

Iterative Design and Pilot Implementation of a Tiered Coaching Model to Support Social-
Emotional Teaching Practices

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Abstract

We used an iterative process to design the Tiered Coaching Model (TCM) to support preschool teachers' implementation of the Pyramid Model. In the TCM, teachers are matched to one of three coaching tiers based on their observed classroom practices, individual characteristics, and preferences. Coaching tiers included self-guided coaching, small group coaching, and individual coaching. We describe TCM model development and two field tests exploring its potential usability and effectiveness. In Field Test 1, the model was tested with 16 lead preschool teachers. Focus groups and teacher feedback informed systematic model revisions. In Field Test 2, we gathered preliminary findings from an additional 24 teachers. All teachers across coaching tiers and field tests increased their use of Pyramid Model practices while engaging in the TCM, providing promising evidence for wider demonstrations and future rigorous evaluations of the model.

Iterative Design and Pilot Implementation of a Tiered Coaching Model to Support Social-Emotional Teaching Practices

Professional development (PD) has emerged as an essential component of high-quality early childhood education systems (Winton et al., 2015) and an active implementation driver of evidence-based practices (Fixen et al., 2018). Coaching, in particular, has emerged as a goal-oriented, job-embedded PD strategy that positively influences both teacher practice and child outcomes across a range of content areas and domains (Schachter, 2015; Taylor et al., 2021). As a result, coaching is now expected in 43 of 44 state early childhood Quality Rating and Improvement Systems (BUILD, 2020) and is integral to the dissemination of evidence-based practice through state and federal technical assistance networks (e.g., Dunlap et al., 2014).

Despite widespread adoption of coaching, there remains a great deal of variability in how coaching is defined, delivered, and evaluated (Artman-Meeker et al., 2015; Snyder et al., 2012). In keeping with recommendations to advance a unified field of PD (Winton et al., 2015), we review first the characteristics of the early learning workforce (the “who” of PD), the research supporting the content-focus of coaching in the current study (the “what” of PD), and a detailed description of the Tiered Coaching Model (TCM), its rationale, and research support (the “how” of PD). We conclude with data from a multi-study iterative design process of TCM.

The Who of PD: What is Known about the Early Learning Workforce

Effective early childhood PD must be designed to address the unique contexts and professionals across the early childhood sector in community childcare programs, private preschools, public preschools, Head Start, and inclusive early childhood special education settings (Winton et al., 2015). For example, reviews of the EC coaching literature consistently reflect participants with high school diplomas through advanced graduate degrees, with and

without formal certification or credentials (Artman-Meeker et al., 2015; Snyder et al., 2012). In addition, there is increasing evidence that teachers' personal characteristics and psychological factors influence their uptake of evidence-based practices and PD (Jeon et al., 2014; Ransford et al., 2009). For example, Ransford (2009) found that teachers who reported negative perceptions of coaching and programmatic supports were less likely to implement PBIS interventions. This warrants examination of teachers' characteristics, beliefs, and preferences to evaluate the contextual factors that may affect teachers' implementation of evidence-based practices (Domitrovich et al., 2015).

The "who" of PD also includes the characteristics of PD providers, such as coaches (NCPDI, 2009), who may be fellow teachers, external consultants, or program leaders. There are few formal training or credential requirements for early childhood coaches. For example, 25% of state QRIS technical assistance systems include no training requirements for coaches or PD providers (BUILD, 2020). As a result, relatively little is known about the background education and experiences of coaches.

The What of PD: Research Support for the Pyramid Model

This pilot implementation focused upon the Pyramid Model (Fox et al., 2003), a public health model of promotion and prevention for young children's social-emotional development. At the foundation of the Pyramid is a skilled workforce that is fairly compensated, provided adequate PD, and staffed intentionally. With this foundation in place, adults build nurturing and responsive relationships with children, families, and colleagues. Children have access to meaningful and challenging materials and learning experiences, clear expectations, predictable routines, and rich conversations in play experiences. Adults create opportunities to teach children friendship skills, emotional regulation, and social problem solving. When these supports are in

place, only a small number of children continue to require individualized and intensive plans to support their behavior in the classroom and/or at home. These plans take a team-based Prevent-Teach-Reinforce framework (Dunlap et al., 2013) and are designed around the “function” of the behavior (what it communicates for the child).

The Pyramid Model has been evaluated in a multi-site randomized control trial (Hemmeter et al., 2016; Hemmeter et al., 2021). Teachers who implemented the Pyramid Model with fidelity had significantly more emotionally supportive classrooms than did control group teachers. Importantly, students of teachers in Pyramid Model classrooms were rated as more socially skilled and as having few challenging behaviors at the end of the year.

The How of PD: Research Support for Practice-Based Coaching

Most of the research-to-date on the Pyramid Model has included a specific coaching model: Practice-Based Coaching (PBC; Snyder et al., 2015). PBC is supported by a growing body of rigorous research. It has been used to support Pyramid Model implementation (Artman-Meeker et al., 2014; Golden et al., 2021; Hemmeter et al., 2015; McLeod et al., 2019), teachers’ implementation of Tier 2 behavior supports in preschool (Conroy et al., 2014; 2021), and embedded instruction (Snyder et al., 2018). PBC is a cyclical process in which collaborative coaching partners engage in a process of goal setting, focused observation, and reflection and feedback around effective teaching practices such as the Pyramid Model. In most research, PBC is characterized as “expert” coaching, in which a coach with expertise on the focal teaching practices works individually with a classroom teacher. For example, Hemmeter et al. (2016) offered preschool teachers 19 hours of workshop training and an average of 13.5 individual PBC sessions with a project-affiliated coach. Coaching resulted in a statistically significant increase in Pyramid Model implementation relative to a waitlist control.

There is evidence that PBC can be offered flexibly to meet individual and program needs (National Center for Pyramid Model Innovation, 2019). PBC can be delivered live in the classroom or at a distance via technology (e.g., Baughn et al., 2019; McLeod et al., 2019). Researchers have used email (Baughn et al., 2019), video (McLeod et al., 2019), and web-based self-coaching (Snyder et al., 2018) to deliver PBC. The collaborative coaching partners are also flexible: researchers have examined peer coaching (Golden et al., 2021; Giordano et al., 2020), small group coaching (Fettig & Artman-Meeker, 2016), and self-coaching (Bishop et al., 2015).

The Tiered Coaching Model: Rationale and Description

Taken together, there is evidence that individual “expert” coaching, small group coaching, and self-coaching are effective strategies. However, no researchers to date have examined these strategies together as a systematic package. There also is little guidance about how to choose specific coaching approaches. To date, coaching has largely been applied in a “more is better”, “one-size-fits all” approach. The TCM was developed to account for individual teacher differences, preferences, and classroom practices in the coaching process.

The TCM uses a person-centered approach to match teachers with an appropriate and efficient level of PBC support. The initial TCM is based on an observational study of 97 teachers (Fettig et al., 2021). We identified four profiles, or patterns, of teachers based on observed implementation of Pyramid Model practices, job commitment, PD experiences and satisfaction, and “disciplinary efficacy” (or teachers’ confidence in their own ability to guide children’s behavior). These profiles are displayed in Figure 1 and were used to inform the pilot implementation of the TCM, in which teachers from each profile were matched systematically with unique PBC supports. To the maximum extent possible, each tier of TCM was implemented as described in previous research or model development on PBC; the focus of this study was to

develop, build, and test the process for matching teachers to appropriate PBC supports. Tier 1 self-coaching was adapted from the PBC models described by Snyder et al. (2018) and Bishop et al. (2015). Small group coaching was closely modeled after the PBC Together Learning and Collaborating model (NCECDTL, n.d.). Individual coaching was based on the procedures described by Snyder et al. (2015). The following section describes the components of TCM in the pilot implementation: universal training, self-guided coaching, small group coaching, and individual coaching. Details about each and alignment to the PBC model are shown in Table 1.

Universal Training and Coaching. In the TCM, all teachers complete a Pyramid Model workshop training, focusing on practices associated with building positive relationships (with children, family, and staff), creating supportive and engaging environments, teaching behavior expectations, and teacher specific social emotional skills (including friendship, emotional literacy, and social problem solving). Each teacher receives a twice monthly newsletter to support Pyramid Model implementation, including links to social stories and classroom visuals. See Supplemental File 1 for a full description of materials and coaching topics.

Tier 1: Self-Guided Coaching. In addition to universal supports, teachers develop an individual action plan related to Pyramid Model implementation. Practice checklists are used for self-observation and reflection. Coaches facilitate with monthly email check-ins and reminders.

Tier 2: Small-Group Coaching. Groups of 3-5 teachers participate in 60 min meetings twice a month. To open each meeting, which can occur via teleconferencing or in-person, a facilitator provides a 20 min presentation around a specific Pyramid practice (e.g. teaching behavior expectations), with guided learning activities and discussion. Then teachers spend 20 min discussing and developing an individual action plan to apply during the two weeks between meetings. A teacher is identified to share a video, photo, or anecdote with specific progress and

challenges with implementation at the next meeting. The facilitator guides a feedback discussion related to the practice and its effects on children.

Tier 3: Individual Coaching. Tier 3 coaching follows the individual PBC model used by Hemmeter et al. (2018) and includes: (1) planning goals and action steps, (2) engaging in focused observation, and (3) reflecting on and sharing feedback about teaching practices. To begin individual coaching, the coach and teacher collaboratively create an action plan to guide each coaching session. The focus of each action plan is driven by information from classroom observations and teacher priorities and reflections. Every week, the coach engages in focused observations to gather information related to the identified goals and teaching practices. Within 24 hours of the focused observation, coach and teacher meet individually to discuss the observation and implementation of action plan steps. If all action plan steps are complete and the goal met, the teacher and coach generate a new goal and action plan. Within 24 hours, the coach sends the teacher an email summarizing the meeting, including descriptive feedback and next steps, as well as relevant resources to support implementation.

Movement Between Tiers. Teachers are matched to an initial tier based upon their observed use of Pyramid model practices and responses to the TCM survey (see method for description of all measures). After approximately 10 weeks of coaching, observed Pyramid practices are reviewed alongside teacher reports of changes in staffing, class size, or behavior, and changes are made as described in Figure 1.

Tiered Coaching Model Iterative Design Process and Pilot Implementation

We followed an iterative design process similar to the Discover, Design, Build, and Test Framework (DDBT; Lyon et al., 2019) to guide TCM development, which combined user-centered design and implementation science approaches. In the discover phase, we engaged

teachers, coaches, and a panel of coaching experts to determine program variables that might impact the different coaching approaches. This phase also included the latent profile analysis reported in Fettig et al. (2021), a systematic literature review (Artman-Meeker et al., 2015) and a series of studies on individual coaching (Artman-Meeker et al., 2014) and small group coaching (Fettig & Artman-Meeker, 2016). In the design and build phase, we used the information gathered from the discover phase to iteratively build, evaluate, and refine the different coaching tiers and the decision-making processes. During this phase, we convened an advisory panel of coaching experts to review and provide feedback on proposed model components. The advisory panel included developers of the Pyramid Model and PBC. The panel provided feedback on (a) fidelity tools and protocols for each tier and (b) the proposed criteria for matching teachers to coaching tiers. The project team—which included researchers and coaches—made revisions based on their feedback.

Following the design and build phases, we carried out two field tests to understand the feasibility of the model. Field Test 1 was an exploratory treatment-only study to inform model development. The goal of this study was to test coaching procedures and gather evidence to inform iterative design work. Following Field Test 1, we engaged in focus groups and systematic model revisions consistent with design-build-test cycles. The goal of this phase of the project was to refine the model and prepare to test its potential efficacy. Finally, in Field Test 2, we began an exploratory quasi-experimental design, but this field test was halted due to the COVID-19 pandemic. The field tests are presented separately below, with iterative design processes and changes to the TCM described between the two field tests.

Field Test 1

The purpose of Field Test 1 was to test the preliminary TCM with a treatment-only, pre-test/post-test design. Detailed implementation fidelity data were collected alongside qualitative data from coach and teacher experiences. The findings were used to iteratively refine the intervention for future larger-scale testing. We were guided by two research questions: (a) what are the preliminary effects of the TCM on preschool teachers' TPOT scores and (b) what is the acceptability and feasibility of the preliminary TCM and its component parts?

Participants and Setting

Sixteen lead preschool teachers in two Pacific Northwest states participated in this first field test (see Table 2). All were lead teachers in inclusive classrooms serving young children ages 3 to 5 years. Most of the participants (68.8%) taught in private childcare programs serving children with and without disabilities. A smaller portion of teachers (31.3%) taught in public developmental preschool classrooms primarily serving children with identified disabilities. The average percent of children with an Individualized Education Program (IEP) or Individualized Family Service Plan (IFSP) in each classroom was 38.2% (range: 0–100%). All but one teacher reported some form of PD in the year prior to the study, and a majority (81.3%) reported receiving some form of regular feedback based on classroom observations at their center.

Two university staff members served as coaches in Field Test 1. Both coaches were white women with graduate degrees in early childhood special education. One coach had a PhD in early childhood special education, 6 years as a teacher, and 7 years as a coach and professional development provider. The second coach had a master's degree in early childhood education, 4 years as a teacher, and 6 years as a coach and professional development provider. Both coaches had extensive experience with the Pyramid Model. Coaches participated in a two-day orientation

to the TCM and received access to all coaching materials. They co-facilitated Pyramid Model training with the first authors and participated in weekly coaching calls with the first authors.

Dependent Variables

Teaching Pyramid Observation Tool (TPOT; Fox et al. 2014). The TPOT was used as the primary outcome measure for this study. The TPOT is an implementation fidelity tool designed to measure teachers' use of practices associated with the Pyramid Model framework. The TPOT is completed during a two-hour classroom observation and a 20min teacher interview. The tool includes 112 indicators organized into 14 Key Practices such as promoting children's engagement, teaching behavior expectations, and teaching friendship skills (see Supplemental File 2 for Key Practice subscales). Additionally, there is one item assessing persistent challenging behaviors and 17 "red flag" indicators associated with practices inconsistent with the Pyramid Model. TPOT Key Practice scores are represented as the percentage of total key practice indicators present during the observation and/or interview. TPOT Red Flag scores represent the percentage of Red Flag items present during the observation and/or interview. The tool has been widely researched with interrater score reliability and agreement for TPOT of ≥ 0.89 for the Key Practices subscale and ≥ 0.84 for the Red Flags subscale (Fox et al., 2014).

TPOT Reliability. A second, independent observer conducted live TPOT observations and interviews alongside the primary observer for 27% of baseline observations and 31.3% of midpoint and post-test observations. Reliability was calculated using a point-by-point interobserver agreement (IOA) formula for the Key Practices and Red Flag indicators. The total number of agreements on indicators was divided by the total number of agreements plus disagreements, and multiplied by 100. Average IOA for baseline observations was 83.9% (range:

81.7–87.8%). Average IOA for the midpoint observations was 84.6% (range: 80.2–88.6%), and average IOA for the post-test observations was 84.6% (range: 80.2–88.6%).

Teacher Survey. The 36-item survey adapted from the Study of Preschool Teachers (Jeon et al., 2016) addressed a teacher's professional background/experiences, professional development preference, job attitudes, and disciplinary efficacy. Teachers reported their demographic information, educational attainment, certification, and years of experience with young children and in early childhood education/special education (EC/ECSE). For PD and satisfaction, teachers reported their participation in PD during the previous school year, and whether they regularly received feedback from a coach through classroom observations. On a five-item Likert scale, they also reported the extent to which they felt the PD activities were positive, useful, and readily available. Similarly, teachers reported on job related stress as well as job satisfaction and commitment across 14 items from the Teaching as a Career scale (Evans & Johnson, 1990) and the Work Engagement Scale (Schaufeli et al., 2006). Lastly, teachers reported their disciplinary efficacy across three items from the Teacher Self-Efficacy Scale (Bandura, 1997). Teachers' survey responses were compared to the profiles identified in Fettig et al. (2021) and used to match teachers with their initial coaching tier.

Intervention: Tiered Coaching Model

In Field Test 1, our research team applied the TCM framework to support preschool teachers' implementation of Pyramid Model practices. Teachers engaged in TCM for approximately six months (November-April). All teachers attended an introductory Pyramid Model workshop training at the onset of the coaching period and received universal coaching support for the duration of the study.

Initial Tier Assignment. Teachers were assigned to one of three tiers of coaching support. Initial assignment to a coaching tier was guided by the teacher coaching profiles developed by the first two authors (Figure 1). After all survey and TPOT data were collected, the research team met to discuss assignment of individual teachers to coaching tiers. Teachers whose scores on the TPOT and responses on the survey most closely aligned to Profile 1 were assigned to Tier 1 coaching. Teachers whose scores and responses most closely aligned with Profiles 2 and 3 were assigned to Tier 2 coaching, and those whose scores and responses aligned with Profile 4 were assigned to Tier 3 coaching. Additionally, if a teacher requested to be in a different coaching tier than the original assignment, that request and the reasoning behind it was documented and honored. Honoring teachers' choices was an important aspect of building a collaborative coaching partnership (Snyder et al., 2015). Second, these requests provided useful data about the perceived appropriateness of the initial match. Two teachers originally assigned to less intensive coaching tiers specifically requested Tier 3 coaching and were moved into that coaching tier. Once TPOT scores, survey data, and teacher preference were considered, seven teachers were assigned to Tier 1, six to Tier 2, and three to Tier 3. Two teachers left prior to midpoint, so their data were excluded.

Movement Between Tiers. A major aim of Field Test 1 was to pilot procedures for movement between coaching tiers. Two general criteria were used in the decision-making process. First, teachers' scores on a midpoint TPOT observation (conducted approximately ten weeks after the start of the coaching period) were reviewed to determine if their use of Pyramid practices had increased, decreased, or stayed the same. The specific TPOT cut points for each tier were based on previous Pyramid Model research; for example, teachers assigned to continue or move into Tier 3 coaching had TPOT scores consistent with untreated control groups in

previous research (Hemmeter et al., 2021; Snyder et al., 2015). Teachers assigned to Tier 1 coaching had scores consistent with sustained implementation and positive child outcomes in those previous studies. Second, any significant changes that had occurred in the classroom since the start of the study were taken into consideration. The specific guidelines used for moving teachers from one Tier into another at the midpoint can be found in Figure 1. Table 3 displays the number of teachers who moved into a new tier at the midpoint, broken down by tier.

Implementation Fidelity

Implementation of coaching was measured in multiple ways. First, the dosage of coaching was tracked by monitoring the frequency of email contact (Tier 1) and the length of coaching sessions (Tiers 2 and 3). Dosage of universal and Tier 1 supports, adherence to the timeline for distribution of newsletters, and email check-ins were monitored across the duration of the coaching period to confirm that all newsletters were sent to all teachers across tiers, and that all teachers in Tier 1 received a check-in email from a coach once per month. On average, teachers who participated in Tier 1 coaching were sent 3-7 check-in emails (depending upon when they began Tier 1 coaching and how long they stayed in Tier 1 coaching). On average, teachers responded to 61% of the coach email check-ins sent to them (range: 33–100%). All teachers responded to at least one check-in email while in Tier 1 coaching. In Tier 2, teachers participated in an average of nine small group coaching meetings (range: 5–13, depending on length of time in Tier 2), and the average length of the Tier 2 small group meeting was 58 min (range: 49–78 min). In Tier 3, teachers participated on average in 12 coaching sessions (range: 9–13). The average length of observation and live coaching portion of the visits was 43 min (range: 10–90 min). The average length of the debrief meetings was 46 min (range: 25–90 min). Follow up emails were sent after 100% of all Tier 3 coaching sessions.

Fidelity for the small group sessions, individual coaching sessions, and adherence to the email protocol was assessed through a researcher-created checklist, and fidelity was assessed on 100% of sessions and 100% of emails. Checklists were designed to capture the number of key coaching components present in each small group and individualized coaching meeting. Fidelity raters reviewed each coaching video and noted the presence or absence of each component. Fidelity percentages were calculated by dividing the total number of components present by the total number of components expected and multiplying by 100. Average fidelity was 88.1% (range: 62.5–100%) for Tier 2 small group coaching; 90.5% (range: 63.6–100%) for Tier 3 coaching, and 80.8% (range: 50–100%) for email components.

Results of Field Test 1

The TPOT was used as the primary outcome measure in Field Test 1. The TPOT was collected at three time-points: pre-intervention, midpoint, and post-intervention. TPOT Key Practice and Red Flag scores are summarized in Table 3 for each time point. Additionally, TPOT Key Practice scores are reported at the subscale level (e.g., Teaching Behavior Expectations, Schedules and Routines, etc.) for each timepoint in Supplemental File 2. The research team also administered the Teacher Survey as a pre-intervention measure.

Pre-Intervention Teacher Survey & TPOT. Our research team gathered teacher survey responses and baseline TPOT observations before the introductory Pyramid Model training. At pre-test, the average TPOT Key Practices score for the full sample of teachers was 59.5% (range: 37.7–78.6). The average Red Flag score was 5.9% (range: 0–23.5) at pre-test.

Teachers were asked to complete the Teacher Survey at pre-test. They rated PD satisfaction and job commitment on a scale of 1 (not at all true) to 5 (very true), resulting in an average PD satisfaction score of 3.4 ($SD = .95$) and an average job commitment score of 3.7 (SD

= 0.6). Teachers rated job satisfaction and job stress on a scale of 1 (strongly disagree) to 5 (strongly agree), resulting in an average job satisfaction of 3.7 ($SD = 0.5$) and average job stress of 2.6 ($SD = 0.7$). Work engagement was rated on a scale of 0 (never) to 6 (always/everyday), resulting in average work engagement of 4.3 ($SD = 0.7$). Lastly, teachers rated disciplinary efficacy on a scale of 1 (strongly disagree) to 5 (strongly agree), resulting in an average efficacy of 3.9 ($SD = 0.6$).

Midpoint Change. At midpoint, the average TPOT Key Practices score for the full sample of teachers was 63.8% (range: 51.8–78.4), representing an average increase of 4.3 percentage points from pre-test. Average Red Flag score was 2.6% (range: 0–11.8) at midpoint, representing a decrease of 3.3 percentage points from pre-test. For the teachers in Tier 1 ($n = 7$), the average TPOT Key Practices score was 67.9% (range: 51.7–78.4), representing an average increase of 1.3 percentage points from pre-test. For teachers assigned to Tier 2 ($n = 6$), the average TPOT Key Practices score was 59.2% at mid-point (range: 54–67.6), representing an average increase of 5.8 points from pre-test. Lastly, for teachers assigned to Tier 3 ($n = 3$), the average TPOT Key Practices score was 63.5% at midpoint (range: 53.9–77.7), representing an average increase of 8.3 percentage points from pre-test. Based on changes observed in the midpoint TPOT, five teachers moved from a more intensive level of support to a less intensive level. One teacher moved from a less intensive tier to a more intensive tier (Tier 1 to Tier 3).

Post-Intervention Change. Following intervention, the average TPOT Key Practices score for the full sample of teachers was 63.4% (range: 42.1–81.3), representing an average increase of 3.9 percentage points from the pre-test. Red Flag scores decreased to 4.8% (range: 0 – 29.4) at post-test, representing an average change of 1.1 percentage points from the pre-test. See Table 2 for average TPOT scores at pre- and post-tests. For the teachers who were placed in

Tier 1 ($n = 7$) at the beginning of the study, the average TPOT Key Practices score at post-test was 69.1% (range: 58.4–77.5), increasing by 2.5 percentage points from the pre-test. For teachers originally placed in Tier 2 ($n = 6$), the average TPOT Key Practices score at post-test was 59.1% (range: 42.1–69.9), representing an average increase of 5.7 percentage points from pre-test. Lastly, for teachers who began the study in Tier 3 ($n = 3$), the average TPOT Key Practice score at post-test was 58.7% (range: 46.0–81.3), representing an average increase of 3.5 percentage points from pre-test. See Supplemental File 1 for full data on subscales.

Iterative Design Process Between Field Tests 1 and 2

During the spring and summer between Field Test 1 and 2, we conducted a series of focus groups with 16 teachers from Field Test 1. A senior consultant on the project’s Advisory Panel facilitated the focus groups and led data analysis. The consultant had expertise on the Pyramid Model, professional development, and qualitative research. Together we triangulated the focus group findings, Field Test 1 results, and feedback from the expert advisory panel to identify and implement model revisions. These complementary efforts provided rich feedback on (a) strengths of the TCM and (b) areas for enrichment and improvement.

Strengths of the TCM

Teachers were unanimous about benefits they gained from participation in the TCM. They appreciated an outside perspective, time to reflect, and alternative ways to think about situations. They noted the ways coaching added “tools to their toolbox” and built their confidence. Two aspects of the TCM model were noted repeatedly across focus groups: (a) the coaches and the quality of support they provided, whether it was through the face-to-face, video, or the email check-in coaching option; and (b) the video coaching format allowed teachers from across programs to connect and learn from each other. Some teachers noted that they felt isolated

in their workplace and that this provided them with a chance to meet other teachers, hear and learn from each other, and feel better about their own situations knowing that others were experiencing the same issues.

Challenges and Limitations of the TCM

The biggest challenge noted by teachers across coaching tiers was the timing for the meetings. They each had to leave their classroom to log in online in another part of the center or meet with a coach. For some, there was no coverage or support to fill in while they were away. Teachers also had mixed reactions to the newsletter and email check-ins from coaches. Teachers appreciated the usefulness of the newsletters and noted how they addressed relevant topics, were short, and very easy to read. Most held on to the newsletters for possible later use. However, some teachers admitted they did not read any of them. Teachers also reported email check-ins felt formulaic and were difficult to manage among their daily emails. It was nice to know a coach was “out there,” but they did not see the email check-ins as active or useful.

Changes Based on Feedback

In consultation with the expert advisory panel, we made several changes to the TCM. First, we streamlined the Pyramid Model training and began offering access to self-paced online modules through the Pyramid Model Consortium. Second, we adapted Tier 3 Individual coaching so it could be offered online or face-to-face. Third, we updated the self-coaching email process to make it more interactive, offer implementation resources at regular intervals throughout the year, and offer intentional opportunities to talk with a coach.

Field Test 2

Field Test 2 was guided by one research question: What is the preliminary evidence of the refined TCM on early care providers’ use of Pyramid model practices? Twenty-four lead

preschool teachers in one U.S. Pacific Northwest state participated. Teachers were randomly assigned to a business as usual (BAU) control group or the TCM group. Due to COVID-19 school closures, research activities were halted prematurely. Therefore, we report on changes from pre-test to midpoint data collection for the 7 teachers who were randomly assigned to participate in TCM activities and for whom both pre-test and midpoint data are available.

Participants and Setting

Recruitment procedures were identical to Field Test 1. Descriptive information about the seven participating classrooms is shown in Table 2. All participants were lead teachers in inclusive classrooms serving young children ages 3-5. Of these, 57% taught in private childcare programs serving children with and without disabilities and 43% taught in public developmental preschool classrooms serving primarily children with identified disabilities. The average percent of children with an IEP or IFSP in each classroom was 32.6% (range: 0 - 94.1%). Approximately 71% of teachers reported participating in some form of PD in the year prior to the study, and 57% reported receiving some form of regular feedback based on classroom observations at their center. Two university staff members served as coaches in Field Test 2. One coach (PhD-level) continued from Field Test 1, and a new coach was hired. The new coach was a white woman with a master's degree in early childhood special education, 8 years as an early interventionist and special educator, and 8 years as a coach.

Dependent Variables

The same tools described for Field Test 1 were used. Baseline TPOT observations were collected in Fall 2019 by research staff who were naive to experimental conditions. Midpoint observations were conducted by coaches using an abbreviated version of the TPOT. Specifically,

coaches observed for 60 min, and they did not interview teachers. Reliability observations were conducted only on baseline TPOT observations. Average IOA was 80.2% (range: 74.8–83.2%).

Intervention

The TCM was implemented using modified Field Test 1 procedures described above. One teacher was assigned to Tier 1, four to Tier 2 and two to Tier 3 based on the pre-test TPOT scores and survey analysis. There were no requests to move into a different tier at the start of coaching. After approximately 4 weeks of coaching, one teacher originally assigned to Tier 2 asked to move into Tier 1 due to scheduling concerns. This request was honored, and the teacher moved to Tier 1 coaching for the remainder of the initial coaching period (approximately 3 weeks). The same procedures from Field Test 1 were used for moving between tiers at the midpoint. Midpoint observations were conducted after approximately seven weeks of coaching. Teachers participated in approximately three additional weeks of coaching after the midpoint tier changes prior to COVID-19 school closures.

Implementation Fidelity

As with Field Test 1, dosage was measured for all tiers of coaching. Adherence to the timeline for distribution of newsletters, and email check-ins were monitored across the duration of the coaching period to confirm that all newsletters were sent to all teachers. The teacher who participated in Tier 1 for the full duration of the initial coaching period received two email check-ins from a coach, responded to 100% of the coach email check-ins, and engaged in one virtual problem-solving meeting with a coach. The teacher who participated in Tier 1 for the second half of the initial coaching period (pre-midpoint) received two check-in emails, but did not respond, and never initiated a virtual problem-solving meeting with the coach. For Tier 2, four small group meetings occurred prior to midpoint observations, and the average length of the

small group meeting was 60 min (range: 58–62 min). For Tier 3, 7–8 individual coaching sessions occurred prior to midpoint observations. The average length of observation visits was 48 min (range: 30–104 min). The average length of the debrief meetings was 22 min (range: 10–39 min). Follow up emails were sent after 100% of Tier 3 coaching sessions.

Adherence to coaching protocols was assessed for 100% of all Tier 2 small group coaching sessions and Tier 3 coaching debrief meetings. Additionally, adherence to the Tier 3 coaching email summary protocol was assessed for 100% of all email messages. Average fidelity across Tier 2 sessions was 98.3% (range: 93.3–100%). Average fidelity across Tier 3 meetings was 96.7% (range: 88.9–100%). Average percentage of the components present in Tier 3 email summaries was 96.4% (range: 75–100%).

Effects on TPOT Scores: Field Test 2

Field Test 2 included only pre- and midpoint data due to COVID-19. Pre-test TPOT and Teacher Survey data were gathered prior to teacher assignment to experimental conditions. The midpoint used an abbreviated version of the TPOT and was gathered after approximately seven weeks of coaching. The research staff, who were naive to the teachers' assignment conditions, conducted pre-test TPOTs, and coaches conducted the midpoint TPOT observations. Pre- and midpoint data for the seven teachers in the TCM group are reported in this section.

Pre-test Teacher Survey and TPOT

At pre-test, average TPOT Key Practices score was 55.6% (range: 41.8–68.2). Note that Red Flag scores were not calculated for the abbreviated midpoint TPOT observation conducted by coaches, and therefore are not reported for Field Test 2. On the Teacher Survey, teachers rated their PD satisfaction as 3.7 ($SD = 0.40$). Average rating of job satisfaction was 3.8 ($SD = 0.7$), job related stress was 2.2 ($SD = 1.1$), work engagement was 4.8 ($SD = 0.5$), and job

commitment was 4.4 ($SD = 0.5$). Lastly, teachers rated disciplinary efficacy an average of 4.4 ($SD = 0.5$). Based on pre-test TPOT scores and the Teacher Survey analysis, one teacher was assigned to Tier 1, four to Tier 2 and two to Tier 3. See Table 4 for a summary of initial Tier assignment and pre-test TPOT and midpoint scores.

Midpoint Change

At midpoint, average TPOT Key Practices score was 66.2% (range: 51.5–80.3), representing an average increase of 10.6 percentage points from pre-test. For the teacher in Tier 1 ($n = 1$), the TPOT Key Practices score was 68.2% at pre-test and 80.3% at midpoint, demonstrating an average increase of 12.1 percentage points. For the teachers in Tier 2 ($n = 4$), the average TPOT Key Practices score was 57.3% at pre-test (range: 47.0–69.7) and 66.7% at midpoint (range: 55.2–76.9), demonstrating an average increase of 9.3 percentage points. Lastly, for teachers in Tier 3 ($n = 2$), the average TPOT Key Practices score was 45.9% at pre-test (range: 41.8–50.0) and 58.3% at the midpoint (range: 51.5–65.15), representing an average increase of 12.4 percentage points. See Supplemental File 3 for full data by subscale.

Discussion

The TCM is an innovative approach to coaching in early childhood settings. We used an iterative design process to conduct preliminary field testing of the TCM focused on Pyramid Model practices. Results provide promising evidence for the TCM as an effective model for supporting teachers' implementation of Pyramid Model practices in preschool classrooms. These findings are an important and novel contribution to the coaching literature, as these are the first studies to examine a professional development approach that individualizes coaching approaches based on implementation fidelity data and teacher preferences. Results support the TCM as a

potentially useful decision-making framework and, overall, speak to the promise of TCM in increasing teachers' use of practices to support children's social emotional development.

Both field tests showed promising gains in teachers' social-emotional teaching practices, as evidenced by TPOT scores. These findings are consistent with previous research on PBC to support the Pyramid Model. Teachers in Hemmeter et al. (2021) reached a post-intervention TPOT score of 59.33% of indicators after 16 sessions of individual PBC. This level of Pyramid Model implementation was associated with higher ratings of preschool children's social competence and more observed social initiations and responses amongst children in the classrooms relative to a control group. Our average final TPOT scores of 63% and 66% of indicators is promising and potentially meaningful for promoting positive child social outcomes. It should be noted, though, that TCM's dosage of coaching differed from previous research. In Hemmeter et al. (2021), teachers received approximately 16 individual coaching sessions. In our Field Test 1, teachers received 14 newsletters from a coach, but the total number of email check-ins, small group, and individual coaching sessions varied as teachers moved across tiers. Teachers in Tier 2 had between 5 and 13 small group meetings. In Tier 3, teachers received 9-13 individual coaching sessions. In Field Test 2, teachers received six newsletters and 1-2 email check-ins, there were four small group meetings, and 7-8 individual coaching sessions before the COVID-19 interruption. Gains in TPOT scores across field tests, despite fewer total numbers of coaching sessions, are promising evidence of the effects of the TCM in matching teachers with appropriate, differentiated coaching supports. However, the variability in coaching dosage within tiers introduces potential threats to internal validity that must be addressed in future research.

While both field tests showed increased TPOT scores, the gains were smaller in Field Test 1. This is likely due to baseline-ceiling effects as several teachers entered with relatively

high TPOT scores. Regardless of entry-level TPOT scores, the gains across each tier in Field Test 1 demonstrated the utility of TCM as a model to provide ongoing support for teachers with a range of Pyramid model fidelity. Interestingly, TPOT gain scores were higher for all coaching tiers in Field Test 2, despite teachers receiving fewer coaching sessions than in Field Test 1. Though this could be attributed to different measurement approaches and different baseline scores across the two studies, it might promote insight into ideal matches between teachers and coaching supports.

The findings in both Field Test 1 and 2 highlight a need for further exploration regarding the fit and dosage of coaching. Given that the two field tests showed differential changes regardless of coaching dosage, this suggests that perhaps the “fit” between a teacher and coaching supports is more important than the total dosage of coaching sessions. Additionally, with the right “fit”, there might be an optimal dosage level that could drive an uptick of practice adaptation by individual teachers. Our decision to allow teachers to request a different coaching tier than their original assignment provides some preliminary evidence of this hypothesis: when teachers received the coaching supports they perceived as being the right “fit” for their immediate needs, their use of Pyramid practices increased and they quickly felt comfortable moving to less intense coaching supports. When teachers are assigned to a coaching approach that fits their learning style and support needs, information shared during the coaching process could expedite the acquisition and attainment of skills, resulting in observation of practice usage within the classroom. In Field Test 1, teachers assigned to group coaching demonstrated the highest gains in TPOT scores. This adds to the evidence of previous group coaching research (Fettig et al., 2016; Golden et al., 2021) and offers support on the utility of this coaching strategy to influence implementation of evidence-based practices. In Field Test 1, in which teachers had

the opportunity to move from one coaching tier to another at midpoint of the study, those teachers who moved tiers were observed to have higher TPOT gain scores as shown in Table 2. While we cannot make causal claims about why such gains were observed, these data may open up interesting future lines of research around coaching. For example, this could be evidence of a “threshold” effect in which teachers who receive a small dose of targeted coaching are able to generalize and broaden implementation with incrementally less support. Alternatively, it could be evidence of a motivational influence of coaching tiers on teachers’ practice. Perhaps movement between tiers is perceived as an observable indicator of progress and it motivates teachers to implement new practices.

Interestingly, participants who received Tier 1 coaching made comparable gains to their peers who experienced more intensive coaching support. This highlights the value of a tiered approach to coaching in which all teachers engage in some form of meaningful, sustained, job-embedded PD (NPDCI, 2008), but it is an important reminder that not every teacher benefits equally from intensive, individualized coaching. Many teachers may see equivalent benefit from self-guided approaches to on-going coaching and PD. For teachers in Tier 1 coaching, knowing they had a coach “on call” seemed to be sufficient for them to set independent goals and continue making progress towards those goals. Schools and programs can consider how to best prioritize more intensive coaching resources to those who could benefit from additional support.

Limitations

It is important to consider the implications of the findings with caution. First, neither study used a true experimental design, so causal conclusions cannot be drawn. We used a pre/post group design for Field Test 1 to gather initial data to support the iterative development of TCM. Thus, no control group was utilized to compare the effectiveness of the model. While

we intended to complete an RCT design for Field Test 2 to better understand the impact of the model, the study had to conclude due to the COVID-19 Pandemic interruption and subsequent school closures. Further studies need to be conducted to systematically evaluate the promise of TCM in supporting teachers' implementation of Pyramid Model practices. Second, we did not systematically control the number of coaching contacts within and across tiers, so this limits our ability to draw conclusions about the associations between coaching and changes in classroom practices. Future iterations of the TCM should provide more specific recommendations for the amount of coaching provided in each tier. It is also important to note that child outcomes are not presented in these findings. Field Test 2 included systematic assessment of changes in child behavior and social emotional development, but those analyses were not completed due to COVID-19. Finally, these findings are limited to a relatively small sample of teachers from childcare programs, private preschools, and public inclusive early childhood special education programs. Implications may not generalize to other contexts.

Conclusion

This series of studies and iterative design processes offer promising evidence of the effects of tiered coaching on preschool teachers' implementation of the Pyramid Model. All teachers who received coaching increased their implementation of the Pyramid Model, and teachers who participated in small group coaching saw the greatest gains. This is the first study to systematically implement and assess a tiered decision-making framework for coaching and PD. Future research should continue to build on this foundation and examine the infrastructure supports necessary to scale and sustain the model across a wide range of early childhood program types.

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Table 1.*Description of each tier in the TCM and alignment with Practice-Based Coaching*

	Tier 1: Self-Coaching	Tier 2: Group Coaching	Tier 3: Individual Coaching
Shared Goals & Action Planning	Goal planning form completed during Pyramid Model training and shared with coach. Opportunities to refine goals and action plans were provided with each newsletter.	Goal planning form completed during Pyramid Model training and shared with coach. Goals and action plan revised collaboratively at each small group meeting.	Goal planning form completed during Pyramid Model training and shared with coach. Goals and action plans revised collaboratively at meetings
Focused Observation	Practice checklists provided for self-observation.	Teachers shared videos or photos at group coaching meeting.	Coach observed live in classroom.
Reflection & Feedback	Self-reflection on practice checklists. Monthly opportunity to check-in with coach.	Small group coaching conversations around the focused observation on Zoom or in person. Included reflection, supportive, and constructive feedback.	Coaching conversation in person after focused observation. Included reflection, supportive, and constructive feedback.

Table 2.*Descriptive Information for Classrooms and Teacher Participants*

Descriptive Variable	Field Test 1	Field Test 2
Private Childcare	68.75%	57%
Public Preschool	31.25%	43%
Average percentage children with IEP	38.17%	32.60%
Mean teacher age in years	36 (range: 25-59)	
Asian/Native Hawaiian/Pacific Islander	6.25%	14.29%
Black/African American	6.25%	0.00%
White/European American	87.5%	71.43%
Other	0.00%	14.29%
Highest level of education (%)		
High School Diploma or GED	6.25%	14.29%
Some college (no degree)	18.75%	0.00%
Associates	6.25%	14.29%
Bachelor's	31.25%	28.57%
Some graduate school (no degree)	6.35%	0.00%
Master's	31.25%	42.86%
Mean years working in early education	9.19 (range: 1-21)	7.29 (range: 2-15)
Mean years at current center	3.92 (range: 0-13)	5.43 (range: 2-15)

Table 3.*Field Test 1 Coaching Assignment and TPOT Key Practice Scores*

	N Teachers	TPOT Pre-Test	TPOT Midpoint	TPOT Post-Test
Tier 1				
Originally Assigned	7	66.64	67.92	69.14
Remained in T1	6	67.63	70.61	70.14
Moved to T2	0	--	--	--
Moved to T3	1	60.71	51.75	63.16
Tier 2				
Originally Assigned	6	53.37	59.20	59.06
Remained in T2	3	49.97	56.17	53.51
Moved to T1	3	56.76	62.23	64.61
Moved to T3	0	--	--	--
Tier 3				
Originally Assigned	3	55.20	63.48	58.65
Remained in T3	1	50.00	58.77	48.67
Moved to T1	1	77.88	77.68	81.25
Moved to T2	1	37.72	53.98	46.02
Full Sample	16	59.52	63.82	63.39

Table 4.*Field Test 2 Coaching Assignment and TPOT Key Practice Scores*

	N Teachers	TPOT Pre-Test	TPOT Midpoint
Tier 1	1	68.18	80.30
Tier 2	4	57.33	66.66
Tier 3	2	45.90	58.33
Full Sample	7	55.61	66.23