MECHANICAL RESTRAINTS AS POSITIVE REINFORCERS FOR AGGRESSION

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Research suggests that, in some cases, mechanical restraints may function as positive reinforcers. In this study, we conducted a functional analysis of severe aggression exhibited by an individual with a history of wearing arm splints. The results of this functional analysis demonstrated that his aggression was maintained by access to the arm splints. Copyright © 2008 John Wiley & Sons, Ltd.

Historically, mechanical restraints such as arm splints have been used to prevent severe self-injurious behavior (SIB) as well as to minimize the injury that may result from SIB (Griffin, Williams, Stark, Altmeyer, & Mason, 1984; Sturmey, 1999). In many cases, the use of mechanical restraints can function as punishment or extinction (Mazaleski, Iwata, Rodgers, Vollmer, & Zarcone, 1994), which effectively decreases SIB. However, in some cases, prolonged use of mechanical restraints may lead to the restraint becoming a positive reinforcer. For example, Favell, McGimsey, and Jones (1978) used mechanical restraints as part of a differential reinforcement of other (DRO) treatment for severe SIB with three individuals with mental retardation. They found that providing access to the restraint contingent in the absence of SIB for prespecified periods of time resulted in a reduction in SIB. They subsequently showed that an arbitrary response (placing a marble in a box) could be reinforced by access to mechanical restraints.

In light of these findings, it is possible that the loss (or removal) of mechanical restraints may lead to increase in problem behavior. That is, if mechanical restraints are a reinforcer, then the loss of the reinforcer may serve as an establishing operation (i.e., deprivation) resulting in an increase in the reinforcer value of the restraint. This in turn may lead to an increase in the future probability of problem behavior that may be associated with access to mechanical restraints. Therefore, the purpose of this

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study was to conduct a functional analysis of aggressive behavior to determine whether or not higher levels of aggression were associated with the removal of mechanical restraints.

**METHODS**

**Participant and Setting**

Dave was a 16-year-old male diagnosed with autism and mental retardation. He was admitted to a hospital for the assessment and treatment of severe SIB and aggression. Prior to admission, he had worn arm splints to prevent injury. During his admission, he wore arm splints throughout the day. These arm splints were taken off for 5 min every hour to conduct range of motion exercises.

All functional analysis sessions were conducted in a 3 × 3 m therapy room located on the inpatient unit. The therapy room was equipped with a one-way mirror that permitted unobtrusive observation.

**Data Collection and Interobserver Agreement**

Observers used laptop computers to collect data. Frequency data were collected on aggression, which was defined as grabbing, hitting, scratching, kicking, pinching, pulling hair, and head-butting.

A second observer independently collected data during 30% of the functional analysis sessions. Data collected by both observers were compared in 10 s interval to calculate interobserver agreement. Agreement was defined as both observers reporting the exact same frequency of behavior during a 10 s interval. To calculate interobserver agreement, the number of agreements was divided by the number of agreements plus disagreements and multiplied by 100. Interobserver agreement of aggression averaged 96.7% (range, 83.6–100%) during the functional analysis.

**Procedures**

A functional analysis based on those procedures described by Iwata, Dorsey, Slifer, Bauman, and Richman (1994a) was conducted. Prior to this functional analysis of aggression, a functional analysis of SIB (without arm splints) was conducted. SIB (hitting his head with a fist and pinching his head or neck) was high and undifferentiated during the demand, attention, play, and ignore conditions of this functional analysis suggesting that his SIB was maintained by automatic reinforcement.
The functional analysis of aggression consisted of three test conditions (attention, demand, and tangible [i.e., access to arm splints]) and one control condition (play). Dave wore arm splints similar to those described in Fisher, Piazza, Bowman, Hanley, and Adelinis (1997) throughout the attention, demand, and play sessions. The arm splints were cloth and consisted of four pockets in which thin or thick metal stays could be inserted for rigidity. The more metal stays in each pocket, the more rigid the arm splints were. The arm splints were wrapped around the arm and tightened with three Velcro straps. A thick metal stay was in each pocket (i.e., four thick metal stays per arm splint) of each arm splint (i.e., the highest level of rigidity) during this functional analysis. The order of sessions was randomized and sessions were 10 min in length. SIB resulted in no programmed social consequences.

During the attention condition, Dave had access to toys throughout this session. An experimenter was present and provided a brief verbal reprimand (e.g., ‘Don’t do that, you will hurt me’) contingent on aggression. This condition tested for aggression maintained by positive reinforcement in the form of social attention. In the demand condition, an experimenter sat next to Dave at a table and presented demands using a graduated guidance prompting procedure (verbal, gestural, and physical prompts). Despite wearing arm splints, he was still able to manipulate the demand materials presented to him. Compliance with the demand resulted in brief praise and aggression resulted in a 30-s break (i.e., demand materials were removed and the experimenter walked away). This condition tested for aggression maintained by negative reinforcement in the form of escape. The final test condition, tangible, consisted of the removal of the arm splints. Prior to this session, Dave wore his arm splints. At the start of the session, the experimenter removed the arm splints. If Dave engaged in aggression, the experimenter placed the arm splints back onto Dave’s arms for 30 s after which they were again removed. This condition tested for aggression maintained by positive reinforcement in the form of access to arm splints. Finally, the play condition served as the control condition to which the tests conditions were compared. During this session, Dave had access to highly preferred toys identified through a preference assessment (Fisher, Piazza, Bowman, Hagopian, Owens, & Slevin, 1992). Additionally, attention was provided on a fixed-time 30-s schedule and aggression did not result in any programmed social consequences.

RESULTS AND DISCUSSION

The top panel of Figure 1 shows the results of the functional analysis of Dave’s aggression. Dave’s aggressions were highest during the tangible condition of the functional analysis in which he averaged 1.0 instances of aggression per minute. He averaged 0.04, 0.1, and 0.1 aggressions per minute during the demand, attention, and
play conditions, respectively. The lower panel of Figure 1 shows the responses per minute of aggressions when arm splints were on and off during the tangible sessions. His aggressions were significantly lower during the tangible sessions when the arm splints were on. These data suggest that Dave’s aggression was maintained by access to his arm splints.

Numerous studies have demonstrated that problem behavior exhibited by individuals with developmental disabilities can be maintained by positive reinforcement
such as attention (e.g., Iwata, Pace, Dorsey, Zarcone, Vollmer, & Smith, 1994b). This study extends functional analysis research by demonstrating that problem behavior (in this case aggression) can be maintained by an idiosyncratic positive reinforcer, mechanical restraints.

One possible limitation to this study may be the fact that Dave wore the arm splints during all functional analysis conditions except for the tangible condition. That is, the arm splints may have resulted in greater response effort, which may have accounted for the lower rates of aggression when he wore the splints. We used the arm splints during these conditions, in large part, because it would have been impossible to conduct this functional analysis without the use of the arm splints (either contingent or noncontingent) due to high rates of aggression and SIB when the arm splints were not available.

Although beneficial in preventing injury from severe SIB, long-term use of mechanical restraints such as arm splints can be associated with deleterious side effects such as injury to the individual wearing the mechanical restraints and limiting participation in habilitative activities (Harris, 1996). Therefore, clinicians should consider decreasing or fading the continued use of mechanical restraints (e.g., Fisher et al., 1997). Alternatively, given that the arm splints functioned as a reinforcer, a reinforcement contingency (e.g., differential reinforcement of other behaviors or DRO) could have been arranged to provide the arm splints contingent on some behavior (or absence of the behavior). The schedule of reinforcement could then be thinned to reduce access to arm splints.

REFERENCES


