

# URINE-TRIGGERED ALARM SIGNALS AND PROMPTS TO PROMOTE DAYTIME URINARY CONTINENCE IN A BOY WITH SEVERE INTELLECTUAL DISABILITY

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**Abstract.** A strategy involving urine-triggered alarm signals and prompts combined with positive reinforcement for appropriate urination was employed for promoting daytime urinary continence in a boy with severe intellectual disability. The strategy, which was applied only in the day centre the boy attended, seemed effective for promoting self-initiated toileting actions and for eliminating almost totally large urinary accidents. Some small urinary accidents (consisting of wetting small areas of the underpants) remained. Implications of the findings are discussed.

*Keywords:* Urine-triggered alarm signals, prompts, daytime urinary continence, severe intellectual disability, self-initiated toileting actions, urinary accidents.

## Introduction

Children with severe intellectual disability tend to have problems acquiring urinary continence and may require special teaching (Luiselli, 1997; Smith, 1979). The main strategy to teach these children toileting skills is the one devised by Azrin and Foxx (1971) and Foxx and Azrin (1973). This strategy is normally applied for several hours a day (or the entire day) and involves the use of a urine alarm device, large quantities of liquids, frequent toileting occasions, proximity to the toilet (i.e., momentary removal of the children from their normal contexts), reinforcement for appropriate urinations and for being dry between toileting occasions, and reprimands and cleanliness training in case of accidents (i.e., as soon as they are detected by the urine alarm device).

Although reportedly successful, this strategy can be quite demanding given its intensive implementation, the initial removal of the children from their normal contexts, and the cleanliness training (Lancioni, Duker, Klaase, & Goossens, 1994). Some questions can also be raised about the frequent (arbitrary) scheduling of the toileting occasions which may lead to urination failures and possibly delay the association of urination need and toileting (Bettison, 1986; Ellis, 1963).

A less demanding strategy, providing toileting occasions in relation to the child's urination need, could probably be drawn from the early research by Van Wagenen,

Meyerson, Kerr, and Mahoney (1969). Such a strategy could be based on urine-triggered alarm signals and prompts. As soon as an alarm signal indicates the appearance of urine, the child would be prompted to go rapidly to the toilet and sit on the toilet bowl (rather than being exposed to reprimands and cleanliness training). Here the child would be reinforced for urinating. Prompting in relation to the alarm signal would probably become redundant as the behaviour of going to the toilet and urinating there is consolidated through reinforcement. Eventually, the bladder tension per se might become the real stimulus that triggers the child's initiative to go or ask to go to the toilet (Butler, 1998; Martin & Pear, 1996). The purpose of this study was to try out such a strategy (determine whether it would promote self-initiated toileting and reduce accidents) with a boy with severe intellectual disability. No extra liquids or consequences for accidents were planned.

## Method

### *Participant*

The boy was 9 years old, had Cri-du-Chat syndrome (see Dykens & Clarke, 1997) and attended a children's day centre. He had a mental age of about 3 years, produced only a few verbal utterances even though he could understand several verbal sentences concerning daily events, and had uncertain ambulation and limited manual skills. He required help for eating, dressing and washing. He could walk to the toilet area but required help for pulling down his pants and sitting on the toilet bowl. He had never been exposed to toilet training and still wore a nappy. He had no history of urinary infections and no urinary tract abnormalities, and had been recommended for this study by staff. He seemed very eager to participate in the study and to wear a urine alarm device.

### *Setting and urine alarm device*

The study was carried out in the day centre the boy attended. Two different units, each with a specific activity room and bathroom, were used. The urine alarm device was a "Nytone" (Medical Products, Salt Lake City, Utah 84119) which had its alarm unit attached to the child's wrist and a wire going through the child's sleeve and ending with two fasteners attached to the child's underpants in the crotch area.

### *Measures, experimenters, and reliability*

The measures recorded were self-initiated toileting actions, large accidents, and small accidents (see Butler, 1976; Litrownik, 1974). Self-initiated toileting actions consisted of the boy asking by a familiar gesture to go to the toilet and urinating in the toilet (i.e., after being helped by the experimenter to pull down his pants and sit on the toilet bowl). Large accidents were recorded when the boy made his underpants and pants wet or had a wet spot larger than 6 cm in diameter in his underpants. Small accidents were recorded when the boy had a wet spot not exceeding 6 cm in diameter in the underpants and the pants were dry. Five undergraduate students and the second author

served as experimenters throughout the study. Only one of them worked at a time. The experimenter was present to implement experimental conditions, record the measures, and possibly help staff in the unit. The first author joined each experimenter for a minimum of 2 days to check reliability on recording the measures. The percentages of agreement on the single measures varied between 67 and 100, with means exceeding 92.

### *Experimental conditions*

The study was carried out during the part of the day (3 to 5.5 hours) in which the boy was in the children's centre and not engaged in activities incompatible with data collection and treatment (e.g., swimming). Before going home, the boy was provided with a nappy. At home, he normally continued to wear a nappy. The first part of the study included a baseline followed by a treatment phase and was conducted over a period of about 3.5 months. The second part of the study started after a break of over 1 month (summer vacation) and included again a baseline and a treatment phase. The second part was conducted over a period of about 1.5 months.

*Baseline I.* Visits to the toilet occurred at two or three fixed times during the day and if the boy asked to go by making the toilet gesture. Clean clothes were put on after each accident. Pants and underpants were checked at intervals of 50–60 minutes if no accidents had been observed before.

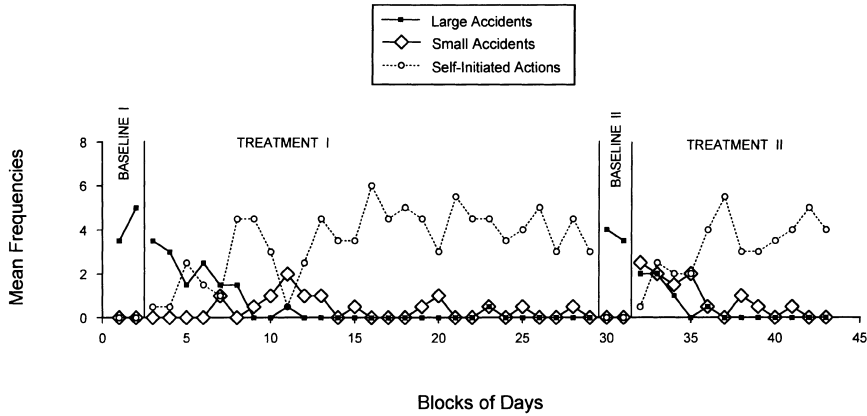
*Treatment I.* The first day of treatment served to familiarize the boy with the alarm signals and the required responding (walking to the toilet, sitting on the toilet bowl and urinating there). During subsequent days, the boy would go to the toilet each time he asked for it with the toilet gesture and if an alarm signal occurred. The boy was reinforced during the urination in the toilet (with praise and caressing) and immediately after that urination (with access to favourite play material).

*Baseline II.* This baseline phase occurred after a long break in the study and with the boy staying in a different unit of the day centre. General conditions were as in Baseline I.

*Treatment II.* This treatment phase occurred in the new unit in which the boy stayed after the break. General conditions were as in Treatment I.

## **Results and discussion**

The data for the different phases of the study are summarized in Figure 1. In Baseline I, the boy had 3 to 6 large accidents per day. No small accidents or self-initiated toileting actions occurred. Following the introduction of Treatment I, self-initiated toileting actions started to appear. This behaviour then increased and acquired a definite consistency. Large accidents declined steadily and eventually disappeared almost totally. Small accidents started to be present relatively early in the treatment and then continued to occur in a non-regular fashion. Baseline II showed a performance level comparable with that of Baseline I. The long break in the study (with a regular use of



**Figure 1.** The black squares represent large accidents, the diamonds small accidents, and the circles self-initiated toileting actions. Each data point represents the mean frequency over a block of two days. Only the last point of Treatment I includes a single day

nappies) and the move to a new unit erased the positive behaviour built during Treatment I. Treatment II seemed effective to re-establish a fairly positive behavioural picture, even though the boy seemed more easily distracted by material and persons in the new unit.

The virtual elimination of large accidents suggested that the strategy made the boy aware of the start of urination events and helped him control the events (hold the urine while walking to the toilet). The acquisition of self-initiated toileting actions suggested that the strategy also helped the boy become relatively aware of bladder tension. The level of awareness, however, was not always high/sufficient to promote the appropriate behaviour, perhaps due to environmental stimuli competing with the performance of this behaviour and with the power of the reinforcing consequences (Ringdahl, Vollmer, Marcus, & Roane, 1997).

The presence of some small accidents until the end of the study and the continuous use of the urine alarm device could be seen as drawbacks. The small accidents had the negative consequence of requiring changes of the boy's underpants. This negative consequence probably could have been avoided by using a small, disposable tissue inside the underpants. The use of the urine alarm device had very limited practical implications since the time to put it on was minimal, and the boy (a) could wear it without restrictions for his normal schedule of activities and (b) was happy to wear it as reported by all experimenters.

In light of these preliminary findings, staff and family are planning to implement the treatment throughout the day, that is, at the children's centre and at home. There is a clear realization that only an extended (consistent) treatment could lead the boy to complete continence. With regard to the strategy, one may underline its apparent friendliness for the boy of this study. As to its overall suitability and strength, no definite comments can be made until other children with intellectual disability have been exposed to it and comparisons with other strategies have been carried out. If satisfactory data are obtained, the strategy may be indicated as a valuable tool for

teaching a socially critical daily skill. Eventually, one would need to determine whether (which) children can become totally independent of the urine alarm device.

### References

- AZRIN, N. H., & FOXX, R. M. (1971). A rapid method of toilet training the institutionalized retarded. *Journal of Applied Behavior Analysis*, 4, 89–99.
- BETTISON, S. (1986). Behavioral approaches to toilet training for retarded persons. In N. R. Ellis & N. W. Bray (Eds.), *International review of research in mental retardation* (Vol. 14, pp. 319–350). New York: Academic Press.
- BUTLER, J. F. (1976). Toilet training a child with spina bifida. *Journal of Behavior Therapy and Experimental Psychiatry*, 7, 63–65.
- BUTLER, R. J. (1998). Annotation: Night wetting in children: Psychological aspects. *Journal of Child Psychology and Psychiatry*, 39, 453–463.
- DYKENS, E. M., & CLARKE, D. J. (1997). Correlates of maladaptive behavior in individuals with 5p- (cri du chat) syndrome. *Developmental Medicine and Child Neurology*, 39, 752–756.
- ELLIS, N. R. (1963). Toilet training the severely defective patient: An S-R reinforcement analysis. *American Journal of Mental Deficiency*, 68, 98–103.
- FOXX, R. M., & AZRIN, N. H. (1973). *Toilet training the retarded: A rapid program for day and nighttime independent toileting*. Champaign, IL: Research Press.
- LANCIONI, G. E., DUKER, P. C., KLAASE, M., & GOOSSENS, A. (1994). Promoting self-initiated toileting in children with severe developmental disabilities. *Scandinavian Journal of Behaviour Therapy*, 23, 113–119.
- LITROWNIK, A. J. (1974). A method for home training an incontinent child. *Journal of Behavior Therapy and Experimental Psychiatry*, 5, 77–80.
- 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.
- MARTIN, G., & PEAR, J. (1996). *Behavior modification: What it is and how to do it* (5th ed.). Upper Saddle River, NJ: Prentice-Hall.
- RINGDAHL, J. E., VOLLMER, T. R., MARCUS, B. A., & ROANE, H. S. (1997). An analogue evaluation of environmental enrichment: The role of stimulus preference. *Journal of Applied Behavior Analysis*, 30, 203–216.
- SMITH, P. S. (1979). A comparison of different methods of toilet training the mentally handicapped. *Behaviour Research and Therapy*, 17, 33–43.
- VAN WAGENEN, R. K., MEYERSON, L., KERR, N. J., & MAHONEY, K. (1969). Field trials of a new procedure for toilet training. *Journal of Experimental Child Psychology*, 8, 147–159.