JOURNAL OF APPLIED BEHAVIOR ANALYSIS 2012, **45,** 607–611 NUMBER 3 (FALL 2012)

SYSTEMATIC EVALUATION OF VARIABLES THAT CONTRIBUTE TO NONCOMPLIANCE: A REPLICATION AND EXTENSION

PAIGE M. MCKERCHAR AND LAYLA ABBY

JACKSONVILLE STATE UNIVERSITY

The effects of time-out and escape extinction were examined with 2 preschoolers after we identified variables that may have resulted in noncompliance. Results of a functional analysis showed that noncompliance was highest in the escape condition for both participants. During the treatment evaluation, escape extinction resulted in greater reductions in noncompliance relative to time-out.

Key words: noncompliance, functional analysis, preschool children

Despite the relative abundance of indirect and descriptive studies on noncompliance (e.g., Crowther, Bond, & Rolf, 1981; Ndoro, Hanley, Tiger, & Heal, 2006), few studies have evaluated appropriate methods for conducting functional analyses of noncompliance (Kern, Delaney, Hilt, Bailin, & Elliot, 2002; Wilder, Harris, Reagan, & Rasey, 2007). Rodriguez, Thompson, and Baynham (2010) tested a procedure for comparing the effects of attention and escape on noncompliance exhibited by three preschoolers. During the attention condition, noncompliance was followed by adult attention and physical guidance to complete the demand, whereas compliance was followed by escape from the demand and removal of attention. In the escape condition, these contingencies were reversed such that escape was contingent on noncompliance and attention was contingent on compliance. This procedure permitted the escape condition to serve as the control for the attention condition and vice versa. Results indicated that noncompliance was maintained by attention for all participants.

In the current study, we sought to replicate and extend Rodriguez et al. (2010) by (a) assessing the function of preschoolers' noncompliance with common preschool curriculum tasks and (b) comparing the effects of two potential treatments for noncompliance, escape extinction (e.g., Cote, Thompson, & McKerchar, 2005) and time-out (e.g., American Academy of Pediatrics, 1998).

METHOD

Participants, Setting, and Materials

Jeane, a 4-year-old girl who had been diagnosed with tuberous sclerosis and infantile spasms, and Jayme, a typically developing 3-year-old boy, participated. Sessions were conducted at the participants' preschool in a room (2.1 m by 1.5 m) equipped with a one-way observation window, a table, two chairs, a baby monitor, a timer, and other relevant materials (see description below). Two to four sessions were conducted per day, no more than three times per week.

Response Measurement and Interobserver Agreement

Trained observers recorded the occurrence of compliance behind a one-way observation window using the ABC Data Pro application for iPhone and iPod Touch. *Compliance* was

This research was completed in partial fulfillment of the requirements for the MS degree in Psychology at Jacksonville State University by Layla Abby, who is now at Texas Tech University. We thank Todd McKerchar, Eileen Roscoe, and the anonymous reviewers for their helpful comments on this paper. We also thank Suzette Rosario, Amanda Nwosu, and Krista White for their assistance with data collection.

Address correspondence to Paige M. McKerchar, Department of Psychology, Jacksonville State University, 700 Pelham Road North, Jacksonville, Alabama 36265 (e-mail: pmckerchar@jsu.edu).

doi: 10.1901/jaba.2012.45-607

defined as initiating the task within 5 s of the experimenter's initial (vocal) prompt and continuously and correctly completing it without interruption. Conversely, *noncompliance*[1] was defined as the participant not initiating the task within 5 s of the initial prompt or initiating the task within 5 s of the prompt with interruption (i.e., not continuously completing the task correctly). *Initiating* included responses required for correctly completing the task (e.g., twisting a puzzle piece to fit in a spot). Participants typically completed tasks within 5 s of the experimenter's prompts; however, tasks always were completed within 25 s. During the functional analysis, data were not collected on participants' responses to instructions presented during the reinforcement interval.

For each participant, a second observer independently recorded data during a minimum of 40% of functional analysis sessions and 35% of treatment sessions. Interobserver agreement was calculated on a trial-by-trial basis by dividing the number of agreements by the total number of demands presented and converting this number to a percentage. An agreement was defined as both observers recording the same response following a demand. Mean agreement across participants was 98% (range, 90% to 100%) for functional analysis sessions and 99% (range, 96% to 100%) for treatment sessions.

Functional Analysis

The functional analysis procedures were identical to those described by Rodriguez et al. (2010), except that a matching task was presented rather than a clean-up task. A multielement design was used to compare the attention and escape conditions, and control was demonstrated via a contingency reversal that allowed noncompliance to occur in both conditions.

Prior to each session, the experimenter briefly described the consequences for compliance and noncompliance to the participant to facilitate differential responding. During all sessions, the participant was seated next to the experimenter at a table. At the start of each demand presentation, the experimenter placed one sample stimulus (e.g., a dog picture), one matching comparison stimulus (e.g., a dog picture), and one nonmatching comparison stimulus (e.g., a fish picture) on the table in front of the participant. The therapist pointed to the sample picture while stating, "match" (a mastered skill according to the Assessment of Basic Language and Learning Skills—Revised for Jeane and based on teacher report for Jayme). This demand was presented every 30 s during each 5-min session (10 demands per session), with the exception of Sessions 6, 7, and 8 for Jayme, in which fewer demand presentations occurred due to occasional difficulty with returning him to the table after the programmed escape.

Attention condition. Contingent on noncompliance, the experimenter presented continuous encouragement (e.g., "Come on. I know you can do it!") and prompts to match additional cards for the remainder of the 30-s interval (no escape). That is, a new card and instruction were delivered as soon as the previous card was matched. If the participant stopped initiating the matching response at any time during the reinforcement interval, the experimenter immediately provided hand-over-hand guidance to ensure that the participant continued to match cards throughout the interval. Compliance resulted in removal of experimenter attention (no attention) and removal of task materials (escape) for the remainder of the 30-s interval (i.e., until the next scheduled demand).

Escape condition. Noncompliance with the initial instruction resulted in removal of

[1] To remain consistent with previous research on the functional analysis of noncompliance, noncompliance is defined as the absence of compliance. Nevertheless, the authors recognize that functional analyses typically involve the delivery of potential reinforcers contingent on the occurrence of a target behavior, and thus, there may be conceptual and, possibly, methodological issues with providing consequences contingent on noncompliance when it is defined as the absence of behavior. Discussion of this issue, however, is beyond the scope of this report.

experimenter attention (no attention) and removal of task materials (escape) for the remainder of the 30-s interval. Contingent on compliance, the experimenter provided continuous praise (e.g., "You're a great worker!") and prompts to match additional cards for the remainder of the 30-s interval (no escape). That is, a new card and instruction were delivered as soon as the previous card was matched. If the participant stopped initiating the matching response during the 30-s interval that followed compliance with the initial instruction, the experimenter immediately provided hand-over-hand guidance to ensure that the participant continued to match cards throughout the interval.

Both participants exhibited higher levels of noncompliance in the escape condition than in the attention condition, suggesting that noncompliance was maintained, at least in part, by negative reinforcement in the form of escape.

Treatment Evaluation

Although the functional analysis included an embedded treatment evaluation in that escape extinction and time-out were in effect for noncompliance in the attention and escape conditions, respectively, we further evaluated the effects of these interventions under more naturalistic conditions (e.g., with a variety of tasks and the removal of encouragement during escape extinction) using a multielement design.

We presented common preschool curriculum tasks reported by teachers to result in noncompliance during typical classroom routines. Specifically, these tasks included placing one piece into a four-piece puzzle with two pieces removed (two different puzzles were used), matching visual stimuli by category (in a two-stimulus array), and pointing to a visual comparison stimulus (in a two-stimulus array) following an auditory stimulus. Stimuli included categories (i.e., flowers, chairs, and apples), actions (e.g., crawling, smiling, running), simple shapes, the letters A through E, and the numbers 1 through 5. Although informal observations revealed that both participants could complete these tasks following a vocal prompt only, the experimenter simultaneously presented vocal and model prompts during initial treatment sessions (i.e., Sessions 17 through 20 for Jeane and Sessions 17 through 19 for Jayme) to ensure that the participants contacted the relevant contingency in effect.

During treatment, the experimenter sat next to the participant at a table and continuously presented demands during 5-min sessions. Instructional tasks were presented in a quasi-random order within and across sessions, such that all tasks were presented in every session and two to three trials of one type of task (e.g., letter identification) were presented before moving on to the next type (e.g., puzzle). For each task, the experimenter placed the necessary materials on the table and presented a vocal prompt (e.g., "Point to the letter C."). In both conditions, compliance resulted in experimenter praise and immediate presentation of the next task.

Escape extinction. In this condition, the table was moved to a corner of the room to enhance stimulus control and treatment integrity (i.e., this placement allowed the experimenter to block attempts to leave the table). Contingent on noncompliance, the experimenter modeled the correct behavior. If the participant initiated the task within 5 s of the model prompt and completed the task correctly, the experimenter provided praise and presented the next task. If the participant did not initiate or correctly complete the task after the model prompt, the experimenter used hand-over-hand guidance to have the participant complete the task. Noncompliance following model prompts was not included in our data summary; only noncompliance after vocal prompts is depicted in our results.

Time-out. Contingent on noncompliance, the experimenter removed the task materials and turned away from the participant for 15 s.

RESULTS AND DISCUSSION

During Jeane's functional analysis (Figure 1, top), noncompliance occurred at higher levels

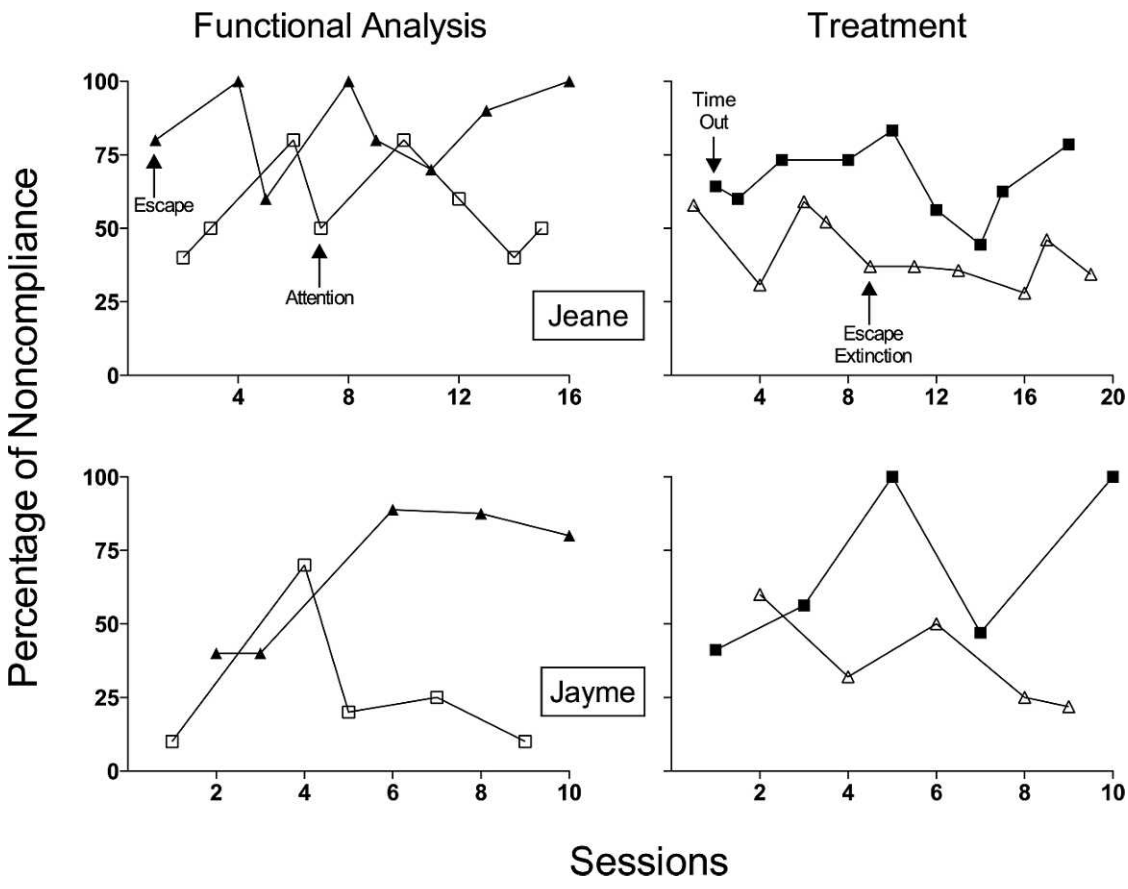

Figure 1. Percentage of demands followed by noncompliance for Jeane (top) and Jayme (bottom) during the functional analysis and treatment evaluation.

in the escape condition ($M = 85\%$) than in the attention condition ($M = 56\%$). During treatment, her noncompliance was consistently lower during escape extinction ($M = 42\%$) than during time-out ($M = 66\%$). Jayme's functional analysis (Figure 1, bottom) shows that, with the exception of Session 4, he consistently engaged in higher levels of noncompliance in the escape condition ($M = 67\%$) than in the attention condition ($M = 27\%$). During treatment, noncompliance decreased across the escape extinction condition ($M = 38\%$), whereas noncompliance was variable throughout the time-out condition ($M = 69\%$).

In our replication of Rodriguez et al. (2010), noncompliance appeared to be maintained by escape from demands, whereas Rodriguez et al. found that noncompliance was maintained by attention. This may be due to procedural differences between the studies (e.g., different tasks, settings), but also underlines the importance of conducting functional analyses of noncompliance prior to treatment to avoid use of a contraindicated treatment.

During treatment, we compared two interventions used for treating noncompliance, escape extinction and time-out. Escape extinction, the treatment informed by the results of the functional analysis, resulted in lower levels of noncompliance for both participants. Therefore, the results of the treatment analysis validated the functional analysis outcome.

Despite these findings, a few limitations should be noted. First, we did not conduct formal assessments to ensure that responses required for compliance were in the participant's repertoire. Therefore, it is possible that noncompliance may have been due to a skill deficit rather than motivational variables. To help rule out this potential confounding effect, formal assessments could be conducted prior to the functional analysis.

Second, although the contingency reversal provided an opportunity for noncompliance to occur in both functional analysis conditions, the absence of a separate control condition limited detection of multiple control when noncompliance occurred in attention and escape conditions (as it did with Jeane). Future research should evaluate alternative control conditions for functional analyses of noncompliance.

Third, because the time-out condition included a 15-s break from demands for noncompliance, it was associated with a lower rate of demand presentations ($M = 3$) than the escape extinction condition ($M = 5.1$). Therefore, it is possible that time-out was less effective because it was associated with fewer opportunities for noncompliance to contact the programmed contingency. In subsequent research that compares these interventions, one might increase the duration of time-out sessions to correct for time spent in breaks.

Finally, although lower levels of noncompliance occurred during escape extinction than in time-out, clinically significant reductions were not observed. This may be due to limited exposure to the treatment conditions (because of time constraints) or the absence of a reinforcement contingency for compliance. For purposes of assessing the independent effects of time-out and escape extinction, we did not include a reinforcement component; however, research suggests that escape extinction is more effective when combined with other treatments (e.g., differential reinforcement of compliance; Lerman & Iwata, 1996). In further treatment evaluations of noncompliance, one could evaluate the relative effects of escape extinction alone and in combination with differential reinforcement.

In summary, we replicated the functional analysis procedures described by Rodriguez et al. (2010) and extended the results by conducting a treatment informed by the functional analysis outcome. However, because we included only two participants with escape-maintained noncompliance, the generality of our findings across populations, settings, and behavioral functions is unclear. Therefore, additional research on the assessment and treatment of noncompliance is warranted.

REFERENCES

American Academy of Pediatrics. (1998). Guidance for effective discipline. *Pediatrics*, *101*, 723–728.

Cote, C. A., Thompson, R. H., & McKerchar, P. M. (2005). The effects of antecedent interventions and extinction on toddlers' compliance during transitions. *Journal of Applied Behavior Analysis*, *38*, 235–238.

Crowther, J. H., Bond, L. A., & Rolf, J. E. (1981). The incidence, prevalence, and severity of behavior disorders among preschool-aged children in day care. *Journal of Abnormal Child Psychology*, *9*, 23–42.

Kern, L., Delaney, B. A., Hilt, A., Bailin, D. E., & Elliot, C. (2002). An analysis of physical guidance as reinforcement for noncompliance. *Behavior Modification*, *26*, 516–536.

Lerman, D. C., & Iwata, B. A. (1996). Developing a technology for the use of operant extinction in clinical settings: An examination of basic and applied research. *Journal of Applied Behavior Analysis*, *29*, 345–382.

Ndoro, V. W., Hanley, G. P., Tiger, J. H., & Heal, N. A. (2006). A descriptive assessment of instruction-based interactions in the preschool classroom. *Journal of Applied Behavior Analysis*, *39*, 79–90.

Rodriguez, N. M., Thompson, R. H., & Baynham, T. Y. (2010). A method for assessing the relative effects of attention and escape on noncompliance. *Journal of Applied Behavior Analysis*, *43*, 143–147.

Wilder, D. A., Harris, C., Reagan, R., & Rasey, A. (2007). Functional analysis and treatment of noncompliance by preschool children. *Journal of Applied Behavior Analysis*, *40*, 173–177.

Received July 20, 2011
Final acceptance January 31, 2012
Action Editor, Eileen Roscoe