

## Restricted Environmental Stimulation Therapy (REST) as a Treatment for Autistic Children

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**ABSTRACT.** This study explored the usefulness of 48 hours of *Restricted Environmental Stimulation Therapy (REST)* as a treatment for autistic children. In order to provide quantified objective measures for evaluating the effects of this treatment, a battery of psychological tests was developed which would be useful and practical for the assessment of these children in regular diagnostic settings. Several positive changes in learning, social and play behavior, and cognitive functioning were noted.

In the late 1960s, successful applications of Restricted Environmental Stimulation Therapy (REST) led to the extension of the technique to the treatment of behaviorally disturbed children. The experimental treatment consists of being isolated in a room with low-intensity light, reduced sound, and a minimum of furniture. Frequent observations and therapeutic sessions were included in the regimen. One study utilizing isolation therapy for six institutionalized children, resulted in generally improved behavior and personality.<sup>1,2</sup> A similar investigation included three autistic boys, all about 5 years old, who were placed in a restricted environment for 40, 68, and 73 days, respectively.<sup>3</sup> The authors reported that the children appeared comfortable and happy in the stimulus-restricted environment. They made few attempts to leave the room and at times tried to push the therapist out so that they could be alone. Short- and long-term effects were considered to be positive inasmuch as the children showed greatly increased interpersonal affect and communication. Although these promising preliminary reports have not been researched further, partial stimulus restriction has been successful in treating autistic children as a contingent procedure. Rincover's sensory extinction procedure, which utilized sound-deadening carpets, blindfolds, and monotonous low-intensity vibration, was effective in reducing self-stimulatory behaviors.<sup>4</sup> Brief immobilization also appears to decrease such behaviors.<sup>5</sup>

This study was designed to reexamine the observations of Schechter et al.<sup>3</sup> on the effects of sensory isolation therapy on autistic children. In addition to attempting a replication of previous research, the investigation had

three major purposes. One goal was to test the isolation therapy hypothesis with a somewhat higher level of methodological rigor. In earlier studies several deficiencies were apparent: (1) lack of extensive pretreatment observations; (2) the REST treatment and the frequent contact with the therapist were confounded; (3) absence of control groups with which the effects of REST could be compared; and (4) measuring "improvement" primarily by clinical judgment and by anecdotal reports. This study attempted to avoid these investigative shortcomings by performing extended pre- and posttreatment testing, preventing therapeutic contact during the REST session, including an alternate therapy for a control group matched for age and diagnosis, and measuring therapy outcome with a battery of objective measures and rating scales.

A second objective was to modify the treatment, making it more practical and acceptable to potential users than the procedures previously reported.<sup>3</sup> In earlier studies the extreme duration of the treatment created unrealistic demands on staff and therapists' time and was very disruptive to the routines of the children and their families. The duration of REST in this study was reduced to one weekend (48 hr), a period much more likely to be adopted and tested by treatment facilities than the 6- to 11-week sessions previously employed.

Finally, an attempt was made to integrate the use of REST with autistic children more closely with the literature on the effects of stimulus reduction. The following specific hypotheses were derived: (1) Stimulus restriction improves rote learning in normal subjects.<sup>6</sup> It was postulated that autistic children who had been treated with REST would improve on the performance of such tasks; (2) Social isolation creates a desire for social interaction and responsivity to social reinforcement.<sup>7</sup> It was postulated that autistic children would be more open to such interactions and reinforcers after a period of stimulus

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reduction; and (3) Autistic symptoms appear to represent a reaction to stimulus overload, characterized by stereotyped behavior and avoidance of stimulating objects.<sup>8-13</sup> It was postulated that autistic symptoms should be reduced when the general environmental "bombardment" of stimuli is diminished, as in the REST program.

## METHOD

### Subjects

The study was conducted on eight autistic children: five boys and three girls (four between the ages of 5 and 7 years and four between 9 and 11 years). The children were matched by age, in an otherwise random assignment, to either the experimental (REST) or the control (Ward) group. Five of the children were verbal, but all were untestable on standardized intelligence tests. All of the subjects were previously diagnosed as autistic and had been enrolled in a program for autistic children.

### Environmental Settings

Each child spent one weekend in the Vancouver Children's Hospital. For the REST program, a small room was carpeted and illuminated by a dim (7 watt) light bulb. All of the furniture and fixtures had been removed, except for a single mattress on the floor. A nurse and a member of the research team constantly monitored the patient visually (through a one-way vision screen) and auditorially via an intercom system. Toilet facilities and nutritious but bland meals were brought into the child's room as needed.

The Ward control subjects spent 48 hours in a hospital room shared with another child. The bedroom facility also contained an adult bed. This room was brightly painted and well-illuminated. It was adjacent to a large common room, furnished as a living room and outfitted with an assortment of toys and a television set. Meals were served in this common room. The children had free

access to the entire area. Their behavior was supervised by an experienced child caretaker. Because of scheduling problems, only three control children were utilized. The "control" treatment was designed solely to provide an experience in which the child was relocated from familiar surroundings and companions.

### Procedure

To allay anxiety about the REST program (occasionally engendered by distorted popularized descriptions of the technique<sup>14</sup>), informative discussions were conducted with parents, nurses, and other involved individuals. The design, duration, measures, environment, and other details of REST were carefully reviewed, both in writing and in personal conversation. Approval was obtained for the project from both the university and the hospital ethics committees.

Base line measures consisted of a diagnostic performance battery (Table 1) 6 weeks before treatment and three 15-minute playroom sessions each week for 6 weeks. During these observational periods, the number of occurrences of 17 specific behaviors was coded (Table 2). Performance was subsequently evaluated on a specially designed set of visual discrimination learning tasks.<sup>15</sup> Observation and videotaping of the child's behavior in a highly stimulating playroom was performed for half an hour immediately prior to the beginning of the weekend sessions. At pretest, the testers and observers were unaware of the child's assigned environmental setting. Although some staff members had a general idea about REST programs, they were not familiarized with the specific hypotheses related to cognitive and social performance which the procedures were designed to test.

Children on the REST protocol were introduced to the dimly illuminated room, which contained only a mattress, and told that they were going to have a good rest. The fact that they were wearing pajamas, and the quiet soothing manner of the nurse in charge, reinforced the explanation. The children in REST were oriented to

TABLE 1. Assessment Battery

Test	Measures	Modality
Goodenough-Harris Drawing Test <sup>16</sup>	Follow directions; use paper and pencil; control pencil; draw a person	Oral instruction; motor response
Boehm and Slater Cognitive Skills Assessment Battery <sup>17</sup>	Knowledge of sex differences, body parts, color, shape, number, picture and story comprehension, auditory and visual memory and discrimination, symbol discrimination, matching, vocabulary, letter naming, following multiple directions, large muscle skills, task persistence, attention span.	Complex oral instructions; oral, written, numerical, and motor responses
Peabody Picture Vocabulary Test <sup>18</sup>	Receptive vocabulary	Oral instruction; motor response
Krug, Arick and Almond Autism Screening Instrument <sup>19</sup>	Receptive and expressive language, body concept, speech imitation	Oral and motor instruction; oral and motor responses
Educational Subtest		
Modified Autism Behavior Checklist <sup>19</sup>	Diagnostic signs of autism	Observational
Leiter International Performance Scale <sup>20</sup>	Knowledge of color, form, shape, number, pattern, games, etc.	Motor instructions and responses

TABLE 2. Behavioral Categories

**Eye Contact**

This category is coded when the child engages another person in eye contact, either on the child's own initiative or responsively.

1. Eye contact with adult
2. Eye contact with child

**Communicative Behavior**

Coded when the child either independently or responsively produces a behavior that appears to be intended to convey meaning to another individual.

1. Self-initiated communicative speech
2. Responsive communicative speech
3. Communicative gesturing

**Expression of Affect**

The child produces vocalization and/or facial expression conventionally associated with affect.

1. Facial expression of positive affect
2. Vocal expression of positive affect
3. Facial expression of negative affect
4. Vocal expression of negative affect

**Situationally Irrelevant Behavior**

This category is coded when vocal or motor behavior appears to be ritualistic, repetitive, and/or unrelated to what is going on in the environment.

1. Situationally irrelevant vocalization
2. Ritualistic, repetitive motor behavior not involving an object
3. Ritualistic, repetitive motor behavior involving the use of an object.

**Situationally Relevant Behavior**

Coded when the child engages in behavior that appears "appropriate" in the environment.

1. Appropriate use of an object
2. Appropriate intentional physical contact with another person

**Aggressive Behavior**

This category is coded when the child, apparently intentionally, comes into contact that is likely to cause physical discomfort, damage, or injury.

1. Physical aggression toward another person
2. Physical aggression toward objects
3. Self-inflicted injury

using the toilet, and were then left alone. During the next 48 hours, social contact occurred *only* when the nurse brought in food, beverages, or toilet facilities. Each of these contacts was brief and task-oriented, although the nurse's manner was friendly and accepting.

Ward control children were escorted to the hospital ward and oriented to the facility by their primary caretaker. Frequent social contacts occurred during the next 48 hours. The caretakers were not familiarized with the experimental design or project hypotheses.

Observers coded the behavior of the REST children at 15 minute intervals and both groups during 20 randomly timed 10-minute periods. Specific behaviors coded included some of those observed during the 18-session pretest; others were relevant to the REST environment (sleeping, exploring the room). Vocalizations were recorded verbatim.

Postsession tests included: (1) a ½-hour period of observation in the playroom immediately after release; (2) a 6-week, 18-session repetition of the playroom interaction and new sets of discrimination learning tasks; and (3) readministration of the assessment battery 6 weeks after the session. The evaluation battery was administered by an examiner who was unaware whether the child had participated in the REST or Ward program.

## RESULTS

There were no statistically significant differences between the REST and the Ward groups on the various pretreatment test measures. In view of the very small number of subjects, nonparametric tests were performed to compare changes from pre- to posttreatment between the two groups. The results suggested a statistically significant positive effect of REST on discrimination learning (Table 3). The *social interaction* and *discrimination learning* data represent a comparison of mean performance scores obtained during the 2 weeks immediately prior to the treatment session with those during the 2 weeks immediately following it. Data from the assessment battery were obtained 6 weeks before and 6 weeks after the therapy session.

The playroom is equipped with a variety of entertaining toys and play materials (red fire truck, rocking horse, doll house, etc.). The room is a favorite and special treat for normal children. Each child was placed in the playroom for a 30-minute period immediately before and after the weekend REST or Ward program. Prior to treatment, the patients responded to the room with crying, heightened levels of stereotyped behavior, and withdrawal. None of the autistic children in either the

experimental (REST) or the control (Ward) groups enjoyed the playroom.

Children in the experimental group appeared to find the room much more attractive immediately after the REST experience. They verbally and facially expressed positive affect at a higher frequency than Ward subjects (Mean = 1.83 versus 0.25,  $U = 3$ ,  $p = 0.033$ ). Children on the REST protocol exhibited little of their previous signs of stress, and even picked up books or toys (although their play was still not appropriate). However, the response of the Ward subjects to the playroom was unchanged as a result of their weekend experience.

### Behavioral Observations during the Session

Early REST behaviors included talking, giggling, touching the walls where a carpet had been placed, jumping on the mattress, looking at their dim reflections in the one-way mirror, and trying the door. One of the four children, who did not like locked doors, exhibited several temper tantrums (a common behavior for her). However, after a short period of time she relaxed, and her overall behavioral pattern did not reflect stress. The children did not avoid the REST room when passing it on subsequent hospital visits. One patient eagerly took his small brother to show him "my room." Parents and caretakers did not feel that the recorded behaviors were unusual or bizarre for their child.

Each behavior was categorized either as *stress-related* (tantruming, crying, grinding teeth, withdrawal) or *non-stress related* (exploring the room, looking in the mirror, eating, lying down). The categorizations were verified with the child's parents or caretakers, and specific be-

haviors in each category varied from child to child. The children did not emit high levels of stress-related behavior during the 48 hours of the session, Mean = 0.69 occurrences per waking hour (Fig. 1). The figure also shows a cyclical increase in the children's activity near the end of each day in REST.

### DISCUSSION

It must be stressed that this was an exploratory study, with only a relatively small number of subjects. The subjects may not be representative of the population of

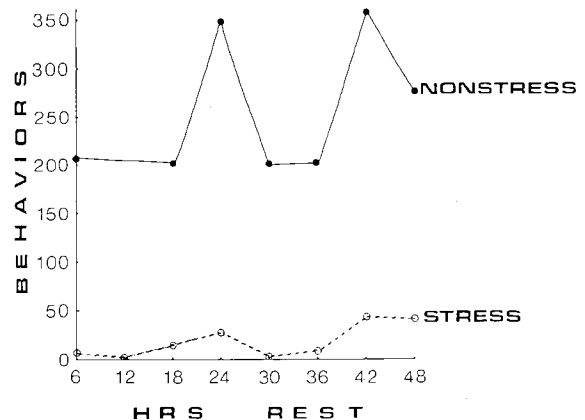


FIGURE 1. Total numbers of stress- and nonstress-related behaviors during REST.

TABLE 3. Mean Pre- and Postsession Improvements\*

Test	REST Change	Ward Change	Confidence Level (I-tailed)
Discrimination Learning	5.7	2.9	Wilcoxon T = 8 <sup>c</sup>
Assessment Battery			
Goodenough-Harris Draw-A-Person <sup>16</sup>	Unscoreable for most children		
Boehm-Slater <sup>17</sup>			
Body Movement	1.3	0	U = 1 <sup>d</sup>
Symbol Discrimination	2.5	0.3	U = 1 <sup>d</sup>
Peabody Picture Vocabulary Test <sup>18</sup>	No changes		
Krug et al. <sup>19</sup> Education Subtest			
Expressive language	1.5	0.3	U = 1 <sup>d</sup>
Additions	7.0	-1.7	U = 1 <sup>d</sup>
Krug et al. <sup>19</sup> Behavior Checklist	0.8	0.3	U = 2 <sup>e</sup>
Leiter International Performance Scale <sup>20</sup>	1.0	-0.3	U = 1 <sup>d</sup>
Social Interaction			
Self-Initiated Communicative Speech	0.5	-0.8	U = 1 <sup>d</sup>
Vocal Expression of Affect	1.5	-0.5	U = 4 <sup>b</sup>

\* Only changes approaching conventional significance levels are indicated. There were no reversals (i.e., more improvement among Ward than among REST children) of this magnitude.

<sup>b</sup>  $p < 0.005$ .

<sup>c</sup>  $p = 0.05$ .

<sup>d</sup>  $p = 0.057$ .

<sup>e</sup>  $p = 0.11$ .

autistic children. However, within the framework of these limits, the data are nevertheless encouraging. Observational, anecdotal, and "self-report" evidence revealed that the REST program was a nonaversive experience for the children. There was some support for the hypotheses that REST increased learning and social responsivity; diminished the avoidance of stimulating experiences; and improved some of the performances on items of the cognitive assessment battery.

The battery per se is potentially useful in the diagnosis and treatment of autism, since it rapidly provides base lines for the measurement of intervention effects on a wide variety of behaviors. The subjects performed better on abstract tasks when these had nonverbal instructions. The children performed less well on equivalent tasks presented verbally. These observations may suggest appropriate directions for the treatment and education of autistic children, as similar findings have been useful in dealing with retarded children and adolescents.<sup>21</sup>

This project represents an addition to previous research on the use of REST with autistic children. Earlier studies used smaller Ns, longer periods of isolation, and clinical judgment as the sole dependent variable. Future research should utilize larger numbers of children with a broader age span. More base line information concerning variables such as intelligence must be documented. A transdisciplinary assessment would make it possible to more comprehensively explore various areas of development and behavior. A larger research team would make it possible to separate functions so that there could be completely blind measurement of the dependent variables. For some measures, more appropriate indices can be chosen partly on the basis of the data reported here. For example, our learning measure proved to be less than completely adequate, since most of the children reached the task ceiling before the end of the testing session. The research protocol should be extended to accrue data on a broader scope such as the child's therapy environments and home situation. Data should be collected over a longer period. The effects of low

stimulation could be evaluated within the child's daily environments: playrooms, bedrooms or classrooms. Parametric studies on different durations and environmental configurations should also be performed.

Like other intervention techniques, REST can be misused. It should not become a substitute for professional interaction, "a labor-saving device." Constant professional monitoring of the child in REST is mandatory. REST is not a punishment and the creation of a negative aura would most likely obviate beneficial effects of the program.<sup>14</sup>

It appears that the optimal use of REST with autistic patients will require repeated but relatively brief periods of therapy. REST could be used prior to, or in conjunction with, various contingent reinforcement paradigms, as an environment in which the child can be exposed in a non-stressful way to new and stimulating objects and activities. Home and school environments for autistic children may be more beneficially designed, incorporating periodic, brief REST sessions as an occasional relief from stimulus bombardment.

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