

PREVENTION OF PROBLEM BEHAVIOR BY TEACHING FUNCTIONAL
COMMUNICATION AND SELF-CONTROL SKILLS
TO PRESCHOOLERS

KEVIN C. LUCZYNSKI

UNIVERSITY OF NEBRASKA MEDICAL CENTER'S MUNROE-MEYER INSTITUTE

AND

GREGORY P. HANLEY

WESTERN NEW ENGLAND UNIVERSITY

We evaluated the effects of the preschool life skills program (PLS; Hanley, Heal, Tiger, & Ingvarsson, 2007) on the acquisition and maintenance of functional communication and self-control skills, as well as its effect on problem behavior, of small groups of preschoolers at risk for school failure. Six children were taught to request teacher attention, teacher assistance, and preferred materials, and to tolerate delays to and denial of those events during child-led, small-group activities. Teaching strategies included instruction, modeling, role play, and differential reinforcement. Six additional children randomly assigned to similarly sized control groups participated in small-group activities but did not experience the PLS program. Within-subject and between-groups designs showed that the PLS teaching procedures were functionally related to the improvements and maintenance of the skills and prevention of problem behavior. Stakeholder responses on a social acceptability questionnaire indicated that they were satisfied with the form of the targeted social skills, the improvements in the children's performance, and the teaching strategies.

Key words: delay tolerance, early child care, functional communication, mands, maintenance, preschool life skills, prevention, problem behavior, self-control, social skills

With the majority of American children experiencing nonparental child care prior to kindergarten (Johnson, 2005), questions have been raised concerning its short- and long-term effects on social development (Belsky et al., 2007). In fact, time spent in nonparental child care is highly correlated with teacher and parent reports of lower social competence, higher interpersonal conflict, and more problem behavior such as aggression and disobedience (National Institute of Child Health and Human Development, NICHD, 2003). Of the 3,595 kindergarten teachers surveyed by Rimm-Kaufman,

Pianta, and Cox (2000), 30% reported that over half the children had problems working in groups, 20% reported that more than half the children had social skills deficits, and 14% reported that more than half the children had communication deficits. When different teachers were asked to identify skills considered to be most important for preschoolers transitioning into kindergarten, they identified social skills (e.g., communicating wants and needs, not being disruptive, and following directions), rather than academic skills, as most important (Lin, Lawrence, & Gorrell, 2003). Taken together, these findings highlight the importance of identifying effective and socially valid strategies to increase social skills and decrease problem behavior in preschool classrooms.

Teachers attending to other children, limited access to certain classroom materials, and initial experiences with challenging curricula are typical

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Address correspondence to Kevin C. Luczynski, Munroe-Meyer Institute, 985450 Nebraska Medical Center, Omaha, Nebraska 68198 (e-mail: kevin.luczynski@unmc.edu).

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situations in which preschoolers probably learn specific behaviors to obtain common classroom reinforcers. Hanley, Heal, Tiger, and Ingvarsson (2007) described these situations as evocative because they establish the value of classroom reinforcers (e.g., attention and assistance from others, classroom materials, escape from challenging tasks, and continuance of play) and evoke behavior that has been successful in obtaining these reinforcers (Michael, 1993). Children may learn acceptable social behavior in these situations, such as asking for a particular toy or for teacher assistance, and then waiting patiently for these events. By contrast, problem behavior such as hitting and yelling may also be effective in these situations (Ingvarsson, Hanley, & Welter, 2009; McKerchar & Thompson, 2004; Reimers et al., 1993). Such problem behavior also may be learned, in part, by observing the reinforcement of peers' problem behavior (e.g., Snyder et al., 2008; Warren, Schoppelrey, Moberg, & McDonald, 2005). Together, the presence of situations that evoke a child's problem behavior as well as increased opportunities to observe the reinforcement of peers' problem behavior may explain reported increases in the problem behavior of children attending nonparental center-based child care (NICHD, 2003).

Hanley et al. (2007) described an approach that capitalized on the evocative situations as opportunities to assess and then teach skills that likely served the same function as problem behavior. Teaching a repertoire of functionally equivalent social skills may not only decrease problem behavior (e.g., Carr & Durand, 1985; Hanley et al.) but may also prevent its development or escalation to more severe forms. Among other skills, children were taught specific requests, often referred to as *functional communication*, to access reinforcers commonly found to maintain problem behavior (access to teacher attention, teacher assistance, and preferred materials) and to tolerate conditions in which these reinforcers were delayed. This preschool

life skills (PLS) program was successful, resulting in a 67% increase in functional communication skills and an 88% increase in delay tolerance. Nevertheless, further refinement of the PLS program is necessary to address the limitations of Hanley et al. First, not every child learned all the target skills with the classwide approach. This is of concern because children who do not acquire functionally relevant social skills may be at risk for developing problem behavior. Second, of the skills that were acquired, not all occurred during the short-term maintenance assessment. Persistence of these skills is likely necessary to maintain decreased levels and to prevent more severe forms of problem behavior. Third, it is possible that some of the skills or reduction in problem behavior would simply occur over time in the absence of the curriculum.

The rationale for the current study becomes clearer when considering the response-to-intervention (RTI) model framework that is being applied in many elementary schools. In this model, the intensity of services is tiered and determined by problem severity (Gresham, 2004). Tiers 1 and 3 represent the continuum ends, with services provided to all children in a classwide format (Tier 1) or to a single child intensively (Tier 3). The PLS program, as implemented by Hanley et al. (2007), would be considered a Tier 1 intervention because it was delivered to all students in the classroom. In contrast, a small-group PLS program would be considered a Tier 2 intervention within the RTI model. Teaching in Tier 2 is characterized by explicitly designed learning opportunities for specific skills among small groups of children who have been shown to be at higher risk or less responsive to the Tier 1 intervention. Given that some children did not acquire certain skills via the classwide PLS program (Hanley et al.), a version of the program that may be delivered at the small-group level is warranted.

Therefore, the purpose of our study was to evaluate the extent of acquisition and maintenance of functional communication and

self-control skills with children of different ages who did and did not experience a modified version of the PLS program, hereafter described as the small-group PLS program. We also evaluated the preventive effects of the small-group PLS program on problem behavior by including a control group of children who did not experience the PLS program. Instead of a classwide format like that used in Hanley et al. (2007), assessment and teaching took place in a small-group format with children nominated by their teachers as warranting more intensive teaching of functional communication and delay and denial tolerance.

METHOD

Participants and Group Assignment

Participants were 12 children, six from each of two classrooms that served children of different ages at an inclusive, nonprofit preschool. The preschool served children from low-income families. All children exhibited developmentally appropriate listener and speaker skills. The teachers from each classroom nominated and ranked these 12 children because of concerns regarding their problem behavior and lack of communication and self-control skills. The six top-ranked children from each classroom were split into three similarly ranked pairs (i.e., first and second, third and fourth, and fifth and sixth), and the children in each pair were randomly assigned to a test or control group. These procedures were repeated in a second classroom with younger children. The procedure of selecting and randomizing children produced two test groups and two matched control groups, with each group composed of three children. The mean age of the six older children was 4.8 years old (range, 4.6 to 5.0); the mean age of the six younger children was 3.4 years old (range, 3.2 to 3.8). All children had been enrolled in full-time, nonparental child care for at least 4 months prior to participating in the current study and spent approximately 7 hr per weekday at the preschool.

Setting and Materials

Sessions took place in a corner (3 m by 2 m) of the children's classroom that contained child-sized chairs and a table typically used for center-based activities. The children and experimenter engaged in one of a variety of craft (e.g., collages, Popsicle stick houses, cotton ball snowmen), manipulative (e.g., Play-doh, Lincoln Logs), and fine-motor activities (e.g., glitter glue, markers, finger paint) during each session. Over 100 activities were used during the course of the study, and no activity was repeated in consecutive sessions. Children experienced approximately one or two 15- to 30-min activities, 4 to 5 days a week.

Dependent Measures and Interobserver Agreement

We expanded the social skills taught in Hanley et al. (2007) to include precursor behavior and multiple functionally equivalent response forms. More specifically, we taught a set of precursor responses (i.e., stopping, looking, and raising hand) in addition to the vocal requests, and taught several functionally equivalent vocal requests. We made these changes to increase the likelihood that communication skills would recruit naturally reinforcing consequences and persist after teaching was discontinued. Additional evocative events (e.g., denial of reinforcers) were included for each skill (see Table 1 for definitions of each skill and problem behavior).

During each session, we arranged evocative situations for teacher attention, materials and assistance, and delays and denials to these events. Each evocative situation represented a separate trial during which observers used paper and pencil to score the occurrence of problem behavior or appropriate social skills in real time. If problem behavior or a social skill occurred during the same trial (this rarely occurred), we recorded only problem behavior; therefore, for data-collection purposes, these responses were mutually exclusive for each evocative situation. Problem behavior and the target skills were scored throughout baseline, teaching, and maintenance conditions.

Table 1
Operational Definitions of Targeted Social Skills and Problem Behavior

Dependent measures	Operational definition
Skill 1: Requests for attention	
Stopping (precursor behavior)	Hands not engaging with activity-related material prior to or simultaneously with a target vocal request.
Looking (precursor behavior)	Head and eyes directed toward teacher prior to or simultaneously with a target vocal request.
Hand raise (precursor behavior)	Hand raised equal to or above head prior to or simultaneously with a target vocal request.
Vocal requests	Saying "excuse me," "pardon me," or "[teacher's name]" using appropriate tone, volume, and tempo.
Waiting for teacher attention	The absence of additional requests for attention until a nonvocal response (e.g., teacher turns toward child), vocal response (e.g., teacher says "yes"), or both responses occur.
Skill 2: Framed requests for materials and assistance	
Vocal framed requests	Saying, "May I have the [item]?" or "Will you give me the [item]?" using appropriate tone, volume, and tempo to access material on the table. Saying, "May I have your help?" or "Will you help me?" to access assistance from the teacher.
Skill 3: Delay and denial tolerance	
Delay and denial acknowledgment	Saying, "okay" using appropriate tone, volume, and tempo following a teacher's signal.
Waiting	The absence of additional requests and problem behavior with or without returning to engage with activity-related materials.
Problem behavior	Hitting, pinching, grabbing, slapping, scratching, throwing things toward the teacher within 6 in., yelling or screaming, and rudeness to access teacher attention, teacher assistance and materials, and following delays to and denials of those events.

A second data collector simultaneously and independently recorded target responses during 34% of baseline sessions and 45% of teaching sessions across children in the test group, and during 34% of baseline sessions for children in the control group. An agreement was defined as recording the same response across the measurement categories during each evocative situation (i.e., trial-by-trial agreement). Interobserver agreement scores were calculated by dividing the number of agreements by the number of agreements plus disagreements and converting the result to a percentage across all children's performances within a session. Mean agreement across all trials averaged 91% (session range, 50% to 100%). With the exception of six sessions, the agreement measures were above 80%.

Procedure

General. Materials related to the activity were presented periodically near the middle of the

table in front of the experimenter, just out of the children's reach. This evocative situation provided an opportunity to observe the type of responses children would exhibit, if any, to access the teacher's attention as well as the type of responses the children would exhibit to access materials or assistance after obtaining a teacher's attention. We continued to arrange these trials until we observed each child's responses to access attention and assistance or materials were observed eight times. During two of the eight trials for assistance and materials, the delivery of the item or assistance was delayed; in another two trials, the delivery of either event was denied. In summary, an activity typically ended when each child's behavior was observed during eight evocative trials for attention and eight trials for assistance or materials, during which assistance or materials were delayed or denied twice (i.e., 20 total observations). When one or more of the children's behaviors had not been observed for

the specified number of trials and the children did not respond within approximately 1 min of three consecutive item presentations, the experimenter provided a group-directed comment, such as, "Please remember that you should use all materials to complete the activity." (This comment was used infrequently.)

During baseline assessments (described below), sessions were conducted only when all three children were present. During teaching conditions, sessions were conducted if at least two children were present. The experimenter described the activity to the children and then said, "Let's start the activity" to signal the onset of sessions. In general, each child started with at least one item in front of him or her (e.g., construction paper). Next, the experimenter arranged an evocative situation by placing a single item (e.g., a blue marker) on the table. The experimenter attended to the child who responded first. After the experimenter-child interaction concluded, the experimenter arranged a second evocative situation and, again, all children had the opportunity to respond. To decrease the likelihood of one child repeatedly requesting the presented items, we presented duplicates (e.g., several blue markers) in consecutive evocative situations to decrease the child's motivation to respond during consecutive trials.

Baseline. The experimenter delivered attention, assistance, and activity-related items contingent on problem behavior or the social skills during evocative situations. Descriptive praise also was provided following the occurrence of a targeted skill. During delay and denial trials, the child's behavior did not influence the delivery of the putative reinforcer (e.g., items were delivered after a delay independent of behavior).

Children in the test and control groups participated in the same number and type of activities and evocative situations during the preteaching (initial) and maintenance (final) baselines. Several additional returns to baseline were conducted with children in the test group after acquisition of each skill. Maintenance

baseline sessions were separated by a minimum of 24 hr and were completed within 10 days after teaching was discontinued.

Skill 1: Requests for attention. Children in the test group experienced small-group-based teaching strategies for developing the functional communication and delay tolerance skills. The pre-session and within-session teaching included instructions, modeling, experimenter-child role plays, and feedback for the request for attention skill. The skill required that a child stop what he or she was doing, look at the experimenter, raise his or her hand, say "excuse me," "pardon me," or "[experimenter's name]," and then wait quietly. The presentation of materials served as an evocative event for attention because obtaining the teacher's attention preceded requests to access materials or assistance.¹

Before beginning an activity, the experimenter provided instruction on how the skill would result in attention and modeled each of the response components of the skill. The experimenter then role played the skill with each child and provided descriptive praise if the child emitted a correct skill; following an incorrect skill, the experimenter described the skill, modeled, and role played again with an emphasis on the skill components executed in error. If the child committed a second error and the incorrect responses involved motor movements, the experimenter provided gentle hand-over-hand guidance to ensure that the skill occurred correctly. After the child emitted the prompted skill, the experimenter provided descriptive praise. Teaching during the session was similar to the strategies present during preteaching, with the exception that the experimenter used one, all,

¹We taught each child only one of the three vocal requests, but the experimenter provided attention contingent on any of the vocal requests. Teaching each child only one vocal request at a time had practical benefits in that the experimenter had to prompt, model, and role play only a single request, rather than alternate these teaching procedures across three requests for each child within each session.

or a combination of the teaching strategies on each trial (see Supporting Information 1 online on *Wiley Online Library* or contact the first author for a description of evocative situations and teaching scripts).

Because the procedures described above were not sufficient to achieve satisfactory acquisition of the request for attention skill with all children, we introduced additional teaching procedures. In Classroom A, following an incorrect skill, the experimenter withheld attention for that trial (i.e., extinction). This differed from previous teaching procedures in which attention was simply delayed due to the time required to describe, model, and role play the skill. With the younger children in Classroom B, we positioned paper cutouts of an outlined hand on the table in front of each child to serve as a visual prompt for the component skill of stopping. Following an error with stopping, the child practiced placing one hand on the handprint while raising the other hand. In addition, a second experimenter occasionally modeled the correct skill during the activity so that the children could observe the differential delivery of attention and descriptive praise for the adult's correct responses. The additional teaching procedures included for children in Classroom B were in place only during this teaching condition. Teaching ended when each child engaged in the skill on 85% of trials or more across three nonconsecutive sessions (i.e., all children had to meet this criterion for at least a total of three sessions).

Skill 2: Framed requests for materials and assistance. Within-session teaching remained in place for Skill 1 while the same pre- and within-session teaching tactics described for Skill 1 were used to teach framed requests for materials and assistance. For the framed requests for materials, children were taught to say "Will you give me the [item]?" and "May I have the [item]?" to access the materials periodically presented on the table after gaining the experimenter's attention. During sessions, some materials were arranged not to work properly (e.g., a marker was dry, a

glue bottle was clogged), or the children had difficulty using the materials (e.g., cutting materials, peeling off the back of stickers). These instances served as evocative situations for the experimenter to teach the framed requests for assistance by prompting the child to say "Will you help me?" or "May I have your help?" Teaching ended when both Skills 1 and 2 occurred on 85% of trials or more across five nonconsecutive sessions.

Skill 3: Delay and denial tolerance. After the children acquired a request for attention and a framed request for materials and assistance, we taught them to say "okay" and return to their activity after a delay or denial cue using the same pre- and within-session teaching described for Skills 1 and 2. Delays were signaled using several cues (e.g., "in a little bit," "later," and "wait, please"), and were varied unsystematically from 15 s to 45 s for each child (each child typically experienced one short and one long delay per session). During the delay, the experimenter acted preoccupied, for example, by interacting with another child or preparing additional materials for the activity. Denials were signaled by using several forms (e.g., "It's not available," "No, I am going to use that item," and "I am sorry, you cannot use it"), and the item was not available for the remainder of the session. While Skill 3 was taught, the previously acquired Skills 1 and 2 continued to occur and contact reinforcement such that all three skills were practiced during this condition. Teaching ended when each child engaged in all three social skills on 85% or more trials in a given session across five nonconsecutive sessions. This criterion ensured that all skills simultaneously occurred at high levels prior to the maintenance (final) baseline.

In addition to teaching Skill 3, we identified the form of the requests primarily exhibited by each child during Skill 1 and Skill 2. Depending on the particular request form, the other targeted request forms were taught via instructions, modeling, role playing, and differential

reinforcement. For example, if a child primarily said "excuse me," we taught the child to say "pardon me"; if a child primarily said, "May I have the [item]?" or "May I have your help?" we taught the child to say, "Will you give me the [item]?" or "Will you help me?" This was done to promote the occurrence of several request forms that resulted in a larger number of response exemplars (Stokes & Osnes, 1989), to increase the likelihood of social skills occurring instead of problem behavior.

Design

A multiple-probe design across skills was used with each of the six children in the test group to determine the effects of teaching on skill acquisition and problem behavior. Reimplementation of baseline contingencies after the acquisition of each skill also permitted an evaluation of skill maintenance. A between-subjects design was also arranged. While teaching was being implemented with children in the test group, play sessions were conducted with children in the control group. During the play sessions, experimenters provided social interaction and access to high-quality materials without using the teaching procedures (as in the baseline condition described above). At the beginning of play sessions with the control group, we distributed activity-related materials noncontingently and equally to the children. During the session, two experimenters provided attention noncontingently in the form of social statements (e.g., "We are making a Play-doh castle"). Two adults participated in order to avoid inadvertently arranging an evocative situation for attention when one adult briefly interacted with a child.

The manner in which experimenters delivered noncontingent materials and attention simulated the use of antecedent strategies designed to avoid situations in which problem behavior may occur in a preschool classroom by reducing competition and motivation for materials, attention, and assistance and by avoiding delays to and denials of these events. If a child engaged in a target skill,

descriptive praise and the relevant reinforcer were provided; the reinforcer was also provided following problem behavior and any other response (e.g., pointing), if these responses occurred. However, problem behavior and the target skills were unlikely because attention, materials, and assistance were freely available throughout the session.

The comparison between groups was designed to isolate the functional relation observed with the single-subject design from additional threats to internal validity, including the potential influence of historical and maturational variables such as playing with activity materials, playing with peers, experiencing high-quality interactions with adults, and physiological changes associated with time.

Social Validity

After completion of the study, we asked stakeholders to rate the acceptability of the goals of the program, the teaching strategies used, and amount and type of behavior changes. The stakeholders included the assistant director of quality assurance for all preschools in the organization, the director of the preschool we served, the lead and assistant classroom teachers of the classroom we served, and a parent of one of the children who participated.

After answering questions about the goals of the project (i.e., the importance of the skills selected for teaching), stakeholders answered questions after viewing each of three 2.5-min video clips. The first video clip showed children's performance in the test group during the preteaching baseline; the second video clip showed children's performance in the test group during the maintenance baseline. Stakeholders were blind to which videos were of the children's preteaching or maintenance performance. Both video clips showed each of the child's responses during the evocative situations. The third video clip showed the experimenter implementing all components of the teaching strategy. To avoid bias in how we selected the children's performance, we included the first sessions in which

children's behavior could be seen and heard clearly during evocative situations in the preteaching and maintenance baselines.

RESULTS

The performances of the three children assigned to the test groups from Classrooms A and B are depicted in Figures 1 and 2, respectively. Each child's performance for Skills 1, 2, and 3 is depicted in a separate panel in the order in which the skills were taught. The three children in Classroom A did not exhibit any of the social skills during the preteaching (initial) baseline (see Figure 1). Requests for attention (top row for each child) steadily increased following implementation of the teaching procedures. Target requests for attention continued in the absence of teaching strategies during the return to baseline, and the other two untaught skills occurred at near-zero levels. We then applied the teaching procedures to teach framed requests for materials and assistance, and observed rapid skill acquisition (see second row for each child on Figure 1). Skills 1 and 2 continued at high levels in the second return to baseline, whereas delay and denial tolerance, which had not been taught, almost never occurred. The children rapidly acquired Skill 3 after teaching was implemented (see the third row for each child on Figure 1). In the final return to baseline, which represented the short-term maintenance assessment, children continued to engage in all of the acquired skills during the different activities at the same high level observed during teaching.

The small-group teaching produced similar effects with the younger children in Classroom B (see Figure 2). Improvement in the children's performance for each skill occurred only after the introduction of teaching. Correct performance across all evocative situations during maintenance involved the following: A child (a) stopped engaging with materials, looked at the teacher, raised a hand, said "excuse me," and waited for the teacher's acknowledgment; (b) after the

teacher's acknowledgment, the child said, "May I have the [item], please?" and waited for the teacher's response; and (c) after the teacher said, "in a little bit," the child said "okay" and did not engage in additional requests for the item. Children in the test group never responded correctly during baseline yet did so on 80% of trials during the maintenance condition (range, 67% to 100% across children).

Summary measures of performance in each group for the skills combined are depicted in Figure 3 during the preteaching (first column) and maintenance (second column) baselines. Before teaching, almost all children across both groups did not exhibit any of the skills. A two-tailed Mann-Whitney U test (Mann & Whitney, 1947) did not show a statistically significant difference between the groups with respect to the target skills prior to teaching ($U = 11.5$, $p > .05$). After teaching, all children in the test group exhibited the skills on a high proportion of trials, and they engaged in the social skills repertoire on an average of 84% or more of the trials. By contrast, children in the control group who experienced the same activity-related materials and interaction with experimenters (but not the teaching strategies) did not acquire the social skills. In comparing differences between groups, the teaching procedures led to a statistically significant difference with respect to the target social skills ($U = 36.0$, $p < .001$). In addition, a between-groups effect size statistic was calculated to describe the magnitude of the difference between children's performances. The mean performance of the children in the control group was subtracted from the mean performance of the children in the test group for the last three sessions during the preteaching and maintenance baselines. The resulting sum was then divided by the pooled standard deviation (Lipsey & Wilson, 2001; Myers & Well, 1991). The magnitude of improvement represented a large effect size ($d' = 22.9$).

One reason for teaching these particular social skills was to decrease the likelihood of

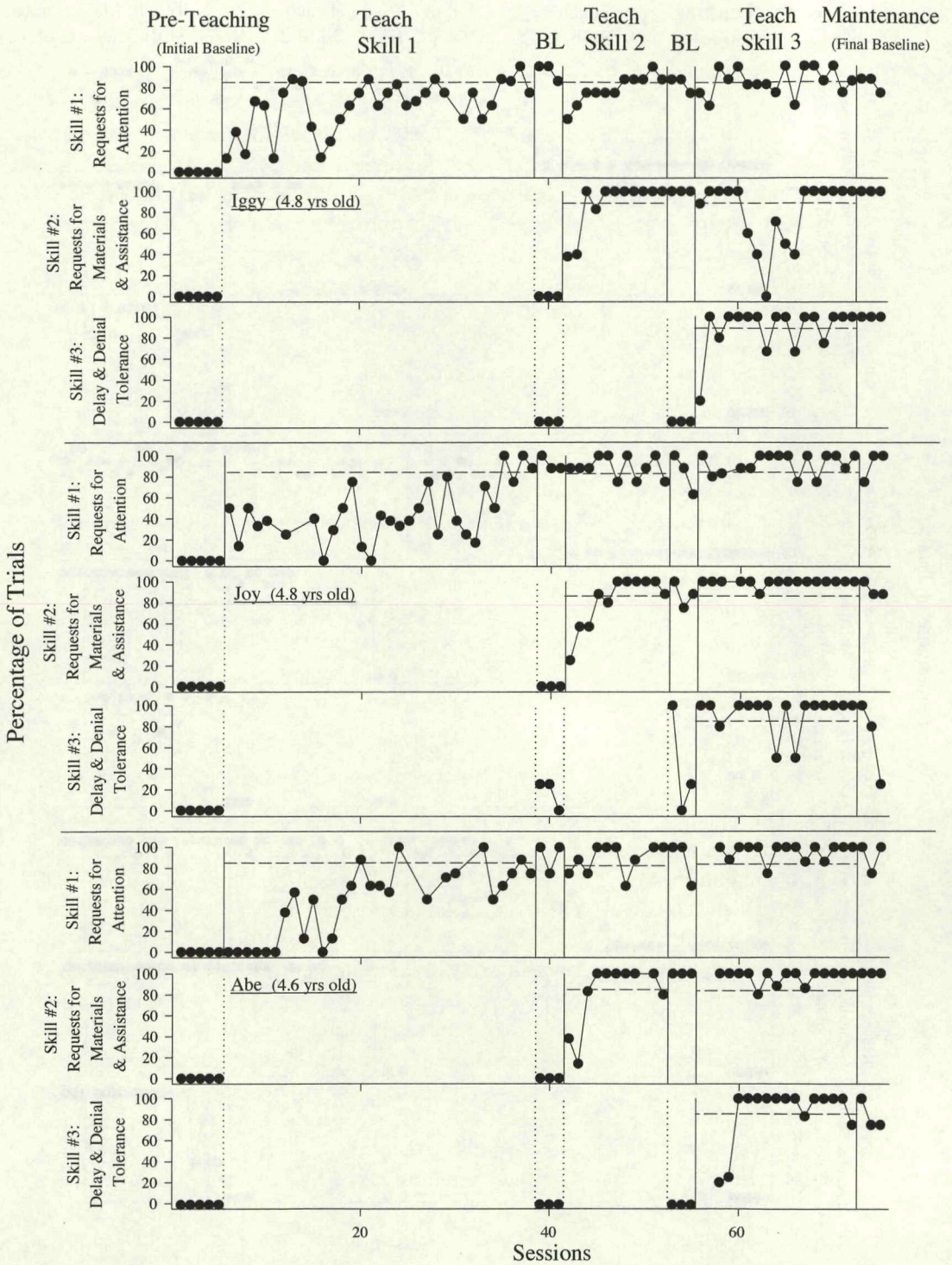


Figure 1. Percentage of trials with the target skills for children in Classroom A. The horizontal dashed lines denote the 85% acquisition criteria line. BL = baseline.

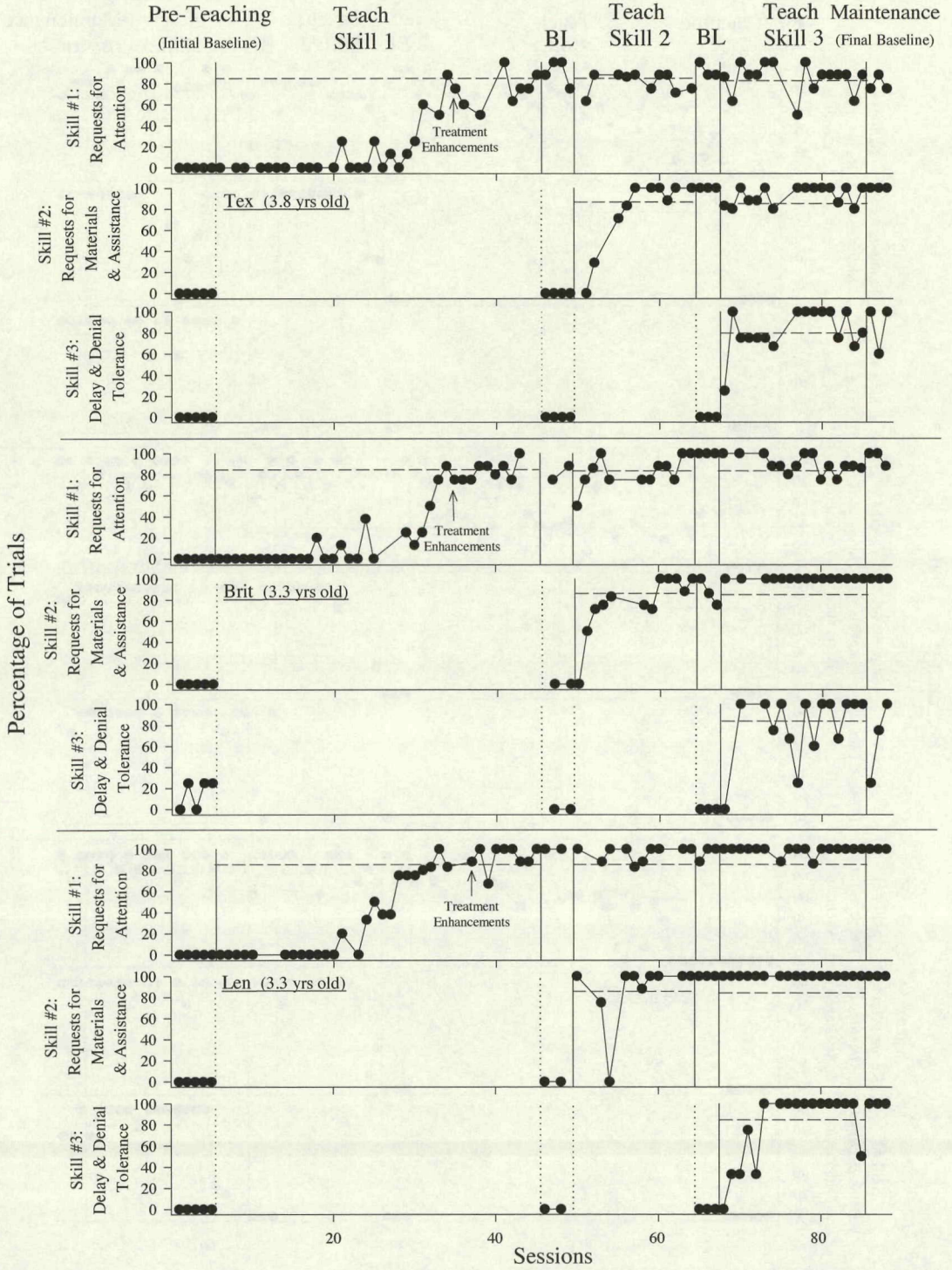


Figure 2. Percentage of trials with the target skills for children in Classroom B. The horizontal dashed lines denote the 85% acquisition criteria line. BL = baseline.

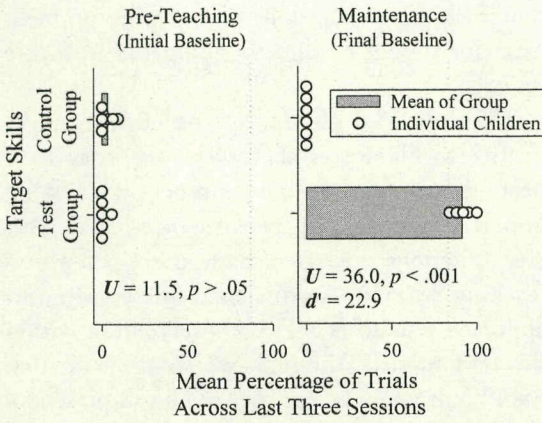


Figure 3. Average performance across skills during the last three sessions of preteaching and maintenance baselines for the test and control groups. A two-tailed Mann-Whitney *U* statistic and a between-groups effect size statistic (*d*) are reported.

problem behavior. Summary measures of the six children's level of problem behavior in each group are depicted in Figure 4 during the preteaching (first column) and maintenance (second column) baselines. Before teaching, 10 of 12 children exhibited variable levels of problem behavior. The difference in the mean level of problem behavior for test (34%) and control (8%) groups was statistically significant

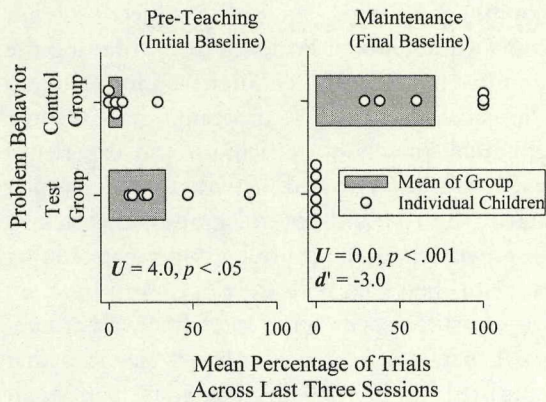


Figure 4. Level of problem behavior during the last three sessions of preteaching and maintenance baselines for the test and control groups. A two-tailed Mann-Whitney *U* statistic and a between-groups effect size statistic (*d*) are reported.

($U = 4.0, p < .05$). That is, children in the test group (two children in particular) engaged in more problem behavior than those in the control group prior to teaching.

After teaching, children in the test group did not engage in problem behavior. By contrast, children in the control group continued to exhibit problem behavior during the final baseline. More problematic, however, was that all children in the control group engaged in more problem behavior during the second baseline assessment than in the first baseline. The teaching procedures led to a statistically significant decrease in problem behavior ($U = 0, p < .001$) with a large effect size ($d' = -3.0$) when comparing differences between the groups.

All the stakeholders strongly agreed that the types of social skills taught in the study were valuable and would be appreciated in an educational setting (Questions 1 and 2; $M = 7$; see Supporting Information 2 online on *Wiley Online Library* or contact the first author for a copy of the questionnaire and results). After watching the preteaching video clip, the stakeholders reported some satisfaction with how the children requested attention ($M = 4.4$; range, 3 to 6), requested assistance and materials ($M = 5.2$; range, 5 to 6), and tolerated the delay or denial of materials ($M = 5.4$; range, 5 to 6). After watching the maintenance video clip, the stakeholders reported more satisfaction with how the children requested attention ($M = 6.6$; range, 6 to 7), requested assistance and materials ($M = 6.6$; range, 6 to 7), and tolerated the delay or denial of materials ($M = 6.6$; range, 6 to 7). Finally, the majority of the stakeholders strongly agreed that the teaching strategies were acceptable ($M = 6.5$; range, 5 to 7) and that they would recommend the use of the strategies to other teachers ($M = 6.8$; range, 6 to 7).

DISCUSSION

Every child who experienced the small-group PLS program exhibited all target skills in over

80% of the opportunities after teaching, and five of six children continued to exhibit all skills in over 80% of the opportunities during maintenance. Moreover, these effects were achieved with a younger group of children whose teachers nominated them due to limited appropriate social skills. The effects of the small-group PLS program were most likely dependent on (a) arranging evocative situations in which problem behavior was likely to occur and (b) capitalizing on these situations by teaching skills that likely serve the same function as problem behavior. This manner of arranging teaching opportunities resembled the "interrupted behavior chain strategy" used by Goetz, Gee, and Sailor (1985) to teach communication skills to students with intellectual disabilities. The similarity is in the embedding of teaching opportunities within common classroom activities for skills that produce access to reinforcers directly related to the ongoing activity. The social validity measures in the current and previous studies indicate that these teachers appreciated the instructional procedures and benefits of the program to the children; however, direct measurement of the sustained implementation of the small-group PLS program in the absence of consultants is an important direction for future research.

Hanley et al. (2007) recommended teaching several functionally equivalent responses per skill and teaching during multiple evocative situations to better prepare children to respond appropriately to typical elementary education settings. We incorporated these recommendations by teaching (a) precursor responses (see Table 1) to the vocal requests for attention, (b) three vocal request forms to access attention and two framed requests to access materials and assistance, and (c) appropriate responses when these common reinforcers are delayed and denied. All children acquired the more complex set of skills, which may have contributed to the high level of skill maintenance. The potential benefit of these

modifications to the skills on reducing problem behavior should be directly compared in future research.

The enhanced efficacy of the current study, relative to Hanley et al. (2007), also may have been due to the greater number of teaching opportunities and the performance-based mastery criterion associated with the small-group teaching format. As discussed previously, our approach resembles a Tier 2 intervention within the RTI model. Although we recommend that the PLS program be experienced by all preschool children on a classwide scale, teaching functional communication and self-control skills to a subset of children allowed us to match the extent of our support to the level of need identified by the teachers. More teaching opportunities were available with this Tier 2 intervention. Also, the criteria for teaching a new skill in Hanley et al. was based on time (2 days) and a minimal criterion of teaching opportunities (10), whereas performance-based criteria were used in the current study. In Hanley et al., children experienced an average of 13 direct-teaching opportunities per skill; by contrast, children in the current study experienced an average of 117 direct-teaching opportunities per skill.

The use of a between-groups design, in conjunction with a within-subject design, provided additional evidence for attributing the improvements in the children's performance to the small-group PLS program. Because the children's preschool curriculum and experience with the center-based activities were similar across the test and control groups, the lack of improvement in the control group suggested that none of the social skills developed as a function of (a) time spent in a preschool classroom, (b) experience with center-based activities that consisted of high-quality materials and adult attention and assistance, or (c) physiological changes over time.

The use of a control group also led to the observation that children's problem behavior worsened in the absence of the small-group PLS

program. An increase in problem behaviors (e.g., forceful grabbing, hitting, and yelling during the maintenance assessment) was observed for all children in the control group. These results support the supposition that inadvertently avoiding opportunities to teach social skills by providing attention, materials, and assistance proactively and noncontingently may increase the probability that problem behavior will emerge when these events are available only on a limited basis. It is important to note that children in the control group were given similar materials at the start of an activity, were allowed to lead the activity (i.e., they could choose what and how to use the materials), and were given free access to adult attention and assistance. Therefore, we did not repeatedly expose children in the control group to evocative situations or teach them how to behave in these situations as we did with children in the test group. The reintroduction of evocative situations during the maintenance assessment appears to have evoked problem behavior, presumably because children did not learn any functionally equivalent skills when materials, adult attention, and assistance were freely available during the 50 or more play sessions.

We speculate that the free-play condition experienced by the children in the control group emulates preschool programs that primarily or exclusively rely on antecedent-based strategies to address problem behavior. The eclipsing of the short-term gain of these strategies by the later emergence of problem behavior may become apparent only when the children who experience these programs transition into educational contexts in which evocative situations are routine (e.g., from preschool to early elementary school classrooms). By contrast, children in the test group, on average, exhibited more problem behavior before the small-group PLS program but engaged in no problem behavior after experiencing the teaching procedures. This finding suggests that the small-group PLS program, at least in the short term, may

positively change the developmental trajectory of child outcomes with respect to problem behavior by establishing functionally relevant social skills. Additional follow-up data are warranted to confirm this result.

The effects of the PLS program rely on the routine arrangement of evocative situations and on explicit teaching during these situations. Teachers' elimination of evocative situations is more the norm and is likely to develop and be maintained by negative reinforcement in the form of avoiding children's problem behavior (Carr, Taylor, & Robinson, 1991). Teachers may be more inclined to arrange evocative situations when they are framed as opportunities to teach important social skills and address problem behavior, as is done in this small-group PLS program.

There are several limitations of the current study that should be addressed in future research. First, data were collected only during center-based activities. Data collection across a broader range of activities and events throughout the day would provide more compelling information on the extent to which the teaching procedures promote generalization of the target skills. Second, although it seems logical to apply the PLS program first on a classwide level and then shift to small-group programming for the subset of children whose levels of target skills and problem behavior remain unsatisfactory (as is done in the RTI approach), we did not evaluate the PLS program in this way in the current study. This type of sequential application of the PLS program seems warranted. Finally, we did not measure generalization of the skills during small-group activities across unfamiliar teachers and classrooms or the maintenance of the skills over longer periods (e.g., 3 months). Because complete acquisition, generalization, and maintenance of the social skills are likely necessary to sustain the benefits of the PLS program, assessment of generalization and longer term maintenance will be an important avenue for future research.

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