A Brief Report: The Neutralizing Effects of Stimulus Control Intervention For Sleep On Escape Behavior and Token Performance Of a Nine-Year-Old Child With Oppositional Defiant Disorder

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Over 35 years of behavioral research have shown contingency management systems in the classroom are highly effective for treating children with behavior problems. Questions remain if such systems can be enhanced by the functional assessment process. This case study looks at a nine-year-old child with oppostional behavior who was on a contingency management program. After a though functional assessment the author determined that poor sleep patterns contributed to poor performance on the token system the following morning. This post-hoc analysis of the data conformed to a reversal design. The program showed a functional relationship between neutralizing sleep difficulty and increasing of point earned and the decreasing of episodes of response cost.
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Since its first use by O'Leary, and Becker, (1967), competent implementation of contingency management systems has been extremely effective in changing most behavioral challenges in the classroom (Axelrod, 1983a, b; Barbetta, 1983a, 1983b; Bongiovanni, 1979; Filcheck & McNeil, 2004; Wolery, Bailey, & Sugai, 1988). For example, Barbetta (1983a, b) used a contingency management system in the form of token reinforcement and response cost (loss of tokens) to reduce impulsivity in children with behavior disorders. MTA **(**Multimodal Treatment Study for Attention-Deficit Hyperactivity Disorder, 1999) Cooperative Group (1999) used contingency management programs for ADHD children to contrast with medication and Pelham, Greiner, & Gnagy, (1997) used such a program in their summer camp program for ADHD children. In addition, Walker and Buckley (1972, 1974) and O'Connor, Struck, and Wyne (1979) used a similar point system with response cost in the Engineered Learning Program, which is one of the few programs empirically validated for use with children in emotional support classes. Contingency management systems have been so successful that some have question if functional analysis can add anything to this type of intervention. For example, Twernbold-Schill, Kratochwill and Elliot (1998) selected twenty preschool children in a Head Start class and randomly assigned them into two groups. They compared a standardized technological intervention package (group contingencies) to a functionally based intervention. There was no significant difference found between the two interventions with respect to outcomes. The functional assessment group achieved higher customer satisfaction rating.

From such research, Branden and Kratochwill (1997) argued that prescribed interventions without a functional behavioral assessment can be more efficient under one of the following three conditions (a) assessment costs can exceed treatment costs, (b) consequences of delaying treatment are minimal, and (c) no link between selected treatment and function have been found. Such calls for parametric analysis are premature in this author's opinion because only one study demonstrates conditions under which functional behavior assessment has enhanced treatment (Hayes et. al, 1987). With all of this attention paid to functional analysis, it remains surprising that so few program have shown that functional analysis can enhance standard treatment packages. One example, of the use of functional analysis to enhance treatment outcomes is in the case of changing establishing operations (Michaels, 1993). Ray and Watson (2001) found that for one child, out-of-seat behavior occurred in only 32.5% of the measured intervals. The authors determined that both escape and access to tangible reinforcers maintained the child's behavior. More importantly, on days in which the child slept less than

5 hours the previous night, out-of-seat behavior increased to 57.5% of the intervals and only access to tangibles maintained that behavior. In this case, sleep deprivation clearly served as an EO to increase the effectiveness of tangible reinforcers. Finally, the authors argued that sleep served as an EO for decreasing the effectiveness of escape for out-of-seat behavior.

The purpose of the present study was an attempt to enhance empirically validated treatments with a functionally derived treatment. The present study was not preplanned. It was a consulting case for the first author. It came about because the parent took the child off the sleep program for two days because the child wanted to see a television show on the first day and the second day, the parent was unable to reinstitute the program. This provided the background for the reversal. The child was performing on a token system but the parent considered the performance below what the child could achieve. In review of the case with the parent, it was determined that the child was having difficulty sleeping and this could affect performance.

Methods

Participant

The participant was a 9-year-old male, who attended fourth grade in a nonpublic school. While included with typical children, a licensed psychologist diagnosed the participant was as having oppositional defiant disorder with a rule out for attention deficit hyperactivity disorder. The participant's global scale of adaptive functioning was 70 indicating mild impairment. Participant was not on medication over the course of the study.

Behavior/Function Assessment

Parent kept a diary of when the child went to sleep. The authors and the teacher used direct observation to code the child misbehavior in school. The teacher kept detailed records of point awards and losses. The author observed two days during the baseline and two days during the intervention phase. Each of the first authors observations were for 3 hours. The teacher's ratings were compared with the authors. Agreement for the occurrences of problem behavior during the observation period averaged 82.6%. Most of the child's misbehavior in school seemed to function to escape from task. In addition, team noticed that on nights where the child had less then 7-hours sleep disruptions were greater. Thus, we attempted to use the stimulus control package as a neutralizing routine (Horner, Day, & Day, 1997) to decrease escape behavior in the classroom.

Analysis of Sleep as a Neutralizing Routine

Baseline 1-data involves the toke system with response cost operating in the school. The participant's token system allowed for approximately 36 points over the six academic hours of the school day. Minimum prize for the day required 25 points. Best prize for the day required 29 points. Each hour, the participant could earn 4 points for being on task (1 point/15 minutes), 1 point could be earned for completion of assignments, and 1 point if the assignment was 90-100% correct. In addition, the response cost program included 1- point loss for violating classroom rule[1], 2 points or verbal aggression[2], 3 points for property destruction. The team had agreed to brief suspension for physical aggression but it did not occur.

[1] The classroom teacher had three rules: (1) if you want to speak, raise hand and wait for teacher to call on you; (2) remain in seat with desk on floor; and (3) complete all work given to you.
[2] Verbal aggression included teasing other students, verbally defiant statements to teacher, and cursing

Intervention 1- data collected. The continuation of the token system with response cost and the neutralizing routine of the sleep enhancement package added. The recording of data between the first data point for this phase was collected on the Monday. The actual sleep program had been in place and adhered to since the Friday before.

Baseline 2- this return to baseline phase was prompted when the child was given permission to stay up one night in the program to watch a special show on television. After the show, the participant had difficulty sleeping. The second baseline replicated the condition from the first baseline. The token system and response cost remained in place.

Intervention 2- The second neutralizing condition replicated the first neutralizing condition, even by coincidence was able to have the next first data point after a weekend of the procedure being in place.

Procedure

A core point of the intervention was the use of Patterson (1976) method for getting children to go to bed. Patterson (1976) designed this method to deal with the child's oppositional behavior around going to bed. In particular, television related issues were covered. In addition, the authors trained the child and parent in methods to help improve sleep. The procedure involved sleep hygiene instructions (guidelines for preparing for sleep including a "whined down routine," avoiding caffeine after noon and alcohol, nicotine, and heavy meals within 2 hours of bedtime); stimulus control (instructions to follow for going to sleep, no day time naps, waking up every morning at the same time, and strategies if sleep is not forthcoming); and relaxation (deep breathing, guided imagery, and repeating an autogenic phrase).

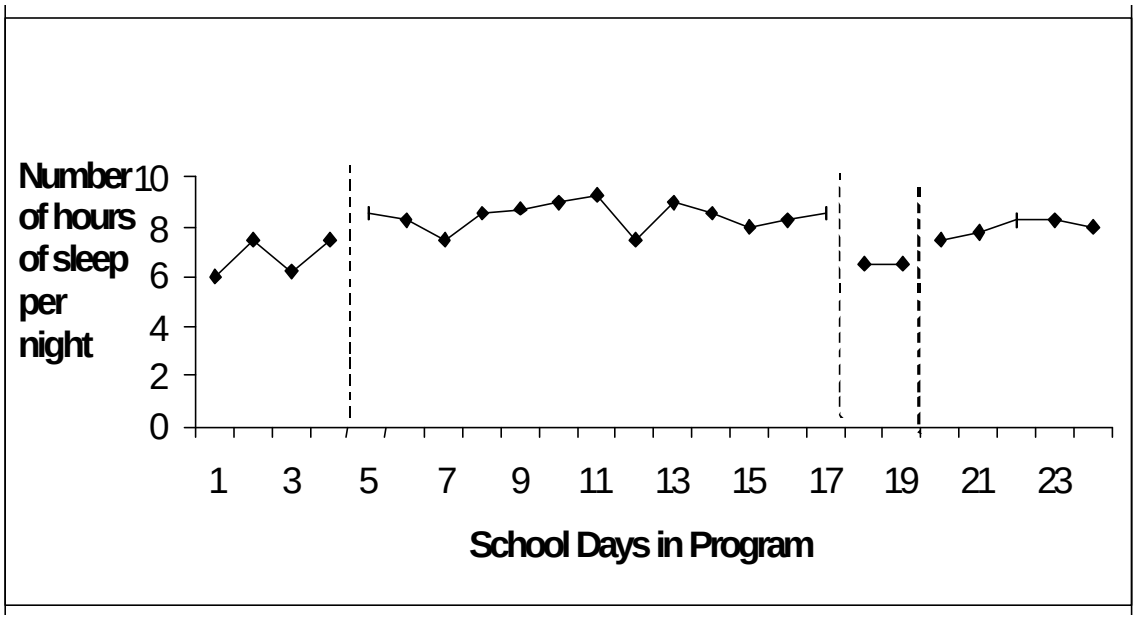

Figure 1. Hours of sleep per night.

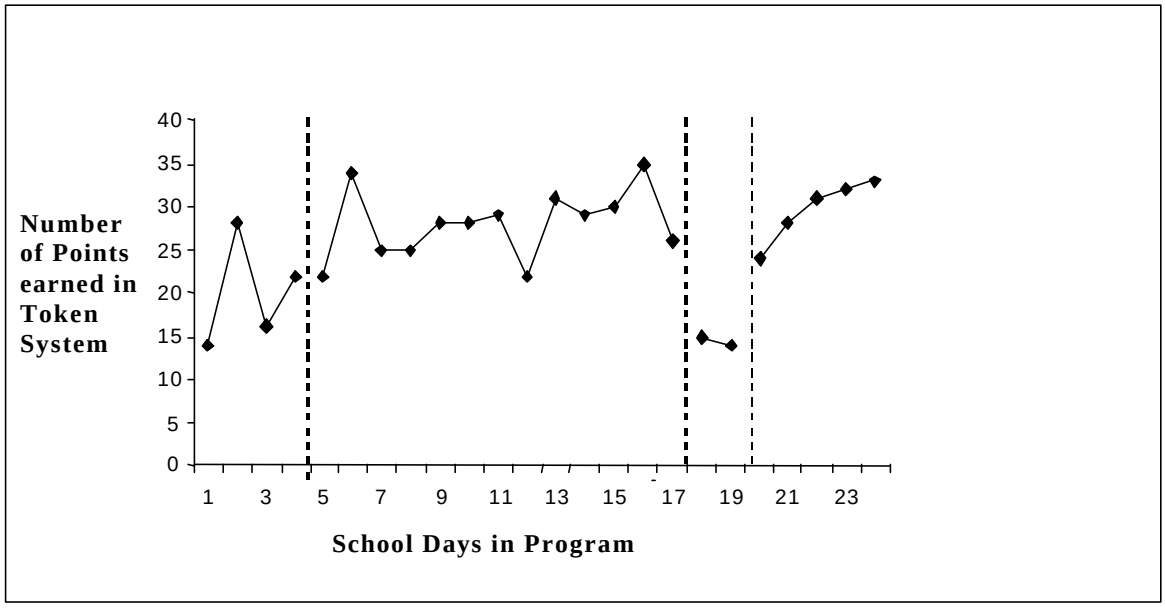

Figure 2. Points earned in program per school day.

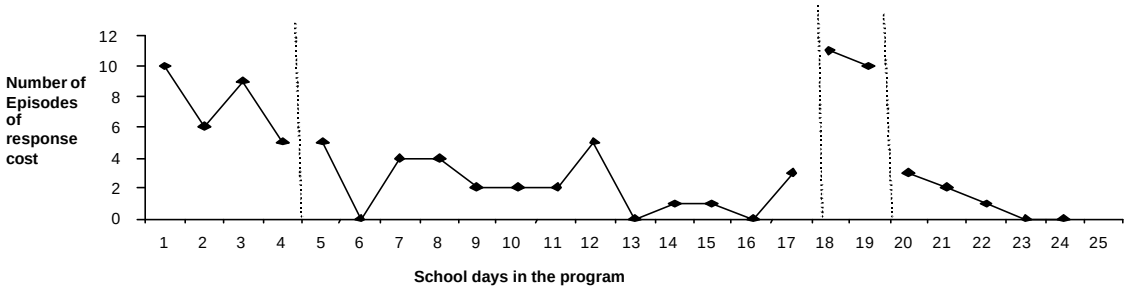

Figure 3. Number of episodes of response cost/day while in the program

Results

The mean amount of sleep the participant had in the first baseline phase was 6.81 hours/night and during this time, he was averaging 20 points out of the possible 36 points/day he could earn on his token system. During the first intervention phase, the mean was 8.42 hours of sleep/night and during this time, he was averaging 28 points/day out of a possible 36 points on the token system. During the return to baseline phase, the average was 6.5 hours of sleep/night and he was averaging 14.5 points/day out of a possible 36 points. During the final intervention phase, the mean amount of sleep each night was 7.95 hours of sleep/night and the participant was averaging 29.6 points/day out of 36 possible points.

Discussion

Sleep seems to be an interesting place to begin to look at establishing operations and if EO's can enhance contingency management systems. Kennedy and Itkonen, (1993) suggested that sleep deprivation could become an establishing operation for avoidance. Dahl, Pelham, and Weirson (1991) treated insomnia in a 10-year-old girl with ADHD. Successful treatment of the girl's insomnia led to better peer interactions, and increased academic productivity at school. The child maintained these gains over a 4-month follow up period. A 10-year-old girl who had true ADD also had significant sleep difficulties. She had long delays before falling asleep. She would often wake up at night and have difficulty falling back a sleep. Intervention consisted of chrono-therapy combined with an intensive behavior modification summer camp program combined with intensive behavioral parent training, which resulted in an increase of sleep from 7.2 to 9.2 hours per night. There was clinically significant, measurable improvement in her schoolwork, teacher evaluations, and behavior. Teachers and peers, who were not aware of her treatment, observed these changes.

Unfortunately, we took no direct measure of the child's behavioral performance. Indirectly, the number of points that the child earned and the number of response costs does appear to be a fair indirect measure of performance. With this child, a clear functional relationship exists between sleep and points earned. Additionally, while response cost seems to be a necessary intervention for children with impulsivity and disruption (see Rosen, O'Leary, Joyce, Conway, Pfiffner, 1984; Walker, Hops, & Fiegenbaum, 1976) and the use of response cost seems to lessen over time (Walker, Hops, & Fiegenbaum, 1976), this procedure lessened the use of response cost. While the use of response cost in the program was decreasing, the use of the neutralizing routine drastically lowered the level of the response cost that needed. Thus, with the neutralizing routine for sleep, the child was able to earn more tokens on his token system and was able to have fewer instances of response cost.

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