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NONCONTINGENT REINFORCEMENT AS TREATMENT FOR FOOD REFUSAL AND ASSOCIATED SELF-INJURY

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We examined the use of noncontingent reinforcement to decrease self-injury and increase bite acceptance in a child who exhibited food refusal. First, a brief functional analysis suggested that self-injury was maintained by escape from food presentation. Next, we evaluated an intervention that involved noncontingent access to a video during feeding sessions. Results of the intervention showed a decrease in self-injury and an increase in bite acceptance.

DESCRIPTORS: brief functional analysis, food refusal, self-injury

Noncontingent reinforcement (NCR) is an effective treatment for many forms of aberrant behavior. However, the effects of NCR have been inconclusive when implemented in the context of feeding sessions for children who exhibit food refusal. For example, Cooper et al. (1995) found that noncontingent play facilitated food acceptance in 2 children who exhibited food refusal, but they did not examine the role of NCR during initial food consumption. More recently, Reed et al. (2004) found that NCR without escape extinction did not reduce inappropriate behavior and did not increase food consumption among participants. Only when combined with escape extinction did NCR produce decreases in inappropriate behavior, and even then only for some participants. Escape extinction was necessary to increase consumption among all participants in the study, regardless of whether NCR was present or absent. The purpose of the present study was to further examine the use of NCR (without escape extinction) for the treatment of inappropriate behavior (self-injury in this case) and food refusal.

We thank the parents of the participant for their cooperation.

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METHOD

Participant and Setting

Raley, a 40-month-old girl, participated in the study. Raley had been diagnosed with autism, gastroesophageal reflux, and food allergies. She ate some select foods and did not receive any calories from supplemental (i.e., tube) feedings. Based on a physician's recommendation, her caregivers fed her soft textured or pureed foods only. Her verbal repertoire consisted of a few unintelligible sounds. All sessions were conducted in a therapy room equipped with a one-way mirror at a psychology clinic affiliated with a university. Sessions took place twice per week for approximately 6 weeks. Due to the intensity of self-injury, session termination criteria were established. However, no sessions were terminated for this reason.

Data Collection and Reliability

During the brief functional analysis, the dependent variable was self-injurious behavior (SIB). During the treatment evaluation, dependent variables included SIB and food acceptance. SIB was scored when Raley pinched, scraped (against objects), or scratched her own skin, or when she hit her head against the ground or an object. Food acceptance was defined as any instance in which the food on the spoon went past the plane of Raley's lips within

5 s of presentation. Data on food expulsion were also collected (Cooper et al., 1995), but this behavior never occurred throughout the study. Data were collected on laptop computers using 10-s partial-interval recording (SIB) and event recording (acceptance). Partial-interval recording was used instead of event recording for SIB because some topographies of Raley's SIB (e.g., scraping, scratching) did not occur as a discrete event. Data on SIB were converted to a percentage measure by dividing the number of intervals with SIB by the total number of intervals in the session and multiplying by 100%. Data on acceptance were converted to a percentage measure by dividing the number of occurrences of acceptance by the number of bite presentations and multiplying by 100%.

A second independent observer scored 29% of sessions during the brief functional analysis and 33% of sessions during the treatment evaluation. Interobserver agreement for SIB was obtained by dividing agreements by agreements plus disagreements and multiplying by 100%. Mean total, occurrence, and nonoccurrence agreements for SIB during the functional analysis were 95% (range, 78% to 100%), 81% (range, 55% to 100%), and 92% (range, 78% to 100%), respectively. Mean total, occurrence, and nonoccurrence agreements for SIB during the treatment evaluation were 88% (range, 61% to 100%), 81% (range, 50% to 100%), and 86% (range, 64% to 100%), respectively. Interobserver agreement for acceptance was obtained on a per-interval basis by dividing the smaller frequency by the larger frequency and multiplying by 100%. Interobserver agreement for acceptance was 90% (range, 80% to 100%).

Experimental Design and Procedure

Brief functional analysis. During the brief functional analysis, Raley was exposed to four conditions: ignore, play, demand, and attention. Due to the severity of her SIB and her reported crying when separated from parents, Raley's mother preferred to stay in the therapy room during sessions, but she did not interact with Raley during this time. During the ignore condition, the therapist did not interact with Raley, and there were no programmed consequences for SIB. During the play condition, Raley had access to preferred items and activities identified via a paired-stimulus preference assessment (Fisher et al., 1992), and no demands were presented. The therapist delivered attention to Raley on a fixed-time 30-s schedule, and there were no programmed consequences for SIB. During the demand condition, Raley sat on the floor of the therapy room. The therapist presented a bite of food (i.e., corn and sweet potatoes, Stage 2 baby food) on a spoon every 30 s. The therapist delivered brief praise if Raley accepted the bite. Contingent on SIB, the spoon was removed and the therapist moved away from Raley for approximately 15 s. If Raley did not accept the bite but did not engage in SIB, the spoon remained at her lips for 30 s, at which time a new bite was presented. The next bite of food was presented either after the escape interval or at the next 30-s interval. During the attention condition, the therapist read a magazine and did not interact with Raley. Contingent on SIB, the therapist delivered a statement of concern and a brief physical touch. A multielement design was used to evaluate the brief functional analysis. After the first four sessions, the play condition and the demand condition were alternated in a brief reversal fashion. The order in which the first four sessions were conducted was randomly determined. All sessions were 10 min in duration.

Treatment evaluation. Baseline sessions were identical to the demand condition of the brief functional analysis. During NCR, sessions remained identical to baseline, except that Raley had continuous access to a children's video (identified as her most preferred item via a paired-stimulus preference assessment). SIB continued to result in a 15-s break. In other words, extinction was not in place. A reversal

design was used to examine the effects of NCR. Because of the severity of SIB, all sessions were reduced to 5 min in duration.

RESULTS AND DISCUSSION

Figure 1 (top) depicts the percentage of intervals with SIB across the various conditions of the brief functional analysis. Raley exhibited relatively high levels of SIB during the demand condition ($M = 53\%$ of intervals) and little SIB during the ignore ($M = 7\%$), play ($M = 5\%$), and attention ($M = 8\%$) conditions. The brief reversal analysis further supports the results of the four initial functional analysis sessions. Raley exhibited elevated levels of SIB during the demand condition ($M = 43\%$) relative to the play condition ($M = 2\%$).

Figure 1 (middle) shows the percentage of intervals with SIB in the treatment evaluation. During the first baseline phase, SIB occurred during a mean of 44% of intervals. During the first NCR phase, SIB decreased to a mean of 7% of intervals. During the return to baseline, SIB increased to a mean of 66% of intervals. During the second NCR phase, SIB again decreased to a mean of 6% of intervals.

Figure 1 (bottom) depicts the percentage of trials with acceptance in the treatment evaluation. During the first baseline phase, Raley accepted a mean of 20% of bites. During the first NCR phase, her acceptance increased to a mean of 90% of bites. During the return to baseline phase, Raley accepted a mean of 23% of bites. Finally, during the second NCR phase, Raley's acceptance increased to a mean of 93% of bites.

Results suggest that noncontingent reinforcement can be an effective treatment for escape-maintained self-injury in some children who exhibit food refusal. In addition, this study suggests that in some children, food acceptance can be enhanced with the use of NCR. The results of this study are in contrast to previous research (e.g., Reed et al., 2004), in that the current study suggests that escape extinction may not always be necessary to reduce inappropriate behavior and to increase acceptance among children who exhibit food refusal.

One reason for the discrepancy between the current study and previous research could be the nature of the reinforcer. That is, the video was not delivered in the traditional sense but was present throughout the session. Although toys and interaction were continuously available during sessions in previous studies (e.g., Reed et al., 2004), the extent to which there were breaks in interaction, toy manipulation, and so forth, is not clear. Also, Raley had a great deal of prior exposure to the video and hence it may have produced more predictable stimulation.

For whatever reason, the video was preferred to the point that it competed with the event that maintained SIB (i.e., escape from food presentation). Previous studies have confirmed that the noncontingent delivery of an arbitrary stimulus can decrease aberrant behavior (Fischer, Iwata, & Mazaleski, 1997; Fisher, O'Connor, Kurtz, DeLeon, & Gotjen, 2000) and that NCR with arbitrary reinforcers is likely to be most effective when the arbitrary reinforcers are of higher quality than the maintaining reinforcer (Fischer et al., 1997). Lalli et al. (1999) reinforced compliance with a preferred edible item and did not place problem behavior on extinction. They speculated about whether their treatment effects were due to the quality of reinforcement available in competing schedules or to the altering of the establishing operation for escape-maintained behavior. In the current study, because the video was available on a noncontingent basis, the NCR procedure may have been effective because it eliminated or altered an establishing operation. Access to the video may have reduced the aversiveness of the situation by altering the establishing operation for escape.

One limitation of the current study involves delivery of attention during the brief functional analysis. It is possible that the results of the

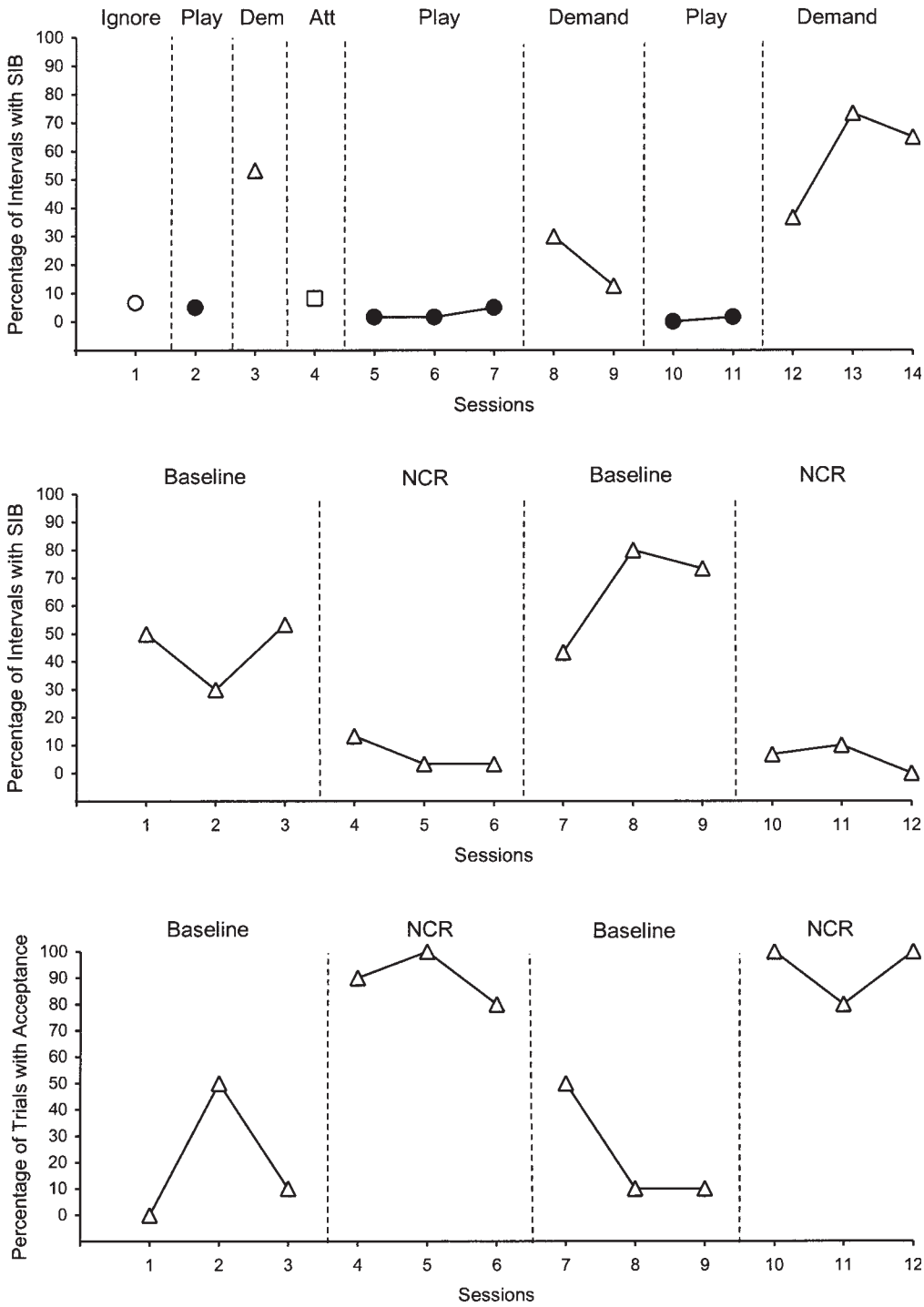

Figure 1. Percentage of intervals with SIB across the conditions of the brief functional analysis (Att = social attention; Dem = demand) (top); percentage of intervals with SIB during the treatment evaluation (middle); and percentage of trials with bite acceptance during the treatment evaluation (bottom).

analysis would have been different had attention been delivered by Raley's mother instead of by a therapist. A second limitation is the brief duration of sessions and the small number of sessions per phase. It is possible that the results would have been different had sessions been longer, phases been extended, or both. However, Raley's mother reported that the intervention was effective during 30-min meals at home. Thus, the brevity of the assessment and observation periods did not compromise the ultimate clinical outcome. A final potential limitation of the study is that it is possible that during the NCR phases of the treatment evaluation, nonremoval of the spoon (in the absence of SIB) may have functioned as extinction, thus limiting the extent to which the results are attributable to noncontingent access to the video. However, if this were the case, a steady increase in food acceptance across all phases of the treatment evaluation would be expected, but such a data pattern was not obtained.

Given the mixed results of this and prior studies, future research should examine the conditions under which NCR is and is not likely to be effective for food refusal. Also, variations in the current treatment approach could be explored. For example, a competing stimulus assessment might be conducted prior to treatment of food refusal to determine if stimuli can be identified that may successfully compete with aberrant behavior. Stimuli identified through such an analysis might be rotated during mealtimes to prevent possible habituation.

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