Examining the Effects of Differential Reinforcement and Time-Out on Unsafe Playground Behavior

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EXAMINING THE EFFECTS OF DIFFERENTIAL REINFORCEMENT AND TIME-OUT ON UNSAFE PLAYGROUND BEHAVIOR

A Thesis

Submitted to the Graduate Faculty of the Louisiana State University and Agricultural and Mechanical College in partial fulfillment of the requirements for the degree of Master of Arts in The Department of Psychology

by

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Abstract

The purpose of this study was to examine the effects of differential reinforcement (DRO) without extinction, and then the additive effects of time-out, on reducing unsafe playground behavior. The results of the DRO in isolation phase indicated that DRO alone was only consistently effective in reducing or eliminating unsafe behavior for one out of four participants. The other three participants moved on to the multielement comparison where the combination of DRO and time-out (DRO+TO) condition was added. The DRO+TO condition reduced and eliminated unsafe playground behavior for all participants who experienced the condition. Those participants engaged in higher levels of positive social interactions in DRO+TO conditions compared to levels in DRO and baseline. The results of the concurrent chains preference assessment indicated, when given the choice, participants showed preference for one of the intervention conditions.
Introduction

Recess allows students an unstructured break in which students engage in play and social behaviors with peers after periods of structured and effortful instruction (Pellegrini, 2005; Pellegrini & Smith, 1993). The unstructured and playful nature of recess makes it unique compared to other school expectations (Pellegrini & Smith, 1993). During recess, students engage in behaviors like role-playing, negotiation, cooperation, sharing, and problem-solving skills for which there may not be as many opportunities during structured classroom time (Pellegrini, 2005; Pellegrini & Smith, 1993; Ramstetter et al., 2010). Several studies have found that preschool and elementary school student attention increased during class time after recess (i.e., students were less fidgety and engaged in more school tasks) compared to students who did not have recess (Holmes et al., 2006; Jarrett et al., 1998). Additionally, recess literature often highlights the significant role unstructured recess plays in a child’s social development (Pellegrini & Bohn, 2005).

Behavioral variability plays an important role in the development of social skills in young children during unstructured play. That is, children’s play behavior during recess (e.g., developing imaginative play scenarios, organizing a system of taking turns with playground equipment, or collaborating in a group game) is shaped by the responses of their peers. Children who engage in variable play behavior have more opportunities for their behavior to contact social reinforcers for peers. Behavioral variability is essential in generalized learning, increased access to reinforcement, and increases in skill acquisition (Galizio & Higbee, 2020; Jarvis et al., 2014; Neuringer, 2002; Wolfe et al., 2014).
Although unstructured play particularly at recess during school is critically important, sometimes injuries occur during recess due to problematic behavior such as incorrect usage of playground equipment or aggressive behavior toward other students. Unsafe problem behavior on the playground is a leading cause of accidental injury amongst children (Naeini et al., 2011; Tinsworth & McDonald, 2001). Incorrect use of playground equipment increases risk of injury; climbers and slides are common locations for injuries (Ward, 1987). The U.S. Consumer Product Safety Commission (USCPSC, 2010) reports that, every year, more than 200,000 children under 14 years old are brought into an emergency department for a playground-related injury in the United States. Despite efforts to decrease injuries through playground redesigns and safety guidelines, accidents still occur on playgrounds (Naeini et al., 2011). The majority of playground-related injuries happen at schools and daycares (Phlean, 2001). One potential explanation for this is the difference in adult-to-child ratios at schools versus when a caregiver takes children to the park. Recess at schools and daycares often have one teacher supervising approximately 20 students, whereas caregiver trips to the park typically have fewer children per adult. This may have two important effects: (a) decreased ability of teachers to notice and intervene on unsafe playground behavior and (b) greater likelihood of injuries due to more children using the same equipment. For example, a child climbing up the slide is more likely to be struck by another child going down the slide when there are more children on the playground and fewer adults supervising. Therefore, preventing unsafe playground behavior at school is an important safety measure.
Differential reinforcement (DR) procedures are a leading approach to reducing problematic behavior, as an alternative to more restrictive and punishment-based procedures. There are several different ways to arrange DR procedures, including differential reinforcement of alternative behavior (DRA), differential reinforcement of other behavior (DRO), and differential reinforcement of low rates of behavior (DRL). Prior to selecting a DR arrangement, the goals and context in which the DR procedure is applied must be considered. One study implemented a full-session DRL procedure to reduce unsafe playground behavior by arranging class prizes (e.g., colored ribbons for each student, a sign on the classroom door) contingent on reducing the overall number of slide and climber misuses each day during three elementary recess periods (Heck et al., 2001). Students had 5 days of playground safety training and the opportunity to earn ribbons each day contingent on a class-wide decrease in target behaviors during recess. Instances of slide misuse decreased during two of the three recess periods and climber misuse during one recess period. This approach provides an example of a simple way to decrease some potentially unsafe playground behavior. However, the researchers targeted only a couple of potentially unsafe behaviors on the playground (e.g., sitting at the bottom of the slide longer than a few seconds), did not include more unsafe targets (e.g., aggressive behavior, jumping from high playground equipment), and did not collect data on individual students with high rates of potentially unsafe behavior. DR procedures in which arbitrary reinforcers (e.g., ribbons) are not delivered following more severe forms of unsafe playground behavior may be needed to produce socially meaningful changes in playground safety.
The most frequently used DR approach to treating problematic behavior includes the use of a DRA procedure (Athens & Vollmer, 2010). During a DRA procedure the target behavior typically no longer produces access to the functional reinforcer (extinction), and reinforcer delivery is arranged contingent on an alternative appropriate behavior. On the playground, the functional reinforcers for unsafe playground behavior are most likely produced by the behavior themselves (i.e., maintained by sources of automatic reinforcement, such as the feeling produced when jumping off high equipment or access to playground equipment by pushing a peer down the slide) or attention from peers (Donaldson et al., 2013). Therefore, extinction is likely not an option as an intervention component. DRA without extinction is possible by minimizing reinforcers delivered following the target behavior and allocating a greater magnitude, higher quality, or more immediate reinforcers contingent on the alternative response (Vollmer, 2022). DRA procedures without extinction have been demonstrated to be effective (Slocum et al., 2015), but are sometimes less effective than DRA procedures with extinction (Hagopian et al., 1998). Additionally, given the likely functions of problematic behavior at recess, it may not be possible for the functional reinforcer to be arranged contingent on appropriate behavior. However, DRA can be effective at reducing problematic behavior even when an arbitrary reinforcer is provided contingent on the alternative response (Vollmer & Iwata, 1992).

Identifying a single alternative response to access arbitrary reinforcers is not ideal in the recess setting in which variable, safe play with peers is the overall goal. In a DRO arrangement, the reinforcer is delivered following the absence of problematic behavior for some period of time. A DRO arrangement may therefore produce greater
variability in play behavior while reducing problematic behavior. Schwebel et al. (2006) attempted to reduce unsafe playground behaviors using a DRO procedure, referred to as the Stamp-In-Safety program, designed to decrease unsafe playground behavior by increasing appropriate supervision behaviors in teachers. Experimenters trained teachers to increase attention and interaction with preschool students during recess by having teachers give students stamps contingent on safe playground behavior. The teachers were told to define safe playground behavior however they wanted and were encouraged to deliver at least one stamp to every student at a constant rate. On average, teachers delivered one stamp every 2-min. Occurrences of teacher redirections and explanations increased during the intervention compared to baseline. Redirections and explanations returned to baseline levels during the reversal phase, but teachers chose not to use the program when given the choice at the 6-month follow-up. Although appropriate supervision increased during the intervention, no conclusions can be confidently drawn due to the lack of experimenter control. Additionally, no data were collected for any unsafe behavior of the students, therefore no conclusions can be made about the intervention’s ability to decrease unsafe playground behavior.

Similar to DRA, extinction is involved when a functional reinforcer of the behavior is used in a DRO procedure (Jessel & Ingvarsson, 2016). However, when extinction is not feasible, a punishment-based procedure can be added to the DRO procedure without extinction to improve procedural success (Fisher et al., 1993; Hagopian et al., 1998; Hanley et al., 2005; Rooker et al., 2013). Furthermore, Hanley et al. (2005) compared the effects of and preference for DRA with and without extinction and punishment via a concurrent-chains preference assessment and found that participants
preferred the condition that included punishment. Therefore, when extinction of the
target behavior is not feasible, adding a punishment component to DR without extinction
can be an effective alternative that is also preferred.

One punishment procedure with evidence supporting its use in reducing
problematic behavior on the playground is time-out (Donaldson & Vollmer, 2011;
Donaldson & Vollmer, 2012; Donaldson et al., 2013; Fabiano et al., 2004). Time-out is
likely to be effective during recess because there is a great reinforcement discrepancy
between time-in and time-out (Turner & Watson, 1999; Shriver & Allen, 1996). That is,
the time-in environment is enriched with putative reinforcers (e.g., peers, swings, slides,
climbers) and a brief time-out in which access to those reinforcers is removed presents
a stark contrast (Solnick et al., 1977; Corralejo et al., 2018).

There are several important aspects of the time-out procedure to be arranged,
including location, verbalized reason (Gardner et al., 1976; Rodgers, 1992), release
contingencies (Donaldson & Vollmer, 2011; Mace et al., 1986), and duration (White et
al., 1972; Benjamin et al., 1983; Freeman et al., 1976; James, 1976; McGuffin, 1991;
Hobbs et al., 1978; Kendall et al., 1975) that influence time-out acceptability and
effectiveness (Corralejo et al., 2018). Prior research has found contingent observation
time-out procedures in which time-out occurs in the same general area as time-in but
away from potentially reinforcing stimuli to effectively reduce problematic behavior
(Porterfield et al., 1976; White & Bailey, 1990). Contingent observation time-out
procedures are particularly appropriate on the playground because the student can sit
on a bench or to the side of the playground equipment and easily be monitored by a
teacher (Donaldson et al., 2013). Rodgers (1992) found that providing a verbalized
reason of why a child is going to time-out does not increase the effectiveness of the intervention, but the children and the adults implementing time-out reported that providing a verbalized reason is more acceptable. There is currently no evidence to suggest that increasing the duration of time-out contingent on problematic behavior during time-out improves the effectiveness of time-out or reduces problematic behavior during time-out (Donaldson & Vollmer, 2011; Mace et al., 1986). However, reducing the time-out interval contingent on independently going to the time-out area increases independence at going to time-out (Donaldson et al., 2013). Research pertaining to duration of time-out collectively suggests that relatively brief time-out durations are sufficient for producing substantial reductions in problematic behavior (White et al., 1972; Benjamin et al., 1983; Freeman et al., 1976; James, 1976; McGuffin, 1991; Hobbs et al., 1978; Kendall et al., 1975).

There are common challenges and barriers that can decrease efficacy of time-out. Incorrect information regarding time-out parameters has led to ineffective use of time-out in classrooms and at home, therefore affecting the use and acceptability of the procedure (Corralejo et al., 2018; Riley et al., 2016; Turner & Watson, 1999). Additional challenges in time-out implementation are due to negative side effects of punishment (Donaldson & Vollmer, 2011; Mace et al., 1986; Slocum et al., 2022). Slocum et al. (2022) examined aggression and crying during time-out relative to time-in and found that nearly all participants engaged in higher levels of aggression and crying during time-out than time-in. Additional negative side effects of time-out have been reported in research examining the effects of release contingencies on time-out efficacy and reducing side effects (Donaldson & Vollmer, 2011; Mace et al., 1986). However, one
method to reduce negative side effects of punishment-based interventions may be to include DR as an intervention component as has been found when DR is combined with extinction (Lerman et al., 1999; Piazza et al., 2003).

Another concern of using a punishment procedure in the playground setting is the potential for punishment to produce generalized response suppression (Lerman & Vorndran, 2002). That is, after experiencing punishment procedures, concomitant with target behavior suppression, some individuals engage in less appropriate behavior as well. Generalized response suppression is a particularly problematic side effect at recess, wherein appropriate, variable play on the playground provides an important opportunity for children to acquire social and problem-solving skills (Danksy, 1980; Pellegrini, 2005; Pellegrini & Bohn, 2005; Pellegrini & Galda, 1982; Pellegrini & Smith, 1993). Therefore, monitoring the effects of playground interventions on social behavior is important.

The purpose of this study was to extend the limited research on behavioral interventions to promote safe play at recess, given the importance of unstructured play on child development. Specifically, we examined the effects of DRO without extinction, and then the additive effects of time-out on DRO without extinction on unsafe playground behavior. Additionally, we assessed the effects of these interventions on social interactions with peers during recess. Lastly, we assessed participant preference for conditions.
Method

Participants and Setting

Four children were recruited by referral from their kindergarten or preschool teacher for engaging in unsafe behavior during recess. Brady was a 5-year-old kindergarten student at a public elementary school in the southeastern United States. His teacher referred him for aggression toward peers and unsafe use of playground equipment during recess. Austin, Travis, and Karim were students enrolled in the same class in a private early education center in the southeastern United States. Austin and Karim were 3 years old, and Travis was 4 years old. None of the participants had disability diagnoses. Parent, teacher, and administrator consents were obtained for each participant.

Sessions took place once or twice per day, three to five days per week during the participant’s regularly scheduled recess. Brady’s recess took place at the elementary school playground area that consisted of slides, swings, monkey bars, and a basketball ball court. Brady’s recess period was combined with two other kindergarten classes, and occasionally one special education class. For the majority of recess sessions for Austin, Travis, and Karim, recess took place on a concrete court area with tricycles and playhouses. Five sessions\(^1\) were conducted on a stand-alone playground set that included ladders, a slide, tunnels, and a Merry-Go-Cycle. Additionally, two of Austin’s sessions were conducted inside due to weather. Inside sessions took place in a separate room from the typical classroom and had a playhouse, toy trucks, and Lego blocks.

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1 Sessions 4, 9, 10, 11, 30 for Austin; sessions 1, 18, 27, 29 for Travis; sessions 4, 28, 29 for Karim
Response Measurement and Interobserver Agreement

Trained graduate and undergraduate students used paper data sheets and tablets with the Lily data collection program to measure responses. Tablets were used to collect frequency data of unsafe playground behavior, social interactions with peers, inappropriate time-out behavior, and teacher responses to unsafe behavior. Additionally, tablets were used to collect data on the duration of time-out. Paper data sheets were used to collect data on selections during the preference assessments and the concurrent chains preference assessments. Frequency data collected on the tablets were converted into a rate after removing time spent in time-out from the total session duration. Data were collected continuously throughout the recess period and then analyzed using a Multi-Option Observation System for Experimental Studies (MOOSES) program.

The primary dependent variable, responses per min of unsafe playground behavior, was defined based on information from each participant’s teachers about the playground rules already established to keep their students safe at recess. Brady’s unsafe behavior was defined as any instance of a) inappropriate physical contact using a body part or object as a tool to make contact with a peer or teacher outside the context of playing tag or catch (e.g., hitting a peer with an open hand or fist, kicking, pushing peer to obtain access to equipment, hitting peer with a tree branch), b) equipment misuse of the slide (i.e., not seated on slide, starting to slide down while another peer was on the slide, climbing up the slide from the bottom, sitting at the bottom of the slide) or swings (i.e., swinging face down with his stomach on the seat, leaning head back to face up or behind him while in motion), or c) passing the
predetermined playground bounds for three or more seconds. Austin, Travis, and Karim had the same teacher so the response definition for unsafe behavior was the same for these participants. For them, unsafe behavior was defined as any instance of a) equipment misuse of the double-rider tricycle bikes (removing feet from the pedals or the backseat footrest on the bikes while in motion, removing hands from handles while in motion, using a bike to run into another’s bike), or slide (i.e., not seated on slide, starting to slide down while another peer was on the slide, climbing up the slide from the bottom, sitting at the bottom of the slide), b) throwing an object at least two feet above or away from their body (not including a ball), or c) removing an object from a peer’s possession without obtaining permission to access it from that peer or the teacher.

Data on inappropriate time-out behavior, social interactions between peers, selection responses during initial preference assessments and concurrent chains preference assessments, and teacher response to unsafe playground behavior were collected as secondary dependent variables. Inappropriate time-out behavior was defined as any instance of leaving the time-out area, interacting with other classmates, yelling out to peers, or aggression toward another person (Donaldson & Vollmer, 2011). Crying or other emotional behavior was not considered inappropriate during time-out. Experimenters were instructed to record duration of inappropriate behavior in time-out, but none occurred for any participant when the time-out procedure was implemented. Social interactions between the participant and their peers were recorded during time-in. Positive social interactions included vocal and nonvocal interactions with a peer that encouraged or maintained novel play (e.g., “Let’s play together!”, “Do you want to play with us?”, high-fives, hugs, initiating play with a peer). Negative social interactions
included vocal and nonvocal interactions that threaten (e.g., “Move or I will push you down the slide”) or exclude (e.g., “You can’t play with us”) another student, or aggression (e.g., pushing, hitting). Because aggression was a target behavior for Brady, instances of aggression were scored once as an unsafe behavior and again as a negative social interaction. Experimenters recorded frequency of positive and negative social interactions throughout the session. Additionally, selection responses during the multiple-stimulus without replacement (MSWO; DeLeon & Iwata, 1996) preference assessments were recorded on paper data sheets to assess each participant’s reinforcer preferences. Participant selection responses during the concurrent chains preference assessments were collected to assess participant preference of conditions. Lastly, experimenters collected data on correct and incorrect teacher responses to unsafe behavior according to the condition (e.g., a correct teacher response is scored when they implement time-out after participant breaks a rule during the DRO+Time-out condition).

Interobserver agreement (IOA) was collected for 64% of Brady’s sessions, 51% of Austin’s sessions, 45% of Travis’ sessions, and 43% of Karim’s sessions. Across all participants, each condition had at least at 33% of sessions with IOA. Proportional agreement was used to calculate IOA for unsafe behavior, positive social interactions, and negative social interactions (Rolider et al., 2012). The session was divided into 10-s intervals, each interval proportion was determined by dividing the smaller frequency by the larger frequency, and then calculating the mean proportion across intervals. Intervals in which both observers record no instances of behavior was calculated as a one. For Brady, mean IOA for unsafe behavior was 95% (range, 87%-100%), positive
social interactions was 98% (range, 96%-100%), and negative social interactions was 97% (range, 92%-100%). For Austin, mean IOA for unsafe behavior was 96% (range, 88%-100%), positive social interactions was 96% (range, 88%-100%), and negative social interactions was 99% (range, 98%-100%). For Travis, mean IOA for unsafe behavior was 97% (range, 94%-100%), positive social interactions was 97% (range, 93%-100%), and negative social interactions was 99% (range, 96%-100%). For Karim, mean IOA for unsafe behavior was 97% (range, 90%-100%), positive social interactions was 98% (range, 95%-100%), and negative social interactions was 99% (range, 99%-100%). IOA for selection responses during the MSWO preference assessments were collected for three of the participants, each at 100% agreement measured using the trial-by-trial exact method. Agreement was counted when the same selection was recorded, the number of agreements were divided by the total number of selection opportunities and multiplied by 100.

**Experimental Design and Procedures**

An initial baseline phase was followed by a DRO phase to capture the effects of DRO in isolation prior to examining the additive effects of time-out on DRO in a multielement design, if necessary. If DRO in isolation eliminated unsafe playground behavior, a reversal design was implemented. When necessary, the multielement phase included three conditions: baseline, DRO, and DRO+Time-out. Following the multielement comparison, a concurrent chains arrangement was used to evaluate participant preference for experienced conditions.
**Teacher Training**

Teacher training of the study procedures took place between baseline and DRO phase, and in vivo coaching during sessions, as needed. Neither teacher was trained in time-out; Brady did not experience time-out and the other participants’ teacher left before the multielement comparison phase had begun. Experimenters implemented the intervention for those participants after the teacher left. Experimenters employed behavioral skills training by providing instructions, modeling, opportunities to role play, and feedback pertaining to how the teacher should respond to possible behavior during the session. During all teacher training sessions, teachers had to correctly perform all steps on the procedural fidelity checklist (Appendix A, B, and C) during a role play to reach mastery. Training sessions lasted approximately 20-min. Each teacher met the criterion after one role play.

**Preference Assessment**

A MSWO preference assessment (DeLeon & Iwata, 1996) was used to measure the relative value of various stimuli to be used as reinforcers. The experimenter asked the teacher what she would be willing to use and the participant what they would like for a prize. If fewer than five of those options could be used as a prize (i.e., school appropriate items that are quick and easy to deliver before returning to class) experimenters added additional items that are likely to function as reinforcers (e.g., scented sticks, Bop-It game, stickers, sensory ball). Using five potentially preferred items, the experimenter conducted two rotations of a MSWO preference assessment with each participant. After placing each item equidistant from one another and the participant in front of the participant, the experimenter instructed the participant to pick
which item they wanted to play with, provided 1-min access to the selected item, and represented the array with the previously selected item removed. For each participant, the hierarchy was the same for both rotations. The top three preferred items used for Brady’s prize options were superhero stickers, bubbles, and scented lip balm to put on his hand. The top three preferred items used for Austin’s prize options were a remote-controlled car, monster truck keychains, and monster truck stickers. The top three preferred items used for Travis’ prize options were a remote-controlled car, monster truck stickers, and slime. The top three preferred items used for Karim’s prize options were slime, a remote-controlled car, and monster truck stickers. For the bubbles, remote-controlled car, and slime, the participant was given 2-min to play with the item before lining up to go back to class. The participant was able to keep the other items identified in the preference assessment.

**Experimental Conditions**

*Baseline.* The teacher\(^2\) reminded the participant(s) of the playground rules and responded to all playground behavior as they normally do. No reinforcers were delivered following recess. Each participant’s teacher reported occasionally using time-out in response to unsafe behavior during recess, but neither of the teachers chose to implement time-out during the initial baseline sessions. It is likely that the teachers had not been implementing time-out procedures with all essential components of the procedure with consistency. The teachers commonly used redirections and reprimands as consequences for unsafe behavior during baseline.

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\(^2\) Following a change in teacher, sessions were led by experimenters for Austin, Travis, and Karim. When this change occurred is indicated on Figure 1.
**DRO.** Prior to the start of each session, teachers reminded the participants of the rules and described the DRO contingency to the participant (i.e., if they play appropriately throughout recess and do not break any of the playground rules, they will earn a prize). The teacher asked the participant two questions that they needed to respond correctly to before releasing them to play: “What happens if you follow all the rules?” and “What happens if you break a rule?”. The top three items identified in the MSWO were in a basket or bag and remained in the recess area. An experimenter asked the teacher to respond to unsafe playground behavior in a manner consistent with baseline. If the participant did not break a rule during the entire recess period, the teacher allowed the participant to select one of the reinforcers at the end of recess. If the participant broke a rule at any point of the recess period, the teacher or experimenter did not deliver the reinforcer and informed the participant they did not earn the prize (e.g., “Unfortunately, you did not earn the prize today because you did not stay safe the whole time at recess”).

**DRO+Time-out.** Prior to the start of each session, the teacher individually reminded the participant of the recess rules. The teacher then explained the DRO+TO contingency to the participant: if they do not break a rule throughout recess, they will earn the reinforcer, but if they break a recess rule, they will be sent to time-out. The teacher or experimenter then explained the time-out procedure; if they go to and sit quietly in time-out then they will only stay sitting out for 1 min, but if inappropriate behavior occurred then they will sit for the entire 3-min. Prior to the first DRO+Time-out session, the experimenter asked the participant questions about the time-out procedure (e.g., “If I tell you to go to time-out, where do you go?”, “If you go right away and sit
calmly in time-out, how long do you have to stay?”, “If you go to time-out, do you still get a prize at the end of recess?”). The teacher or experimenter implemented time-out contingent on every instance of unsafe playground behavior (i.e., on a fixed-ratio 1 schedule). The time-out environment was separated from the play equipment and other students (e.g., a bench on the side of the play area or a spot on the concrete near the play area). The time-out area had two large sand timers of different colors placed nearby: one with a 1-min duration and the other with a 3-min duration. Once the participant arrived to time-out, a 1-min timer was started. If they engaged in no inappropriate behaviors during the time-out and the timer ended, they were told to return to the playground. If a participant engaged in inappropriate behavior during time-out, the 3-min timer would be started and participants could leave when that timer was completed; however, no participant stayed in time-out longer than 1-min. If they did not break a rule during the entire recess period (i.e., the participant never went to time-out), the participant was able to select a prize at the end of recess.

**Procedural fidelity**

Experimenters recorded procedural fidelity for conditions using a checklist of the implementation steps, also indicating errors of commission and omission of steps (see Appendices A, B, and C). Procedural fidelity checklist included steps to be completed before, during, and after a session. Each checklist was scored as a percentage of steps completed correctly. Every session checklist for each participant was 100%, except for Austin and Karim who each had one session with 85% steps correct due to time-out commission and omission errors made by the supervising teacher after the original teacher left. The new teacher implemented time-out with Austin for lying down in the
grass, which was not a part of the predetermined rules. The time-out environment for this occurrence was at a picnic table surrounded by other peers; Austin had to sit out for the remainder of recess (9-min). The other error refers to the teacher not allowing time-out to be implemented for Karim after he forcefully took an item from a peer (i.e., breaking his rule of asking to share).

**Qualitative Social Validity**

To measure enjoyment of recess across conditions, the experimenter asked the participant to rate that day of recess on a 3-point smiley scale (see Appendix D) after each session ended. The 3-point smiley scale had three options to choose from: (1) a smiling green face icon labeled “I loved it!”, (2) a yellow face with neutral expression labeled “It was ok.”, and (3) a red frowning face labeled “I did not like it.” The experimenter first explained the smiley faces and their corresponding labels and asked, “How did you feel about recess today?”. Next, the experimenter asked the participant to make a selection by pointing to one of the faces and reiterated the selection back to the participant to confirm (e.g., “OK, you picked green, which means you loved recess today?”).
Results

Figure 1 depicts unsafe behaviors per minute for all participants across sessions. Brady engaged in higher levels of unsafe behavior during the initial baseline phase, followed by an immediate reduction, and ultimate elimination, of unsafe behavior during the DRO phase. For Brady, adding time-out was not needed to reduce unsafe behavior to acceptable levels. Brady’s unsafe behavior increased during the reversal to baseline; however, after session 14, Brady lost bus transportation access due to problematic behavior on the bus and was no longer able to attend school. Austin and Travis consistently engaged in unsafe behavior during baseline. Karim initially engaged in low levels of unsafe behavior during baseline, which was inconsistent with teacher reports. During the final three baseline sessions, Karim engaged in higher levels of unsafe behavior. Austin and Karim engaged in lower levels of unsafe behavior during the DRO phase, but Travis’ level of unsafe behavior during the DRO in isolation phase was similar to his initial baseline levels. All three of these participants experienced earning the reinforcer at least once during the DRO phase. After three or four sessions of failing to earn the reinforcer, we began the multielement comparison. During the multielement comparison, DRO+TO was consistently effective in reducing or eliminating unsafe behavior. When the time-out procedure was implemented, no participant engaged in any instance of inappropriate time-out behavior (i.e., all time-out durations were only 1-min). During the multielement comparison, DRO sessions produced higher rates of unsafe behavior compared to sessions during the prior DRO phase for all three participants. Austin, Travis, and Karim participated in the choice phase, and rates of unsafe behavior remained consistently low during DRO+TO sessions during this phase.
for all participants. Austin and Karim engaged in unsafe behavior at similar levels to prior DRO phases, and Travis' unsafe behavior was eliminated during DRO sessions in the choice phase.

Figure 1. Rate of Unsafe Playground Behavior Per Minute

*Note.* DRO = differential reinforcement of other behavior; TO = time-out; (a) = Teacher procedural fidelity error
Figure 2 shows cumulative selection responses during the concurrent chains preference assessment for Austin, Travis, and Karim. Across the three participants, there were no selections for baseline. Additionally, all three participants selected to experience both the DRO and DRO+TO conditions at least once. Austin and Karim selected DRO+TO most often, and Travis selected DRO most often.

Figure 2. Cumulative Selection Responses of Concurrent Chains Preference Assessment

Note. BL= Baseline; DRO= differential reinforcement of other behavior; TO= time-out 
(a)= Teacher procedural fidelity error
Figure 3 depicts the average positive (left panel) and negative (right panel) social interactions with peers across conditions. For all participants, positive social interactions were lowest, on average, during the baseline condition. For all participants who experienced DRO+TO, the average levels of positive social interactions were highest in DRO+TO sessions. Additionally, Figure 3 shows the interaction averages separated by if the participant earned the reinforcer (i.e., DRO-Won or DRO+TO-Won) or did not earn the reinforcer (i.e., DRO-Lost or DRO+TO-Lost) during DRO and DRO+TO sessions. For all participants, there were no distinct differences in positive interaction levels between sessions in which they earned or did not earn the reinforcer. Across all four participants, the highest levels of negative social interactions occurred during baseline and DRO sessions in which the participant did not earn the reinforcer and consistently low in DRO sessions in which participants earned the reinforcer and all DRO+TO sessions.

Figure 4 shows percentages of each participant’s social validity ratings of recess enjoyment across conditions. Brady selected “green” following the majority of baseline sessions (87%) and in all DRO (100%) sessions. Similarly, Austin selected “green” following the majority of baseline (91%), DRO (92%), and in all DRO+TO (100%) sessions. Travis also selected “green” for the majority of baseline (71%), DRO (75%), and following all DRO+TO (100%) sessions. Karim’s selections varied more than the other three participants; following baseline sessions, he selected “green” following 44% of sessions, “yellow” following 33% of sessions, and “red” following 22% of sessions. Karim only rated DRO sessions “yellow” (70%) or “red” (30%); never “green.” Conversely, the highest percentage of “green” selected by Karim was following
DRO+TO sessions (71%). All participants’ percentages of “green” selections were highest in either DRO or DRO+TO conditions. A social validity rating of “red” was rarely selected by all participants, and never selected following a DRO+TO condition by any of the participants.

Figure 3. Rate of Positive and Negative Social Interactions Per Minute
Note. DRO= differential reinforcement of other behavior; BL= baseline; TO= time-out; grey filled symbols= participant did not win the prize
Figure 4. Percentage of Rating Selection Across Conditions

Note. DRO = differential reinforcement of other behavior; TO = time-out.
Discussion

All four participants’ unsafe behavior on the playground was drastically reduced or eliminated by one of the intervention conditions. The DRO condition was effective for eliminating Brady’s unsafe behavior, thus, the time-out component was not a necessary addition. Conversely, for the other three participants, DRO alone was not effective in eliminating unsafe behavior; therefore, participants were not contacting the reinforcement contingency. The combination of DRO and time-out (DRO+TO) reduced and eliminated unsafe playground behavior for all participants who experienced the condition. Additionally, participants engaged in higher levels of positive social interactions in DRO+TO conditions compared to levels in DRO and baseline. Furthermore, results from the concurrent chains preference assessment indicated a preference for either DRO+TO or DRO; no participant selected to experience the baseline condition when given the choice.

Brady’s success in the DRO condition differed from the other participants’ DRO sessions. Notably, aggression was the most prominent unsafe behavior, and likely had different functions than other behaviors included in his rules. Therefore, the reason that extinction was not needed to be effective might be due to the function of Brady’s aggression. Another reason for Brady’s success in the DRO condition may have been related to his age and learned history; he was older than other participants, in kindergarten, and may have had more experience with rules and delays to reinforcement. The ineffectiveness of DRO alone for the other participants could be attributed to factors such as the extended intervals between reinforcement opportunities, which may have been too long given the inter-response intervals (IRI).
they experienced in baseline. Additionally, the absence of an extinction component in the DRO procedure may explain the lack of success in the DRO alone condition. The DRO procedure used in this study was not designed consistent with effective DRO procedures that include extinction and have shorter initial values than the mean or median IRI.

All three participants who experienced the multielement comparison engaged in no instances of unsafe behavior on the playground during the first session that included time-out, indicating at least an initial effect of the threat of time-out. All participants did experience the time-out contingency at least once during the DRO+TO condition. One reason time-out may have been so effective for these participants is that there was a large reinforcement discrepancy between the enriched time-in environment and time-out. That is, potential reinforcers such as attention from peers and access to play equipment are readily available in the time-in environment and inaccessible in time-out environment.

It is important to highlight the limited use of time-out, as it was both brief in duration and infrequently implemented. Austin, Travis, and Karim each experienced one, two, and three total time-outs, respectively, during the course of the study. Because no participant engaged in problematic behavior during time-out, each time-out was only 1-min. The total duration spent in time-out across participants was 6 min out of 332 minutes of total DRO+TO sessions. The effectiveness of a 1-min time-out is consistent with previous time-out research that reduced time-out intervals contingent on time-out instruction compliance (Donaldson et al., 2013). However, this is not consistent with a previous parametric study on time-out duration, in which 1-min time-outs were not
as effective as 4-min time-outs (Hobbs et al., 1978). Additionally, the absence of problem behavior during time-out is inconsistent with previous time-out research (Donaldson & Vollmer, 2011; Mace et al., 1986; Slocum et al., 2022). Notably, Austin’s teacher referral indicated concern for problem behavior during the time-out procedure the teacher previously used. Future research should further investigate approaches that both reduce negative side effects of time-out and minimize the duration necessary for effective time-out procedures.

During the choice condition phase, participants exhibited a preference for intervention conditions. Austin’s concurrent chains preference assessment results indicated a preference for DRO+TO. Following a DRO+TO session in which a commission error occurred, he chose to experience DRO. However, after two unsuccessful DRO sessions, Austin reverted to selecting DRO+TO. Notably, after being unsuccessful in a DRO+TO session (i.e., broke a rule and experienced the time-out procedure), he selected to experience DRO+TO again. When experimenters asked why he chose DRO+TO, he reported that he “needed to win the prize this time.” This is consistent with Austin’s social validity results, in which he selected a “green” enjoyment rating selection for all DRO+TO sessions. Travis’s results indicated a preference for DRO. After being unsuccessful in his first two choices of DRO and DRO+TO, Travis continued to select DRO for the remainder of his choice opportunities, all of which he was successful in earning the reinforcer. This is moderately consistent with Travis’ social validity results; he selected a “green” enjoyment rating selection for all DRO sessions in which he earned a reinforcer. Once he contacted more success with DRO in the choice phase, a consistent pattern of preference appeared. Karim’s results
suggested a preference for DRO+TO. This is consistent with Karim’s social validity results; the highest percentage of a “green” rating selection by Karim was during DRO+TO sessions (71%). Karim experienced success in his first two choices, both were DRO+TO. However, after being unsuccessful in his third DRO+TO choice session, Karim’s choices began to alternate between DRO and DRO+TO as he continued to not win a prize. Reasons behind participant choice selection might be related to the participant’s successful experience with each condition. Previous research has found preferences for intervention with the addition of a punishment procedure (Hanley et al., 2005; Donaldson et al., 2014). Future research should continue to measure and incorporate preference to capture and expand the benefits of choice.

Given the potential of generalized response suppression as a possible punishment side effect (Lerman & Vorndran, 2002), and the valuable opportunities for children to engage in varied activities together during recess, assessing the implications of social interactions are imperative (Danksy, 1980; Pellegrini, 2005; Pellegrini & Bohn, 2005; Pellegrini & Galda, 1982; Pellegrini & Smith, 1993). Importantly, the decrease in unsafe behavior produced by the addition of time-out did not generalize to a decrease in all play behavior. Instead, participants continued to engage in play, often demonstrating more appropriate and improved social interactions. Reasons behind this might be related to the increase in opportunities to respond as a result of the decrease in unsafe behavior and negative social interactions.

There are several limitations that should be considered when discussing the implications of this study. Teacher social validity was not able to be conducted for Austin, Travis, and Karim’s teacher due to the teacher leaving, therefore the intervention
was not consistently teacher implemented. Additionally, Brady’s premature study termination also hindered teacher social validity being collected. Collecting teacher social validity and having the teacher implement all aspects of a recess intervention would have provided important external and ecological validity benefits. Future research should incorporate teacher social validity and attempt to capture the effects of procedures that are consistently teacher-implemented.

Another limitation to be considered is related to the design of this study. Given that time-out was not implemented in isolation, we cannot make conclusions as to the extent to which DRO remained a necessary part of the intervention. Incorporating potentially unnecessary components is important to consider given the context (i.e., 1 teacher to multiple kids in a larger area). Adding effort has potential for not only limiting the teacher’s procedural fidelity, but also teacher social validity. Additionally, there may be benefits to examining the effects of time-out in isolation in terms of preference. As previously mentioned, previous research has shown preference for intervention that has the addition of a punishment procedure (Hanley et al., 2005; Donaldson et al., 2014). Although it does not demonstrate a preference for punishment procedures alone, there might be a case to be made for it in this context. Time-out at recess presents a different setting where time-out may produce salient beneficial side effects that may make it preferred (e.g., time-out decreasing behavior that previously prevented access to social reinforcement from peers). Future research might consider incorporating time-out alone to assess the necessity of DRO and how it influences preference.

Participants were all students a part of a larger class, many of whom engaged in similar unsafe behaviors. This presents the limitation of participants being singled out
for intervention and creates an issue of unfairness by arranging reinforcers or punishers for some students but not all, despite others engaging in similar behaviors. Consequently, there might be benefits regarding teacher social validity for effective class-wide interventions that ease teacher effort to manage student behavior across the class during recess. Future research could investigate the use of group contingency or class-wide procedures to reduce unsafe behavior during recess and promote appropriate play.
Appendix A. Baseline Procedural Fidelity Checklists for Experimenter

Participant:_____  Session #:____  Date:____  Experimenter:________

Checklist Instructions:
- If teacher completed the component, place a check mark on the line.
- If teacher did not complete the component, place a circle on the line.

Before starting the session:
___ Teacher reminds the participant of the playground rules (e.g. “Today at recess, remember it is important to play safely. That means…”)

After the session:
___ Teacher does not deliver a prize at the end of recess.
Appendix B. DRO Procedural fidelity Checklists for Experimenter

Participant: _____  Session #:_____  Date:____  Experimenter:________

Checklist Instructions:
• If teacher completed the component, place a check mark on the line.
• If teacher did not complete the component, place a circle on the line.

Before starting the session:
___ Teacher reminds the participant of the playground rules (e.g. “Today at recess, remember it is important to play safely. That means…”)
___ Teacher states consequences of unsafe playground behavior for the sessions (e.g. “If you do not break any of the playground rules, then you will get prize at the end of recess. If you do break a rule, then you will not get a prize.”)
___ The teacher will ask the participant to recite back the contingencies of the condition (e.g., “What happens if you follow all the playground rules?”, “What happens if you break any of the playground rules?”).

During the session:
___ Teacher responds to unsafe playground behavior as they typically do prior to the study but does not implement time-out.

After the session:
___ Teacher delivers the correct consequence at the end of recess.
    ___ Delivered prize    ___ Did not deliver prize
Appendix C. DRO+Time-out Procedural Fidelity Checklist for Experimenter

Participant:_____ Session #:_____ Date:_____ Experimenter:_______

Checklist Instructions:
- If teacher completed the component, place a check mark on the line.
- If teacher did not complete the component, place a circle on the line.

Before starting the session:
___ Teacher reminds the participant of the playground rules (e.g. “Today at recess, remember it is important to play safely. That means…”)
___ Teacher tells participant about consequences of unsafe playground behavior for the sessions.
___ The teacher will ask the participant to recite back the contingencies of the condition (e.g., “What happens if you follow all the playground rules?”, “What happens if you break any of the playground rules?”).

During the session:
___ Teacher gives participant corrective feedback/reminders if they engage in unsafe playground behavior and instructs participant to go to time-out.
___ Teacher flips over both sand timers and reminds participant that they only have to stay for 1-min if they sit in time-out correctly.
___ Teacher releases participant from time-out at the correct time contingent on their behavior during time-out.

After the session:
___ Teacher delivers the correct consequence at the end of recess.
    ___ Delivered prize   ___ Did not deliver prize
Appendix D. Social Validity for Students

Participant: ______
Session #: ______ Condition: ______
Date: ______ Experimenter: ______

Instructions for experimenter:
- After every session, explain to the participant what each smiley face means (i.e. green=I liked it a lot, yellow=it was just ok, and red=I did not like it). Tell them: “Point to which smiley face is how you felt about recess today.”
- After they pick a smiley face, reiterate the selection back to the participant to confirm (e.g., “OK, you picked green, which means you loved recess today?”).

I liked it a lot!It was just OK.I did not like it.
Appendix E. IRB Approval

TO:  
LSUAM Col of HSS Psychology  
CC00124

FROM:  
Alex Cohen  
Chairman, Institutional Review Board

DATE:  
28-Nov-2022

RE:  
3903

TITLE:  
Evaluations of Time-Out Procedures with Young Children

New Protocol/Amendment/Continuation:  
Transitional Amendment

- Removing "Release" from the title.
- Add Elizabeth Linton as an investigator.
- Recruiting changed to administrator and teacher referral following researcher contact with local preschools and elementary schools.
- Add teachers as implementers of the time-out procedure following training in the procedures.
- Remove in-home and Donaldson Lab as potential settings.
- Add exclusion criteria of children with intellectual and developmental disabilities.
- Add the possibility of using reinforcement-based procedure prior to or in addition to time-out procedures.
- Updated consent form to align with changes described above.
- Added social validity surveys.

Review Type:  
Expedited Review

Risk Factor:  
Minimal

Review Date:  
28-Nov-2022

Status:  
Approved

Approval Date:  
28-Nov-2022

Approval Expiration Date:  
(annual unless otherwise stated)

Number of subjects approved:  
100

By:  
Alex Cohen, Chairman

Continuing approval is CONDITIONAL on:

1. Adherence to the approved protocol, familiarity with, and adherence to the ethical standards of the Belmont Report, and LSU’s Assurance of Compliance with DHHS regulations for the protection of human subjects*
2. Prior approval of a change in protocol, including revision of the consent documents or an increase in the number of subjects over that approved.
3. Obtaining renewed approval (or submittal of a termination report), prior to the approval expiration date, upon request by the IRB office (irrespective of when the project actually begins); notification of project termination.
4. Retention of documentation of informed consent and study records for at least 3 years after the study ends.
5. Continuing attention to the physical and psychological well-being and informed consent of the individual participants, including notification of new information that might affect consent.
6. A prompt report to the IRB of any adverse event affecting a participant potentially arising from the study.

SPECIAL NOTE: When emailing more than one recipient, make sure you use bcc.

* All investigators and support staff have access to copies of the Belmont Report, LSU’s Assurance with DHHS, DHHS 45 CFR 46 and FDA regulations governing use of human subjects, and other relevant documents in print in this office or on our World Wide Web site at http://www.lsu.edu/research/

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References


Vita

Elizabeth Kay Linton, born in Bradenton, Florida, received her bachelor’s degree in psychology from the University of Florida. After studying behavior analysis at the University of Florida, she decided to continue her education at Louisiana State University in the School Psychology doctoral program. Upon completion of her master’s degree, she will continue to work on her doctorate.