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Reciprocal Peer Coaching and Teaching Teams' Use of Pyramid Model Practices

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Abstract

A multiple probe design across behaviors, replicated across teaching teams, was used to evaluate the effectiveness of training plus reciprocal peer coaching on teaching teams' implementation of Pyramid Model (PM) practices. In this study, teaching teams (three dyads and one triad) were provided with training around the use of targeted PM practices and reciprocal peer coaching. Coaching required teachers within each team to observe and provide feedback to one another around their use of targeted PM practices. Data from this study indicate reciprocal peer coaching is an effective and efficient way for early childhood teaching teams to increase their use of PM practices. Increased use of PM practices generalized across classroom activities and maintained following the removal of peer coaching. Results, limitations, impacts on the field, and next steps are discussed.

Keywords

reciprocal peer coaching, Pyramid Model, early childhood education, professional development, social-emotional development

About one third of preschool-age children engage in persistent challenging behavior, with children living in poverty and those with disabilities reported as engaging in higher rates of challenging behavior than their more affluent and typically developing peers, respectively (Baker et al., 2002; Holtz et al., 2015; TACSEI, 2018). Children with challenging behavior often lack the skills needed for emotion regulation, effective communication, and peer interactions (Gilliam & Shahar, 2006). With many teachers and programs ill-equipped to address persistent challenging behavior, preschool children with challenging behavior are suspended at alarming rates, and these rates are disproportionate for boys and black children (U.S. Department of Education Office for Civil Rights, 2016). Children who exhibit challenging behavior and who do not develop appropriate prosocial skills when they are young are likely to continue facing problems throughout their educational careers (Garrity et al., 2016). Given a high correlation between challenging behavior and preschool expulsion, it is imperative for teachers and programs to have

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effective strategies and resources for addressing challenging behavior and teaching children appropriate social skills (Adamu & Hogan, 2015; Garrity et al., 2016).

The Pyramid Model (PM; Fox et al., 2003; Hemmeter et al., 2006; Hemmeter, Ostrosky, et al., 2021) is a tiered framework of research-based practices designed to teach social-emotional skills and prevent and address challenging behavior in early childhood classrooms. The foundation of the PM is an effective workforce that includes teachers who have the support needed to implement the PM practices with fidelity. The tiers of the PM include universal practices related to nurturing and responsive relationships and high-quality supportive environments, targeted supports to promote social-emotional competencies for children who are at-risk, and the development of intensive interventions for children who need additional support (TACSEI, 2018). Implementation of PM practices is associated with positive child outcomes, including increased social skills and decreased challenging behavior (Hemmeter et al., 2016; Hemmeter, Fox, et al., 2021). Current literature on the PM indicates that teachers who received training and ongoing support using Practice-Based Coaching (PBC) implemented the PM practices at higher levels of fidelity (Hemmeter et al., 2016; Snyder et al., 2015).

In previous studies, research staff provided the training and coaching related to behavior support practices (e.g., Artman-Meeker & Hemmeter, 2012; Barton et al., 2013; Snyder et al., 2015; Wilson et al., 2012). Research staff observed teachers in the classroom, provided training on targeted practices, and provided feedback as the teacher(s) learned to implement new skills. In randomized trials examining the effects of coaching on teacher implementation of PM practices, participants received 19 hr of training as well as an average of 13 weeks of coaching, provided by research staff (Hemmeter et al., 2016). In a second, smaller scale study, teachers received a minimum of 90 min of training plus 3 weekly observations and feedback from an expert coach (Hemmeter et al., 2015). In these studies, authors suggested that programs need to consider the resource-intensive coaching necessary, beyond training, for teachers to implement practices (e.g., behavior expectations, schedules and routines, problem solving) (Hemmeter et al., 2015) when planning for professional development. Thus, while studies show coaching is effective, there is a need to examine approaches that can be implemented more efficiently in early childhood programs.

One such approach is peer coaching, which involves teachers observing and providing feedback to each other. This might provide a less resource-intensive option that would be feasible in early childhood settings. A limited amount of research has been conducted on the effects of reciprocal peer coaching on teaching practices, focusing mostly on the effects of peer coaching with pre-service teachers (e.g., Bowman & McCormick, 2000; Goker, 2006) or teachers in elementary and secondary school settings (e.g., Kohler et al., 1997; Zwart et al., 2007), although some studies have demonstrated peer coaching may be effective in early childhood settings in relation to adult use of response statements (Tschantz & Vail, 2000; Vail et al., 1997) and student–teacher interactions (Johnson et al., 2016). For both pre-service and inservice teachers and both indigenous and researcher coaches, coaching within previous research studies has often been provided only to one teacher in the classroom, most often the lead teacher (e.g., Barton et al., 2013; Fox et al., 2011; Hemmeter et al., 2015, 2016). Including other members of the classroom teaching team could potentially enhance the consistency with which target practices (e.g., PM practices) are implemented. It is an opportunity to provide all team members with valuable professional development and follow-up support. In early childhood education settings, teachers often work in teams (i.e., a lead teacher and one or more assistant teachers), and it is important for all teachers to learn to implement research-based practices to build classroom capacity and consistency.

The purpose of this study was to examine the effects of training plus reciprocal peer coaching on the implementation of PM practices within and across early childhood teaching teams where teaching teams work together in the same classroom. This study sought to answer the following research questions:

Research Question 1: Is training and reciprocal peer coaching effective for increasing early childhood teaching teams' use of PM practices?
Research Question 2: Do skills targeted through training and reciprocal peer coaching generalize to activities in which coaching was not provided?
Research Question 3: Do skills maintain when coaching is removed?

Method

Participants and Implementers

Following the acquisition of Institutional Review Board (IRB) approval, nine participants across four teaching teams were recruited (three dyads and one triad; Teaching Teams 100, 200, 300, 400) by contacting local school and child care principals and directors, providing information about the study, and gathering nominations for participants. Once consented, teachers were included if (a) they worked as part of a teaching team (i.e., multiple adults consistently worked in one classroom with overlapping shifts), (b) they taught in a preschool classroom with 3- to 5-year-olds, and (c) at least three discrete PM (Fox et al., 2003) practices were identified to target during intervention based on data from the Teaching Pyramid Observation Tool (TPOT; Hemmeter et al., 2014). Teaching teams were diverse, in terms of age, level of education, and teaching experience, with all teams working together for two or fewer years (see Table 1). One teacher (Teaching Team 400) had previously attended a PM overview training. All teams reported having at least one child with a behavior support plan in place, with Teaching Team 100 reporting having four children on behavior support plans. Across teams, children with behavior plans exhibited a variety of challenging behaviors (e.g., physical aggression toward peers, difficulty regulating strong emotions, tantrums). Teaching Team 300 withdrew from the study 15 sessions after the introduction of the intervention due to competing responsibilities. The primary researcher, the first author, was a doctoral student in early childhood special education (ECSE). She held a master's degree and was a licensed teacher and Board Certified Behavior Analyst. The primary researcher conducted all but two of the teacher training sessions and was the primary coder for all data. Two teacher training sessions and secondary data coding were conducted by an ECSE master's student. An additional ECSE doctoral student, ECSE master's student, and psychology undergraduate student assisted with data collection.

Settings

This study occurred in four preschool classrooms in schools in a large southeastern city. Reciprocal peer coaching and all data collection occurred during typical classroom activities and routines. All four teaching teams chose center time as their intervention activity. During center time in all classrooms, children chose where to play and could move freely between centers. Three of the classrooms (100, 200, and 400) limited the number of children allowed in each center, and two classrooms (100 and 400) had a system where children hung their picture or name in their chosen center to indicate a spot was occupied. In two classrooms (100 and 200), teachers would pull small groups of children during center time to finish work not completed during small group activities earlier in the day. Routines–snack and toileting–were embedded into center time in classrooms 200 and 400, respectively. Teams identified a second activity during which generalization data were collected. Table 1 provides information about the participating classrooms, and the intervention and generalization activities.

Materials

Materials typical of a preschool classroom including toys, child sized tables and chairs, books, curriculum materials, and visual supports were present. Visuals for classroom behavior

Table 1. Teacher and Classroom Demographics and Target Activities.

Participant	Age	Gender	Ethnicity	Level of education	Licensed	Years of experience[a]	Time as a team[b]	Type of school	Number of children	Age range (months)[b]	Baseline/ intervention activity	Generalization activity
100												
Darby	49	F	Caucasian	Master's	Y	15	6 months	Private Catholic school	22	54-66	Center time	Small groups
Isabel	41	F	Hispanic	Master's	Y	9						
Amaia	48	F	Caucasian	Master's	Y	0.6						
200												
Mikayla	31	F	Caucasian	Bachelors	Y	5	2 years	Private Catholic school	19	37–62	Center time	Small groups
Annie	37	F	Caucasian	Bachelors	N	7						
300												
Eloise	51	F	Caucasian	Bachelors	N	34	6 months	Child care center	16	43–52	Center time	Transition
Lydia	25	F	Caucasian	Bachelors	N	2						
400												
Abby	28	F	Caucasian	High School	N	5	1 week	Daycare center	17	28–40	Center time	Lunch
Charley	18	F	Biracial	High School	N	2						

[a]Experience working with children age 3 to 5.
[b]At start of study.

expectations were given to three of the participating classrooms because they were not present during the initial TPOT observation. Visuals were present in the fourth classroom, but the coach worked with the teachers to reduce the number of behavior expectations to five to comply with TPOT guidelines (e.g., five or fewer expectations, each with a corresponding visual; Hemmeter et al., 2014). Young children are typically nonreaders. Pairing a visual representation with the written expectations supports young children's understanding of the expected behaviors. During intervention, teachers were provided a researcher-created observation sheet (see Teacher Coaching Form in Supplemental material) to record information about their peer's use of the targeted PM practices during the observation period. The data sheet instructed the observing teacher to tally the number of times their peer used targeted practices during the session, as well as three examples of use and one to three examples of missed opportunities. The observing teacher gave the data sheet to the observed teacher as written feedback. Researchers used a different data collection form (see Data Collection Form in Supplemental material) to tally the use of the targeted practices as well the use of previously coached and not yet introduced practices.

Response Definitions

The first author provided each team with a menu of five PM practices to target (Fox et al., 2003) based on areas of need that emerged during the TPOT observation conducted prior to baseline; teams chose three to target. Practices included rule reminders; providing choices; using emotion words; commenting on appropriate behavior; suggesting peer interactions; providing positive descriptive feedback about friendship, social, or emotional skills (PDF-FSE); and providing positive descriptive feedback about engagement (PDF-E; see Table 2 for definitions and information about which teams selected each practice).

Data Collection

Data on teacher use of the practices were collected from 5-min video recordings using a timed event recording system (Yoder & Symons, 2010). While watching the video recordings of each observation (one video per teacher per observation), the first author tallied each instance of the targeted practices by any member of the teaching team. The event recording system was used across targeted practices and teachers. Data were collected on each teacher's use of the targeted practices and then aggregated across teachers within a team. The aggregated data were graphed and used to make phase change decisions. Definitions are available in Table 2 and examples and nonexamples are described in Table S1 in Supplemental material.

Experimental Design

A multiple probe design (MP) across behaviors, replicated across teaching teams, was used to evaluate the effectiveness of training and reciprocal peer coaching on teacher implementation of PM practices (Gast et al., 2018). Data were collected concurrently across tiers (both across behaviors and teaching teams), and the intervention was introduced in a time-lagged manner across practices and teaching teams.

Procedures

Teaching Pyramid Observation Tool (TPOT). Two TPOT observations were completed in each classroom, one (pre-study) prior to the start of the baseline condition and one (post-study) during the maintenance condition. All of the pre-study TPOTs were conducted by the lead author. Fifty-percent of the post-study TPOTs were conducted by the lead author and 50% of post-study

Table 2. Definitions of Selected and Unselected Practices.

Definition	Selected	Not selected	Not offered
Rule reminders: verbal utterance, physical gesture, or visual aid directed toward a child(ren) with the purpose of (a) reminding the child(ren) of the posted classroom rules or expectations, or (b) positively correcting a child's behavior	100 300	200 400	—
Comments on appropriate behavior: verbal utterance directed toward a child(ren) acknowledging that child's/group's positive behavior by referring to a posted classroom rule or expectation	200 400	100 300	—
Choices: explicitly offering a child(ren) a choice between at least two things (e.g., activities, materials, centers, ways of completing a task)	100	200 300	400
Emotion words: verbal utterance including a positive (e.g., happy, excited, proud) or negative (e.g., sad, angry, frustrated) emotion word used to (a) describe a child or teacher's current emotions, (b) describe how a situation may make someone feel, (c) as part of a discussion, or (d) as part of a play scheme	200 300 400	100	—
Positive descriptive feedback on friendship, social, or emotional skills: a verbal statement directed toward a child(ren), acknowledging their use of a friendship, social, or emotional skill. The statement had to (a) be both positive and (b) include a specific statement about what the child did	100 300	400	200
Positive descriptive feedback on engagement: a verbal statement directed toward a child(ren), acknowledging their engagement within an activity. The statement had to (a) be positive, (b) include a description what the child was doing, and (c) be focused on the child or group of children's current engagement with peers, adults, an activity, or materials	200	—	100 300 400
Suggesting interactions between peers: a verbal statement directed toward a child(ren) who encouraged two or more children to play, complete an activity together, or engage in a conversation. The statement had to include a specific statement telling the child(ren) with whom they could interact and what they could do to initiate the interaction	400	—	100 200 300

TPOTs were conducted by master's students. All data collectors were trained and met TPOT reliability standards for research studies. Interobserver agreement (IOA) was conducted on 50% of pre- and post-study TPOTs. Overall TPOT IOA was 92.04% (range = 88.63%–96.21%). After pre-study TPOTs were completed, the lead researcher met with each teaching team to review TPOT scores and presented a menu of five practices they could choose to target during the study. Each team chose three practices (see Table 2) as well as an activity during the day in which to implement coaching and a second activity for the collection of generalization data (see Table 1).

Baseline. After practices were selected, baseline conditions began. During baseline, teachers were instructed to teach and interact with children as they had prior to the study. Research staff collected 5-min videos of each teacher during the target activity (i.e., center time) each day. After a minimum of three low and stable baseline data points were collected across each teaching team, the intervention was introduced in the first tier for that teaching team. Throughout the study, data on the three target practices were coded from a single daily video. These videos were collected at a different time than when the teachers were observing and providing feedback to collect data on all teachers' use of the strategies.

Training. Following the collection of baseline data in the first tier, the teaching team received a 20-min training on the first-tier target practice and on the coaching process. The training included the use of a PowerPoint presentation, handouts, short videos (approximately 30 s to 1 min in length) of examples and nonexamples of the practice, and discussion. Using the PowerPoint presentation, the researcher defined the target practice and provided the teaching team with a rationale for the importance of incorporating the practice into daily activities. When possible, videos of the teaching team were used to provide examples of how to use the target practice as well as to highlight additional opportunities for practice use. Videos from nonstudy classrooms were used as needed. After reviewing the target practice, the researcher reviewed the Teacher Coaching Form (see Supplemental material) by explaining when and how to complete the form (e.g., tally practice use, record examples). Teachers were instructed to conduct four coaching sessions per week during their target activity (i.e., center time). Teams with two teachers (i.e., 200, 300, 400) observed each other twice per week. The team with three teachers (i.e., 100) also conducted four observations per week with the lead teacher observing each of the co-teachers once per week (two observations) and each co-teacher observing the lead teacher once per week (two observations). Training occurred prior to the beginning of coaching in each subsequent tier and followed the same format. The fidelity of each training session was coded.

Intervention. The independent variable in this study was training plus reciprocal peer coaching which involved teachers observing each other and providing feedback on their peer's use of a targeted teaching practice. During coaching sessions, the observing teacher (i.e., observer) observed her peer for 10 min and completed the Teacher Coaching Form. On the form, the observer (a) tallied the peer's use of the target practice, (b) recorded three examples of the peer using the target practice, and (c) recorded one to three examples of when the peer could have used the target practice. In Tiers 2 and 3, the observer also tallied the peer's use of the previous target practices as a reminder for the peer to continue using those practices. At the conclusion of each coaching session, the observer gave the completed Teacher Coaching Form to the peer. The completed form served as feedback for the peer, and teachers were not asked to engage in debriefing conversations. Anecdotally, Teaching Team 200 reported engaging in occasional conversations about coaching feedback. Once a week, project data collectors made copies of the completed coaching forms to collect procedural fidelity (PF) data on the coaching process. If teachers made mistakes completing the coaching form (e.g., not completing a section, recording examples that

did not fit the definition of the target practice), the researcher provided a short, verbal reminder at the next data collection session (e.g., remember to record one to three opportunities for use; remember, feedback statements need to be linked to a child's use of friendship, social, or emotional skills). Coaching sessions occurred separately from the video recorded data collection sessions.

Fading. Once a teaching team increased their use of one practice, that practice entered a fading phase. With the introduction of a new practice, teaching teams were instructed to focus coaching and feedback on the new skill and to provide limited feedback on the previously coached practices by continuing to tally use of the other practices to remind peers to continue using all practices. Observers did not record specific examples of the use of or missed opportunities for using previously coached practices.

Generalization. Sessions were conducted in the generalization context at least once for every three sessions conducted in the primary context across teaching teams, target behaviors, and conditions. These data were collected in an activity or routine that differed from the primary data collection setting in either type of activity, time of day, or both (i.e., lunch, transition, small group). See Table 1 for the generalization settings for each teaching team. As with the baseline condition, teams were instructed to continue teaching and interacting with children during generalization sessions in a typical fashion. Teams were not instructed to coach one another within the generalization setting.

Maintenance. Maintenance data were collected, using the same procedures that were used during the baseline condition, across teaching teams and target behaviors 1, 2, and 3 weeks after the completion of intervention in the third tier. Due to teacher vacation and scheduled school breaks, for one teaching team, 400, only one maintenance data point was collected, 4 weeks after the completion of the intervention in the third tier.

Social validity. Social validity data were collected through a questionnaire that used a 5-point Likert-type scale. Prior to baseline, participants completed a form assessing their experience and comfort with being coached and coaching others. Teachers completed the same form after the completion of the study. After the study, teachers were also prompted to reflect on the feasibility of the coaching intervention and their likelihood of using reciprocal peer coaching in the future (see Teacher Social Validity Forms in Supplemental material).

IOA and PF

IOA data were collected for a minimum of 50% of sessions (range = 50%–100%) across teaching teams, target behaviors, and conditions using a 3 s agreement window. Data were calculated using the point-by-point agreement method where the total number of agreements was divided by the total number of agreements plus disagreements and then multiplied by 100 (Ledford et al., 2018). Prior to beginning data collection, the primary and secondary data collector trained to reliability across all target practices using videos from both nonparticipating and participating classrooms. Behavioral definitions were provided to and reviewed with the secondary data collector. Prior to coding data for study purposes, data collectors reached 90% reliability on each target practice on three practice videos. During study data collection, when IOA fell below 80%, data collectors met to review the operational definitions and discrepancies from the previous reliability session before continuing with data collection. IOA data across target practices are presented in Table S2 in Supplemental material. Average IOA across all teaching teams, study conditions, and targeted practices was 93.61% (range across teaching teams: 89.71%–97.78%).

PF data were collected on 100% of teacher training sessions. Data were collected live, by the trainer, and calculated using the gross method (Ledford et al., 2018; number of items correctly implemented divided by total number of items intended to be implemented). Steps assessed during training sessions were reviewing the purpose of the study, reminding participants of the three chosen practices, introducing the target practice, providing examples and nonexamples of the target practice, reviewing the coaching process, and providing an opportunity for teachers to practice using the coaching form. Following the initial training, an item was added to ensure the trainer reminded the participants to continue using practices from previous tiers. Training PF and IOA for training PF for all teacher training sessions was 100%.

Self-reported PF on coaching was assessed for 100% of sessions by evaluating the completeness of forms teachers completed during coaching sessions. Fidelity was collected on eight indicators, divided into two components of the coaching session: (a) structure (i.e., observed the correct activity, observed for 10 min, handed feedback form to peer) and (b) completeness (i.e., tallied the target practice, recorded three examples of observed practice use, recorded examples met the definition of the practice, recorded one to three examples of missed opportunities, the recorded examples of missed opportunities met the definition of the practice).

Average PF was 75% (range = 69%–89%; see Table S3 in Supplemental material). PF was variable across teams for several components, with low fidelity for some teams around five indicators: recording examples of missed opportunities (i.e., 100, 200, 400), observing for the prescribed 10 min (i.e., 100, 300, 400), observing during the correct activity (i.e., 100, 200), recording three examples of practice use (i.e., 100, 200), and recorded examples of practice use being accurate (i.e., 100, 300). IOA data were collected for a minimum of 33% of randomly selected teacher coaching sessions across teaching teams. IOA on teacher coaching session PF was calculated using the gross method (Ledford et al., 2018), dividing the number of agreements by total number of items (eight) and multiplying by 100. Average IOA on teacher coaching session PF was 97.87%.

Results

Data were graphed daily and visual analysis of graphs was used to make phase change decisions and to analyze results of the training plus peer coaching intervention on teaching teams' use of PM practices. Graphed data (Figures 1–4) are presented as an aggregate across teachers within a team, with the bar graphs representing practice use by teacher. Results are presented and discussed by team.

Teaching Team 100

Data were low and stable across tiers during baseline conditions. An immediate shift in level and trend was observed in use of rule reminders with the introduction of training and reciprocal peer coaching. Across the five coaching sessions, teachers used the rules reminders an average of 7 times per data collection session (range = 5–10). Once data were high and stable in the first tier, and baseline data continued to be low and stable in subsequent tiers, training was provided on the second target practice (providing PDF-FSE). There was an immediate increase in level and trend in the second tier but a booster session was needed before Session 12 due to a decrease in team use of PDF-FSE. During the 10-min booster session, teachers were reminded of the definition of PDF-FSE and were provided with examples and nonexamples of the practice. Following the booster training, team use of PDF-FSE further increased in level. Teachers conducted a total of eight coaching sessions and used an average of 4.4 (range = 2–10) feedback statements per data collection session. An immediate shift in level and trend was observed following the introduction of training and coaching on the third practice (providing choices). Teachers conducted three

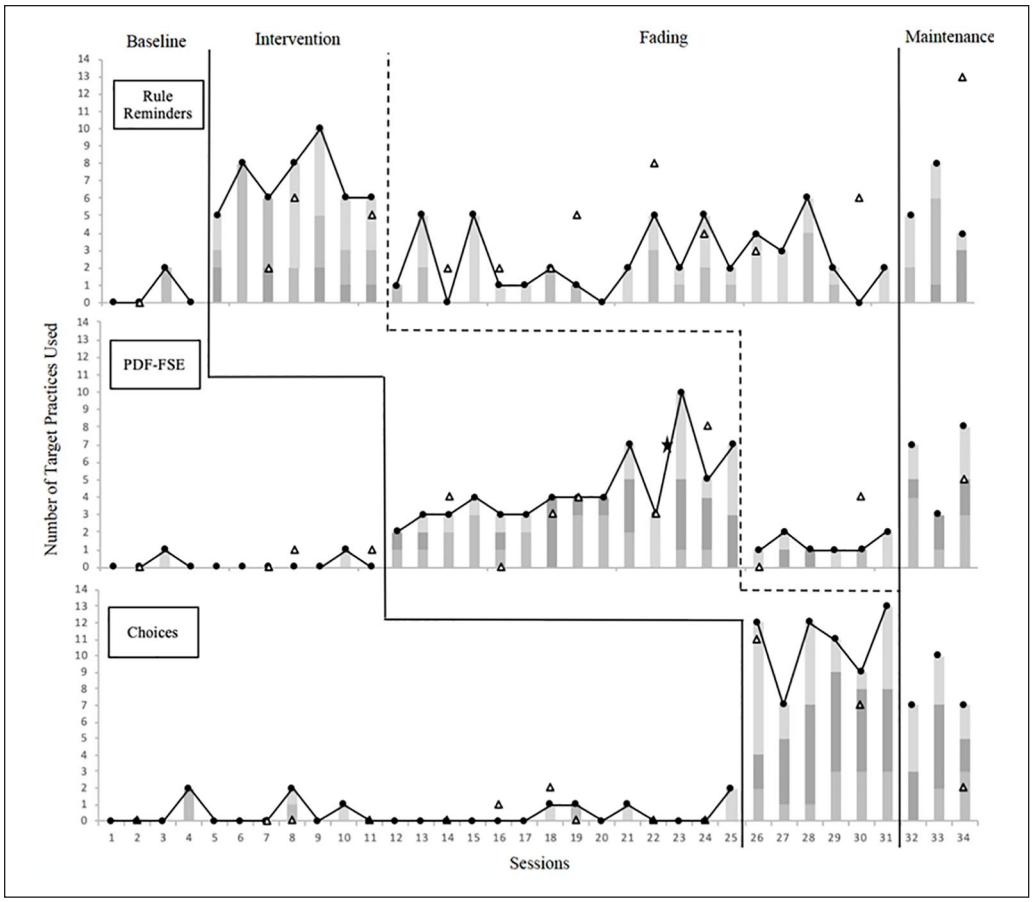

Figure 1. Teaching Team 100's use of targeted PM practices.
Note. Use of targeted PM Practices during baseline, intervention, fading, and maintenance (1, 2, and 3 weeks) sessions is shown. Triangles indicate generalization data. The star symbol indicates the occurrence of a booster training session. The shades of gray in the bar graph indicate individual teacher use of target practices within a session. Training occurred between the final baseline data point and first intervention data point in each tier. PM = Pyramid Model; PDF-FSE = positive descriptive feedback about friendship, social, or emotional skills.

coaching sessions and provided an average of 10.7 choices per data collection session (range = 7–13). Levels of the use of rule reminders and PDF-FSE were lower and more variable during the fading phase when the focus of coaching shifted to a new practice but overall use of all targeted practices remained above baseline levels. Practice use across tiers maintained 1, 2, and 3weeks after teachers were told they could discontinue peer coaching. There was a clear functional relation for Teaching Team 100.

Teaching Team 200

Data remained low and stable across all three tiers throughout the baseline condition. There was an immediate shift in level and trend of practice use with the introduction of training and reciprocal peer coaching in each tier, demonstrating a clear functional relation for Teaching Team 200. Teachers conducted 22 coaching sessions across tiers (10 in Tier 1 and 6 in both Tiers 2 and 3). During intervention, teachers used an average of 18.4 comments on appropriate behavior

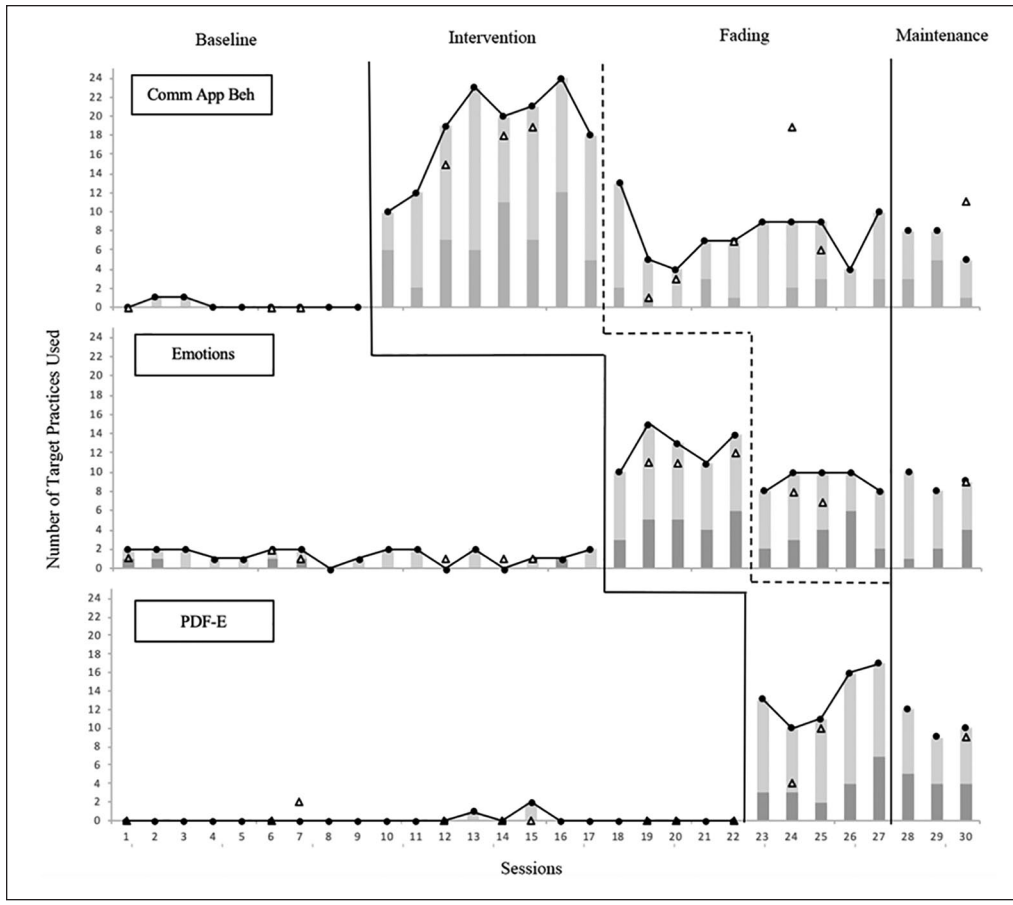

Figure 2. Teaching Team 200's use of targeted PM practices.
Note. Use of targeted PM Practices during baseline, intervention, fading, and maintenance (1, 2, and 3 weeks) sessions is shown. Triangles indicate generalization data. The shades of gray in the bar graph indicate individual teacher use of target practices within a session. Training occurred between the final baseline data point and first intervention data point in each tier. PM = Pyramid Model; PDF-E = positive descriptive feedback about engagement.

(range = 10–24), 12.8 emotion words (range = 10–15), and 13.4 PDF-E (range = 10–17) per data collection session. Once the intervention was faded in each tier, practice use decreased but remained well above baseline levels. Practice use maintained 1, 2, and 3 weeks after teachers were told they could stop implementing peer coaching.

Teaching Team 300

Baseline data were low and stable across tiers. With the introduction of training and reciprocal peer coaching in the first tier, there was a slight but variable increase in the use PDF-FSE with three of the first five data points being at or below the highest baseline data point. The teachers completed a total of four coaching sessions, all prior to the sixth data collection session. Teachers reported struggling to find time to conduct coaching sessions, and one teacher expressed that increasing her use of feedback statements was difficult within the context of play and ongoing conversations with children. Prior to Sessions 6 through 8, the lead researcher modeled how the teachers could naturally incorporate feedback statements into their conversations with children.

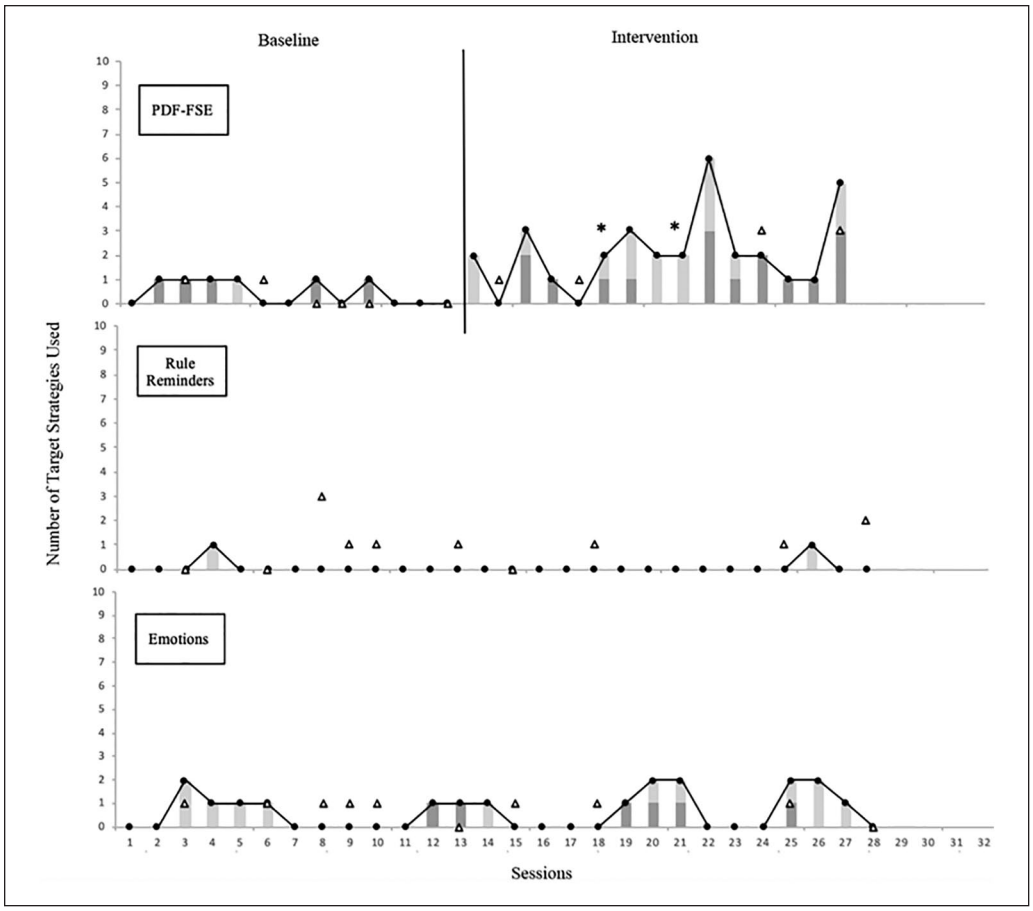

Figure 3. Teaching Team 300's use of targeted PM practices.
Note. Use of targeted PM Practices during baseline and intervention sessions is shown. Triangles indicate generalization data. Asterisk symbols indicate the occurrence of researcher feedback. The shades of gray in the bar graph indicate individual teacher use of target practices within a session. Training occurred between the final baseline data point and first intervention data point in Tier 1. PM = Pyramid Model; PDF-FSE = positive descriptive feedback about friendship, social, or emotional skills.

With the modeling, data stabilized but did not increase in level. To further support the teachers, beginning with data collection Session 9, data collectors provided the teachers with feedback on their use of the target practice by completing the peer coaching form during the video recording session. Teaching Team 300 withdrew from the study following intervention Session 15 because of competing responsibilities.

Teaching Team 400

Data were low and stable across all tiers throughout the baseline condition. Following introduction of training and coaching in the first tier, use of emotion words increased to the highest baseline data point and remained stable for two sessions and then increased in level and trend. The same pattern occurred with the introduction of the intervention for commenting on appropriate behavior in tier two; data remained stable at the highest baseline data point and then increased in level and trend. With the introduction of training and coaching for suggesting peer interactions in the third tier, there was an immediate shift in level and trend. Teaching Team 400 conducted a

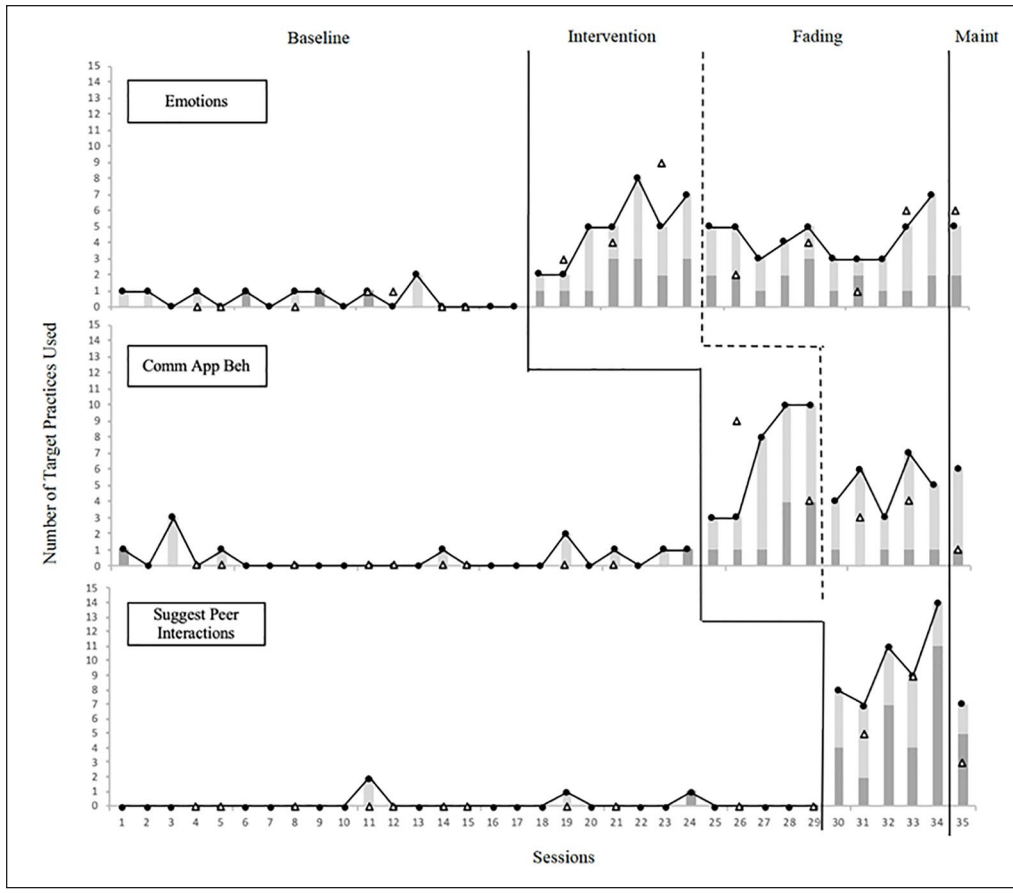

Figure 4. Teaching Team 400's use of targeted PM practices.
Note. Use of targeted PM Practices during baseline, intervention, fading, and maintenance (4 weeks) sessions is shown. Triangles indicate generalization data. The shades of gray in the bar graph indicate individual teacher use of target practices within a session. Training occurred between the final baseline data point and first intervention data point in each tier. PM = Pyramid Model.

total of 16 coaching observations (six in Tiers 1 and 2 and four in Tier 3). During intervention, Teaching Team 400 used an average of 4.9 (range = 2–8) emotion words, 6.8 (range = 3–10) comments on appropriate behavior, and 9.4 (range = 7–14) suggestions of peer interactions per data collection session. When the intervention was faded in the first two tiers, practice use decreased slightly but remained at or above the lowest intervention data point. Due to teacher vacation and scheduled school breaks, only one maintenance session, 4 weeks after the final intervention data point, was conducted, and all three practices maintained. However, these data should be interpreted with caution because at the time of the maintenance session, the teaching team no longer worked together in the same classroom but were put back together for data collection purposes. There was a clear functional relation for Teaching Team 400.

Generalization

Generalization data are graphed (open triangles) on the primary graphs (Figures 1–4) and are presented as an aggregate of practice use by all teachers within the teaching team. Use of all practices across teaching teams generalized across activities. Across teams, practice use during baseline generalization sessions was low and stable, averaging less than one use of a practice per

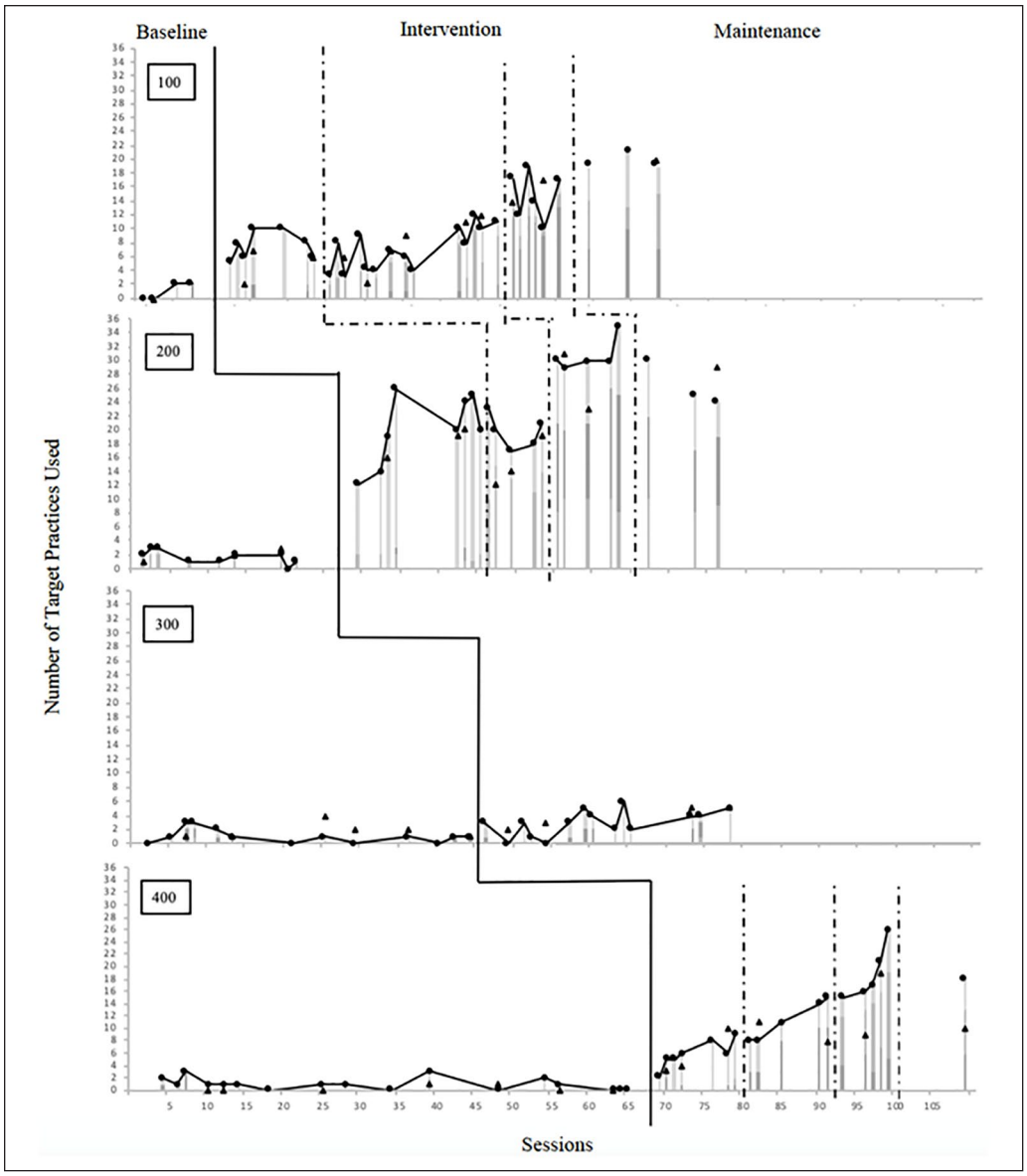

Figure 5. Combined use of PM practices within a session across teaching teams.
Note. Combined use of PM practices, across teaching team, during baseline, Tier 1, Tier 2, Tier 3, and maintenance (1–4 weeks) sessions are shown. Triangles indicate generalization data. Shades of gray in the bar graph indicate teaching team use of each target practice within a session. PM = Pyramid Model.

session. For Teaching Teams 100, 200, and 400, there was an immediate increase in level of practice use during generalization sessions with the introduction of the training plus peer coaching intervention. Practice use in generalization sessions maintained across teaching teams.

Combined Use of Practices

Figure 5 presents a combination of all target practices used by the teaching team within a data collection session. For three teams (100, 200, 300), data across sessions were variable but had an

overall increasing trend compared with baseline. There is a clear increasing trend with minimal variability for Team 400. Although use of one practice often decreased when an additional practice was introduced, the overall increasing trend indicates that teams continued to increase their total use of targeted practices.

TPOT Data

A TPOT was conducted in each classroom prior to the start of baseline and within 1 week of the teaching team completing the intervention. See Table S4 in Supplemental material for overall pre and post TPOT scores across teams. On average, teams who completed the intervention increased their overall TPOT scores by 16% from pre to post intervention. All indicators measuring the presence of practices targeted by training and peer coaching were scored as present on the post-study TPOTs. Table S4 in Supplemental material provides a breakdown of the specific TPOT indicators targeted by training and coaching across teams.

Social Validity

Teachers were asked to complete a survey both prior to and following the study. All nine participants, including those who withdrew from the study, completed both social validity surveys. Prior to the study, teachers reported being comfortable with receiving and giving feedback ($M = 4.19$, range = 2–5). Comfort with feedback remained high following the study ($M = 4.31$, range = 2–5). Following the study, teachers reported they were likely to continue using reciprocal peer coaching ($M = 4.22$, range = 3–5). Teachers, who completed the intervention, rated the intervention as both feasible ($M = 4.21$, range = 3–5) and effective for changing their practice ($M = 4.86$, range = 4–5). Teachers reported, "the observations and coaching were very helpful for keeping us on the same page," "the process was feasible," "it was quick and easy doing observations in the class," "it strengthened and solidified our team," and "it overall made the flow of the classroom better." Teachers who withdrew from the study reported that reciprocal peer coaching was somewhat effective for changing their practice ($M = 3.5$, range = 3–4) but was not feasible ($M = 2$), saying, "It was very hard to conduct an observation in the specific "center only" time period [the activity during which teachers chose to conduct coaching]" and "I felt like my focus was on my co-teacher instead of the children."

Summary

There were five opportunities for demonstrations of an effect, one within each of the four teaching teams and one across all teaching teams. There was a functional relation between training plus reciprocal peer coaching and teaching team use of PM practices, within and across each of the teaching teams who completed the intervention (i.e., 100, 200, 400). A shift in level and trend was present in each of the three tiers within and across those teaching teams from baseline to intervention. Results generalized across activity type and maintained following the completion of the intervention for all three teams. There was insufficient data to determine an effect within Teaching Team 300.

Discussion

With the introduction of training and reciprocal peer coaching, three teaching teams increased their use of target PM practices. A functional relation was demonstrated within and across the three teaching teams who completed the intervention. Teacher use of targeted practices was low and stable during baseline. A shift in level and trend was observed with the introduction of

training plus reciprocal peer coaching. Use of targeted practices generalized across activities and maintained after coaching was discontinued. On average, teaching teams increased their use of each practice with only six coaching sessions per practice (about 60 min of observation), indicating reciprocal peer coaching may be an efficient model for increasing use of PM practices following training. Teaching teams, who completed the intervention, increased their overall scores on the TPOT by at least 15% from pre to post intervention. Findings from this study provide evidence to support the use of training plus reciprocal peer coaching for some classroom teams. Reciprocal peer coaching may not be appropriate for all teaching teams, as evidenced by the difficulty faced by Team 300.

Two interesting patterns emerged from PF data. First, for two of the teaching teams (i.e., 100 and 200), overall PF changed significantly throughout the intervention (i.e., from Tier 1 to Tier 3). Teaching Team 100 conducted more observations within the selected target activity (i.e., center time) over time and their adherence to the coaching protocol increased from an average of 51% in Tier 1 to an average of 86% in Tier 3. Teaching Team 200's adherence to the coaching protocol decreased from an average of 81% in Tier 1 to an average of 54% in Tier 3. This decrease in PF was due to the fact that they conducted observations during large group activities versus the target activity (i.e., center time) and did not record examples of missed opportunities. PF for Teaching Team 400 remained stable across tiers. Another interesting pattern was the overall lack of coaching occurring during the target activity (i.e., center time) for Teaching Teams 100 and 200. Across the teams, only 53% of coaching sessions occurred during center time, the activity teachers chose originally as the coaching context and during which data were collected and used to make phase change decisions. For these teams, all coaching sessions that were conducted outside of the target activity (i.e., center time) occurred during large group activities. Despite almost half of the coaching sessions occurring outside of the target activity, both teaching teams increased their use of the targeted practices during the target activity, providing additional evidence of possible generalization, as large group activities were not the focus of intervention and generalization activities selected by teaching teams. Data on teaching team use of targeted practices were not collected during large group activities in either classroom. Fidelity of coaching was variable across teams but the teams who completed the study increased their use of targeted practices, providing evidence that reciprocal peer coaching can be effective with somewhat inconsistent levels of fidelity. Future research might look to understand what level of fidelity is needed to produce benefits, and which aspects of the coaching are most closely aligned with change in practice.

Current literature on PM implementation indicates that training plus coaching is effective for increasing teacher use of PM practices (Fox & Hemmeter, 2011; Hemmeter et al., 2015, 2016; Hemmeter, Fox, et al., 2021). Coaching in those studies was delivered by research staff. Previous research on the effectiveness of peer coaching has also examined feedback provided by a coach outside the classroom (e.g., grade-level teaching peer, fellow pre-service teacher) (Bowman & McCormick, 2000; Goker, 2006; Johnson et al., 2016; Kohler et al., 1997; Zwart et al., 2007). This study adds to this research in four ways: (a) provides additional evidence to support the effectiveness of training plus peer coaching for some teaching teams, (b) extends the use of peer coaching to early childhood classrooms, (c) utilizes teachers who work together in the classroom as coaches, and (d) applies reciprocal peer coaching to the implementation of PM practices.

Outcomes in this study were achieved with significantly less coaching time compared with previous studies on implementation of PM practices. On average, teams in the current study attended 20 min of training and completed 60 min of coaching per target practice. In two large-scale studies, teachers attended over 19 hr of training around the PM and received an average of 30 to 44 min of weekly coaching over 10 to 16 weeks (Hemmeter et al., 2016; Hemmeter, Fox, et al., 2021). In a study focused on specific items on the TPOT, teachers received 30–60 min of training per target practice as well as in vivo feedback during observations and follow-up feedback from an expert

coach three times per week for an average of 3½ weeks per target practice (Hemmeter et al., 2015). The current study indicates training plus reciprocal peer coaching may be a more efficient model of coaching teachers around the implementation of PM practices.

The collection of generalization and maintenance data in current studies utilizing coaching to increase teacher use of discrete skills is variable. The current study expanded the literature by examining both generalization and maintenance for all participants. Data showed the use of practices targeted by coaching both generalized to a novel activity and maintained 3 to 4 weeks after the removal of reciprocal peer coaching, across all teaching teams who completed the intervention.

Limitations

When interpreting the results from this study, several limitations should be considered. First, the practices teachers selected may not have been equivalent to one another in terms of ease and naturalness of use. For example, PDF-FSE may have been more difficult for teachers to learn to incorporate into their practice than providing choices. Team 100 chose to target PDF-FSE. It took them longer to increase their use of PDF-FSE, compared with the other practices, and they struggled with identifying correct examples of the practice during their coaching observations, as evidenced by incorrect examples on their coaching forms. Teachers were recording examples of positive descriptive feedback that did not focus on a friendship, social, or emotional skill (e.g., "I love how you're sitting so quietly," "thank you for lining up when you were told," "you did the puzzle all by yourself"). Teaching Team 100 received a booster training around PDF-FSE to support their differentiation between feedback around friendship, social, or emotional skills and other types of skills and behavior. Identifying the relative difficulty of different PM practices has implications for planning professional development and ensuring data consistency across tiers.

A second limitation is that data collectors were not blind to the purpose of the study or to procedures, which could lead to detection bias. Moreover, study participants were also not blind to data collection purpose. Teachers knew data on the target practices would be collected from the recorded videos. As a result, performance bias may have occurred. In future studies, data collectors could record longer videos and only code data on a segment of the video to decrease the likelihood of performance bias influencing the data.

A third limitation of this study is that, aside from length of time working together as a team, information was not collected on team dynamics. Anecdotally, team functioning varied widely across teams and could have been a factor in team fidelity to the intervention. For example, while all teams had a designated lead teacher and assistant teacher(s), three of the teams (i.e., 100, 200, 400) employed a co-teaching approach throughout the school day, wherein teachers shared responsibilities and made decisions jointly. Teaching Team 300 employed more traditional lead and assistant teacher roles, with the assistant teacher completing more prep tasks and the lead teacher making classroom decisions. The assistant teacher from Team 300 indicated she was not comfortable giving feedback to her peer (score of 2/5 on both pre- and post-intervention surveys). The relationship between teachers may have impacted her comfort level with giving feedback to her peer, resulting in their withdrawal. In addition to the short amount of time teams had worked together (i.e., 2 years or less), other factors such as teacher age and years of teaching experience that differed within teams may have contributed to team dynamics (see Table 1). Information about roles within the classroom and how the teachers communicated with one another prior to the intervention may have helped to capture the dynamics and provide insight into differences between teams.

A fourth limitation is that all dependent variable data were collected in one 5-min session per teacher. By the third tier, teachers were expected to use all three practices within one 5-min session. As a result, data on previously coached practices decreased with the introduction of a new practice. When aggregated across practices, as displayed in Figure 5, data indicate that while the

level of a specific practice use decreased with the incorporation of a new practice, combined use of all target practices increased. This trend in the data may indicate that teachers were finding a level of practice use that was conducive to the use of multiple practices over time.

Implications for Practice and Future Research

Results of this study indicate training plus reciprocal peer coaching is effective for increasing teacher use of discrete targeted PM practices with minimal external support for some teaching teams. Teaching teams received a total of three trainings that were each about 20 min in duration. Aside from the booster training provided to one teaching team (approximately 10 min), teachers in three of the four teams successfully implemented the intervention without additional support from the research team. The amount of external support provided in this study is significantly less than that provided in the current coaching literature around PM implementation (Fox et al., 2011; Hemmeter et al., 2016; Hemmeter, Fox, et al., 2021). This could be a cost-effective way to extend professional development and increase teacher use of practices learned during training already provided by schools and child care programs because minimal external support was required. Both generalization and maintenance data were collected in this study and demonstrated that training plus reciprocal peer coaching can result in the generalization and maintenance of targeted practices. This study indicates that a package of training plus reciprocal peer coaching is effective and efficient. A component analysis could be included in future research to understand the independent effects of training and reciprocal peer coaching. This intervention also involved the whole teaching team, everyone working together and supporting one another, focused on a common goal. The team approach might lead to more consistent use of practices across teachers (Hunt et al., 2004) and puts all teachers on a level playing field, giving both lead and assistant teachers the opportunity to receive and provide feedback. Further research might examine how the dynamics of teaching teams change as a result of this type of intervention.

Additional research should be conducted to replicate these findings to build an evidence-base for the effectiveness of training plus reciprocal peer coaching. In replication studies, researchers should try to ensure targeted practices are equivalent across tiers and address concerns from this study about performance bias and the lack of blind data collectors. Future research should look to expand the use of training plus reciprocal peer coaching beyond discrete PM practices. For example, can training plus reciprocal peer coaching effectively increase teacher compliance to a multicomponent intervention that includes multiple practices such as implementing effective and efficient transitions between activities or leading an engaging large or small group activity?

Conclusion

The purpose of this study was to fill a gap in the research on coaching by studying the effects of training plus reciprocal peer coaching on the implementation of PM practices within and across early childhood teaching teams where peers work together in the same classroom. Results indicated training plus reciprocal peer coaching was effective for increasing teaching team use of PM practices. Teaching teams generalized their use of targeted practices to classroom activities in which they did not receive coaching. Results maintained following the withdrawal of the intervention, and teachers reported they were likely to use the reciprocal peer coaching model in the future. Future research should be conducted to expand the evidence base for the effectiveness of training plus reciprocal peer coaching and explore additional types of practices that could be targeted during coaching sessions.

Authors' Note

Marisa Edmonds is now at Autism in Motion Clinics. Portions of these findings were presented as posters at the following conferences: the 2019 National Training Institute on Effective Practices: Addressing Challenging Behavior, St. Petersburg, Florida, United States; the 2019 Annual DEC Conference on Young Children with Special Needs and their Families, Dallas, Texas, United States; and the 2020 Conference on Research Innovations in Early Intervention, San Diego, California, United States.

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Supplemental Material

Supplemental material for this article is available online.

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