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EVALUATION OF AN AWARENESS ENHANCEMENT DEVICE FOR THE TREATMENT OF THUMB SUCKING IN CHILDREN

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An evaluation of the awareness enhancement device (AED) described by Rapp, Miltenberger, and Long (1998) was conducted with 2 children who engaged in thumb sucking past the age at which it was developmentally appropriate. The AED effectively suppressed thumb sucking for both children. Future research evaluating the AED is discussed.

DESCRIPTORS: awareness enhancement device, habit behaviors, thumb sucking, automatic reinforcement, automatic contingency delivery procedures

Thumb sucking that persists beyond early childhood can result in a number of physical and social problems (Friman, 1987). Various behavioral interventions, such as the application of aversive-tasting substances to the thumb, differential reinforcement, time-out, token economy programs, and habit reversal, have been moderately to highly successful in treating this behavior. However, there may be problems with treatment integrity and acceptability when the program requires close monitoring of child behavior.

As an alternative to socially mediated interventions, Rapp, Miltenberger, and Long (1998) developed an automated device, called the awareness enhancement device (AED), that produces a tone each time an individual raises a hand to the head. This device successfully treated hand-to-head habit behaviors (i.e., finger sucking and hair pulling) for 2 individuals, but it was evaluated only after other interventions were ineffective (Ellingson et al., 2000; Rapp et al., 1998). Thus, the purpose of this investigation was to evaluate the effects of the AED on the thumb sucking of two children within a more rigorous experimental design.

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METHOD

Participants and Setting

Participants were 2 children who had been diagnosed with attention deficit hyperactivity disorder (ADHD) and who engaged in thumb sucking. Jack was 7 years 3 months old and Mark was 14 years old when treatment began. Mark took 80 mg of Ritalin and 100 mg of Nortriptyline per day for the duration of the investigation. All assessment and treatment sessions took place in the living room of each child's home. Prior to the study, we conducted a functional analysis involving alone, attention, escape, and control conditions (these data are contained in Stricker, Miltenberger, Anderson, Tulloch, & Deaver, 2000). Thumb sucking occurred most often in the alone condition (M = 93% and 77% for Mark and Jack, respectively) and rarely occurred in the other conditions (means ranged from 0% to 6%), suggesting that thumb sucking was maintained by automatic reinforcement.

Target Behaviors and Interobserver Agreement

Thumb sucking was defined as the insertion of the thumb past the front teeth with the lips closed over the thumb. Data on the second-by-second occurrence of thumb sucking were collected in 10-min sessions using a real-time videocassette recording method and were reported as a percentage of session time. To assess interobserver agreement, a second observer scored 33% of all sessions. The number of seconds of agreement concerning the occurrence or nonoccurrence of the behavior was divided by the total number of seconds in the session and multiplied by 100%. Mean interobserver agreement was 99.7% (range, 98.5% to 100%) for Mark and 97.7% (range, 89.7 to 100%) for Jack.

Awareness Enhancement Device

The AED consisted of two transmitters (5 cm by 7.5 cm) fastened on the wrists with Velcro and a receiver (5 cm by 7.5 cm) pinned to the shirt approximately 15 cm from the child's mouth. When either transmitter came within 10 cm of the receiver (i.e., approximately 25 cm from the child's mouth), the receiver's beeper (65 dB) was activated while the two units were in proximity to one another.

Procedure and Experimental Design

Baseline. The participant sat by himself and watched television with the videocamera placed in the corner of the room.

Inactive AED. The participant watched television alone and wore the AED while it was turned off. No tone was delivered. This condition was conducted to determine whether wearing the apparatus per se had any effect on thumb sucking.

Active AED. This condition was similar to that described above. However, contingent on the transmitter coming within 10 cm of the receiver, a 65-dB pulse sounded while the units were in proximity to one another.

The AED was evaluated within an ABCBAC (A = baseline, B = inactive AED, C = active AED) design for both participants.

RESULTS AND DISCUSSION

Following baseline (M = 94.7%), minor reductions in Mark's thumb sucking were observed during the inactive AED condition (M = 75.8%) (Figure 1). In the active AED condition, thumb sucking decreased to zero for four sessions and then increased during the inactive AED reversal (M = 83.4%). One baseline session was conducted (93.5%) before the active AED again decreased thumb sucking to zero for 17 sessions across 8 weeks.

Jack's thumb sucking was also reduced to near zero during active AED conditions (Figure 1). Levels of thumb sucking were variable early in baseline but stabilized by the sixth session (M = 38.4%). Thumb sucking decreased and then increased during the inactive AED condition (M = 50.2%). In the active AED condition, thumb sucking decreased to zero for eight sessions and then increased during one inactive AED session (M = 98.7%) and two baseline sessions (M = 94.1%). Reimplementation of the active AED resulted in near-zero levels of thumb sucking (M = 0.7%) for 27 sessions across 13 weeks.

The results of this investigation showed that the AED was effective for Mark and Jack when the 65-dB pulse was delivered each time the hand was raised to the mouth. These results replicate and extend previous findings (Ellingson et al., 2000; Rapp et al., 1998) by demonstrating a clear functional relationship between contingent delivery of the tone and levels of thumb sucking. Although these results demonstrate the effectiveness of the AED, Stricker, Miltenberger,

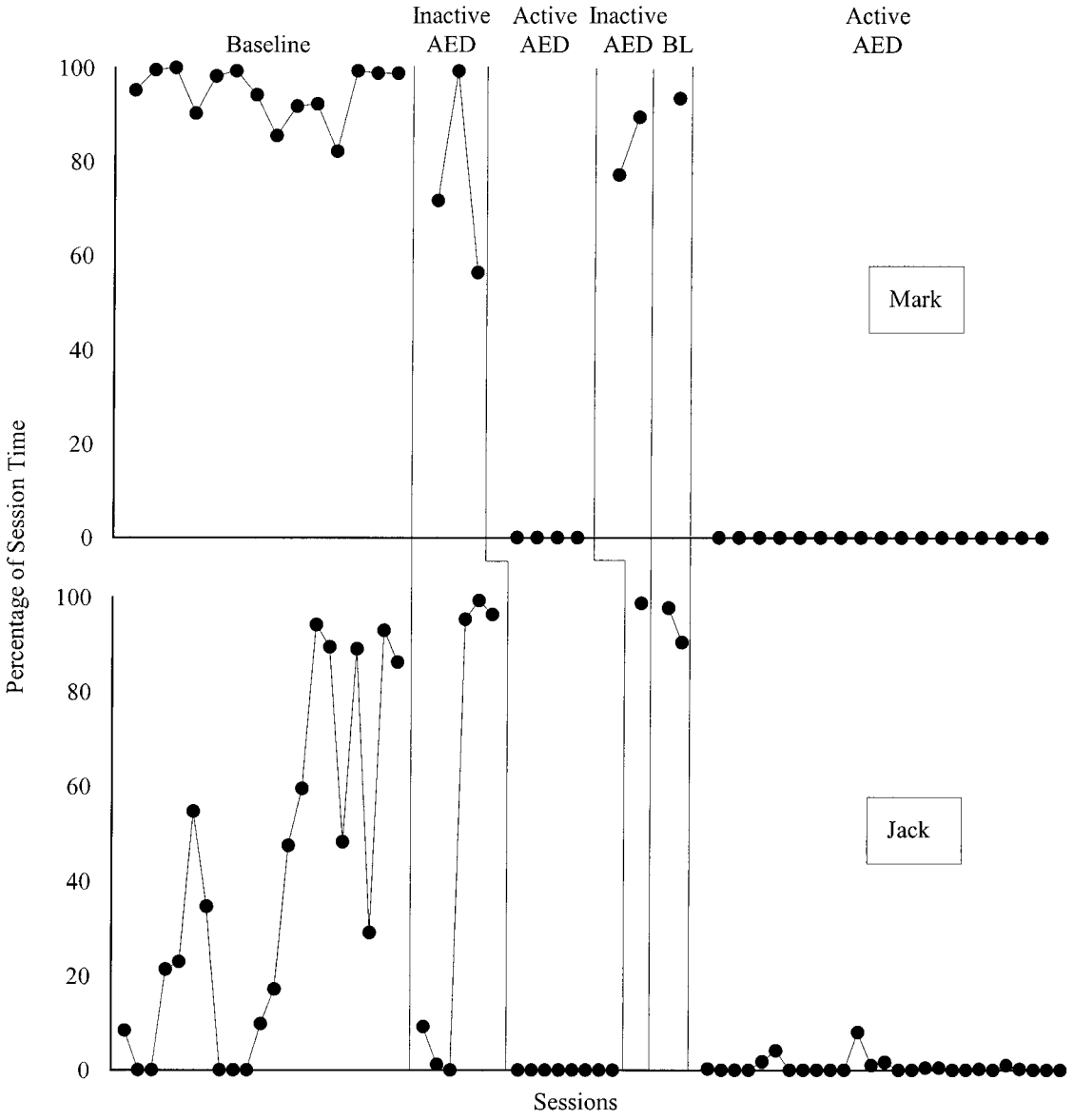

Figure 1. Percentage of session time of thumb sucking for Mark and Jack across baseline (BL), inactive AED, and active AED conditions.

Garlinghouse, et al. (2000) found that the AED was not effective in treating finger sucking for 1 child. In this case, a more intense auditory stimulus reduced the behavior to low levels.

The AED has at least two advantages over socially mediated interventions for thumb sucking. First, the device does not require a person to continuously monitor the behavior and implement prescribed procedures. A second benefit was that the apparatus allowed the children to participate in activities while it continuously detected occurrences of the behavior. This feature was appealing because both children reported that they sucked their thumbs while participating in other activities (e.g., playing video games, eating, doing homework).

It is not yet clear why the AED is effective. One possibility is that the AED increased awareness of thumb sucking, which led to reductions in the behavior. Another possibility is that the tone punished thumb sucking and the termination of the tone negatively reinforced the movement of the hand away from the face. Future research should investigate the mechanism responsible for the effectiveness of the AED.

The effects of the AED on other problem behaviors (e.g., nail biting, hair pulling, hand mouthing) and long-term maintenance also should be evaluated in future studies. Maintenance may be achieved by fading the tone in a systematic way and by replacing the tone with vibration or other subtle stimulation. The AED with subtle stimuli may be more appropriate for use in public settings (e.g., the classroom or workplace). Finally, when a behavior rarely occurs with subtle stimuli, the AED itself could be faded.

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