Sorensen taught the techniques on an ongoing basis, as they were needed, according to the child's progress. Thus, in the present study, by the time parents implemented the scheduled chair sitting component of the intervention, several days had passed since they had learned the procedure at the workshop. It is likely that the time lag between the workshop and the point when scheduled chair sittings were required created some difficulty for some parents. Nonetheless, phone contact with the researcher appeared sufficient to resolve their concerns.

3.2. Defecation continence

During the RTT-derived workshop, defecation was never mentioned specifically, and all examples, definitions, role plays, and quiz questions focused solely on urination training. In fact, most toilet training studies have focused on urination training alone, and others dealt with urination and continent defecation separately, using RTT-derived tactics (Kroeger & Sorensen-Burnworth, 2009). However, the results of this study suggest that it may be unnecessary to provide separate tactics for urination and defecation training, as all five child participants who completed the study demonstrated fecal continence by the end of the intervention period. This may be related to the fact that the anal and urethral muscles are closely linked and often contract simultaneously; thus, training for urination may be sufficient in order for continent defecation to occur. Additional research is needed to examine this issue more closely.

3.3. Social validity

Overall, parents were extremely pleased with the outcomes of the intervention, as reflected in the uniformly high social validity ratings. At the 1-month follow-up point, one parent commented, "I still can't believe that [my child] is toilet trained and that I did it!" Another noted, "I feel like I can teach [my child] so many things now." However, every parent noted at least once during the intervention that the RTT protocol was challenging to implement. One parent said, "This is the hardest thing I've ever done! It's so hard to stick with it all day." Another told the researcher, "When you said that we would have to cancel everything for a few days and just focus on this, you weren't kidding." Nonetheless, during the follow-up visit, all five parents told the researcher that their hard work was worth the toileting success. One parent noted, "I learned a lot about [my child] being so focused on him for a few straight days." Another said, "I am really proud of [my child] and I'm really proud of myself. I can't believe we did this."

3.4. Clinical implications

Aside from the obvious advantages to the children and the increased self-efficacy reported by parents as a result of their involvement, it is also important to note the financial advantages of involving parents in a workshop-based toilet training intervention. Parents in this study implemented the intervention for (on average) 10–12 h/day over at least a 5-day period (i.e., at least 50–60 h). If they had hired a behaviour analyst to implement the intervention for that many hours at \$70 per hour (the minimum rate charged by behaviour analysts in the province where they lived), they would have paid between \$3,500–\$4,200 each. Alternatively, the approximately 10 h of in vivo and phone support provided by Kroeger and Sorensen

(2010) would have cost families at least \$700 each at the same hourly rate. In contrast, this study consisted of a 5-h workshop for 3 families plus no more than 5 h per family of pre-training meetings and intervention phone support—for a total of 20 h that would have cost \$467 per family. Thus, involving parents in a workshop-based RTT intervention appears to be an economical pursuit for clinical practice, as paying to attend a workshop and receive follow-up support is likely to be much more affordable than any other option. Additionally, the workshop-training format used in the study has positive clinical implications. Parents in rural areas could travel to a workshop on toilet training and then return home to implement the intervention, receiving telephone support from a practitioner who would be otherwise unable to travel to the family home. Practices such as these can help to mediate the limited availability of resources to families in rural areas.

3.5. Limitations and directions for future research

One limitation of the present study is that the design did not enable demonstration of a functional relationship between the modified-RTT workshop and improvements in child continence. In order for a functional relation to be demonstrated within a multiple baseline design, it is necessary to demonstrate a change in target behaviour that occurs immediately following introduction of an intervention, at three different points in time (Horner, Carr, Halle, McGee, Odom, & Wolery, 2005). Because only two workshop groups participated in the study, intervention began for participants at two different points in time, rather than three. Thus, the study provided evidence for a basic effect (personal communication, Robert H. Horner, July 7, 2011) but not a functional relation between the independent and dependent variables.

Only six families participated in this study and only five completed the toilet training protocol, which limits the external validity of the findings. However, external validity is enhanced by the diversity of the parents who were involved; they had a range of education and employment histories, and all of the parents in Group 1 spoke English as a second language. The child participants also displayed considerable diversity with regard to chronological age, diagnosis, educational experience, speech ability, adaptive skills, and toilet training histories. Nonetheless, additional research is needed with more diverse participant samples, perhaps including toilet training workshops with larger groups of parent or caregivers. Future research should also focus on extending the toilet training workshop model to other populations affected by toileting issues (e.g., adults with disabilities; individuals with long histories of problem toileting). Additionally, because this study is the first to teach parents to toilet train their children in a workshop format, replication is needed.

The study would have been strengthened by the use of a formal preference assessment, as per LeBlanc et al. (2005). Parents in this study were asked to identify reinforcers based on their children's past preferences for items and activities. The decision to have parents select the reinforcers was made in order to limit researcher contact with the participating children, as would occur in a true workshop. However, some research has shown that it is often difficult for parents, caregivers, and interventionists to identify items that function as reinforcers (Cannella, O'Reilly, & Lancioni, 2004). Additionally, motivating operations related to the reinforcing effects of potential items are likely to change over time, depending on a multitude of variables. Accordingly, an item that a parent expects to function as a reinforcer might be effective after one incident of elimination and not after the next (Dyer, 1987). Thus, future research should require parents to perform preference assessments as part of the toilet training protocol so that the potential strength of reinforcers can be assessed on an ongoing basis throughout the intervention, which could contribute to more rapid acquisition of positive toileting behaviours.

Finally, it would be interesting for future studies to investigate the relationship between parent optimism and intervention effectiveness. Several parents in the present study mentioned during the initial meeting with the researcher that their children were extremely difficult to train and that their child probably wouldn't be able to "get it." In fact, one mother remarked during the initial meeting, "If my son gets trained, it will be a miracle," and later, after her child was initiating toilet use, said she still "couldn't believe it!" Future research could study the potential relationship between optimism and implementation fidelity and/or positive outcomes (Durand, 2011).

In summary, this study makes an important contribution to the small body of toilet training research that involves parents. The results suggest that parent attendance at an RTT-derived workshop can result in increases in positive toileting behaviours in their children, with telephone support from a researcher. In addition, training focused on urination resulted in both urinary and fecal continence in all child participants that completed the study.

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