

*EVALUATION OF A MULTICOMPONENT INTERVENTION FOR
DIURNAL BRUXISM IN A YOUNG CHILD WITH AUTISM*

EMILY L. BARNOY, ADEL C. NAJDOWSKI, JONATHAN TARBOX,
ARTHUR E. WILKE, AND MEGAN D. NOLLET

CENTER FOR AUTISM AND RELATED DISORDERS

Bruxism, forceful grinding of one's teeth together, can produce destructive outcomes such as wear on the teeth and damaged gums and bone structures. The current study implemented a multicomponent intervention that consisted of vocal and physical cues to decrease rates of bruxism. A partial component analysis suggested that the vocal cue was only effective at decreasing levels of bruxism when paired with a simultaneous physical cue.

DESCRIPTORS: autism, bruxism, physical cue, vocal cue

Bruxism consists of forcefully grinding one's teeth together. Chronic nocturnal or diurnal bruxism can cause abnormal wear on the teeth, damaged gum and bone structures, facial pain, and tooth sensitivity (Glaros & Rao, 1977). Previous research on the treatment of diurnal bruxism has employed aversive procedures (e.g., brief response-contingent application of ice to the cheeks or chin; Blount, Drabman, Wilson, & Stewart, 1982) or the use of protective devices (e.g., occlusal splints) combined with noncontingent reinforcement (Leksell & Edvardson, 2005).

To date, few investigations have evaluated treatments for bruxism displayed by individuals with autism. In a notable exception, Bebko and Lennox (1988) employed a multicomponent cuing procedure to reduce the diurnal bruxism of 2 boys with developmental delays and autism. The procedure consisted of touching the participants' chins with an index finger and applying minimal downward pressure while simultaneously presenting the vocal cue "no grinding." The combined vocal and physical cuing procedure effectively reduced bruxism.

However, neither the vocal nor the physical cue was evaluated in isolation; thus, the relative contributions of the separate components are unknown. The current study replicated the procedures described by Bebko and Lennox with a young girl with autism and conducted a component analysis in an attempt to identify whether the less intrusive component (the vocal cue) was sufficient for reducing bruxism.

METHOD

Participant and Setting

Abby was a 6-year-old girl with autism who received one-on-one, home-based behavioral therapy for approximately 10 to 15 hr per week. Abby had limited language, adaptive, and play skills. Her only means of communication was a picture communication system and hand leading. She also had limited independent feeding, dressing, and toileting skills. She exhibited some appropriate play with cause-and-effect toys and task-completion toys (e.g., puzzles), but most of her play tended to be repetitive and stereotypical. All sessions conducted for the current study were embedded in Abby's ongoing therapy sessions, which occurred in a play room in her home. During the therapy sessions, Abby was taught adaptive (e.g., toileting, dressing, and using utensils), play (e.g., functional pretend play and peer play), and language skills (mands, echoics, tacts, and

We thank Susie Balasanyan, Kathryn Quidano, Angela DeDios, Jennifer Paul, Stacy Blanco, and Taira Lanagan for their assistance with this project.

Address correspondence to Adel Najdowski, Center for Autism and Related Disorders, 19019 Ventura Blvd., Suite 300, Tarzana, California 91356 (e-mail: a.najdowski@centerforautism.com).

doi: 10.1901/jaba.2009.42-845

matching). Therapy sessions (including the follow-up sessions) were 2 hr in duration and were conducted once per day, 5 to 7 days per week.

Response Measurement and Interobserver Agreement

Bruxism was defined as the grinding of Abby's upper and lower teeth together with sufficient force to create an audible sound, separated by at least 2 s of nonoccurrence. No movement of Abby's jaw or mouth was visible when grinding occurred, so the only indication that the behavior was occurring was the distinct grinding sound it made. Due to the clear onset and offset and the relatively brief (i.e., less than 1 s) duration of the behavior, frequency data were used to measure the occurrence of bruxism. Frequency data were collected on handheld tally counters and were converted to a response rate (responses per minute) for the purpose of data analysis.

Interobserver agreement was assessed by having a second observer independently record the frequency of bruxism during 37% of sessions and was calculated by dividing each 2-hr session into separate 10-min bins. Within each bin the smaller number of responses was divided by the larger, the resulting fractions were averaged across all intervals in a given session, and this ratio was converted to a percentage. Mean interobserver agreement on the occurrence of bruxism was 90% (range, 81% to 98%).

Procedure

Two staff members with a minimum 6-month history with Abby were interviewed via a structured questionnaire (Questions about Behavioral Function [QABF]; Matson & Vollmer, 1995) to identify the reinforcement contingency that maintained her bruxism. Results of the QABF suggested that bruxism was maintained by automatic reinforcement. Therefore, the treatment analysis was conducted to compare the effects of a combined (vocal and physical) cue condition to a no-treatment (ignore)

condition and to a condition in which only the vocal cue component of the combined cue condition was implemented. Using a reversal design (BABCB; Kazdin, 1982) the analysis began with the combined cue condition rather than a no-treatment baseline, based on the fact that the combined cue condition was the existing treatment for Abby's bruxism when the investigation was initiated.

During the combined cue condition, a vocal and a physical cue were simultaneously presented contingent on bruxism. The vocal cue consisted of the therapist saying to Abby, "Say 'ah,'" and the physical cue consisted of applying downward pressure to her chin using the index finger for 3 s. The physical cue was discontinued after 3 s regardless of Abby's behavior; however, if bruxism continued beyond 3 s, the physical cue was not reimplemented until another instance of bruxism occurred (i.e., bruxism ceased for at least 2 s and then recurred). It should be noted that Abby was rarely observed to engage in bruxism for more than 3 s at a time.

During the ignore condition, the therapist implemented the ongoing therapy program (as described above) but did not differentially respond to any episodes of bruxism. The ignore condition was designed to evaluate the occurrence of bruxism in the absence of any social consequences (i.e., to evaluate the automatic reinforcement hypothesis suggested by the QABF results). The vocal-cue-only condition was similar to the combined cue condition except that the physical cue was omitted following the occurrence of bruxism and only the vocal cue (i.e., the therapist saying, "Say 'ah'") was provided contingent on bruxism. During follow-up, the combined cue procedure was implemented. Follow-up sessions were conducted once per week for the 3 weeks following Session 48.

RESULTS AND DISCUSSION

The results are displayed in Figure 1. During initial exposure to the combined cue condition,

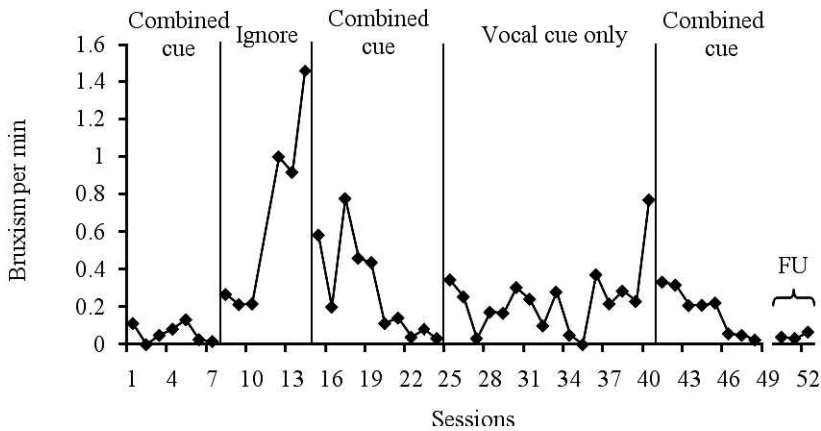


Figure 1. Bruxism per minute during the treatment analysis (FU = follow-up).

bruxism occurred at low levels. By contrast, bruxism increased during the ignore condition, particularly toward the end of the phase. During the reversal to the combined cue condition, bruxism eventually decreased to levels that were similar to those observed in the initial combined cue condition. Introduction of the vocal-cue-only condition resulted in levels of bruxism that exceeded those observed in the combined cue condition. Thus, the combined cue condition was reimplemented, and bruxism gradually decreased to low levels. During follow-up with the combined cue procedure in place, bruxism remained low.

Results of the current study replicate the findings of Bebko and Lennox (1988) by demonstrating that delivering a combined vocal and physical cue following bruxism effectively reduced the behavior. Further, the current results suggest that the procedure was effective in sessions of relatively long duration (i.e., 2 hr) and when implemented during ongoing therapy in the child's home (i.e., the treatment for bruxism did not interfere with Abby's other therapy). The current results also suggest that the combined cue was more effective at reducing the occurrence of bruxism than the vocal cue alone. However, the effects of the physical cue in isolation were not evaluated in the current investigation. Thus, it is unknown if the physical cue alone or in combination with

the vocal cue was responsible for the reduction in bruxism observed in the combined cue condition.

Several limitations of the current study warrant discussion. First, the treatment analysis was not preceded by an analogue functional analysis (Ahearn, Clark, MacDonald, & Chung, 2007). The results of the QABF suggested that bruxism was maintained by automatic reinforcement, but the lack of a functional analysis did not permit an empirical evaluation of this reinforcement contingency. However, bruxism occurred at relatively high levels during the ignore condition, suggesting that this response was maintained, at least in part, by automatic reinforcement (e.g., Vollmer, Marcus, & LeBlanc, 1994). Furthermore, the gradually increasing rates of bruxism observed in the ignore condition are atypical of an extinction curve (e.g., Lerman, Iwata, & Wallace, 1999), suggesting that this pattern of behavior was not related to the discontinuation of social reinforcers (e.g., attention delivery). Finally, it was unlikely that bruxism was maintained by negative reinforcement in the form of escape from demands, because all sessions were conducted in an instructional context (i.e., the ongoing therapy program). Nevertheless, future research should consider conducting analogue functional analyses to evaluate the extent to which social and nonsocial reinforcement

contingencies play a role in the maintenance of bruxism.

An additional limitation of the current study was that the effective intervention for bruxism did not include a reinforcement-based component. It is considered best practice to begin treatment of destructive behavior with a reinforcement-based procedure and to include reinforcement components when implementing response-reduction procedures (Carr, Robinson, & Palumbo, 1990). However, during Abby's therapy program, positive reinforcement was delivered at a high rate throughout the day, contingent on a variety of adaptive, play, and language skills. Thus, although the bruxism treatment did not include a reinforcement component, Abby could obtain positive reinforcement through a variety of other means.

It is possible that using 10-min, as opposed to smaller (e.g., 10-s), intervals for calculating interobserver agreement could have influenced the agreement results. However, Abby's therapy program typically involved data collection in 10-min intervals, and the continuation of this practice permitted conducting the current analysis in the context of that program. Future researchers should evaluate the extent to which interval length affects agreement calculations, particularly when response rate might interact with interval length (e.g., Hopkins & Hermann, 1977).

The omission of a pretreatment baseline did not permit a conclusive demonstration of functional control between the combined cue condition and baseline. Likewise, the results of the vocal-cue-only condition were not replicated. However, repeated decreases in bruxism were observed when the combined cue procedure was implemented, regardless of the preceding condition. Thus, the combined cue condition appeared to reliably reduce the occurrence of bruxism. Despite this finding, the underlying mechanism for this reduction remains unknown. It is possible that bruxism decreased as a result of (a) an increase in

response effort given the physical cue, (b) the presentation of the physical cue acting as a punisher for bruxism, or (c) the physical cue blocking access to automatic reinforcement that she contacted when she engaged in bruxism. Future research should attempt to evaluate these variables by conducting more thorough component analyses.

REFERENCES

- Ahearn, W. H., Clark, K. M., MacDonald, R. P., & Chung, B. I. (2007). Assessing and treating vocal stereotypy in children with autism. *Journal of Applied Behavior Analysis*, 40, 263–275.
- Bebko, J. M., & Lennox, C. (1988). Teaching the control of diurnal bruxism to two children with autism using a simple cueing procedure. *Behavior Therapy*, 19, 249–255.
- Blount, R. L., Drabman, R. S., Wilson, N., & Stewart, D. (1982). Reducing severe diurnal bruxism in two profoundly retarded females. *Journal of Applied Behavior Analysis*, 15, 565–571.
- Carr, E. G., Robinson, S., & Palumbo, L. W. (1990). In A. C. Repp & N. N. Singh (Eds.), *Perspectives on the use of nonaversive and aversive interventions for persons with developmental disabilities* (pp. 361–379). Sycamore, IL: Sycamore.
- Glaros, A., & Rao, S. (1977). Bruxism: A critical review. *Psychological Bulletin*, 84, 767–781.
- Hopkins, B. L., & Hermann, J. A. (1977). Evaluating interobserver reliability of interval data. *Journal of Applied Behavior Analysis*, 10, 121–126.
- Kazdin, A. E. (1982). *Single-case research designs: Methods for clinical and applied settings*. New York: Oxford University Press.
- Leksell, E., & Evdardson, S. (2005). A case of Tourette syndrome presenting with oral self-injurious behavior. *International Journal of Paediatric Dentistry*, 15, 370–374.
- Lerman, D. C., Iwata, B. A., & Wallace, M. D. (1999). Side effects of extinction: Prevalence of bursting and aggression during the treatment of self-injurious behavior. *Journal of Applied Behavior Analysis*, 32, 1–8.
- Matson, J. L., & Vollmer, T. R. (1995). *Questions about behavioral function (QABF)*. Baton Rouge, LA: Scientific Publishers.
- Vollmer, T. R., Marcus, B. A., & LeBlanc, L. (1994). Treatment of self-injury and hand mouthing following inconclusive functional analysis. *Journal of Applied Behavior Analysis*, 27, 331–344.

Received April 21, 2008

Final acceptance November 3, 2008

Action Editor, Henry Roane