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Toilet Training - A Critical Review

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TOILET TRAINING -
A CRITICAL REVIEW

by
Albert James Gutierrez

A Thesis
Submitted to the
Faculty of The Graduate College
in partial fulfillment
of the
Degree of Master of Arts

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Albert James Gutierrez
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INTRODUCTION

Social standards dictate that people learn to bring their bladder and sphincter muscles under control at an early age. Children and adults may be socially ostracized for not doing so.

For the person who is incontinent, staying overnight with friends or relatives becomes an aversive event for both guest and host. If the person is enuretic or encopretic during the daytime, visiting others may become embarrassing. Thus, it is conceivable that one's social interactions may become strictly limited as a result of being incontinent. Within the family tempers may become short over incontinent behaviors. In large institutions where staff attention is limited, inappropriate toileting behaviors may lead to avoidance on the part of staff and an exclusion of the resident from various training activities.

There are also obvious health hazards for being incontinent. Wet clothes may lead to skin irritations such as diaper rash and the spread of infectious diseases such as shigella (Foxx & Azrin, 1973). Continued incontinence may lead to smearing or consumption of feces both of which are often associated with the "mentally retarded."

Lastly, toilet training is desirable from an economic point of view. In terms of time, Azrin and Foxx (1974) state that most normal children are capable of being toilet trained at 20 months of age. They also state that toilet training should begin at 30 months of age for the "mentally retarded" and that even "severely retarded" individuals should be trained by no later than five years of age.
This means that the longer the person remains incontinent the more costly it will be in terms of time and money. It has been estimated that a mother of a two-year-old child spends nine hours each week changing diapers, in addition to time spent washing and soaking diapers (Azrin & Foxx, 1974). Whether in a home or in an institution, such time could be spent more productively. Parents could have more time to themselves and attendants in institutions could spend more time in training activities with their patients. Maintaining clean diapers can also be quite expensive. It has been estimated (Azrin & Foxx, 1974) that it costs the average family about $200 per year in either buying disposable diapers or receiving diaper service. Dayan (1964) estimated that 31,200 pounds of laundry or $850 a year was saved as a result of his toilet training procedures for a group of 25 institutionalized retarded boys.

The purpose of this paper is to review current research in the area of toilet training. Although it is not the author's intention to comment on the experimental design of each study, those aspects of design which may invalidate the results of the study will be discussed. This review is primarily concerned with the effectiveness of the research in the areas of nighttime and daytime incontinence with normal and special populations.

We will also look at the research to determine if incontinence is a problem of acquisition or maintenance. Techniques dealing with an individual who has been incontinent all of his life will be considered an acquisition procedure. Conversely, techniques dealing with a person who has at one time gained control over enuresis,
encopresis, or both, will be considered problems in maintenance. Finally, conclusions will be drawn regarding current status in toilet training, and suggestions will be made for future research.

DEFINING TERMS

The literature has classified enuretic behaviors into two types: primary and secondary enuresis. Primary enuresis has been defined as never having gained bladder control or dryness (Freyman, 1963; Nordquist, 1971; Young & Morgan, 1972a). Secondary enuresis has been defined as any protracted period of dry nights (Peterson, Wright & Hanlon, 1969) and loss of urinary control following a period of dryness (Young & Morgan, 1972a).

Similarly, encopresis can be classified into two types. Young (1973) defined primary encopresis as continuous soiling since birth and secondary encopresis as at least a one-year period during which the person ceased soiling after the age of three years.

This review will discard such terms as primary and secondary enuresis or encopresis. Instead, studies will be characterized as either problems in acquisition or maintenance. Acquisition procedures deal with individuals who have never gained bladder or sphincter control. Likewise, procedures concerning individuals who have at one time gained these controls but have lost them will be maintenance procedures. One must be aware that the distinction between the two problems is not clear. Yates (1970) describes some of the possible reasons for this lack of clarity:
...Should one, for example, define as a bed wetter a child of four who wets, on average, two nights per week? Or a child of seven who wets, on average, one night per week? Or a child of ten who wets, on average, once a month. Certainly it seems reasonable to regard a child of four wetting once a month as less of a problem than an adolescent of fifteen who wets once a month....Secondly, very few sample surveys (if any) are based on direct observations of the incidence of wetting; rather, the tendency is to rely on verbal reports from the child or parents of events that have taken place in the past. (p. 78)

Continence then shall be defined as a person having gained control over bladder and sphincter muscles, such that elimination occurs under appropriate social stimuli; i.e., toilet. Conversely, incontinence will be the loss of control over bladder, sphincter or both occurring under inappropriate social stimuli; i.e., bed or clothing.

THEORIES

Mower and Mower (1938) believed that if some arrangement could be made to awaken a child immediately after the onset of nighttime urination that the child would eventually stop bedwetting. This arrangement, in which a neutral stimulus was paired with an unconditioned stimulus eliciting an unconditioned response, characterized a respondent paradigm. After a series of pairing, the neutral stimulus becomes a conditioned stimulus and elicits the conditioned response, formerly the unconditioned response. The aversive stimulus (bell) was an unconditioned stimulus (UCS) which contracted the sphincter (UCR) when presented during urination. Thus, by providing an awakening stimulus contingent on urination (due to sphincter relaxation) the original stimulation (neutral stimuli) produced by bladder distention would eventually lead to an awakening response.
and sphincter contraction (CR) and become a conditioned stimulus.

Lovibond (1963) theorised that the conditioning of nocturnal enuresis using the bell and pad followed operant avoidance rather than the respondent model suggested by Mower and Mower (1938)*. For avoidance conditioning to occur a stimulus (discriminative) is closely followed in time by a punisher. When a response is made following the discriminative stimulus and preceding the aversive stimulus which prevents the onset of the aversive stimulus, avoidance conditioning is said to have taken place. Likewise, when sphincter relaxation (resulting in urination) occurring in response to bladder distention stimulation (discriminative stimulus) is followed by an aversive stimulus (bell) avoidance behaviors will develop. The Twin Signal device which exemplifies this avoidance paradigm will be discussed in the Avoidance section of Nighttime Incontinence.

A major contribution was made by Ellis (1963) in the area of daytime toilet training. According to operant theory, when a response is followed by a reinforcing stimulus (i.e., candy) it is more likely to occur again. Conversely, if an aversive stimulus or situation is presented contingent on a response, that response is less likely to occur again (punishment). He proposed that appropriate toileting behaviors could be shaped through reinforcement. He also suggested punitive situations for inappropriate toileting behaviors; i.e., when a client had an accident, his clothes were changed 15 minutes later. Researchers have not only applied Ellis' reinforcement and punishment techniques in the area of daytime
incontinence but also for nighttime incontinence.

The use of punishment techniques alone to decrease incontinence has also been mentioned in the literature. Punishment, contingent on inappropriate toileting behavior, has been shown to eliminate daytime incontinence.

**APPARATUS**

The use of apparatus in the researched literature has served an important function in toilet training. Without the use of apparatus, detection of incontinence would be made difficult for recording or contingency purposes. Continuous monitoring by staff would be required and there would be the possibility that the incontinent behavior would not be detected immediately. Thus, devices provide immediate detection of incontinence without constant staff observation and almost eliminate measurement error. One advantage of using an apparatus that incorporates an aversive stimulus (bell) is that the stimulus has the effect of inhibiting urination for a short duration after which time the client can be taken to the bathroom to finish voiding.

Research has made use of one basic type of apparatus. The device called the bell and pad apparatus was suggested by Mower and Mower (1938) and has essentially remained the same. Only modifications or improvements in the device have been reported in the literature (Coote, 1965; Davidson & Douglass, 1950; Fried, 1974; Seiger, 1952; Taylor, 1963). The apparatus consists of a pad placed under the sleeping subject. The pad is connected to an electrical
device which houses a bell or buzzer. When urination occurs, the fluid completes an electrical circuit and activates the bell. The bell has been found to inhibit further urination (serves as a punisher) and to awaken the client.

Devices used with daytime enuretics and encopretics were first developed by Van Wagenen and Murdock (1966). The Signal Device or Signal Package, as it was called, consisted of a grid attached to the underpants of the subject. The grid was hooked to a buzzer and battery. When the client urinated or defecated through the grids, an electrical circuit was completed and the buzzer sounded, also inhibiting urination. Similar devices were designed by Azrin, Bugle and O'Brien (1971). The Pants Alarm consisted of two snaps connected to ordinary men's briefs and hooked to an electrical circuit which activated when urination or defecation occurred. The Toilet Signal worked on the same principle with the exception that the two snaps were placed in the bottom of a plastic bowl which was inserted into the ward toilet.

A device similar to that of Azrin, et al. (1971), Pants Alarm, was designed by Logan and Garner (1971). Instead of snaps, they used metal coated electrodes located inside and outside of the pants. When urination occurred, a complete circuit between the two electrodes set off a buzzer.

Another daytime device was invented by Watson (1968). The electronic training device consisted of a small room with a toilet in it. It had a photoelectric cell which triggered a reinforcer when the subject voided. Reinforcers were administered through a
special dispenser. Although the device was reliable it was difficult to justify its $1,500 cost.

**DAYTIME INCONTINENCE**

**Reinforcement and Punishment**

The Ellis Model, previously mentioned, involved reinforcing appropriate toileting behaviors while providing mild punitive consequences for accidents; i.e., pants were changed 15 minutes after accident is discovered. Hundziak, Maurer and Watson (1965) conducted a study based on the Ellis Model, utilizing 29 severely retarded institutionalized males, age 7 through 14 years, who were incontinent. Three comparison groups were used. Residents in the Operant Conditioning group were placed on the toilet at two-hour intervals or when the subject showed eliminative responses; i.e., hand covering crotch. Appropriate eliminative responses were reinforced by an automatic candy dispenser. The Conventional Training group was also placed on the toilet at two-hour intervals or when showing eliminative responses. Subjects were occasionally reinforced with verbal praise and candy but unlike the Operant Conditioning group, this group was inconsistently reinforced. In addition, residents were scolded for soiling their pants. The group approximated the traditional method of toilet training in an institution. The final group, the control group, received no treatment. Frequencies of both urination and defecation were recorded daily. Results showed the Operant Conditioning procedure brought about a significant increase in the number of appropriate toileting responses while
the Conventional Training procedure did not. Surprisingly, the control group also showed a significant increase in the frequency of appropriate toileting responses, but it was not as effective as the Operant Conditioning group.

Reinforcement techniques were also applied to an autistic nine-year-old encopretic male in a study done by Marshall (1966). The subject was reinforced for such behaviors as approaching the toilet, taking the appropriate body stance, straining and finally production. The subject was given a slap on the buttocks for soiled pants. Results indicated a significant reduction in inappropriate voiding but not a complete cessation. Although the study cites a follow-up phase, its results are questionable since the reinforcement was still being presented to the subjects by the parents. Thus, it appeared that the follow-up was a continuation of treatment.

The Ellis Model was successfully used with an institutionalized 15-year-old, blind, profoundly retarded boy (Waye & Melnyr, 1973). During a two-day period the subject was placed on the commode for two eight-hour intervals with five minutes of every quarter hour spent walking around the ward for exercise. The rationale for placing the subject on the commode for this excessive amount of time was to allow him to acquire a tactile concept of "toilet." In addition, he was given positive reinforcement for elimination in the toilet. After this two-day period, he was allowed free access to the ward. Accidents were then consequated with the inability to visit favorite spots on the ward. Accidents were later consequated by requiring the subject to stay in his soiled pants for a half hour,
while fluid intake was increased. Results showed that daily accidents decreased substantially.

Eleven severely retarded males having neither bladder nor bowel control were studied by Baumeister and Klosowski (1965). A chain which consisted of such behaviors as going to the toilet and removing clothing were reinforced. Accidents were consequated with leaving the subject in wet clothes for a 15-minute interval. The procedure, however, was not effective in eliminating accidents. The authors stated that the subjects became hyperactive, emotional, and difficult to manage during treatment. The procedure, number of times each subject was placed on the commode, and the time they were required to sit on the commode were unclear.

Another study utilizing retarded subjects was done by Giles and Wolf (1966). Again, reinforcement and punishment conditions were used. The five institutionalized severely retarded males (mean age = 10.2 years) received reinforcement for appropriate toileting behaviors. Aversive contingencies followed accidents, such as termination of meals during mealtime and being attached to a rope for a specified interval on the ward. These conditions were shown to be effective in increasing the number of appropriate eliminative responses throughout treatment.

A different approach in dealing with encopretic children was taken by Young (1973). Twenty-four encopretic normal children (mean age = 8 years) were required to wait 20 to 30 minutes after each meal before sitting on the toilet where proper elimination was reinforced. Young theorised that colonic motor activity occurring
during this time interval resulted in the desire to defecate. Senokol was also administered to each child before going to bed by the parents, which increased the probability that elimination would occur after a given time interval had elapsed. The criteria for success were defined as 28 consecutive days free of soiling. Results showed that it required 17 months for 22 of the 24 subjects to meet criteria. The remaining two subjects were considered failures. Follow-up taken at an average of 23 months showed that four subjects relapsed. Actual criteria for success included closure of the internal sphincter and the absence of feces in the rectum which had to be inspected. The study utilized more than just reinforcing appropriate toileting after meals and administration of Senokol. Scybola detected in the rectum or colon of the subject before treatment was eliminated by the use of a microlox enema or colonic lavage. Thus, enemas and inspection of the subjects may have been responsible, in part, for the success of treatment.

Until the 1960's suitable devices for detecting enuresis and encopresis during the day had not been developed. Van Wagenen and Murdock (1966) developed a Signal Device to detect daytime incontinence in both male and female clients. Upon urination or defecation an alarm sounded. Utilizing this device, Van Wagenen, Meyerson, Kerr, and Mahoney (1969) developed a procedure that was incorporated with nine severely retarded children (mean age = 6.1 years). Initially, the subject's voiding was brought under the control of the Signal Device. The use of the apparatus was faded until the child was voiding independently of the cues of the alarm. Toileting
behaviors were recorded as being in one of six levels. In Level I the subject urinated so that the urine dropped on the floor; in Level VI the subject walked to the toilet, removed his clothes, and urinated without prompts. Levels II through V were intermediate categorizations. During the experimental condition the subjects wore the apparatus. When inappropriate voiding occurred, an auditory signal was emitted and the subject was taken to the toilet by an experimenter. When the subject urinated in the toilet after activation of the alarm, he was reinforced. In addition, fluid intake was increased in all phases of the experiment to increase the likelihood of voiding. Dressing and undressing were shaped during treatment. Only when the subjects toileted themselves independently (going to toilet and voiding without prompts) was the Signal Device removed. Follow-up results lack clarity. One subject's family moved out of the community and follow-up was not possible for him. Many of the subjects had accidents after treatment terminated and required further intervention.

The Signal Device was again utilized by Mahoney, Van Wagenen and Meyerson (1971) with three normal and five retarded children (age range = 1.6 to 9 years). The device was a modified version of that used by Van Wagenen et al. (1969) in that it could also be activated by a transmitter which the experimenter carried. In this multiphase experiment, Phases I through III were termed the Pre-requisite Behavior Training Period. Subjects were taught to walk to the commode in response to the auditory stimulus (Phase I), to lower their pants (Phase II) and sit on the toilet seat or take the
proper male stance while facing the commode (Phase III). Reinforcement were given for each behavior chain. Remaining phases were designated Elimination Training and Clothing Return. In Phase IV fluid intake was increased and the subject was required to emit requisite behaviors (those learned in Phase III) in response to the auditory stimulus which was operated manually by the experimenter. Again, each subject was reinforced for completing the behavior sequence. When the child voided in the toilet he was reinforced and his pants were pulled up by the experimenter. When an accident occurred the client was taken to the toilet to complete voiding. Afterwards, wet pants were removed without comment. In Phase V, subjects were taught to pull their own pants up and in Phase VI subjects practiced the behavior chain without the signal device. Reinforcement was then given contingent on independent toileting. Treatment was terminated when the child performed independently for three consecutive sessions. Both normal and mentally retarded children required 29 hours to meet criteria. Only one subject failed to meet criteria (mentally retarded child). Follow-up was taken on only two of the subjects (one normal and one retarded). Six months' follow-up indicated the normal subject was averaging one accident per week while the retarded child averaged four accidents per week. The procedure was effective in shaping a behavioral toileting sequence in seven of the eight subjects.

A final study incorporating the Signal Device was done by Litrownik (1974) with a seven-year-old profoundly retarded male, in which the parents served as experimenters. In Phase I the subject
was placed on the toilet three times a day where voiding was reinforced. In the next and final phase the subject wore the signal device (Van Wagenen & Murdock, 1966). At the beginning of this phase, the children were taken to the toilet upon activation of the alarm and reinforced for being on the toilet. When urination occurred in the toilet he was reinforced from then on for voiding in the toilet. Finally, he was reinforced for voiding in the toilet independently (without the alarm as a cue). Later in the phase the Signal Device was removed. Results showed that Phase I was not effective in decreasing accidents while Phase II eliminated accidents for a 14-day period. A five-month follow-up indicated that the subject was still maintaining this continent behavior.

A reinforcement-only condition was used with a five-year-old aberrant male (uncooperative, hyperactive, possible minimal brain dysfunction) in a study done by Johnson and Thompson (1974). The subject was reinforced for modeling his younger brother (who was toilet trained). When the brother urinated in the toilet and the subject did the same he was reinforced. In addition, the subject was reinforced for initiating urination on his own or for being dry at specific times. The study terminated due to the parents’ breaking off contact with the experimenters. However, during the last seven days of the experiment the subject was dry. A six-month follow-up showed that the subject was still continent.

One of the most sophisticated studies dealing with daytime incontinence was done by Asrin and Foxx (1971). Nine institutionalized profoundly retarded males served as subjects (mean age = 43
years). Two apparatus were used in the procedure - the Pants Alarm and the Toilet Signal. Four residents were used in the treatment group while the other five residents served as controls. After the treatment group completed their training the control group began treatment. As each of the residents completed training they were placed on the post-training maintenance program. Table 1 outlines the procedure used in the treatment. (See page 16.)

To increase the likelihood of urination, large volumes of fluids were given to each resident every half hour. The procedure incorporated positive reinforcement for correct toileting and learning situations for inappropriate toileting. Prompts were faded over time to increase the likelihood of an independent toilet approach. When residents completed training, their behavior was maintained by using the Post-Training Ward Maintenance Procedure as outlined in Table 2. (See page 18.)

Results showed the procedure was effective in decreasing incontinence in all nine subjects by over 90 percent during the first seven weeks of the post-training period. A five-month follow-up showed that accidents were virtually absent (exact frequency not clear).

Reinforcement techniques alone were used to eliminate encopresis in an 11-year-old male in school (Pedrini & Pedrini, 1971). Treatment consisted of reinforcing the subject after every class if he was not soiled. The teacher inspected the client's pants each day. This procedure was effective in eliminating encopretic behavior for a five-week period at which time the study was terminated.
Table 1

Foxx & Azrin Toilet Training Procedure

I. When No Accidents Occur

1) Resident seated in chair when not seated on toilet bowl
2) Resident drinks fluids every half-hour
3) Scheduled toileting of resident every half-hour
4) Resident given edible and social reinforcer every 5 min. while dry
5) Shaping of undressing and dressing during toileting
6) Resident given edible and social reinforcer following elimination in toilet bowl and returned to chair

II. When Accidents Occur

1) Trainer disconnects pants alarm
2) Trainer obtains resident's attention
3) Resident walks to laundry area to obtain fresh clothing
4) Resident undresses himself
5) Resident walks to nearby shower, receives shower, and dresses himself
6) Resident obtains mop or cloth and cleans soiled area on chair or floor
7) Resident handwashes soiled pants, wrings pants out, and hangs pants up to dry
8) Trainer removes resident's chair from use
9) 1-hour timeout procedures:
   a) no edibles or social reinforcers every 5 min.;
b) no fluids every 30 min.;
c) chair not available;
d) continue 30-min. scheduled toilet periods

due to summer vacation. For the seven months of the next school year the client had only one accident.

Punishment

Several studies have been conducted which used punishment conditions to decrease daytime incontinence. The two studies presented deal with eliminating encopretic behavior.

A normal child (age not clear) who was encopretic in school was the subject of research done by Ferdinden and Van Handel (1970). Treatment consisted of having the child clean himself and wash soiled clothing. When an accident occurred he was required to wash himself with a soap that caused mild skin irritation and with water which was kept below room temperature. Class time that was missed while washing and cleaning himself was made up after school hours. The study was effective in decreasing soiling behavior from a high of three soilings per day to zero level during an approximate five-month contingency. A six-month follow-up showed no reoccurrences of soiling.

The second study to incorporate punishment alone was done by Edelman (1971) with an encopretic 12-year-old normal female. The bell and pad apparatus was also used for the subject's bedwetting, but the procedure was not discussed. A punishment condition was
Table 2

Foxx & Azrin Post-Training Ward Maintenance Procedure

I. General Procedure

1) Advance assignment of one attendant for Toilet Responsibility each shift
2) Snack period between breakfast and lunch and between lunch and dinner
3) Residents pants inspected at mealtime, snack time and bedtime (6 times daily)
4) Attendant initials record sheet when residents checked; record sheet sent directly to supervisor
5) Discontinued use of both apparatuses for detecting eliminations

II. When Accidents Occur

1) Cleanliness training whenever an accident was detected:
   a) Resident walks to laundry area to obtain fresh clothing
   b) Resident undresses himself
   c) Resident walks to nearby shower, receives shower and dresses himself
   d) Resident obtains mop or cloth and cleans soiled area on chair or floor
   e) Resident handwashes soiled pants, wrings pants out, and hangs pants up to dry
2) Delay of meal for 1 hr. if accident prior to meal
3) Omission of snacks if accident prior to snack
4) Attendant initials and records each accident.

**Minimal Maintenance - Starts Eight Weeks After Training**

1) Inspections only at mealtime and bedtime
2) Cleanliness training given for accidents

**Termination of Maintenance Procedure - When Resident is Continent for at Least One Month**

1) No regular inspections for that patient
2) Cleanliness training given for accidents when detected

began in which the child was placed in her room for a 30-minute interval contingent on soiled pants detected at pant checks. In the second treatment condition the punishment condition was maintained in addition to allowing her to avoid dishwashing if she remained dry during the day. During baseline she had soiled about six times per week, compared to about four times per week in the first and less than once per week during the second conditions. A three-month follow-up showed virtually no occurrences of soiling. The study is limited as a result of implementing a procedure to deal with the subject's nocturnal enuresis. This procedure in itself may have served to facilitate elimination of encopresis.

**Special Problems in Toileting**

This section will primarily discuss subjects who are emitting appropriate toileting behaviors but who either lack the normal frequency of such behaviors or are not eliminating in public places. The two most common problems are urinary and bowel retention. Thus,
subjects are eliminating appropriately but are doing so infre­quently. A study which utilized special techniques for increasing rectal pressure in an encopretic male will also be discussed.

Lal and Lindsley (1968) provided reinforcement for a three-year-old constipated normal male. Baseline showed that the client was defecating approximately once per week (and this was because they gave him a suppository). The treatment procedure consisted of allowing the subject to play in a bathtub of water contingent on a bowel movement in the toilet. The study terminated when the subject was defecating seven times per week (normal frequency) in the commode. An eight-month follow-up indicated that the subject was not constipated.

Tomlinson (1970) sought to increase defecating responses in a three-year-old normal constipated male. During baseline, the client was defecating once per week. In the treatment condition the subject received reinforcement contingent on defecating in the toilet. A mild laxative was given the first week of treatment. This condition increased defecation to six responses per week (normal). This post-treatment level was observed two years later.

Urine retention was a problem for a 51-year-old female and a 31-year-old male in a study done by Lamontagne and Marks (1973). Both clients were unable to urinate in a public toilet facility, but could do so at home. During treatment, both clients were required to withhold urination at home in the morning and to increase fluid intake (drinking five cups of coffee) prior to meeting with the therapists. Subjects were reinforced with praise for steps
approximating urinating in public places. Steps included having the client urinate in a toilet with the therapist waiting a certain distance outside the toilet (to lessen the client's anxiety); having the therapist move closer to the door until he was eventually at the door of the toilet; and finally having the client urinate with the therapist and someone else waiting outside the door. Between sessions, subjects were required to urinate once in a public place and in a friend's home. After 13 sessions both subjects were able to urinate in a public place. The female had problems urinating at work but this problem was not involved in treatment. After nine months, both subjects were continuing to urinate in public places.

Kohlenberg (1973) treated a 13-year-old encopretic male. The subject had a dilated sphincter which allowed for a constant fecal discharge; thus, there was no accumulation of stool. The study made use of a special apparatus, part of which was inserted into the subject's rectum, allowing direct continuous measurement of pressure in the anal area via a vertical tube filled with red tinted water and a scale that could measure relative changes in pressure. For the first 15 minutes of Phase I the water column was hidden from the subject's view. During the next 15 minutes the column was visible to the client and he was told that keeping a high water level meant that surgery would not have to be performed. This sequence was repeated for the next two 15-minute intervals. The number of seconds the water column exceeded a 22.5 level (criterion) was recorded. In Phase II alternating 15-minute segments of no contingency and monetary reinforcement (when the water level exceeded
criterion) were implemented. In Phase III the column was continuously observed and two timers were activated each time the water level exceeded criterion. Reinforcement was given when both timers ran out. The time interval for each timer varied throughout the condition. Results showed that visual feedback had little effect in increasing sphincter pressure. In Phase II, sphincter pressure met criterion for approximately 14 minutes. In the final phase, sphincter pressure was exceeding criterion for more than 25 minutes. The effects of this procedure in decreasing soiling were limited, since soiling on the hospital ward was not vigorously recorded. However, the study was effective in increasing rectal pressure through the use of reinforcers.

Summary of Daytime Incontinence

Reinforcement and punishment techniques used in various combinations have been shown to eliminate or decrease daytime incontinence. Azrin and Foxx (1971) developed the most sophisticated procedures for toilet training, using both reinforcement and punishment techniques. To increase the likelihood of urination, thereby providing the opportunity to reinforce or punish voiding, the volume of liquids was increased. The more opportunities for urination, the more learning trials there are for the client to be reinforced and learn appropriate toileting behavior.

It would appear that reinforcement and punishment would be doubly effective in decreasing incontinence for two reasons: first, clients would learn under what conditions they would be reinforced; i.e., voiding in toilet; and secondly, they would learn under which
conditions toileting behavior would be punished; i.e., soiling pants.

In addition to reinforcing eliminative responses, some studies have attempted to shape dressing and undressing behaviors (Marshall, 1966; Baumister & Klosowski, 1965; Van Wagenen et al., 1969). Dressing and undressing behaviors would be a requisite for any client to achieve toileting independency.

Apparatus such as the Signal Device have been successful in detecting incontinence and in serving as a discriminative stimulus for approaching the bathroom (Mahoney, 1971). These devices have been faded out; i.e., alarm deactivated, without producing increases in incontinence.

Each study mentioned in this section has been found lacking in at least one aspect of methodology which may invalidate the effectiveness (short- or long-term) of the procedure and its replicability. Areas include missing baseline, the use of AB designs, unclear procedures, inadequate criteria for success and follow-up, and lack of reliability. (These areas will be discussed in the Methodology section.)

**NIGHTTIME INCONTINENCE**

**Bell and Pad**

**Theory criticisms**

There has been some controversy as to the model (operant or respondent) under which the bell and pad device operates. According to Mower and Mower (1938), who supported the respondent theory, the neutral stimulus of bladder distention was paired with the uncon-
ditioned stimulus of the bell at the onset of urination (resulting in bladder contraction). After time, bladder distention stimulation became the conditioned stimulus for eliciting bladder inhibition. Lovibond (1963), on the other hand, felt that respondent conditioning was not the process involved in decreasing nighttime accidents with the bell and pad apparatus. He proposed the operant model and offered two reasons in support of that model.

First, when the unconditioned stimulus (shock or bell) was permanently withdrawn, the conditioned response (contraction of sphincter) should extinguish, due to termination of pairings. This was not the case with many patients treated with the bell and pad. Thus, over time they should have lost bladder control due to the termination of pairing with the unconditioned stimulus. Second, in classical conditioning the stimulus to be conditioned was neutral with respect to the response to be conditioned. However, this was not the case with Mower and Mower's hypothesis. Bladder distention stimulation (conditioned stimulus) was not neutral with respect to sphincter contraction (conditioned response). Lovibond stated that "It (bladder distention stimulation) is in fact already an adequate stimulus for the antagonistic response of sphincter relaxation" or urination. Instead, he felt that the stimulus resulting in urination when followed by an aversive stimulus (bell) became the conditioned stimulus for the avoidance response of sphincter contraction.

Yates (1970) offered a rebuttal to Lovibond's view:
Now, it is in fact, arguable that Lovibond's criticisms are both incorrect. In the first place, it has been shown that an unconditioned stimulus may become a conditioned stimulus under certain conditions. Thus, a pain stimulus of a severe kind (electric shock), which will normally produce an unconditioned response of withdrawal, may become a conditioned stimulus producing approach behavior provided it is introduced gradually, in association with a positive reinforcing stimulus (Pavlov, 1927). And, in the second place, whether or not a classically conditioned response will extinguish easily when the reinforcing stimulus is withdrawn depends in part on the method by which the classically conditioned response is established.... The use of partial reinforcement techniques may lead to very strong resistance to extinction. Hence, neither of Lovibond's criticisms are fatal to the classical conditioning theory. (pp. 89-90)

At present, the debate still continues. Research involved in settling this argument is still lacking; however, the issue may be a moot point with respect to considering the applied value of various toilet training procedures.

Bell and pad research

Research utilizing the bell and pad technique is discussed in this section and constitutes the most widely studied technique in the area of nighttime toilet training. Variables such as age and problems associated with the apparatus are also discussed.

Mower and Mower (1938) developed a technique that was used with their bell and pad device. Subjects were told to complete urination in the toilet upon activation of the bell (see section on Apparatus). When the subject was not aroused by the bell, he was awakened by the parent or attending adult, the wet pad was changed, and the alarm reset.
Geppert (1953) modeled a study after the Mowers' techniques. He studied 42 normal children (age range not clear) who were nocturnally enuretic. Treatment consisted of having the parents guide children to the toilet to complete urination when the alarm sounded. Success was defined as seven consecutive days without bedwetting. The procedure was effective in eliminating nocturnal enuresis in 90 percent of the children.

DeLeon and Mandell (1966) compared the bell and pad technique as described by the Mowers with two other treatment groups. Eighty-seven normal enuretic children (age range from 5.5 through 14 years) were divided into the three treatment groups. Group 1 used the bell and pad device. Group 2 served as the psychotherapy-counseling group and consisted of 40-minute counseling sessions (there were 12 sessions) with the subject, in addition to a 20-minute counseling session with the parents (the type of counseling used was not specified). Group 3 received no treatment and served as controls. Frequencies of nighttime accidents for each subject were recorded on a daily basis. Criteria for success for all groups were defined as 13 consecutive dry nights. Results indicated that 86 percent of the bell and pad group achieved success, compared to 18.2 percent and 11.1 percent for the psychotherapy and control groups, respectively. The average follow-up period was 30 weeks (ranging between 4 to 88 weeks). Approximately 80 percent of the bell and pad, 100 percent of the psychotherapy and 50 percent of the control group relapsed during this time.
Another comparison study utilizing normal subjects was done by Baker (1969). Thirty nocturnally enuretic children (ages not clear) were divided into three treatment groups. Group 1 received no treatment and served as controls. In Group 2, the wake-up group, subjects were awakened at specified times during the night by parents and taken to the bathroom to void. Subjects remaining dry for a one-week period were then awakened several nights during the week (instead of every night). The bell and pad technique comprised Group 3. Subjects were required to wake up and complete urination in the toilet when the alarm activated. Criteria for this group were remaining dry for 14 consecutive days with the device in addition to 14 consecutive days without it. Results showed that 10 percent of the control, 14 percent of the wake-up, and 79 percent of the bell and pad groups achieved nighttime continence. A six-month follow-up showed that four subjects relapsed (how many of these relapses occurred in each group was not clear). The percentage of success for each group must be viewed with care due to the fact that some subjects in the control group (the ones who did not meet criteria) were placed in the other two groups after the groups had met initial success, thus affecting the success rate.

The final comparison study using normal subjects was done by Peterson, et al. (1969) with 28 children (mean age = 8 years). In Group 1 (control) parents were told they would receive the bell and pad apparatus but did not during the experiment. The standard bell and pad technique (procedure not clear) comprised the second group. The final group used the same procedure and apparatus as
Group 2 but there was a three-minute delay between the onset of urination and the activation of the bell. The experimenter sought to determine what effects the delayed aversive stimulus (bell) had on conditioning (see Avoidance section under Nighttime Incontinence). Treatment lasted three weeks for each group. Results showed no significant differences between any of the groups.

A study which eliminated bedwetting in addition to daytime incontinence in 19 chronic institutionalized males (mean age = 52 years) was done by Wagner and Paul (1970). Subjects were checked for incontinence at two-hour intervals during the day and beds were checked each morning for nighttime accidents during baseline. Treatment consisted of arranging the unit where subjects lived into three physically separated sleeping quarters. These areas were designated the nursery, kindergarten, and good sections. When a subject was found dry at pants checks or independently toileted himself he was reinforced. Any time a subject was wet at mealtime, he went without eating. In the nursery, sheets were changed once every three days in spite of nighttime accidents and subjects were awakened three specified times per night whereupon they were taken to the toilet to void. Criteria for leaving this section and living in the kindergarten section were seven consecutive days of daytime continence. Nocturnal enuresis was dealt with using the bell and pad device when subjects were in the kindergarten section. When the apparatus activated, the subject was required to finish voiding in the toilet. Criteria for leaving were seven consecutive days of both day and nighttime continence. When subjects met these
criteria they were placed in the good section. The good section contained individual rooms adjoining a reading room equipped with radio and other extras. Patients slept through the night uninterrupted. A 13-month follow-up taken over a three-day period indicated that none of the 13 remaining patients had any day-time accidents; however, two of these had at least one nighttime accident. The procedure originally called for 35 patients, but in baseline 13 patients stopped urinating while three others were dropped due to neurological impairment.

There has been some research studying the effects of drugs used in conjunction with the bell and pad technique. Young and Turner (1965) sought to determine what effects drugs used with the bell and pad technique had on 229 normal (assumed) children (mean age = 7.7 years). Their rationale was to make the parents' job easier by using drugs to increase the number of dry nights recorded during the early stages of treatment. Group 1 was the standard bell and pad group. When the bell activated, the subject was required to finish urination in the toilet. Parents remade the child's bed and reset the apparatus. Group 2 was the same as Group 1 with the exception that specified dosages of Dexedrine were administered to subjects. Finally, the device used with specified dosages of Methedrine comprised Group 3. Success was considered to be 14 consecutive nights without bedwetting. Group 1 served as baseline or control group. Results showed that the drugs had a facilitating effect on the conditioning process. Methedrine was marginally more effective than Dexedrine in decreasing nighttime accidents. However, 12-month
follow-up revealed that 13.2 percent of Group 1, 29.7 percent of Group 2, and 13.3 percent of Group 3 relapsed; thus, there was a higher relapse rate in the Dexedrine group. The hypothesis that drugs could facilitate treatment appeared reasonable but follow-up data related to treatment effectiveness were not supportive. In a long-term follow-up of this study, Turner and Young (1966) reported that the bell and pad group had a 33 percent relapse over a three-to-five year period. Seventy-five percent of the Dexedrine group relapsed in two-to-three years, and 43 percent of the Methedrine group in one-to-two years. Thus, the relapse rates were much higher for the drug groups than the conditioning group over time, even though the period of follow-up was shorter for the drug groups.

(Follow-up was taken on 60 percent of the children who met criteria for success.)

Young and Morgan (1972a) studied the effects of increased fluid consumption on relapse rates of 144 normal (assumed) bedwetters (age range between 4 and 15 years). All subjects were treated with the bell and pad technique. The procedure consisted of having the subject complete urination in the toilet contingent on bell activation, and having him remake the bed and reset the device. Criteria for success were defined as 14 consecutive nights without bedwetting. Sixty-seven subjects were randomly selected to partake in an additional phase in which fluid intake increased. This consisted of drinking two pints of liquid within the last hour before retiring, in conjunction with using the bell and pad apparatus and meeting the additional 14-night criteria. Results showed relapse rates of
13 percent for the group that received increased fluid consumption, and a 35 percent relapse rate for those that did not. Relapse data were collected at intervals varying from three months to over two years. Statistical analysis indicated that the relapse rate was significantly lower in those subjects that received increased fluids. An additional follow-up (Young & Morgan, 1972b) supported these results. However, relapse may have been low for the increased fluid group due in part to the extra 14-night criteria that subjects had to meet.

Factors such as sex and type of incontinence (primary or secondary) have been studied in relation to the bell and pad technique. Martin and Kubly (1955) sent questionnaires to parents of children who had been treated with the apparatus. They found that continued continence of the subject was not a function of the age or sex of the person. In addition, data suggested that average treatment length with the bell and pad apparatus lasted six weeks. Boys took an average of 6.7 weeks, while girls required only 4.1 weeks to achieve continence.

Young (1965) sought to determine what effects introversion and extraversion (measured by the Maudsley Personality Inventory) had on the relapse rate of subjects treated with the bell and pad. They found that relapse among extroverted subjects was significantly higher when compared with introverted subjects.

The type of enuresis (primary or secondary) has not been shown to have been an important factor in facilitating treatment with the bell and pad. Sacks and DeLeon (1973) treated 12 secondary enuretics
(previous history of at least six months of continence followed by at least six months of wetting) and 50 primary enuretics (those falling short of criteria for secondary enuresis) with the bell and pad technique (as outlined by Mower and Mower, 1938). Results showed no significant differences between the primary and secondary enuretics in terms of length of treatment and cure rate.

Young and Morgan (1973) analyzed variables associated with the slowest and most rapidly responding patients treated with the bell and pad technique. No relationship was found between sex and age as a function of being a slow (reaching continence after 32 weeks) or rapid (reaching continence in ten weeks or less) respondent to treatment. However, slow responders were significantly more likely to have had histories of failing to awaken to the bell.

Bell intensity has engendered problems of waking subjects up in some studies using the bell and pad device (Young & Turner, 1965; Young & Morgan, 1973). A study done by Browning (1967) treated a ten-year-old psychoneurotic institutionalized male who had previously failed to awaken to the bell. Bell intensity could not be increased due to other nearby residents. The treatment procedure incorporated four consecutive morning and evening trials lasting 15 minutes. Initially, the evening trials began at 7 p.m. while the morning trials took place when the subject awakened in the morning. The client was instructed to lay down until the bell activated (manually operated). When he walked to the bathroom within two minutes of bell activation, he was reinforced. Morning and evening trials were moved progressively toward midnight on successive
days. The bell was then only activated by urination of the client. Results showed that the subject was arising 75 percent of the time to the bell, which resulted in termination of the study after five weeks of dryness.

It is interesting to note that nocturnal enuresis has been studied as a function of the sleep and dream levels of subjects. Pierce, Whitman, Maas, and Gray (1961) found that dreams occurred 2.3 hours after the onset of enuresis in a group of eight normal male children (age range = 5 to 9 years). Ditman and Blinn (1955) found that enuresis occurred at various levels of sleep in a group of 25 normal males (age range = 5 to 20 years). However, it is unclear to what extent these variables in any way influence either toilet-related problems or toilet training.

Avoidance

Lovibond (1963) felt that the bell and pad apparatus operated under the operant rather than the respondent model. He designed a device known as the Twin Signal which exemplified the avoidance model by which he believed the bell and pad operated. The Twin Signal was described by Lovibond as follows:

...makes use of a pad electrode and presents two auditory stimuli. The first of these is provided by a 240 volt warning signal similar to a modern car hooter and suitably attenuated. This stimulus lasts for a little less than one second and is followed by an interval of silence of about one minute... After this period an ordinary buzzer operates continuously until it is switched off. The duration of the hooter was chosen to be slightly longer than the latency plus the duration of the response of sphincter contraction. Thus this response would appear to provide escape from the...
noxious stimulus... The function of the busser was simply to summon the attendant.

He compared his Twin Signal device with Mower and Mower’s (1938) bell and pad and Crosby’s (1950) shock devices on 36 nocturnally enuretic subjects (age range = 6 to 14 years). Criteria for success were 14 consecutive dry nights. Results showed that all subjects in the Twin Signal group met criteria requiring only 14.5 reinforcements (activation of bell), whereas the Crosby group required 20 and the Mower group required 30.5 reinforcements to reach criteria.

In a two-year follow-up, four relapses occurred in each of the three groups (approximately 35 percent). Thus, as far as long-term results are concerned, there appeared to be no differences between the three techniques.

In a related study, Turner, Young, and Rachman (1970) compared the Twin Signal with other forms of treatment of 155 children (mean age = 7.5 years). A group designated the Conditioning Group was made up of three subgroups. In the Continuous Signal Apparatus Subgroup (1) the bell activated after every nighttime accident. After each accident, subjects were taken to the toilet by parents to complete urination. The Twin Signal device as described previously (Lovibond, 1963) comprised Subgroup 2. In Subgroup 3, the Twin Signal Intermittent Reinforcement Group, subjects were treated the same as in Subgroup 2 for the first two weeks of treatment. Parents were then given an intermittent reinforcement schedule (50 percent) in which they switched the machine on or off at specified times. The second major group, the Control Group,
was comprised of two subgroups. In the Random Waking Chart Subgroup (1), parents were requested to awaken their children at randomized times and take them to the commode to urinate. In the Placebo Tablet Subgroup (2) parents gave children tablets before bedtime. Parents were told that the tablets would stop bedwetting. Criteria for success of any one treatment were 14 consecutive dry nights. Results showed no significant differences between any of the treatment groups. Unfortunately, therapy had to be stopped in 48 percent of the cases when it was determined that parents were not administering therapy as instructed. Thus, treatment effectiveness appeared hampered by poor administration methods.

Reinforcement and Punishment

Reinforcement and punishment procedures have been used in a variety of combinations to decrease nighttime incontinence. Of all the techniques used to bring about appropriate toileting behavior, reinforcement in conjunction with punishment has been shown to be most effective.

A reinforcement procedure was used on 12 institutionalized schizophrenic patients who had been hospitalized for over 20 years (ages varied from 42 to 77 years) and were nocturnally enuretic (Atthows, 1972). During the first phase, subjects were awakened four times each night and escorted to the toilet. Voiding was not reinforced during this phase. The next phase consisted of reinforcing the patient for voiding in the toilet at any of the scheduled awakening times or voiding in the toilet on his own. After two
consecutive dry nights, one of the four awakening times was eliminated; after one week of dryness, all scheduled trips to the bathroom were eliminated. Phase 1 was shown to be effective in eliminating nocturnal enuresis in those subjects who had been previously bed-wetting less than twice per week. The second phase eliminated bed-wetting in the remaining subjects. Follow-up data collected at 22 and 43 months on subjects remaining on the ward showed that they were still continent.

Punishment used in conjunction with reinforcement techniques has been effective in eliminating nocturnal enuresis. Azrin, Sneed and Foxx (1973) used both techniques on 12 retarded subjects (mean age = 37 years). The procedure incorporated two treatment groups consisting of the following sequence of conditions: Group 1: Baseline - Urine Alarm - Dry-Bed Training; Group 2: Baseline - Dry-Bed Training. In the Urine Alarm phase, the bell and pad device was used. No consequences were provided for the child after an accident occurred. The alarm simply sounded for five minutes before the staff member disconnected it. This phase was not meant to duplicate the standard bell and pad technique. The Dry-Bed Training phase made use of the potty-signal apparatus (Azrin, Bugle, and O'Brien, 1971), increased fluid intake, hourly awakenings, consequence for accidents, monitored post-training, cleanliness training, positive practice, and normal ward procedures. The Dry-Bed procedure is presented in Table 3 (see page 37). Results of the treatment showed that the Urine-Alarm phase did not bring about any significant reduction in enuretic behavior. However, the Dry-Bed Training phase decreased
Table 3
Azrin, Sneed & Foxx Dry-Bed Procedure - Institutional

I. Intensive Training

A. Before bedtime
1. Bedwetter drinks fluids
2. Urine alarm placed on the bed
3. Potty-alert placed in toilet bowl

B. Hourly awakenings
1. Minimal prompt given for awakening the resident
2. Resident instructed or guided to the toilet
3. Resident seated on toilet bowl
   a. If urination does not occur within 5 minutes
      (i) return resident to bed
      (ii) at bedside give resident fluids and praise as reinforcers
   b. If urination does occur within 5 minutes
      (i) give resident praise, snacks and fluids as reinforcers
      (ii) return the resident to bed
4. Praise resident for having dry bed (require resident to touch the dry sheets)
5. Resident returns to sleep

C. When accident occurs—45 Minutes of Cleanliness Training and Positive Practice
1. Disconnect the sound of the urine-alarm
2. Awaken resident

3. Reprimand resident for wetting and direct him to the toilet to finish urination

4. Cleanliness Training
   a. Bedwetter changes wet linen
   b. Attendant reactivates urine-alarm

5. Positive Practice in toileting
   a. Bedwetter lies down in bed for 3 minutes
   b. Bedwetter awakened with minimal prompt after 3 minutes
   c. Bedwetter directed to toilet
   d. Repeat steps a, b, c about 9 times

6. Bedwetter returns to sleep when 45 minutes have elapsed since accident was detected

II. Monitored post-training phase

A. Initiation of monitored post-training
   1. When resident has no more than one accident during a training night
   2. When the resident correctly toilets on at least 50 percent of all opportunities during a training night.

B. Procedure
   1. Urine-alarm on bed
   2. Whenever accident occurs, reprimand, Cleanliness Training and Positive Practice follow for 45 minutes.
   3. No fluids, no hourly awakenings, no reinforcers.

C. Termination of monitored post-training
1. Terminated 7 nights after last accident

III. Normal procedure

A. Initiated after resident goes 7 nights without accident
B. No urine-alarm, no reinforcers, no Positive Practice, etc.
C. Bed inspected each morning
   1. If bed wet, resident remakes and cleans bed (Cleanliness Training)
   2. If 2 accidents occur within a given week, the Monitored phase is reinstated

Enuresis significantly. The Intensive Training phase required a mean of 1.4 nights to reach criteria of continence. During the fifth week of Dry-Bed Training, nocturnal enuresis had been reduced by 95 percent. A three-month follow-up period reflected this same low level.

Azrin, Sneed and Foxx (1974) again used reinforcement and punishment techniques with nocturnal enuretics in a later study. Twenty normal children (mean age = 8 years) served as subjects. Two experimental groups, each incorporating two treatment subgroups, were compared as follows:

<table>
<thead>
<tr>
<th>Exp. I</th>
<th>Experimental Group</th>
<th>1st Two Weeks</th>
<th>After 1st Two Weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>Standard Bell and Pad Procedure (Child-Only Alarm)</td>
<td></td>
<td>Dry-Bed Procedure (Parent-and-Child Alarm)</td>
</tr>
<tr>
<td>Exp. II Experimental Group</td>
<td>1st Two Weeks Dry-Bed Procedure</td>
<td>After 1st Two Weeks Dry-Bed Procedure</td>
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<td>(Parent-Only Alarm)</td>
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<tr>
<td>Control Group</td>
<td>Standard Bell and Pad Procedure</td>
<td>Dry-Bed Procedure</td>
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<tr>
<td></td>
<td>(Child-Only Alarm)</td>
<td>(Parent-Only Alarm)</td>
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</tbody>
</table>

The standard bell and pad procedure consisted of taking the child to the bathroom to finish urination when the bell rang in either the child’s, and/or parents’ room. Parents changed sheets and reset the device. This condition lasted for two weeks. The Dry-Bed procedure was similar to that previously described by Azrin, et al. (1973), and is outlined in Table 4, (see page 41).

During baseline, subjects were bedwetting each night. The bell and pad procedure reduced bedwetting to five accidents per week during the second week as compared with once per week with the Dry-Bed procedure for the same period of time. Accidents using the Dry-Bed procedure were reduced to a zero level for all subjects during the fourth week. A six-month follow-up showed these same results. The average child had two accidents before meeting criteria (14 consecutive dry nights). There were found to be no differences between any of the bell and pad groups: parent-and-child, child-only, and parent-only alarms. The Dry-Bed procedure was effective in reducing bedwetting to a zero level within a short period of time.

Several studies have examined variables associated with nocturnal enuresis such as withholding urination during the day. Nordquist (1971) tried to assess the effectiveness of a new method
Table 4
Azrin, Sneed & Foxx: Dry-Bed Procedure - Home Training

I. Intensive training (one night)

A. One hour before bedtime

1. Child informed of all phases of training procedure
2. Alarm placed on bed
3. Positive practice in toileting (20 practice trials)
   a. Child lies down in bed
   b. Child counts to 50
   c. Child arises and attempts to urinate in toilet
   d. Child returns to bed
   e. Steps a, b, c, and d repeated 20 times

B. At bedtime

1. Child drinks fluids
2. Child repeats training instructions to trainer
3. Child retires for the night

C. Hourly awakenings

1. Minimal prompt used to awaken child
2. Child walks to bathroom
3. At bathroom door (before urination), child is asked to inhibit urination for one hour (omit for children under 6)
   a. If child could not inhibit urination
      (i) Child urinates in toilet
      (ii) Trainer praises child for correct toileting
(iii) child returns to bed

b. if child indicated that he could inhibit urination for one hour

(i) trainer praises child for his urinary control

(ii) child returns to bed

4. At bedside, the child feels the bed sheets and comments on their dryness

5. Trainer praises child for having a dry bed

6. Child is given fluids to drink

7. Child returns to sleep

D. When an accident occurred

1. Trainer disconnects alara

2. Trainer awakens child and reprimands him for wetting

3. Trainer directs child to bathroom to finish urinating

4. Child is given Cleanliness Training

a. child is required to change night clothes

b. child is required to remove wet bed sheet and place it with dirty laundry

c. trainer reactivates alara

d. child obtains clean sheets and remakes bed

5. Positive Practice in correct toileting (20 practice trials) performed immediately after the Cleanliness Training

6. Positive Practice in correct toileting (20 practice trials) performed the following evening before bedtime
II. Post-training supervision (begins the night after training)

A. Before bedtime

1. Alarm is placed on bed
2. Positive Practice given (if an accident occurred the previous night)
3. Child is reminded of need to remain dry and of the need for Cleanliness Training and Positive Practice if wetting occurred.
4. Child is asked to repeat the parent's instructions

B. Night-time toileting

1. At parents' bedtime, they awaken child and send him to toilet
2. After each dry night, parent awakens child 30 minutes earlier than on previous night
3. Awakening discontinued when they are scheduled to occur within one hour of child's bedtime

C. When accidents occurred, child receives Cleanliness Training and Positive Practice immediately upon wetting and at bedtime the next day

D. After a dry night

1. Both parents praise child for not wetting his bed
2. Parents praise child at least 5 times during the day
3. Child's favorite relatives are encouraged to praise him
III. Normal routine—initiated after 7 consecutive dry nights
   A. Urine-Alarm is no longer placed on bed
   B. Parents inspect child's bed each morning
      1. If bed is wet, child receives Cleanliness Training immediately and Positive Practice the following evening
      2. If bed is dry, child receives praise for keeping his bed dry
   C. If two accidents occur within a week, the Post-Training Supervision is reinstated

for treatment of nocturnal enuresis in a five-year-old disruptive male. The subject refused to follow parental instructions and tantrummed. The experimenter recorded two classifications of the child's behavior: a) oppositional behavior (not complying to parental demands within 20 seconds), and b) cooperative behavior (complying with parental demands). The occurrences or non-occurrences of nocturnal enuresis was recorded each morning. Bed-wetting behavior was ignored by parents and attention was given to the subject contingent on cooperative behavior, while oppositional behavior was consequated with placing the boy in a corner of his bedroom. A reversal design was used, and results showed that enuretic behavior decreased markedly during the treatment phases as compared to an increase in enuretic behavior during both baselines. Nordquist concluded that nocturnal enuresis appeared to be functionally related to other aspects of a child's behavior that
were amenable to direct parental control. An 18-month follow-up showed continued continence.

Kimmel and Kimmel (1970) designed a procedure to strengthen the withholding capacity of the bladder during the day so that the subject would also withhold urination throughout the night. Their study dealt with three nocturnal enuretic females (mean age = 6 years). Subjects were required to withhold urination for progressively longer periods of time until within a few days they were withholding it for 30 minutes (after the onset of pressure stimulation). The procedure incorporated having the child notify the parent when she needed to urinate; the child was then reinforced when the required withholding time had expired. Results showed that two children (normal) ceased bedwetting within seven days of the beginning of treatment while the other female (special) took two weeks.

A study based on the Kimmel and Kimmel method was done by Miller (1973), using two nocturnal enuretic normal children (ages 13 and 14). A reversal design was used in which frequency of nighttime accidents and times toileted in the daytime were recorded during baseline, and subjects were required to withhold urination for up to 30 minutes during the treatment phases. During treatment, children increased their fluid intake and were reinforced for withholding the required period of time. Results indicated that as the number of daytime urinations decreased, so did the frequency of nighttime accidents. Treatment resulted in having one subject remain dry for three consecutive weeks and the other dry for four weeks.
consecutive weeks (which resulted in termination of treatment).
Follow-up reflected this same success when taken at four months for
one subject and at seven months for the other.

A case study of a 13-year-old nocturnally enuretic normal
female done by Stedman (1972) was modeled after Kimmel and Kimmel's
method. The client monitored her own behavior. During baseline the
client recorded her frequency of urination each day and the awareness
of bladder distention as being either weak, moderate or strong.
During the experimental condition she withheld urination for up to
30 minutes after the onset of strong distention cues. No reinforce­
ment was given beyond the client's own awareness of increased
bladder retention. She became dry after the twelfth week of
treatment and had few accidents during a three-month follow-up.

A final study using this model (Paschalis, Kimmel & Kimmel,
1972) involved 35 nocturnally enuretic children (mean age = 8 years)
who were placed in one of three groups. Group 1 withheld urination
for progressively longer periods of time, up to 45 minutes. Group
2 served as control and received no treatment. Group 3 consisted of
non-enuretic children serving as controls. Results showed that when
the number of daytime urinations decreased, so did the frequency of
nighttime accidents for Group 1. During the 20-day treatment, 45
percent of the withholding group (1) and 33 percent of the untreated
controls attained a minimum of one continuous week without bedwetting.
Summary of Nighttime Incontinence

The bell and pad technique as proposed by Mower and Mower (1938) is the most well researched technique dealing with nighttime incontinence. Relapse rates, drop-out rates, increased fluid consumption, effects of drugs, and the like have all been studied with respect to this technique. Advantages of using the device are that continuous monitoring is not needed by parents or staff in detecting incontinence and that parent supervision need only take place when the alarm activates (possibly twice each night). Even though there is minimal response cost in terms of parental involvement (time) on a per night basis, this must stand in contrast to the two months' training which may be required before continence is reached, and the disrupted sleep of the parents. In fact, the disrupted sleep of the parent is probably the major contributing factor to client drop-out rates.

The most sophisticated methods for nighttime toilet training were developed by Azrin, Sneed and Foxx (1973, 1974) which utilized reinforcement and punishment techniques. The advantage of their methods is the short time that it takes to develop continence (4.5 weeks). Disadvantages include learning the complex procedures and the amount of time spent during Intensive Training.

It has been shown that increased fluid intake decreases the likelihood of relapse in the bell and pad research (Young & Morgan, 1972) while providing more opportunity for learning trials in Azrin, Sneed and Foxx' methods (1973, 1974).

In general, procedures were not specified for having clients
remove and replace clothing. Such behaviors are necessary for reaching nighttime independence, even though there is a possibility that the client may withhold urinating throughout the night.

Again, all studies lacked certain methodological controls which invalidate their results.

METHODOLOGY

As mentioned previously, studies have been found lacking in demonstrating short- and long-term (12 months or more) effectiveness or providing adequate information for replication. For instance, baseline data has been found missing (Baumeister & Klosowski, 1965; DeLeon & Mandell, 1966; Geppert, 1953; Hundziak et al., 1965; Kimmel & Kimmel, 1970; Lovibond, 1963; Paschalis, et al., 1972), thus questioning the degree of effectiveness of the procedures. Replication is often made difficult, if not impossible, due to unclear descriptions of treatment procedures (Atthowe, 1972; DeLeon & Mandell, 1966; Hundziak et al., 1965; Lal & Lindsley, 1968; Lamontagne & Mark, 1973; Lovibond, 1963; Marshall, 1966; Paschalis, et al., 1972; Waye & Melnyr, 1973).

Although studies varied in defining criteria for success, most set criteria at 14 consecutive days or nights of continence. Approximately 30 percent of the studies reviewed dealing with daytime incontinence vs. 60 percent of those dealing with nighttime incontinence defined criteria of success.

The use of reliability checks has been extremely low; only three studies utilized inter-observer agreement procedures.
Follow-up data were provided in about 60 percent of the studies. Half of the follow-ups dealing with nighttime incontinence took place at a minimum of a year whereas only one of the follow-ups dealing with daytime incontinence provided follow-up of a year or more. Although follow-up is not a part of the actual training procedure, it is necessary in evaluating the effectiveness after such procedures have been terminated. The use of group comparisons and single subject AB Designs (where A is baseline and B is treatment) in the various toilet training studies should be looked at with caution since neither of these designs establish a functional relationship between independent and dependent variables (Edelman, 1971; Ferdinden & Van Handel, 1970; Johnson & Thompson, 1974; Lal & Lindsley, 1968; Marshall, 1966; Pedrini & Pedrini, 1971; Stedman, 1972; Tomlinson, 1970; Waye & Melnyr, 1973; Young & Morgan, 1972a). There were only a handful of studies whose designs were adequate (Azrin & Foxx, 1971; Azrin et al., 1973; Azrin et al., 1974; Kohlenberg, 1973; Mahoney et al., 1971; Nordquist, 1971).

CONCLUSION

It appears that the Azrin and Foxx method (Azrin & Foxx, 1971; Azrin, et al., 1973; Azrin, et al., 1974) is the most promising in eliminating daytime and nighttime incontinence in a short period of time. However, long-term effectiveness (minimum of one year) has not been established by follow-up data nor have there been replication studies to add support to their methods.
One variable which should be examined in future studies is the ease of administration of any toilet training method. Although the Azrin and Foxx techniques are effective, what is the likelihood that parents will realistically carry them through? Thus, component analysis research might attempt to eliminate some of their perhaps unnecessary techniques so that less time and effort is required on the part of both staff and parents. For instance, why have 45 minutes of cleanliness training if five minutes of training will have the same effect?

More research should be done with the Kimmel and Kimmel (1970) method of dealing with nighttime incontinence, since it requires no supervision during the night by parents. Considering its ease of administration, this method might prove fruitful. However, variables such as the interval of time urination must be withheld, length of sessions per day, increased fluid consumption, and the like, must all be studied in relation to this method.

In conclusion, aspects of methodology which may invalidate results have been mentioned. Thus, emphasis should be placed on providing studies which show more continuity in methodology. Baseline data, reliability checks (in each phase), clearly described procedures and conditions, long-term follow-up (on all subjects), and the criteria for success (e.g., two consecutive weeks of continence) should all be incorporated. To provide data for testing the ease of administration, research studies could also take careful data on why parents terminate treatment.
REFERENCES


