Graduated Exposure and Differential Negative Reinforcement of Other Behaviour to Increase Compliance with Wearing a Medical Alert Bracelet

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ABSTRACT

We used a changing criterion design with three stages to evaluate the extent to which differential negative reinforcement of other behavior increased compliance with wearing a medical alert bracelet for a young boy with autism. Results show the duration for which the participant wore the bracelet systematically increased across trials from 5 s to 24 hr over the course of several weeks.

INTRODUCTION

Compliant behavior can be subcategorized as being active or passive. Relatively few studies have evaluated simple interventions (e.g., one- or two-step procedures) for increasing passive compliance with mildly aversive events for which individuals with autism may engage in problem behavior to escape or terminate the event.

In one of the few studies of this kind, Richling et al. (2011) used noncontingent reinforcement (NCR) to increase passive compliance with medical procedures for two children with autism. However, providing NCR may not be effective for some individuals.

Schumacher and Rapp (2011) used contingent escape plus contingent edibles for a child with autism who refused to have his hair cut; however, it is possible that the same outcome could have been produced without contingent edibles.

Toward this end, Buckley and Newchok (2006) used DNRO to decrease problem behavior emitted by a young boy in the presence of ambient music. None of the aforementioned studies of DNRO extended the interval beyond 5 min, which would be necessary for increasing passive compliance with wearing medically prescribed items.

The purpose of the present study was to systematically replicate and extend the Buckley and Newchok (2006) study by using DNRO to increase passive compliance with wearing a medical bracelet by a young boy with autism. Informal observations suggested that the boy's noncompliance was maintained by escape from discomfort produced by wearing the bracelet.

METHOD

Participant, Setting, Response Definitions, and Data Collection

One 8-yr old boy with ASD participated in this study. Therapists conducted baseline and treatment sessions in one of five therapy rooms (approximately 2.5 m x 3 m) within an ABA centre. The rooms typically contained at least two tables, four chairs, and various training materials, as well as another student and corresponding therapist. Later sessions included various other settings.

Jonah's problem behavior consisted of: yelling, requests to remove the bracelet, flopping, hitting, hand biting, pulling or biting the bracelet, and wrist shaking. A therapist scored a trial as 'compliant' when Jonah (a) wore the bracelet for the criterion DNRO interval and (b) did not display problem behavior for the duration of the trial. A second therapist scored at least 50% of all trials.

Experimental Design and Procedures

We evaluated the effects of a DNRO procedure with progressively lengthier intervals on Jonah's compliance with wearing the medical bracelet using a changing criterion design with multiple sub-phases across three stages. Once Jonah had met criterion for a specific sub-level for five consecutive trials, the next sub-level was implemented.

Baseline (BL). Each trial began when a therapist said "Jonah, it's time to wear your bracelet now," and then placed bracelet on his wrist. Contingent upon Jonah's engagement in problem behavior, the therapist removed the bracelet for 30 s and ended the trial, and a new trial began. A compliant response was scores if Jonah had worn the bracelet for 15 min without emitting problem behavior.

Differential negative reinforcement of other behavior (DNRO). Each trial began when a therapist stated, "It's time to wear your bracelet now. If you can wait, I will take it off." She then placed the bracelet on Jonah's wrist and set the timer. If Jonah wore the bracelet without engaging in problem behavior for the duration of the predetermined interval, the therapist provided brief praise and simultaneously removed the bracelet for the indicated escape duration, and scored the trial as 'compliant.' After the escape period elapsed, the therapist began the next trial. If Jonah displayed problem behavior during a trial, the therapist blocked Jonah's attempts to remove the bracelet by placing her hand over the bracelet, gave a verbal description of what was required for removal of the bracelet (e.g., "Try to 'wait' again with no yelling"), reset the timer, and scored that trial as 'failed.'

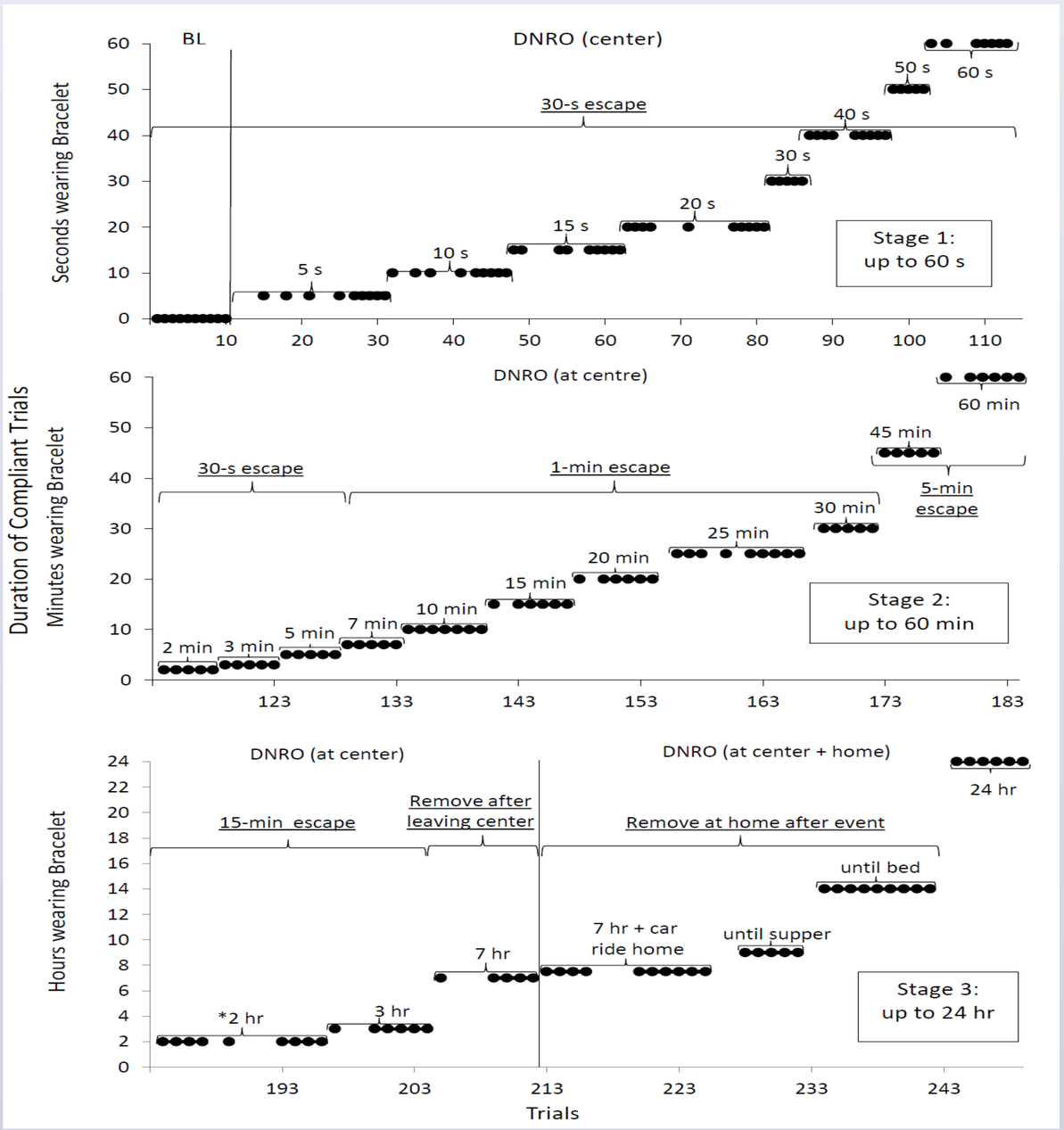

Figure 1. The duration Jonah wore the medical bracelet across baseline (BL) and differential negative reinforcement of other behavior (DNRO) trials during stage 1 (seconds; upper panel), stage 2 (minutes; middle panel), and stage 3 (hours; lower panel). Response criteria are denoted above the data points. Open space between data points denotes failed trials. Asterisk denotes a planned progression after only four trials.

RESULTS

Figure 1 shows the progression of Jonah's compliance with wearing the medical bracelet across stage 1 (upper panel), stage 2 (middle panel), and stage 3 (lower panel). The duration of the escape period for compliant responses is listed in the upper portion of each panel. During stage 1, we conducted 122 baseline trials (mean latency to problem behavior was 6 s; only the last 10 trials are depicted in Figure 1) to determine if simply exposing Jonah to the bracelet would increase his compliance with wearing it. We introduced DNRO at Stage 1 (5 s to 60 s); this progression required 93 trials over 3 days. Stage 2 (2 min to 60 min) required 70 trials over approximately 6 days. Stage 3 (2 hr to 24 hr of continuous wearing [i.e., no escape period]) was completed in 65 trials over 47 days. Jonah wore the bracelet continuously for the next 2 years.

DISCUSSION

Results of this study replicate the Buckley and Newchok (2006) study by using DNRO to increase the period of time a child with autism tolerated an aversive stimulus and extend the literature by showing that DNRO procedures lead to continuous wearing of a previously aversive stimulus. Although this study was not designed to isolate the behavioral process responsible for increasing Jonah's compliance, it is possible that the DNRO procedure extinguished his problem behavior, disrupted the contingency between his problem behavior and removal of the bracelet (i.e., it produced a negative contingency), or both. Alternatively, it is possible that Jonah habituated to the aversive properties of the bracelet as we gradually increased the DNRO-interval criterion; however, this seems unlikely as Jonah emitted problem behavior for 122 consecutive trials in the baseline phase and he displayed problem behavior intermittently until trial 219.

A few limitations of this study should be noted. First, we did not consistently collect data on the duration for which Jonah wore the bracelet during failed trials. Second, it is possible that we could have produced the same outcome with fewer trials or larger increases in trial duration across sub-phases; however, Jonah's verbal behavior indicated that he was consistently motivated to remove the bracelet (when the timer elapsed) until he completed the 2-hr trials. Thus, increasing the duration more rapidly in either stage 1 or 2 may have produced more problem behavior or failed trials. Third, it is not clear if DNRO would produce the same outcome for individuals who have fewer academic skills than Jonah.

Future research should evaluate the generality of DNRO procedures for increasing passive compliance with wearing articles of clothing and other medically prescribed prostheses (e.g., eye glasses).

REFERENCES

Buckley, S. D. & Newchok, D. K. (2006). Analysis and treatment of problem behavior evoked by music. *Journal of Applied Behavior Analysis, 39,* 141-144. doi: 10.1901/jaba.2006.120-04

Richling, S. M., Rapp, J. T., Carroll, R. A., Smith, J. N., Nystedt, A., & Siewert, B. (2011). Using noncontingent reinforcement to increase compliance with wearing prescription prostheses. *Journal of Applied Behavior Analysis, 44,* 375-379. doi: 10.1901/jaba.2011.44-375

Schumacher, B. I. & Rapp, J. T. (2011). Increasing compliance with haircuts in a child with autism. *Behavioral Interventions, 26,* 67-75. doi: 10.1002/bin.321