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ORIGINAL PAPER

A "Healthy-Contingencies" Behavioral Intervention

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Abstract Interventions based on functional analyses may result in better treatment outcomes than those using arbitrary reinforcers. However, functional analyses may be impractical in some situations, or an immediate intervention may be necessary while a functional analysis is being conducted. In these situations, delivering the social reinforcers most commonly identified by functional analyses (attention, access to tangibles, and escape from demands) following appropriate behavior and withholding these events following problem behavior may improve behavior. We assessed the extent to which this type of intervention would improve child behavior with three participants. All participants engaged in moderate to high rates of problem behavior and very little appropriate requesting during baseline, and high rates of appropriate requests and reduced rates of problem behavior during treatment.

Keywords Functional analysis · Differential reinforcement · Extinction · Problem behavior · Synthesized intervention

Introduction

The term "functional analysis" typically describes deliberate manipulation of environmental events to determine why a particular behavior is occurring (e.g., Iwata et al. 1994a). Interventions derived from functional analyses can be individualized based on the precise reinforcement contingencies maintaining the behavior. In a typical functional analysis, response rates during one or more test conditions are compared to rates during a control condition. In an early functional analysis study, Iwata et al. (1994c) compared rates of self-injurious behavior when

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attention or breaks were provided as a consequence for the response to when these potential reinforcers were given independently of responding. Responding was elevated when one or more of the events occurred as a response-dependent consequence for most participants, allowing the experimenters to identify environmental factors that contributed to the behavior. These procedures have now been replicated successfully hundreds of times (Beavers et al. 2013).

Functional analyses may have several benefits in the development of interventions for problem behavior. First, interventions based on functional analyses are often more effective than ones based on the delivery of arbitrary reinforcers (e.g., Carr and Durand 1985; Iwata et al. 1994b). Second, functional analyses provide an empirical demonstration that a consequent event serves as a reinforcer, and provide evidence that the problem behavior may be maintained by that event. Knowing the reinforcers maintaining problem behavior allows clinicians to use extinction as part of a treatment package (e.g., Bowman et al. 1997; Iwata et al. 1994c). Third, Hanley (2012) noted that functional analyses may be a "humanistic" approach to assessment because these analyses allow the client to have a voice in the assessment and intervention process; essentially, functional analyses allow the client to "tell" the behavior analyst why the behavior is occurring.

Despite the advantages of conducting a functional analysis, this procedure may not always be feasible (e.g., Applegate et al. 1999; English and Anderson 2006; Pyles et al. 1997; Sturmey 1994) or may require extensive time to complete (e.g., Applegate et al. 1999; Pyles et al. 1997; Sturmey 1994). Iwata et al. (1994c) conducted an epidemiological study of functional analyses for self-injurious behavior of 152 individuals over an 11-year period. The functional analyses lasted between 8 and 66 sessions, with a mean of 26.2 sessions. The total duration of the function analyses was between 2 and 16.5 h, with a mean of 6.5 h. A functional analysis is typically extended if a clear function cannot be readily determined, which prolongs the duration of time before a function-based treatment can be recommended. To address the extensive time and costs required to conduct a traditional functional analysis, researchers have recommended briefer functional analysis procedures (e.g., Northup et al. 1991; Hanley 2012). Even these brief procedures require time to implement, and may therefore delay the use of interventions designed to reduce the behavior. These delays may reduce the social validity of our work with clients. Therefore, some researchers have recommended immediate implementation of intervention components in a systematic way in lieu of functional analysis procedures, particularly when time is limited or caregivers implement procedures (e.g., Harding et al. 1994; Millard et al. 1993).

When an immediate treatment is warranted, it might be advantageous to recommend a treatment in which appropriate contingencies are provided following problem behavior and appropriate behavior. Such an approach could focus on delivery of the three most common social reinforcers identified through typical functional analysis. Beavers et al. (2013) found that 90.1% of published functional analyses included tests for social-negative reinforcement (typically, escape from demands) and 88.7% included tests for social-positive reinforcement, including attention and access to tangible items. Escape, attention, or access to materials were identified as reinforcers for over 80% of the participants across studies.

Restricting access to escape, attention, and materials following problem behavior, and providing access following appropriate behavior, may be a viable short-term intervention while a functional analysis is conducted or as a temporary measure until component analyses can be used to streamline the intervention package (e.g., Millard et al. 1993). Early research suggests that packaged interventions that address common behavioral functions may reduce problem behavior. For example, Harding et al. (1994) and Millard et al. (1993) evaluated treatment packages based on common behavioral functions that were introduced in a hierarchical way (Harding et al.) or later evaluated using component analyses (Millard et al.) for children with common, minor forms of problem behavior. The treatment package included clear presentation of demands, attention for compliance, assistance with difficult work following child mands for help, and access to preferred work or preferred items if necessary. Problem behavior was successfully reduced using the treatment package in the absence of a formal functional analysis in both studies, and the package intervention was successfully implemented by caregivers. However, the necessary components of the package to establish or maintain treatment effects were idiosyncratic across children. Although "active" components of an intervention may vary across children, results of Beavers et al. (2013) suggest that package interventions incorporating the three most common behavioral functions could result in one or more components acting as function-based interventions for over 80% of the population.

Although previous studies have shown efficacy of function-based treatment packages (e.g., Harding et al. 1994; Millard et al. 1993), those studies were conducted over a short period (a single 90-min clinic appointment), precluding systematic evaluation of intervention efficacy during extended application. Additionally, caregivers implemented the interventions throughout the studies with variable levels of procedural fidelity, reducing the extent to which behavioral changes could be clearly attributed to the treatment package as specified. The purpose of the current study was to conduct a preliminary evaluation of a similar intervention. Our goal was to demonstrate that the combined presentation of the three most common function-based events following appropriate behavior would increase and maintain appropriate behavior across extensive repeated measures without the use of functional behavior assessments.

Method

Participants and Setting

Three children who had been referred for behavioral support due to ongoing or severe challenging behavior in the classroom participated. Sam was a 7-year-old boy diagnosed with attention-deficit/hyperactivity disorder, who engaged in inappropriate vocalizations, disruption, and aggression. Jacob was an 8-year-old boy with educational labels of emotional and behavioral disorders and learning disabilities, who engaged in inappropriate vocalizations, disruption, and aggression.

Joey was a typically developing 6-year-old boy, who engaged in inappropriate vocalizations and disruption.

Sam's sessions were conducted in a university laboratory. Jacob and Joey's sessions were conducted in a small, unused classroom at a local elementary school. Across both settings, the session rooms were relatively barren and contained a table, chairs, age-appropriate math and reading worksheets, pencils, erasers, and various tangible items (crayons and paper, squeeze balls, board games, modeling clay, puzzles, blocks, and other toys).

Procedure

Trained graduate students conducted one to six sessions per participant, per day, one to four days per week. All sessions were 10 min in duration. Sessions were structured into two 5-min components to ensure that the participant contacted an appropriate establishing operation to evoke problem behavior during each session. At the start of the session, the participant was instructed to complete mastered math and vocabulary worksheets independently. The worksheets were chosen after consultation with each participant's teacher or caregiver. The therapist did not attend to the participant, and pretended to complete work in corner of the room for approximately 5 min.

During the second 5 min of each session, the therapist sat at the table next to the participant and instructed him to complete academic work using a three-prompt sequence, in which prompts were delivered at 15-s intervals. The first prompt was a vocal demand to complete the task, such as "Write the answer to three plus two." The second prompt was a model, such as "Three plus two equals five, write five like this," while the experimenter wrote "5." If the participant complied after the vocal or model prompts, the therapist provided a brief praise statement and immediately presented another vocal prompt (to complete the next problem on the worksheet). If the participant did not comply after the vocal or model prompt, the therapist guided the participant's hand to write the correct answer.

Throughout the experiment, a 30-s enriched break was used as the reinforcer. The same enriched break was used regardless of the antecedents in place during the session. During the enriched break, the therapist removed the worksheets and pencils and interacted with the participant. For Sam and Jacob, interaction initially consisted of the therapist providing access to "therapeutic items," such as stress balls, and counseling the student about the targeted behavior, such as, "If you're feeling frustrated, you can take deep breaths, count to ten, and squeeze this ball." The topography of attention and leisure items was selected to mimic those typically provided following problem behavior in the children's school. Both participants appeared to satiate on the items during the first treatment phase, as demonstrated by an increase in problem behavior, a decrease in item engagement, and requests for other items or activities. Therefore, the therapist provided access to a variety of toys and leisure items (puzzles, crayons and paper, toy cars, and games) and engaged in child-directed play starting at session 14 for Sam and session 25 for Jacob. This form of child-directed play with leisure items continued throughout the remainder of the experiment for Sam and Jacob was used from the first session of the experiment

for Joey. For Jacob and Joey, problem behavior during the enriched break resulted in no programmed consequences. For Sam, problem behavior during the break resulted in termination of the break starting at session 22 of the analysis.

During baseline sessions, problem behavior resulted in a 30-s enriched break, and appropriate requests resulted in no programmed consequences. Baseline sessions continued for at least three sessions, and until problem behavior occurred at a steady state or increasing trend for at least two consecutive sessions, determined by visual inspection of graphed rates of behavior.

Prior to the first session of each treatment phase, the therapist provided a prompt to the participant, such as, "Remember you can have a break anytime you want if you ask nicely, using a nice voice, and a question or the word *please*, but you cannot have a break if you yell." The therapist modeled an appropriate request and instructed the participant to practice an appropriate request one time. No additional instructions about the topography of the request were delivered during treatment sessions.

During treatment sessions, problem behavior resulted in no programmed consequences for Jacob and Joey, and appropriate requests resulted in a 30-s enriched break. Sam continued to display problem behavior after child-directed play began (session 14); therefore, we made three additional modifications to his intervention starting at session 22. First, if Sam engaged in problem behavior during the reinforcer interval, the break ceased immediately. Second, appropriate requests that occurred within 30 s of problem behavior were not reinforced. Third, we added 4 in.-by-4 in. laminated red and green cards as discriminative stimuli to signal when asking for a break would be reinforced. At the beginning of each session, the therapist placed a green card on the table. This card remained on the table as long as Sam did not engage in problem behavior. While the green card was on the table, appropriate requests for a break were reinforced. If Sam engaged in problem behavior, the therapist removed the green card and placed a red card on the table. Appropriate requests were not reinforced while the red card was visible. When Sam ceased engaging in problem behavior for 30 s, the red card was removed and the green card was placed on the table. The intervention was modified without explanation or instructions to Sam. Because Sam engaged in escalating rates of problem behavior, the following instructions were delivered prior to session 26, "We are going to do things a little differently today. I have two cards here: a red card and a green card. If the green card is on the table, you can ask for a break whenever you want. If you ask nicely, using a nice voice, and a question or the word *please*, then you can have a break. Do you want to try it?" Sam was given one opportunity to practice. Next, the therapist delivered the following instructions, "If you do anything that your Mom wouldn't like you to do, like yell, throw things, hit me, or rip paper, then I am going to put the red card on the table and I cannot give you a break. If the red card is on the table then I will not play with you and you will need to do your work. If you do your work and stop doing naughty things, then I will put the green card back on the table and you can have a break." No further instructions were given, and the modified intervention was used for the remainder of Sam's treatment sessions.

Treatment sessions for all participants continued until appropriate requests and problem behavior occurred at a steady state for at least 9 sessions, determined by visual inspection of graphed rates of behavior. Nine sessions were chosen to assess whether treatment would produce the sporadic high rates of problem behavior observed prior to modifications of the enriched break. We used an ABAB reversal design to demonstrate experimental control.

Data Collection and Analysis

Trained observers collected data using computers and a real-time data collection program. One or two observers collected data during each session. Observers collected frequency data on appropriate requests and problem behavior, which included inappropriate vocalizations, disruption, and aggression. For all participants, inappropriate vocalizations included statements made using volume above conversational level, growling, groaning, whining, or complaining about the activity (such as *I don't want to do this*, or *it's too hard*), name calling, cursing, or statements related to bodily functions, other than asking to use the restroom. Each statement was scored as a separate instance of behavior. Disruption was operationalized as climbing on furniture, pushing or tipping furniture (except chairs), banging on walls, windows, or furniture, running into walls or windows, ripping materials, or throwing items not within 0.5 m of another person. For Sam, disruption also included spitting, attempting to break items, attempting to leave the room, pushing buttons on the thermostat, and pushing items under the door. Attempts to climb on furniture or leave the room were blocked; each attempt was scored as a new instance. Aggression was operationalized as hitting, kicking, biting or scratching another person, or throwing an item or spitting within 0.5 m of another person. Appropriate requests were defined as asking for attention, a break, or a tangible item using normal conversational volume and tone, and a question or the word "please."

Interobserver Agreement

Two trained independent observers collected data for interobserver agreement (IOA). Interobserver agreement was calculated using a block-by-block method (Mudford et al. 2009). Interobserver agreement was calculated separately for each target behavior. To calculate IOA, each session was divided into 10-s intervals. The percent agreement for each behavior within each interval was calculated by dividing the smaller number or duration of events scored by the larger number or duration of events scored, and multiplying by 100. When both observers agreed on the absence of behavior, the agreement score for that block was considered 100% agreement. The IOA scores for each target response during each 10-s interval were summed and then divided by the total number of intervals to obtain a mean IOA score for each target behavior for the entire session. For Sam, IOA was calculated for 45% of sessions and averaged 98% across responses (range 75–100%). For Jacob, IOA was calculated for 30% of sessions and averaged 91% (range 34–100%). For Joey, IOA was calculated for 25% of sessions and averaged 98% (range 82–100%).

Results

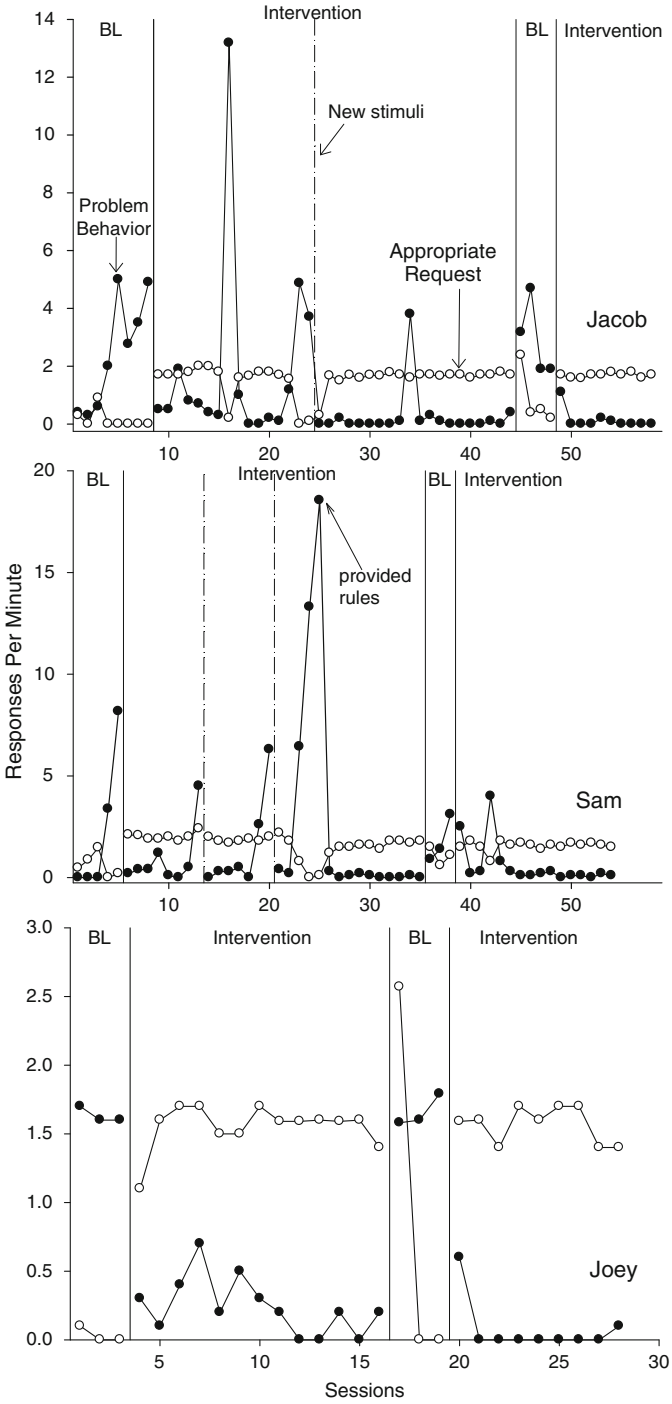
Results for all children are shown in Fig. 1. For all children, problem behavior occurred at high or increasing rates during the initial baseline. For Jacob (top panel) and Sam (middle panel), the initial implementation of the healthy-contingencies intervention resulted in an immediate suppression of problem behavior and an increase in appropriate requesting. However, this effect was transient, and rates of problem behavior increased within or above the range of baseline responding by the eighth intervention session. During session 16, Jacob asked for a break two consecutive times above conversational volume and, when he was not given a break, his problem behavior resurged and continued throughout the session. When the positive reinforcers were changed to child-directed play, treatment effects were recovered for Jacob. However, we needed to add antecedent interventions (included signaled reinforcement periods and rules) for Sam; responding was consistently suppressed once we provided Sam with rules about the existing contingencies. We continued the healthy-contingency phase to 9 sessions of stable, reduced problem behavior to ensure that the revised treatment remained efficacious. Baseline and intervention effects were rapidly recovered during reversals.

Data for Joey are shown in the bottom panel of Fig. 1. Joey experienced the child-directed positive reinforcer throughout his participation. The healthy-contingencies intervention produced high, stable rates of appropriate requesting and low rates of problem behavior throughout both replications.

Discussion

We evaluated a package intervention, in which we provided the three events most commonly identified as reinforcers (escape, attention, and materials) following problem behavior (during baseline) or appropriate requests (during treatment). The intervention reduced problem behavior and increased appropriate requests for all three children, even though the function of the problem behavior was not identified. A similar intervention approach may be useful as a temporary way to reduce problem behavior while caregivers find behavior analytic services or while a functional analysis is underway. Thus, our study adds further support to findings from Harding et al. (1994) and Millard et al. (1993) showing that treatment packages based on common behavioral functions may effectively reduce problem behavior.

We began the study by conducting informal observations to identify the forms of attention and materials that were typically provided to children in their schools. Most often, problem behavior resulted in the teacher counseling the student about his behavior and providing “sensory” items. We used similar forms of attention and materials during the initial baseline and intervention phases for Jacob and Sam. Providing counseling and sensory items following problem behavior maintained that behavior at high rates for both participants. However, our intervention effects were transient. At least two factors may have been responsible for this weakening of


BL
Intervention
BL
Intervention
New stimuli
Problem Behavior
Appropriate Request
Jacob
provided rules
Sam
Joey
Responses Per Minute
Sessions

◀**Fig. 1** Responses per minute of problem behavior and appropriate requests during baseline (BL) and treatment ("Intervention") conditions. *Filled circles* show rates of problem behavior. *Open circles* show rates of appropriate requesting. *Dashed phase change lines* denote changes in stimuli. The *first dashed line* denotes changes to child-directed play. The *second dashed line* indicates the introduction of colored cards and response cost for Sam

effect. First, it is possible that the children satiated on the items. The attention from the therapist was highly repetitive (such as reviewing the school rules), and only a limited number of items were used. Second, it is possible that the delivery of this attention and materials was unnatural to the participants during the intervention phase. During this phase, the topography of the therapist's attention shifted from reminders to obey the rules (during the baseline phase) to reminders that asking nicely was part of the rules (during the intervention phase). This form of attention may no longer have resembled what the children typically received in their classrooms. Unfortunately, the children rarely received attention for appropriate behavior in their classrooms, so we were unable to initially use the forms of attention in the classrooms as a model for our attention during the intervention phase.

The weakened effect of the initial reinforcers suggests that, although the intervention as a whole may be identical across participants, careful consideration should be given to the specific forms of escape, attention, and materials that are provided during the reinforcer intervals. The modified intervention included child-directed play with a standard set of toys, which were easily available in the children's classrooms. One limitation of our study was that we did not conduct preference assessments to identify items, activities, or forms of attention that were preferred by the participants. We chose to exclude those assessments to minimize the number of procedures that were incorporated into our treatment package. However, problem behavior may have been suppressed even further if the forms of attention and materials were individualized for each child based on his preferences. Future research should evaluate a "healthy contingencies" intervention that individualizes attention and items based on the child's preferences. Additionally, future research should evaluate the role of antecedent interventions like those used with Sam to determine whether rules and signaled reinforcer periods enhance treatment efficacy for most participants. If additional procedures like preference assessments and antecedent rules greatly enhance treatment efficacy, forms of remote support from highly trained professionals may be needed for package interventions like the one in this study to be maximally effective.

Although package interventions may be more cumbersome than single-component interventions based on outcomes of a functional analysis, packages may have four distinct advantages. First, a "healthy contingencies" intervention may be a useful temporary approach while a functional analysis is conducted. For example, teachers or parents may ask for strategies to reduce severe behavior while a functional analysis is underway. Once the functional analysis was completed, the healthy-contingencies intervention could be replaced with a more streamlined, function-based intervention. In the current study, the intervention was similar across all children. The development of effective package interventions that are likely to

suppress challenging behavior across children may mean that caregivers could implement these strategies even before problem behavior develops. For example, teachers could be trained to implement a healthy-contingencies procedure for their classrooms. Providing this kind of training would give teachers skills in a potential intervention, should one of their students begin exhibiting problem behavior.

Second, the healthy-contingencies approach that we describe would be useful for treating problem behavior that is maintained by multiple reinforcers. Approximately 19% of problem behavior in the published functional analysis literature was maintained by more than one reinforcer (Beavers et al. 2013). Typically, function-based interventions for multiply maintained problem behavior involve the delivery of several different reinforcer types, which would be automatically addressed through a healthy-contingencies intervention. Recently, Hanley et al. (2014) suggested that problem behavior may be maintained by complex contingencies involving more than one reinforcer ("synthesized" contingencies). For some clients, these synthesized contingencies maintain behavior even when the component contingencies do not. For example, Hanley et al. (2014) demonstrated that a synthesis of attention and tangible items maintained problem behavior for one participant, Gail, even though attention or tangibles in isolation did not. A healthy-contingencies approach may help to reduce behavior maintained by complex contingencies before the exact combination of maintaining variables is identified through a functional analysis.

Third, interventions that address all common social reinforcers may prevent transfer of the problem behavior's function over time. The literature on transfer of function is currently sparse. Lerman et al. (1994) analyzed transfer of the function of problem behavior with 4 adults whose problem behavior re-emerged after a previous functional analysis and successful function-based treatment. Following a new functional analysis, 2 of 4 participants displayed evidence for a transfer of the function of their problem behavior. Transfer of function presumably occurs when a response contacts a new reinforcement contingency. Teaching caregivers to provide healthy contingencies by withholding potential reinforcers following problem behavior and providing these stimuli following appropriate behavior may prevent problem behavior from contacting new contingencies, and thus prevent transfer of function. Training caregivers to use a healthy-contingencies approach may reduce the frequency with which the caregivers provide access to commonly identified reinforcers following problem behavior. Reducing the extent to which possible reinforcers follow problem behavior may in turn reduce the likelihood of transfer of function. However, this is a speculative suggestion; the data from the current study cannot address transfer of function. Future research should explicitly evaluate the likelihood of transfer of function following a single-function intervention and a multi-function intervention after initial functional analyses identifying a single, clear behavioral function. Although providing multiple reinforcers may improve intervention efficacy, the use of multiple reinforcers also could increase momentum of several behavioral classes, thus actually increasing the likelihood of treatment relapse if the intervention is suddenly discontinued. For this reason, both immediate and long-term treatment effects should be evaluated in future studies, including conditions in which the intervention is challenged.

Fourth, teaching caregivers to implement interventions like the healthy-contingencies approach described in this manuscript may constitute a form of "Tier 1 intervention" for behavior problems (e.g., Stewart et al. 2007). Tier 1 interventions are applied as proactive procedures designed to teach children appropriate behavior as a means of preventing problem behavior from developing. Caregivers fluent in a healthy-contingencies approach may apply this approach even in the absence of problem behavior by proactively teaching children to request for enriched breaks and ensuring frequent reinforcement for those requests. This frequent reinforcement of appropriate behavior, even in the absence of ongoing problem behavior, may result in children developing robust communicative repertoires. Additionally, instructing caregivers in healthy-contingency approaches before explicit behavior management is needed may increase the extent to which those caregivers "buy in" to the manipulation of environmental contingencies as a means of improving child behavior. Like many of the other advantages described above, these assertions are highly speculative and should be tested in future studies.

The current study should be considered a preliminary evaluation. The value of a healthy-contingencies approach is primarily a clinical one. As discussed above, it may have utility when behavior analysts cannot be immediately involved with a child, or when a functional analysis is underway. Presumably, the child's caregivers would be responsible for implementing the intervention. In the current study, we merely established that a healthy-contingencies intervention would be effective in a highly controlled context. The therapist in our study was a trained graduate student who worked as a behavior analytic consultant to local schools. Sessions were conducted in a university laboratory or a small, barren classroom. The structure of sessions, including the type and frequency of demands provided, was highly controlled, and every response resulted in a reinforcer.

Preliminary efficacy studies like this one are important to establish the potential efficacy of an intervention. However, there are four clear avenues for future research. First, the efficacy of the intervention should be evaluated under more naturalistic contexts. For example, will the intervention maintain its efficacy when the reinforcer is delivered on an intermittent schedule or when there are competing reinforcers also available (as would be the case in a classroom)? Additionally, our procedures should be replicated with a variety of different populations of individuals in need of behavioral treatment. Our participants had modest to typical verbal repertoires, which may have affected the rate at which they acquired the communicative responses in our study. Given the wide array of students for whom behavioral interventions are appropriate, replicating our study with individuals who have less extensive verbal repertoires may be warranted. Additionally, we only reinforced a vocal request as our appropriate behavior. Caregivers may want to increase other forms of appropriate behavior, such as compliance with demands. We believe a healthy-contingencies approach would be equally effective at increasing compliance, but future investigators may want to demonstrate this empirically.

Second, the ease with which caregivers can be trained to implement a similar intervention should be evaluated. Implementing a healthy-contingencies intervention may require discriminations that are not already in many caregivers' repertoires, as suggested by the wide range of procedural fidelity values when

similar interventions were implemented by caregivers (e.g., Harding et al. 1994; Millard et al. 1993). For example, caregivers must discriminate which antecedents are in place when problem behavior occurs so that they can withhold potential reinforcers after that behavior. We structured our sessions to make these antecedents clear (the child was ignored for the first half of the session and prompted to work through the second half). However, these distinctions are not clear in typical environments. If a caregiver asks a child to clean up and walks away as problem behavior occurs, should the caregiver follow through with prompting the child to clean up (possibly providing attention following the problem behavior) or continue walking away (possibly providing escape)?

The issues associated with caregiver discrimination of antecedents may be reduced if the healthy-contingencies approach that we describe is effective even when extinction is not in place for problem behavior. A third avenue of research would be to test the efficacy of providing breaks enriched with attention and materials for appropriate behavior without programming extinction for problem behavior. Providing a higher magnitude, higher quality, or more immediate access to enriched breaks than to the reinforcers maintaining problem behavior may be effective even when caregivers continue to reinforce problem behavior (Athens and Vollmer 2010).

Finally, the outcomes of a healthy-contingency intervention could be compared to those of an individualized intervention based on the results of a functional analysis. To date, interventions based on functional analysis outcomes are often more efficacious than those based on arbitrarily selected reinforcers or interventions that are contraindicated by the functional analysis outcomes. However, it is possible that an intervention that targets the three most common outcomes of a functional analysis may be as efficacious as an individualized intervention based on functional analysis outcome for many children. If this is the case, it would be important to assess caregiver and client preference for each procedure. However, it is also important to note that we only targeted the three most commonly identified functions, and used rather generic forms of escape, attention, and tangible items. The reinforcers maintaining problem behavior can be highly idiosyncratic (see Schlichenmeyer et al. 2013 for a review). When idiosyncratic events maintain problem behavior, a healthy-contingency intervention like the one described here may not effectively reduce that behavior; in these cases, individualized interventions based on functional analysis outcomes may be necessary. Additionally, we changed the forms of attention and tangible items used as reinforcers for two children from reminders of expectations and common stress-relieving items to play-based items and attention. We did not conduct a component analysis to determine which of the intervention components were responsible for behavior change. It is possible that access to arbitrary reinforcers (potentially preferred leisure items) was responsible for the entirety of behavior change. However, previous evaluations using similar package interventions have shown that function-based components were often necessary or sufficient. Future research should directly compare healthy-contingencies interventions to differential reinforcement procedures in which arbitrary, highly preferred items are provided for appropriate behavior. Future studies could also conduct component analyses of the healthy-contingencies

package to determine which intervention components are necessary for behavior change, but we expect that those components would probably be idiosyncratic across individuals (consistent with Harding et al. 1994 and Millard et al. 1993).

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Compliance with Ethical Standards

Conflict of interest Claire C. St. Peter and Tonya M. Marsteller declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the Institutional and/or National Research Committee and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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