Monitoring Progress in Toilet Training

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Abstract

Many training protocols have been developed to facilitate acquisition of continence skills. These range from structured, parent-directed protocols epitomized by the work of Foxx and Azrin to unstructured, child-guided protocols such as those of Brazelton, Schmitt, and Spock. Regardless of the protocol, measuring progress is an important element of any behavior change program and acquisition of continence skills is no different. This chapter provides a review of methods and measures commonly used to evaluate the acquisition of continence skills in young children. Measuring toilet training progress entails more than counting voids in the toilet or episodes of wet pants. Measurement also encompasses recording the integrity with which a protocol is implemented as well as the reliability of the dependent measures. In turn, this requires an appropriate candidate for toilet training as well as having the necessary materials to initiate the protocol successfully. Therefore, while methods of direct observation and measures of toileting behavior will be a primary focus here, measures related to verifying the fidelity of methods, materials, and procedures necessary for the successful implementation of toilet training with integrity also are presented.

Key Words: toilet training, potty training, incontinence

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Toilet training research is far more recent than toilet training itself, yet the practical challenges of training children to become continent have remained the same whether they take place in a research setting or in the home. While toilet training is a universal experience, cultural, familial, and historical variables affect the final common procedural pathway to toileting independence. Nevertheless, successful attainment of continence is the rule and a developmental milestone eagerly anticipated by parents.

Many training protocols have been developed to facilitate acquisition of continence skills. These range from structured, parent-directed protocols epitomized by the work of Foxx and Azrin (1973a; hereafter referred to as the *Foxx and Azrin* procedure) to unstructured, child-guided protocols such as those of Brazelton (1962), Schmitt (2004), and Spock (1946; hereafter collectively referred to as the *child-oriented* method). While both procedures have their adherents and history of success, structured protocols are more frequently evaluated in research settings, in part because they lend themselves to precise measurement (e.g., Klassen et al., 2006) and precise progress monitoring. Regardless of the protocol, measuring progress is an important element of any behavior change program and acquisition of continence skills is no different.

Focus of this Chapter

This chapter provides a review of methods and measures commonly used to evaluate the acquisition of continence skills in young children. In the larger view, measuring toilet training progress entails more than simply counting voids in the toilet or episodes of wet pants. Measurement also encompasses recording the integrity with which a protocol is implemented

(e.g., Gresham, Gansle, & Noell, 1993; Peterson, Homer, & Wonderlich, 1982) as well as the reliability of the dependent measures (e.g., Johnston & Pennypacker, 2009). In turn, this requires an appropriate candidate for toilet training as well as having the necessary materials to initiate the protocol successfully. Therefore, while methods of direct observation and measures of toileting behavior will be a primary focus here, measures related to verifying the fidelity of methods, materials, and procedures necessary for the successful implementation of toilet training with integrity also are presented.

Prerequisite Measures

Before a child is ready to be toilet trained, an assessment of developmental, behavioral, and physical readiness should be obtained to determine if the child is an appropriate candidate. Typically developing children are most commonly toilet trained when they are between 2-3-years old (Bloom, Seeley, Ritchey, & McGuire, 1993; Schum et al., 2002) but older children and those with developmental delays also are trainable, as exemplified by Foxx and Azrin (1973b) or, more recently, Cicero (2012; Cicero & Pfadt, 2002). The ideal time to initiate toilet training is by no means agreed upon and there is great variability in training windows depending upon the readiness signs selected by the trainer (Kaerts, Van Hal, Vermandel & Wyndaele, 2012; Schum et al., 2002). Kaerts et al. (2012) provide an example of 21 directly observed readiness signs (e.g., "children understand potty words," "pull clothes up and down," "can sit still on the potty for 5-10 min") but their individual predictive power relative to successful toilet training has not been evaluated.

Indirect measures of readiness take the form of structured retrospective parent report. For example, the Denver II Developmental Screening test (Frauman & Brandon, 1996) and the Ages and Stages Questionnaire (Squires & Bricker, 2009) are popular screening devices, among many

(e.g., Battelle Developmental Inventory in Mota & Barros, 2008; Bayley Scales of Infant Development in Schum et al., 2001) that have been used to assess toileting training readiness within the context of broad assessment of early child development. Both screening measures are recommended by the American Academy of Pediatrics (Bright Futures Steering Committee & Medical Home Initiatives for Children with Special Needs Project Advisory Committee, 2006). Nevertheless, there is no significant research that evaluates the functional relationship between individual readiness skills and successful toilet training (Blum, Taubman & Nemeth, 2003; Kaerts et al., 2012). A number of commonly agreed upon prerequisite skills are noted in Table 1.

Table 1

Child Prerequisite Abilities

- Physiological readiness
  - bowel peristalsis
  - normal bladder capacity
  - voluntarily tightens sphincter muscles
  - perceives full bladder
  - sits independently
- one to two bowel movements per day
- periods of time between voids
- recognizes being wet or soiled
- mobility/ dexterity/ walking
- pull pants down and up
- imitates behavior
- follows directions

- unafraid of toilet or flush
- understands words for elimination
- understands the social expectations that bladder emptying takes place in toilet

Note. Adapted from Frauman, & Brandon (1996), Foxx & Azrin (1973b), and Harris (2004).

Progress toward achieving readiness criteria can be evaluated over time by using the above components with the caveat that readiness criteria are loosely defined. These measures should not be influenced by developmental or medical status, although attaining these readiness milestones may vary as a function of developmental and medical factors. Measures of prerequisite behaviors may be established as binary events (e.g., recognizes being wet or soiled, pull pants down and up) or occur on a continuum (e.g., child follows what percentage of parental requests, how much time typically elapses between voids).

Of the many readiness skills, following directions is one of the most crucial to toilet training success and may be one of the most important. Children who are not under effective instructional control are poor candidates for toilet training (Polaha, Warzak, & Ditmer-McMahon, 2002). For these children, successful toilet training may be enhanced by implementing compliance training prior to toilet training. A child's compliance can be evaluated by simply asking parents about the likelihood of a child complying with a number of age appropriate one-step commends, or by providing parents with a formal protocol for assessing compliance, as in Shriver & Allen (1997; see Table 2). Seventy percent compliance to one-step commands in young children is often considered satisfactory prior to teaching trials (Shriver & Allen, 1997). In addition, there are a number of child behavior rating scales, such as the Child Behavior Checklist (Achenbach & Rescorla, 2000) and the Eyberg Child Behavior Inventory (Eyberg, Boggs, & Reynolds, 1980) that assess disruptive and otherwise difficult behaviors in

young children that may suggest deferring toilet training until the child comes under instructional control.

Table 2

Evaluating Child Compliance

Component	Definition, Measurement, and Mean Response
- Compliance	- The child initiating and completing the parent instructed task - Measured as completed or not completed
- Initiation Latency	- The time from the end of the initial command to an initial change in the child's behavior directed toward task completion - Measured in seconds - Mean time for 2-4 year olds 6.5 s (SD =3.4)
- Completion Latency	- The time from initiation to the completion of the task - Measured in seconds - Mean time for 2-4 year olds 14.9 s (SD = 9.5)
- Compliance Rate	- The number of commands the child complied with divided by the total number of parent provided commands - Measured as a percentage - Mean percentage for 2-4 year olds 79.4 % (SD = 24.1)

Note. Taken from Shriver & Allen (1997).

Dependent Measures

In- vs. out-of-toilet voids. The behaviors most central to progress in toilet training are successful voids in the toilet versus voids occurring outside of the toilet (e.g., Beaudry, Bellefuille, Schaaf & Polo, 2013; Kroeger & Sorensen, 2010). In-toilet voids have been variously referred to as in-toilet urination (Luiselli, 1997; Rinald & Mirenda, 2012), successful urination (Chu ng, 2007), continent urination (Simon & Thompson, 2006), correct urination (Cocchiola, Martino, Dwyer, & Demezzo, 2012), and continent urinations (Hagopian, Fisher, Piazza, & Wierzbicki, 1993). Out-of-toilet voids have been described as accidents (Cicero & Pfadt, 2002), incontinence (Luiselli, 1997), incontinent urinations (Simon & Thompson, 2006), and urinary incontinency (Smith, 1979). Although accidents may be a misnomer, as the child may intend to void outside of the toilet, the use of the terms *successes* and *accidents* to refer to in- and out-of-toilet voids, respectively, has become commonplace (Hanney, Jostad, LeBlanc, Carr, & Castile, 2012; LeBlanc, Carr, Crossett, Bennett & Detweiler, 2005).

Several toilet training procedures include a provision for interrupting out-of-toilet voids, if possible, to provide children with the opportunity to finish the void appropriately in the toilet (Cicero & Pfadt, 2002; LeBlanc et al., 2005). In these procedures, once voids are detected and interrupted, children are quickly taken to the toilet. Hanney et al. (2012) described this behavior chain as accident/success conversions. Other authors have included this condition within their accident definition (Cicero & Pfadt, 2002), or treated such occurrences as successes (LeBlanc et al., 2005).

Researchers have reported toileting successes, accidents (Cicero & Pfadt, 2002; LeBlanc et al., 2005), or both (Brown & Peace, 2011; Luiselli, 1997). Recording and evaluating both accidents and successes has the advantage of allowing a comprehensive analysis of all voids.

However, as voids are largely binary events (with the exception of accident/success conversions), clinicians and authors may allocate effort to recording just one or the other of these behaviors. In addition, researchers may be interested in assessing the level of independent toileting, which authors have measured by the percentage of voids that are self-initiated. Self-initiation occurs when a child requests to use the toilet, or moves to the bathroom, and completes a void in the toilet without the assistance of physical or verbal prompts (Kroeger & Sorensen, 2010; LeBlanc et al., 2005). Self-initiation may be tailored to accommodate the communication abilities of the child. For example, self-initiation may occur with a verbal request for one child, an ASL sign for another, and the exchange of a communication card (e.g., PECS; Bondy & Frost, 1994) for yet another.

The definition of voiding episodes is important to consider before toilet training begins. Few would argue that a large puddle of urine represents an accident. However, small urine stains on underwear may less clearly meet criteria for voids outside of the toilet, as it is possible that such a small amount of urine may contact the underwear when a child pulls up their pants at the end of the toileting routine (Foxx, 1986). Thus, it may be necessary to operationalize accidents. One may physically measure the size of the wet spot, as in Lancioni and Marcus (1999), who scored large accidents when both the child's pants and underwear were wet or the child's underwear had a wet spot larger than 6 cm in diameter, and small accidents for wet spots less than 6 cm in diameter and dry pants. In the case of Foxx (1986), parents measured accidents by placing the lid of an olive jar over the wet spot. If the wet spot exceeded the diameter of the lid, the child was considered to have an accident.

Finally, one must consider *moisture alarms* as a potential means of accurately detecting voids that occur outside of the toilet. Moisture alarms have a long history in the treatment of

elimination disorders. Mowrer and Mowrer (1938) pioneered their use as an enuresis intervention and Azrin and Foxx (1971) implemented them in early toilet training efforts, but alarms subsequently fell into disuse. More recently, however, moisture alarms once again have been included in toilet training procedures (Cicero & Pfadt, 2002; Vermandel, Weyler, De Wachter, & Wyndaele, 2008; Van Kampen, De Wachter, Weyler, & Wyndaele, 2008). Although the primary function of a urine alarm is to alert the child to the release of urine, it also has the effect of alerting caregivers that a void is occurring. However, alarms may introduce artifact by sounding when no accident has occurred, such as when sweat triggers the alarm, or failing to detect accidents (e.g., due to misplacement of the sensor). Therefore, direct observation of target behaviors and permanent products may be a more reliable measure of continence skills.

Toilet training completion. Toilet training is a procedure and a process. The primary procedure addresses mechanics of toilet training, the nuts and bolts of sit schedules, fluid loading, schedules of reinforcement, etc. The process of toilet training accrues over time and trials, as child development and environmental contingencies shape and maintain successful toilet training trials, eventually culminating in control of bowel and bladder and independent use of the toilet for elimination.

It is unclear which components of toileting a child must accomplish independently, such as undressing and dressing, flushing the toilet, or washing hands, to be considered toilet trained. Whether or not a child must be completely hygiene independent or not is a function of cultural norms and the goals of caregivers. Typically, children must initiate toileting to be considered toilet trained, but it is unlikely that a 3 year-old who self-initiates toileting also is hygiene independent and unfailingly continent throughout the day and night. It is not uncommon for children to be dry during the day but still wet the bed at night (Foxx, 1986; Schum et al., 2002;

von Gontard, Heron, & Joinson, 2011).

Furthermore, there is no agreed upon percentage of voiding episodes that must occur in the toilet to have achieved mastery. One could argue that 100% of elimination events must occur in the toilet to be considered toilet trained but there are innumerable young children who intermittently wet their pants let alone the numerous examples of adults who void under conditions where toilets are not available (e.g., camping, swimming). So, the standard for "toilet trained" is clearly less than 100%, but how much less than 100% is a function of culture, community, and family norms and may reflect the presence of behavioral or developmental handicaps.

A number of additional dimensions may affect the definition of **"**toilet trained**".** For example, Blum et al. (2003) defined toilet training completion as when the child wore underwear during the day and had fewer than four urine accidents per week and less than two fecal accidents per month. LeBlanc et al. (2005) completed training when participants achieved 80% success for two consecutive days after scheduled sits were discontinued. Kroeger and Sorensen (2010) completed training when the sit schedule had been thinned to 30 min break/5 min sits, with self-initiations occurring 50% of the time or more. Finally, one study included not only dryness criteria but also a latency criterion wherein voids needed to occur within 10 min of sitting on the toilet (Didden, Sikkema, Bosman, Duker, & Curfs, 2001).

Task analyses enable documentation of each discrete task over time as a function of intervention (Donlau, Mattsson & Glad-Mattsson, 2013). Change in the number of steps completed over time represents progress, and can be reported as a percentage of steps completed, with and without prompting. In addition, the level of assistance, or prompt (i.e., physical, gestural, verbal) required at each step of the protocol can be recorded to monitor progress toward

successful toileting. For example, Azrin and Foxx (1971) ranked levels of prompting from most invasive and detailed to least starting with physical guidance, then direct verbal guidance, to a touch, a hand motion, a head or finger motion, and finally no prompt. Donlau, Mattsson and Glad-Mattsson (2013) labeled independence in toileting skills into five categories: does not perform, performs with physical and verbal support, performs with physical support, performs with verbal support, and performs independently.

Problem behaviors. Resistance to toilet training was reported by several early researchers of the Azrin and Foxx procedure (Butler, 1976; Foxx & Azrin, 1973a; Matson & Ollendick, 1977). Butler (1976) noted severe emotional reactions to the positive practice component of toilet training. Matson and Ollendick (1977) stated that all mothers reported emotional side effects, specifically tantrums and avoidance behavior, primarily during the positive practice and graduated guidance components. Foxx and Azrin (1973a) reported that most children responded to toilet training as a pleasurable experience, but a few children engaged in tantrums at the start of training. Problem behavior has not been as commonly reported during more recent evaluations of toileting training (Klassen et al., 2006), yet problem behaviors such as tantrums, aggression, noncompliance, and negative vocalizations are likely in children with a history of challenging behavior in response to instructions and physical guidance (Cicero & Pfadt, 2002). Problem behavior during toilet training also may be an indication of distress in response to specific toilet training components (e.g., positive practice; Matson & Ollendick, 1977). It would be beneficial to record ongoing problem behaviors during toilet training given its occurrence, its potential effect on the caregiver's response effort, and as an indication of the child's distress.

Measurement Procedures

Achieving continence is a developmental milestone that typically occurs outside of clinical intervention and experimental arrangements (Choby & George, 2008). As such, monitoring toilet training progress presents unique challenges. Measurement allows determination if intervention is warranted and if so, if it is effective. Methods of data collection have to be selected for their feasibility in children's homes, schools, and day care settings and for use by parents, teachers, and day care providers. It should be noted that the more effort required by data collectors to obtain information the less likely it will be collected (Friman & Poling, 1995). The effectiveness of toilet training can be directly measured and recorded in a number of ways using time sampling, permanent product and event recording measures.

Time sampling. Toileting events occur intermittently throughout the day. They are brief, discrete, unpredictable, yet certain. As such, time-sampling is relevant, especially during baseline, when no schedule (i.e., structured/scheduled sits) is applied to a child's voids, and continuous observation for toileting occurrences may not be feasible. Time-sampling involves the division of an interval of time into smaller, equal intervals and recording the presence or absence of a behavior during that interval. There are several types of time-sampling methods, including whole-interval, partial-interval, and momentary time sampling. Partial-interval recording, which is used to assess whether a behavior occurred at any point in an interval, may be the most relevant procedure for recording voiding events.

For example, Simon and Thompson (2006) conducted pants checks to assess wetness every 15 min. Pants checks identify the occurrence of voids even if they are otherwise not easily noticeable. As a urine stain only reveals the occurrence of an accident, rather than its precise occurrence in time, pants checks during regular, short intervals may be the most accurate means of detecting the number of voids and their approximate distribution in time, in lieu of moisture

alarms, which allow timely detection but are subject to artifact.

Time sampling also is relevant to recording problem behavior during toilet training. As noted above, problem behavior has the potential to interfere with toilet training, yet is rarely reported in research. Problem behaviors, such as yelling and hitting, occur with varying frequency and duration. As such, a partial-interval data collection procedure may be most appropriate. However, time sampling is more complex than other data collection procedures because it requires a response during each interval, and therefore, may be most feasible in research settings. At the most basic level, a data collection system could include recording the presence or absence of problem behavior at any point in the chain of behavior involved in each toilet training trial, although this would reflect the limits of any large interval recording procedure and would underestimate occurrences of problem behavior (Cooper, Heron & Heward, 2007).

Permanent product recording. Permanent product measurement occurs after a behavior takes place by detecting the effect of the target behavior on the environment, rather than by observing the behavior itself (Cooper et al., 2007). As urination occurs quietly, detection often occurs after the fact. Permanent product of out of-toilet voids are detected by feeling or seeing wetness on the child's clothes or nearby items after the behavior occurred (Simon & Thompson, 2006). For example, there are diaper products that change colors as a function of urination and these can be used in combination with time sampling procedures to record the presence or absence of wetting during standard intervals of time.

Event recording. Event recording captures the occurrence of a target behavior (e.g., a child's voids) reported as the frequency (i.e., absolute number) or rate (i.e., the frequency of voids over unit of time), such as per day (LeBlanc et al., 2005) or school day (Cicero & Pfadt,

2002). Event recording is relevant to toilet training because in- and out-of-toilet voids are discrete events with a clear beginning and end, and are relatively brief. Event recording also is feasible from a resources point of view as voids are relatively infrequent and successes and accidents, as well as self-initiations, are easily detectable and easily recorded. Event recording holds advantages over time sampling in that recording only needs to occur in response to voids, and therefore, requires less response effort than time sampling methods. However, event recording assumes a reliable observational procedure that captures all relevant occurrences of the target behavior as they occur in real time, which is not always possible.

Procedural Integrity

Procedural integrity is important to successful implementation of either the child-oriented method or the Foxx and Azrin procedure. The latter procedure is the most commonly researched (Warzak, Forcino, Sanberg, & Gross, 2016) and requires the more structured protocol of the two. The Foxx and Azrin procedure is a multi-component procedure, but over time, many of the components have fallen into disuse and are not commonly found in research with typically developing children (Warzak et al., 2016). A small number of components comprise the majority of commonly reported procedures used with typically developing children. A check-list of these components--that is, fluid loading, differential response to dry/wet pants upon pants checks, prompted practice trials, fading prompts, and thinning the schedule of reinforcement for dry pants and voids in the toilet--would provide a measure of procedural integrity. Combining this with measures of readiness skills (Table 1), instructional control (Table 2) and basic materials (Table 3) provides monitoring of procedural integrity that affects the success or failure of the training procedure.

Table 3

Suggested Materials Used for Toilet Training

- Cotton briefs with moisture detecting snaps inserted in the crotch area
- Potty chair or toilet with foot stool and ring.
- Urine alerts
- Pants alarms
- Small table
- Variety of fluids
- Rewards and other reinforcement (reinforcement menu of tangible rewards, special activities, friends who care, etc.)
- Individually marked drinking glasses
- Kitchen timer or pocket timer
- Cloths
- Toilet training procedure protocol
- Progress record forms or chart

Note. Adapted from Azrin and Foxx (1974), Foxx and Azrin (1973), and Schaefer (1979).

Inter-observer Agreement

Reliability refers to the consistency with which an event was measured (Cooper et al., 2007) and is often assessed with inter-observer agreement (IOA) procedures. These procedures require that at least two individuals independently observe and record a portion of the events (e.g., 33% of sessions) under study. To determine the level of observer agreement, data from two observers are compared, and the level of agreement between them is expressed as a percentage. Although IOA does not provide information regarding how accurately the measures

reflect the true value of the event under study, it has the potential to increase the believability of the measures by indicating how often two independent observers recorded the same outcome when observing the same event.

Interobserver-agreement procedures are standard throughout much of behavioral research, but occasionally absent from toilet training research. Cicero and Pfadt (2002) stated that they did not conduct reliability checks because accidents and self-initiations were clearly defined and easily observed. Another reason that IOA may occasionally not be collected is because a second observer may not be available, given the unpredictable timing and relatively low frequency of toileting events. This issue may be accommodated in schools, when a second staff member may serve as a reliability observer, but appears as a particular obstacle relevant to toilet training in home settings. For example, in-home training programs frequently use a parent as the primary data collector, but it may intrusive and unrealistic to have a second experimental observer in the home to obtain sufficient amounts of IOA data. This issue may be resolved by having a second parent record IOA data when possible (e.g., nights and weekends). It is also possible that the frequency of toilet training research in children's natural environments may increase if it was acceptable to conduct IOA on a lower proportion of the data that is commonly done in behavioral research, or to include indirect measures of IOA (e.g., phone calls) as supplements to direct measures.

Summary and Future Directions

Most toilet training procedures occur without benefit of measurement, data collection, or experimental design. Training is conducted by parents without professional assistance and it is not uncommon for children to practically train themselves. Nevertheless, there are children who require professional assistance, as well as researchers who pursue the most effective and efficient

training procedures. For these individuals, measurement is essential. We have highlighted the most commonly implemented data collection procedures and dependent measures in pursuit of these goals.

Comprehensive progress monitoring entails measures of child readiness and procedural integrity as well as measures of toileting itself. Data collection and dependent measures must conform to children's natural environments and caregivers' ability to observe and record. Confusing the situation is the lack of a consensus definition of what comprises successful toilet training. Just how much of the routine must be completed independently and what percentage of the time remain open questions.

We would note that compliance issues are among the least referenced in the toilet training literature yet we believe these are among the most important prerequisite skills in toilet training. Training a child who is not under instructional control of parent or staff can become a major challenge emphasizing the importance of compliance assessment and careful measurement of behavioral disturbance as a function of different training procedures.

There are a number of unresolved questions pertaining to the importance of particular readiness skills and which toilet training procedures are most efficient and effective. One practical obstacle to answering these questions is the fact that continence is the norm and the number of individuals who experience difficulty acquiring continence skills is very small relative to the overall population, limiting research funds to support related projects. Perhaps the larger issues raised here could be enfolded within large longitudinal population based studies which investigate demographics and public health outcomes. In this way, the relationship between toileting readiness, for example, and toileting independence could be economically evaluated over time. Regardless, inroads in toilet training, whether they be through large population based

efforts or the result of small-*n* studies, as featured here, require precise measurement and progress monitoring.

References

Achenbach, T. M., & Rescorla, L. A. (2000). *Manual for the ASEBA preschool forms & profiles: An integrated system of multi-informant assessment; Child behavior checklist for ages 1 1/2-5; Language development survey; Caregiver-teacher report form*. University of Vermont.

Azrin, N. H. & Foxx, R. M. (1971). A rapid method of toilet training the institutionalized retarded. *Journal of Applied Behavior Analysis, 4*, 89-99.

Azrin, N. H., & Foxx, R. M. (1974). *Toilet training in less than a day*. New York, NY: Simon and Schuster.

Beaudry Bellefeuille, I., Schaaf, R. C., & Polo, E. R. (2013). Occupational therapy based on Ayres Sensory Integration in the treatment of retentive fecal incontinence in a 3-year-old boy. *American Journal of Occupational Therapy*, *67*(5), 601-606.

Bloom, D. A., Seeley, W. W., Ritchey, M. L., & McGuire, E. J. (1993). Toilet habits and continence in children: An opportunity sampling in search of normal parameters. *The Journal of Urology*, *149*(5), 1087-1090.

Blum, N. J., Taubman, B., & Nemeth, N. (2003). Relationship between age at initiation of toilet training and duration of training: A prospective study. *Pediatrics*, *111*, 810-814.

Bondy, A. S. & Frost, L. A. (1994). The picture exchange communication system. *Focus on Autistic Behavior, 9,* 1-19.

Brazelton, T. B. (1962). A child-oriented approach to toilet training. *Pediatrics*, *29*(1), 121-128.

Bright Futures Steering Committee & Medical Home Initiatives for Children with Special Needs Project Advisory Committee. (2006). Identifying infants and young children with developmental disorders in the medical home: An algorithm for developmental surveillance and screening. *Pediatrics*, *118*(1), 405-420.

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.

Butler, J. F. (1976). The toilet training success of parents after reading toilet training in less than a day. *Behavior Therapy*, *7*(2), 185-191.

Choby, B. A., & George, S. (2008). Toilet training. *American Family Physician, 78*(9), 1059-1064.

Chung, K. (2007). Modified version of Azrin and Foxx's rapid toilet training. *Journal of Developmental Physical Disabilities, 19*, 449-455.

Cicero, F. R., & Pfadt, A. (2002). Investigation of a reinforcement-based toilet training procedure for children with autism. *Research in Developmental Disabilities, 23*, 319-331.

Cicero, F. (2012). *Toilet training success: A guide for teaching individuals with developmental disabilities*. New York, NY: DRL Books.

Cocchiola, M. A., Martino, G. M., Dwyer, L. J., & Demezzo, K. (2012). Toilet training children with autism and developmental delays: An effective program for school settings. *Behavior Analysis in Practice, 5,* 60-64.

Cooper, J. O., Heron, T. E., & Heward, W. L. (2007). *Applied behavior analysis*, 2nd ed. Upper Saddle River, N.J.: Pearson Prentice Hall.

Didden, R., Sikkema, S. P., Bosman, I., Duker, P. C., & Curfs, L. M. (2001). Use of a modified Azrin–Foxx toilet training procedure with individuals with Angelman syndrome. *Journal of Applied Research in Intellectual Disabilities*, *14*(1), 64-70.

Donlau, M., Mattsson, S., & Glad-Mattsson, G. (2013). Children with myelomeningocele and independence in the toilet activity: A pilot study. *Scandinavian Journal of Occupational Therapy, 20*(1), 64-70.

Eyberg, S., Boggs, S. R., & Reynolds, L. A. (1980). *Eyberg child behavior inventory*. University of Oregon Health Sciences Center.

Foxx, R. M., & Azrin, N. H. (1973a). Dry pants: A rapid method of toilet training children. *Behaviour research and therapy*, *11*(4), 435-442.

Foxx, R. M., & Azrin, N. H. (1973b). *Toilet training the retarded: A rapid program for day and nighttime independent toileting*. Champaign, IL: Research Press.

Foxx, R. M. (1986). The successful treatment of diurnal and nocturnal enuresis and encopresis. *Child & Family Behavior Therapy, 7,* 39-48.

Frauman, A. C., & Brandon, D. H. (1996). Toilet training for the child with chronic illness. *Pediatric Nursing, 22*(6), 469-493.

Friman, P., & Poling, A. (1995). Making life easier with effort: Basic findings and applied research on response effort. *Journal of Applied Behavior Analysis, 28,* 583-590.

Friman, P. (2010). Cooper, Heron, and Hewards's Applied Behavior Analysis (2nd ed.): Checkered flag for students and professors, yellow flag for the field. *Journal of Applied Behavior Analysis, 43,* 161-174.

Gresham, F. M., Gansle, K. A., & Noell, G. H. (1993). Treatment integrity in applied behavior analysis with children. *Journal of Applied Behavior Analysis*, *26*(2), 257-263.

Harris, A. (2004). Toilet training children with learning difficulties: What the literature tells us. *British Journal of Nursing, 13*(13), 773-777.

Hagopian, L. P., Fisher, W., Piazza, C. C., & Wierzbicki, J. J., (1993). A water-prompting procedure for the treatment of urinary incontinence. *Journal of Applied Behavior Analysis, 26,* 473-474.

Hanney, N. M., Jostad, C. M., LeBlanc, L. A., Carr, J. E., & Castile, A. J. (2012). Intensive behavioral treatment of urinary incontinence of children with autism spectrum disorders: An archival analysis of procedures and outcomes from an outpatient clinic. *Focus on Autism and Other Developmental Disabilities, 28*, 26-31.

Johnston, J. M., & Pennypacker, H. S. (2009). *Strategies and tactics for human behavioral research*. New York, New York: Routledge.

Kaerts, N., Van Hal, G., Vermandel, A., & Wyndaele, J. J. (2012). Readiness signs used to define the proper moment to start toilet training: a review of the literature. *Neurourology and Urodynamics*, *31*(4), 437-440.

Klassen, T. P., Kiddoo, D., Lang, M. E., Friesen, C., Russell, K., Spooner, C., & Vandermeer, B. (2006). The effectiveness of different methods of toilet training for bowel and bladder control. *Evidence Report/Technology Assessment (Full Report)*, *147*, 1-57.

Kroeger, K., & Sorensen, R. (2010). A parent training model for toilet training children with autism. *Journal of Intellectual Disability Research, 54,* 556-567.

Lancioni, G. E., & Markus, S. (1999). Urine-triggered alarm signals and prompts to promoto daytime urinary continence in a boy with severe intellectual disability. *Behavioural and Cognitive Psychotherapy, 27*, 261-265.

LeBlanc, L. A., Carr, J. E., Crossett, S. E., Bennett, C. M., & Detweiler, D. D. (2005). Intensive outpatient behavioral treatment of primary urinary incontinence of children with autism. *Focus on Autism and Other Developmental Disabilities, 20,* 98-105.

Luiselli, J. K. (1997). Teaching toilet skills in a public school setting to a child with pervasive developmental disorder. *Journal of Behavior Therapy and Experimental Psychiatry, 28*, 163-168.

Matson, J. L., & Ollendick, T. H. (1977). Issues in toilet training normal children. *Behavior Therapy*, *8*(4), 549-553.

Mota, D. M., & Barros, A. J. (2008). Toilet training: situation at 2 years of age in a birth cohort. *Jornal de pediatria*, *84*(5), 455-462.

Mowrer, O. H., & Mowrer, W. M. (1938). Enuresis—a method for its study and treatment. *American Journal of Orthopsychiatry*, *8*(3), 436-459.

Peterson, L., Homer, A. L., & Wonderlich, S. A. (1982). The integrity of independent variables in behavior analysis. *Journal of applied behavior analysis*, *15*(4), 477-492.

Polaha, J., Warzak, W. J., & Dittmer-McMahon, K. (2002). Toilet training in primary care: Current practice and recommendations from behavioral pediatrics. *Journal of Developmental & Behavioral Pediatrics*, *23*(6), 424-429.

Reynolds, C. R., & Kamphaus, R. W. (2015). *Behavior Assessment System for Children (3rd ed.)*. New York: Pearson.

Rinald, K., & Mirenda, P. (2012). Effectiveness of a modified rapid toilet training workshop for parents of children with developmental disabilities. *Research in Developmental Disabilities, 33*, 933-943.

Schaefer, C. E. (1979). *Childhood encopresis and enuresis: Causes and therapy*. New York: Van Nostrand Reinhold.

Schmitt, B. D. (2004). Toilet training: Getting it right the first time. *Contemporary Pediatrics*, *21*(3), 105-116.

Schum, T. R., McAuliffe, T. L., Simms, M. D., Walter, J. A., Lewis, M., & Pupp, R. (2001). Factors associated with toilet training in the 1990s. *Ambulatory Pediatrics, 1*(2), 79-86.

Schum, T. R., Kolb, T. M., McAuliffe, T. L., Simms, M. D., Underhill, R. L., & Lewis, M. (2002). Sequential acquisition of toilet-training skills: a descriptive study of gender and age differences in normal children. *Pediatrics*, *109*(3), 48.

Shriver, M. D., & Allen, K. D. (1997). Defining child noncompliance: An examination of temporal parameters. *Journal of applied behavior analysis*, *30*(1), 173-176.

Simon, J. L., & Thompson, R. T. (2006). The effects of undergarment type of on the urinary continence of toddlers. *Journal of Applied Behavior Analysis, 39*, 363-368.

Smith, P. S. (1979). A comparison of different methods of toilet training the mentally handicapped. *Behavior Research & Therapy, 17,* 33-43.

Spock, B. (1946). *The common sense book of baby and child care.* New York: Duell, Sloan and Pearce.

Squires, J., & Bricker, D. (2009). *Ages and stages questionnaires*, 3rd ed. (ASQ-3). Baltimore, MD*:* Paul H. Brookes Publishers.

Vermandel, A., Van Kampen, M., De Wachter S., Weyler, J., & Wyndaele, J. (2008). The efficacy of a wetting alarm diaper for toilet training of young healthy children in a day-care center: a randomized control trial. *Neurourology and Urodynamics, 28*, 305–308.

Vermandel, A., Weyler, J., de Wachter, S., & Wyndaele, J. (2008). Toilet training of healthy young toddlers: A randomized trial between a daytime wetting alarm and timed potty training. *Journal of Developmental & Behavioral Pediatrics, 29,* 191-196.

von Gontard, A., Heron, J., & Joinson, C. (2011). Family history of nocturnal enuresis and urinary incontinence: results from a large epidemiological study. *The Journal of Urology*, *185*(6), 2303-2307.

Warzak, W. J., Forcino, S. S., Sanberg, S. A., & Gross, A. C. (2016). Advancing continence in typically developing children: Adapting the procedures of Foxx and Azrin for primary care. *Journal of Developmental & Behavioral Pediatrics*, *37*(1), 83-87.