The Role of Trainer Contact in the Treatment of Enuresis Using a Conditioning Device

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THE ROLE OF TRAINER CONTACT IN THE TREATMENT OF
ENURESIS USING A CONDITIONING DEVICE

by

Elaine Lee Phillips

A Dissertation
Submitted to the
Faculty of The Graduate College
in partial fulfillment of the
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THE ROLE OF TRAINER CONTACT IN THE TREATMENT OF
ENURESIS USING A CONDITIONING DEVICE

Elaine Lee Phillips, Ph.D.
Western Michigan University, 1986

This study examined if regular planned contact compared to no contact with a trainer made a difference in terms of dropout rate and success rate in the treatment of enuresis using a conditioning device. The study additionally attempted to determine if the frequency of contact had an impact on success and dropout rates. Twelve boys and six girls were assigned to one of three groups, a high contact group, medium contact group, and no contact group. Other than matching for age, subjects were randomly assigned. All subjects received the same training on the use of the conditioning device. Subjects in the high contact group had weekly contact with the experimenter consisting of a phone call one week and a face-to-face appointment the following week. The medium contact group had biweekly contact with the experimenter consisting of a phone contact after 2 weeks with a face-to-face appointment after 2 more weeks. The no contact group had no planned phone or face-to-face contacts with the experimenter. They mailed stamped, addressed postcards to the trainer weekly on which they had recorded the child's progress. These schedules were maintained throughout the experimental phase. After criterion was reached (14 consecutive dry nights) or 120 days had elapsed, the experimental period was terminated. A 1-month follow-up period
ensued at the end of which the experimenter contacted the family by phone to assess progress. The lowest dropout rate occurred in the high contact group, but the highest success rate and the shortest amount of time to criterion occurred in the medium contact group.
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Elaine Lee Phillips
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CHAPTER I

INTRODUCTION

Through the past four centuries, much has been written about the possible causes and treatments for nocturnal enuresis. Glicklich (1951), in a historical review of medical documents, noted that enuresis "has been recognized as a disturbance of childhood necessitating medical treatment since the time of the Papyrus Ebers, which is dated 1550 B.C." (p. 850).

Glicklich (1951) found that prior to the nineteenth century, the most widely held theory regarding the cause of nocturnal enuresis was that it was a result of "weakness of the bladder" (p. 861). Such remedies as eating pulverized parts of various animals, drinking teas made from various plants and/or animal organs, and the wearing of plasters or poultices of varying origins were widely used (Glicklich, 1951, p. 862).

In the nineteenth century, a number of other causes and treatments were suggested, including the following:

1. Hereditary predisposition—Medical writers of the time were noting that often there was a family history of nocturnal enuresis (Glicklich, 1951, p. 863).

2. Sleep patterns—"Heavy sleepers were believed to have enuresis more frequently than those who were not" (Glicklich, 1951, p. 863).
3. Imbalance of musculature in the bladder—i.e., "irritable detrusor acting against a relaxed sphincter" (Glicklich, 1951, p. 863).

4. Urinary irritations or general system irritations—Writers included such causes as intestinal parasites, various foods or drinks, and hip diseases (Glicklich, 1951, p. 863).

5. Dietary hygiene or behavior habits—Improper foods, parental failure to see that the child emptied his or her bladder before bed, and habit were given as possible causes (Glicklich, 1951, p. 864).

6. Dreams—"Dreams were often mentioned as the inciting cause of enuresis. These included dreams of wetting the bed, dreams of urinating in a convenient receptacle, and amorous or lascivious dreams which in later life gave rise to nocturnal emissions" (Trousseau, cited in Glicklich, 1951, p. 864; Smith, cited in Glicklich, 1951, p. 864).

7. Neurogenic—These explanations included specific origins such as dysfunction of nerves to the bladder and general origins such as "neurosis," with Glicklich (1951) noting that "neuroses were thought of as organic rather than functional disturbances" (p. 685).

8. Pathology of the genitourinary tract—These included anatomical malformations and genital or urinary diseases (Glicklich, 1951, p. 685).

9. Personality variables—Glicklich (1951) credits Trousseau (1870) as listing "laziness, cowardice and fright" (p. 865) as possible causes of enuresis.
Among the nineteenth century medical writers and lecturers, Glicklich (1951) noted the following treatments:

1. "Limiting Fluid intake three hours before bedtime, emptying the bladder at bedtime" (p. 866).

2. "Sleeping on a hard mattress with few covers, assuming any position but that of lying on his back" (p. 866).

3. "Deep sleep was to be avoided by awakening the child during the second hour of sleep. The child should further be awakened just prior to the time he usually wet" (p. 866).

4. Cold or warm sitz baths (p. 866).

5. Various pharmacological techniques (p. 866).

6. Various diet and exercise recommendations (p. 866).

7. Prohibition of the supine position (p. 876).

8. Surgical procedures, including cauterizing the orifice of the urethra with silver nitrate, thought to increase sensitivity to urine passing over it (p. 867).

9. Distending the bladder gradually with water until it held up to one pint (p. 867).

10. Various mechanical gadgets. For females, some of these included India rubber bags placed in the vagina and inflated with air, thought to put pressure on bladder and urethra and thereby eliminate the problem; for males, penile bandages, pouring collodium into the prepuce, etc. (p. 867).

11. Do nothing. This theory (perhaps born out of frustration) was based on the idea that natural shocks to the genitourinary systems, such as the onset of puberty, intercourse, pregnancy, or the
development of special organs, would take care of the problem in time (p. 867).

Twentieth-century thought on causes and treatment of enuresis ranges from a behavioral view to a psychodynamic view. The behavioral view was expressed by Walen, Hauserman, and Lavin (1977): "An inadequate behavioral repertoire appears to be responsible. Enuretic children are unable to inhibit the voiding reflex when the volume and pressure of urine in the bladder increase" (p. 65). Yates (1970) summarized the psychodynamic view: "Enuresis is a symptom of some underlying disturbance of a fundamentally more important nature" (p. 79). Whatever the psychological view, physiologically only "1-2% of the children who wet their beds have medical problems that could account for the bedwetting" (Azrin & Besalel, 1979, p. 27).

There is some variation in the reported prevalence of nocturnal enuresis in the U.S. population. Pierce (1967) and Murphy, Nichols, Eddy, and Umphress (1971) found that "approximately 85% of the population has acquired bladder control by 4-1/2 years of age and 90% by age 7-1/2; only 3% of adolescents and 1% of young adults experience this problem" (cited in Walen et al., 1977, p. 65). Azrin and Besalel (1979) reported a slightly higher incidence: Approximately 33% of all 3-year-olds are bedwetters, 25% of all 4-year-olds, one-seventh (15%) of the 5- and 6-year-olds, 7% of all 8- and 9-year-olds, 4% of all 12- to 14-year-olds, and 2% of all 17- and 18-year-olds still wet the bed (pp. 13-14). In quoting studies of army draftees, Azrin and Besalel (1979) further reported that 2% of these males are bedwetters (p. 14). Unfortunately, there are no valid
predictors for determining which child will spontaneously become dry and/or at what age this will occur (Doleys, 1977).

Fritz and Armbrust (1982) noted that bedwetting is more common in the United States than in Europe. They also propose that there may be an inherited predisposition for enuresis as there is a higher incidence in families where the parents were enuretic as children. In examining epidemiological studies, Fritz and Armbrust (1982) reported that of children surveyed 77% of those in which both parents were childhood bedwetters were themselves bedwetters. In children whose mothers were enuretic 44% reported enuresis. Of the children who reported their fathers were enuretic 43% reported they too were enuretic.

Several authors (Azrin & Besalel, 1979; Fritz & Armbrust, 1982; Walen et al., 1977) noted that bedwetting is more prevalent in the male population than in the female population with approximately twice as many male children being bedwetters as female children. Azrin and Besalel (1979) commented that this finding seems to be true across cultures. They stated that although several hypotheses have been proposed to explain this phenomenon (including increased permissiveness with boys or physical maturational differences), none have been proven.

Regardless of the population affected, current treatment approaches can basically be categorized into one of the following three areas: (a) pharmacology, (b) psychotherapy, or (c) behavior modification. One technique, the modification of fluid intake, is often reported as being used in combination with one or all of the
preceding. When used by itself, neither restricting fluid intake (typically after 6:00 p.m.) nor increasing fluid intake is reported as successful in eliminating nighttime enuresis (Ritko, cited by Walen et al., 1977, p. 66).

Pharmacological treatment often consists of the use of tricyclic antidepressants (usually imipramine) or less frequently the use of amphetamines. The exact action of imipramine is unknown. It is hypothesized to have an anticholinergic action in that the drug relaxes the detrusor muscle resulting in increased bladder capacity.

In the case of amphetamines, Bindelglas (1975) reported that amphetamines and other CNS stimulants are used as a result of the theory that by lightening the child's sleep, the enuresis will be controlled. He suggested that not only does the use of amphetamines fail to control enuresis, but it may in the case of hyperactive enuretics aggravate the problem.

There is controversy surrounding the use of these drugs in light of their side effects. The possible side effects of imipramine include "nervousness, sleep disorder, tiredness, and mild gastrointestinal disturbances" (Physicians' Desk Reference [PDR], 1981, p. 917). One of the side effects of the regular use of amphetamines is "drug dependence" (PDR, 1981, p. 1290).

Additionally, the success rate of either of these drugs in eliminating nocturnal enuresis is questionable (Poussaint & Ditman, 1965; Shaffer, Costello, & Hill, 1968).

Shaffer et al. (1968) reported that although imipramine did reduce nighttime enuresis in approximately 50% of the children.
studied, enuresis was eliminated in only 2 of the 56 children once
the drug was withdrawn. Further, they found that whether the drug
was withdrawn abruptly or slowly, the rate of relapse remained the
same: 53 out of 56 reported relapse. These findings are in-
consistent with Poussaint and Ditman's (1965) results of a 24% cure
rate when the drug was removed.

Yates (1974, p. 94) stated that the results of the Forrester,
Stein, and Susser study (1964) indicate that amphetamines do not
result in a higher remission rate than that which occurs naturally.

Psychotherapy is also not identified by most authors as a treat-
ment of choice. Johnson (1980) noted that "only two controlled
studies using psychotherapy have been carried out" (p. 99). Both of
these studies compared psychotherapy with the use of a conditioning
apparatus.

Werry and Cohrssen (1965) compared three groups of matched
subjects. The first, a no treatment group was placed on a waiting
list for treatment. The second group received six to eight sessions
of supportive psychotherapy over a 3-month time period. The therapy
was described as psychodynamically oriented and included encourage-
ment and suggestion. The third group used the pad and buzzer. The
results were that the pad and buzzer group was significantly superior
to the psychotherapy and no treatment groups, with the latter two
groups not differing significantly in terms of cures.

DeLeon and Mandell (1966) compared psychotherapy with the use of
a conditioning apparatus (pad and buzzer). They found that out of 87
children studied, 86% were "cured" using the pad and buzzer system,
while only an 11% cure rate was achieved through the use of psychotherapy. The criterion for a "cure" was 13 consecutive dry days. One major flaw in this frequently cited study is that the type of psychotherapeutic technique used was unspecified. The reader is told only that the sessions occurred 12 times, at a rate of one per week. Forty minutes were spent with the child and 20 minutes with the mother. Sessions were conducted by a psychiatrist, psychologist, or (in two cases) a psychology intern.

The behavioral explanation for enuresis is that it is due to poor learning experiences, more specifically poorly arranged contingencies or inappropriate contingencies (Doleys, 1977). Out of this view six commonly used techniques for treatment have developed. These include the use of: retention control training, staggered awakening, positive reinforcement, punishment, Arzin's dry bed method, and the pad and buzzer.

Retention control training developed by Kimmel and Kimmel (1970) involves teaching increased urinary retention during the day (up to 30 minutes) with the hope that generalization will occur during the child's sleep. In this method the child ingests a prescribed amount of liquid and is reinforced for withholding urine for gradually increasing durations. The goals are to increase the ability to hold urine and to increase sensitivity to bladder cues. This area of research has been encouraged by studies which have shown a correlation between increased bladder capacity and decreased enuresis. Unfortunately correlation does not equal cause.
Kimmel and Kimmel's (1970) initial work was with three subjects, all of whom were 3-4 years old. They did succeed in helping all three reach and maintain dryness (100% cured). Their later work (1972), however, was not nearly as successful. Using a larger number of subjects (approximately 40), they found only 40% achieved dryness.

Doleys (1977) reviewed eight studies using retention control training and concluded that it was not a particularly promising technique but more research is needed. The reported success rates did not compare with those achieved using the pad and buzzer. Additionally, the number of subjects utilized was often so small as to make the results questionable. Doleys (1977) also noted that procedural differences (such as, was the child rewarded at the end of the interval or after using the toilet?) made the studies somewhat difficult to compare.

Staggered awakening is a technique in which the child is awakened at various times throughout the night and escorted to the toilet. This method is often used in the institutional setting, as it is less disruptive than the pad and buzzer. Unfortunately, it is also much less successful.

Greer and Davis (1975) worked with nine subjects using a single-subject design of multiple baselines. They had the subjects awakened three times per night at variable times during the first 2-week period. They awakened the subjects two times per night during the second 2-week period and one time per night during the last 2-week period. None of their subjects achieved dryness. Four did, however, have a decrease in wetting frequency.

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Walen et al. (1977) dismissed the staggered awakening procedure, stating that it is successful with some patients in the institutional setting but that in home use 50% of the families drop out before dryness is achieved (p. 66). One could speculate that this would indeed be quite aversive to parents if after 6 weeks of awakening a child at night and having one's own sleep disrupted, all that has occurred is a decrease in the wetting.

The goal of the staggered awakening procedure is that after the awakenings are faded out, the child will awaken himself in the night and go to the toilet.

Reinforcement, in the form of charting and rewards for dry nights, is also typically dismissed in the literature. As Walen et al. (1977) succinctly put it, although the child may be motivated by the system, it is not successful due to the child's "sleeping through the actual wetting event" (p. 66).

Punishment procedures have included everything from mild punishments, such as having the child change his sheets and wash them and response cost systems, to plunging the child into cold water. There are many ethical concerns voiced by parents and therapists alike regarding the use of punishment procedures, particularly those as radical as plunging the child into cold water.

One practical concern would be that to have a punisher be effective it would need to be paired closely in time with the wetting event. One method of pairing would be to use the pad and buzzer and present the punisher at the time the buzzer went off. This, however, increases the probability of noncompliance on the child's part and
may result in the child’s turning off the machine after the parents leave the room, rolling himself in blankets so the buzzer will not be activated, etc., and eventually dropping out of the program. Again, Walen et al. (1977) dismissed punishment as a technique of choice.

Azrin’s dry bed method was developed in 1974. It is described by some authors as a "social motivational system." It incorporates the use of mild punishers, reinforcers, activities to increase attentiveness to bladder cues, staggered awakenings, and the optimal inclusion of the pad and buzzer. One major drawback of this system is its complexity and the amount of effort it requires from both the therapist and the family. Walen et al. (1977), in their review, stated that this method is so complex that it should be used only with children who have not responded to other methods. Doleys (1977), who also reviewed it, commented on its complexity and heavily weighted his remarks toward the use of the pad and buzzer only. He did, however, complete a follow-up experiment with colleagues on the use of this method. He found a lower success rate than that reported by Azrin, Sneed, and Fox (1974).

By far the most widely used and researched method is the pad and buzzer. This method was developed in 1938 by Mowrer and Mowrer. It consists of a moisture-sensitive pad connected by wires to a battery and an alarm. Moisture on the pad completes the circuit, and the alarm sounds. When the child wets the bed, therefore, the alarm sounds, resulting in the child's awakening, arising, and using the toilet.
Mowrer and Mowrer (1938) conceptualized this program using a classical conditioning paradigm. The alarm was viewed as an unconditioned stimulus that was being paired with bladder sensations and wetness (initially these being neutral stimuli). As the pairing continued, the bladder sensations become a conditioned stimulus for awakening.

Over the past 46 years, much research has been conducted using this procedure. Doleys (1977), in reviewing 12 recent studies (1965-1977), found a 75% cure rate using the pad and buzzer. The relapse rate was approximately 41%. These statistics are averages he computed on the studies he examined. This is slightly lower than the earlier reviews, which typically reported a success rate of 80-90% (Lovibond, 1964). Azrin and Theines (1978) reported a dropout rate of 30% based on their review of the literature.

Several authors have alluded to the role of reinforcement of the parents in the form of regular therapist contact in the successful treatment of enuresis using the pad and buzzer. For example, Werry and Cohrssen (1965) noted that high rates of successful treatment reported in the literature have been associated with close supervision of the child by the parents. Some authors identify lack of parental cooperation as one of the most common reasons for failure of the pad and buzzer procedure (Collins, 1973; Forsythe & Redmond, 1970; Young & Morgan, 1972). Taylor and Turner (1975) are even more specific in their statement: "Reasons for failure are complex but appear to be related less to background variables and more to difficulty arousing the child and maintaining parental motivation"
(p. 285). Doleys (1977), in reviewing the role of contact with the trainer on outcome tasks, stated: "Although there are no specific data that compare the effects of minimum and maximum supervision, dropout rates and failures appear to be lower and the percentage of arrests higher under constant supervision" (p. 39).

An examination of individual studies reveals that the success rates differ significantly between studies. For example, Dische (1971) reported a combined dropout and failure rate of 17%. Her technique included face-to-face contact with the parent and child three times per week. In contrast to this, Werry and Cohrssen (1965) reported a success rate of only 30% using the pad and buzzer. An examination of their study reveals that due to another variable being examined, they attempted to minimize contact between the trainer and family after the initial training in use of the pad and buzzer.

In spite of agreeing that parental motivation and cooperation are important in terms of success rates and dropout rates, some studies do not report the type or frequency of contact between the parents and the trainer (Forsythe & Redmond, 1970). Other studies report that contact occurs but are vague in terms of actual frequency of contacts (Werry & Cohrssen, 1965).

Bollard and Nettlebeck (1981) conducted a study in Australia examining the role of family and trainer contact in the use of the pad and buzzer. They examined two treatment groups and one control. One treatment group maintained phone contacts with the trainer one time per week. The second group was not required to make weekly contact. There are several problems with the data reported, the
analysis of the data, and the conclusions which followed. One problem is that the reader is not informed as to whether any of the parents in the no-contact group made contact during the experimental phase. The second major question about this study concerns the use of "average data." Three subjects in the no-contact group dropped out. The average bedwetting frequency of the three children at the point of dropout was retained in the calculation of mean scores throughout the experimental phase, i.e., their wet days at the point of dropout continued to be averaged in with the other children's wet days, although they were no longer reporting or participating in the study. Using this method, the authors claimed a significant difference between groups in terms of the number of days taken to reach dryness and the number of wet beds at the end of the experimental period, with the contact group fairing better in both respects. This technique is suspect, especially when one notes that the difference between groups when the dropouts' "average data" are not used is not significant.

This researcher would therefore like to answer the following questions:

1. Does regular planned contact as compared to no contact with the trainer result in a decrease in dropout rate and increased success rate as several authors have hypothesized?

2. Does the frequency of contact (high versus medium) have an impact on dropout rate and success rate?
CHAPTER II

METHOD

Subjects

Forty-five families responded to newspaper and other locally posted advertisements. Nineteen met the requirements for and agreed to participate in the study. Of these 19, one child reached the criterion for dryness during the baseline phase. She was, therefore, not included in the study.

The 18 children who were left were 5-11 years of age with a mean age of 7.3 years and a median age of 7 years. Twelve were boys and six were girls. In 15 children the enuresis was of lifelong duration. Three children had experienced 6 months of dryness followed by years of regular wetting. All of the parents described previously working with their children in attempts to eliminate the enuresis. Methods utilized included limiting liquids after 6:00 p.m., nighttime awakenings, medication, scolding, praising dry nights, having the child change the sheets, verbally ignoring the situation, and in two cases previous use of the pad and buzzer.

None of the children were taking medication which would affect the enuresis. Each had undergone medical evaluations with his/her physician prior to the study to rule out an organic cause for the enuresis. All of the children had a bedwetting frequency of at least one night per week. All subjects were diurnally continent.
Apparatus

Each family was asked to purchase a conditioning device from the department store of their choice. Seven families purchased the Sears model (catalog number 801302); 9 families purchased the J. C. Penney model (catalog number AW662-0041A). One family purchased the Wet Stop Alarm available through Palco Labs, Santa Cruz, California, at the recommendation of their physician. One family purchased the Nytone alarm through a local pharmacy. These latter two devices have a moisture sensitive element attached to the child's underpants. This element is wired to a small battery operated alarm which is attached to the child's undershirt at the shoulder in the case of the Wet Stop Alarm, or on a band worn on the child's wrist in the case of the Nytone alarm. The Sears and Penney's devices consist of metallic sheets connected to a six volt battery operated buzzer. These sheets are placed on the bed.

All of these devices operate in the same manner. Urine on the moisture sensitive element (whether the element is on the bed or on the child's underpants) completes the electrical circuit resulting in a buzzer being activated.

Procedure

After the initial telephone contact, all subjects were asked to chart the child's dry nights on a calendar for the next 2-week period. They were instructed to bring this calendar and the apparatus to the training session.
The training sessions were held individually for each family. The instructions for the use of the equipment and method of charting progress were exactly the same for all subjects. The method and frequency of contacting the trainer differed between groups. Experimental Group 1 (high frequency contact group) was contacted by telephone by the experimenter once weekly, with a face-to-face contact once every 2 weeks. Experimental Group 2 (medium frequency contact) had contact by telephone with the examiner once every 2 weeks, with once-a-month face-to-face contact. Experimental Group 3 (no contact) were provided with stamped, addressed postcards. They were asked to mail their charting of the child's progress to the trainer once a week. Face-to-face contact with Group 3 did not occur.

The instructional session consisted of a brief discussion with the parents and the child regarding the theory of bedwetting specific to the use of the pad and buzzer and a brief history of bedwetting as a problem through cultures and times. Families were given a typed sheet with some statistics regarding bedwetting (Appendix A). The parents and child were then asked the questions listed in Appendix B with the experimenter writing out their responses. All families were asked to use no methods other than the one described and practiced in the training session; i.e., if they had been limiting the child's fluids or awakening the child in the night to urinate, they were asked to stop. Additionally, parents were asked to sleep in the same room as the child for the first 3 weeks of treatment. This was to insure that the child awakened to the sound of the buzzer and followed the desired routine. Parents were advised to make no comment.
regarding accidents. They were instructed to praise both dry beds and cooperation with the program.

Role Play

The role play portion of the training session was divided into three parts: (a) before bed procedure, (b) procedure if alarm sounds, and (c) procedure when child beats the alarm. At the completion of the role play, the parents were given a typed sheet reviewing each procedure.

Before Bed

First the parent and child were asked to role play a 3-minute procedure to be used nightly at bedtime. The parent was to review with the child the benefits of staying dry (the child had identified these during the questionnaire, Appendix A). The parent or child would then touch the two clips of the device together causing the alarm to sound. The child would stand up and turn the buzzer off. The child chose a "password" for the night.

Alarm Sounds Procedure

The parent and child were then taught how to make up a bed with the pad on it. The child turned on the buzzer (parent checking to insure) and lay down pretending to sleep. The alarm was then sounded. When the alarm was sounded the child was to role play getting up, turning off the alarm, stating the "password," and going to the bathroom in that order. The concept of "beating the buzzer"
was used to encourage the child to arise as quickly as possible once the buzzer sounded. The parents were instructed that only the child could turn off the buzzer. This should occur only after arising from the bed. The parent was instructed to awaken the child if the sound of the buzzer did not result in voluntary arising.

**Beating the Alarm**

The child also role played a successful "beating the alarm"; i.e., the child lay down pretending to sleep. The child would then spontaneously jump up, call out to the parents, and go to the bathroom.

After completing all portions of the role play, the parent and child were asked to determine reinforcers that the child would receive for the first dry night, 3 consecutive dry nights, 5 consecutive dry nights, 7 consecutive dry nights, 9 consecutive dry nights, and 14 consecutive dry nights. The reinforcers could consist of activities, food, toys, clothes, or anything that the child and parent agreed upon. It was recommended, however, that the parents and child start out with small rewards and work up to larger ones, with the biggest occurring at 14 consecutive dry nights. Every dry night was rewarded with a star on the calendar and parental praise.

**General Recommendations**

To facilitate urine flowing freely on the pad and thereby triggering the alarm, the manufacturer and most authors recommend that the child sleep without nightclothes below the waist. It was
recommended that all subjects comply with this when actually using the equipment in their homes. Parents were instructed in the manufacturer's recommended maintenance of the equipment. They were also instructed to change the battery at the first sign of the signal becoming weak. Additionally, they were informed of the manufacturer's recommendation to never allow the child to sleep in the metallic sheets without a cloth sheet covering the metal. All families were provided with written reminders of these procedures (Appendix D). Additionally, during the training session the informed consent was reviewed with all families signing and receiving a copy (Appendix E).

Charting

All families were advised to chart dry nights using stars and leave wet nights blank on their calendars. The trainer then charted the families' progress as reported by telephone calls, face-to-face contacts, or mail depending on group assignment schedule.

Experimental Phase

In Groups 1 and 2 phone contacts consisted of the trainer charting progress, answering questions, praising compliance with the program, and praising progress in conversations with the parents. Face-to-face follow-up visits consisted of charting and praising compliance and progress; answering questions; and the child and parent role playing the before bed procedure, procedure if alarm sounds, and procedure when child beats the alarm. Face-to-face follow-ups were
typically of a 20-30 minute duration. Group 3 was given addressed postcards and told to mail them in on a specific day of the week. No face-to-face or phone contacts were arranged.

**Follow-up Phase**

All families were instructed to use the pad and buzzer nightly until the child achieved 14 consecutive dry nights. At that point the before bed procedure and the use of the pad and buzzer could be discontinued. Charting was to continue for 30 days after this point to provide a brief follow-up period. If the child had any further wet nights, the use of the pad and buzzer and the before bed procedure was to be reinstated until 14 consecutive dry nights had again been achieved.

If the child had not become dry by the end of 120 days, the experimental phase was terminated. The therapist did, however, follow up with those families 30 days after discontinuation to assess the frequency of wetting.

During the follow-up phase, the family and the experimenter did not have contact regardless of group assignment. At the end of the 30 days the experimenter called the family to record any relapses.
CHAPTER III

RESULTS

All subjects, regardless of group assignment, showed a decrease in wetting over the rate reported during baseline. Fourteen out of the 16 subjects who used the procedures and completed the experimental phase reached the criterion (14 consecutive dry nights) by the end of the follow-up phase. This gives an overall success rate of 87%.

Success rate by group is shown in Table 1. By the end of the follow-up phase there was very little difference between the no contact success rate of 80% and the high contact group rate of 83%. The medium contact group performed the best with 100% of the five subjects in that group reaching criterion by the end of the experimental phase. These calculations exclude dropouts.

Table 1
Subjects Reaching Criterion by the End of the Experimental Phase and Follow-up Phase

<table>
<thead>
<tr>
<th>Group</th>
<th>Experimental phase</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>High contact</td>
<td>4/6</td>
<td>67</td>
</tr>
<tr>
<td>Medium contact</td>
<td>5/5</td>
<td>100</td>
</tr>
<tr>
<td>No contact</td>
<td>4/5</td>
<td>80</td>
</tr>
</tbody>
</table>
Three children completed the experimental phase without reaching criterion. Two of the three were in the high contact group, with the third child being in the no contact group.

One of the two children in the high contact group who had not reached criterion at the end of the experimental phase, did reach criterion by the end of the follow-up phase. The second child was improved by the end of follow-up, but continued to wet sporadically. This child had been a multiple wetter. Initially, he wet as frequently as three times per night.

The child in the no contact group who did not reach criterion also showed improvement, but continued to wet periodically.

The overall dropout rate for this experiment was 16%. A total of three subjects out of the original 18 were identified as dropouts. Table 2 displays these data by group.

Table 2

<table>
<thead>
<tr>
<th>Group</th>
<th>Experimental phase</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>High contact</td>
<td>6</td>
<td>100</td>
</tr>
<tr>
<td>Medium contact</td>
<td>5</td>
<td>83</td>
</tr>
<tr>
<td>No contact</td>
<td>5</td>
<td>83</td>
</tr>
</tbody>
</table>

Of the original six subjects in the high contact group, none had dropped out by the end of the follow-up period for a 100% completion rate.
rate. In the no contact group, one child dropped out after training and never reported any data. Two subjects were considered dropouts in the medium contact group.

The first subject actually kept appointments and used the pad and buzzer throughout the experimental phase, but was considered a dropout as the family refused to follow the procedures as established in training. For example, the mother periodically awakened the child at night before she went to bed. She and the father only occasionally had the child engage in the bedtime routine. The parents did not give the child reinforcers for consecutive dry nights. Although this family did continue to meet with the experimenter on a scheduled basis, they often asked to delay or change meeting times. Finally, the mother reported that she counted as dry the nights when her child awakened to the alarm even though he was wet. She stated she felt he should receive a "dry" on the calendar as a "reward" for getting up. This child's data were, therefore, rendered unusable. It should be noted, however, that at follow-up this child was still wetting.

The second dropout in the medium contact group occurred during the follow-up phase. This child's data were included in all calculations of data through the experimental phase. The child and his mother were compliant with all aspects of the experimental phase with the child reaching criterion at Day 42. The child became a dropout during follow-up after a relapse in which the mother did not reinstate the use of the pad and buzzer. She decided that the reason the child relapsed was that the father had joined them on vacation that day and that the problem was the father. She continued to not
use the pad and buzzer during the follow-up and stopped recording progress 11 nights into the follow-up phase. By this time, the child had rapidly regressed to eight wet nights. Follow-up data on this child was, therefore, not included in calculations of the wet nights during follow-up.

Table 3 displays the number of wet nights by group for subjects who reached criterion by the end of the experimental or follow-up phase. Although the raw data indicate that the high contact group does better during follow-up, the difference between groups is not significant at the .10 alpha level.

Table 3
Number of Wet Nights During Follow-up for Subjects Reaching Criterion

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>High contact</td>
<td>2</td>
</tr>
<tr>
<td>Medium contact</td>
<td>6</td>
</tr>
<tr>
<td>No contact</td>
<td>7</td>
</tr>
</tbody>
</table>

Figure 1 shows the mean number of wet nights occurring each week by group. Prior to training all groups had averaged 5.5 or more mean wet nights per week. At the end of the first week of pad and buzzer use, there was a decrease in the mean number of wets in all three groups with little variation between groups. By the end of the 6th week of training, all three groups had decreased in mean number of wets per week to one per week or less. After this point, more
variation between groups began to occur, with the medium contact and no contact groups consistently averaging less than one night per week. The high contact group increased in mean number of wets to slightly more than 2 wets per week. By Week 12, the high contact group was also consistently averaging one or less wet nights per week.

![Figure 1. Mean Number of Wet Nights Per Week Per Group.](image)

It was noted during the experiment that two of the subjects in the high contact group were multiple wetters. Both of these subjects initially wet more than one time per night. As reported earlier, one of these two subjects never reached criterion. The other reached criterion after 93 days.
The estimate of the probability of getting dry by time $t$ was calculated for each group using the Kaplan-Meier product limit method. Tables 4, 5, and 6 reflect these data for the high, medium, and no contact groups, respectively.

Table 4

<table>
<thead>
<tr>
<th>Days to dryness</th>
<th>Probability of getting dry before time $t$</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>$F(t)$</td>
</tr>
<tr>
<td>21</td>
<td>.167</td>
</tr>
<tr>
<td>38</td>
<td>.330</td>
</tr>
<tr>
<td>44</td>
<td>.500</td>
</tr>
<tr>
<td>93</td>
<td>.670</td>
</tr>
<tr>
<td>120+</td>
<td>--</td>
</tr>
</tbody>
</table>

The data for the subjects in the high group indicate that by Day 93, there was only a .670 probability of getting dry. In contrast to this, in the medium contact group, the probability of getting dry by Day 56 was 1.000; while the probability of getting dry by Day 47 was .800.
Table 5
Estimate of the Probability of Getting Dry by Time $t$, $F(t)$, Using the Kaplan-Meier PL Method for the Medium Contact Group

<table>
<thead>
<tr>
<th>Days to dryness</th>
<th>Probability of getting dry before time $t$ $F(t)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>t</td>
<td>$F(t)$</td>
</tr>
<tr>
<td>14</td>
<td>.200</td>
</tr>
<tr>
<td>39</td>
<td>.400</td>
</tr>
<tr>
<td>40</td>
<td>.600</td>
</tr>
<tr>
<td>42</td>
<td>.800</td>
</tr>
<tr>
<td>56</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Table 6
Estimate of the Probability of Getting Dry by Time $t$, $F(t)$, Using the Kaplan-Meier PL Method for the No Contact Group

<table>
<thead>
<tr>
<th>Days to dryness</th>
<th>Probability of getting dry before time $t$ $F(t)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>t</td>
<td>$F(t)$</td>
</tr>
<tr>
<td>30</td>
<td>.200</td>
</tr>
<tr>
<td>40</td>
<td>.400</td>
</tr>
<tr>
<td>44</td>
<td>.600</td>
</tr>
<tr>
<td>47</td>
<td>.800</td>
</tr>
<tr>
<td>120+</td>
<td>--</td>
</tr>
</tbody>
</table>
Figures 2, 3, and 4 graphically depict the estimate of the probability of getting dry by time \( t \) for each group. It is clear from the graphs that the children in the no contact group and the medium contact group had a greater probability of getting dry in a shorter amount of time than children in the high contact group. From these data, if given a choice as to which group they'd like their children assigned, most parents would probably choose the medium contact group (in which all subjects got dry by Day 56) or the no contact group in which the probability of getting dry by Day 47 was .800.

![Figure 2](image-url)

**Figure 2. Estimate of Probability of Getting Dry by Time \( t \), \( F(t) \)
Using the Kaplan-Meier PL Method: High Group**

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Figure 3. Estimate of Probability of Getting Dry by Time $t$, $F(t)$ Using the Kaplan-Meier PL Method: Medium Group
Figure 4. Estimate of Probability of Getting Dry by Time $t$, $P(t)$
Using the Kaplan-Meier PL Method: No Contact Group
CHAPTER IV

DISCUSSION

Several authors have observed that there seems to be a relationship between parental motivation and supervision of parent and the dropout and failure rate of children using the pad and buzzer (Doleys, 1977; Taylor & Turner, 1975). The intent of this study was to determine if regular planned contact as compared to no contact with the trainer made a difference in terms of dropout rate and success rate. The study additionally attempted to examine if the frequency of contact had an impact on success rate and dropout rate.

Data from the three groups indicated that the high contact group did do better than the other two groups in terms of dropout rate, i.e., no subjects dropped out compared with two dropouts in the medium contact group and one dropout in the no contact group. This was the result initially hypothesized by Doleys (1977) in his examination of various experiments which utilized the pad and buzzer.

The higher dropout rate in the medium contact group as opposed to the no contact group can be explained only in terms of the individual subjects involved. Both of the subjects considered dropouts in the medium contact group actually continued to keep appointments throughout the experimental phase. One subject followed procedures in this phase, the other was considered a dropout due to lack of compliance with procedures. The former subject was transferred into the dropout category when the family did not comply with follow-up
procedures. It is interesting to note that they had followed procedures while receiving supervision, but once the follow-up phase began (involving no regular contact with the trainer for 30 days), the dropout occurred. In terms of the first family, it seems that there was some reinforcement value to the parent of attending sessions and receiving supervision or the family would have dropped out by no longer attending or reporting data. Would increased supervision (such as that received by those in the high contact group) have resulted in compliance?

In terms of success rate and days to criterion (as shown by the probability of getting dry by time $t$), the medium contact group responded better than either the high or low contact group. This seems reasonable in terms of the medium contact group out performing the no contact group, but is in opposition to the expected outcome that the high contact group would perform better than either of the other groups in these areas. The only hypothesis one might use to explain this phenomenon is the inadvertent assignment of two 7-year-old multiple wetters to the high contact group. It took these children 13 weeks and 7 weeks, respectively, to get to the point where they consistently had only one wet per night on the nights they wet. The first child improved although he never achieved dryness. The second child took 93 days to achieve dryness. There was one 5-year-old multiple wetter who was assigned to the medium contact group. His wetting pattern did not seem as well established as by the end of the fourth week he no longer wet more than one time per night. This child achieved dryness in 39 days.
This situation points out several recommendations for future researchers in this area. A two-phased baseline would be recommended. In the first 2-week baseline, wet nights would be charted as in the present study. The second phase would take place during the first week of pad and buzzer use. Multiple wetters could thereby be identified and assigned evenly among various groups. This did appear to be a factor which should be accounted for and matching done accordingly. Unfortunately, without the use of the pad and buzzer many parents do not know that their child is a multiple wetter upon entering a bedwetting program.

A second recommendation would be for an increased sample size. The number of subjects utilized in this study was so small as to make it unwise to generalize the findings to the general population or to make clear recommendations based on the findings. With a small sample, it may be the case that the results are reflective not of the interventions used, but of some nonmeasured factor, such as pre-experimental motivational level or that the sample is not reflective of a cross section of the general population. This researcher had hoped to recruit a minimum of 30 subjects, but in 6 months was only able to recruit 19. It was noted by this worker that most of the experimenters who were successful in recruiting large numbers of subjects were employed by agencies which specialized in the treatment of children (such as Child Guidance Clinics) and therefore had ready access to large numbers of children. Replication of this experiment using a larger number of subjects would be recommended.
An area which might be explored further would be a comparison of two groups of no contact subjects. One group might be asked to respond with postcards (as in the present study). A second group might be asked to contact the experimenter after 120 days elapsed or criterion was reached, whichever came first. It may be that the positive performance of the no contact group in terms of success rate and days to dryness was a function of being assigned to mail in prepared post cards on a weekly basis. Perhaps the addressed postcards served as a discriminative stimulus for engaging in the prescribed procedures with increased dry nights reinforcing this behavior. Due to the time lapses involved, it is more likely that rule governed behavior occurred in which seeing the postcards resulted in thought regarding the program and compliance with procedures. At any rate, this would be worth exploring in a later experiment.
Appendix A

Statistics
Azrin and Besalel (1979):\(^1\)

- 33\% of all 3 year olds are bedwetters
- 25\% of all 4 year olds are bedwetters
- 15\% of all 5 and 6 year olds are bedwetters
- 7\% of all 8 and 9 year olds are bedwetters
- 4\% of all 12-14 year olds are bedwetters
- 2\% of all 17-18 year olds are bedwetters

Statistics from Army draftees indicate approximately 2\% are bedwetters.

Calculations based on the number of children at each age level indicate bedwetting affects about 5 million persons in the United States.

Fritz and Armbrust (1982):\(^2\)

- Approximately twice as many boys as girls are bedwetters.
- Uropathies of all types probably account for only 2-4\% of the enuretics.


Appendix B

Intake
PARENT

1. Does your child seem to urinate more frequently than other children?

2. Does your child exhibit urgency at the need to urinate?

3. Is your child diurnally continent?

4. Has your child ever had a 6-month or longer period of dryness?

5. List previous methods you've used to assist your child in becoming dry.

6. Does your child have any allergies?

7. Why do you think your child wets the bed?

8. What is your reaction to your child wetting?

9. How often was your child wet in the last 2 weeks? (Baseline count from their calendar.)

10. List other family members who wet the bed. If they stopped, how did they stop?

11. Model of machine used.

CHILD

1. What does wetting keep you from doing that you would like to do?

2. Would anything change if you quit wetting?

3. Does it hurt or burn when you urinate?

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Appendix C

Instructions
PARENTS

I. Before bed
   A. Demonstrate the sound of the alarm before bed by touching the clips together.
   B. Set the alarm.
   C. Have your child review the benefits of staying dry.
   D. Assure your child that before long s/he will awaken before the alarm sounds.
   E. Have child choose a password.

II. If alarm sounds in the night
   A. Get up immediately when alarm sounds.
   B. Help your child awaken and get out of bed.
   C. Apply a damp washcloth gently to child's face if necessary to help awaken.
   D. Help your child remake the bed after s/he has turned off the alarm and used the toilet.
   E. Reset the alarm.

III. Sleep in the child's room for the first 3 weeks to make sure the child awakens at the sound of the alarm.

CHILD

I. Before bed
   A. Tell why you want to stay dry.
   B. Choose password.

II. If alarm sounds
   A. Get out of bed.
   B. Shut off the alarm.
   C. Tell parents the password.
   D. Go to the bathroom.
   E. Remake the bed.
   F. RESET ALARM.

III. WHEN YOU BEAT THE ALARM!
   A. Wake up parent.
   B. Go to the bathroom.
   C. Go back to bed.
   D. GOOD WORK!!!
Appendix D

General Instructions
1. Change batteries IMMEDIATELY if buzzer becomes weak. (Allowing child to sleep on pad for extended period of time while buzzer goes off can cause small sores to develop on child's skin.) READ MANUFACTURER'S DIRECTIONS.

2. Never allow your child to sleep directly on the metallic surface, always cover with a sheet.

3. Have your child sleep nude below the waist to facilitate urine flowing freely on the pad.
Appendix E

Informed Consent
INFORMED CONSENT

I/We ____________________________________, legal guardian of _____________________________, agree to participate and give permission for our child to participate in a research project studying the elimination of bedwetting conducted by Elaine Phillips, M.A.

I/We certify that our child, _____________________________, has been examined by a physician who has determined that his/her bedwetting is not due to any physical or organic problem.

I/We understand that the project will involve the use of a conditioning machine. We certify that Ms. Phillips has explained the care and use of this machine to us.

I/We understand that we and our child may withdraw from this project at any time without any repercussions to us.

I/We give Ms. Phillips permission to utilize the data obtained in her dissertation. The data collected during this project will be stored in a locked file in the home of Ms. Phillips. I/We understand that any publication of the data will not include our names, the name of our child, or any reference to our address. We also understand that any identifying data will be destroyed once the dissertation is published.

Ms. Phillips has explained to us that we will receive the same training on the use of the conditioning apparatus regardless of the group we are assigned to, but that we may or may not have regular assigned contacts with Ms. Phillips. Regardless, we are free to call Ms. Phillips at anytime regarding questions or problems we might
have. We understand that Ms. Phillips will not charge us for the training we receive. We agree to participate in this study as nonpaid volunteers.

Further, we understand that in pursuing this project Ms. Phillips is not acting as an employee of any agency. This study is a dissertation requirement as part of Ms. Phillips's doctoral training at Western Michigan University.

____ Legal guardian's signature ________

____ Child's signature ________

Elaine L. Phillips


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