Best Practices for Toilet Training Children with Disabilities

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Gabriela Gonzalez
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Best Practices for Toilet Training Children with Disabilities

May 2022

This evidence project, submitted by
Sara Kne, Gabriela Gonzalez, Jorge Medina

has been approved and accepted
in partial fulfillment of the requirements for the degree of
Master of Science in Occupational Therapy and Occupational Therapy Doctorate
from the University of Puget Sound.

Project Chairperson: Renee Watling, PhD, OTR/L, FAOTA

OT637/737 Instructors: Renee Watling, PhD, OTR/L, FAOTA; George Tomlin, PhD, OTR/L, FAOTA;

Director, Occupational Therapy Program: Yvonne Swinth, PhD, OTR/L, FAOTA

Dean of Graduate Studies: Sunil Kukreja, PhD

Key words: toilet training, potty training, pediatrics, autism spectrum disorder, developmental delay, behavior disorder, intellectual disability, sensory processing disorder, occupational therapy, ADL.
Abstract

This research project was conducted in collaboration with Paige Kensil, OTR/L and Erica Petru, OTR/L at Little Fin Therapies. Through discussion with Paige and Erica, we determined that there was a need to examine the effectiveness of various toilet training interventions for children with disabilities. Therefore, a systematic review of the literature was conducted on strategies and interventions for toilet training focused on promoting independence of children between the ages of 2-18 years old with disabilities. The literature review yielded a total of 20 research articles published in peer-reviewed journals. Ten toileting interventions were examined in these articles for children with disabilities, including children with autism spectrum disorder (ASD), intellectual or developmental disability (IDD), developmental delay, and sensory processing disorder (SPD). Ten toileting interventions were identified in the research, including video modeling, rapid toilet training, sit schedules or timed toileting, reinforcement, technology-based, visual prompts, behavioral modification, urine alarm, underwear or pad removal, and sensory integration. Results indicated that toilet training is not a one-size-fits-all approach. However, the ten identified interventions did show significant improvements in independence in toilet training.

Our knowledge translation product included development of a toilet training guide for pediatric therapists and caregivers containing information and resources for nine of the ten identified toileting interventions. The interventions included in the guide are evidence-based and supported by research. Occupational therapy practitioners have a unique role in toilet training and should collaborate with parents and caregivers when creating an individualized toilet training program based on a client's specific needs. There is a need for increased outcome research on toilet training interventions for children with disabilities.
Executive Summary

The purpose of this research project was to identify the best practices available for toilet training to promote independence in children with disabilities in their natural environment. Occupational therapy students from the University of Puget Sound collaborated with practicing pediatric occupational therapy practitioners from an outpatient clinic on a year-long research project to develop a clinical question, complete a literature review, analyze and synthesize available data and implement an effective knowledge translation product.

To establish our research question, we met with our collaborators Paige Kensil, OTR/L and Erica Petru, OTR/L who identified the need for evidence-based toilet training interventions specifically for children with disabilities based on the needs of their clientele. Through discussion and inquiry with our collaborators we identified the need to establish toileting interventions for children ages 2-7, however after careful consideration we decided to expand the age range from 2-18 to capture a broader range of children with disabilities. Our final research question was, “What is the effectiveness of various approaches to toilet training to promote the independence of children ages 2-18 in their natural environment?”

A systematic literature review was performed yielding 20 articles that met our inclusion and exclusion criteria. Articles were then summarized into a critically appraised topic (CAT), determining that toilet training interventions should be individualized and client-centered based on a child's unique needs, environmental contexts, and personal contexts. Additionally, it was found that collaboration between caregivers and occupational therapists is essential in many toilet training protocols.

We wanted the toilet training guide to serve as a resource tool for therapists and parents/caregivers. Of the 10 identified interventions in our literature review, nine were determined appropriate for inclusion as the tenth intervention involved sensory integration and would need to be delivered in a clinic setting by a trained professional. For each intervention a definition, the expected outcomes, supplies needed, instructions/protocol, and additional resources were identified and described. In addition, a section related to general information related to toilet training and a break-down of the toilet training sequence was
developed. A survey designed to obtain information on the efficacy and usefulness of the toilet training guide was developed and used to collect outcomes data.

Finally, the toilet training guide was provided via hard copy to our collaborators. After having one week to review the toilet training guide, our collaborators and their colleagues were provided with a survey measuring efficacy and usability. Response to the survey was limited, with only four respondents completing the survey. Overall feedback from the survey was positive regarding the efficacy and usefulness of the *Pediatric Toilet Training Guide for Occupational Therapists and Parents*. However, two themes emerged about the toileting guide needing more information about the research (e.g., level of evidence, population samples) as well as additional resources for therapists in the appendix.
Focused Question

"What is the effectiveness of various approaches to toilet training to promote the independence of children ages 2-18 in their natural environment?"

Prepared By
Sara Kne, Gabriela Gonzalez, Jorge Medina

Date Review Completed
1/21/2021

Professional Practice Scenario

Little Fin Therapies is an outpatient pediatric clinic in Puyallup, Washington. The clinic is multidisciplinary, with 3 occupational therapists (OT), 4 Certified Occupational Therapy Assistants (COTA) and 4 Speech Language Pathologists (SLP) with a wide range of experience. Little Fin Therapies provides services to children from birth to 16 years with a variety of diagnoses and who are ethnically and economically diverse. We collaborated with 2 pediatric occupational therapists from Little Fin Therapies, Paige Kensil, OTR/L and Erica Petru, OTR/L, who identified a need for improvement surrounding evidence-based interventions to support increased independence in toilet training for children in their natural environment. Kensil transitioned out of Little Fin Therapies about midway through the project but continued to collaborate with us in her new work location throughout the duration of the evidence project. In their current practice settings, Kensil and Petru identified a lack of evidence-based toileting interventions, specifically for children with disabilities. Toileting is an important skill that practitioners work on with their clients throughout the lifespan. Thus, reliable therapeutic interventions and evidence-based research to support children with toileting is necessary and important for practitioners to have access to.

Kensil and Petru currently do not have a streamlined system or protocol for toilet training but have recommended various interventions to their clients (e.g., sticker charts, rewards, books about toileting). However, this approach has been inconsistent and unsuccessful for many of their clients, specifically clients with autism spectrum disorder (ASD), attention deficit hyperactivity disorder (ADHD), intellectual or developmental disability (IDD), and behavioral disorders. As a result, both Kensil and Petru have experienced difficulty with providing sufficient support, parent education, and recommendations for supporting toilet training in a child’s natural environment.

This evidence review will help Kensil and Petru better serve their clientele by providing a variety of evidence-based and client-centered interventions with more specific guidelines and protocols. This will assist therapists and caregivers in implementing toilet training interventions for children in their natural environment. Additionally, this critical appraisal will also provide Petru and Kensil with researched-based interventions with higher efficacy compared to the current recommendations they have been providing to families, as well as a more streamlined procedure that is designed specifically for children with ASD, ADHD, IDD, and behavioral disorders.

Search Process: Procedures for the selection and appraisal of articles

Inclusion Criteria

The inclusion criteria for the critical appraisal includes:

1. Peer-reviewed articles about toilet training interventions or approaches for children.
2. Participants between the ages of 2 and 18.
3. Participants diagnosed with ASD, IDD, ADHD, or behavior disorders who are participating in a toileting intervention.
4. Toileting intervention implemented in a child’s natural environment (e.g., family home, relatives home, child-care site, school).
5. Toileting intervention was implemented by a therapist, parent, teacher, teacher’s assistant, caregiver, or guardian.

Exclusion Criteria

The exclusion criteria for the critical appraisal includes:
1. Non-peer reviewed articles, systematic reviews, dissertations, theses, books, conference presentations, expert opinion, videos, and websites.
2. Participants outside of the identified age range (younger than age 2; older than age 18).
3. Participants with a diagnosis not specified in the inclusion criteria (e.g., typically developing children and children without a diagnosis).
4. Studies published in a language other than English.

Search Strategy: Keep detailed notes on each search conducted and its yield

<table>
<thead>
<tr>
<th>Categories</th>
<th>Key Search Terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient/Client Population</td>
<td>pediatrics, peds, children, toddlers, kids, student, ped*, child*</td>
</tr>
<tr>
<td>Diagnosis to be reached</td>
<td>autism, autism spectrum disorder, ASD, attention deficit hyperactivity disorder, ADHD, developmental delay, intellectual disability, intellectual disorder, behavior disorder, developmental disability, cognitive disability, cognitive delay, behavior*, conduct disorder, CD, emotional behavioral disorder, EBD, disability</td>
</tr>
<tr>
<td>Intervention (Approach)</td>
<td>toilet*, toileting, potty, potty training, toileting interventions, continence training, toilet learning, toilet training</td>
</tr>
</tbody>
</table>

Databases, Sites, and Sources Searched

1. American Journal of Occupational Therapy (AJOT)
2. Canadian Journal of Occupational Therapy (CJOT)
3. British Journal of Occupational Therapy (BJOT)
4. Cumulative Index to Nursing and Allied Health Literature (CINAHL)
5. Education Resources Information Center (ERIC)
6. Medline
7. PubMed
8. Proquest
9. Cochrane Library
Search Outcomes/Quality Control/Review Process

We began our search strategy by dividing six databases among the team evenly. Kne was responsible for AJOT, CINAHL, and ERIC. Medina was responsible for CJOT, MEDLINE, and Proquest. Gonzalez was responsible for BJOT, Cochrane Library, and PubMed. We began searching each database using fewer search terms and quickly learned that our searches were too wide and yielded too many hits to reasonably sift through. After meeting with the library liaison at the University of Puget Sound (UPS), we decided to adjust our search strategy by including more search terms in a single search, which ultimately provided a more reasonable number of articles with greater relevance to our research topic. Initially, the inclusion criteria for age was 2 to 7 years old. However, this very narrow window presented challenges as it excluded many valuable studies from our research. Therefore, we decided to extend our age range to 2 to 18 years old, because it is common that children with ASD, IDD, and SPD are developmentally behind and/or diagnosed at a later age when compared to their typically developing counterparts. Thus, a child with IDD who is 14 years old could be developmentally functioning at a much younger age. In addition, we noticed that many of the articles that fit our inclusion criteria had participants with a diagnosis of ASD. This was concerning, as our practitioners indicated they would like to incorporate more behavioral disorders, developmental delays, and intellectual disabilities into our research topic. By expanding our search strategy as previously mentioned, we were able to locate studies that included participants with an IDD diagnosis, such as Down Syndrome, Fragile X Syndrome, and Angelman’s Syndrome. While this provided some additional diagnoses in our research, a large majority of the articles retained remained centered around children with ASD. Additionally, while the intervention setting and outcomes were not a part of our key search terms, each team member thoroughly and strategically looked through article abstracts and full article reviews to ensure the specific parameters of the inclusion and exclusion criteria were met.

During our search process, 1,577 records were identified through database searching, of which 16 duplicates were removed, leaving a total of 1,561 records. 64 records were kept after the title/abstract screen, excluding 1,497 records. After screening articles flagged as “maybe” by identifying articles that met the inclusion and exclusion criteria, 35 records were retained and 29 were excluded. After assessing full text for eligibility, 14 records were retained and 21 were excluded if not peer-reviewed, if systematically reviewed, had participants outside of the identified date range or diagnosis, lacked a specific toileting intervention, and not in the English language. This resulted in a total of 20 quantitative articles retained of which 6 were identified through hand searching. There were 2-3 reviewers for each article and all 3 members completed the Risk of Bias analysis together to rule out reliability and validity issues. Based on our inclusion and exclusion criteria, one article was excluded for not meeting the inclusion criteria of a natural setting. Seven articles were excluded for not meeting criteria for publication dates. Four studies were excluded for not meeting criteria for types of study, 14 studies were excluded for not meeting criteria for diagnosis identification, and 24 studies were excluded for not meeting criteria for intervention implementation.

The key players involved in our research process included Renee Watling, our research chair and mentor, who assisted with guidance on article selection, search strategy, and answered numerous questions as our research progressed; our collaborators who provided us with a research topic; and the library liaison at the UPS, Eli Gandour-Rood, who assisted in obtaining interlibrary loan articles.
### Master Citation Table (MCT)

**PICO Question:** “What is the effectiveness of various approaches to toilet training to promote the independence of children ages 2-18 in their natural environment?”

<table>
<thead>
<tr>
<th>Type of study</th>
<th>RoB</th>
<th>Level of Evidence</th>
<th>Author &amp; Year</th>
<th>Citation</th>
<th>DX</th>
<th>Intervention Type</th>
<th>Include (Y/N) (abstract)</th>
<th>Maybe-explain (abstract)</th>
<th>Final decision (Y/N) (full text)</th>
<th>If NO, reason to exclude</th>
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<tbody>
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<tr>
<td>SCED</td>
<td>Does not meet standards</td>
<td>Nizam et al. (2019). Using visual prompt approach in parental intervention to improve the toileting skills of children with autism spectrum disorder. Education and</td>
<td>Nizam et al. (2019). Using visual prompt approach in parental intervention to improve the toileting skills of children with autism spectrum disorder. Education and</td>
<td>ASD</td>
<td>Visual-prompts</td>
<td>Y</td>
<td>No- Article primarily lists the steps for how to use a PPP but does not provide enough information a/b the specific case and IV. More of a step-by-step guide for PPP.</td>
<td>Yes</td>
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<tr>
<td>N/A</td>
<td>N/A</td>
<td>IV, E4</td>
<td>Frank et al. (2020). The effects of a decision-protocol informed toilet training intervention for preschoolers with disabilities. Journal of Developmental and Physical Disabilities, 32(3), 477-488. doi:<a href="http://dx.doi.org.ezproxy.ups.edu/10.1007/s10882-019-09703-2">http://dx.doi.org.ezproxy.ups.edu/10.1007/s10882-019-09703-2</a></td>
<td>Dx not specified</td>
<td>ASD</td>
<td>Video-modelin g</td>
<td>Duplicate</td>
<td>Duplicate</td>
<td>Duplicate</td>
<td></td>
</tr>
<tr>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Rogers, J., &amp; Enoch, N. (2020). Early intervention toilet training for children with Down syndrome. British Journal of Nursing, 29(22), 1325–1326. [<a href="https://doi-org.ezproxy.ups.edu:2443/10.12">https://doi-org.ezproxy.ups.edu:2443/10.12</a> 968/bjnn.2020.29.22.1325](<a href="https://doi-org.ezproxy.ups.edu:2443/10.12">https://doi-org.ezproxy.ups.edu:2443/10.12</a> 968/bjnn.2020.29.22.1325)</td>
<td>Develop mental Delay/ Down Syndro me</td>
<td>N/A</td>
<td>M</td>
<td>Maybe- Could we categorize Down syndrome as developmental delay/ intellectual disability? Not sure which TT intervention was implemented based on abstract.</td>
<td>No</td>
<td>No- article primarily discussed how this EI program was IV but did not discuss a specific case study, purpose, results, etc.</td>
<td></td>
</tr>
<tr>
<td>Author</td>
<td>Research Question</td>
<td>Methodology</td>
<td>Sample</td>
<td>Outcome</td>
<td>Feasibility</td>
<td></td>
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<tr>
<td>Mruzek et al. (2019)</td>
<td>A pilot investigation of an iOS-based app for toilet training children with autism spectrum disorder.</td>
<td>Autism: The International Journal of Research &amp; Practice, 23(2), 359–370. <a href="https://doi-org.ezproxy.ups.edu:2443/10.1177/1362361317741741">https://doi-org.ezproxy.ups.edu:2443/10.1177/1362361317741741</a></td>
<td>ASD</td>
<td>iOS-based App</td>
<td>M</td>
<td>Maybe - not sure if the article is examining the effectiveness of a TT intervention or is it examining the feasibility of the app they are developing for the Pilot RCT</td>
<td>No</td>
<td></td>
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<tr>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
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<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
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</tr>
</tbody>
</table>

N/A: Not available or applicable
IV, E4: Intervention, Evaluation 4
SCED: Special Education
ASD: Autism Spectrum Disorder
M: Males
Female
| N/A | N/A | N/A | Hyams et al. (1992). Behavioural continence training in mental handicap: a 10-year follow-up study. Journal of Intellectual Disability Research, 36(6), 551–558. [https://doi.org/10.1111/j.1365-2788.1992.tb00573.x](https://doi.org/10.1111/j.1365-2788.1992.tb00573.x) | Dx not specified | Reinforcement-based, alarms, prompts; (1) scheduled toileting, (2) intervals, (3) group | M | M- article published in 1992 (outside of identified date range), age of participants= 5-17 (outside of identified age range) | No |

No- participants in this study do not have a specified dx and some are not in our identified age range. Additionally, this is a follow-up study and does not discuss the initial TT intervention as much as the long-term results on the original intervention.
<table>
<thead>
<tr>
<th>Study</th>
<th>Participants in this study</th>
<th>Study Design</th>
<th>Diagnosis Excluded</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Van Aggelpoel et al. (2020)</td>
<td>Healthy, typically developing children</td>
<td>Cluster Randomized Controlled Trial</td>
<td>M</td>
<td>No participants in this study are healthy, typically developing children. Children with behavioral, developmental, or intellectual disabilities were excluded from study.</td>
</tr>
<tr>
<td>Cagliani et al. (2021)</td>
<td>Does not meet standards IV, E4</td>
<td>Classroom Based Intensive Toilet Training for Children with Autism Spectrum Disorder</td>
<td>ASD</td>
<td>No participants in this study do not have a dx included in our inclu/exclu criteria &amp; this study does not examine a toileting IV, but instead looks at association between early hiding while defecating &amp; TT</td>
</tr>
<tr>
<td>Taubman et al. (2003)</td>
<td>N/A</td>
<td>Children Who Hide While Defecating Before They Have Completed Toilet Training</td>
<td>N</td>
<td>No participants in this study do not have a dx included in our inclu/exclu criteria &amp; this study does not examine a toileting IV, but instead looks at association between early hiding while defecating &amp; TT</td>
</tr>
</tbody>
</table>


| N/A | N/A | N/A | Ladi et al. (2014). Combined functional pelvic floor muscle exercises with Swiss ball and urotherapy for management of dysfunctional voiding in children: a randomized clinical trial. European Journal of Pediatrics, 173(10), 1347-1353. [https://doi.org/10.1007/s00431-014-2336-0] | Dysfunctional Voiding (DV) | Urotherapy & Muscle Retraining | M | M- does dx of children in the study fit out inclusion criteria? | No | No- participants in this study are dx with DV, which is not a dx in our inclusion criteria. |
| N/A | N/A | N/A | Lowenthal, Barbara. (1996). Teaching basic adaptive skills to young children with disabilities. Early Child Development and Care, 115, 77-84. | Broad dx (children with disabilities) | Timed TT, sitting schedule, Rapid technique | M | M- article published in 1996 but still focuses on increasing independence in toileting and teaching toileting skills (timed toileting, scheduled toileting, and the rapid technique) | No | No- article is not a study but an informational article about adaptive skills for toileting and feeding (not necessary useful for our research b/c does not examine specific TT intervention). |
| SCED | IV, E4 | N/A | Brown, F. J., & Peace, N. (2011). Teaching a child with challenging behaviour to use the toilet: a clinical case study. British Journal of Learning Disabilities. 39(4), 321-326. [https://doi.org/10.1111/j.1468-3156.2011.00676.x] | Modified Azrin and Foxx (1971) TT procedure | Global Developmental Delay | M | M- child in this study is 13 y/o, but otherwise fits inclusion criteria. This would be a great study to include because it is one of the few that have a dx besides ASD. Maybe we can extend the age range again so we can include this article? SK | Yes | |
|--------|-------------------------|-------|-------------------------------------------------|-------------------------------------------------|-------|----------------------|--------|-----|
|------|------------------------|---------------------------------|--------|---------------------------------|----|-----|
|-----|-----|-----|-------------------|-----------------------------------------------------------------------------------|

- No article examines many unwanted behaviors without enough emphasis on toileting skills and IV specific for toileting.
- No article mainly examines difference between two types of encopresis and not IV for toileting; article also outside of identified publication date range.
- No article reads like a how to versus a study, does not discuss methodology/results/conclusions of a specific TT intervention but instead gives step-by-step directions to TT children with ASD.
<p>| Leader et al. (2018). Toileting Problems in Children and Adolescents with Parent-Reported Diagnoses of Autism Spectrum Disorder. Journal of Developmental &amp; Physical Disabilities, 30(3), 307–327. | Maybe - abstract states dx is parent reported (not confirmed by MD) so participants might not have an official dx of ASD (SK) full article states that dx is provided by psychologist or pediatrician (jm) | No- article mainly discusses problems associated with toileting but does not examine specific TT interventions |</p>
<table>
<thead>
<tr>
<th>Title</th>
<th>Author(s)</th>
<th>Procedure</th>
<th>Inclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investigated the relationship between RFI and SOR but not interventions; article has participants w/o a dx in our inclu criteria</td>
<td>Bellefeuille, I.B. &amp; Lane, S.J. (2017).</td>
<td>Retentive Fecal Incontinence</td>
<td>N/A</td>
</tr>
<tr>
<td>No- article primarily focuses on how to support caregivers and health care professions involved in toilet training children with learning difficulties</td>
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</tr>
<tr>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Beaudry-Bellefeuille, I., Bundy, A., Lane, A., Ramos Polo, E., &amp; Lane, S. J. (2019). The toileting habit profile questionnaire: Examining construct validity using the Rasch model. British Journal of Occupational Therapy, 82(4), 235–247. <a href="https://doi.org/10.1177/0308022618813266">https://doi.org/10.1177/0308022618813266</a></td>
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<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Macdonald, J. (2001). The Raeden Early Development Group for Preschool Children with Motor Difficulties. British Journal of Occupational Therapy, 64(12), 601–608. <a href="https://doi.org/10.1177/030802260106401205">https://doi.org/10.1177/030802260106401205</a></td>
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<tr>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Vermandel et al. (2009), The efficacy of a wetting alarm diaper for toilet training of young healthy children in a day-care center: A randomized control trial. Neurourol. Urodyn., 28: 305-308. <a href="https://doi.org/10.1002/nau.20658">https://doi.org/10.1002/nau.20658</a></td>
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<tr>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Smith L, Smith P, Lee SK. (2000). Behavioural treatment of urinary incontinence and encopresis in children with learning disabilities: transfer of stimulus control. Dev Med Child Neurol. 42(4):276-9. doi: 10.1017/s0012162200000475. PMID: 10795568.</td>
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<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Cocchiola et al. (2012). Toilet training children with autism and developmental delays: an effective program for school settings. Behavior analysis in practice, 5(2), 60–64. <a href="https://doi.org/10.1007/BF03391824">https://doi.org/10.1007/BF03391824</a></td>
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<tr>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Berry-Kravis et al. (2019). Toilet training in fragile x syndrome. Journal of Developmental and Behavioral Pediatrics. 40(9), 751–761. <a href="https://doi.org/10.1097/DBP.0000000000000735">https://doi.org/10.1097/DBP.0000000000000735</a></td>
</tr>
<tr>
<td>SCED</td>
<td>Does not meet standards</td>
<td>IV, E4</td>
<td>Lancioni et al. (2002). Urine alarms and prompts for fostering daytime urinary continence in a student with multiple disabilities: a replication study. Perceptual and motor skills, 94(3 Pt 1), 867–870. <a href="https://doi.org/10.2466/pms.2002.94.3.867">https://doi.org/10.2466/pms.2002.94.3.867</a></td>
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<tr>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Grieve, T. (1998). Continence promotion among children with severe disabilities. Nursing times, 94(41), 58–59.</td>
</tr>
<tr>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Azrin &amp; Foxx. (1971).</td>
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<tr>
<td>SCED</td>
<td>Meets Standards with Reservations</td>
<td>IV, E4</td>
<td>Greer et al. (2016).</td>
</tr>
<tr>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Ritterband et al. (2003).</td>
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<tr>
<td>Study</td>
<td>Design</td>
<td>Risk of Bias</td>
<td>SPD</td>
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</tr>
<tr>
<td>Vermandel et al. (2008).</td>
<td>Quasi-experimental pre-post test design</td>
<td>High RoB</td>
<td>III, O4</td>
</tr>
<tr>
<td>Richardson, D. (2016).</td>
<td>No experimentation.</td>
<td>Does not provide a study with a proposed IV</td>
<td></td>
</tr>
<tr>
<td>Rogers J. (2010).</td>
<td>No- Article does not use a specific IV on a group of participants. The article does describe steps for TT but no clinical experimentation.</td>
<td></td>
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<tr>
<td>SCED</td>
<td>N/A</td>
<td>N/A</td>
<td>Wenger, J.K. (2017). Toilet training kids with ASD. Contemporary Pediatrics, 34(4), 20–22.</td>
</tr>
<tr>
<td>--------</td>
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<tr>
<td></td>
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<td></td>
<td>Radstaake et al. (2014). Toilet training in individuals with Angelman syndrome: A case series. Developmental Neurorehabilitation, 17(4), 243–250. <a href="https://doi-org.ezproxy.ups.edu:2443/10.31">https://doi-org.ezproxy.ups.edu:2443/10.31</a> 09/17518423.2013.783140</td>
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<tr>
<td></td>
<td></td>
<td>N/A</td>
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</tr>
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<td>------</td>
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<td>-------</td>
<td>----------------------</td>
</tr>
<tr>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Viruses et al. (2021).</td>
</tr>
<tr>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Gelfand &amp; Hartmann, (1968).</td>
</tr>
<tr>
<td>Controlled clinical trials (prospective cohort study)</td>
<td>Moderate RoB</td>
<td>Bartos et al. (2021). Toilet training children with special needs using a Potty Monkey toy device. Journal of Paediatrics and Child Health, 57(3), 365–370. <a href="https://doi-org.czproxy.ups.edu:2443/10.1111/jpc.15222">https://doi-org.czproxy.ups.edu:2443/10.1111/jpc.15222</a></td>
<td>IDD</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Klassen et al. (2006). The effectiveness of different methods of toilet training for bowel and bladder control. Evidence Report/Technology Assessment, 147, 1–57.</td>
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<tr>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Lancioni et al. (2002). Urine alarms and prompts for fostering daytime urinary continence in a student with multiple disabilities: a replication study. Perceptual and Motor Skills, 94(3 Pt 1), 867–870. <a href="https://doi-org.ezproxy.ups.edu:2443/10.2466/pms.2002.94.3.867">https://doi-org.ezproxy.ups.edu:2443/10.2466/pms.2002.94.3.867</a></td>
</tr>
<tr>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Macias et al. (2006). Toileting concerns, parenting stress, and behavior problems in children with special health care needs. Clinical pediatrics, 45(5), 415–422. <a href="https://doi.org/10.1177/0009922806289616">https://doi.org/10.1177/0009922806289616</a></td>
</tr>
</tbody>
</table>

No- systematic review, mainly consisted of TT interventions for TD children which is part of our exclu criteria; No- not enough focus on TT IV. Study is more focused on perceived stress of parents when TT children with special needs.
<table>
<thead>
<tr>
<th>Year</th>
<th>Type</th>
<th>Title</th>
<th>Authors</th>
<th>Journal</th>
<th>Publication Date</th>
<th>STT</th>
<th>utopia</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>N/A</td>
<td>Conduct disorder, encopresis: a case-note study of 63 boys. European child &amp; adolescent psychiatry, 5(1), 33–37.</td>
<td>Foreman &amp; Thambirajah (1996).</td>
<td>N/A</td>
<td>M</td>
<td>No</td>
<td>- article is outside of our identified publication date range; not sure if there is a TT intervention implemented in this study or if it just examines primary &amp; secondary encopresis</td>
<td>No- there is not a TT intervention examined in this study, not useful for our research topic</td>
</tr>
<tr>
<td>1994</td>
<td>N/A</td>
<td>A stimulus control technique for improving the efficacy of an established toilet training program. Journal of behavior therapy and experimental psychiatry, 25(2), 155–160.</td>
<td>Azrin and Foxx (1994).</td>
<td>IDD, ASD, severe mental retardation</td>
<td>N</td>
<td>No</td>
<td>- article is outside of our identified publication date range</td>
<td>No- article is outside of our identified publication date range</td>
</tr>
<tr>
<td>2013</td>
<td>N/A</td>
<td>Vietnamese mothers' experiences with potty training procedures for children from birth to 2 years of age. Journal of pediatric urology, 9(6 Pt A), 808–814.</td>
<td>Duong, T. H., Jansson, U. B., &amp; Hellström, A. L. (2013).</td>
<td>Timed TT development</td>
<td>N</td>
<td>No</td>
<td>- participants in the study are healthy and typically developing</td>
<td>No- participants in the study are healthy and typically developing</td>
</tr>
<tr>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Ando H. (1977).</td>
<td>Ando H. (1977). Training autistic children to urinate in the toilet through operant conditioning techniques. Journal of autism and childhood schizophrenia, 7(2), 151–163. <a href="https://doi.org/10.1007/BF01537726">https://doi.org/10.1007/BF01537726</a></td>
<td>ASD</td>
<td>Operant conditioning</td>
<td>M</td>
<td>Maybe- great article but outdated</td>
</tr>
</tbody>
</table>

Records identified through database searching
\( (n = 1,577) \)

Duplicates removed
\( (n = 16) \)

Records after duplicates removed
\( (n = 1,561) \)

After title/abstract screen
\( (n = 64) \)

Records excluded
\( (n = 1,497) \)

After screening "Maybes"
\( (n = 35) \)

Records excluded
\( (n = 29) \)

Full-text articles excluded, if not peer-reviewed, systematic review, participants outside of identified age range or dx, lacks toileting intervention, or not in English
\( (n = 21) \)

Total articles included
\( (n = 20) \)

Records identified through hand searching and retained
\( (n = 6) \)

Studies included in qualitative synthesis
\( (n = 0) \)

Studies included in quantitative synthesis
\( (n = 20) \)
### Results of Search: Summary of Study Designs of Articles Selected for the CAT Table

<table>
<thead>
<tr>
<th>Pyramid Side</th>
<th>Study Design/Methodology of Selected Articles</th>
<th>Number of Articles Selected</th>
</tr>
</thead>
</table>
| Experimental | _Meta-Analyses of Experimental Trials_  
 _Individual Blinded Randomized Controlled Trials_  
 _Controlled Clinical Trials_  
 _Single Subject Studies_ | 18 |
| Outcome      | _Meta-Analyses of Related Outcome Studies_  
 _Individual Quasi-Experimental Studies w/ Covariates_  
 _Case-Control or Pre-existing Groups Studies_  
 _One Group Pre-Post Studies_ | 2 |
| Qualitative  | _Meta-Syntheses of Related Qualitative Studies_  
 _Group Qualitative Studies w/ more Rigor_  
 a. prolonged engagement with informants  
 b. triangulation of data (multiple sources)  
 c. confirmation (peer/member-checking; audit trail)  
 d. comparisons among individuals, w/i a person_  
 _Group Qualitative Studies w/ less Rigor_  
 _Qualitative Study on a Single Person_ | 0 |
| Descriptive  | _Systematic Reviews of Related Descriptive Studies_  
 _Association, Correlational Studies_  
 _Multiple Case Series, Normative Studies, Descriptive Surveys_  
 _Individual Case Studies_ | 0 |

**AOTA Levels**
1A-0  
1B-0  
2A-0  
2B-2  
3A-1  
3B-0  
4-17  
5-0  
NR-0

TOTAL # of articles- 20

**Comments:**
<table>
<thead>
<tr>
<th>Citation</th>
<th>IV thoroughly described</th>
<th>DV thoroughly described</th>
<th>Baseline distinguishes from other conditions</th>
<th>Data displayed to show phase patterns</th>
<th>DV aligns with purpose</th>
<th>DV Data collection appropriate</th>
<th>IV systematically manipulated</th>
<th>DV assessed in 20% of sessions by 2+ raters &amp; M IOA 80%</th>
<th>3+ attempts to demonstrate IV effect</th>
<th>Data collection in each phase meets requirement</th>
<th>Quality Appraisal Decision</th>
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</thead>
<tbody>
<tr>
<td>Cicero et al (2002)</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>Does Not Meet</td>
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<tr>
<td>Lee et al. (2013)</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
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<td>Y</td>
<td>Y</td>
<td>Y</td>
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<tr>
<td>Drysdale et al. (2015)</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
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<td>Kroeger et al. (2010)</td>
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<td>Y</td>
<td>Y</td>
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<td>Y</td>
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<tr>
<td>Rinald et al. (2012)</td>
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<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Does Not Meet</td>
</tr>
<tr>
<td>Nizam et al (2019)</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
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<td>N</td>
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<tr>
<td>Leblanc et al. (2005)</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
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<tr>
<td>McLay et al. (2015)</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
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<td>Y</td>
<td>Y</td>
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<tr>
<td>Study</td>
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<td>Y</td>
<td>Y</td>
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<td>----------------</td>
</tr>
<tr>
<td>Cagliani et al. (2021)</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
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<tr>
<td>Brown et al. (2011)</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
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<td>Y</td>
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<td>N</td>
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<td>Does Not Meet</td>
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<tr>
<td>Luiselli (2007)</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
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<td>Y</td>
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<td>Mruzek et al. (2016)</td>
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<td>Does Not Meet</td>
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<tr>
<td>Cocchiola et al. (2012)</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
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<td>Y</td>
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<td>Does Not Meet</td>
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<tr>
<td>Chang et al. (2011)</td>
<td>Y</td>
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<td>Y</td>
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<td>N</td>
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<td>Does Not Meet</td>
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<tr>
<td>Ricciardi et al. (2003)</td>
<td>Y</td>
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<td>N</td>
<td>Y</td>
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<td>Y</td>
<td>N</td>
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<td>Lancioni et al. (2002)</td>
<td>N</td>
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<td>Y</td>
<td>Y</td>
<td>Y</td>
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<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
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<tr>
<td>Radstaak et al. (2014)</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>Does Not Meet</td>
</tr>
</tbody>
</table>
### Risk of Bias Table: RCT and Non-RCT ("YES" Articles)

<table>
<thead>
<tr>
<th>Citation</th>
<th>Random Sequence</th>
<th>Allocation Concealment</th>
<th>Baseline differences between groups</th>
<th>Blinding of Participants</th>
<th>Blinding of Study Personnel</th>
<th>Blinding of Outcome Assessment</th>
<th>Incomplete Outcome Data</th>
<th>Selective Reporting</th>
<th>Overall Risk of Bias</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keen et al. (2007).</td>
<td></td>
<td>-</td>
<td>?</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>H</td>
</tr>
<tr>
<td>Koshy et al. (2018).</td>
<td>?</td>
<td>?</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>H</td>
</tr>
</tbody>
</table>

**Note.** Categories for risk of bias are as follows: Low risk of bias (+), unclear risk of bias (?), high risk of bias (-).

Scoring: 0-3 minuses = Low risk of bias (L), 4-6 minuses = Moderate risk of bias (M), 7-9 minuses = High risk of bias (H)

### Risk of Bias for Non-Control Research Studies ("YES" Articles)

<table>
<thead>
<tr>
<th>Citation</th>
<th>Study question or objective clear</th>
<th>Eligibility or selection criteria clear</th>
<th>Participants representative of real-world patients</th>
<th>Sample size appropriate</th>
<th>IV clearly described</th>
<th>Outcome measures pre-specified, defined, valid/reliable and assessed consistently</th>
<th>Assessor(s) blinded</th>
<th>Loss to follow up after baseline 20% or less</th>
<th>Statistical methods examine changes in outcome measures</th>
<th>Outcome measures collected multiple times</th>
<th>Overall Risk of Bias</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bartos et al. (2020).</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>NR</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

Evaluation: Y = yes, N = no, NR = Not reported; Scoring: Add Yes scores for each item together and divide by 11; RoB rating: Low (L) 75-100%, Moderate (M) 25-75%, or High (H) 0-25%

This tool was adapted from the original tool:

Copyright © 2016, by the American Occupational Therapy Association, Inc. This form is intended to be used for personal use or use by educational programs in partnership with the AOTA Evidence-Based Practice Project. For all other uses, contact cdavis@aota.org
<table>
<thead>
<tr>
<th>Author, Yr, Jrn, Cntry</th>
<th>Purpose &amp; Design</th>
<th>Participant Description</th>
<th>Intervention &amp; Outcomes</th>
<th>Data collection &amp; analysis</th>
<th>Findings &amp; Generalizability</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cagliani, R.R., Snyder, S.K., White, E.N. 2021 <em>Journal of Autism &amp; Developmental Disorders</em> USA (SK)</td>
<td>Investigate effects of an ITT program on continence &amp; self-initiation at school</td>
<td>N=4; dx with ASD, able to sit on toilet for 1-2 min w/o challenging behaviors, I remove clothing</td>
<td>IV: Teacher-implemented TT protocol w/ contingent time intervals for sit schedule, programmed reinforcement for on-toilet voids, dry checks after accidents, ↑ access to fluids, &amp; initiation training</td>
<td>Data collected daily by researchers &amp; school staff</td>
<td>IV effective in ↑ on-toilet voids &amp; self-initiation during TT at school. ↓ variability in on-toilet voids; wide variability in self-initiation attempts. 3 of 4 met mastery &amp; remained dry across school day when taken to the restroom every 120 min; 4th participant reached mastery during baseline when diaper was removed; 3 of 4 demonstrated ↑ with self-initiation; 4 of 4 met mastery &amp; maint. 1 toileting after study completion</td>
<td>Small sample size Initiation of baseline varied but pre-baseline data provided to indicate the # of on-toilet voids &amp; accidents for all participants. Difficult to determine which IV’s can explain IV effects.</td>
</tr>
<tr>
<td>Cicero, F.R. &amp; Pfadt, A. 2002 <em>Research in Developmental Disabilities</em> USA (SK)</td>
<td>Examine the effectiveness of a reinforcement-based, operant toilet training intervention</td>
<td>N=3; dx of ASD, wore diapers &amp; had daily urination accidents</td>
<td>IV: Teacher-implemented toilet training for 5.5 hr/day for 22 days &amp; 30 min prompted request schedule; verbal praise &amp; positive reinforcement for urination; prompts &amp; reinforcement faded over the intervention period.</td>
<td>Data collected daily by teachers during school hours. Data analyzed using visual analysis &amp; celeration line.</td>
<td>↑ in self-initiated requests to use toilet w/o accidents achieved w/in 11 training days for all 3 participants ↓ variability in self-initiated requests; ↓ variability in freq. of accidents 3 of 3 pts made gains, increasing gen. to similar participants &amp; behaviors Toileting gains maint. at 1 yr, 6 mo. for 1 of 3 participants during FU</td>
<td>Small sample size, objective data not formally collected on gen. to other settings Difficult to determine which IV can explain IV effects; endurance of IV effects unclear at FU</td>
</tr>
</tbody>
</table>
S1: 5.1 y.o. m with IDD, prior attempts at TT unsuccessful  
S2: 3.9 y.o. m with ASD, prior attempts at TT unsuccessful  
S3: 4.2 y.o. m with ASD, prior attempts at TT unsuccessful  
S4: 4.2 y.o. m with IDD, prior attempts at TT unsuccessful  
S5: 4.1 y.o. m with IDD, prior attempts at TT unsuccessful | IV: school based TT consisting of diaper removal, ↑ access to fluids, timed potty training, bathroom task analysis, consequences, reinforcement  
DV: % of correct urinations in the toilet | Data collected by recording each child’s urinary status throughout the day every 30-60 min; staff documented the occurrence of urination immediately.  
Data analyzed using data recording sheets, visual analysis & celeration line. | ↑ continent void ↑ in bladder control  
5 of 5 pts made ↑ gains in retaining urine in bladder for 2 hours or more  
5 of 5 pts maint. at FU  
No gen to other schools. | Small sample size  
No self-initiating training procedures for children to use bathroom |
|---|---|---|---|---|---|---|---|
DV: successful visits to toilet bowl until elimination, or for a maximum of 2 min. | Observation, recording sheets & tx fidelity checklist used.  
Social validity assessed using the Treatment Acceptability Rating Form questionnaire  
Data analyzed using data recording sheet & visual analysis | IV effective in reducing # of prompts  
After 4 weeks gen. to other settings & skill retention was evident after intervention  
2 of 2 pts made gains, gen. ↑ to other settings | Small sample size |
| Kroeger, K. & Sorensen, R. (2010) | **Journal of Intellectual** | Examine the effectiveness of a RTT parent-delivered, intensive training protocol within the home w/o | N=2; dx w/ ASD, nonverbal, PECS, S1: 4 y.o. 11 mo, m wore diapers, no hx of attempting to toilet train, demo. 1/2 of | IV: Parent driven intensive TT program consisting of ↑ fluids, scheduled sitting on toilet, positive & negative reinforcement for target behavior, redirection for | Data collected continuously throughout baseline, training, & return to baseline. | S1: Continent at end of 2nd day, TT by day 10  
S2: Continent at end of 1st day, TT by day 5, beg. day 6 I pottying & requesting to go via PECS | Small sample size |

---

S1: 5.1 y.o. m with IDD, prior attempts at TT unsuccessful  
S2: 3.9 y.o. m with ASD, prior attempts at TT unsuccessful  
S3: 4.2 y.o. m with ASD, prior attempts at TT unsuccessful  
S4: 4.2 y.o. m with IDD, prior attempts at TT unsuccessful  
S5: 4.1 y.o. m with IDD, prior attempts at TT unsuccessful | IV: school based TT consisting of diaper removal, ↑ access to fluids, timed potty training, bathroom task analysis, consequences, reinforcement  
DV: % of correct urinations in the toilet | Data collected by recording each child’s urinary status throughout the day every 30-60 min; staff documented the occurrence of urination immediately.  
Data analyzed using data recording sheets, visual analysis & celeration line. | ↑ continent void ↑ in bladder control  
5 of 5 pts made ↑ gains in retaining urine in bladder for 2 hours or more  
5 of 5 pts maint. at FU  
No gen to other schools. | Small sample size  
No self-initiating training procedures for children to use bathroom |
DV: successful visits to toilet bowl until elimination, or for a maximum of 2 min. | Observation, recording sheets & tx fidelity checklist used.  
Social validity assessed using the Treatment Acceptability Rating Form questionnaire  
Data analyzed using data recording sheet & visual analysis | IV effective in reducing # of prompts  
After 4 weeks gen. to other settings & skill retention was evident after intervention  
2 of 2 pts made gains, gen. ↑ to other settings | Small sample size |
| Kroeger, K. & Sorensen, R. (2010) | **Journal of Intellectual** | Examine the effectiveness of a RTT parent-delivered, intensive training protocol within the home w/o | N=2; dx w/ ASD, nonverbal, PECS, S1: 4 y.o. 11 mo, m wore diapers, no hx of attempting to toilet train, demo. 1/2 of | IV: Parent driven intensive TT program consisting of ↑ fluids, scheduled sitting on toilet, positive & negative reinforcement for target behavior, redirection for | Data collected continuously throughout baseline, training, & return to baseline. | S1: Continent at end of 2nd day, TT by day 10  
S2: Continent at end of 1st day, TT by day 5, beg. day 6 I pottying & requesting to go via PECS | Small sample size |
<table>
<thead>
<tr>
<th>Research</th>
<th>Use of punishment procedures</th>
<th>Research procedures for training</th>
<th>IV: Parent &amp; teacher implemented TT procedure: (a) sitting schedule, (b) reinforcement, (c) access to fluids, (d) communication training, (e) urine sensor &amp; alarm, (f) positive practice for accidents</th>
<th>Data collected on daytime toileting incidents by researchers, school staff, &amp; family members.</th>
<th>3 of 3 remained continent across settings at 1-m.o. FU. 2 of 3 consistently initiated toileting daily by end of IV; self-initiations maint. at mod. to high levels.</th>
<th>Small sample size. No procedural integrity data to ensure that the IV was implemented as prescribed. Difficult to determine which of the IV's can explain IV effects.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leblanc, L.A., Carr, J.E., Crossett, S.E., Bennett, C.M., Detweiler, D.D.</td>
<td>ABA design</td>
<td>2005</td>
<td>USA</td>
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</table>

Focus on Autism and Other Developmental Disabilities | 

Nonconcurrent MBD | N=3; dx w/ ASD, had not responded to prior lower intensity TT IV. S1: 4 y.o. 1 m.o., m., infreq. urination on toilet at school but not home, vocab. of ~100 words. S2: 4 y.o., 11 m.o., m., no prior attempts at urination in toilet, no spoken language, PES | IV: Parent & teacher implemented TT procedure: (a) sitting schedule, (b) reinforcement, (c) access to fluids, (d) communication training, (e) urine sensor & alarm, (f) positive practice for accidents | Data collected on daytime toileting incidents by researchers, school staff, & family members. | Data collected at home, school, outpatient clinic, & community. | 

Data analyzed using visual analysis. | 2 of 2 subjects made gains, toileting gains gen. to other bathrooms in the home then to other familiar settings to the child. | Maint. of skills 3 yrs post training 2/2 subjects |
| Lee C.Y.Q., Anderson A., Moore, D.W. | Examine the effectiveness of using a custom-made VM intervention in conjunction | 2013 | USA | 

(GG) | 

(SK) | N=1, 4 y.o. m/w/ASD, wore diapers, showed signs of discomfort after soiling, language dev. delayed, limited vocal repertoire, PES | IV: 48 sessions of designated TT times to watch toileting video, video cue cards, verbal prompts, positive reinforcement, In-Vivo modeling introduced at | Data collected 8x/day during identified training times | ↓ variability in # of completed steps in TT. Gen. of 5 steps to school setting 6 steps maint. over a 5-day post-tx | Small sample size. VM may not be suitable for some sensitive |
| Journal of Developmental Physical Disabilities | USA (GG) | w/ prompting and reinforcement to TT a child AB design | session 87 apx. 1x every 2 days for 25 days. DV: Unprompted completion of 6 steps of toileting: walking to toilet, undressing, sitting on the toilet, eliminating in the toilet, redressing, & flushing. | Data analyzed using data recording sheet. | Ineffective for in-toilet voiding. | behaviors due to privacy issues re: explicit depiction of genitalia & excretion. Fidelity compromised w/ # of training sessions occurring per day (4-5) compared to # times video was shown (2-3). Uncontrollable changes to participants' schooling routine. |
| McLay, L., Carnett, A., Van Der Meer, L., Lang, R. 2015 | | Investigate effects of VM procedure using animation to depict in-toilet voiding, behavioral prompting & reinforcement procedures to teach independent toileting skills at home to 2 boys with ASD | N=2; dx with ASD, wore diapers day & night, no spoken language, 1-word requests using SGD, previous attempts at TT unsuccessful S1: 8 y.o., 1 m.o. male S2: 7 y.o., 2 m.o. male IV: Parent & teacher implemented VM toileting procedure (a) video-modeling, (b) behavioral prompting, (c) reinforcement DV: # of steps completed I in TT sequence; % of times urination occurred & the freq. of defecation | Data collected on toileting sequence & completion of each step at home by family members. Data analyzed using visual analysis. ↓ variability in toileting seq. completed I; wide variability in # of in-toilet urinations and defecations. Mastery of in-toilet urination (<80% for 3 consecutive days) for 2 of 2 pts; defecation (1x/day for 3 consecutive days) for 1 of 2 pts; Skills gen. to the school & were maint. over 3-4 m.o. IV conducted at home & gen. probes conducted at school, ↑ overall gen. | Small sample size Difficult to determine which of the IV's can explain IV effects |
| Authors                  | N= | dx disorders | Sessions | Parent support | Data collection | IV effects | DV | Data analysis | Small sample size, objective data not formally collected on gen. to other settings  
Difficult to determine which of the IV's can explain IV effects |
|-------------------------|----|-------------|----------|----------------|----------------|------------|----|---------------|------------------------------------------------------------------|
| Nizam, N.K., Matzin, R., Abdullah, N.Z.M.  
2019  
*Education and Training in Autism and Developmental Disabilities*  
Brunei (SK) | 5; dx with ASD, between the ages of 3 to 5 y.o., attended an Early Developmental Program, able to follow simple instructions, able to go to the toilet w/ assistance, prior attempts at TT unsuccessful.  
ABA design | N=5; dx with ASD, aged 5-10, able to maintain seating on the toilet for 10 min. | Parent- implemented toilet training for 15-20 min. sessions (5x/day) for 7 months; busy bags w/ reinforcements, visual prompts w/toileting steps; parent demonstration of TT skills | Data collected 5x/day during IV phase & recorded on recording sheet; parents filled in freq. recording form throughout tx & data collection materials for 5 sessions tx phase.  
Data analyzed using visual analysis. | IV effective in teaching toileting skills; pts able to retain mastery (<80% correct) of skills during the retention phase (5 wks after IV)  
↓ variability in opening/closing toilet door, sitting on toilet bowl, & flushing; ↓ variability in on-toilet urination/ defecations  
5 of 5 participants made gains in AB design ↑ gen. to toileting skills in other settings  
5 of 5 participants maint. gains during FU | Small sample size, objective data not formally collected on gen. to other settings  
Difficult to determine which of the IV's can explain IV effects |
| Ricciardi, J.N. & Luiselli, J.K.  
2003  
*Child & Family Behavior Therapy*  
USA (GG) | 1; 11 y.o. male w/ ASD & mental retardation. | In school, 6 days/wk for 6 hrs for 85 days. Pt wore disposable diaper (escape extinction), limiting requests for bathroom, withholding attention contingent on continence, praise, systematic fading. | Data recorded through freq. count on precoded data sheet  
Data analyzed using visual analysis | ↓ variability in # of accidents.  
Participant successful in 85-100% of in toilet voiding opportunities.  
1 of 1 participants made & maint. gains 6 mos post intervention. Gen. to a school setting. | Small sample size. |
| Rinald, K. & Mirenda, P.  
2012  
*Research in Developmental Disabilities* | 6 families comprised of diff. ethnicity, family status, occupation. Participating children diagnosed with ASD, IDD, Down Syndrome  
AB design | protocol included ↑ fluid intake, positive reinforcement scheduled toilet settings, scheduled chair settings to teach initiation, neutral redirection for accidents, & procedures to enhance maint. & gen. | Parents recorded data on their child's urination & defecation during implementation; researcher telephoned | ↑ in-toilet urination and defecation, ↓ accidents  
RTT-derived workshop ↑ toileting behaviors in participating children with increased toilet urination and defecation; decreased accidents | Design did not enable demonstration of a functional relationship between modified RTT workshop &
<table>
<thead>
<tr>
<th>Canada (JM)</th>
<th>3 f 3:3, 3:11, 5:11 3 m 3:5, 3:7, 3:9</th>
<th>DV: † in-toilet urination &amp; defecation &amp; ↓ accidents</th>
<th>parents for data reports daily during IV period. Social validity data collected during home visit 2-weeks post tx Data analyzed using data recording sheet visual analysis, &amp; celeration line</th>
<th>5 of 6 pts. made gains, ↑ gen. to other settings outside the home. 5 of 6 pts. maint. 1 month F.U. 1 pt. acquisition but withdrew after 7 days.</th>
<th>improvements in child continence. Small sample No formal preference assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intellectural or Developmental Disability (IDD)</td>
<td></td>
<td></td>
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<tr>
<td>Brown, F. J., &amp; Peace, N. 2011 British Journal of Learning Disabilities Brystol (SK)</td>
<td>Examine the effectiveness of a modified Azrin &amp; Foxx’s (1971) basic TT procedure for a 13 y.o. child with learning disabilities &amp; aggressive behavior at school. ABCA design</td>
<td>N=1; 13 y.o. m w/GDD; limited comms skills, PECS, aggressive behaviors, wore pad at all times, no prior continence skills, previous TT attempts unsuccessful</td>
<td>IV: Teacher &amp; support staff implemented TT procedure w/ scheduled toileting, removal of pads, ↑ access to fluids, positive reinforcement, positive practice, &amp; communication training DV: # of accidents &amp; # of urine in-toilet voids &amp; off-toilet voids</td>
<td>Data collected &amp; recorded at school by teacher &amp; support staff. Data analyzed using data recording sheets, visual analysis &amp; celeration line. Evidence for effective continence programs with TT procedure. ↓ variability in accidents &amp; in-toilet urinations. Urinary continence achieved within 2 wks &amp; maint. at 6-wk F.U.; continence maint. at 6-,12- &amp; 24-m.o. F.U. Program successfully transferred to home setting, ↑ gen. to other settings.</td>
<td>Small sample size Weak internal validity due to ABCA design Difficult to determine which of the IV’s can explain IV effects</td>
</tr>
<tr>
<td>Chang, Y.J., Lee, M.Y., Chou, L.D., Chen, S.F., Chen, Y.C. 2011 Journal of Developmental Disabilities</td>
<td>Assess the possibility of TT using ZigBee based wetness sensor technology &amp; positive reinforcement.</td>
<td>N=1; 9 y.o. m, IDD lack of speech, hearing impairments.</td>
<td>IV: ZigAlert Diaper, 5x/wk, 2-3 TT sessions/day in school w/teacher. DV: # of wet &amp; dry diapers.</td>
<td>Data collection recorded automatically in the EeePC console Data analyzed using visual analysis ↓ variability in # of wet diapers. Significant decrease in # of wet diapers from baseline to intervention.</td>
<td>Longevity of effect unknown. Larger participant pool required to examine gen. across settings &amp; populations.</td>
</tr>
<tr>
<td>Physical Disabilities</td>
<td>USA (GG)</td>
<td>ABAB design</td>
<td>Lancioni, G.E., Van Bergen, I.</td>
<td>Perceptual and Motor Skills</td>
<td>Netherlands (SK)</td>
</tr>
</tbody>
</table>
time before urinating was less than 3-min criterion, & maint. when IV3 was terminated

Possible that variables other than the MP IV caused or influenced the acquisition of toileting skills.

Conducted fidelity checks infrequent

Small sample size.

S1, S5, S6, S7 = ↑ # of correct voids
S1, S5, S7 = # of accidents per day ↓
S6 = no diff. in accidents between phases
S2 = ↑ accidents on day 3. Rise in correct voids & ↓ in accidents in intervention phase
FU results:
S6, S7 = correct voiding maint.
S5 = showed self initiation
S1, S2, S7 = not maint.

Small sample size & individualized training protocols make gen. challenging.

Low level design that lacked control.
### Autism Spectrum Disorder (ASD)

<table>
<thead>
<tr>
<th>Author, Yr Jrn, Cntry</th>
<th>Study Objectives</th>
<th>Design/ Evidence</th>
<th>Participants: Sample Size &amp; Inclu/Exclu</th>
<th>Interventions &amp; Outcome Measures</th>
<th>Summary of Results</th>
<th>Study Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keen, D., 2007</td>
<td>Compare effectiveness of an animated TT video combined w/ OC strategies vs using OC strategies alone in TT in 5 boys w/ ASD across multiple settings.</td>
<td>Case-series, multiple baseline design between &amp; across groups AOTA level IV Pyramid D3</td>
<td>N=5, m participants M age = 5yr, 2 mo</td>
<td>I= ↑ access to fluids, 6-min animated video of toileting before toilet use, prompts to request toileting, reinforcement for walking to toilet, undressing, sitting, eliminating, redressing, &amp; handwashing</td>
<td>Tx=more freq. in-toilet urinations (4, 11, 14), results maint. at follow-up, for 2 of 3 children in tx group, toileting practices gen. to different settings</td>
<td>Small sample size Parents/caregiver s recorded progress so bias &amp; inconsistencies in recording scores may have impacted the results (poor IRR)</td>
</tr>
<tr>
<td>Brannigan, K. L., &amp; Cuskelley, M.</td>
<td></td>
<td></td>
<td>Incl= ages 4-7 y.o., ASD dx, urinary accident ≥ 2x/day, no prior I initiation of toileting.</td>
<td>Ctrl= ↑ access to fluids, prompted to request toileting using pictures, language, or signs; reinforcement for walking to toilet, undressing, sitting, eliminating, redressing, &amp; handwashing, no video</td>
<td>O= freq. of in-toilet urination (prompted &amp; unprompted)</td>
<td>Ctr!= less frequent in-toilet urination (0, 2), results not maint. at FU for both children</td>
</tr>
<tr>
<td>Autmn, C.</td>
<td>Journal of Developmental Physical Disabilities Australia (SK)</td>
<td></td>
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<tr>
<td>Bartos, Bartos, N.S.O, Hamilton, E., Barnes, E., Caldwell, P.H.Y.</td>
<td>Evaluate the use of “Potty Monkey” for TT children w/ special needs</td>
<td>Controlled clinical trials (prospective cohort study) AOTA level II Pyramid E3</td>
<td>N=21, 15 m, 6 f. age ranged 4-10, special needs including physical, emotional, sensory, cognitive &amp; or/intellectual problems. Incl= pts 4-10 y.o., not TT, physical ability to self-toilet (or required min. assistance), &amp; ability to understand &amp; follow instructions Excl= pts w/ neuro conditions resulting in urinary leakage or w/ severe neuro disability.</td>
<td>I: ‘Potty Monkey’ facilitated by parents for 156 days in the child’s natural environments. ‘Potty Monkey’ prompted the child to void at 30- or 90- min intervals. ‘Potty Monkey’ provided verbal praise for voiding or notified child of an accident when failed to void in toilet by 3rd attempt. Parents encouraged to provide modeling &amp; positive reinforcement. O= Attaining daytime continence by self-toileting at the end of 6 mos., time to achieve daytime continence, improvements in TT acceptability of treatment for child &amp; family, adverse</td>
<td>At 6 mos., 8 children didn’t use ‘Potty Monkey’; 9 children, improved, 5 were unchanged &amp; 4 were worse (3 were &quot;unknown&quot;). Among those that did not use ‘Potty Monkey’ 4 improved, 1 unchanged, 1 was worse, 2</td>
<td>Uncertain of effectiveness of IV for kids w/ special needs. ‘Potty Monkey’ is an American toy; study conducted in Australia, so children not familiar with toy. No control group for comparison</td>
</tr>
<tr>
<td>Intellectual or Developmental Disabilities (IDD)</td>
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<td>Uncertain of effectiveness of IV for kids w/ special needs. ‘Potty Monkey’ is an American toy; study conducted in Australia, so children not familiar with toy. No control group for comparison</td>
</tr>
</tbody>
</table>
### Sensory Processing Disorder (SPD)

<table>
<thead>
<tr>
<th>Koshy, N.M., Sugi, S., R.K.</th>
<th>The Indian Journal of Occupational Therapy 2018</th>
<th>India (GG)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effectiveness of SIT to improve TT in children w/SPD, and compare SIT w/behavior modification for developing TT habits in children w/ SPD.</td>
<td>Cross-sectional survey &amp; quasi experimental pre-posttest design.</td>
<td>AOTA 3, Pyramid O4</td>
</tr>
<tr>
<td>Inclu = ASD, ADHD, learning disability, FXS, emotional problems with the potential of SPD, identified with SPD &amp; screened for toileting challenges</td>
<td>Exclu= physical dysfunctions, visual, hearing impairments</td>
<td></td>
</tr>
<tr>
<td>N=22</td>
<td>Tx 1: n=10</td>
<td>Tx 2: n=11</td>
</tr>
<tr>
<td>Inclu= poor toileting skills who had been screened using SP</td>
<td>Exclu= other laxative therapy, enemas, &amp; suppositories, biofeedback &amp; medication for constipation</td>
<td></td>
</tr>
<tr>
<td>1=regular OT sessions, diet modification classes for parents</td>
<td>O= SP, COPM</td>
<td></td>
</tr>
<tr>
<td>Tx 1=SIT</td>
<td>Tx 2=BMT</td>
<td></td>
</tr>
<tr>
<td>4 mos, 2x/wk for 45 min w/the researcher &amp; parents</td>
<td>4 mos. parent administered home program</td>
<td></td>
</tr>
<tr>
<td>50 defecations inside purposive toileting scheduling chart-modified baseline chart.</td>
<td></td>
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</tr>
<tr>
<td>68.75% of SPD children had toilet skill problems prior to tx.</td>
<td>68.75% of SPD children had toilet skill problems prior to tx.</td>
<td></td>
</tr>
<tr>
<td>Tx1: CI: 95%, p = 0.005 (&lt;0.05), medium effect size for COPM components, 50 defecations inside toilet, 20 defecations outside toilet</td>
<td>Tx2: p = 0.004 (&lt;0.05), small effect size, 29 defecations in toilet, 56n defecations outside of toilet</td>
<td></td>
</tr>
<tr>
<td>Caregiver compliance difficult to maintain.</td>
<td>Caregiver compliance difficult to maintain.</td>
<td></td>
</tr>
<tr>
<td>Results examined at a single point in time.</td>
<td>Results examined at a single point in time.</td>
<td></td>
</tr>
<tr>
<td>No FU data.</td>
<td>No FU data.</td>
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</tr>
</tbody>
</table>
Abbreviation Key
&= and, #= number, ↑= increase, increased, increasing, ↓= decrease, decreased, decreasing, acq: acquired, ADL= Activities of Daily Living, ASD= Autism Spectrum Disorder, Apx= approximately, ASL= American Sign Language, avg.= average, BMT= Behavior Modification Therapy, comms= communication, COPM= Canadian occupational performance measure, Ctl= control, demo= demonstrates, Dev.= development, Diff= difference, f= female, freq= frequency, FU= follow-up, FXS= Fragile X Syndrome, Gen.= generalization/ generalizability, GDD= Global Developmental Delay, hx= history, I= independently, IDD= intellectual or developmental disability, maint= maintained, m= male, M= mean, MBD= multiple baseline design, min= minutes, mo=month, mod.= moderate, min= minute, MP= Moisture Pager Device, neuro= neurological, OC= operant conditioning, P1= Phase 1, P2= Phase 2, PECS= Picture Exchange Communication System, PinQ= Pediatric Incontinence Questionnaire, QoL= quality of life, re:= regarding, RI= Reinforcement interval, RR= Rapid restriction, RTT= Rapid Toilet Training, SIB-R= Scales of Independent Behavior, SCED= Single Case Experimental Design, SIT= sensory integration therapy, SP= Sensory profile, SGD= Speech Generating Device, TBI= traumatic brain injury, TD= typically developing, TT= toilet training, Tx= treatment, WMP= wireless moisture pager, w/o=without, wk= week, VM= video modeling, vocab. = vocabulary, y.o.= years old,, yr= year
Summary of Key Findings

Summary of Single Case Experimental Design Studies for Autism Spectrum Disorder

Many relevant Single Case Experimental Design (SCED) studies involving children with Autism Spectrum Disorder (ASD) were included in this evidence review about best practices for toilet training. However, many gaps remain and limit conclusions regarding the most effective toilet training intervention for this population.

Video modeling was found to be effective in three studies for toilet training for children with ASD. Video modeling was successful when used in combination with other interventions such as sit schedules, timed toileting, verbal prompts, or positive reinforcement (Drysdale et al., 2015; Lee et al., 2013; McLay et al., 2015). Lee et al. (2013) raised concerns of privacy and sensitivity surrounding the depiction of genitalia, questioning the suitability of video modeling for children. This was accounted for in Drysdale et al. (2015) and McLay et al. (2015) by utilizing animated video modeling which was as effective as videos of real people as utilized in Lee et al. (2015).

Various components of the Azrin and Foxx (1971) toilet training protocol were implemented with and without modifications in nine studies with varied success (Cicero & Pfadt, 2002; Kroeger & Sorensen, 2010; Rinald & Mirenda, 2012; Cagliani et al., 2021; Cocchiola et al., 2012). Overall, studies concluded that using the Azrin and Foxx Rapid Toilet Training (RTT) program in toileting individuals with a variety of disabilities resulted in positive outcomes in initiation, reducing accidents, and increasing skill acquisition of toileting independence.

Six studies incorporated sitting schedules or timed toileting used concurrently with other toileting protocols or approaches. Sit schedules and timed toileting were found to be more effective when combined with other toileting methods, such as reinforcement, video modeling, or behavior modification and increased retention and generalizability of toileting skills (Kroeger & Sorensen, 2010; Bartos et al., Rinald & Mirenda, 2012; Leblanc et al, 2005; Cagliani et al., 2021; Cocchiola et al., 2012). Additionally, sit schedules were found to increase toileting independence if they were gradually faded.

Reinforcement-based training was examined in eight studies (Cicero & Pfadt., 2002; Kroeger & Sorensen, 2010; Rinald & Mirenda, 2012; Nizam et al., 2019; Leblanc et al, 2005; McLay et al., 2015; Cagliani et al., 2021; Cocchiola et al., 2012). Reinforcement-based toilet training interventions were effective in teaching toileting skills & sequencing of behaviors necessary for successful toileting (e.g., walking to the toilet, undressing, sitting on the toilet, dressing, and flushing). Additionally, reinforcement encouraged retention and repetition of toileting skills. Reinforcement played a key role and was regularly used in addition to other toileting methods. Effectiveness of reinforcement-based toilet training in conjunction with other toileting protocols were found to be an effective approach to toilet training children with ASD.

Nizam and colleagues (2019) investigated visual prompting as part of a toileting protocol and found that using visual prompts with toileting steps was effective to toilet train children with ASD if the child uses pictures to communicate their needs and is a visual learner.

Behavioral modification interventions, such as behavioral prompting, shaping, and fading, were implemented in two studies for children with ASD. McLay et al. (2015) identified behavioral prompting (verbal, gestural, physical) as an effective toileting technique when used in combination with other toilet training interventions. This method was beneficial when a child did not respond, responded incorrectly, went off-task, or exhibited challenging behaviors. Ricciardi & Luiselli (2003) implemented a behavioral modification intervention to toilet train a child with ASD and concluded
that differential reinforcement upon successful elimination in the toilet (e.g., social praise, access to preferred toys) was beneficial in reducing a variety of challenging behaviors while toilet training a child.

Research found that individuals with toilet training difficulties benefited from switching to underwear from pull-ups or diapers during an intervention that included components of the Azrin and Foxx (1971) RTT. Brown & Peace (2011) utilized a similar strategy of pad removal from underwear during their intervention and concluded that successful urinary continence was achieved after a two-week period.

Leblanc et al. (2005) utilized technology as a component of intervention by implementing wetness detection sensors into the children’s diapers, in addition to positive reinforcement, scheduled sitting, communication training, and toileting alarms. Due to the wide variety of techniques implemented, it is difficult to distinguish if the sensors were beneficial in toilet training children with ASD.

All eleven SCED studies that examined toilet training interventions for children with ASD were rated as “did not meet evidence standards” based on the Quality Appraisal for Single Case Experimental Design Studies (Kratochwill et al., 2010). Additional well-designed studies that examine best practices for toileting individuals with ASD are needed to increase the strength of evidence for these interventions. More research is needed to understand the effects of video modeling, rapid toilet training, sit schedules or timed toileting, reinforcement, technology-based, visual prompts, behavioral modification, urine alarm, underwear or pad removal, and sensory integration.

**Summary of Single Case Experimental Design Studies for Intellectual or Developmental Disabilities**

This evidence review included seven studies that examined best practices for toilet training children with intellectual or developmental disabilities (IDD). Many gaps still remain and the lack of sound evidence limited the research group’s ability to make conclusions regarding the most effective toilet training intervention for children with IDD.

Urine alarms were utilized in two studies for children with IDD. Chang et al. (2007) used a wetness detection sensor at school as a primary intervention supported with positive reinforcement. All participants made improvements in increasing independence in toilet training and were able to generalize from school to the home setting, indicating that wetness detection sensors combined with positive reinforcement in a school-based setting were effective in toilet training children with IDD. Mruzek et al. (2016) used an urine alarm device with disposable sensors and also found that this was an effective toileting intervention for children with IDD.

Among other studies that utilized a combination of toilet training protocols, Brown & Peace (2011) found that a teacher & support staff implemented toilet training procedure that include scheduled toileting, removal of pads, increased fluid intake, positive reinforcement, & communication training were effective continence programs for children with learning disabilities. In addition, Luiselli (2007) concluded that a negative reinforcement strategy that required a child to remain seated on the toilet until they voided was effective in toilet training children with IDD. Lancioni et al. (2002) indicated that a teacher and staff implemented toilet training program with a vibratory urine alarm signal, reinforcement, and behavioral prompts were effective in toilet training children with IDD.

Additionally, Mruzek et al. (2016) concluded that for children with IDD who had a limited awareness of being wet, or demonstrated few or very subtle overt signs of a full bladder, training with the urine alarms as a toileting method may be beneficial and should be considered as a toilet training approach.
Summary of Quantitative Studies for ASD, SPD, and IDD

One study compared the effectiveness of an animated toilet training video combined with operant conditioning strategies in a child’s natural environment versus operant conditioning strategies alone to toilet train 5 children with ASD (Keen et al., 2007). The study concluded that the video modeling toilet training package was more effective in teaching a sequence of behaviors necessary for successful and independent toileting and can aid in more frequent in-toilet urinations, retention, and increase generalizability to various settings for children with ASD.

Koshy et al. (2007) compared the effectiveness of Sensory Integration Therapy (SIT) to standard behavior modification therapy (BMT) for developing age appropriate toilet training skills in children with sensory processing challenges. The study concluded that SIT was a valuable technique to address toileting problems and teach toileting independence skills and was more effective than BMT for toilet training children with sensory processing challenges.

In an examination of the Potty Monkey toy coupled with timed toileting and positive reinforcement for children with IDD (Bartos et al., 2020) some children developed valuable toilet training skills, some were unchanged, others got worse, and some experienced adverse effects of the toy. The effectiveness of ‘Potty Monkey’ for toilet training children with disabilities is inconclusive.

Implications for Consumers

This evidence review can be used to guide consumers, who are seeking to improve independence in toileting for a child with developmental disabilities. The current evidence suggests that individuals with developmental delays may benefit from occupational therapy interventions that utilize a combination of strategies and approaches to address their unique challenges. One strategy that remained consistent across all studies was the importance of parent/caregiver collaboration with occupational therapists. Due to the individualized nature of toilet training, parents/caregivers should seek collaboration in problem-solving challenges that arise when generalizing the learning that occurs in the clinic setting to the home setting.

Implications for Practitioners

The evidence synthesized in this review suggests that toilet training can be improved in children with disabilities through a variety of approaches. Occupational therapy practitioners should consider several intervention components when considering best practices for pediatric toilet training for children with a disability, such as increasing fluid intake, scheduled toileting visits, reinforcement, video modeling, visual prompts, urine alarms, and a variety of behavioral techniques (e.g., shaping, fading, rewards). Additionally, RTT is a common toilet training approach that uses a combination of interventions identified in this literature review including scheduled sittings on toilet, fluid intake, positive reinforcement, and an alarm device. Moreover, studies which modified and shortened RTT have also been effective in teaching these skills (e.g., Rinald & Mirenda, 2012). Since there isn’t a standard or preferred approach to toilet training young children with disabilities, toileting interventions should be individualized and adapted based on a client’s specific needs, environmental contexts, and performance capacity. Occupational therapy practitioners should consider these practices when implementing a toilet training intervention and supporting families in individualized toileting strategies to enhance ADL performance in toileting.

Implications for Researchers

There are several gaps in the kind of information that is available to practitioners regarding effective methods for toilet training children with disabilities and many areas where research can be strengthened to provide occupational therapists with quality, evidence-based practices. Further high-quality research that examines toileting interventions for clients with specific diagnoses is
needed as indicated by the lack of studies that meet evidence standards. It should also be noted that while this evidence review did not find any peer-reviewed articles that examine toileting interventions for children with ADHD and intellectual or developmental disabilities, there is an overwhelming amount of evidence focused around the diagnosis of ASD.

There are two main areas researchers should prioritize to strengthen the evidence around toilet training for individuals with disabilities in their natural environment. First, additional research is needed for diagnoses other than ASD. This will arm occupational therapists with the knowledge to provide sound, evidence-informed recommendations and suggestions to the clients they work with. Second, the methodology of the level of studies conducted must be more rigorous. The majority of the studies in this evidence review were SCED studies that did not meet the standards for risk of bias. Researchers should increase the level of strength and types of studies that are conducted around toileting.

**Bottom Line for Occupational Therapy Practice/ Recommendations for Best Practice**

Toileting is an important skill that practitioners work on with their clients throughout the lifespan. As a result, reliable evidence-based interventions that support children with toilet training are paramount. Toilet training should be client-centered and individualized based on a child's unique needs, environmental contexts, and personal contexts. This evidence review confirms that there is not a one-size-fits-all approach that can be confidently identified as the best practice for toilet training. There are many approaches to toilet training that may be beneficial, including video modeling, rapid toilet training, sit schedules or timed toileting, reinforcement, technology-based, visual prompts, behavioral modification, urine alarm, underwear or pad removal, and sensory integration.

This evidence review suggests that children with ASD were most successful with toileting interventions that utilized structured protocols centered around a multisensory approach. Additionally the interventions that considered a child's unique strengths, weaknesses, environmental barriers, readiness, and motivation were extremely beneficial in increasing toileting independence. This evidence review indicates that urine alarms, video modeling, technology-based toileting interventions, or a multifaceted approach to toilet training may be effective for children with intellectual or developmental disabilities. In addition, children with SPD have the most success with approaches that involve SIT. Additional well-designed studies that examine best toileting practices for individuals with ASD, IDD, SPD, and behavior disorders are needed to increase the strength of evidence for these interventions. With additional research on a wider variety of diagnoses, practitioners will likely be more equipped to provide sound, evidence-based recommendations to their clients, ultimately strengthening the value of occupational therapy and providing client-centered individualistic care.
Involvement Plan

The collaborating pediatric occupational therapy practitioners for this evidence project were Erica Petru, OTR/L, and Paige Kensil, OTR/L from Little Fin Therapies. Kensil and Pertu identified a need for evidence-based interventions for increased independence in toilet training children with disabilities. They reported that they did not follow a specific protocol for toilet training in their practice, but recommended various toileting strategies to their clients to use on a trial and error basis. However, they found the outcomes of this approach to be inconsistent, confusing to caregivers, and without consideration of each child’s unique needs, diagnosis, or contextual factors. To address this issue, the research group critiqued the literature on best practices for toileting training children with disabilities and identified several toilet training interventions that are commonly used with children with disabilities.

Considering the evidence and the needs of the collaborating practitioners, the research group offered several potential ideas for the knowledge translation project, including a toileting guide of various toileting interventions, a web-based platform with information about toileting interventions, printed materials in the form of a tool kit, and a one-page handout with specific interventions and tips for parents. After discussing these possible options with the collaborators, the researchers concluded that a toilet training guide with streamlined information about evidence-based toileting interventions and guidelines for how and when they should be implemented would be most applicable, so practitioners could easily access and use evidence-based toileting interventions for their clientele.

Contextual Factors

There are a variety of factors that could have potentially affected the knowledge translation process, including individual, organizational, and departmental factors. Little Fin Therapies serves a diverse clientele in terms of ethnic, economic, and educational backgrounds. Therefore, the implementation, convenience, and feasibility of toileting interventions included in the toilet training guide may depend on a caregiver’s English-language competency, time demands, access to resources, family
support, and generalization from the clinic and home settings to other settings (e.g., school, daycare, etc.). In addition, family support and caregiver buy-in are essential to ensure adherence to each toileting protocol since therapists are not present when toileting occurs outside of therapy sessions. Therefore, educating parents and caregivers about toileting interventions, providing sufficient support to families, and providing recommendations for toilet training in a child’s natural environment is vital to address this need. The toilet training guide needed to be a convenient resource for therapists to use during the toilet training process. In implementation, therapists will need to use their clinical judgment to select, recommend, and implement a toileting intervention that is best suited to each client’s unique needs and provide the corresponding handouts to parents or caregivers.

Potential factors that may have facilitated the implementation of the involvement plan include the receptiveness of the clinic directors and therapists, the low-cost nature of the product, ability to easily reproduce the contents (e.g., making copies on an office printer), and the opportunity to customize the wide variety of intervention options available to meet the individual needs of the client. The toilet training guide also provides low-risk toilet training options that can be implemented by parents and caregivers that are non-invasive and are easily observable.

Goals & Objectives of Involvement Plan

The main rationale for this project was to educate occupational therapy practitioners about current best practices regarding pediatric toilet training and create a guide for therapists and caregivers to promote increasing independence in toileting for children with special needs. In order to measure the effectiveness of the knowledge translation project, the researchers formulated two long-term goals to measure the practicality and efficacy of the toilet training guide:

- **LTG 1:** Occupational therapists from Little Fin Therapies will review and critique the toilet training interventions in the toilet training guide for applicability, clarity, and content quality on a Likert scale within 2 weeks of receiving the resource guide.
- **LTG 2**: Occupational therapists from Little Fin Therapies will report the perceived usefulness of the toilet training guide for their clientele using a Likert scale within 2 weeks of receiving the resource guide.

**Expected Outcomes**

In order to monitor and evaluate the effectiveness of the toilet training guide and handouts in the knowledge translation product, the researchers planned to survey therapists using a feedback survey via Google Forms asking questions regarding how useful the toilet training guide was, how often it was used, if it was easily accessible, and overall thoughts on its practicality and effectiveness. Additionally, the researchers planned to ask therapists to rate satisfaction and perceived efficacy of the guide as well as likelihood of using the developed materials with clients, and how helpful the information in the toilet training guide was for their practice in an outpatient pediatric clinic. The researchers also planned to survey parents and caregivers who received toileting handouts from the guide with a short 1-3 question survey about their satisfaction with the handouts and its helpfulness in providing information about a specific toileting intervention.

**Knowledge Translation**

The research group took several steps to ensure the research from the reviewed literature was properly translated into a usable product for the outpatient pediatric clinic, Little Fin Therapies. The knowledge translation product included a written resource guide, *Pediatric Toilet Training Guide for Occupational Therapists and Parents*, designed for both therapists and caregivers with information on toileting interventions. For a complete copy of the *Pediatric Toilet Training Guide for Occupational Therapists and Parents*, see Appendix A. The toileting interventions included in the toilet training guide are evidence-based and obtained from literature examined in the CAT table.

The research group wanted to create a resource to support therapists and parents in toilet training children with disabilities. The aim of this knowledge translation product was to strengthen evidence-based
practice and undertake a translational research project by developing a toilet training guide and providing it to an outpatient pediatric clinic.

The first step included in the creation of the knowledge translation project was gathering information about the various toileting interventions identified in the evidence table and selecting the interventions to be included in the resource guide. The researchers decided to only include toileting interventions that were appropriate and feasible for pediatric occupational therapists to implement in an outpatient setting. To begin the process of creating the toilet training guide, the research group created an outline of the toilet training guide with a cover page, headings, table of contents, and layout of each toileting intervention. During the creation of the handout outline, it was decided that each page would feature the following items: an image or picture related to the toileting intervention, a description of the intervention, expected outcomes, supplies needed, instructions or protocol, and additional resources. The font of the handouts was to be at least size 12 with content at an 8th grade reading level for parents and caregivers for patient education.

The toilet training guide was divided into four main sections: introduction, general information related to toilet training, toilet training interventions, and additional information and resources. After creating a basic outline of the handouts, the research group divided the toileting interventions among the three of them for creation of the handouts. Kne completed the introduction, general information related to toilet training, and handouts for visual schedules, reinforcement, and urine alarms. Gonzalez completed the handouts for video modeling, sit schedules, and parent/caregiver collaboration. Medina completed the handouts for Rapid Toilet Training (RTT), behavior modification, and underwear/pad removal. This process resulted in the final toilet training guide including a total of 9 toileting intervention handouts. Once the first draft for each toileting intervention was created, the research group met and edited each toileting intervention handout as a team. They submitted a first and second draft of the toilet training guide to their research chair and mentor for edits, suggestions, and feedback. Once feedback was
provided, the research group had another meeting and made the final edits as a team. Each page in the
toilet training guide is a single sheet and placed in a page protector to allow for easy removal to
photocopy or to be replaced as needed. Once the final draft of the toilet training guide was approved by
the research chair, the research group provided their collaborators with a PDF and hard copy of the toilet
training guide for use and implementation in an outpatient pediatric clinic. Both editable and PDF
versions of the toilet training guide were also provided so that therapists could easily make any changes to
the original document based on the needs of a specific client.

There were a few challenges encountered during the creation of the knowledge translation
product. First, the research group encountered some difficulties with creating a list of interventions to
include in the toilet training guide that accurately represented the interventions used across the 20
research studies in the literature review. Some toileting interventions discussed in the research studies
were not appropriate for use by both therapists and caregivers (e.g., sensory integration therapy not
appropriate for parents to implement). Therefore, the research group had to come to an agreement about
which toileting interventions to include and exclude in the toileting resource guide. This process involved
careful review of each study’s intervention procedures, compilation of all interventions used, and
discussion regarding appropriateness for use by both therapists and caregivers during the toilet training
process. Another challenge the research group encountered included having to synthesize protocols of the
9 toileting interventions. The protocols for each toileting intervention in the resource guide were adapted
based on the information from each study in the evidence table. However, the protocols reported in the
reviewed literature articles varied from study to study, so the research group had to decide on a general
protocol for each toileting intervention that could be adapted based on the unique needs of a child. This
required careful, collaborative and cohesive group work.
Outline of Activities and Products Completed

<table>
<thead>
<tr>
<th>Task/ Product and Final Deadline</th>
<th>Steps and Dates of Completion</th>
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</table>
| **Develop a rough draft of the toileting guide with various evidence-based toileting interventions found in our CAT articles with guidelines for each toileting protocol, expected outcomes, and additional resources for therapists and caregivers.** | 1. Draft document for toileting guide was created on 2/1/2022.  
2. Each group member researched protocols for all toileting interventions from CAT and collectively identified which toileting interventions would be feasible for therapist and caregiver implementation on 2/7/2022.  
3. Group met and decided to divide up toileting interventions and began to add information and resources with terminology appropriate for both therapists and caregivers into the guide on 3/1/2022.  
4. Group met and discussed how to organize and structure the toileting guide and created an outline for each toileting intervention handout on 2/8/2022.  
5. Article citations were included in each toileting intervention handout on 3/1/2022.  
6. Group met and reviewed each toileting intervention resource as a team and edited prior to submitting the first draft on 3/2/2022.  
7. Group provided a hard copy rough draft of the toileting guide to the research chair for feedback on 3/3/2022. |
| **Target Date: Mid February (2/16/2022).** | Date completed: 3/3/2022 |
| **Create a final draft of the toileting guide and handouts.** | 1. Group met and made final revisions of the guide and handouts based on feedback from the research chair by 3/17/2022.  
2. Group submitted a hard copy of the guide to the research chair for final approval by 3/22/2022.  
3. Revision from chair feedback made by the group on 3/29/2022.  
4. Final draft of toileting guide was approved by research chair on 3/28/2022. |
| **Target Date: Early March (3/9/2022)** | Date completed: 3/22/2022 |
| **Provide collaborators with final draft of the toileting guide.** | 1. After approval from research chair, group provided collaborators with a draft of the resource guide on 3/30/2022 for feedback. Group sent a PDF copy to collaborators via email.  
2. Group emailed Paige and Erica to set up a time to provide our final product with them on 4/6/2022.  
3. Group printed out a final hard copy of all materials and organized it into a toileting resource guide with sheet protectors on 4/13/2022. |
<p>| <strong>Target Date: Mid March (3/21/2022)</strong> | Date completed: 4/13/2022 |</p>
<table>
<thead>
<tr>
<th>Survey</th>
<th>4. Group members dropped off the final product at Little Fin Therapies clinic on <strong>4/13/2022</strong>.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Target Date:</strong> Surveys were planned to be sent and analyzed by early April (4/1/2022)</td>
<td></td>
</tr>
<tr>
<td><strong>Date completed:</strong> Survey administered to practitioners on:</td>
<td>1. Group created a therapist survey on Google Forms on <strong>3/29/2022</strong>.</td>
</tr>
<tr>
<td><strong>4/18/2022 - 4/28/2022</strong></td>
<td>2. Group emailed the survey to collaborators and participating practitioners at Little Fin Therapies Clinic on <strong>4/18/2022</strong>.</td>
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<tr>
<td></td>
<td>3. Group sent an email reminder to therapists on <strong>4/22/2022</strong>.</td>
</tr>
<tr>
<td></td>
<td>4. Group analyzed the results from data collection on the toileting resource guide on <strong>4/30/2022</strong>.</td>
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**Monitoring the Outcomes of Activities**

In order to carry out the involvement plan and knowledge translation product, the research group had to be very diligent about adhering to the predetermined due dates. This was done through use of frequent check-ins, meetings, and text message reminders between the student researchers. At each group meeting, tasks were delegated and progress and barriers to the project were discussed. The research group also remained in weekly contact through virtual communication via the Google Docs and other forms of media. Additionally, meetings between the chair and collaborating practitioners were also scheduled throughout the process to check progress and answer questions. The researchers shared multiple drafts of the project with the research chair for feedback, edits, and suggestions. Due to time restraints, the student researchers did not present their research and knowledge translation product with their collaborators until closer to the end of the process once the final drafts of the CAT draft and toileting guide were approved by their research chair.

A survey was sent to participating practitioners in order to monitor the outcomes and effectiveness of the *Pediatric Toilet Training Guide for Occupational Therapists and Parents* using an online survey tool (Google Forms). The survey questions investigated the usefulness of the toilet training guide, likelihood of potential use, and perception and satisfaction of the guide’s value. There was also
room for qualitative feedback at the end of the survey. A copy of the practitioner survey is located in Appendix B.

**Evaluation of Outcomes**

The final knowledge translation project consisted of an informative product for caregivers and occupational therapy practitioners that contained informative handouts designed for caregivers and therapists regarding the key features of each toileting intervention. The researchers provided a survey to their collaborators to monitor the outcomes and effectiveness of the *Pediatric Toilet Training Guide for Occupational Therapists and Parents* at Little Fin Therapies outpatient clinic sent five days after receiving the guide. A follow-up reminder email was sent four days after the initial email was sent. Finally, a thank you email was sent to the respondents of the survey.

Initially, the researchers had planned to survey parents and caregivers who received toileting handouts from the guide with a short 1-3 question survey about their satisfaction with the handouts and their helpfulness in providing information about a specific toileting intervention. However, parents and caregivers were not surveyed due to limited time for implementation of the knowledge translation product. Therefore, only the therapist survey was used to gauge the applicability of the knowledge translation product to the Little Fun clientele. It was decided that Erica Pertru would present the *Pediatric Toilet Training Guide for Occupational Therapists and Parents* to her colleagues during a meeting at Little Fin Therapies and provide them with the survey following the meeting. Due to unforeseen circumstances, the meeting was pushed back and limited time was allotted for practitioners to respond to the survey. Despite extending the initial timeline to complete the survey, response was limited, with only four respondents completing the survey. For this reason, it is inappropriate to generalize the data beyond those who responded.

Overall, feedback from the survey was positive. Four of four respondents reported they had a chance to look at the toileting binder at the time of the survey. Three respondents identified the *Pediatric*
Toilet Training Guide for Occupational Therapists and Parents as moderately useful for their clientele and one respondent identified the guide as extremely useful for their clientele. All four respondents reported that they have not had an opportunity to present the guide to a client at the time of the survey. Additionally, all four respondents reported that they intend to use information and handouts from the guide with a client in the future. Two qualitative questions requested additional feedback about what would have been helpful to include in the guide as well as general feedback. Three of four respondents had suggestions for additional information to be included in the guide such as incorporating information about gravitational insecurities, different approaches for boys to learn how to urinate while standing, and peri care. One respondent stated that “the links were great but having print-outs as an appendix of communication logs, potty charts, sticker charts, etc. would have been very helpful!” The second respondent did not have additional feedback. One respondent commented on the organization of the Toilet Training Guide for Occupational Therapists and Parents stating, “I think it’s a great resource and appreciate how accessible it is. I liked the organization by intervention type and the links included.” One respondent provided additional feedback regarding inclusion of an article from 1971, stating that this article is outdated and doesn’t reflect the needs of the population seen at Little Fin Therapies. Additionally, the same respondent reported that “toileting has always been a tricky topic, so I appreciate the resource!”

Analysis of Entire Project

The research group had the opportunity to collaborate with practitioners in the community, Erica Petru, OTR/L, and Paige Kensil, OTR/L on a year-long evidence project process. In addition, the researchers had support and guidance from their research chair and mentor, Renee Watling, PhD, OTR/L, FAOTA. The evidence project process was a challenging and rewarding learning experience. This process involved identifying a research question based on a topic provided by our collaborators (best practices for toilet training), identifying search terms and inclusion/exclusion criteria to conduct a review of the
literature, and carefully screening articles for relevance and eligibility. Afterwards, the research group critically examined the selected articles to determine implications, conclusions, and recommendations. After initial research and literature review, the research group collaborated with their practitioners and research chair to create a meaningful knowledge translation product. This resulted in the creation of the *Pediatric Toilet Training Guide for Occupational Therapists and Parents*. Outcomes on the efficacy of the knowledge translation product were also assessed and measured.

The overall process was collaborative, arduous, and rewarding. Completing this project as a group of three had its challenges, but it also provided the research group members with the opportunity to practice and understand the importance of open communication, individual accountability, and group decision-making. All three researchers identified the topic and population as an area of interest. In addition, one group member had prior education and experience in toilet training and was a valuable resource for the team. The researchers found the execution of the research project valuable as it provided them with a first hand account of conducting and executing evidence based research, completing a literature review, and producing a translational research product based on the findings. This gave the researchers a greater understanding and appreciation for evidence-based practice. Additionally, this process resulted in acknowledgement and appreciation of the amount of work and dedication required to strengthen evidence-based practice for the occupational therapy community. Overall, the research group believes the entire year-long evidence project process was very valuable and a great learning experience.

**Recommendations**

The research group has identified several follow-up projects for the future that may strengthen the evidence found in this literature review. Namely, a mixed methods study on the efficacy of each of the nine identified toilet training interventions for children with disabilities should be conducted. Through a mixed methods study, outcomes of each of the identified interventions could be measured to assess if certain interventions were more effective than others for this population. A survey specifically designed
for parents to speak to the efficacy and understandability of the identified toilet training interventions may also aid in the development of future therapist and parent/caregiver handouts to add to the toilet training guide. Since children spend a large part of their day at school, a survey dedicated to teachers may also provide information around the effects of generalization across multiple settings for each toilet training intervention. The survey to teachers would have questions related to the number of toileting accidents and if verbalizations to use the toilet were used or have increased. Lastly, further research could be conducted to explore the effectiveness of toilet training interventions not addressed in this literature review as well as an expansion of the identified diagnosis to include.
Appendix A: Pediatric Toilet Training Guide for Occupational Therapists and Parent

Pediatric Toilet Training Guide for Occupational Therapists and Parents
Sara Kne, OTS
Gabriela Gonzalez, OTS
Jorge Medina, OTS

Collaborators: Paige Kensil, OTR/L and Erica Petru, OTR/L
# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>2</td>
</tr>
<tr>
<td>General Information Related to Toilet Training</td>
<td>3</td>
</tr>
<tr>
<td><strong>Toilet Training Interventions</strong></td>
<td>4</td>
</tr>
<tr>
<td>Collaborating with Caregivers</td>
<td>5</td>
</tr>
<tr>
<td>Azrin and Foxx Rapid Toilet Training Protocol</td>
<td>7</td>
</tr>
<tr>
<td>Behavioral Modification</td>
<td>9</td>
</tr>
<tr>
<td>Positive Reinforcement</td>
<td>11</td>
</tr>
<tr>
<td>Sit Schedules/ Timed Toileting</td>
<td>13</td>
</tr>
<tr>
<td>Urine Alarms</td>
<td>15</td>
</tr>
<tr>
<td>Underwear or Pad Removal</td>
<td>17</td>
</tr>
<tr>
<td>Video Modeling</td>
<td>19</td>
</tr>
<tr>
<td>Visual Schedules</td>
<td>21</td>
</tr>
<tr>
<td><strong>Additional Information and Resources</strong></td>
<td>23</td>
</tr>
<tr>
<td><strong>References</strong></td>
<td>24</td>
</tr>
</tbody>
</table>
Introduction

Toileting is an important skill that occupational therapy practitioners work on with their clients throughout the lifespan. Each child will develop toileting skills at their own pace, depending on their emotional, physical, and cognitive development. There are a variety of reasons why children may have difficulties with toileting, including not being developmentally ready to learn yet, sensory processing challenges, disinterest in using the toilet, medical issues such as constipation or encopresis, fear or anxiety, or lack of a general toileting routine. While these are a few of the common themes around toilet training difficulties, there are a variety of unique reasons that may make toilet training challenging for children.

Occupational therapy practitioners can support parents and caregivers in toilet training children by using skilled observation, activity analysis, and critical reasoning to problem-solve and identify potential causes for toileting difficulties. They can also help equip families with the knowledge and skills to implement a toileting protocol that best meets the needs of each child and their family.

Toilet training should be client-centered and individualized based on a child's unique needs. There are several areas to consider when working on toilet training, including the family's routine, the child's sensory preferences, the child's learning abilities, and any necessary environmental adaptation and/or modifications. This guide provides general information on toilet training followed by detailed information on a range of evidence-based toilet training interventions. Each intervention includes instructions for implementation, supplies needed, expected outcomes, and additional resources for therapists and/or parents.
General Information Related to Toilet Training

The steps involved in toileting can be broken down into smaller steps to support children in learning the sequencing of toileting steps. For example:

- **Step 1**: Go into the bathroom (e.g., open the bathroom door and walk into the bathroom)
- **Step 2**: Removing clothing (e.g., unbutton pants, pull down pants, pull down underwear or pull-ups)
- **Step 3**: Lifting up the toilet seat or lid
- **Step 4**: Getting up on the toilet seat (e.g., transfer onto the toilet with or without assistance)
- **Step 5**: Sitting on the toilet seat (e.g., maintain a seated position on the toilet seat with or without assistance)
- **Step 6**: Get toilet paper (e.g., reach for toilet paper or wipes)
- **Step 7**: Wiping clean (e.g., coordinate wiping movements, weight shift in order to reach and wipe clean)
- **Step 8**: Getting off the toilet: (e.g., transfer from sitting to standing, using a step stool)
- **Step 9**: Getting dressed (e.g., pull up underwear and pants, button pants)
- **Step 10**: Wash and dry hands
- **Step 10**: Exiting the bathroom (close the bathroom door to leave the bathroom)

Additionally, some children may require use of adaptive equipment or a modified environment when toilet training. Adapt or modify the toileting sequence as necessary to adjust for those accommodations.

Examples of adaptive equipment and environmental modifications include:

- Potty chair
- Seat reducer
- Handicapped accessible bathroom
- Grab bars
- Padded and raised seat
- Splash guards
- Seat reducers
- Reading a children's book about going potty while they sit on the toilet
- Playing music in the background
- Pants that are easy to don/doff
- Training underpants
Toilet Training Interventions

The toileting interventions included in this toilet training guide are evidence-based approaches to support increasing independence in toileting for children with disabilities.

**General information related to toilet training** is included on page 3. This information can be used to help gain the various toilet training approaches that follow in the toilet training guide. Additionally, ideas for **Collaboration with caregivers** are included on page 5. This information is beneficial for the implementation and success of toilet training with each child and their family. Collaboration between parents and therapists is an integral part of the toilet training process.

For each toileting intervention discussed, therapists should teach and/or instruct parents or caregivers on how to use the materials and resources provided (e.g., visual schedule, sticker chart, sit schedule) so it can be implemented by the parents in the child’s natural environment.

Toileting interventions include:

- Azrin and Foxx (1971) Rapid Toilet Training protocol
- Behavioral modification
- Reinforcement
- Sit schedules/ timed toileting
- Underwear or pad removal
- Urine alarms
- Video modeling
- Visual schedules
Collaborating with Caregivers

What is collaboration with parents and caregivers?
Collaboration with parents and caregivers involves occupational therapists working closely with key members of the child’s life to develop a toilet training routine that meets the unique needs of the child and family. Due to the individualized nature of toilet training, collaboration is necessary to continually evaluate methods that are or aren't supporting the child in effectively learning the toileting sequence. Collaboration also provides the opportunity for parents to reinforce therapeutic strategies in the home and equips parents/caregivers with the knowledge to independently problem-solve challenging moments with their child outside of the clinic.

Expected outcomes:
Collaboration with parents and caregivers has been shown to be effective for generalizing toilet training between various settings within the child’s life (i.e. home, daycare, and school settings). Additionally, through collaboration with parents and caregivers a therapist is able to assist in problem solving with the family as well as identify supports and barriers to the child’s toilet training routine.

Supplies Needed:
- Communication log shared between occupational therapist and parent/caregiver
- Journal to note strategies that do or do not support independence and track progress
*Note: additional supplies may vary depending on the needs of the child and the recommendations of the therapist.

Instructions/Protocol:
- Instructions and protocol for collaboration will vary depending on the needs of the child and the recommendations provided by the occupational therapist.

---

1 Parent/caregiver collaboration is a key component to implementing a successful toilet training routine as it is likely that occupational therapists will not be present when toileting is occurring. Parent/caregiver collaboration is embedded throughout each article discussed in the back of the resource guide.
Additional resources:

- Free, downloadable communication logs:
  https://www.sampltemplates.com/business-templates/communication-log-templat e.html

- Toilet training log book for children:
Azrin and Foxx Rapid Toilet Training Protocol

What is a Rapid Toilet Training (RTT) Protocol?
RTT is one of the first toilet training studies conducted on toileting interventions that were designed and studied by psychologists Dr. Nathan Azrin and Dr. Richard Foxx. RTT is an intensive toilet training method that involves blocking 6-8 hours of time in a day to toilet train a child. This method includes the use of a toilet training doll that voids when activated

The book, "Azrin and Fox Toileting Training in Less Than One Day" lays out this sequence of toilet training:
During part one of RTT, the child starts by simulating training the doll using these steps:
1. The child lowers the doll's pants and puts the doll on the toilet. Adult activates the doll and makes the doll pee. The child praises the doll, saying, "Dolly is a good girl for peeing in the toilet" and offers the doll a treat. If the child promises to use the toilet then the child can eat the treat.
2. The child shows the doll how to empty the toilet bowl into a toilet.
3. The child checks the doll's pants and checks their own pants for dryness. If the child is dry, they will get a treat.
4. The adult makes the doll wet their pants and prompts the child to check and see if the doll is wet. Since the doll is wet, the child shows displeasure by saying, "No, Dolly, big girls don't wet their pants." The child guides the doll through the correct steps.
5. The child checks their own pants for dryness and gets a treat or drink if they are dry.
6. The doll correctly pees into the toilet.

In "Part Two" of the Azrin and Foxx Method, your child will now repeat all the steps himself. Give him rewards for dry pants. The steps are:
1. Checking for dry pants.
2. Going to the toilet every 15 minutes and when needed.
3. Pulling down pants.
4. Sitting quietly on the toilet.
5. Pulling up pants.
6. Emptying the pan from his toilet into a toilet, flushing, and putting the pot back.

Every time the child does something correctly, they recieve a treat/drink, and verbal reinforcement such as "good job going potty in the toilet!"
Accidents may happen. If the child starts to urinate, or if the child finds his/her pants wet, you say “No,” verbally express disapproval, and give the child a sequence of corrections. This may include:

1. Take the child to where he wet himself.
2. Have the child walk to the toilet, pull down his pants, and sit.
3. Repeat this from nine more locations.
4. Have the child check his pants again, showing wetness.
5. Have the child change his pants.

**Expected Outcomes:**

The protocol is designed to be implemented in a short amount of time with faster results. This faster method is further designed to ultimately save time and money, decreasing some financial and stressful burdens for families. The method artificially increases the frequency of urination through increased hydration, creating multiple opportunities for the child to be successful.

**Supplies Needed:**

1. Potty chair/ portable toilet
2. Potty training doll
3. Fluids (water) and snacks
4. Loose-fitting pants
5. Stickers, toys, other reinforcers

**Instructions/ Protocol:**

The original design in the study in 1971 had multiple steps, which were implemented in a mental health facility. The following are the major components of the intervention.

1. Provide fluids every 30 minutes
2. Child goes to toilet **
3. Reward for voiding in toilet
4. Return to sitting/playing area
5. Reward every 5 minutes for staying dry, then repeat step 1

**After 20 minutes of no voiding, return to sitting/ play area and start with step 1**

**Additional resources:**

- AOTA Website: Establishing toilet routines for children:  
• Guidelines for Azrin & Foxx method and data tracking sheets:
  https://storage.outreach.psu.edu/autism/96.%20Handout%20.pdf
Behavioral Modification

What is behavioral modification?
Behavioral modification is, consists of strategies and techniques used to either increase or decrease a desired outcome. Like positive reinforcement (see page 12), a child will be praised and rewarded for engaging in a desired behavior. The key difference in behavioral modification is the use of negative reinforcement which is defined as the removal of an unfavorable event or outcome after the desired behavior. More simply, behavior modification is based on the idea of modifying a child's behavior by using both positive consequences and negative consequences.

Expected Outcomes:
Through the use of positive and negative reinforcement strategies in toileting practices, behavioral modification allows parents to respond appropriately to unavoidable toileting accidents, implement appropriate measures and successfully interact with their children in helping them with the toileting process.

Examples of Behavior Modification:
- Implementation of negative consequences (e.g., withholding positive praise and a sticker if child wets pants)
- Positive praise and approval
- Modeling
- Shaping
- Token economy
- Self-monitoring
- Shaping

Instructions/ Protocol:
1. Identify possible contributing psychosocial (e.g., fear, anxiety, embarrassment) issues that may be impacting toileting.
2. Focus on the child’s emotions by making them feel heard and noticed in the toilet training process (e.g., validating potential fears and challenges that arise during the toilet training process such as flushing).
3. Be positive and reassuring.
4. Provide reassurance through a calm voice and phrases.
5. Reduce noise and distractions to help the child relax.

2 If you’re interested in learning more about the evidence surrounding behavior modification, please check out these references in the back of the resource binder: (Koshy et al., 2007).
6. Provide negative reinforcement when necessary for unwanted toileting behaviors (e.g., urinating outside of the toilet, inappropriate touching of toilet and self)

Hints and Tips:
These products/supplies may be useful to include as part of a behavioral modification toileting approach:

- Reward chart
- Potty toy or book
- Verbal praise
- Visual toileting schedule
- Talk about the process

Additionally, keep in mind that some behaviors can indicate that the child isn’t ready to use the toilet and they are communicating a lack of readiness through their behaviors. Therefore, begin toilet training when it works for your child and family (e.g., do not start toilet training during a vacation or when other changes are happening in the household).

Additional resources:
- The OT tool box: https://www.theottoolbox.com/about-us/
Positive Reinforcement

What is positive reinforcement?
Positive reinforcement involves acknowledging and rewarding your child for a positive behavior, thereby increasing the likeliness that the behavior will be repeated. A key aspect of positive reinforcement is that the reinforcer is personally meaningful to the child, and therefore powerful when incorporated in the toilet training process.

Expected Outcomes:
Reinforcement-based toilet training interventions have been shown to be effective in teaching toileting skills and helping children learn the sequencing of toileting behaviors necessary for successful toileting. Additionally, reinforcement can be used to support retention and repetition of toileting skills.

Examples of positive reinforcement:
- Verbal praise and celebration (e.g., “great job going potty on the toilet!”)
- Clapping, cheering, or giving a high-five
- Sticker charts (or other token reinforcers)
- Celebrate small successes too (e.g., “I know how scary it can be to do something new. I like how you tried to go potty on the toilet even though you were scared.”)

Supplies Needed:

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3 If you’re interested in learning more about the evidence surrounding reinforcement based toilet training, please check out these references in the back of the resource binder: Cicero & Pfadt., (2002); Kroeger & Sorensen, (2010); Rinald & Mirenda, (2012); Nizam et al., (2019); Leblanc et al., (2005); McLay et al., (2015); Cagliani et al., (2021); Cocchiola et al., (2012).
Supplies will change depending on the reinforcer chosen. Some examples include:
  - Potty chart
  - Expo marker, clothespin, or stickers
  - Paper/clipboard/file folder/binder/etc.
  - Preferred book or toy

Protocol:
1. Attempt to follow the toileting sequence mentioned on page 4 of this guide.
2. Give your child a reward immediately after he or she urinates or has a bowel movement in the toilet.

Hints and Tips:
- The more quickly you reward a behavior, the more likely that behavior will increase. Toileting rewards are special.
- Rewards used for toileting should only be used for toileting. Additionally, it is important to note that there will likely be toileting accidents during toilet training. That is OK- accidents are a normal part of the toilet training process!
- Preferred toys (e.g., stuffed animal) may be useful to include in the toilet training process as a reinforcer.

Additional resources:
- Free, printable potty charts for parents and therapists:
  https://letscraftinstead.com/printable-potty-charts/
- Toilet charts for purchase:
  https://www.teacherspayteachers.com/Browse/Search:potty%20training%20tracking
- Different approaches to implement a visual reward chart:
  https://www.theottotoolbox.com/how-to-use-visual-reward-charts/
What are sit schedules/timed toileting?
Sit schedules and timed toileting involves establishing a consistent routine around toileting that familiarizes the child with the cues their body gives them to identify when it's time to go to the bathroom. While routines for every family and child may look different, establishing a schedule of the times of day the child visits the toilet will help him/her anticipate sit schedules/timed toileting. Some of the suggested times of day to implement going to the bathroom include upon waking up, before and after naptime, before and after a play activity, before a meal, before bedtime, and before leaving the house.

Expected Outcomes:
Sit-schedules/timed-toileting interventions have been shown to be effective in developing a toileting routine that aids in identifying the need to go. Building a routine around toilet training may also help the child and family build healthy toileting habits and reinforce the toileting sequence. Sit-schedules/times toileting interventions appear to be most effective when combined with video modeling, reinforcement, and behavior modification.

Supplies Needed:
- Timer or alarm
- Toilet training schedule with scheduled times (e.g., 8:00am, 8:30am)
  - Can be written, pre-designed, or printed toilet training schedule

4 If you're interested in learning more about the evidence surrounding sit schedules and timed toileting, please check out these references in the back of the resource guide: (Kroeger & Sorensen, 2010; Bartos et al., Rinald & Mirenda, 2012; Leblanc et al, 2005; Cagliani et al., 2021; Cocchiola et al., 2012).
Instructions/ Protocol:
1. Create a schedule of times during the day for the child to visit the toilet.
   a. Personalize the schedule to the child to limit excessive toilet trips.
2. Set a timer or alarm to sound for each identified toileting opportunity in the day.
3. When the alarm sounds, walk the child over to sit on the toilet for no more than 5 minutes.

*Note: Creating the right schedule for the child may require observing them for a few days to recognize emerging toileting patterns to incorporate into a daily routine.

Additional resources:
- Optional: free, printable, blank schedule to establish routine for parents and therapists:
  https://www.youngmommaslife.com/2020/08/06/potty-training-schedule/
- Variety of toilet training timers and alarms for parents:
  https://www.amazon.com/s?k=potty+training+timer&crid=1T7KS7KBjBL0X&sprefix=potty+training+timer%2Caps%2C301&ref=nb_sb_noss_1
Urine Alarms

What are urine alarms?
Urine alarms, also known as enuresis alarms, are devices used to alert children (and caregivers) that elimination has occurred based on detection of moisture. A urine alarm is made up of two parts: a moisture sensor and an alarm. There are a variety of different types of urine alarms (described below). The most common type of urine alarms is one that is connected to a small clip-on sensor that is strategically placed in the child's underwear. When the sensor in the underwear detects moisture, an alarm will sound to notify the child that elimination has occurred.

Expected Outcomes:
Urine alarms tend to be most beneficial for children who have some active bladder and bowel control. Urine alarms teach children to attend to the response of the alarm (e.g., vibratory signal, audible alarm) until the child is capable of independently holding and releasing urine to eventually finish voiding in the toilet. Urine alarms are also commonly used for children who struggle with nighttime bedwetting (nocturnal enuresis), as the alarm can be used to awaken a child so they may go to the bathroom to finish voiding.

Types of Urine Alarms:
There are several types of enuresis alarms available, including:

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5 If you're interested in learning more about the evidence surrounding enuresis alarms in toilet training, please check out these references in the back of the resource guide: (Chang et al., 2007; Mruzek et al., 2016; Leblanc et al., 2005; Lancioni et al., 2002).
• Pad-and-bell alarms: the sensor pad is positioned under a pad or draw sheet beneath the child in the bed
• Body-worn alarms: the sensor is attached to the child's underpants and the alarm is worn on the body (e.g., on a child's pajama top)
• Vibrating alarms: vibrating urine alarms are great options for children who are sensitive to sound.

**Supplies Needed:**
- Urine alarm
- Optional:
  - Night time schedule (visual or written) with "urine alarm" added as a step

**Instructions/ Protocol:**
1. Attach the sensor as instructed by the directions (this depends on the type of urine alarm being used).
2. Have the child wear the urine alarm every night and/or during naps.
3. When the alarm is activated (once moisture is detected), an alarm or vibration will go off.
4. The child may wake up on their own, but if the parent or caregiver wakes to the alarm as well, they can help direct the child to the bathroom.
5. Do not turn off the alarm until after the child attempts to finish urinating in the toilet.
6. If recording progress on a calendar or schedule, document "wet” and “dry” days on a calendar to track progress and determine if the urine alarm is helping.
7. If progress is being made, slowly fade the use of the urine alarm over time. For example, caregivers can begin fading the urine alarm in several ways (e.g., by lowering the volume of the alarm, decreasing the frequency of use, etc.)

*Note: It may take some time to find the right urine alarm for the child. Once you find the right fit for the child, the urine alarm can help teach them how to physiologically identify when they need to go to the bathroom. This can take some time—sometimes up to 6 months to a year. However, there is good research saying it is effective.*

**Additional resources:**
- Different types of urine alarms and explanation: [https://thesensorytoolbox.com/best-bedwetting-alarm/](https://thesensorytoolbox.com/best-bedwetting-alarm/)
- Bed wetting alarm resources: [https://www.eric.org.uk/bedwetting-alarms](https://www.eric.org.uk/bedwetting-alarms)
- Video demonstration of how a urine alarms works: [https://youtu.be/-5z3BtW0Qs4](https://youtu.be/-5z3BtW0Qs4)
What is underwear or pad removal?
Underwear or pad removal is switching from wearing a disposable liner in the underwear or disposable diapers to using only underwear. Removing the pad or disposal diaper allows the child to feel when they are wet. If a child wears only a pad or disposable diaper, then they may not be aware of when they have soiled their clothes. The advantage of using regular underwear is increasing the ease of the trainee feeling accidents (Azrin & Foxx, 1971).

Expected Outcomes:
The use of underwear has many benefits, which include reducing the financial burden in purchasing pads or disposable diapers. Diapers and pads may delay the toileting process for some children, so the use of underwear may be more advantageous over time. Ultimately the use of underwear will allow a child to participate in the toileting process and increase their independence (e.g., to help select and purchase their preferred underwear or choosing which one to wear or not to wear).

Instructions/ Protocol:
1. Allow the child to choose their underwear.
2. Ensure that the child is able to pull underwear up by themselves and modify if the child is not able to don/doff underwear independently. For example, Velcro underwear, adapting underwear to have pull straps/loops, wearing loose
underwear. These modifications can help alleviate some of the challenges associated with pulling up underwear.

3. Always have additional changes of underwear that the child can locate and select.

4. Incorporate behavioral modification strategies if the child does soil their clothes. For example, have the child place their soiled clothes into the dirty laundry hamper, have the child select and locate new underwear, have the child help the parent or caregiver clean up any messes that occurred when the child soiled their clothes.

Additional resources:

- The Pocket OT: https://www.pocketot.com/7-tips-for-toilet-training-lets-get-this-potty-started/
Video Modeling

What is video modeling?
Video modeling involves the use of custom made videos clearly depicting the behaviors involved in the toileting sequence (i.e., undressing, sitting on the toilet bowl, redressing, and flushing). Custom made videos coupled with picture prompts have been utilized to increase the effectiveness in learning the toileting sequence and have helped children increase their independence in toilet training. Video modeling based toilet training interventions have also been shown to generalize to a second setting outside of the home (i.e., school, daycare, another family member's home).

*Note: Video modeling based toilet training was not effective in voiding in the toilet but was effective in teaching the toileting sequence.

Expected Outcomes:
Video modeling interventions have been shown to be effective in learning the various components of the toileting sequence. It also provides visual cueing for children who may be visual learners. Video modeling was successful when used in combination with other interventions such as sit schedules, timed toileting, verbal prompts, or positive reinforcement.

Supplies Needed:
- Technology device to play video (i.e. Laptop, Phone, Tablet)
- Picture prompts/cue cards

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If you’re interested in learning more about the evidence surrounding video modeling toileting, please check out these references in the back of the resource guide: (Lee, C. Y. Q., Anderson, A., Moore, D. W., 2013; Keen, D., Brannigan, K. L., & Cuskelly, M., 2007; Drysdale et al., 2015; Lee et al., 2013; McLay et al., 2015).
• Custom created video clearly depicting the toileting sequence (refer to pg 2-3 in toileting guide)

Content of Custom Created Video:
Example of video sequence:
1. Title frame (e.g., "Potty Training Video")
2. Transition to a hand holding the picture prompt cue card of specific step (e.g., hand holding cue card for walking to toilet).
3. Depiction of specific step (e.g., physically walking over to toilet)
4. Verbal prompt of specific step (e.g., verbally stating, "Let's go to the toilet.") (*This will be repeated for each toilet training step*)
5. Video should end with the parent/caregiver saying, “Good job [insert child's name]!”

Instructions/ Protocol:
1. Identify elimination schedule.
2. Show child full video immediately before identified toileting time.
3. Prompt child with the same verbal phrase and picture cue card as depicted in the video.

Troubleshooting:
• After initial prompting, if the behavior is not performed within 10 seconds, provide a second verbal prompt to the child to complete the step. If the step is still not completed, physically prompt the child to complete the step.
• Have the child sit on the toilet for a minimum of 2 minutes and verbally prompt the child to “pee-poo/poo-poo” to eliminate in the toilet if not completed automatically.
What is a visual schedule?
A visual schedule\(^7\) is a series of pictures and/or words that can be used to communicate a series of activities or the steps of a specific activity, such as toileting. A visual schedule can be used to help children learn the sequence of toileting steps. Additionally, using a visual schedule can make the sequence more predictable, thereby reducing possible anxiety about learning a new skill.

Expected Outcomes:
Visual schedules and visual prompting as part of a toileting protocol were found to be effective in supporting children with autism spectrum disorder in toilet training, specifically if the child already used pictures to communicate their needs and has shown signs of being a visual learner (Nizam et al., 2019).

Supplies Needed:
- Printed or written visual schedule

Instructions/ Protocol:
1. Create an individualized visual schedule for the child.
   a. Use pictures from the child's home, clip art, or words to create the schedule.

\(^7\) If you're interested in learning more about visual schedules and visual aids for toileting, please check out these resources in the back of the Toileting Resource guide: Nizam et al., (2019)
b. Consider using pictures and/or text with the steps of toileting, dressing, and personal hygiene skills.

2. Place the pictures in order on a piece of paper/clipboard/file folder/binder/etc. to show the child each step of the toileting sequence.

3. During the toileting process, show the child the visual schedule and walk them through each step as needed.

4. Encourage the child to check the schedule to determine whether they’ve done each part of the sequence correctly.

Additional resources:
- Toileting picture cards: [www.do2learn.com/picturecards/printcards/selfhelp_toileting.htm](http://www.do2learn.com/picturecards/printcards/selfhelp_toileting.htm)
- Teachers Pay Teachers: [https://www.teacherspayteachers.com/Browse/Search/toilet%20schedules](https://www.teacherspayteachers.com/Browse/Search/toilet%20schedules)
- Autism Little Learners visual schedule for toileting: [https://autismlittlelearners.com/free-toileting-sequence/](https://autismlittlelearners.com/free-toileting-sequence/)
Additional Information and Resources

The resources below have additional information regarding toilet training that may be useful.

**Establishing Toilet Routines for Children (Tip Sheet) – AOTA:**

**Tips for Daily Life—Toilet Training:**

**Bright Tots: Toilet Training and Autism:**
www.brighttots.com/Toilet_training_and.autism.html

**7 Tips for toilet Training—Let’s get this potty started!**
https://www.pocketot.com/7-tips-for-toilet-training-lets-get-this-potty-started/

**Potty training with attention and behavior problems**
https://www.theottoolbox.com/potty-training-with-behavior-attention-problems/

**Autism Speaks Toilet Training Guide for Parents:**
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https://doi.org/10.1007/s10882-013-9348-y


Appendix B: Practitioner Survey

OT Outcome Survey - Toilet Training Guide

Disclaimer: All responses from this survey will remain anonymous. Data from this survey will be used by UPS students and faculty to support current and future decision-making and dissemination of information about this process for educational purposes. By filling out this survey you consent to allowing anonymous publication of your responses.

* Required

1. Have you had the opportunity to use/look at the toilet turning guide? *
   
   Mark only one oval.
   
   ○ Yes
   ○ No

2. If so, on a scale of 1-4 how useful did you find this resource? *
   
   Mark only one oval.
   
   ○ 1 = Not at all useful
   ○ 2 = Somewhat useful
   ○ 3 = Moderately useful
   ○ 4 = Extremely useful

3. Have you had the opportunity to present the toilet training guide to a client and or caregivers? *
   
   Mark only one oval.
   
   ○ Yes
   ○ No
4. If so, on a scale of 1-4 how useful did you find this resource for your client? *

Mark only one oval.

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5. If not, why? *

6. Do you predict you will use this with a client in the future? *

Mark only one oval.

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7. If unsure, why? *
8. Is there anything else that would be helpful to include in the toilet training guide?
   *

9. Do you have additional feedback about the toilet training guide? *
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