Journal of Autism and Developmental Disorders, Vol. 26, No. 5, 1996

# Procedures for Reducing Dental Fear in Children with Autism

Deanna M. Luscre and David B. Center
*Georgia State University*

*Children with autism are often unable to tolerate dental examinations because of fear associated with sights and sounds in the dental operatory. This study applies procedures commonly used to reduce phobic behavior in otherwise normal persons and individuals with mental retardation, to dental fear in children with autism. Three male subjects were desensitized to a dental exam by the experimenter who paired the anxiety-causing event with stronger stimuli that elicited anxiety-antagonistic responses. Application of the treatment package resulted in successful completion of the steps in a dental exam in an analog setting, and a clinically significant increase in the number of steps completed in vivo. This study demonstrates that children with autism can be trained to cooperate during a dental exam.*

It has been well documented in the educational literature that many children with autism exhibit fears of unknown origin which resemble phobias in severity (Howlin et al., 1973; Jackson & King, 1982; Love, Matson, & West, 1990; Luiselli, 1978). The presence of fear challenges families and educators, and especially the child whose life is filled with anxiety and avoidance of feared objects. These fears may be related to the difficulty children with autism have in dealing with impressive, novel, and anxiety-eliciting visual and auditory stimuli (Hemsley, 1978). Fear of a dental examination was the focus of this experiment.

Parents frequently avoid taking their children with autism for routine examinations because of the children's fear of dental procedures (Howlin & Rutter, 1987; LaCamara & LaCamara, 1987). As a result, children with autism have a high prevalence of carious lesions, poor oral hygiene, and more periodontal disease than their "normal" counterparts (Butts, 1967; Starks, Market, Miller, & Greenbaum, 1985). Dental caries are neglected until so far advanced that drugs, or hospitalization, or general anesthesia



0162-3257/96/1000-0547$09.50/0 

are required to treat them (Braff & Nealon, 1979; Kamen & Skier, 1985; Kopel, 1977; Lowe & Jedrychowski, 1987; Lowe & Lindemann, 1985).

Although dentists agree that the behavior of patients with autism prevents dental treatment under routine conditions, only a few researchers have examined alternative treatment methods. The application of behavioral methods to dental fear in children with autism is time consuming. Additionally, the lack of validated procedures and training has precluded behavioral treatments from becoming routine in the dental community. However, dental treatment in children with autism can be accomplished using methods commonly known to reduce phobic behavior in other children.

The most common counterconditioning procedure used with children is systematic desensitization (Center, 1989). However, no studies were found using systematic desensitization for dental fear in children with autism. Modeling has been used extensively to reduce dental fear in normal children but no experimental studies were found that employed modeling to treat dental fear in children who have autism. With one exception data on the use of positive reinforcement, negative reinforcement, and punishment has been limited to descriptive reports (Burkhart, 1984; Kamen & Skier, 1985; Kopel, 1977).

## METHOD

### *Preintervention Interview and Subject Selection*

An interview was conducted with parents and teachers regarding fearful behavior previously exhibited by children with autism in various settings, including medical and dental settings. Six children were initially selected to participate in preintervention probes of dental fear on the basis of this information. The reinforcement preferences of the children were also obtained.

A single *in vivo* probe was performed to select the final subjects for the experiment. Children not chosen as subjects were able to undergo a partial oral exam, and showed no unusual fearful behavior at the dental office. None of the three subjects chosen was able to sit in the dental chair for longer than 1 minute. Two children became aggressive toward the investigator.

The three children selected to participate in the study attended self-contained classes for children with autism in a public school, and lived at home with their parents. The subjects had a prior diagnosis of autism, according to criteria in the DSM-III-R (American Psychiatric Association,

1987), determined by a school system multidisciplinary team, or a psychologist specializing in autism. All the subjects were male, and their respective ages (in years; months) were S1, 9; 7; S2, 9; 7; and S3, 6; 3. All three boys were nonverbal and had developmental profiles as follows: S1, 18.6 months (Cattell), and 26 months (Merrill Palmer); S2, 9–34 months (Callier Azuza); and, S3, 18–30 months (Psychoeducational Profile). Subjects 2 and 3 scored 18–40 months, and 1–11 months, respectively on the Vineland Adaptive Behavior Scale. Overall scores for the subjects suggest that they were functioning at the severely mentally retarded level.

### *Trainers*

One of the two teachers in the self-contained classes from which the subjects were selected acted as the researcher for the experiment. The cooperating dentist, a specialist in pediatric dental care, had limited experience with patients with autism. The dentist participated in a modeling video of dental exams with four normal children, and performed the actual dental exam in the final step of the dental exam hierarchy (Table I). A dental hygienist assisted the investigator by acting as dentist during *in vivo* probes of steps already achieved in the analog setting.

Four normal peers, who were regular patients of the dentist, acted as the peer models in a video of a dental exam conducted in the dental office (*in vivo* setting). Using a voice-over procedure, the investigator gave verbal instructions on the video for each coping step in the hierarchy leading to a dental exam.

The reliability observers were trained to an 80% criterion on the recording procedures. This training was conducted using nontreated children.

Table I. Steps in the Hierarchy of a Dental Examination

| | |
|---|---|
| 1. | Leave car/classroom |
| 2. | Enter building/hall |
| 3. | Enter waiting room |
| 4. | Sit/play in waiting room |
| 5. | Enter dental operatory |
| 6. | Sit in dental chair |
| 7. | Lean back in chair |
| 8. | Wear apron |
| 9. | Tolerate light |
| 10. | Open mouth for mirror |
| 11. | Open mouth for explorer |
| 12. | Open mouth for evacuator |
| 13. | Tolerate dentis/novel adult during exam |

### *Setting*

The analog dental office was a small room across the hall from the boys' classrooms and included a reclining chair and light stand. A small waiting area with two chairs and a television monitor on a cart was set up outside this simulated dental office. During treatment sessions, the television monitor was rolled into the analog dental office and placed beside the reclining chair in full view of the subjects. Tools, identical to those used in the actual dentist's office (dental apron, explorer, evacuator, and mirror) were utilized by the investigator during the treatment procedures.

The actual dental office was used during preexperimental probe sessions, weekly probe sessions, and for the dental exam during the final step of the hierarchy.

## EXPERIMENTAL DESIGN

A multiple baseline design across subjects was employed. Data were collected and graphed for the coping steps achieved in the analog and the *in vivo* settings. Subjects were assessed on achievement of steps based upon expected responses to verbal directions of the investigator (Figure 1). Data were collected during baseline, treatment, and maintenance phases in both settings.

Baseline *in vivo* probes were conducted by the investigator, with the assistance of the dental hygienist. No preparation or treatment was provided during baseline *in vivo* probes.

Because of the extreme reaction of the subjects during the initial *in vivo* probe, obtaining lengthy baseline data (for both *in vivo* and analog sessions) was rejected. Subjects 1, 2, and 3 received, respectively, one, two, and three *in vivo* and analog probes before treatment. All *in vivo* probes for all subjects were terminated for aggression or refusing to cooperate. Prior to intervention in the analog setting, no subject was able to sit in the dental chair (*in vivo*) for 5 minutes.

During baseline analog sessions, S1 completed 6 steps, S2 completed 9 steps, and S3 completed 6 steps in the treatment hierarchy. During baseline *in vivo* sessions, S1 and S2 achieved fewer steps than in the analog baseline, and S3 achieved he same number of steps in both baselines. The step following the terminal step in each subject's *in vivo* baseline became the initial step for intervention in the analog setting. Analog treatment conditions continued on each step until criterion was reached for that step. When criterion was reached on any step, that step was probed in the *in vivo* setting at the next scheduled *in vivo* session. If the *in vivo* probe in-

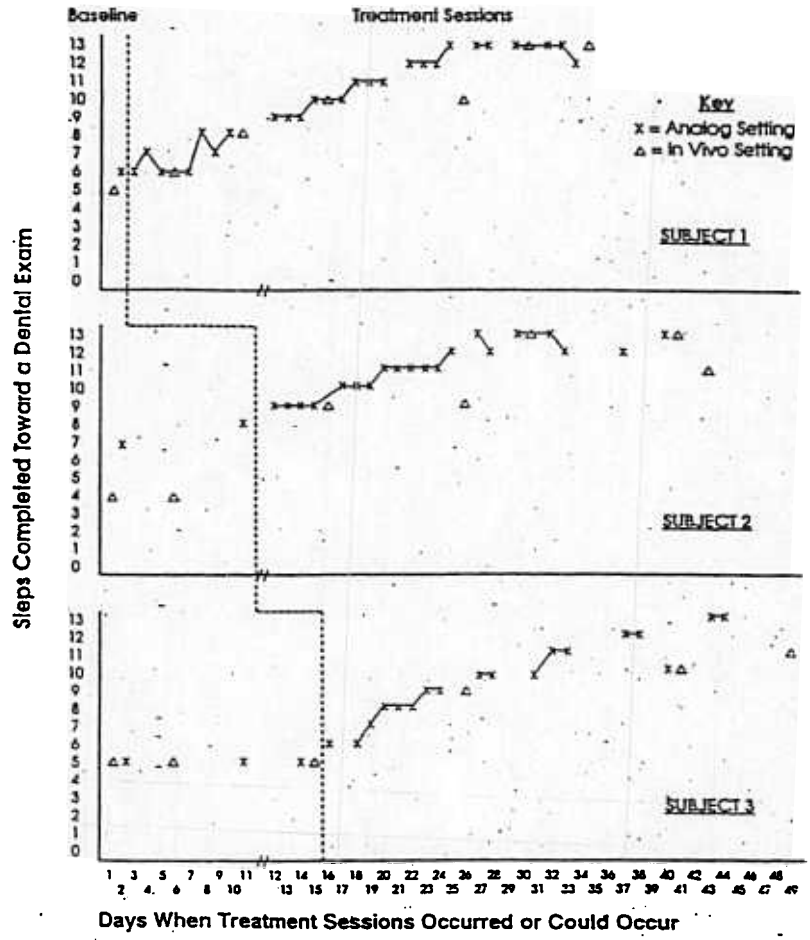


Fig. 1. Multiple baseline design across subjects; Systematic Desensitization, Symbolic Modeling, and Reinforcement, as treatment for dental fear in children with autism. Treatment did not occur on Days 29, 36, 39, 42, 46, 47, 48.

dicated that generalization of analog dental coping steps had occurred, a probe of the remaining steps was conducted. If the analog-treated step did not generalize to the dental office, treatment for that step began *in vivo*. Treatment and probes continued until criterion was reached on steps achieved in the analog setting, or a subject exhibited excessive avoidance behavior such as aggression, persistent vocal resistance, escape behavior, or 10 unsuccessful trials on a step. Extended treatment for the steps already

a continuous increase in the number of steps toward a dental examination during intervention in the analog setting, and during *in vivo* probe sessions.

*Subject 1.* During analog training, Subject 1 received six *in vivo* generalization probes, over an 8-week period. Following three analog treatment sessions, he was able to sit in the dental chair in the *in vivo* setting. Although he continued to improve in the analog setting, he refused treatment *in vivo* for one session after missing the previous *in vivo* probe. During the final two *in vivo* probes, he made continual progress toward a complete oral exam with the dentist. For S1, the goal of a dental exam with a novel adult was accomplished in the analog setting after 24 sessions, and in the *in vivo* setting after 6 sessions.

*Subject 2.* After only four analog training sessions, S2 was able to complete the first 9 steps of the dental exam *in vivo.* During the following nine analog sessions, he was able to accomplish 12 steps. However, he again only accomplished 9 steps *in vivo*. The expected interval of 1 week between the first and second *in vivo* probe was prolonged an extra week because the dental hygienist was ill. This unforeseen condition may have delayed progress for him in the *in vivo* setting. Subject 2 refused to wear a standard plastic apron, and during analog session 13, the experimenter replaced the plastic with a cloth apron. This alternative was more acceptable to all subjects. For S2, the goal of a dental exam in the analog setting was completed in 16 sessions. The final step, however, was not completed successfully in the *in vivo* setting. Subject 2 did consent to a complete exam by the investigator in the dental office, and to a partial exam by the dentist, but he did not allow the dentist to use the evacuator. More treatment in the *in vivo* setting might have produced a better end result.

*Subject 3.* In 19 treatment sessions, S3 was able to complete all 13 steps and to have a dental exam with a novel adult in the analog setting. Subject 3 experienced three *in vivo* generalization probes during treatment. These probes took place over a 7-week period. Following completion of 9 steps of the dental exam in eight analog treatment sessions, he was able to perform the identical 9 steps *in vivo* (first *in vivo* treatment probe), including sitting in a reclined chair, wearing an apron, and tolerating the dental light. Subject 3 was absent for the next *in vivo* visit, and although he accomplished 12 steps during interim analog sessions, he was only able to complete up to Step 10 (acceptance of a dental mirror) at his second *in vivo* treatment probe. During the final visit, following success in the analog setting with two unfamiliar adults, he was able to complete only some of the dental exam with the actual dentist. However, he continued to improve through the last visit, when he was able to accept both the mirror and explorer from the dentist. Subject 3 had less time to complete the experiment than the other two subjects, because the school year ended.

### *Summary of Results*

1. Clinically significant differences were found between the number of steps completed during analog baseline and treatment in the analog setting.

2. Treatment in the analog setting generalized to the *in vivo* setting. Compared with *in vivo* baseline, more steps of a dental exam were completed *in vivo* following analog treatment. Results were clinically significant.

3. The more frequently subjects were exposed to analog and *in vivo* treatment, the greater were the number of steps accomplished in both settings.

4. Once treatment began, there were no aggressive acts toward any adult acting as dentist.

It was not possible to fade desensitization procedures and reinforcement from any subject during the course of this investigation during *in vivo* sessions. Two possible reasons for this are (a) there was insufficient time during the investigation to increase the number of *in vivo* visits to the dental office, because the school year ended; and, (b) some coping procedures may always be necessary during anxiety-eliciting dental exams which do not occur routinely. The dentist in this investigation did not object to the coping procedures used during a dental exam except when they interfered with the examination.

## GENERAL DISCUSSION

Results of this investigation suggest that children with autism can be trained through a combined desensitization, symbolic modeling, and reinforcement treatment package to undergo a dental exam in an analog setting. Furthermore, this training can generalize to an actual dental office. All three subjects were able to undergo a dental exam in an analog setting in less than 4 weeks of daily treatment. Following five *in vivo* sessions, each at least 1 week apart, S1 underwent a dental exam at the dental office. Because of the limited time, S2 experienced only 4 sessions *in vivo,* and S3 completed only three sessions *in vivo.* Nevertheless, both S2 and S3 were able to complete at least 11 of the 13 steps in an actual dental exam. It is probable, therefore, that had the experiment continued, all subjects would have been able to undergo a total exam after several more *in vivo* sessions. The good results attained in this study are remarkable especially for S2, who had to be tied to a papoose board during previous dental visits. Although an oral examination is only a first step in dental care, this is nevertheless an important result. It demonstrates that children with autism

can be trained to overcome fearful impressions and to cooperate during an upsetting experience, such as a dental examination.

The results of this investigation suggest replications that extend the results to more intrusive procedures, including teeth cleaning and routine dental care. The results also suggest that any future study should allow more time to reach conclusion.

## REFERENCES

American Psychiatric Association. (1987). *Diagnostic and statistical manual of mental disorders* (3rd ed., rev.). Washington, DC: Author.

Braff, M., & Nealon, L. (1979). Sedation of autistic dental patient for dental procedures. *Journal of Dentistry for Children, 46,* 404-407.

Burkhart, N. (1984). Understanding and managing the autistic children in the dental office. *Dental Hygiene,* pp. 59-64.

Butts, J. (1967). I. Dental status of mentally retarded children; II. A survey of the prevalence of certain dental conditions in mentally retarded children of Georgia. *Journal of Public Health Dentistry, 27*(4), 195-211.

Center, D. (1989). *Curriculum and teaching strategies for students with behavioral disorders.* Englewood Cliffs, NJ: Prentice Hall.

Hemsley, R. (1978). Treating autistic children in a family context. In M. Rutter & E. Schopler (Eds.), *Autism: A reappraisal of concepts and treatment* (p. 392). New York: Plenum Press.

Howlin, P., & Rutter, M. (1987). *Treatment of autistic children* (p. 91). New York: Wiley.

Howlin, P., Marchant, Rutter, M., Berger, M., Hersov, L., & Yule, W. (1973). A home-based approach to the treatment of autistic children. *Journal of Autism and Childhood Schizophrenia, 3,* 308-336.

Jackson, H. J., & King, N. J. (1982). The therapeutic management of an autistic child's phobia using laughter as the anxiety inhibitor. *Behavioral Psychotherapy, 10,* 364-369.

Kamen, S., & Skier, J. (1985). Dental management of the autistic child. *Special Care in Dentistry, 5*(1), 20-23.

Kopel, H. (1977). The autistic child in dental practice. *Journal of Dentistry for Children,* pp. 302-309.

LaCamara, R., & LaCamara, C. (1987). Routine health care. In D. Cohen & A. Donnellan (Eds.), *Handbook of autism and pervasive developmental disorders* (pp. 584-595). New York: Wiley.

Love, S., Matson, J., & West, D. (1990). Mothers as effective therapists for autistic children's phobias. *Journal of Applied Behavioral Analysis, 23,* 379-385.

Lowe, O., & Jedrychowski, J. (1987). A sedation technique for autistic patients who require dental treatment. *Special Care in Dentistry, 7*(6), 267-270.

Lowe, O., & Lindemann, R. (1985). Assessment of the autistic patient's dental needs and ability to undergo dental examination. *Journal of Dentistry for Children,* pp. 29-35.

Luiselli, J. (1978). Treatment of an autistic child's fear of riding a school bus through exposure and reinforcement. *Journal of Behavior Therapy and Experimental Psychiatry, 9,* 169-172.

Milan, M. A., & McKee, J. M. (1976). The cellblock token economy: token reinforcement procedures in a maximum security correctional institution for adult male felons. *Journal of Applied Behavior Analysis, 9,* 253-275.

Starks, D., Market, G. Miller, C., & Greenbaum, J. (1985, July). Day to day dental care: A parent's guide. *Exceptional Parent,* pp. 13-17.