Published in final edited form as:

J Appl Behav Anal. 2015 December ; 48(4): 912–917. doi:10.1002/jaba.255.

Assessment and Treatment of Pica and Property Destruction of Holiday Decorations

Daniel R. Mitteer, Patrick W. Romani, Brian D. Greer, and Wayne W. Fisher

University of Nebraska Medical Center's Munroe-Meyer Institute

Abstract

Problem behavior exhibited by individuals with autism can be disruptive to family traditions, such as decorating for the holidays. We present data for a 6-year-old girl who engaged in automatically reinforced pica and property destruction of holiday decorations. Treatment was evaluated within an ABCDCD reversal design. During baseline Phases A and B, we observed elevated rates of problem behavior. We implemented differential reinforcement of alternative behavior in Phase C to teach a response to compete with problem behavior. Little change in toy play or problem behavior occurred. In Phase D, we added a facial screen to the differential-reinforcement procedures, which resulted in increases in toy play and decreases in problem behavior. Findings are discussed in terms of how interventions for problem behavior can promote alternative behavior while facilitating household activities and traditions.

Keywords

differential reinforcement; facial screen; pica; property destruction; punishment

Children diagnosed with autism spectrum disorder (ASD) are at an increased risk of disrupting family activities and routines (DeGrace, 2004; Rodger & Umaibalan, 2011). Schaaf, Toth-Cohen, Johnson, Outten, and Benevides (2011) showed that families of children with ASD adjusted daily routines around sensory stimuli (e.g., noise and lights) that occasioned problem behavior. Family routines around the holidays may be particularly disrupted due to the presence of holiday-specific stimuli (e.g., decorations, music) and activities (e.g., decorating the house, opening gifts), which may occasion problem behavior and present overwhelming barriers to families who wish to participate in holiday traditions. For example, a family may forgo decorating for the holidays if their child consumes or destroys the holiday decorations.

Unfortunately, little research has been devoted to helping families who experience these types of disruptions. There is, however, a large body of literature addressing similar forms of problem behavior. Piazza et al. (1998) addressed pica of twigs maintained by social attention, and Reese, Richman, Zarcone, and Zarcone (2003) treated property destruction maintained by escape from aversive sensory stimuli. The purpose of the current investigation

was to extend the literature on the assessment and treatment of problem behavior by identifying the function of one girl's pica and destruction of holiday decorations and to evaluate a function-based treatment informed by prior research.

Method

Subject and Settings

Callie was a 6-year-old girl diagnosed with ASD by a multidisciplinary autism-diagnostic clinic who was referred to a severe behavior disorders program for the assessment and treatment of pica and property destruction. Her caregiver reported that problem behavior was often directed toward holiday decorations and that the family had been unable to conduct their usual holiday celebrations for several years. Thus, one of Callie's intake goals was to establish a treatment to permit her family to have wrapped gifts and decorations throughout their home during the holiday season.

We initially conducted ignore-baseline sessions in a 2.5-m by 2.5-m therapy room containing a table and two chairs to evaluate the function of pica. The room included a one-way mirror that allowed trained observers to collect data unobtrusively from an adjacent observation room. We conducted all subsequent conditions in a 6-m by 4.5-m enclosure located in a larger therapy room to accommodate multiple holiday decorations while ensuring that the therapist could prevent pica.

Materials

During the initial baseline, we placed dried beans, dried macaroni noodles, pieces of rice paper, and fondant on a sterilized table. These items allowed Callie to consume baited pica materials without therapist intervention. In subsequent conditions, we programmed materials that Callie's caregiver reported to be problematic during the holiday season, including (a) artificial garland with pine needles, (b) boxes covered in wrapping paper, (c) shatterproof ornaments, (d) artificial wreaths and berry branches, (e) strings of illuminated lights, and (f) holiday figurines provided by Callie's caregiver. We also incorporated an array of leisure items (e.g., a coloring application on a tablet device, early learning toys).

Response Measurement

We collected frequency data on pica and property destruction and duration data on toy play. *Pica* was defined as attempting (including blocked attempts) or successfully inserting baited or inedible items (e.g., holiday decorations) past the plane of Callie's lips. *Property destruction* was defined as breaking or tearing session materials. *Toy play* was defined as appropriately manipulating the available toys.

Trained staff used laptop computers to collect data. A second observer independently collected data simultaneously with the primary data collector for 33% of sessions. Sessions were divided into 10-s intervals, and an agreement was recorded for each interval during which both observers recorded the same number of responses (or seconds of the response). We summed the number of agreement intervals and then divided the number of agreement intervals by the total number of intervals within the session. We then converted these

quotients to percentages. Interobserver agreement averaged 98% (range, 90% to 100%) for pica, 92% (range, 71% to 100%) for property destruction, and 93% (range, 57% to 100%) for toy play.

Design and Procedures

Callie's analysis occurred within an ABCDCD reversal design. Following baseline in the functional-analysis context (Phase A), all subsequent conditions occurred in a holiday-decoration context. All sessions lasted 5 min.

Baseline (Functional-Analysis Context)—We conducted a series of ignore sessions to evaluate whether Callie's pica was maintained by automatic reinforcement (Querim et al., 2013). Prior to the start of each session, a therapist placed two to three handfuls of the baited pica items on a sterilized table. The therapist ignored pica of the baited items, but blocked all attempts to insert any non-baited items (e.g., table legs or her shoes) past the plane of her lips (Hagopian & Adelinis, 2001).

Baseline (Holiday-Decoration Context)—We conducted a second series of ignore sessions similar to the procedures described above, except baited pica items were removed and all sessions included holiday decorations nominated by Callie's caregiver (e.g., garland and shatterproof ornaments along each wall, a table with illuminated string lights and miniature figurines, presents next to an artificial tree on the ground). The therapist directed Callie to a table next to the holiday decorations that contained approximately five leisure items. The therapist stood within close proximity of Callie to block all instances of pica. If necessary, we paused data collection to assist with the removal of any inedible items that Callie attempted to ingest. Following each session, a therapist repaired or replaced broken holiday decorations and reset the environment to its original condition.

DRA—Procedures for this condition were similar to those described in the previous baseline (holiday-decoration context) condition except that we added a reinforcement contingency for toy play. The therapist delivered one edible for discrete instances of toy play (e.g., pressing a button on a toy) according to a progressive ratio (PR) schedule of reinforcement (i.e., fixed ratio [FR] 1, FR 2, FR 3, FR 5, FR 7, FR 9, and FR 11). The PR schedule reset following each session. Because Callie consumed a limited number of foods, we selected edibles based on caregiver report. Pica continued to be blocked, and there were no programmed consequences for property destruction.

DRA plus Facial Screen—Procedures for this condition were similar to those described in the DRA condition with the addition of a facial screen contingent on pica (including attempts) and property destruction. During the facial screen, the therapist placed one hand over Callie's hands and one hand on her face covering her eyes for 30 s. The therapist's hand gently contacted her face and tracked her head movement during the facial screen. After the facial screen, the therapist guided Callie back to the toys. We selected the facial screen based on the results of a stimulus avoidance assessment (Fisher et al., 1994; data available upon request) and from consultation with Callie's caregiver.

Results and Discussion

Results from the baseline in the functional-analysis context suggested that Callie's pica was maintained by automatic reinforcement (see Figure 1, top panel). Little to no property destruction was observed in the functional-analysis context. In the holiday-decoration context, therapists implemented response blocking to prevent consumption of inedible items; however, pica continued to occur at unsafe levels ($M = 1.4$ per min). High rates of property destruction also occurred toward the holiday decorations ($M = 4.4$ per min). Although multiple toys were available in the holiday-decoration context, Callie spent minimal time playing with these toys ($M = 0.1\%$ of session; see Figure 1, bottom panel).

During DRA, toy play remained low ($M = 7.7\%$ of session), and problem behavior decreased but persisted at unacceptable rates ($M_{\text{pica}} = 0.8$ per min; $M_{\text{property destruction}} = 1.7$ per min). When supplementing the DRA procedure with the facial screen following problem behavior, we observed low rates of pica ($M = 0.1$ per min) and property destruction ($M = 0.4$ per min) and increasing levels of toy play ($M = 15.2\%$ of session). Following the removal of the facial screen, problem behavior increased ($M_{\text{pica}} = 0.5$ per min; $M_{\text{property destruction}} = 2.0$ per min), and toy play decreased ($M = 8.1\%$ of session). When we reintroduced the facial screen, rates of pica decreased to zero, few instances of property destruction occurred ($M = 0.2$ per min), and toy play increased ($M = 13.4\%$ of session).

We observed decreases in problem behavior when DRA was initially introduced, but these reductions neither reached the level of clinical significance nor maintained during the final DRA phase. Therefore, it remains unclear whether the edible items delivered according to the PR schedule in the DRA condition competed with the automatic reinforcement Callie produced by engaging in pica and property destruction. Perhaps a better test of reinforcer competition would have been to deliver edible items on a relatively dense schedule without the response requirement associated with the PR schedule. Because improving the level of Callie's toy play was one goal of the DRA condition, we chose to arrange reinforcement for toy play rather than assess if the edibles competed with problem behavior per se.

We evaluated the possibility of whether a denser schedule of reinforcement could have decreased Callie's problem behavior without the use of the facial screen by analyzing the number of reinforcers delivered in her final two treatment phases. Callie earned an average of 1.2 reinforcers per session in the final five DRA sessions while engaging in high rates of problem behavior, despite the PR schedule for toy play beginning with a dense schedule of reinforcement (i.e., FR 1, FR 2). In contrast, Callie earned an average of 3.8 reinforcers per session in the final five sessions of DRA plus facial screen while engaging in low rates of problem behavior. These results suggest that a denser reinforcement schedule for toy play alone would have been equally ineffective if used without the facial screen. These findings are consistent with previous studies that have shown increases in toy play when automatically maintained problem behavior was suppressed (Koegel, Firestone, Kramme, & Dunlap, 1974; Saini, Gregory, Uran, & Fantetti, 2015), which may be due to changes in motivating operations (Laraway, Snyderski, Michael, & Poling, 2003) or contrast effects (Catania, 2012; Emmendorfer & Crosbie, 1999).

The contingent application of the facial screen following instances of problem behavior likely functioned as punishment for pica and property destruction, and the necessity of this punishment procedure may have been due to our implementation of response blocking for pica (as a safety precaution) but not for property destruction. Although we did not evaluate the specific sources of automatic reinforcement that maintained each of these responses, it remains possible that blocking only one of these two responses constituted intermittent reinforcement (i.e., property destruction continued to produce the automatic reinforcer, whereas pica did not). We may have observed lower overall levels of problem behavior had we implemented response blocking for both pica and property destruction. However, given the persistence of pica with response blocking (see Phase 2 in top panel of Figure 1), it seems equally likely that property destruction would have also persisted with response blocking.

The current study highlights the importance of considering the social validity of behavioral treatments (Carr, Austin, Britton, Kellum, & Bailey, 1999). For Callie's caregiver, decorating for the holidays was an important family tradition in which the family was unable to participate for several years. Thus, targeting this context for treatment was an important step toward meeting this family's needs. At one month following discharge from the program, Callie was reported to have no instances of pica or property destruction with the final treatment procedures.

Acknowledgments

This research was supported in part by Grant #1R01HD079113-01 from The National Institute of Child Health & Human Development.

References

- Carr JE, Austin JL, Britton LN, Kellum KK, Bailey JS. An assessment of social validity trends in applied behavior analysis. *Behavioral Interventions*. 1999; 14:223–231. doi: 10.1002/(SICI)1099-078X(199910/12)14:4<223::AID-BIN37>3.0.CO;2-Y.
- Catania, AC. *Learning*. 5th ed.. Sloan Publishing; Cornwall-on-Hudson, NY: 2012.
- DeGrace BW. The everyday occupation of families with children with autism. *American Journal of Occupational Therapy*. 2004; 58:543–550. doi: 10.5014/ajot.58.5.543. [PubMed: 15481781]
- Emmendorfer JL, Crosbie J. Effects of punishment proportion and condition sequence on contrast and induction with humans. *The Psychological Record*. 1999; 49:261–271.
- Fisher WW, Piazza CC, Bowman LG, Kurtz PF, Sherer MR, Lachman SR. A preliminary evaluation of empirically derived consequences for the treatment of pica. *Journal of Applied Behavior Analysis*. 1994; 27:447–457. doi: 10.1901/jaba.1994.27-447. [PubMed: 7928789]
- Hagopian LP, Adelinis JD. Response blocking with and without redirection for the treatment of pica. *Journal of Applied Behavior Analysis*. 2001; 34:527–530. doi: 10.1901/jaba.2001.34-527. [PubMed: 11800195]
- Koegel RL, Firestone PB, Kramme KW, Dunlap G. Increasing spontaneous play by suppressing self-stimulation in autistic children. *Journal of Applied Behavior Analysis*. 1974; 7:521–528. doi: 10.1901/jaba.1974.7-521. [PubMed: 4443320]
- Laraway S, Snycerski S, Michael J, Poling A. Motivating operations and terms to describe them: Some further refinements. *Journal of Applied Behavior Analysis*. 2003; 36:407–414. doi: 10.1901/jaba.2003.36-407. [PubMed: 14596584]

- Piazza CC, Fisher WW, Hanley GP, LeBlanc LA, Worsdell AS, Lindauer SE, Keeney KM. Treatment of pica through multiple analyses of its reinforcing functions. *Journal of Applied Behavior Analysis*. 1998; 31:165–189. doi: 10.1901/jaba.1998.31-165. [PubMed: 9652098]
- Querim AC, Iwata BA, Roscoe EM, Schlichenmeyer KJ, Virués Ortega J, Hurl KE. Functional analysis screening for problem behavior maintained by automatic reinforcement. *Journal of Applied Behavior Analysis*. 2013; 46:47–60. doi: 10.1002/jaba.26. [PubMed: 24114084]
- Reese RM, Richman DM, Zarcone J, Zarcone T. Individualizing functional assessments for children with autism: The contribution of perseverative behavior and sensory disturbances to disruptive behavior. *Focus on Autism and Other Developmental Disabilities*. 2003; 18:89–94. doi: 10.1177/108835760301800202.
- Rodger S, Umaibalan V. The routines and rituals of families of typically developing children compared with families of children with autism spectrum disorder: An exploratory study. *British Journal of Occupational Therapy*. 2011; 74:20–26. doi: 10.4276/030802211X12947686093567.
- Saini V, Gregory MK, Uran KJ, Fantetti MA. Parametric analysis of response interruption and redirection as treatment for stereotypy. *Journal of Applied Behavior Analysis*. 2015; 48:96–106. doi: 10.1002/jaba.186. [PubMed: 25640901]
- Schaaf RC, Toth-Cohen S, Johnson SL, Outten G, Benevides TW. The everyday routines of families of children with autism: Examining the impact of sensory processing difficulties on the family. *Autism*. 2011; 15:373–389. doi: 10.1177/1362361310386505. [PubMed: 21430016]

Figure 1.

Pica and property destruction per min (top panel) and percentage of session with toy play (bottom panel). With exception of the first phase, all sessions occurred in the holiday-decoration context with response blocking in place for all instances of pica. DRA = differential reinforcement of alternative behavior.