TEACHING PARENTS TO CONDUCT BEHAVIORAL RELAXATION TRAINING WITH THEIR HYPERACTIVE CHILDREN

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Summary — Three boys meeting multiple criteria for hyperactivity received Behavioral Relaxation Training (BRT) in their homes from their parents, under the supervision of the experimenter. BRT involved modeling, prompting, token reinforcement, and praise, for ten overt relaxed behaviors. All children learned to relax to a criterion of at least 80% on the Behavioral Relaxation Scale (BRS), an objective measure of relaxation. Frontalis EMG levels were correlated with BRS scores for two children. Proficiency was maintained at one and three-month follow-ups. All children were removed from medication by follow-up. Parent ratings of hyperactive behavior on two standardized questionnaires showed improvements from baseline to follow-up. Teacher ratings of problem behavior were less consistently positive. The concept of relaxation as a skill rather than a state, and its implications as an alternative to medication therapy, are discussed.

More than half the children referred for professional evaluation and treatment of behavior problems are diagnosed as hyperactive (Safer & Allen, 1976; Whalen, 1983). Prevalence estimates range from 3% to as high as 15% of American school-age children, with boys represented three to ten times as frequently as girls (APA, 1980; Barkley, 1981; Bosco & Robin, 1980). Though there is continuing discussion concerning diagnostic criteria and assessment methods, hyperactivity is recognized as a childhood disorder of major proportions (Hinshaw, 1987; Whalen, 1983).

Stimulant medication is the most common treatment of hyperactivity (Lambert, Sandoval, & Sassone, 1978). Surveys indicate that 86% of children so diagnosed have received psychostimulants at some time in their lives (Gadow, 1981). Many studies report drug-related improvements in behaviors ranging from reaction time to classroom comportment (Conners, 1972; Werry & Sprague, 1974). However, the long-term usefulness of medication has been seriously questioned because of growth inhibition and other somatic side-effects, lack of academic improvement, and absence of noticeable benefit in many children (Hollander, 1983; O'Leary, 1980; Rapoport, 1983; Safer & Allen, 1976; Whalen & Henker, 1976). These limitations have inspired the search for alternative treatments.

Relaxation training has shown promise as a non-chemical means of reducing disruptive behaviors and increasing adaptive behavior in hyperactive children. Progressive muscle relaxation training and frontalis EMG biofeedback, separately or in combination, have been found to result in clinical improvements on measures such as parent ratings, test performance, classroom observations, and personality tests (Braud, 1978; Braud, Lupin, & Braud, 1975; Cobb & Evans, 1981; Denkowski, Denkowski, & Omizo, 1983; Dunn & Howell, 1982; Hampstead, 1979; Hughes, Henry, & Hughes, 1980).

Other studies, employing placebo compar-
son procedures, often have found similar improvements with both relaxation and control treatments (Denkowski & Denkowski, 1984; Klein & Deffenbacher, 1977; Luiselli, Steinman, Marholin, & Steinman, 1981; Putre, Loffio, Chorost, Marx, & Gilbert, 1977). In an early review of the research on progressive muscle relaxation in conduct problem children, Luiselli et al. (1981) conclude that the non-specific use of relaxation is unwarranted. With barely a decade of research, it is too early to reach definite conclusions on the effectiveness of relaxation methods.

Raymer and Poppen (1985) demonstrated a new method of teaching hyperactive children to relax. Behavioral Relaxation Training (BRT) consists of ten overt postures and behaviors taught by modeling, prompting, and performance feedback (Poppen, 1988; Schilling & Poppen, 1983). Employing a multiple-probe-across-subjects design, they showed that BRT resulted in improvements on an objective observational measure of relaxation, reductions in frontalis muscle tension, and improvements on the Hyperactivity Index of the Conners Parents Rating Scale (Goyette, Connors, & Ulrich, 1978). Performance was maintained in the home by teaching the parents to conduct BRT. Marked improvements on the Hyperactivity Index also occurred with home training.

Brandon and his associates employed BRT with children diagnosed as hyperactive or learning disabled (Brandon, Eason, & Smith, 1986; Eason, Brandon, Smith, & Serpas, 1986). They found that BRT was associated with decreased frontalis muscle tension and improved performance on a complex reaction-time task.

The possibility of employing relaxation as an alternative to medication would be strengthened by the development of a training procedure which, in addition to showing effectiveness, could be implemented by parents or other non-professionals. The purpose of the present study was to teach parents to train their own hyperactive children in relaxation skills, and to determine if such training is associated with improved comportment in the home and school.

Method

Subjects

Three boys were referred by a pediatrician who judged them to be inadequately controlled by medication. Subject 1, 8 years old, was taking 25 mg of Ritalin per day. Subject 2, 10 years old, was taking 20 mg of Ritalin per day. Subject 3, 9 years old, was taking 15 mg of Ritalin per day. The mothers of Subjects 1 and 2, and the father of Subject 3, participated in training their children.

In addition to the medical diagnosis, the subjects met the criteria for hyperactivity described by Barkley (1981): parental and teacher complaints of inattentiveness, impulsiveness, and restlessness; onset of problems by age 6; duration of symptoms for at least one year; problem behaviors reported in at least 50% of the situations described in Home Situations Questionnaire and the School Situations Questionnaire; and no evidence of gross sensory, motor, or neurological dysfunction or psychosis.

Apparatus

Frontalis muscle tension was measured by an Autogenic Systems Inc. portable electromyograph (HT-1) connected to an integrator (HT-10) which calculated a mean and provided a digital readout at 10 s intervals. The child’s forehead was cleansed with an alcohol swab and the silver/silver-chloride electrode cups, containing a non-saline conductive gel, were attached with adhesive collars in a standard frontalis placement (ASI, 1975). Sessions were timed with an electronic stopwatch.

Dependent Measures

Behavioral Relaxation Scale (BRS). The BRS consists of 10 postures and behaviors
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scored as either relaxed or unrelaxed during five 1 min intervals at the end of each session. Definitions and details for scoring the BRS are available in Poppen (1988). Reliability scoring of the BRS was obtained for at least 25% of the observation periods by an independent observer, trained to a proficiency criterion of better than 90% in a standardized training program (Poppen, 1988). Reliability between the primary observer and the parent was also determined. Reliability was calculated as the percentage of agreements divided by the total scoring intervals.

_Electromyograph (EMG)._ The 10-s average frontalis muscle tension, in microvolts, displayed by the HT-10 at the conclusion of each BRS recording interval, was written on the data sheet. The values were averaged for a session mean.

_Hyperactivity Index (HI)._ The Conners Parent Scale (Goyette et al., 1978) was completed by the parent on each day there was a baseline or training session, and once per week between the last training session and follow-up. The HI is the mean of 10 items pertaining to impulsive/hyperactive behavior rated on a four-point scale according to frequency of occurrence; a score of 1.5 or greater is generally accepted as discriminating hyperactive from other children.

_Home Situations Questionnaire (HSQ)_ (Barkley, 1981). This was filled once prior to training and at follow-up. Parents identified which of 15 situations presented behavior problems for their child and rated their severity on a 9-point scale.

_School Situations Questionnaire (SSQ)_ (Barkley, 1981). This was completed by the subjects’ teachers prior to training and at follow-up by different teachers, since the subjects had progressed to a new grade. The teachers indicated which of 12 situations were problematic for the child and rated their severity on a 9-point scale.

Additional school-related measures were permitted by the school attended by Subject 2. Daily classroom observations were carried out by a teaching assistant for two weeks during baseline. Three behaviors (out of seat, talking out, and on task) were scored as present or absent during 15 consecutive 1 min intervals each morning. Post-training observations were conducted by the first author since the assistant was no longer available; observations occurred twice weekly for six weeks.

**Procedure**

Training was conducted with the child seated in a beanbag chair in a quiet room in his home. Most training took place in the summer months when the children were home from school.

First, a token reinforcement program was developed with each family to help make the child’s difficult task of sitting still more positive (Poppen, 1988). Tokens were given contingently on cooperation and performance of relaxed behaviors for increasing time periods, and were subtracted for pulling on the EMG wires and refusing to comply with instructions.

During baseline sessions, each child was asked to sit quietly and relax for 20 min; during the last 5 min both the parent and experimenter scored the BRS. After each session the experimenter and parent discussed BRS scoring. The parent was given a copy of the postural definitions and practiced the relaxed behaviors while the experimenter provided feedback. Next, the parent provided feedback as the experimenter modeled relaxed and unrelaxed behaviors.

Training sessions consisted of a 5-min adaptation period, a 20-min training period, and a 5-min measurement period. The order in which the behaviors were taught varied with each child; items which were the most relaxed during baseline were taught first to ensure immediate success. The first three items were taught by the experimenter while the parent
observed and scored the BRS. Afterwards, the parent was given appropriate feedback for correct and incorrect scoring. The next two behaviors were taught by the parent providing feedback to the child as directed by silent signals from the experimenter. The last five behaviors were taught by the parent, with corrective comments, if needed, offered by the experimenter after each session.

Each of the 10 behaviors were individually trained using modeling and, if necessary, verbal instruction or manual guidance. The behaviors were successively linked together for increasing durations until the child could perform at least seven out of ten for 60 s. After this acquisition criterion was met, proficiency training was implemented. The child was asked to relax for 15 min, during which time the parent provided praise, tokens, and corrective feedback, followed by the 5-min measurement period. Proficiency training continued until the child met a criterion of 80% correct during the measurement period for two successive sessions. Details of the training procedure may be found in Poppen (1988).

Training sessions occurred approximately twice a week, depending on the schedules of the families and the experimenter. Each subject experienced one or more lengthy interruptions due to illness or vacations. Throughout training, families were encouraged to practice on their own, though no systematic data were collected on independent practice. Two follow-up sessions were conducted 4 to 14 weeks following the proficiency criterion.

Results

Medication was discontinued for all subjects at parental request and physician's concurrence. Medication was stopped for Subjects 1 and 3 prior to the last follow-up session, and was discontinued for Subject 2 prior to the last baseline session.

BRS scores were based on the final three minutes of the observation period, since subjects often stirred at the completion of training and 2 min were allowed for them to “settle down” (Raymer & Poppen, 1985). Reliability of observation between the experimenter and the independent observer was 92, 93 and 90%, and between the experimenter and the parents was 87, 93, and 95%, for subjects 1, 2, and 3, respectively. This indicated equal proficiency by parents and graduate students in scoring the BRS.

Figure 1 shows the percentage of relaxed behaviors, as measured by the BRS, for each subject. During baseline, subjects' scores worsened. After training was implemented, the children met the acquisition criterion within five to seven sessions. Subject 3 reached the
proficiency criterion in four additional sessions. In contrast, Subject 1 required 12 additional sessions to reach criterion. All subjects maintained or improved their BRS performance in the follow-up sessions.

Frontalis EMG levels generally mirrored the BRS scores, decreasing as relaxed behavior increased. This is shown by significant correlations between BRS and EMG for Subject 1 \((r = -0.72; p < .001)\) and Subject 3 \((r = -0.61; p < .01)\); the correlation for Subject 2 was not significant, due to unusually high EMG levels in two training sessions.

Mean parental ratings on the HI are shown in Table 1. Scores for Subjects 1 and 2 did not decrease during training, but did show improvement by follow-up. The HI declined to the “normal” range for Subject 1 but not for Subject 2. Ratings for Subject 3 were below the hyperactive range during baseline and decreased even further during training and follow-up.

Table 1 also presents the scores on the HSQ and the SSQ. For all subjects there was a marked improvement in parental ratings on the HSQ, both in the percentage of situations reported as problematic and in the severity rating. Teacher ratings on the SSQ were not as uniformly positive. Subject 3 showed an improvement in both frequency and severity ratings. Subject 1 showed a decrease in severity ratings but an increase in the percentage of problematic situations. For Subject 2, both frequency and severity ratings increased to high levels. In contrast, classroom observations indicated that Subject 2 made great improvements: the percentage of intervals in which he was observed to be “talking out” decreased from 23.1 to 7.7%; “out of seat” intervals decreased from 19.5 to 0.6%; and “on-task” behavior increased from 23.3 to 85.5%.

Discussion

BRT was found to be an effective method for parents to teach their hyperactive children to relax. The parents learned the procedure quickly and conducted training with little help from the experimenter by the third session. More efficient methods of parent training, such as group instruction, remain to be investigated.

The children were able to demonstrate relaxed behaviors two months after training, and
parents provided anecdotal reports that they spontaneously engaged in relaxation. However, no parent continued formal sessions after conclusion of the project. Maintenance programming should be included in future programs.

Though all subjects learned the relaxed behaviors rapidly, individual differences occurred in proficiency training. Subject 1, who required the most training, reacted adversely when given corrective feedback for unrelaxed behavior. Positive feedback for correct performance resulted in less disruption. BRT trainers should be alert to individual factors which enhance training (Poppen, 1988).

Frontalis EMG measures decreased during BRT, consistent with previous research (Eason et al., 1986; Raymer & Poppen, 1985; Schilling & Poppen, 1983). It is likely that tension in other areas of the body declined as well, when the child engaged in relaxed behavior (Poppen & Maurer, 1982).

All parents reported positive changes from baseline to follow-up on both the HI and HSQ. For two subjects, no improvements on the HI were noted during the training period. This result was inconsistent with Raymer and Poppen (1985), who found the greatest improvement on the HI when the parents implemented training at home. One factor may be that training in this study took place during summer vacation when the children were home all day every day. Improvements on the HI were reported when the children were back in school.

Improvements on the SSQ were less consistent. This measure is confounded by the fact that baseline ratings were done by one set of teachers in the spring, and the follow-up by a different set in the fall. Only Subject 3 showed improvements in both the percent of problematic situations and the severity rating. SSQ ratings for Subject 2 deteriorated markedly. He attended a different school in the fall, and upon finding out he was diagnosed as hyperactive, his teacher strongly urged that he be placed on medication, which was refused by his parents. Classroom observations contradicted the teacher's ratings, but bias and reactivity cannot be ruled out since they were conducted by the experimenter.

All children were withdrawn from medication. Although the design of the study does not permit this result to be directly related to relaxation training, the subjective appraisal by parents and physician about improved comportment contributed to their decision to remove medication.

The present study illustrates several difficulties in carrying out research in applied settings. A multiple-baseline design would have demonstrated better experimental control, but the need to begin treatment prohibited this approach. The EMG equipment added distractions to the training situation, and the independent reliability observer was somewhat intrusive. Interruptions due to illness and vacations seemed to prolong training. Medication was not systematically controlled. Finally, cooperation of school administration and teachers in obtaining ratings and observations was inconsistent.

In spite of the limitations of this study, BRT holds promise for those who live and work with hyperactive children. The behavioral approach suggests an alternative to the common conceptualization of relaxation as an internal state which has generalized and prolonged effects on behavior (Poppen, 1988). Relaxation training is often seen as providing a "dose" of calmness which is supposed to last for hours or days. This "medicine model" may be inappropriate, accounting for the weak or inconsistent effects of non-specific relaxation training on hyperactive behavior.

In contrast, relaxed behavior may be regarded as a specific skill, providing an adaptive alternative in situations which ordinarily lead to hyperactive behaviors (Raymer & Poppen, 1985). In the future, training should focus on cueing the child to engage in relaxed behaviors in problematic situations. The specific use of relaxation may provide the solution for problems in "generalization" from the training
setting to the classroom, living room, or playground, and may also provide an alternative to chemotherapy for many children labeled as hyperactive.

References


