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HABIT REVERSAL TREATMENT OF THUMBSUCKING*

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(Received 25 March 1980)

Summary—About 40% of young children suck their thumbs, an action which is associated with dental problems and for which intra-oral devices have been the most effective treatment. The present study of 30 thumbsucking children evaluated the habit reversal treatment which included competing response training, parental support, and stimulus identification during a single session plus follow-up maintenance by the parent. Habit reversal training reduced thumbsucking by 92% in the first week, 95% in the fourth month, and 89% at the 20-month follow-up. A comparison treatment by a bitter tasting substance produced a reduction of about 35%.

Thumb or fingersucking has been found to occur among 42% of 2-year-olds, 46% of 3-year-olds, and 37% of 4-year-olds (Honzik and McKee, 1962). Even at 12 years of age, 22% sucked their thumbs in a survey by Baalack and Frisk (1971). Thumbsucking is usually considered offensive aesthetically but also has been shown to be associated with dental problems, especially for children 4 years of age and older (Wright, Schaefer and Solomons, 1979). Bitter tasting substances on the thumbs have been commonly employed, but experimental evaluations of this procedure are rare (Flesher, 1956) and have not included follow-up data permitting evaluation. The most common professional method of treatment has been the palatal arch or crib which may include spurs that discourage thumbsucking but causes considerable inconvenience. Haryett *et al.* (1967) and Haryett, Hansen and Davidson (1970) found that the palatal arch had no effect, but that the palatal crib with spurs eliminated thumbsucking in almost all children if worn for several months, although also producing emotional problems and difficulties in speech as well as in eating. Counseling or psychotherapy has produced little or no benefit (Foster and Stebbins, 1929; Haryett *et al.*, 1967).

Operant procedures have been used in several small scale applications, with less than four children or in time-limited applications, with beneficial results that hold promise for larger scale evaluations. These operant procedures have used reinforcement of non-thumbsucking as the principal method (Ross and Levine, 1972; Ross, 1974, 1975; Martin, 1975; Feniger, 1971; Baer, 1962; Bishop and Stumhauzer, 1973; Kaufman and Serraten, 1974; Knight and McKenzie, 1974; Shirbroun, 1974).

A second type of operant approach to thumbsucking has been the habit reversal method which consists of teaching competing reactions, identifying the habit prone situation, arranging social support by the family, providing a response contingent period of competing reactions, and identification of response precursors. Initially developed to treat the autistic behavior of retarded and autistic children who also may exhibit undesirable oral habits (Foxy and Azrin, 1973; Azrin, Kaplan and Foxy, 1973; Freeman *et al.*, 1977), the method was found effective in eliminating thumbsucking of two normal children (Azrin and Nunn, 1973). The present study attempted to evaluate the method more fully with normal children by using a larger number of subjects and also providing a comparison with the commonly used method of painting the thumb and fingers with a bitter tasting substance.

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METHOD

Subjects

Thirty-two children were enlisted as subjects by a newspaper advertisement. All respondents were included, except for three adults. Random assignment by a coin flip resulted in 18 children being assigned to the habit reversal method and 14 children to the control method. Two of the controls were not used since their parents declined to participate in the control procedure to which they were assigned in that they had used that procedure previously without success. Of the 30 children, 20% were boys; the mean age was 8.3 years with a range of 2.5-14 years, 75% had consulted a dentist regarding the problem, 25% had worn orthodontic appliances. For the habit reversal children, the median number of thumbsucking episodes was 25 per day with a mean of 36 and S.D. of 28. The control children had a median of 22, mean of 52, and S.D. of 58 episodes per day. Chi square or *t* tests, as appropriate, showed no significant differences between the treatment and control groups for any of the above dimensions. One of the children was reported as sucking only at night and scored as having one episode per day. Sucking of the thumb was the pattern for most (72%) children, but some children sucked the index finger.

Recording

The parents provided an estimate at the initial contact of the frequency of thumbsucking. Standard recording sheets were used thereafter on which to record daily the number of thumbsucking episodes which were reported by phone or mailed. Follow-up calls were made about every 10 days during the first month, every 2 weeks during the next 10 months and once per month thereafter. Follow-up was not conducted after 3 months for the control children. Thumbsucking was recorded in terms of the frequency, rather than duration, since this measure appeared more meaningful to the parents who usually interrupted the behavior upon detecting it. Observer reliability measures were desired but did not seem feasible since the mother was usually the only adult in continuing contact with the child.

The counseling occurred in a single session of 1-2 h duration, the first portion of which was spent teaching the child what to do; in the latter portion, the child described the program, with the counselor's assistance, to the parent and requested the parent's assistance. In the 'annoyance review' procedure, the child listed all of the problems created by the thumbsucking. In the 'heightened awareness' procedure, the child acted out the usual response sequence, especially the precursors of the thumbsucking so as to identify the stimulus antecedents of the behavior.

The child was taught competing reactions such as making a fist in which the thumb gripped the fingers if the child was a fingersucker or the fingers gripped the thumb if a thumbsucker, or the child grasped some convenient object. This competing reaction was rehearsed until performed correctly. The grasping-clenching reaction was to endure for about 1-3 min. The children timed the duration by counting aloud slowly to 100, or, in the case of younger children they repeated a count to 10 several times. The competing reaction served as a preventive measure in the identified habit prone situations as well as a corrective measure when thumbsucking or any face touching occurred. For the first few children, this competing reaction consisted of holding the hands away from the body, but this was discontinued when children reacted unfavorably to it. Since nighttime sucking was especially likely, the children were told to keep their hands by their side with the fists clenched when they went to sleep at night.

Social support (social reinforcement) was encouraged by the parent praising the child when sucking was absent and by providing pleasant surprises, visits, etc., when sucking was absent for an extended period. For all habit reversal children, the parents were to turn off the television set or interrupt the suggested bedtime story whenever thumbsucking occurred. Also, concerned persons were identified, such as neighbor or grandparent, whom the child was to call to report progress.

The procedure was presented as a game involving 'exercises' (clenching and grasping) that were the responsibility of the child, the parent serving to provide reminders and encouragement and enforcing the program only should the child fail to perform the exercises after a gentle reminder. The various procedures and probable problem situations were role-played.

Control procedure (bitter tasting substance)

The children in the control group were not counseled directly by the counselor, but rather the counselor instructed the parents by phone on the use of a commercially available liquid containing cayenne pepper extract and citric acid and sold for the purpose of deterring thumbsucking. The liquid was to be applied every morning and evening. The parents were encouraged to be consistent in the application and to instruct babysitters and other caretakers to apply it in the parent's absence. The parents were instructed to keep daily records of the child's thumbsucking in the same manner as did the habit reversal parents. Since these children and parents were advised only by phone, they constitute only a partial control to determine how well this commonly used procedure functioned with minimal professional contact.

RESULTS

Figure 1 shows the changes in thumbsucking expressed as the mean percentage reduction from the pre-treatment baseline level. The data are expressed in terms of percentage change rather than absolute frequency since the children varied greatly from 1-200 episodes per day. Measure of central tendency based on absolute frequency would have given disproportionate weight to the small number of high rate thumbsuckers. For the habit reversal children, follow-up data was available for all clients up to the third week, for 17 up to the fourth month, 11 up to 6 months and 9 clients at the 20-month follow-up. The habit reversal children had a mean reduction of 55% on the first day, and about 95% thereafter until the twentieth month when the reduction was 89%. In contrast,

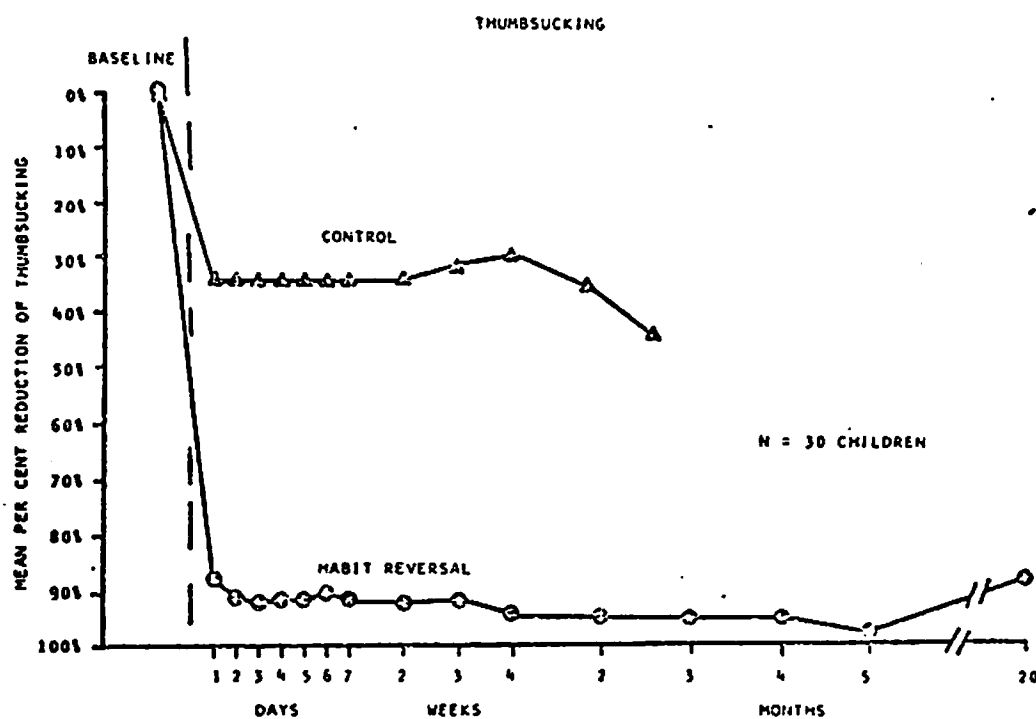


Fig. 1. Treatment of thumb- and fingersucking of 30 young children by habit reversal and by a control procedure. The control procedure consisted of painting the fingers and thumb with a bitter tasting solution. The data are expressed as a percentage reduction relative to the baseline level and are presented daily for the first week, weekly for the remainder of the first month, and monthly thereafter with a long-term follow-up at 20 months. Treatment consisted of a single training session indicated by the vertical dotted line.

the mean percentage reduction of thumbsucking for the control children was 34.44% during the 3 months of follow-up. At the 3-month follow-up, the difference between groups in the reduction of thumbsucking was statistically significant ($t = 4.79$; $p < 0.0001$).

In terms of absolute frequency, the habit reversal children had a mean of 1.8 episodes per day at the 3-month follow-up compared to the pre-treatment mean of 36 episodes per day. The control children had a mean of 21.2 episodes per day at the 3-month follow-up compared to their pre-treatment mean of 52 episodes per day.

Analysis of the individual data of the habit reversal children at the 3-month follow-up in terms of percentage reduction showed that 47% had stopped thumbsucking completely and all of the others had a reduction of at least 50%. Of the control children at the same 3-month follow-up, 10% had stopped completely; 60% of the children showed little or no change (less than a 50% reduction).

To evaluate the effect of the children whose data became unavailable during the follow-up, their scores at their last recording were compared with those of the remaining children. The mean difference in percentage reduction between those children whose data became unavailable during follow-up and the remaining children at the same time was 3%.

DISCUSSION

The habit reversal method was more effective in eliminating thumbsucking than the use of the bitter tasting substance. About half of the children receiving the habit reversal training stopped sucking entirely, compared to 10% of the control children. The effect of the habit reversal continued for the duration of the 20-month follow-up, with a reduction of 89-98% in sucking throughout the period. The children who were unavailable for follow-up were probably not unrecorded failures since their reduction of sucking was almost the same at their last record as those children who remained available for follow-up. The magnitude of the reduction by the habit reversal method was substantial and immediate in that the mean reduction of sucking was 88% on the first day and progressively increased to a 98% reduction at the 5-month follow-up. At the 20-month follow-up, seven of the nine children had stopped sucking entirely, one child had a reduction of 98% and one child had returned to sucking at the initial rate. The present results appear almost as favorable as those obtained by the use of the palatal crib with spurs by Haryett *et al.* (1970) who also obtained a 90% reduction. The habit reversal method, of course, did not produce the eating and speaking problems which have been reported for the crib. Future evaluations of the present method might well use a control group which receives the same face-to-face contact as the treatment group. Also, future applications of the method might well omit the arm exercises which were used with some of the children, but discontinued for them and the subsequent children because of its effortfulness and negative emotional reaction.

Acknowledgements—Grateful acknowledgement is given to R. DeVito for providing facilities and assistance, to J. Maedke for statistical assistance, and to P. K. Levison for his general assistance and encouragement.

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