

## **Suppression of Pica by Overcorrection and Physical Restraint: A Comparative Analysis<sup>1</sup>**

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*Overcorrection and physical restraint procedures have been shown to be effective in controlling certain classes of maladaptive behavior in mentally retarded persons. In the present study, an alternating treatments design was used to measure the differential effects of overcorrection and physical restraint procedures in the treatment of pica. Changes in collateral behaviors were also monitored. Each occurrence of pica was followed by either an overcorrection procedure or a physical restraint procedure. Although both procedures reduced the occurrence of pica and had a similar effect on the occurrence of collateral behaviors, physical restraint was clinically more effective in terms of immediate response reduction.*

Pica, the ingestion of nonnutritive or inedible objects, is commonly observed in mentally retarded persons. Although pica is also observed in normal infants up to the age of 12 to 18 months (Baltrop, 1966), it tends to persist with mentally retarded and developmentally delayed children and adults. For example, Singh and Winton (1982) found 8% of an institutionalized population of 598 mentally retarded persons engaged in pica. Furthermore, about 26% of an institutionalized population of 991 mentally retarded adults have been reported to indulge in pica (Danford & Huber, 1982).

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The suppression of pica is of some importance since it may lead to lead poisoning (Lourie & Millican, 1969; Snowdon, 1977) and medical complications such as intestinal obstruction, constipation, and nutritional anemia (Kanner, 1962). A number of behavioral techniques have been used to suppress pica in normal and mentally retarded persons. For example, differential reinforcement, verbal reprimand, time-out, discrimination training, and screening procedures have been used (Ausman, Ball, & Alexander, 1974; Madden, Russo, & Cataldo, 1980; Singh & Winton, 1984).

Two other procedures, physical restraint and overcorrection, have been used to suppress pica. The physical restraint procedure requires the subject's arms to be held for a brief period contingent on a maladaptive response. In one study, Bucher, Reykdal, and Albin (1976) used verbal reprimand ("No") and a 30-sec physical restraint to control pica by two mentally retarded children. However, only partial suppression was achieved, and the differential effects of verbal reprimand and physical restraint were not assessed. These findings were extended by Winton and Singh (1983), who showed that physical restraint alone was effective in controlling pica and that a 10-sec duration was more effective than 30 sec with one subject and 3 sec with another.

Overcorrection procedures are designed not only to suppress maladaptive behavior but also to teach individuals appropriate alternative behavior. Foxx and Martin (1975) used an overcorrection procedure to treat pica that required the subject to spit out or throw away the inedible object, engage in oral hygiene training followed by personal hygiene, and tidy the floor and empty the trash can. Variations of this procedure have been used by Matson, Stephens, and Smith (1978) and Mulick, Barbour, Schroeder, and Rojahn (1980) in the treatment of pica.

The relative effects of these procedures on stereotypic behaviors has recently been investigated, with one study showing overcorrection and physical restraint to be equally effective (Shapiro, Barrett, & Ollendick, 1980), and the other showing them to be differentially effective across subjects (Ollendick, Shapiro, & Barrett, 1981). However, the overcorrection procedure used in the treatment of stereotyped behavior (i.e., verbal warning and manual guidance in appropriate tasks) is topographically different from the Foxx and Martin (1975) overcorrection procedure for treating pica. Thus, the findings from the two comparative studies (Ollendick et al., 1981; Shapiro et al., 1980) cannot be generalized to the treatment of pica.

The present study compared the relative effects of overcorrection and physical restraint on pica and collateral behaviors of two profoundly mentally retarded girls.

## METHOD

### *Subjects*

The subjects were two girls from an institution for the mentally retarded. Both were profoundly retarded on the basis of the AAMD criteria (Grossman, 1977) and had receptive but only minimal expressive language. The two girls exhibited high rates of maladaptive stereotypic and self-stimulatory behavior, including pica. They exhibited minimal prosocial behavior. Subject 1 was a 20-year-old Polynesian who had been institutionalized for 7 years. She was the second twin of a monozygous pair. Subject 2 was 21 years old and had been institutionalized for 12 years. The etiology of both subjects was not known. Their IQs were below 20, and their social age on the Vineland Social Maturity Scale was less than 12 months. Both had a long history of ingesting nonnutritive substances, including stones, cigarette butts, remains of food off the floor, bits of string, grass, and other materials. Neither subject had been tested for pica-related lead poisoning. Regular ward treatment for pica through differential reinforcement and punishment procedures had little effect on the behavior of both girls. This was probably due to the inconsistent application of these treatments by rostered staff.

### *Settings*

Observation and treatment sessions were scheduled in two settings: a sunroom inside the subjects' regular residential ward, and outside the ward (e.g., playground and lawn area).

### *Behavior Observed*

Pica and three collateral behaviors were observed throughout the study.

*Pica* was defined as an inedible or nonnutritive substance either touching the subject's lips or being placed in the mouth.

*Picking and handling* was defined as touching, picking up, and/or holding an inedible or nonnutritive substance. Pica, not picking and handling, was recorded if the item was subsequently brought into contact with the lips or placed in the mouth. Picking up and handling as deviant behavior

was distinguished from other picking up and handling of objects by the type of substance picked up. This category was coded only when those substances used for pica were picked up.

*Stereotypy* was defined as repetitive complex finger movements, body movements, or rocking.

*Social behavior* was defined as smiling, appropriate speech or laughter, appropriate toy play, and interaction with other residents and staff.

### *Recording and Interobserver Agreement*

Five observers with extensive experience from earlier studies on pica (e.g., Singh & Winton, 1984; Winton & Singh, 1983) were given additional training before participating in this study. These observers had no experience or training in behavior modification, were naive to the experimental procedures, and were not informed of the experimental hypothesis. Data were collected by two observers, one per subject, randomly assigned on a daily basis. A third observer was also randomly assigned during about 25% of the sessions (for each subject) for reliability checks. Two sessions were conducted daily, one in each setting per subject. Behaviors were observed in 90 10-sec periods. The total free response time across baseline and experimental sessions was held constant at 15 minutes; i.e., time spent in treatment was not recorded.

Interobserver agreement was computed by dividing the number of agreements on the occurrence of each target behavior, on an interval-by-interval basis, by the sum of the agreements and disagreements, and multiplying by 100. An agreement was defined as both observers recording an occurrence of the same target response during the same interval. The mean interobserver agreements (with ranges in parentheses) for Subject 1 were pica—97% (92-100), picking and handling—85% (82-89), stereotypy—94% (86-98), and social behavior—81% (75-91). For Subject 2 they were pica—91% (82-96), picking and handling—84% (79-91), stereotypy—95% (90-100), and social behavior—83% (78-89).

### *Experimental Design and Procedures*

An alternating treatments design (Barlow & Hayes, 1979) was used to assess the effects of overcorrection and physical restraint on pica and collateral behaviors. Following baseline observations, overcorrection and physical restraint procedures were used in two settings (sunroom, outside),

with each procedure being randomly allocated to a setting each day for each subject. Subsequently, only the more effective treatment for each subject was implemented in both settings.

The three experimental phases were as follows:

*Baseline.* Data were collected on the naturally occurring rate of pica and collateral behaviors for 5 consecutive days, twice a day, per subject. No programmed contingencies for any of the behaviors were in effect during this phase except that, for medical and ethical reasons, the ward staff removed any inedible substances from the subject's mouth when they were observed.

*Alternating Treatments.* The alternating treatments phase was in effect for 10 days for both subjects. Each of the two treatments was randomly assigned to one of the two settings on a daily basis. Each occurrence of pica was followed by either a 10-sec physical restraint (see Winton & Singh, 1983) or the Foxx and Martin (1975) overcorrection procedure. During physical restraint, the subject was required to spit out or throw away the inedible object, and her arms were restrained at the side of her body for 10 sec. No verbal reprimand was used. Release from physical restraint was contingent on a period of nondisruptive behavior for 10 sec. During overcorrection, the subject was required to spit out or throw away the inedible object, undertake oral hygiene, tidy the area in the vicinity of the subject, pick up trash and empty the trash can, and engage in personal hygiene training. The entire sequence took about 15 minutes (see Mulick et al., 1980), and the maximum number of overcorrection treatments was limited to eight per session (i.e., 2 hours excluding observation time of 15 minutes).

*Physical Restraint.* The more effective of the two procedures, physical restraint, was used in both settings in this phase with both subjects. The physical restraint contingency was the same as in the previous phase.

## RESULTS

Figures 1 and 2 show the daily percent of intervals of pica and collateral behaviors across all phases and settings for Subject 1 and Subject 2. The means for these behaviors during each phase are given in Table I. The data from the alternating treatments phase are presented according to the type of treatment. As the physical restraint treatment proved more effective with both subjects, this treatment was employed in the final phase in both settings with the two subjects.

*Subject 1.* During baseline, pica occurred at a slightly higher rate in the sunroom than outside. This reduced to similar low levels in both settings

**Table 1.** Mean Percent of Intervals and Observed Behaviors Across Experimental Conditions

Setting and behavior	Baseline	Alternating treatments <sup>a</sup>		Physical restraint
		Physical restraint	Over-correction	
Subject 1				
Sunroom				
Pica	32.2	6.4	9.9	1.3
Picking and handling	33.4	21.9	15.8	7.9
Stereotypy	42.8	37.3	36.1	37.5
Social	7.4	9.6	8.4	1.3
Outside				
Pica	20.4			1.4
Picking and handling	27.4			5.8
Stereotypy	40.4			38.2
Social	4.2			13.5
Subject 2				
Sunroom				
Pica	10.8	10.8	25.8	.9
Picking and handling	12.2	7.5	10.0	5.0
Stereotypy	83.6	72.6	55.1	74.5
Social	3.2	5.0	.4	7.8
Outside				
Pica	83.8			4.3
Picking and handling	14.0			4.0
Stereotypy	35.4			49.1
Social	.6			1.0

<sup>a</sup>For ease of presentation, the data on alternating treatments are presented with the sunroom data. In practice, the two treatments were randomly presented either in the sunroom or outside on a daily basis.

during the alternating treatments phase under both the overcorrection and physical restraint contingencies. However, suppression was more rapid and complete under physical restraint. In the final phase, pica was maintained at very low levels by the physical restraint contingency.

Picking and handling decreased during the alternating treatments phase under both treatments, with a greater reduction being evident under the overcorrection contingency for pica. The final phase resulted in further reductions in both settings under the physical restraint contingency for pica. Stereotypic behavior remained relatively stable across phases. Changes in social behavior were not consistent; in the sunroom, social behavior occurred less in the final phase than in the baseline, while social behavior increased in the other setting.

*Subject 2.* During baseline, pica occurred more frequently in the outside setting than in the sunroom. This was due to this subject's particular craving for substances usually found in the outside setting, such as grass and stones. As for Subject 1, both treatments reduced pica, with physical restraint being more effective.

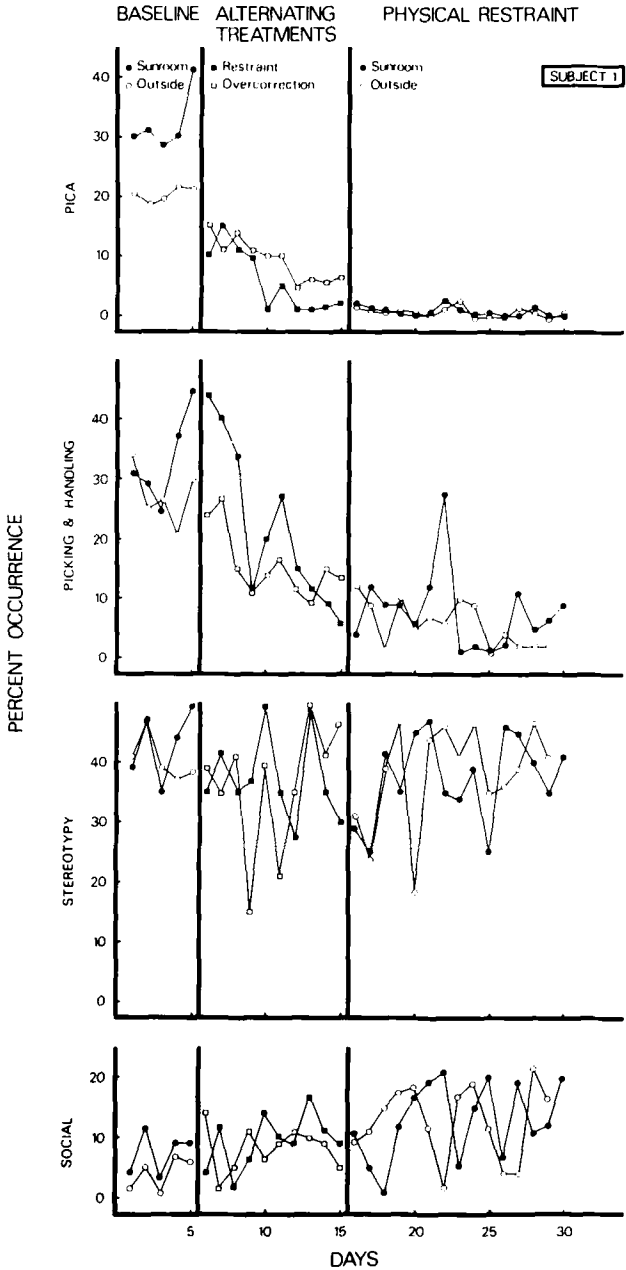


Fig. 1. Rate of pica and collateral behaviors for Subject 1 across experimental conditions.

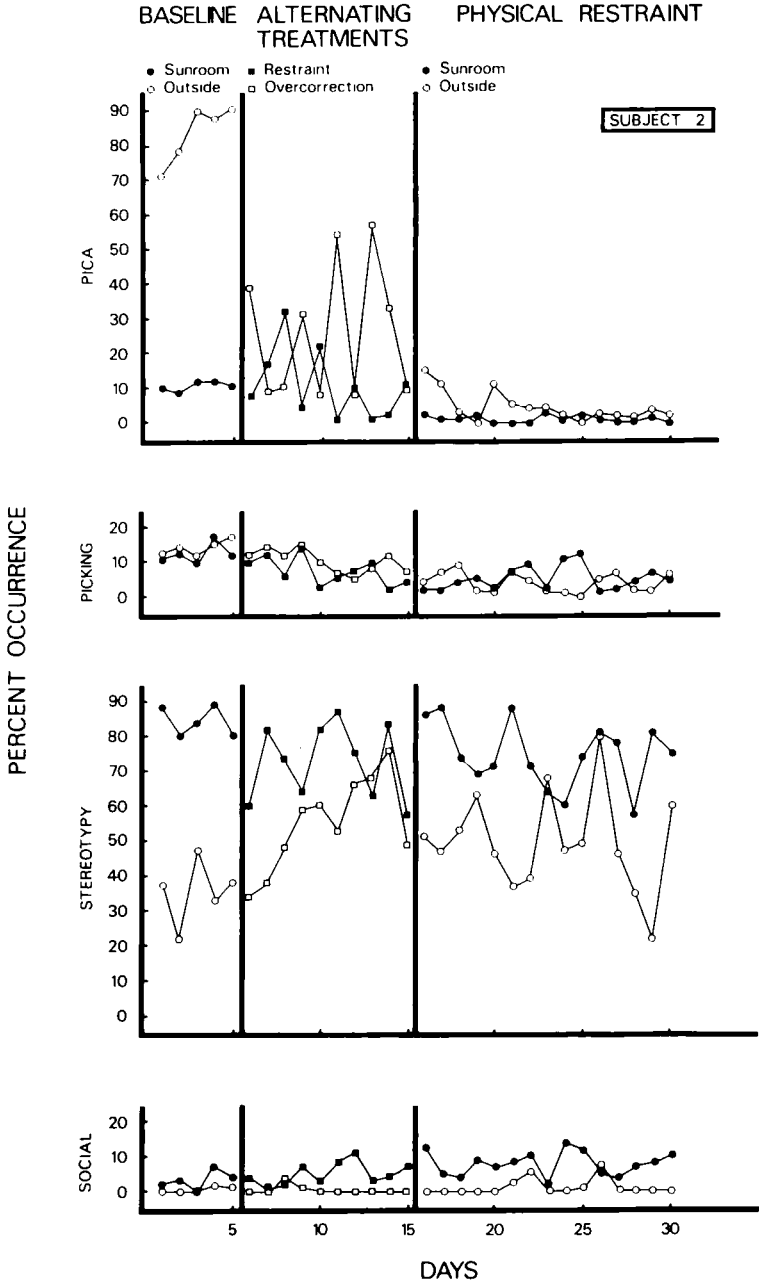


Fig. 2. Rate of pica and collateral behaviors for Subject 2 across experimental conditions.



Picking and handling was reduced under both treatment contingencies for pica and reached even lower levels during the final phase under physical restraint. No consistent changes in stereotypic behavior were noted, although a slight decrease was observed in the sunroom and an increase in the outside setting. Social behavior increased only slightly across both treatment phases in both settings.

## DISCUSSION

The results showed that while both treatments suppressed pica, physical restraint was clinically more effective than overcorrection with both subjects. In terms of the mean response rate, the difference between the two procedures was small for Subject 1. Although the difference was much larger for Subject 2, there was a greater variability in the daily data of this subject during the alternating treatments phase. Nonetheless, there was a clear quantitative difference between the two procedures for both subjects.

In contrast to the present study, previous comparative studies found physical restraint and overcorrection to be either equally effective (Shapiro et al., 1980) or differentially effective across subjects (Ollendick et al., 1981). However, the overcorrection procedure for pica used in the present study is not directly comparable with the overcorrection procedure for stereotypy used by Ollendick et al. (1981) and Shapiro et al. (1980). One of the hazards of using a single term, such as overcorrection, for a combination of procedures with different components is that it may lead to false comparisons of its efficacy across studies.

In terms of collateral behaviors, both treatments appeared to affect them equally. Picking and handling decreased under both treatments for pica, and stereotypy remained at about the same level. Only minor gains were made in social behavior but these were distributed equally across both treatments. Thus, while physical restraint was clinically more effective than overcorrection in the reduction of the target behavior, both treatments affected the collateral behaviors in the same way and to the same extent.

In practical terms, the physical restraint procedure may have certain advantages over the overcorrection procedure employed in this study. It takes a lot less staff-training time and the procedure is much briefer. Thus, it is more likely to be used by primary care staff in large, understaffed institutions. Furthermore, since the procedure does not require the use of special equipment, it can be implemented more easily and more systematically in applied settings (e.g., classrooms, workshops) or even in the community (e.g., supermarkets, buses). In terms of social validity, all

therapists reported a preference for physical restraint when compared to the overcorrection procedure.

Both subjects reacted to the two treatments in similar ways. They struggled and resisted treatment for the first two or three sessions when physical restraint was the intervention in effect. The subjects showed more passive resistance to the overcorrection procedure, particularly with the first component (i.e., picking up trash and emptying the trash can). While most resistance was evident during the initial treatment sessions, some passive resistance was observed during most overcorrection sessions.

In sum, the study showed that physical restraint was clinically more effective than the Foxx and Martin (1975) overcorrection procedure for treating pica by two mentally retarded persons. This study further confirms the efficacy of brief response-contingent physical restraint for controlling the maladaptive behaviors of mentally retarded persons.

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