

A Descriptive and Experimental Evaluation of Preschooler Aggressive Toy Play

By

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## Abstract

Aggressive toy play is commonly observed in early childhood classrooms, yet strategies to address this problem behavior have not been articulated in the research literature. In Study 1, we examined the relation between aggressive play and preference for three toy types: a) structured “aggressive” (e.g., action figures), b) structured “non-aggressive” (e.g., docile animals), and c) unstructured (e.g., wood blocks) toys. Nine of 10 children that participated preferred structured aggressive toys; only half of the children exhibited the most aggressive play with toys of this type. For three children, we identified two sets of toys that were highly preferred (HP) and correlated with aggressive play and two sets of toys that were less preferred (LP) and not correlated with aggressive play. These children and toys were evaluated in Study 2 in which the direct and indirect effects of blocking aggressive play were assessed on aggression and toy interaction. Blocking reduced aggressive play for two of three children. All participants displayed a shift in preference for toys as a function of blocking. One participant displayed a decrease in overall levels of interaction as a function of blocking; however, no other negative side effects were observed.

## A Descriptive and Experimental Evaluation of Preschooler Aggressive Toy Play

The National Association for the Education of Young Children deems play a fundamental feature of developmentally appropriate practice (NAEYC, 1997). Toy play is generally accepted to promote social, motor, and cognitive skills (NAEYC, 1997; Quilitch & Risley, 1973; Sigafos, Roberts-Pennell, & Graves, 1999), which is evident in the prevalence of free play opportunities throughout early childhood centers (Sigafos et al., 1999).

In addition to promoting healthy development, noncontingent access to highly preferred toys is a proactive strategy for deterring problem behavior (Hanley, Piazza, & Fisher, 1997; Ringdahl, Vollmer, Marcus, & Roane, 1997; Roscoe, Iwata, & Goh, 1998; Vollmer, Marcus, & Leblanc, 1994). In an often cited study showing the side effects of freely accessible toys, Horner (1980) suggested that an environment “enriched” with highly preferred play materials promotes appropriate engagement and simultaneously attenuates problem behavior. However, the respective goals of high levels of engagement and low levels of problem behavior are in conflict when a child’s highly preferred toys specifically occasion aggressive play or other problem behavior (see Piazza, Fisher, Hanley, Hilker, & Derby 1996, for examples of this relation). Many early childhood educators exclude structured “aggressive” toys, such as toy guns and action figures, because of the high likelihood that these toys will promote specific and aggressive play. These same educators supply their classrooms with open-ended toys (also known as unstructured toys) such as blocks, Legos®, and play dough, because these toys are thought to occasion varied and even creative

behavior and because these toys do not often occasion aggressive-themed play (Carlsson-Paige & Levin, 1990).

Aggression is commonly displayed toward other people, and is therefore likely to be socially mediated. In a review of the literature relevant to the functional analysis of problem behavior, Hanley, Iwata, and McCord (2003) reported that all but one published functional analysis of aggressive behavior yielded results that suggested a sensitivity to social reinforcement (for the notable exception, see Thompson, Fisher, Piazza, & Kuhn, 1998). Aggressive toy play, by contrast, often occurs with two toys and in the absence of another person. Aggressive toy play is therefore different than other forms of aggression in that the presence of another person is not required. This feature of aggressive toy play, along with the fact that it often occurs for extensive periods in the absence of social consequences, suggests that this behavior is likely maintained by automatic as opposed to social reinforcement. In other words, the likely reinforcers for aggressive toy play are usually produced directly by the play and not mediated by another person.

Response blocking procedures have been used to reduce various forms of automatically reinforced problem behavior, such as head hitting, property destruction, and pica (Fisher, Grace, & Murphy, 1996; Fisher, Lindauer, Alterson, & Thompson, 1998; Hagopian & Adelinis, 2001; Lalli, Livezey, & Kates, 1996; Lerman, Kelley, Vorndran, & Van Camp, 2003; Lindberg, Iwata, & Kahng, 1999; Reid, Parsons, Phillips, & Green, 1993; Smith, Russo, & Le, 1999; Thompson, Fisher, Piazza, & Kuhn, 1998). Beyond this direct reductive effect, which is likely attributable to an

extinction or punishment process (Lerman & Iwata, 1996; Smith et al., 1999), changes in the probabilities of unblocked behavior or of blocked behavior during times in which blocking is not programmed may occur (Lerman & Iwata, 1996; Lerman & Vorndran, 2002). Positive indirect effects of reducing a target behavior via extinction or punishment, such as increases in the variability of desirable toy play (Lalli, Zanolli, & Wohn, 1994), eye contact and compliance (Rolider, Cummings, & Van Houten, 1991), correct responding during a discrimination task, (Koegel & Covert, 1972) and object manipulation (Hanley, Iwata, Thompson, & Lindberg, 2000; Fisher, Lindauer, Alterson, & Thompson, 1998; Harris & Wolchik, 1979; Koegel, Firestone, Kramme, & Dunlap, 1974; Wells, Forehand, Hickey, & Green, 1977) have been demonstrated. In addition, Tarbox, Tarbox, Ghezzi, and Wallace (in press) assessed the effects of blocking the mouthing of a leisure item on the item's effectiveness as a reinforcer for academic responding, and concluded that the blocking procedure decreased stereotypy with highly preferred leisure items but did not alter the reinforcing efficacy of those items.

Negative indirect effects of extinction or punishment via response blocking have also been reported. These include decreases in overall item-manipulation and increases in unblocked forms of stereotypy (Lerman, Kelley, Vorndran, & Van Camp, 2003), aggression (Hagopian & Adelinis, 2001), and post-intervention increases in rates of stereotypy (Rapp, 2006). Rapp described a three-component sequence to detect changes in post-intervention rates of the stereotypic behavior of a 9-year-old boy who was diagnosed with autism and mental retardation. No consequences (baseline) were delivered following stereotypic behavior during the first component,

blocking was arranged for stereotypic behavior in the second component, and baseline conditions were again in effect during the third component. An increase in stereotypy was observed in this third component, suggesting that the period of time with response blocking may have served to establish the value of the reinforcers derived from engaging in stereotypy and increase the probability of stereotypy once the blocking procedure was terminated. This relation is analogous to the 'rebound effect,' in which a suppressed behavior subsequently reappears with higher frequency or intensity. Rebound effects have been examined following interventions on a diverse range of problem behaviors such as motor tics associated with Tourette's syndrome (Meidinger, Miltenberger, Himle, Omgvig, Trainor, & Crosby, 2005), smoking (Chapman, Haddad, & Sindhusake, 1997), and behaviors associated with several psychological disorders such as depression (Roemer & Borkovec, 1994) and obsessive compulsive disorder (Smari, Sigurjonsdottir, & Saemundsdottir, 1994). However, research in this area has produced negative or conflicting results regarding the rebound effect.

No research to date has been conducted on the potential for a rebound effect from the treatment of the aggressive toy play of typically-developing preschoolers, despite the fact that a common criticism to the suppression of such behavior appears similar to the concerns associated with the rebound effect (Carlsson-Paige & Levin, 1990):

Insofar as this new generation of war toys [structured aggressive toys] is influencing play, or more accurately, undermining play and turning it into

imitation, we can argue that they should not be called toys at all; and that children should not play with them at all. But children want them, children won't give up trying to get them, and children will find a place to use them where they aren't banned. (p. 61)

Concerns regarding aggressive toy play frequently appear in professional publications such as *Young Children* (Levin, 2003) and the popular press; newspapers, such as the *Wall Street Journal* (Pereira, 1994), and magazines, such as *Time Magazine* (Ludke, 1990), have published articles offering suggestions for minimizing aggressive play. The suggestions are, however, quite disparate, and include: (a) creating an open dialogue with children to address violent themes while engaging in play, (b) redirecting play, and (c) providing time-out for inappropriate play behavior (Carlsson-Paige & Levin, 1990; Ludke, 1990; Pereira, 1994). Only one empirical study to date has demonstrated the direct effects of an intervention for this problem (Sherburne, Utley, McConnell, & Gannon, 1988).

Sherburne et al. (1988) compared two strategies to reduce the violent or aggressive-themed play exhibited by eleven preschool children in an inclusive classroom during free-play periods. The first strategy involved a verbal prompt that interrupted each instance of inappropriate play (e.g., "Find a new way to play") and occasionally suggested an alternative behavior (e.g., "Make the Lego's into a building"). In the second strategy, the teacher directed any child engaged in aggressive play to a designated area in the classroom (i.e., 2' x 4' carpet square) to continue their aggressive play without further interference. This area was at all times



accessible to one or multiple children, and children were allowed to exit the carpet square when their aggressive play ceased. Any child who did not move to the carpet square within 10 s of the teacher's instruction would be physically guided to the area. In addition, the teacher stated the contingency for aggressive play at the beginning of each day (i.e., "The rug is here. When you play guns or other dangerous games the teacher will tell you to go to the rug and play."). The researchers found that both strategies decreased instances of aggressive play, but a greater decrease was observed during the latter strategy. The authors speculated that the small carpet square may have served as a timeout from the reinforcing properties of the free play area. This study stands out as providing the only empirical evidence for specific strategies to address aggressive toy play, but it was limited in two important ways. First, structured aggressive toys were specifically not available in the classroom during the analysis, so the impact of this treatment when aggressive toy play is perhaps more likely to be occasioned is unknown. Second, the possibilities that overall toy interaction decreased or that aggressive toy play increased under conditions in which the treatment was not in place (i.e., the rebound effect) were not evaluated.

Therefore, several questions remain regarding the direct and indirect effects of strategies for addressing aggressive toy play of preschool children. Response blocking appears to be a good strategy to minimize aggressive toy play because of the likelihood that this behavior is maintained by its own reinforcement and because the direct effects of response blocking have been well-documented for other automatically-reinforced problem behavior (Fisher et al., 1996; Fisher et al., 1998;

Hagopian & Adelinis, 2001; Lalli et al., 1996; Lerman et al., 2003; Lindberg et al., 1999; Reid et al., 1993; Smith et al., 1999; Thompson et al., 1998). Fewer studies have reported on the indirect effects of response blocking (or similar reductive procedures), and those that have report discrepant results that are difficult to generalize to relations between blocking and the aggressive toy play of preschoolers. Therefore, the current study extends previous research by evaluating children's preferences for structured and unstructured toys and their relative levels of aggressive play with each toy type. The direct and indirect effects of blocking aggressive toy play were then evaluated with preschoolers who preferred structured aggressive toys and demonstrated high levels of aggressive play with these toys.

### Study 1

#### *Method*

##### *Participants, Materials, and Setting*

Preschool teachers in the Edna A. Hill Child Development Center at the University of Kansas were asked to identify children for whom aggressive toy play was observed in the classroom. Ten preschool-aged (2.5 to 3.7 years old) children of typical development, one female and nine males, were identified from a pool of 35 and participated in Study 1. Parent consent was obtained prior to their inclusion in the study, and each child's verbal assent was obtained prior to each session.

The same eleven toy sets were included in the preference assessments for each child and could be placed in one of three categories according to the way in which the toys were portrayed by the manufacturer or the media. We included five structured aggressive toy sets portraying specific aggressive roles (i.e., action figures, wild

predatory animals, Disney® villains and heroes, vehicles, and predatory dinosaurs), four structured non-aggressive toy sets portraying specific passive roles (i.e., docile animals, domestic animals, ponies, and community helpers), and two unstructured toy sets portraying neither aggressive nor passive roles (i.e., wooden blocks and Lego's®). Twelve to fifteen exemplars of each toy set were placed in clear plastic bins (e.g., 12 action figures in one bin, 12 predatory animals in a second bin). Table 1 lists the contents of each bin. Assessments were conducted on the floor of a 3 m x 3 m session room that was in close proximity to the child's classroom.

#### *Procedure for Preference Assessments*

A multiple stimulus without replacement (MSWO) preference assessment was conducted similar to that described by DeLeon and Iwata (1996). Prior to the assessment, children were allowed to play with each toy set for 90 s. At the beginning of each assessment, the eleven toy bins were randomly placed in a semi-circle array in front of the participant. The experimenter sat near the child and prompted him to "look at all of the toys, and point to your favorite." The child was given 2 min of continuous access to the toys in the bin following his selection. Data were recorded on interaction and aggression during these 2-min periods (see below). The selected toy bin was removed from the array on subsequent trials, and the positions of the remaining toy bins were rotated by placing the left-most bin to the right of the array. The experimenter followed each repositioning with the prompt, "Look at all of the toys, and point to your favorite." This procedure continued until all toy sets were experienced for 2 min or until the child refused to select a bin of toys (this latter event occurred for only one child). The experimenter sat beside the child and provided

verbal attention every 30 s throughout each assessment. The attention delivered described a feature of the toy (e.g., “The doctor has a robe.”) or of the child (e.g., “Nice haircut.”), but not a feature of his play with the toys (e.g., “Superman is conquering the world!”). In addition, the experimenter provided attention at the request of the child. There were no programmed consequences for aggression in this assessment—the experimenter did not comment on aggressive toy play, and there were no other changes to the environment made following aggression (e.g., the toy was not removed, a different toy was not offered, and prompts to play differently were not provided). A second preference assessment, identical to the first, was conducted with each child to assess the consistency of preference rankings and the stability of the level of aggressive play evoked by each toy type. The mean number of days between assessments was 5 (range, 1 to 16).

#### *Data Collection and Interobserver Agreement*

Toy selection was defined as the child pointing to a toy bin following the prompt, “point to your favorite.” Ranks were assigned to each toy based on the order in which the participant selected the toy bin from the array. For example, the first toy set selected was given a rank of 1; thus, highly-preferred toy sets would be associated with ranks near 1 and less-preferred toy sets with ranks near 11. During the 2-min access period following each selection, toy interaction and aggressive play were recorded using a 10-s partial interval scoring procedure. Interaction, defined as any part of the body in contact with the toy during any part of the interval, was recorded but was not included in the analysis due to near 100% levels of interaction for all toys within and between assessments. Aggression was defined as any instance of banging,

stomping, throwing, hitting, smashing, choking, swiping, breaking, kicking, or verbal threats directed at the toys, between the toys, or with the toys towards the experimenter. The mean preference rank and the mean level of aggressive play were computed for each toy set following two preference assessments by adding the measures obtained from each assessment and dividing by two.

Two observers served as primary and secondary data collectors and scored target behaviors using paper and pencil during an average of 61% of assessment trials across all children (range 36% to 100%). The observers were trained by the experimenter on the definitions of aggressive play through a study sheet that contained examples and non-examples of each member of the observation code. In addition, the experimenter modeled different forms of aggressive play and provided five practice videos to score. Interobserver agreement (IOA) on interaction and aggression was calculated during the 2-min trials by dividing the number of intervals with agreements by the total number of intervals and multiplying by 100. An agreement was scored for interaction and aggression if both data collectors scored either an occurrence or non-occurrence of the behavior in the same interval. Agreements were scored on each trial for toy selection if both data collectors wrote the same toy item in the same rank order; a disagreement never occurred on this measure. Average selection, interaction, and aggression agreements were 100%, 99.9% (range, 92% to 100%) and 94% (range, 33% to 100%). Agreement on aggression for six of the 135 trials with a second observer was at or below 67%. These low reliability scores seemed to occur when one observer, usually the

secondary observer, overlooked a specific member of our multi-member code and the omission persisted throughout the 2-minute trial. These data were therefore retained in our analysis.

### *Results*

We initially sought to determine the stability of toy preferences and levels of aggressive play across the two assessments for each child. To this end, Pearson correlation coefficients were computed and are displayed in Table 2. Behavior was considered stable when the correlation coefficient equaled or exceeded the critical  $r$  value of 0.52 (Salkind, 2001). The preference measure was stable for all participants ( $M = .78$ , range, 0.57 to 0.94), whereas the aggressive play measure was stable for only one participant ( $M = .31$ , range, -.17 to 0.78). A closer inspection of both assessments for each child indicated that fluctuations in the absolute level of aggressive play often occurred across assessments, and this produced low to moderate correlations for most participants. Other relations that suggested greater consistency in levels of aggression between assessments were evident on the data. The likelihood that the toy with the most aggressive play from the first assessment evoked aggressive play in the second assessment was 89%. For those toys that evoked any aggressive play in the first assessment, aggressive play was observed with the same toys in 80% of the second assessments. For those toys that *did not* evoke any aggressive play in the first assessment, aggressive play was also not observed with the same toys in 64% of the second assessments. The top panel of Figure 1 shows the toys that reliably occasioned aggressive toy play (greater than 10% of intervals with aggression in both assessments), reliably did not occasion aggressive toy play (less than 10% of intervals

with aggression in both assessments), or were unreliable with respect to aggressive toy play across preference assessments. For each toy type, the majority of the children played either reliably aggressive or reliably not-aggressive between assessments (this occurred for 71% of the toy sets across children).

Based on the consistently high correlations between the preference indices across the two assessments, and the consistency observed for those toys that did and did not occasion aggressive play (see top panel of Figure 1), we posit that our assessment is a reliable tool for determining preschooler preferences and aggressive toy play among different toy sets.

The second aim of Study 1 was to determine children's relative preferences for the three toy types. To this end, the mean preference ranks for the toy sets in each category were averaged to create an overall rank score for the structured aggressive, structured non-aggressive, and unstructured toy types. The top panel of Figure 2 displays that 9 of the 10 children preferred the structured aggressive toys. The remaining child, Cara, preferred the structured aggressive toys and the unstructured toys similarly. After mean ranks were computed for each toy set, these were ordered from highest to lowest to create a relative preference hierarchy (see the bottom panel of Figure 1). In the case of a tie (i.e., two equal mean ranks), the toy set that was selected first in the second assessment was given a higher position on the preference hierarchy. Nine of the children had preference hierarchies in which four of their top five toy sets were structured aggressive toys. For five children, all five structured aggressive toy sets occupied the top five spots in their preference hierarchy. These

data suggest that the preference demonstrated for the structured aggressive toys was prevailing and, generally, very strong.

The third and final aim of Study 1 was to assess the relation between toy type and aggressive play. To this end, the mean level of aggressive play with each toy set was averaged across the toy sets in each category. It has been suggested that structured aggressive toys evoke elevated levels of aggressive play (Carlsson-Paige & Levin, 1990); however, Figure 2 (bottom panel) shows that only half of the participants in the current study (Logan, Paul, Don, Andy, Cara) displayed the highest mean level of aggression with structured aggressive toys. The remaining participants engaged in more aggressive play with either structured non-aggressive toys (Art, Ace, Danny, Dexter) or unstructured toys (Derek). Further, for those children who did display the highest level of aggressive play with structured aggressive toys, this toy type did not often exclusively evoke aggressive play. Many children displayed similar levels of aggressive play across two or three toy types. The similarity in relative levels of aggressive play across toy types, paired with the idiosyncrasy of the absolute levels of aggressive play with each toy type across children, further highlight the lack of a relation between toy type and aggressive play.

### *Discussion*

The creation of an enriched environment with the goal of proactively minimizing inappropriate behavior depends on a teacher's ability to provide noncontingent access to highly-preferred materials or activities. The first step in achieving this environment is to identify items which are preferred and also do not occasion inappropriate behavior. Assessments that simultaneously measure object



engagement and problem behavior are common tools to determine which items to include or exclude from an environment (Fisher, DeLeon, Rodriguez-Catter, Keeney, 2004; McEntee & Saunders, 1997; Piazza et al., 1996; Shore, Iwata, DeLeon, Kahng, & Smith, 1997). The current assessment was successful in simultaneously measuring preference for specific toy sets and the aggressive play associated with them. One strength of this assessment method was that high correlations between preference measures across two assessments were obtained. By contrast, moderate to weak correlations between aggressive play measures leaves the reliability of our assessment measure to question. However, the observed variability in this latter measure appears to have been influenced by fluctuating absolute levels of aggressive play, possibly imparted by the heterogeneity of aggressive toy play. Previously published assessments of the evocative effects of certain stimuli (Fisher et al., 2004; McEntee & Saunders, 1997; Shore et al., 1997) have primarily focused on problem behaviors of a single topography, such as stereotyped hand flapping and self-injurious head hitting. The current study extends this assessment procedure to the measure of aggressive toy play, a diverse behavioral repertoire that includes gross motor (e.g., throwing a toy), fine motor (e.g., moving a figure's hand to hit another figure), and vocal (e.g., threatening an aggressive action) behavior. A teacher may be most interested in the relative levels of aggressive play, that is, which toys will reliably occasion *some* or *no* aggression. This assessment provided more consistent results with respect to these relative measures, and thus, can aid in the creation of an enriched environment.

In this study, the most frequent top-ranked items were toys that are often banned from early childhood centers because they are thought to evoke elevated

levels of aggressive play. The fact that a majority of the children in Study 1 preferred structured aggressive toys to other types of toys may have been alarming if these toys were consistently correlated with the highest levels of aggression. Surprisingly, results of Study 1 showed that half of the participants played *more* aggressively with structured non-aggressive or unstructured toys than with structured aggressive toys. These data suggest that the potential relation between structured aggressive toys and aggressive play is idiosyncratic and may not be as prevalent as previously proposed. Given these results, we caution against bans on structured aggressive toys. Not only would this strategy limit children's access to preferred toy materials, but it may not decrease the probability of aggressive toy play for many children.

Study 1 was limited in two ways. First, the number of toy sets included in each category was unequal (i.e., 5 structured aggressive, 4 structured non-aggressive, and 2 unstructured toy sets). However, each category was represented by at least two toy sets and preference rank was reported as a mean, thereby partially addressing the difference in category representation. The second limitation was that children were recruited for participation based on teacher report of elevated levels of aggressive toy play in their classroom. This potential selection bias may limit the generality of conclusions regarding preference and aggressive play. Namely, other children may not have demonstrated clear preference for structured aggressive toys or may have exclusively engaged in aggressive play with this toy type.

Irrespective of the concerns regarding the generality of the relations found in Study 1, we did identify multiple children for whom aggressive toy play reliably

occurred with their most preferred toys. Thus, study 2 assessed the direct and indirect effects of blocking aggressive toy play occurring with highly preferred toys.

## Study 2

### *Method*

#### *Participants, Materials, and Setting*

The preference assessments from Study 1 were used to identify children who displayed high levels of aggressive play with two highly preferred (HP) toy items and low levels of aggressive play with two less preferred (LP) toy items. Five children from Study 1 displayed higher levels of aggression with structured aggressive toys than with structured non-aggressive and unstructured toys (Cara, Andy, Paul, Logan, and Don). Cara did not display a strong preference for the toys with which she displayed the most aggression, and Andy did not assent to further sessions, so these two children were not included in Study 2. Paul, Logan, and Don were typically-developing children of age 3.7, 3.5, and 3.6 years, respectively. Parent consent was obtained prior to their inclusion in the study, and each child's verbal assent was obtained prior to each session.

Paul displayed high levels of aggression with action figures and dinosaurs (ranked 1 and 2) and low levels of aggression with Lego's® and ponies (ranked 6 and 9). Logan displayed high levels of aggression with Disney® villains/heroes and predatory animals (ranked 2 and 3) and low levels of aggression with ponies and Lego's® (ranked 10 and 11). Don displayed high levels of aggression with vehicles and dinosaurs (ranked 2 and 3) and low levels of aggression with Lego's® and docile animals (ranked 10 and 11). These items were included in the assessment for these

children. All sessions were conducted on an open floor area in a 3m x 3m session room that was in close proximity to the child's classroom. Data collectors sat apart from each other inside the room, facing the participant. Covert baseline sessions took place in the same room, but in the absence visible data collectors. During covert baseline sessions, data were collected from behind a one-way mirror.

#### *Procedures for Blocking Assessment*

*Baseline.* Four toy bins were randomly placed in a semi-circle array on the floor, in front of the child. Two bins contained the child's HP toys and the remaining two bins contained the child's LP toys. The experimenter began each session by stating, "There are four bins of toys. You can play with the toys from one bin at a time in any way that you want. If you want to switch toys, just take out the toys from a new bin, and I will put your old toys away. Pick the toys you want to play with the most." If the participant did not select any toys, the prompt, "Pick the toys you would like to play with the most" was repeated once every 15 s. Switching between bins could occur at any point within the 5-min session. A reminder that "you can switch bins at any time and I will put these toys away," was repeated once every 90 s. Each bin was rotated before the next session began. The experimenter sat beside the participant and provided 3-5 s of verbal attention once every 30 s and no consequences were programmed for aggressive toy play, in a manner identical to the preference assessments of Study 1.

*Block Highly Preferred (HP).* The Block HP condition was arranged in the same manner as the baseline condition. However, during this condition, aggressive

play with the toys from the two HP bins was blocked. At the beginning of the session, the experimenter put on a yellow visor and stated, “When I am wearing this hat, I will block your aggressive play with toys from this bin (point to first HP bin) and this bin (point to second HP bin). I will not block aggressive play with the toys from this bin or this bin (point to remaining LP bins).” The yellow visor and the pre-session rules were included to facilitate discrimination of the conditions. The experimenter blocked all attempts at aggressive play with the two HP toy types by placing one hand between the two toys if aggressive play occurred between the toys, or by placing one hand between the toy and the person if aggressive play occurred between the toy/s and a person, and saying, “We don’t play like that.” If the aggressive play was vocal, the experimenter simply stated, “We don’t play like that.” The experimenter sat beside the child and delivered attention once every 30 s and at the request of the participant, as in baseline. During this condition, no consequences were programmed for aggressive play with LP toys.

*Covert Baseline.* The covert baseline condition was included to assess any post-treatment effects that may have been produced by the blocking procedure. These sessions began with the experimenter stating, “Research is over. You can play with the toys from one bin at a time in any way that you want. If you want to switch toys, you can put the toys back in their bin, and take out a new bin of toys. I am going to finish some work over here.” The data collectors left the room and the experimenter took off the hat, sat in the corner of the room, and engaged in work tasks for the duration of the session. The toys were arranged in the bins as previously described. Measures of interaction and aggressive play were collected from behind a one-way

mirror. Any attempts by the child to communicate with the experimenter were ignored. This condition served to approximate conditions under which a child is able to engage in materials, independent of explicit adult rules or direct supervision.

### *Experimental Design*

The direct and indirect effects of the intervention were evaluated using a three-component multiple-schedule design, similar to that described by Simmons, Smith, and Kliethermes (2003). Each session block lasted 15 min and was comprised of three, 5-min components, which were always conducted in the same order. For Component I sessions, the *Baseline* condition was always in effect; for Component II sessions, either *Baseline* or *Block HP* conditions were in effect; for Component III sessions, the *Covert Baseline* condition was always in effect. Thus, the experimental manipulation involved the presence or absence of response blocking and this manipulation only occurred in Component II. Initially, baseline contingencies were in effect in all components. Subsequently, the Block HP condition replaced the Baseline condition in Component II. The effects of the blocking procedure on interaction and aggressive toy play could be determined by (a) comparing responding in the Block HP condition to the initial baseline in Component II and (b) comparing responding in the Component II blocking condition to responding in the preceding Component I baseline condition. For Don, a return to the baseline in all components followed the blocking manipulation.

### *Data Collection and Interobserver Agreement*

During *Baseline*, *Block HP*, and *Covert Baseline* conditions, interaction and aggressive play were recorded using a 10-s partial interval scoring procedure in the same manner as described in Study 1. Session-by-session measures of interaction with the HP toys and the LP toys in each component were calculated by adding the number of intervals with interaction in the component and dividing that sum by the total number of intervals in each component of each session. These data on interaction were used to evaluate preference shifts within and between sessions. Session-by-session measures of aggression for each toy type were calculated by adding the number of intervals with aggression in the component and dividing that sum by the total number of intervals of *interaction*. Therefore, this measure of aggression was sensitive to the amount of interaction observed in each session. The session-by-session data for aggression with the HP toys were used to evaluate direct and indirect effects of response blocking. An overall measure of interaction per component is reported separately and was calculated by adding the total number of intervals with interaction for *both* the HP and the LP toys across all sessions of one component and dividing that number by the total number of intervals in that component. Overall data on interaction were used to identify changes in overall levels of interaction and to determine whether those changes were a function of response blocking. Overall data on aggression were calculated in the same manner and were insensitive to the amount of interaction within any individual session. This measure describes the absolute level of aggression per component and was used as a supplemental evaluation of the direct effect of the blocking treatment.

Two observers simultaneously and independently scored interaction and aggression on 61%, 64%, and 60% of sessions for Paul, Logan and Don, respectively. IOA was calculated in the same manner as described in Study 1. Across all conditions, mean IOA on interaction was 99% (range, 80% to 100%) for Paul, 99% (range, 93% to 100%) for Logan, and 99% (range, 90% to 100%) for Don. Mean IOA on aggression was 93% (range, 50% to 100%) for Paul, 96% (range, 73% to 100%) for Logan, and 95% (range, 83% to 100%) for Don. Agreement scores on aggression were below 80% for two sessions for Paul.

### *Results*

Results for each participant will be discussed in terms of direct and indirect effects. A reduction in aggression following blocking will be described as a direct effect of the independent variable. A systematic change in the overall level of interaction with the toys or a shift in time allocation to either set of toys (indicative of a preference shift) will be considered an indirect effect on interaction. An increase in aggressive play above baseline levels with either toy type during the covert baseline condition will also be considered an indirect effect on aggression (indicative of a rebound effect).

#### *Direct Effect*

*Paul.* Figure 3 summarizes the overall levels of interaction and aggression (with both HP and LP toys combined) across conditions for Paul. The mean level of aggression was 33%, 34%, and 53% during the baseline for Components I, II, and III, respectively, and 38%, 9%, and 46% during the Components I, II, and III,



respectively, when blocking was added to Component II. Thus, a decrease in aggressive play was observed during Component II with the introduction of the Block HP condition. Session-by-session data for Paul are displayed in Figure 4 by toy type. Paul engaged in moderate levels of aggression with HP toys across all components during the baseline. Levels of aggressive play with the HP toys were consistently lower in Component II when blocking was implemented relative to Component I in which baseline contingencies were operating. Levels of aggressive play were also lower in Component II during blocking as compared to that observed in Component II when baseline contingencies were in effect. Blocking appears to have decreased aggression, but this conclusion is tentative, based on a decreasing trend in Component II baseline sessions.

*Don.* Figure 5 summarizes the overall levels of interaction and aggression across conditions for Don. The mean level of aggression was 15%, 28%, and 29% during baseline for Components I, II, and III, respectively, and 19%, 23%, and 11% during Components I, II, and III respectively with the introduction of the Block HP condition. No substantial decrease in aggressive play was observed in Component II with the introduction of the Block HP condition. A return to baseline resulted in mean levels of aggression of 6%, 34%, and 2% for Components I, II, and III respectively. Session-by-session data in Figure 6 show that Don engaged in variable levels of aggressive play across all components in baseline. Don selected his HP toys during the first session of the Block HP condition and experienced the response blocking contingency twice. Thereafter, he interacted exclusively with his LP toys during the

Block HP condition. This selection pattern prohibits a comparison between levels of aggressive play with HP toys in Component II when blocking was implemented relative to Component I in which baseline contingencies were operating, and thus also prohibits a conclusion regarding the direct effect of blocking on aggressive play with the HP toys. During the Block HP condition, Don's aggressive play with LP toys was highly variable, with three sessions of elevated aggressive play. This pattern contributed to the lack of a decrease in overall level of aggressive play with both toy types, combined (see Fig. 5).

*Logan.* Figure 7 summarizes the overall levels of interaction and aggression across conditions for Logan. The mean level of aggression was 27%, 41%, and 13% during the baseline for Components I, II, and III, respectively, and 14%, 7%, and 2% during Components I, II, and III, respectively when blocking was added to Component II. Aggression decreased across all conditions, but the largest decrease was observed in Component II with the introduction of the Block HP condition. Session-by-session data for Logan are displayed in Figure 8. Moderate levels of aggressive play were observed with the HP toys in Components I, II, and most sessions of Component III during the baseline. Levels of aggressive play with the HP toys were initially lower in Component II when blocking was implemented relative to Component I when baseline contingencies were operating; however, an eventual overlap between these two data paths was observed. The reduction in aggression across both conditions following the implementation of the blocking procedure may have been due to carryover effects. Levels of aggressive play were consistently lower

in Component II during blocking as compared to that observed in Component II baseline sessions. Blocking appears to have directly decreased aggression with HP toys, but a potential carryover effect limits the strength of this conclusion.

In summary, blocking aggressive toy play was generally effective in reducing intervals with aggressive play for Paul and Logan. By contrast, Don's overall level of aggressive play did not change as a function of the blocking procedure, but rather, aggressive play which was initially observed with HP toys during the baseline condition was subsequently observed with LP toys during the Block HP condition.

#### *Indirect Effects*

*Paul.* The top panel of Figure 3 shows Paul's overall level of interaction with both toy types. Near 100% levels of interaction were observed across all conditions. Thus, the blocking procedure did not decrease overall levels of toy interaction for Paul.

Introduction of the Block HP condition did, however, change Paul's time allocation between the HP and LP toys. Paul interacted exclusively with his HP toys across all components during the baseline, but allocated more time towards interaction with his LP toys during Component II as compared to Components I and III when the Block HP condition was introduced (Fig. 4). This indicates that blocking aggressive toy play decreased preference for previously preferred toys or increased preference for previously less-preferred toys. Aggressive play with LP toys was moderate and variable across all components, but remained relatively lower than aggressive play observed with HP toys in the baseline.

We did not observe higher levels of aggressive play in the covert baseline that followed the Block HP condition as compared to the covert baseline that followed the baseline condition. Paul had a higher overall level of aggressive play in the majority of all covert baseline components, regardless of which condition they followed.

*Don.* The top panel of Figure 5 shows Don's overall level of interaction with both toy types across conditions. Overall levels of interaction remained high in Component I and II, but decreased in Component III across all sessions. To determine if the decrease in interaction during Component III was a function of the Block HP condition that preceded it, we reversed to baseline and did not replicate baseline levels of interaction in the covert baseline condition. Thus, the decrease observed across the covert baseline condition did not appear to be an effect of the blocking condition that preceded it, but might rather be accounted for by habituation to the toy sets.

During the first Block HP condition, Don selected his HP toys and experienced the contingency for aggressive toy play (Figure 6). Thereafter, Don selected his LP toys during Component II, but continued to select his HP toys during Component I. Thus, Don demonstrated a clear shift in preference towards his LP toys when aggressive play was blocked with his HP toys. In a reversal to baseline, Don again selected his HP toys during all components, lending further support to the demonstration of a shift in preference. Variable but high levels of aggressive play were observed with LP toys when blocking was introduced in Component II. These levels of aggressive play were similar to those observed with HP toys in the baseline.

The demonstration of a potential reallocation of aggressive play to an unblocked toy type as a function of blocking is not possible due to the lack of a baseline for aggressive play with LP toys. However, this speculation is quite plausible given that the researcher included these specific LP toys based upon low levels of aggressive play during the preference assessments.

Similar to Paul, Don did not display higher levels of aggression with HP toys in the covert baseline condition when blocking was implemented relative to the initial covert baseline.

*Logan.* The top panel of Figure 7 displays Logan's overall levels of interaction with both toy types across conditions. We observed a small decrease in interaction during Component I, a moderate decrease during Component II and a large decrease during Component III, following the introduction of the Block HP condition. Logan's session-by-session data (Figure 8) indicate that interaction in the covert baseline condition decreased to zero during the baseline; thus, it is improbable that the decrease in interaction during Component III was a function of blocking, but might rather be accounted for by habituation effects. By contrast, a substantial decrease in interaction during Component II only occurred following Logan's first experience with the blocking contingency (Session 15). After this session, Logan's interaction with both toy types was variable and intermittently lower in Component II as compared to Component I.

During the first five sessions of the Block HP condition, Logan exclusively interacted with his LP toys, suggesting a shift in preference governed by the pre-

session rules. After experiencing the blocking contingency in the sixth Block HP session, he continued to select his LP toys more often in the Block HP condition than in the baseline condition. Similar to Paul and Don, blocking aggressive play with highly-preferred toys shifted preference towards less-preferred toys. Logan's level of aggressive play with LP toys during the Block HP condition was lower than that observed with HP toys in the initial baseline.

Logan interacted with toys during only three sessions of the covert baseline condition following the Block HP condition and never engaged in aggressive toy play at those times.

In summary, blocking aggressive toy play resulted in an overall decrease in interaction for only one child, but a shift in time allocated towards play with low-preferred toys for all children. Response blocking did not result in an increase in aggressive play during a subsequent baseline for any child, but may have resulted in a reallocation of aggressive play to LP toys that were previously not correlated with aggressive play for one child.

### *Discussion*

This is the first study to report on the effects of blocking the aggressive toy play of typically developing preschool children. Consistent with previous behavioral literature, our results demonstrated that physically blocking an inappropriate behavior generally resulted in the reduction in (Paul and Logan) or avoidance of the opportunity to engage in (Don) that behavior. The determination of this effect was compromised by a baseline trend in the data for Paul and possible carry-over effects for Logan; however, no participant showed an increase in levels of aggressive play

when such behavior was blocked and general levels of aggression were either the same or lower across all sessions and toy types when blocking was introduced.

Therefore, the data generally support the use of a blocking procedure to minimize the occurrence of aggressive toy play.

In reviews of the basic and applied literature on extinction and punishment, Lerman and Iwata (1996) and Lerman and Vorndran (2002) called for a more complete analysis of the indirect effects of these procedures in natural settings. These two articles specifically address behavioral contrast, behavioral induction, extinction-induced aggression, and punishment-elicited aggression, as phenomena with unknown prevalence or inconsistent outcomes in the application of extinction and punishment procedures to problems of social importance. We attempted to assess those side effects that have features in common with both the behavioral literature and popular concerns related to the suppression of aggressive toy play. In Study 2, two of the hypothesized side effects were observed.

Behavioral induction, the decrease in untreated behavior as a result of a reduction in treated behavior, could potentially account for a decrease in overall levels of toy interaction as a function of blocking aggressive toy play. Lerman and Vorndran (2002) note that this effect is most common in applied interventions when punishment is made contingent on one topography of behavior, and a functionally equivalent response that is exhibited in a similar context as the punished response is observed to decrease. It is very likely that toy interaction and aggressive toy play are functionally equivalent responses and share a number of common occasioning stimuli

(e.g., similar toys). Even given these similarities, only one participant showed a decrease in overall levels of interaction during Component II when aggressive toy play was blocked with his HP toys. This negative side effect was intermittently displayed and also occurred outside of the Block HP condition and with LP toys with which aggressive play was not blocked. Therefore, the current study offers very limited evidence of induction following the suppression of aggressive toy play.

We attempted to assess behavioral contrast by observing increases in blocked behavior under conditions with no blocking. In the current study, behavioral contrast could be assessed by examining two different patterns of behavior: a) increases in aggressive play with LP toys during the Block HP condition relative to baseline, and b) increases in aggressive play with either toy type during the covert baseline condition. The variable and high levels of aggressive play Don exhibited with LP toys when such play was blocked with HP toys may have exemplified the first pattern; however, this conclusion could not be adequately assessed with the present design because baseline levels of aggressive play were not established with LP toys. This occurred because free choice trials resulted in almost exclusive selection of HP toys during the initial baseline. In the future, forced choice baseline sessions could be conducted to assess whether LP toys occasion more aggression following the blocking of aggressive play with HP toys. The second contrast pattern is consistent with the rebound effect and was amenable to assessment in the current study. Blocking did not produce an above-baseline increase in overall levels aggression during the covert baseline for any child. It should be noted that habituation to the toy



sets may have accounted for lower levels of interaction during the covert baseline for two children. Nevertheless, the current study offers no evidence of behavioral contrast as an indirect effect of blocking aggressive toy play.

Our definition of aggressive play encompassed both aggression between two toys and aggression between the child and his toys or the toys and the experimenter. This second form of aggressive play was topographically similar to what is commonly measured as aggressive behavior. Thus, the fact that no contrast effect was observed also suggests that blocking did not result in extinction-induced or punishment-elicited aggression. Overt aggressive acts that did not include toys were not measured, but informal observation indicates that this never occurred. Sherburne et al. (1988) measured overt aggressive acts under conditions during which response interruption and time out were (treatment) or were not (baseline) contingent upon aggressive-themed play. No increase in overt aggressive acts, defined by instances of hitting, kicking, biting, or other aggressive acts between children, was observed following the reduction of aggressive themed play; in fact, a slight decline in overt aggression occurred between baseline and treatment conditions. These results, along with the results of the current study, imply that the reduction of aggressive toy play does not lead to an increase in overt aggressive acts.

The single most consistent indirect effect of blocking found in the current study was one that has rarely been cited in the punishment and extinction literature: preference for particular toy items shifted as a result of blocking aggressive play with those items. This effect was observed for all children. A few studies have reported

similar shifts in preference following the manipulation of establishing operations, reinforcement contingencies, and response effort (Hanley, Iwata, & Lindberg, 1999; Shore, Iwata, DeLeon, Kahng, & Smith, 1997; Zhou, Goff, & Iwata, 2000) Tarbox et al. (in press) found that reinforcer efficacy was *not* altered as a function of blocking stereotypic interaction with highly preferred leisure items. Although this outcome might seem inconsistent with the current results, it is important to note that Tarbox et al. did not assess the relative preference for an item among an array, but rather assessed the absolute efficacy of an item as a reinforcer. Typical preschool classrooms have multiple leisure items simultaneously available in a free choice area. A shift in preference may be beneficial if it brings children into contact with a variety of toys and increases their opportunity to exhibit novel play. This positive side effect, along with the limited evidence of negative side effects, lends further support to the utility of the blocking procedure in a typical preschool classroom.

The complexity of the relation between toy play, aggression, and preference leaves certain gaps in our analysis that can be addressed by future research. One limitation of the current study is that we did not directly measure appropriate play behavior. It might be inferred that decreasing aggressive play without interrupting interaction leads to an increase in novel forms of play, some of which may be highly appropriate. Studies that have directly measured both variables report observing a negative correlation between inappropriate play and appropriate play as approximated by interaction (Koegel, Firestone, Kramme, & Dunlap, 1974). However, future research on response blocking should address ways to directly measure qualitative

changes in play with objects as a function of blocking a single form of inappropriate play. Further, although this study provided very little evidence for the negative side effects associated with blocking, perhaps a failure to produce robust direct effects partially accounts for the scarcity of side effects observed. Future research should continue to monitor unblocked behavior or blocked behavior during periods of no blocking to determine the prevalence of the negative collateral effects associated with response blocking.

### General Discussion and Implications

Aggressive toy play is a topic of much speculation (Carlsson-Paige & Levin, 1990; Levin, 2003; Ludke, 1990; Periera, 1994) and effective strategies to reduce its occurrence are rarely empirically demonstrated (see Sherburne et al., 1988, for a notable exception). Because of its presumed prevalence among typically developing preschoolers, the need for its assessment and treatment are clear.

Study 1 described an assessment procedure that simultaneously determined children's preferences for specific toy types and their relative levels of aggressive play with each. These children generally demonstrated strong preferences for structured aggressive toys, such as action figures, although only half of the participants exhibited the most aggression with these toys. Our results are consistent with suggestions by the NAEYC and the popular press that many children prefer the structured aggressive toys; however, our results are inconsistent with suggestions by these same sources in that structured aggressive toys did not evoke elevated levels of aggression for all children. Our data suggest that structured aggressive toys, like the

ones used in this study (e.g., predatory dinosaurs), be included in a preschool classroom with the implication that access to highly preferred items may proactively deter problem behavior, so long as they do not, themselves, evoke aggressive toy play.

If highly preferred toys *do* occasion aggressive play, the results of Study 2 showed desirable direct and indirect effects of blocking the aggressive play of typically-developing preschoolers. In addition, little evidence was found for the negative side effects of blocking aggressive play that are often assessed in the behavioral literature and are speculated by parents, teachers, and early childhood specialists. Thus, this study provides preliminary support for blocking the aggressive play of preschoolers.

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Table 1. Toys Used in Preference Assessments

Toy Type	Toy Label	Toys in Bin	Group $\bar{x}$ Rank	Group $\bar{x}$ Agg.
Structured Aggressive	Action Figures	Superman®, Supergirl®, Ninja Turtles®, Flame Thrower®, Alien, Spiderman®, Cavemen	3	4%
	Dinosaurs	Predatory Dinosaurs, Rocks, Trees, Prehistoric Mat	3	20%
	Disney® Villains and Heroes	Scar®, Mufasa®, Flick®, Captain Hook, Dash®, Frozone®, Hopper®, Buzz Lightyear®, Aladdin®, Babyface®, Syndrome®	3	4%
	Vehicles	Race Cars, Monster Trucks, Motorcycles with Ramp, Tractors, Transformers®	3	12%
	Predatory Animals	Tigers, Lions, Alligators, Spider, Elephant, Snakes, Cheetah, Crocodile	5	26%
Structured Non- Aggressive	Community Helpers	Doctors, Police, and Firefighters	8	18%
	Docile Animals	Fish, Panda, Seal, Sheep, Frog, Whale, Hippopotamus, Bird, Rabbit, Kangaroo	7	18%
	Domestic Animals	Cows, Horses, Dogs, Chickens, Cats	7	14%
	Ponies	My Little Ponies®, Generic Ponies, Small hair brushes, Small hair bows	6	7%
Unstructured	Lego® Blocks	Various shapes, colors, and sizes of Legos®	7	5%
	Wood Blocks	Various shapes, colors, and sizes of wood blocks	8	9%

Table 2. Correlation between dependent measures in preference assessments 1 &amp; 2

Child	Correlation Coefficient (r)	
	Preference	Aggressive Play
Art	0.93*	-0.17
Danny	0.92*	0.22
Logan	0.91*	0.18
Cara	0.79*	0.47
Ace	0.79*	0.20
Paul	0.77*	0.44
Derek	0.70*	0.78*
Dexter	0.69*	0.42
Andy	0.67*	0.36
Don	0.57*	0.22

*Note.* \* $p < .05$ , one-tailed

### Figure captions

*Figure 1.* Reliability of aggression evoked by each toy type between preference assessments 1 and 2 is shown for all children (top panel). An “X” denotes when aggressive play occurred for greater than or equal to 10% of the intervals in both assessments. An “O” denotes when aggressive play occurred for less than 10% of the intervals in both assessments. Spaces in the columns represent children for whom aggressive play was recorded in less than 10% of intervals in one assessment and greater than or equal to 10% of intervals in another assessment. Dashes indicate toy sets that were not selected in at least one assessment. The preference rank for structured aggressive toys (black squares), structured non-aggressive toys (gray squares), and unstructured toys (white squares) is shown in the bottom panel for individual children.

*Figure 2.* Mean preference rank (top panel) and intervals with aggression (bottom panel) for each toy type across each child. An aggregate of each measure across all children is presented to the right of the dashed line. An asterisk indicates children that were included in Study 2.

*Figure 3.* Overall percent interaction (top panel) and aggressive play (bottom panel) with both toy types for Paul.

*Figure 4.* Session-by-session data for Paul, depicting interaction with the HP toys (first panel), interaction with the LP toys (second panel), aggression with the HP toys (third panel), and aggression with the LP toys (fourth panel) in the blocking assessment.

*Figure 5.* Overall percent interaction (top panel) and aggressive play (bottom panel) with both toy types for Don.

*Figure 6.* Session-by-session data for Don, depicting interaction with the HP toys (first panel), interaction with the LP toys (second panel), aggression with the HP toys (third panel), and aggression with the LP toys (fourth panel) in the blocking assessment.

*Figure 7.* Overall percent interaction (top panel) and aggressive play (bottom panel) with both toy types for Logan.

*Figure 8.* Session-by-session data for Logan, depicting interaction with the HP toys (first panel), interaction with the LP toys (second panel), aggression with the HP toys (third panel), and aggression with the LP toys (fourth panel) in the blocking assessment.

















