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THE EFFECTS OF SLEEP DISRUPTION ON THE TREATMENT OF A FEEDING DISORDER

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We evaluated the effects of sleep disruption on the mealtime behavior of a young boy with developmental disabilities. Results showed that bite acceptance was less likely to persist during meals following disrupted sleep, but only when escape extinction was not implemented. Findings are discussed in terms of establishing operations and the effects of sleep disruption on the assessment and treatment of feeding problems.

DESCRIPTORS: establishing operations, food refusal, pediatric feeding disorders, sleep disruption

Sleep disturbance is a common concern that has received relatively little attention among children with developmental disabilities and feeding problems. However, prior studies have indicated that sleep problems can influence the occurrence of problem behavior (O'Reilly, 1995). Given such findings and the reported high correlation between food refusal and other biological events (e.g., illness), it seems reasonable that sleep problems might disrupt feeding patterns as well. In the current study, we evaluated the effects of sleep disruption on the food refusal of a young boy who had been diagnosed with a feeding disorder.

METHOD

Participant and Setting

Kevin, a 4-year-old boy who had been diagnosed with broncho-pulmonary dysplasia, immune deficiency, gastroesophageal reflux, and developmental delays, participated in the study. He exhibited irregular sleeping patterns (i.e., he typically slept more than 12 hr per day, was easily fatigued, slept frequently and on demand during the day, and had difficulty initiating and sustaining sleep during the night). Kevin inconsistently consumed a limited variety and quantity of foods. Attempts by care providers to persist with feedings resulted in disruptive behaviors, including aggression. All feeding observations were conducted on a pediatric inpatient unit, in a room that contained furniture (tables, chairs, and two single beds) and various leisure materials (e.g., toys and books). Foods offered during meals were served from the hospital's dietary menu for children.

Dependent Variables and Data Collection

The major dependent variable was percentage of bites accepted (i.e., Kevin's mouth closed around the presented bite, resulting in a food deposit) when his sleep was disrupted or not disrupted (defined below) prior to scheduled meals. Kevin slept frequently during the day and therefore needed to be awakened for some meals. Thus, sleep-disrupted meals were those in which Kevin had to be awakened 15 min prior to the start of a meal. All other meals not

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meeting this criterion were scored as not sleep disrupted. Meals occurred on a regular schedule, four to five times per day. Interobserver agreement was calculated for 31% of the sessions using a total agreement formula. Mean agreement for acceptance was 98% (range, 88% to 100%). In addition, two therapists independently scored meals as sleep disrupted (or not) prior to each meal based on the above criteria. Agreement for the presence of sleep disruption was 100%.

Design and Procedure

Three conditions were presented in a reversal design (ABCBC) while naturally occurring sleep disruption was measured across meals. During each condition, data from meals were analyzed as sleep disrupted or not sleep disrupted, thus resulting in two data paths per condition.

During baseline, Kevin was seated in a highchair and a timer was set for 20 min. Bites of food were presented at a maximum pace of approximately two per minute. Acceptance resulted in brief praise (e.g., "Thank you for eating, Kevin"). Refusal (e.g., behaviors that disrupted or precluded successful bite consumption, including head turning, batting at the feeder's hand, and expulsions) resulted in 20 to 25 s of escape (i.e., the spoon and plate were removed from the feeding tray) and intermittent attention in the form of coaxing and verbal reprimands (e.g., "You need to eat now, Kevin; stop hitting!"). The differential positive reinforcement of alternative behavior (DRA) condition was identical to baseline except that 20 to 25 s of interaction with preferred toys and attention was provided only for bite acceptance. If refusal occurred, the bite was removed for 20 25 s (escape was allowed). The final condition, DRA plus escape extinction, was identical to DRA with the exception that bites were presented to Kevin's lips until acceptance was gained (i.e., escape was not allowed). Meals ended at the sound of the timer (20 min), unless escape extinction was occurring. In that case, the meal ended only after Kevin accepted the last bite offered.

RESULTS AND DISCUSSION

Figure 1 shows the percentage of bites accepted across all phases of Kevin's treatment

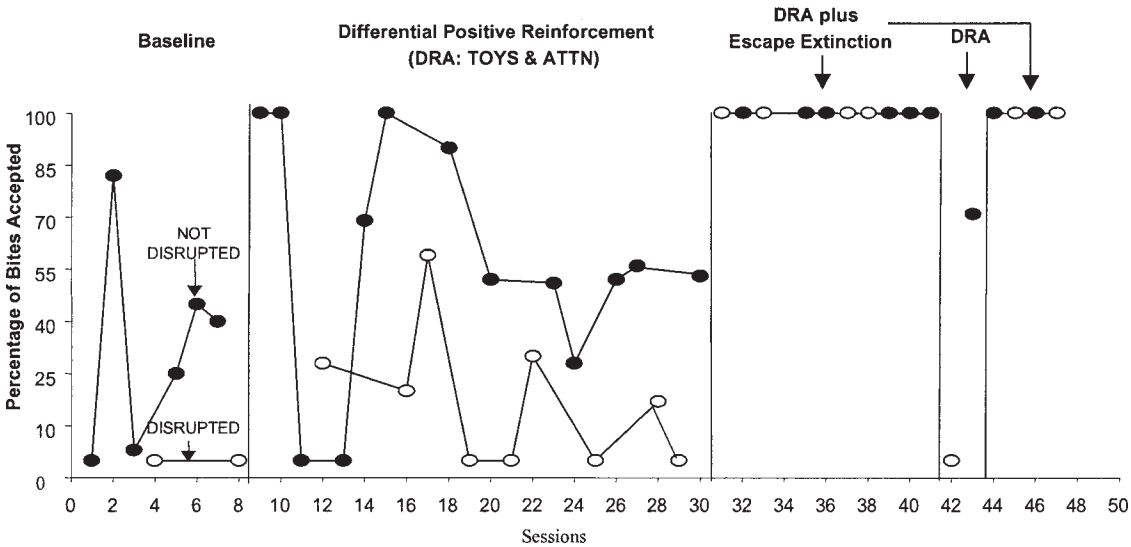

Figure 1. Percentage of bites accepted during meals that were sleep disrupted (open circles) and not sleep disrupted (filled circles).

evaluation. Overall, results from the reversal analysis showed that acceptance increased to clinically acceptable levels only when escape extinction was added to the DRA intervention, although a slight effect also was observed during DRA alone. Results from the sleep comparison showed that acceptance varied as a function of whether Kevin's sleep had been disrupted or not, suggesting a likely relation between sleep and food refusal. Of note, however, is that the effects of sleep disruption were not observed when escape extinction was implemented.

These findings contribute to existing literature in at least two ways. First, they add to a small pool of studies that have attempted to experimentally demonstrate operant interactions with biological variables such as sleep (e.g., O'Reilly, 1995) and represent an extension of such work to the area of pediatric feeding disorders. Second, these results suggest that sleep disruption may serve (at least partially) as a possible establishing operation for feeding problems with some children. During DRA, Kevin was less likely to accept bites (and receive positive reinforcement) when his sleep had been disrupted. Thus, sleep disruption appears to have altered the value or relative effectiveness of reinforcement as well as the frequency of associated behaviors. Such conclusions must be tempered however, by the fact that the current data are correlational in nature and a clear functional relation between refusal and negative reinforcement was not established in the current study. Future work might include a functional analysis of food refusal as well as an analysis of the effects of sleep.

Several additional limitations should be noted. First, fewer data points were recorded overall for sleep-disrupted sessions relative to nondisrupted sessions. This limitation reflects a major difficulty in evaluating variables such as sleep disruption. The measurement of sleep and corresponding changes in behavior must rely on their natural occurrence; thus, such variables are difficult (if not impossible) to manipulate directly within controlled single-case experimental designs. Second, due to the relatively short admission period (2 weeks) and impending caregiver training, the reversal phases of both DRA only and DRA plus escape extinction were relatively brief (two and four sessions, respectively). However, the general effects with regard to sleep disruption and negative reinforcement were replicated across conditions with adequate experimental control. Future research, however, should investigate the generality of these findings.

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