Functional analyses (Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1994) have been useful in determining function-based treatments for problem behavior. Recently, however, researchers have evaluated the use of arbitrary reinforcers (e.g., positive reinforcers) to decrease problem behavior maintained by negative reinforcement, particularly in the absence of extinction. We provide a brief review of recent research on this topic and discuss implications regarding mechanisms, practice, and future research directions.

Key words: negative reinforcement, positive reinforcement, problem behavior

Functional analysis (Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1994) is considered to be the gold standard for the assessment and treatment of problem behavior (see Beavers, Iwata, & Lerman, 2013, for a review). By determining the function of problem behavior, clinicians can modify reinforcement contingencies to decrease problem behavior and increase appropriate behavior (e.g., Kurtz et al., 2003). Although the efficacy of function-based treatment is well documented, recently researchers have evaluated the effects of using arbitrary reinforcers to decrease problem behavior. Specifically, research has shown that under some conditions, positive reinforcement can be effective for reducing problem behavior maintained by escape (e.g., Carter, 2010; DeLeon, Neidert, Anders, & Rodriguez-Catter, 2001; Lalli et al., 1999; Piazza et al., 1997) even when extinction is not implemented.

Research on the use of positive reinforcement for reducing escape-maintained problem behavior is important for several reasons. Provision of positive reinforcers rather than negative reinforcers during instructional or demand contexts may be preferred by teachers and caregivers and less disruptive to learning. Provision of positive reinforcers during demand contexts also may preclude the use of escape extinction, which may be unsafe if the client is large or if it results in undesirable side effects such as extinction bursts (Lerman & Iwata, 1996). Thus, the purpose of this review is to provide an overview of recent studies that have examined noncontingent and contingent positive reinforcement for the treatment of escape-maintained problem behavior as well as to discuss implications and recommendations for further areas of research.

Lalli et al. (1999) was one of the first studies to evaluate the use of differential positive reinforcement to reduce problem behavior maintained by negative reinforcement. They compared the effects of functional (noncontingent escape, escape for compliance) and nonfunctional (positive reinforcement [edible items] for compliance) treatments for problem behavior displayed by five participants with intellectual and developmental disabilities (IDD). Positive reinforcement for compliance more effectively decreased problem behavior and increased compliance than did the treatments based on negative reinforcement, even in the absence of extinction. In an extension of Lalli et al., Carter (2010) compared the effects of escape extinction to the delivery of different positive reinforcers (i.e., high-preference edible item, low-preference edible item, or high-preference
leisure item) for compliance in the absence of escape extinction with one participant. The delivery of high-preference edible or leisure items for compliance was more effective than the delivery of low-preference items or escape for compliance in reducing problem behavior and increasing compliance. Together, these studies showed that treatments using positive reinforcers more effectively reduced problem behavior and increased compliance than did treatments that used only negative reinforcers.

In addition to studies that have assessed the effectiveness of differential positive reinforcement to reduce problem behavior maintained by negative reinforcement, several studies also evaluated participants’ choice of positive or negative reinforcers for compliance with individuals whose problem behavior was maintained by escape from demands (e.g., DeLeon et al., 2001; Fisher et al., 2005; Kodak, Lerman, Volkert, & Trosclair, 2007). For example, DeLeon et al. (2001) reinforced compliance with a choice of either escape or edible items and provided escape extinction contingent on problem behavior for one participant with IDD. The participant chose edible items under low schedule requirements but reallocated choice to escape when the schedule requirements for compliance increased. Kodak et al. (2007) extended DeLeon et al. by evaluating choice of escape or edible items contingent on compliance during both preferred and nonpreferred tasks. All participants preferred edible items over escape across both preferred and nonpreferred tasks, even when the schedule of reinforcement was thinned and they were offered a choice between edible items and an enhanced escape period (with attention and preferred toys) contingent on compliance. The preference of most participants shifted to escape only when they were given a choice between low-preference edible items and an enhanced escape period. Together, these findings indicate that participants preferred positive reinforcement in the form of highly preferred edible items over negative reinforcement.

Consistent with research on differential reinforcement and choice, some studies have shown that the noncontingent delivery of positive reinforcers also is effective in decreasing problem behavior maintained by negative reinforcement (e.g., Ingvarsson, Kahng, & Hausman, 2008; Lomas, Fisher, & Kelley, 2010). In Ingvarsson et al. (2008), a participant’s problem behavior was maintained by both escape and access to edible items, and the experimenters compared high-density (edible items delivered before each demand) and low-density (edible items delivered before every fourth demand) schedules of noncontingent reinforcement (NCR) without escape extinction. Problem behavior was reduced to low levels under both NCR conditions, an outcome that was replicated when edible items were delivered contingent on compliance in the absence of escape extinction. Lomas et al. (2010) showed similar results using a variable-time 15-s reinforcement schedule with edible items and praise in the absence of escape extinction for problem behavior.

Overall, research on the use of positive reinforcers to decrease problem behavior maintained by negative reinforcement has produced promising results. Provision of positive reinforcers contingent on compliance or noncontingently can reduce problem behavior maintained by negative reinforcement, even in the absence of escape extinction. In fact, provision of positive reinforcement may be more effective than provision of escape (the functional reinforcer) contingent on compliance, as long as the schedule of reinforcement is dense (e.g., Carter, 2010; DeLeon et al., 2001).

Nonetheless, current research in this area is limited in several respects. One limitation is that problem behavior for one or more participants was maintained by both positive and negative reinforcement in a number of studies (e.g., DeLeon et al., 2001; Fisher et al., 2005; Hoch, McComas, Thompson, & Paone, 2002; Lomas et al., 2010; Piazza et al., 1997). Therefore, positive-reinforcement-based interventions may
have been effective because problem behavior also was maintained by positive reinforcement. The design of several studies that compared negative and positive reinforcement for compliance also introduced potential order effects (e.g., Carter, 2010; Hoch et al., 2002). For example, in both Carter et al. (2010) and Hoch et al. (2002), positive reinforcement was always evaluated before negative reinforcement. This order may have established negative reinforcement as punishment for compliance because it resulted in a loss of positive reinforcers. Future research should include individuals whose problem behavior is maintained exclusively by negative reinforcement and counterbalance conditions to account for order effects.

Current research also has not yet identified the mechanisms that may be responsible for the effectiveness of positive reinforcement in reducing problem behavior maintained by negative reinforcement. Participants may allocate more responding to compliance because it produces higher quality reinforcement than does problem behavior (Lalli et al., 1999). In fact, results of research on choice of positive versus negative reinforcers suggest that positive reinforcers are often preferred over negative reinforcers (e.g., DeLeon et al., 2001; Kodak et al., 2007). Alternatively, the delivery of positive reinforcers may serve as an abolishing operation (AO) for escape-maintained behavior by reducing the aversiveness of the demand context, making escape less valuable. Results of research on the effectiveness of noncontingent positive reinforcement in the absence of escape extinction are consistent with this hypothesis (e.g., Ingvarsson et al., 2008; Lomas et al., 2010). Nonetheless, in Ingvarsson et al. (2008), both NCR and differential reinforcement produced similar increases in compliance, suggesting that compliance may have competed with problem behavior. It is unclear why compliance increased under NCR, but it may have been the result of adventitious reinforcement or stimulus control (Dozier et al., 2001). Finally, the delivery of positive reinforcers necessarily includes a short escape period (i.e., consumption time), a combination of positive and negative reinforcers that may be more powerful than negative reinforcement alone (Hoch et al., 2002; Lalli & Casey, 1996). To assess this potential mechanism, researchers could use reinforcers that are not immediately consumable (e.g., tokens) such that their delivery does not interfere with the ongoing task.

An additional mechanism that has not been addressed is the potential punishing effects of escape. As noted above, escape may become aversive following a history of positive reinforcement in the demand context due to the loss of access to these positive reinforcers during the escape interval (i.e., punishment). In this case, the use of positive reinforcers establishes both positive reinforcement contingencies for compliance and negative punishment contingencies for problem behavior, which may be more effective than negative reinforcement for compliance alone. To assess this mechanism, researchers could compare the effects of two conditions: a punishment condition (i.e., delivery of noncontingent positive reinforcement during demands only) and a control condition (i.e., delivery of noncontingent positive reinforcement during both demands and the escape interval). During both conditions, problem behavior would produce access to the escape interval. Greater reductions in problem behavior during the punishment condition compared to the control condition would suggest that problem behavior might be reduced due to punishment. However, one potential confounding effect is that higher levels of problem behavior in the control condition may be due to a higher magnitude of reinforcement for problem behavior (i.e., escape and positive reinforcement).

Identification of the mechanisms responsible for the effectiveness of positive reinforcement is important so that treatments can be applied under the correct conditions. For example, if it is determined that behavior change under a
differential reinforcement procedure using positive reinforcers is due to an AO effect, the procedure could be enhanced by reducing the aversiveness of the tasks or using more potent reinforcers. Because these mechanisms could be idiosyncratic, it may be important to develop assessment procedures that determine whether positive reinforcement (or which specific procedures) might be effective for a given individual.

Future research also should be conducted to determine the conditions under which positive reinforcement contingencies are most effective. For example, positive reinforcement might be less effective when tasks are more aversive or require more time to complete (e.g., classroom transitions). In addition, most of the research conducted has used edible reinforcers, so future research should attempt to determine the effects of other positive reinforcers on escape-maintained problem behavior.

The long-term effects of the procedures are also unknown. Although they are feasible in the short term, it may be impractical for caregivers to use dense schedules of positive reinforcement over the long run (e.g., when a teacher must attend to multiple students). Results of DeLeon et al. (2001) suggest that individuals may allocate more responding to problem behavior when reinforcement for compliance is thinned if escape is only available contingent on problem behavior. Thus, additional research is needed to identify the conditions under which positive reinforcement effectively maintains low levels of problem behavior when schedules are thinned to clinically feasible levels.

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