

USING VIRTUAL COACHING TO TEACH CAREGIVERS TO SUPPORT THE
PLAY OF THEIR CHILDREN WITH DISABILITIES

By

Jennifer C. Bancroft

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Approved:

Erin E. Barton Ph.D. BCBA-D

Mary Louise Hemmeter, Ph.D.

Elizabeth Biggs, Ph.D.

Angel Fettig, Ph.D.

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CHAPTER 1

Introduction

The development of play is critically important to all children (Barton et al., 2020). Play provides a developmentally appropriate context for children to participate in meaningful activities, learn and practice new skills across domains, and develop friendships (Barton & Wolery, 2008, Barton et al, 2018, Ginsburg, 2007). Play is often considered a behavioral cusp; play provides access to the development and learning of language, cognitive, motor, and social skills (Barton & Wolery, 2008; Barton et al., 2020; Lifter et al, 2011). The United Nations purports that play is the right of all children worldwide (Ginsburg, 2007).

Social play taxonomies classify the type of play by how the child interacts with others, with or without objects (Parten, 1932). Infants initially exhibit solitary play and become increasingly interactive during play as their play skills, social skills and communication skills develop (Lifter et al, 2011). Conversely, object play consistently has been classified relative to the child's use of objects that begins with an infant's sensory-motor exploration and develops to include the use of objects in a symbolic or pretend manner (Belsky & Most, 1981; Fenson et al., 1976; Nicolich, 1977; Lifter & Bloom, 1989; Lifter, 2008). Pretend play, play that simulates real life situations and invented scenarios, provides an important context for the development and practice of language and communication, social, and problem-solving skills in young children (Cheyne & Rubin, 1983; Fein, 1981; Ginsburg, 2007). Table 1 provides definitions of social and object play.

Some children—including children with disabilities—are often delayed in their play skills (Barton, 2015; Movahedazarhouligh, 2018; Nelson et al., 2020). Additionally, children with disabilities often experience delays in the development of skills for which play provides the

Table 1*Types of Play*

Term	Definition
Social Play Taxonomy	
Unoccupied behavior	Infants watch people and things with momentary interest rather than play with them.
Solitary Play	Child plays alone, with toys that are different from those of peers near him/her.
Onlooker play	Children watch each other play and occasionally talk to each other.
Parallel play	Children play near each other with similar toys, but they rarely interact.
Associative Play	Children play near each other, with the same materials, and talk about their play and the materials, but mostly engage in their own play behavior.
Cooperative Play	Children play together with the same toys with the same purpose. The play activity is based on a common goal or topic.
Object Play Taxonomy	
Sensory-Motor Play	
	Children explore materials by touching, mouthing, biting, smelling, banging, kicking, lifting, stretching, and balancing them.
Relational Play	Children discover the relationship between the properties of objects through building, grouping, or associating objects in different ways.
Functional play	Children use objects in the manner in which they are supposed to be used.
Functional Play with Pretend (FPP)	Nonliteral use of actual or miniature objects in the manner they are supposed to be used without the reality-based outcome.
Symbolic Play	
<i>Object Substitution (OS)</i>	Children use objects as if they were something else.
<i>Assigning Absent Attributes (AAA)</i>	Assigning roles, emotions, or attributes to the self, objects, or others.
<i>Imagining Absent Object (IAO)</i>	Children perform a motor action that suggests using an object in the object's absence.

Adapted from Barton (2010), Parton (1932), Piaget (1962), and Sherratt & Peter (2002).

context for learning: language, cognitive, social, and motor skills (Barton & Wolery, 2008; Barton et al., 2020; Lifter et al., 2005; Movahedazarhouligh, 2018). Given the importance of play, as a behavioral cusp and a context for learning, it is imperative that we use evidenced-based interventions to target play for children who have delays in play.

To date, evidence-based interventions have included systematic instruction targeting child-led play actions (Barton et al., 2020; Lifter et al., 2011b; Movahedazarhouligh, 2018). Researchers have demonstrated that children with disabilities benefit from intentional and systematic instruction targeting the development of play skills (Barton et al., 2020; Barton & Wolery, 2008; Movahedazarhouligh, 2018; Thiemann-Bourque et al., 2012). Play interventions are often classified by the agent used to target the change in child's play behaviors. Interventions are classified by the contextual supports or behavioral strategies used to target increased play. This may include specific changes to the environment, the inclusion of peers trained to support play, the use of prompting or modeling of specific play behaviors, the use of a prompting hierarchy to teach a play response, or the use of a combination of multiple components listed above (Movahedazarhouligh, 2018). Three common categories of interventions include: environmental arrangement, increasing caregiver responsiveness, and systematic instruction.

Environmental Interventions

Environmental interventions require the interventionist (caregiver) to set up the environment to support and elicit play by the child (Movahedazarhouligh, 2018; Wong, 2013). The interventionist may manipulate the physical characteristics of an environment to make the setting interesting and engaging for the child. This may include the use of rugs to designate play area and promote proximity, the use of specific toys to promote interest, or the use of furniture to promote access (Lifter et al., 2011; Movahedazarhouligh, 2018). Changes also may be made to

the social environment, including the use of strategies to promote and prompt play between children or teaching peers to use strategies to support the behavior of their peers with disabilities (Movahedazarhouligh, 2018).

Caregiver Responsiveness

Increasing the level of caregivers' responsiveness during play is a strategy often used to target an increase in the communication and play skill development of children. Caregivers are taught to match their child's pace of play and interaction, follow their child's lead in activities and interests, and to increase their own expressions of warmth during the interaction (LaForett & Mendez, 2016; Landry et al., 2008). Thus, caregivers create an environment that is conducive and reinforcing to their child's play. Two behaviors that caregivers are taught to use to increase caregiver responsiveness are contingent imitation (CI) and verbal mapping (VM). CI is defined as the caregiver doing the same motor or vocal behavior as the child (Barton & Wolery, 2010). VM occurs when the caregiver uses words or phrases to describe the child's play behavior within three seconds of the occurrence of the play behavior (Barton, 2015).

Systematic Instruction

Prompting hierarchies are procedures where the level of the prompt delivered to the child is part of a planned sequence. Depending on the type of hierarchy used, the level of the prompt will change based upon the child's response. The system of least prompts (SLP), has been commonly used to teach play (e.g., Barton et al., 2020; Lane et al., 2009). Researchers have reported that the use of prompting hierarchies are more effective and less intrusive than single prompting procedures (Movahedazarhouligh, 2018).

Need for Caregiver Mediated Interventions

Unfortunately, effective interventions are not ubiquitous. In March 2020, the Novel Corona Virus (COVID-19) was classified as a global pandemic and the impacts on children and families have been tragic. For example, early data from the US indicated that children with disabilities experienced a loss or reduction in services. In a recent survey, 74% of caregivers reported that their child lost at least one service and 30% of caregivers reported that their child lost all services (Jeste et al., 2020). The disruptions in services have impacted the development of the children served, and have heightened caregiver stress (Neece et al., 2020). Researchers and policy makers have suggested that districts and service providers provide authentic engagement with caregivers in an effort to meet the ever-changing needs of children with disabilities during the pandemic (Jameson et al., 2020). One means to support caregivers and their children during the pandemic is to teach caregivers to use caregiver-mediated interventions (CMI) to support their child's development and learning.

CMI Play Literature

Multiple researchers have reiterated the need for collaboration between interventionists and caregivers (Barton & Fettig, 2013; Fixsen, 2005; Kaiser & Hancock 2003; Kemp & Turnbull, 2014). In a review of play-focused interventions, only five of 23 studies (21.7%) using CMI to teach children with disabilities to play reported collaboration with caregivers regarding their child's current level of play, goal planning, or strategy selection (Bancroft, et al., 2021). CMIs taught to caregivers include: the use of environmental arrangement techniques in three of 23 studies (13%) and the use of strategies to increase caregiver responsiveness in seven of 23 studies (30%) (Bancroft et al, 2021). Researchers taught caregivers to use CI in two of 23 studies

and VM in two of the 23 (8.9%) studies reviewed (Bancroft et al., 2021). Though the prompting hierarchy, SLP, has been commonly and successfully used by researchers to teach children with disabilities to play, no studies in the review taught caregivers to use SLP (Bancroft et al., 2021). Additionally, though seven studies in the review used videos to share information and feedback with caregivers, only one study provided coaching virtually (Bancroft et al., 2021; Wainer & Ingersol, 2015). Finally, none of the studies that used CMI to teach children with disabilities to play reported the specific type of social, object, or pretend play targeted during intervention or demonstrated by children.

Numerous researchers have purported the need for rigorous research, including measuring procedural fidelity in CMI studies. Barton and Fettig (2013) reported, in a review of CMI implemented with children with disabilities, that 19 of 23 studies reported intervention fidelity and yet only seven studies reported coaching fidelity. In a similar review of the communication literature, Lieberman-Betz (2014) reported that only 20% of reviewed studies reported coaching fidelity and 29% of the studies reported intervention fidelity. Similarly, in studies that taught caregivers to use CMI during play, only 45% of the included studies reported coaching fidelity meeting current research standards and only 25% of the included studies reported intervention fidelity (Bancroft et al., 2021). Without consistent fidelity measurement, it is difficult to draw meaningful conclusions about the coaching the caregiver received and the ability of caregivers to use the intervention as planned. Similarly, only 12 of the 23 studies reviewed by Bancroft and colleagues (2021) reported reliability ratings meeting current research standards. Again, this limits the confidence we have in the validity of this research.

In the current study, we explored the use of virtual coaching on caregiver use of CMI, to expand our knowledge about CMI used to teach children increasingly complex play. We

intentionally included collaboration to promote caregivers buy in to coaching across conditions. First, prior to baseline, the caregivers were asked to provide information about their child's play interests and their goals for their child's play. Second, caregivers were asked about their own level of comfort using imitation, describing their child's play, and using prompting techniques including modeling, prompting, and providing specific reinforcement (see Figure 1). This information was used to guide toy selection and the delivery of coaching provided to the caregiver, and to extend what we know about caregiver collaboration during CMI studies. Third, caregivers were individually coached to use CI, VM, and SLP to teach their children with disabilities to use increasingly complex play.

We addressed the following research questions: (a) Does the use of virtual coaching increase caregiver use of CMI strategies, CI, VM, and SLP, to teach their child with disabilities to play? (b) Do caregivers continue to use the CMI strategies when coaching is removed? (c) Can coaching be provided virtually with fidelity to teach caregivers to use CMI strategies? (d) Does the use of CI, VM, and SLP by caregivers result in increases in their child's play? (e) Do caregivers rate virtual coaching as feasible and effective for supporting them in enhancing their child's play? (f) At the conclusion of the study, do caregivers report using SLP to teach skills other than play to their children? (g) Does the use of virtual coaching to increase caregiver use of CMI strategies to teach their child with disabilities to play impact caregivers' overall self-reported stress?

Figure 1

Caregiver Interview

Family ID _____ Child D.O.B. _____ Date of interview _____
Primary language _____ Disability/ eligibility: _____
Mental age/ZPD _____

Please answer the following questions about yourself and your child. This information will be used to plan our intervention. No answers are right or wrong, this is for informational purposes.

General questions:

- A. Are you willing to participate in play sessions and feedback sessions daily?
- B. Do you have access to wireless internet or are you willing for us to provide it?
- C. What is your preferred mode of communication: a) phone, b) zoom meeting, c) text, d) private email?
- D. Will your child play with you for at least 8 minutes?

Questions about you and your child:

- 1. Please describe how you see your child playing?
- 2. What actions do you generally see?
- 3. Who is near to your child, when he/she plays?
- 4. How long will your child engage in a play activity with you?
- 5. How does your child respond to your own play?
- 6. What specific toys is your child most interested in?
- 7. What toys (if any) are aversive to your child?
- 8. What is reinforcing to your child? (edibles, hugs, praise, high fives)
- 9. How comfortable are you:
 - a) showing your child how to play with a toy/object?
 - b) guiding your child physically to play with a toy or object?
 - c) showing your child that you are happy with his/her play?
 - d) imitating your child's play?
 - e) describing your child's play while he/she is playing?
- 10. When you play with your child do you generally engage in the play that he/she is demonstrating or use this as play as an opportunity to teach your child something new?
- 11. What goals do you have for your child regarding to his play?

CHAPTER 2

Method

Participants and Implementors

Two caregiver-child dyads were recruited for this study after obtaining approval by the appropriate institutional review board (IRB). One caregiver-child dyad lived in a southeastern state and one caregiver-child dyad lived in a southwestern state in the US. Inclusion criteria required that caregivers (a) speak English as their primary language at home; (b) were willing to participate in virtual training, play sessions with their child, and feedback sessions set at their convenience, at least 4 times per week for a period of 4-6 weeks; (c) had access to reliable wireless internet in their home, or that they were willing to use wireless internet provided at no cost to the family for the duration of the study; and (d) had reliable text, phone, or personal email account and commit to using their selected mode of communication to correspond with the research team once daily throughout the course of the study. Additionally, the caregiver had a child that met the following inclusion criteria: (a) a chronological age between 24 and 60 months; (b) identified as having a developmental disability; (c) minimum mental age of 18 months; (d) demonstrate the ability to engage in a one-on-one play activity with their caregiver for at least 8 minutes; and (e) delay in their level of play (i.e., fewer than 8 different unprompted pretend play behaviors demonstrated during a five-minute observation). All child inclusion criteria, except (e), were established based on parent report during an oral interview. We used the pre-study interview to guide the presentation of questions and requests for information about both the child and caregiver. See Figure 1 for the interview format used across both caregivers. Caregivers from both dyads were asked during the interview to provide educational/therapeutic

records for their child that reported diagnosis of developmental disability and a mental age of at least 18 months. Criteria (e) was measured during three, five-minute caregiver-child free play sessions. Interviews and play sessions occurred after obtaining consents for child and caregiver participation.

Kristen was a 38-year-old white female. She was the mother of eight children. Kristen had a college education and worked as an educator prior to staying home with her children. She and her four-year-old daughter, Megan, participated in this study. Megan was a forty-eight-month-old Hispanic female, adopted shortly after birth. She had Down syndrome and a complicated medical history. She attended an early childhood program in the public schools. At the time of the study, her educational services were provided “in person.” Her language skills were delayed. Her mother reported that Megan used one-word utterances and signs along with verbalizations to communicate her wants and needs. Additionally, she reported that Megan’s play interests included kitchen play sets, balls, and babies, and she demonstrated some pretend play.

Alexandra was a 32-year-old college educated, white, female with dwarfism. She was a full-time homemaker and home schooled her four children. She and her four-year-old son, Wesley, participated in this study. Wesley was a 50-month-old white male, also diagnosed with dwarfism and complex medical needs. He was trached, though the trachea was plugged. His mother reported that he used signs and had begun to use verbal words to communicate. Alexandra reported that, prior to the study, Wesley primarily played with toys that required assembly (e.g., Legos) and rarely engaged in pretend play.

The primary researcher, the first author, was a doctoral student in early childhood special education. She had a master’s degree in speech and language pathology and certification of

clinical competence in speech and language pathology through the American Speech Language and Hearing Association (ASHA). The primary researcher, a white female, provided all coaching and feedback to Kristen. A master's student in a child studies graduate program, a white female, was trained by the primary researcher to implement the training package and coached Alexandra. The first author served as primary data coder for the dyad that she coached, as well as the coder for 15% of primary data and 89% of the reliability data from the other dyad. The second coach coded 85% of the primary data and 11% of the reliability data from the dyad that she coached, as well as all of the reliability data for the other dyad. Both researchers coded fidelity across the two dyads.

Settings

This study occurred in the homes of the caregivers and children consented to participate. The caregiver trainings, play sessions, and feedback were conducted and recorded via Zoom (2019) and scheduled based on the needs and preferences of the caregiver. Text messages were used to schedule sessions. The caregiver trainings, play sessions, and feedback were planned during a time when the caregiver would typically interact with the target child.

Materials

Toy sets were selected based on toys typically available in the homes of young children and based on caregiver report. Two toy sets were provided to the caregivers for use during the study and left with families at the conclusion of the study. One toy set was used for intervention and one toy set was used for generalization probes. Toys sets were selected based on the caregiver's identification of toys that were most interesting to the child and according to the child's developmental abilities. Caregivers were given a flyer with toy choices that were

appropriate for their child’s age and development. Figure 2 is an example of the flyer provided to caregivers for toy selection.

Figure 2

Toy Set Flyer (kitchen set)



Note: Similar flyers provided to caregivers for choice of animal, block, baby doll and transportation toy sets.

Caregivers were asked to select the specific toys to be used for the study with their child’s interests and preferences in mind. Each toy set had at least two of every toy to ensure that caregivers could imitate and model targeted play actions (e.g., kitchen toys, vehicles, farm and farm animals, blocks). To prevent the children from satiating on toy sets (Barton et al., 2018), we asked caregivers to use the toys during study sessions only for the duration of our study. We

provided a carpet to designate the play area. Table 2 provides a list of toy sets chosen by families.

Table 2

Toys Chosen by Caregivers

Type of set	Toy set options	Caregiver	Toy sets chosen
Dishes/Kitchen	Tea party set	Kristen	Blocks Cookware Play food for kitchen set
	Deluxe kitchen set		
	Toy food set		
	Pots and pans set		
Block set	Foam set		Air transport set Safari animal set Hispanic dolls (2) Doll bottles (milk and OJ)
	Wood set		
Transportation set	Air transport set with cars		
	Construction set with trucks		
Animal set	Arctic animals	Alexandra	Blocks Cookware Play food for kitchen set
	Jungle animals		
	Farm animals		
Dolls	Baby dolls of either gender or both;		Construction vehicle set Polar animal set Grizzly plush dolls (2)
	Plush animals if not interested in dolls		

We gave an iPad to caregivers to record all study sessions. Observations occurred and were recorded using an iPad daily via Zoom (2019). Coders used ProCoderDV (Tapp, 2003). Training and feedback sessions were recorded via Zoom (2019) and visual supports (power points slide handouts and play review summary) were sent to participants via email.

Response Definitions and Measurement

Caregiver Behaviors

We measured each caregiver's use of CMI strategies across conditions. We measured caregiver's use of CI in the first tier. We measured the caregiver's use of VM in the second tier. Finally, we measured the caregiver's use of SLP in the third tier. Table 3 provides a list of caregiver behaviors and definitions. Coding procedures and definitions were similar to those used in Barton (2015). We used momentary time sampling (MTS), using 5-s intervals, to record the caregivers use of CI. Partial interval recording (PIR) was used to record the frequency of the caregiver's use of VM. To reduce the potential for error, we used the Poisson correction method to determine an estimated count of occurrence for VM (Ledford & Gast, 2018; Yoder, et al., 2018). We used timed event sampling to identify the number of full sequences of SLP implemented by the caregiver with fidelity during the 8 min session. A full sequence of SLP required the caregiver's sequential presentation of a model, followed by specific positive reinforcement for the play act completed by the child or, if the child did not respond to the model, the caregiver's provision of the controlling (hand-over-hand) prompt, followed by specific positive reinforcement for the play act. A secondary measure, the delivery of the model of pretend play within the 12-20s period absent of pretend play also recorded. Figure 3 provides a sample of coded data.

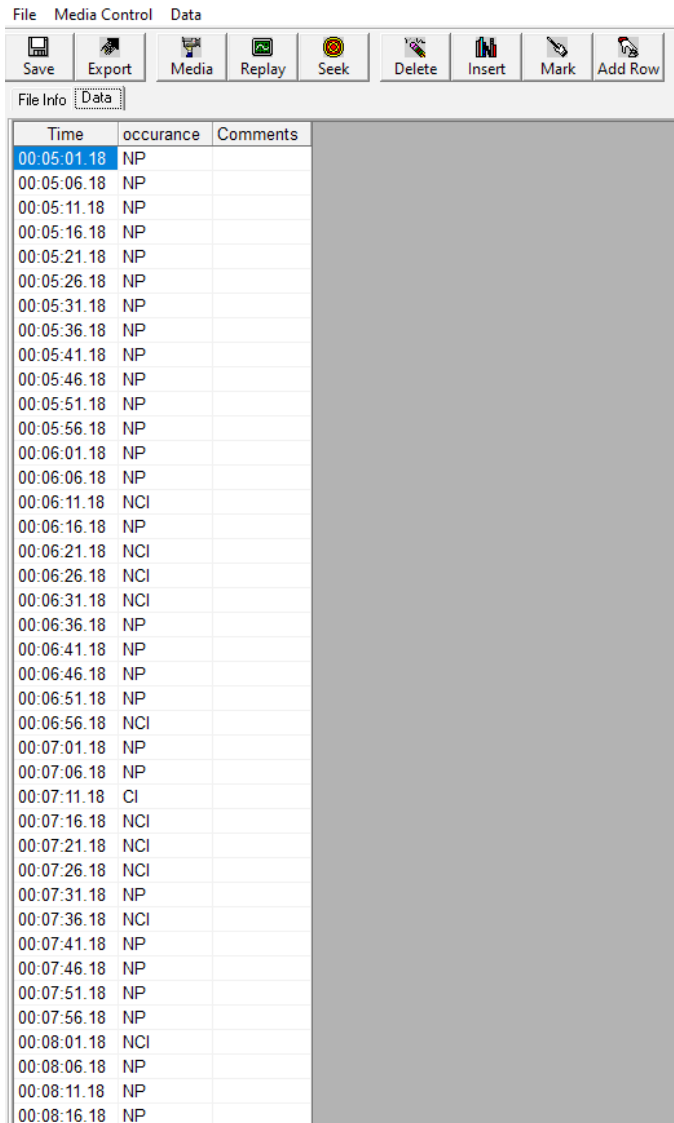
Table 3*Target Caregiver Behaviors*

Behavior	Definition
	Caregiver imitates pretend play act demonstrated by child.
VM	Caregiver verbally describes the play act demonstrated by the child.
Model prompt	Caregiver provided a model prompt within 30s of the last child target behavior.
Model prompt error	Caregiver failed to independently provide model of pretend play behavior within 30s of the last child target behavior.
Physical prompt	Caregiver guided the child's hands through a target behavior within 5s of a model prompt that did not result in target behavior.
Physical prompt error	Caregiver failed to independently guide the child's hands through a target behavior within 5s of a model prompt that did not result in target behavior.
Verbal reinforcement	Caregiver verbally described the child's play behavior with positive affect.
Verbal reinforcement error	Caregiver did not describe the child's play behavior with positive affect or caregiver provided only non-descriptive praise ("Good job!")

(Barton, 2015)

Figure 3

Example of Pro-coder file for CI



The screenshot shows a software interface with a menu bar (File, Media Control, Data) and a toolbar with icons for Save, Export, Media, Replay, Seek, Delete, Insert, Mark, and Add Row. Below the toolbar is a 'File Info' section with a 'Data' tab selected. The main area contains a table with three columns: Time, occurrence, and Comments. The table lists 40 rows of data, with the first row highlighted in blue.

Time	occurrence	Comments
00:05:01.18	NP	
00:05:06.18	NP	
00:05:11.18	NP	
00:05:16.18	NP	
00:05:21.18	NP	
00:05:26.18	NP	
00:05:31.18	NP	
00:05:36.18	NP	
00:05:41.18	NP	
00:05:46.18	NP	
00:05:51.18	NP	
00:05:56.18	NP	
00:06:01.18	NP	
00:06:06.18	NP	
00:06:11.18	NCI	
00:06:16.18	NP	
00:06:21.18	NCI	
00:06:26.18	NCI	
00:06:31.18	NCI	
00:06:36.18	NP	
00:06:41.18	NP	
00:06:46.18	NP	
00:06:51.18	NP	
00:06:56.18	NCI	
00:07:01.18	NP	
00:07:06.18	NP	
00:07:11.18	CI	
00:07:16.18	NCI	
00:07:21.18	NCI	
00:07:26.18	NCI	
00:07:31.18	NP	
00:07:36.18	NCI	
00:07:41.18	NP	
00:07:46.18	NP	
00:07:51.18	NP	
00:07:56.18	NP	
00:08:01.18	NCI	
00:08:06.18	NP	
00:08:11.18	NP	
00:08:16.18	NP	

Child Behaviors

Child play behaviors were coded using the definitions described in previous research (Barton, 2015; Barton & Wolery, 2010). Timed event sampling was used to code if pretend play was prompted or unprompted, whether the pretend play was novel or seen previously during the session, and the type(s) of pretend play demonstrated by the child. See Table 4 for definitions and coding descriptions related to play.

Experimental Design and Analysis

We used a multiple-probe design across CMI strategies (i.e., CI, VM, and the SLP) and replicated across two caregiver-child dyads (Gast 2010). The design included baseline, intervention, generalization, and maintenance conditions. During the first tier, we coached the caregiver's use of CI of their child's play. During the second tier, we coached the caregiver's use of VM of their child's play. During the third tier, we coached the caregiver's use of SLP to teach their child pretend play. The decision to move from one intervention condition to the subsequent condition was determined through visual analysis. A caregiver's level of correct implementation of the target CMI strategies was used to make condition change decisions.

Visual analysis was used to examine the presence of experimental control and determine if a functional relation existed between the training provided to the caregiver and the fidelity at which the caregiver applied the CMI (Barton et al., 2018). The following contemporary visual analysis guidelines were used to conduct formative visual analysis: (a) the stability of data during baseline, (b) the presence of within condition data patterns, (c) the comparison of data in adjacent conditions to assess an effect, and (d) the presence of three demonstrations of effect (Barton, 2015; Barton et al., 2018). We also used visual analysis at the conclusion of the study (i.e., summatively) to identify if a functional relation existed.

Table 4*Coding descriptions for Play*

Coding	Definition	Example	Non-example
Functional pretend play (FPP)	the nonliteral use of actual or miniature objects in the means that they were intended, but without realistic outcome	Using a toy hammer to hammer in a toy nail or driving a toy car down a carpet road.	Using a toy hammer to hit a pop-up toy; bouncing a ball;
Object substitution (OS)	child uses one object, in the place of another: the use of a block as a hammer during play	Using a block to make a phone call; Using a boat like a car;	Using a toy phone to make a call;
Assigning absent attributes (AAA)	children assign dramatic roles or emotions to self, others, or inanimate objects	Picking up a baby doll to feed her, stating, “My baby is sick!” or “My baby is crying.”	Picking up a baby doll and feeding the doll a bottle.
Imagining absent object (IAO)	child pretends an object is present when in reality it is not;	Pretending to lick the imaginary ice cream off an empty toy cone; pretending to eat soup from an empty bowl.	Pretending to eat toy food on a toy plate.
Prompted play	Child demonstrates a play acted that was prompted by the adult within a 5s time frame.	Caregiver models eating from a spoon. Child follows the caregiver’s model and pretends to eat from a toy spoon.	Child independently (without model or prompt) begins to feed a baby doll. This is unprompted play .
Same/different play	Same play behavior has already occurred during that session.	Driving a red car, then driving a green car is considered the same play.	Stirring imaginary cookie dough, then stirring imaginary soup would be different examples of (IAO).

(Barton, 2015)

IOA

The primary researcher trained the second coder to 90% agreement on non-study videos of children and caregivers engaged in play. The coach who did not provide the coaching for the caregiver-child dyad acted as the IOA coder for that session. The IOA coder coded the caregiver and child behavior for at least 30% of randomly selected videos for each target CMI, and condition. IOA was calculated by the number of coding agreements divided by the total of agreements plus disagreements, multiplied by one hundred (Ledford & Gast, 2018). To monitor for systematic coding errors, bias, and drift, both the IOA coder's data and primary coder's data were continually graphed and monitored (Ledford & Gast, 2018.) Table 5 provides a summary of IOA across participants and study conditions. The graphs used to monitor for systematic coding errors, bias and drift are included in Figures 4 and 5.

Procedures

Coach Training

The primary researcher (i.e., first author) acted as the primary coach and trained the aforementioned master's student to coach caregivers. The coaches' training included the use of effective coaching practices identified in previous CMI research. These coaching practices included: the provision of instruction and written material prior to the caregiver's play with their child, practice of targeted skills, and feedback provided to the caregiver following a play session with the child (Bancroft et al., 2020; Barton & Fettig, 2013). Two caregivers and their children, family members of the first author, were recruited to participate in practice training sessions, as means of training the coaches. After completing training, the secondary coach practiced the coaching procedures with one "practice" dyad. Training and coaching were provided to

Table 5

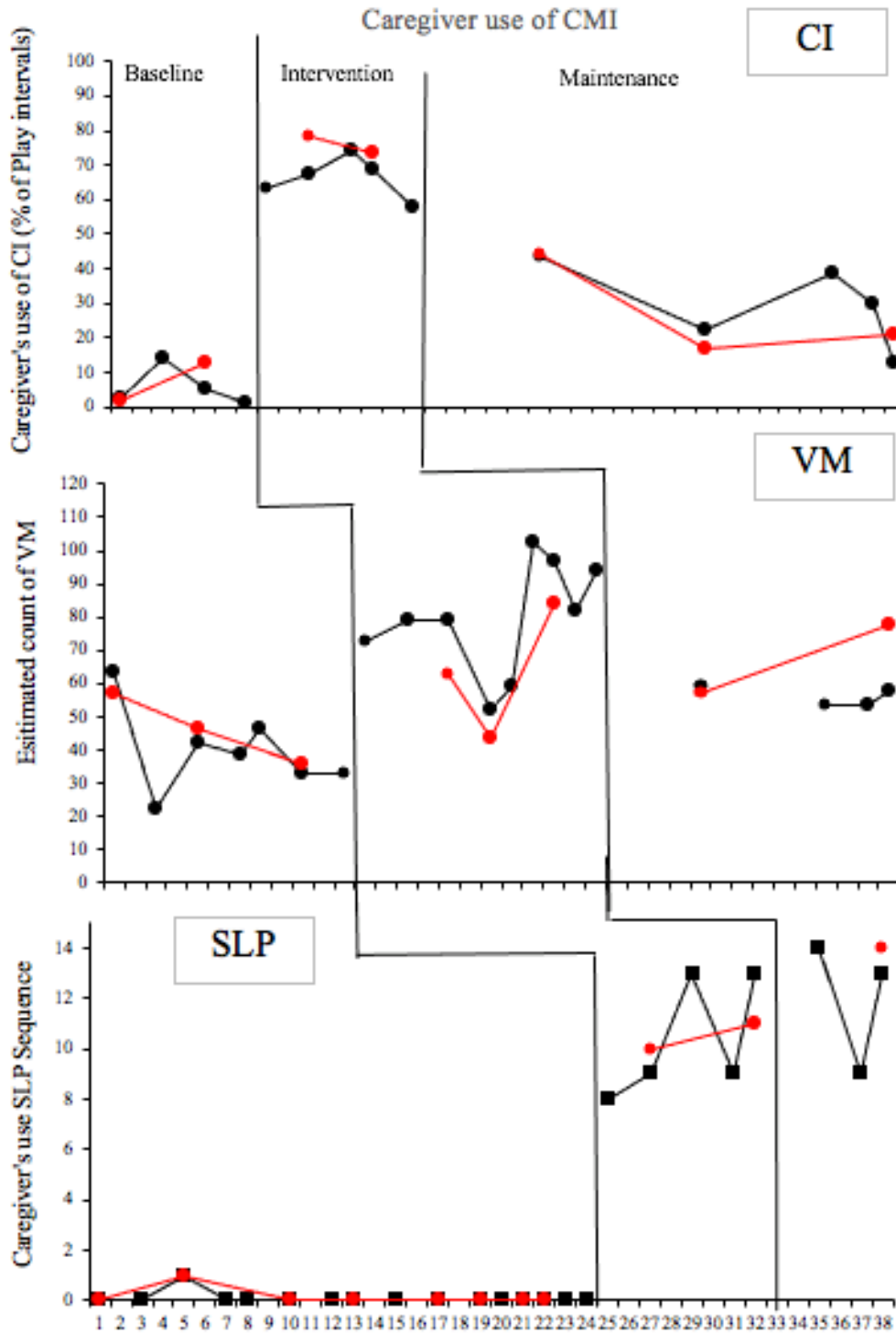
IOA

Participant /CMI	Baseline (%of sess)	Intervention (%of sess)	Maintenance (%of sess)
Kristen			
CI	84% (50%)	87% (40%)	86% (60%)
	90% (33%)	89% (33%)	85% (33%)
VM	86% (30%)	86% (33%)	89% (50%)
	84% (40%)	85% (66%)	92% (33%)
SLP	100% (31%)	81% (40%)	86% (33%)
	100% (37.5%)	87.5% (33%)	80% (33%)
Recommended timing of SLP	50% (50%)	83% (35%)	50% (33%)
	100% (33%)	83% (37.5%)	60% (33%)
Child Play	69% (66%)	75% (41%)	72% (33%)
	66% (33%)	73% (37.5%)	72% (33%)
Alexandra			
CI	82% (50%)	79% (100%)	84% (33%)
	96% (33%)	75% (100%)	84% (33%)
VM	83% (43%)	84% (60%)	89% (37.5%)
	85% (33%)	80% (66%)	90% (33%)
SLP	100% (42%)	96% (33%)	100% (33%)
	100% (33%)	80% (33%)	81.8% (33%)
Recommended timing of SLP	100 (42%)	18% (33%)	71% (33%)
	100% (33%)	73% (33%)	63% (33%)
Child Play	62% (50%)	69% (41%)	67% (33%)
	76% (33%)	88% (33%)	68% (33%)

Note: CMI indicates type of CMI: contingent imitation (CI); verbal mapping (VM) or system of least prompts (SLP). Generalization data reported below primary data across study conditions. Data rounded to nearest percent.

Figure 4

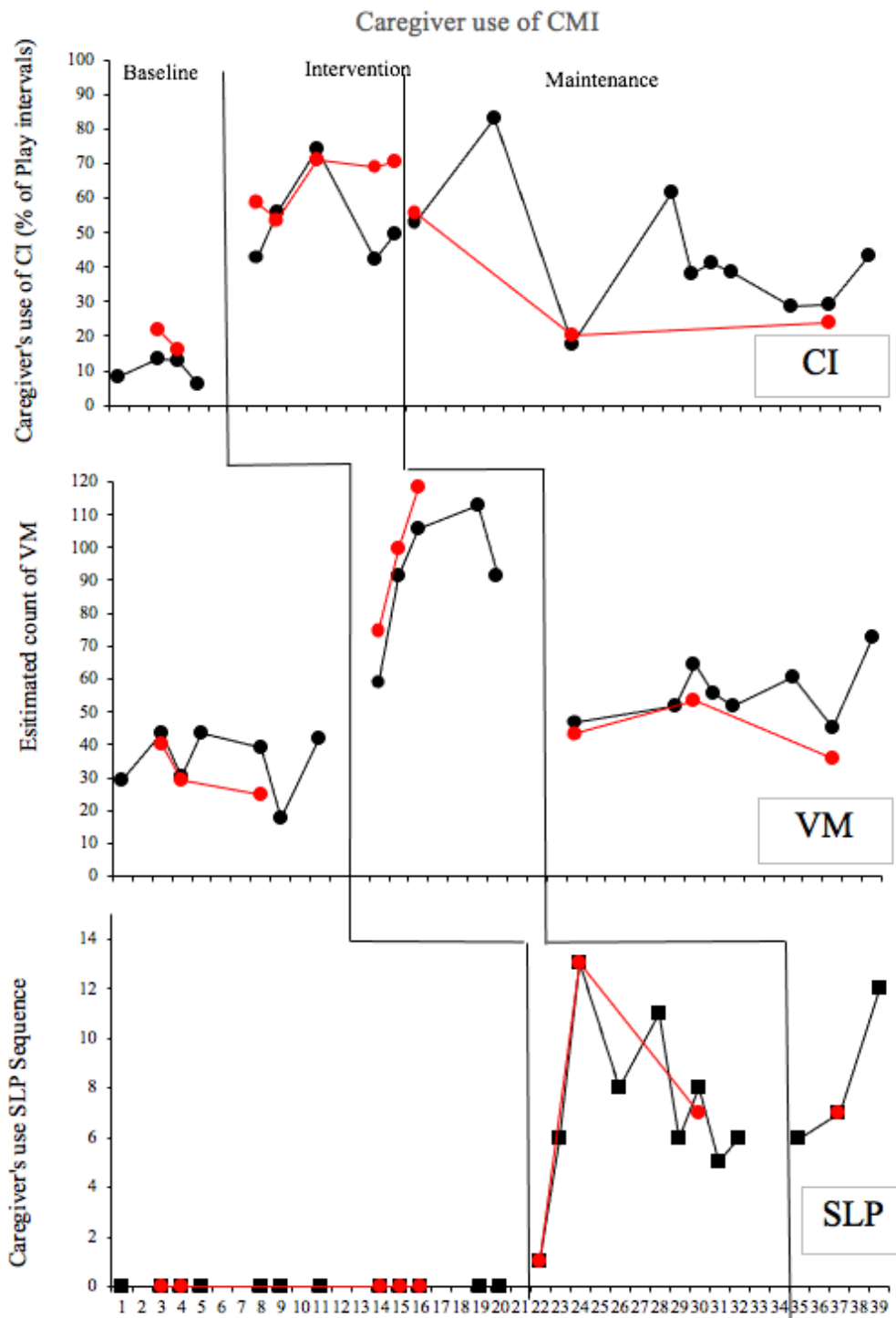
IOA coding comparison: primary coder and IOA coder for Kristen.



Note: red indicates IOA coder's data.

Figure 5

IOA coding comparison: primary coder and IOA coder for Alexandra.



Note: red indicates IOA coder's data.

“practice” dyads at 100% fidelity. See Appendix A, the coaching manual, for a description of training and coaching procedures across the study. Table 6 is the caregiver training fidelity form.

Collaboration with Caregivers

Opportunities to develop a collaborative relationship with caregivers were intentionally planned to occur throughout the study (Tucker & Schwartz, 2013). First, during the initial phone interview, caregivers were asked to provide background information about their child’s current level of play skills prior to the study and to report their child’s current interests during play. Second, caregivers also were asked to select toys from a prepared list that their child would find most interesting. Third, we also asked caregivers to share the goals that they had for their child’s play skill development. Fourth, we asked caregivers to rate their own comfort in using specific strategies to support their child’s play prior to providing coaching. This information was used to plan and deliver coaching and to extend their level of comfort related to strategy use. After intervention sessions, the coach specifically addressed the caregiver’s questions and provided feedback relevant to the caregiver’s goals for her child. Finally, using practices reported by Allen and Wiles (2016), caregivers were given the opportunity to choose their own pseudonym and the pseudonym to be used for their child in the written document. Table 7 lists the coach-caregiver collaboration activities implemented throughout study.

Baseline (Initial Probe) Conditions

We conducted eight-minute probe sessions with each caregiver-child dyad for a minimum of three sessions per toy set. We (i.e., the coaches) asked the caregivers to play with their child “as they normally would” and to provide descriptive praise to their child for staying on the play rug. We did not provide coaching or prompting during baseline probe sessions.

Table 6

Coach Training Fidelity Checklist

Coach Trained to:	Rate of occurrence of Coach training	Information covered	Primary coach covered item during training (YES/NO).	Secondary coach demonstrated coaching procedure during practice (YES/NO).
<i>Power point provided to secondary coach for review</i>	Once, prior to coach's training	<i>Power Point</i>	_____	<i>NA</i>
<i>Discuss the importance of pretend play</i>	Once prior to start of study, and at any time coaching fidelity falls below 90%	<i>Primary coach will discuss research and share power point with secondary coach to discuss:</i> a) social skill development; b) cognitive skill development; c) opens up opportunities for interaction and engagement with peers.	_____	_____
<i>Develop caregiver responsive play</i>		<i>Primary coach will discuss definitions and share power point with secondary coach to discuss:</i> a) set up the physical environment b) follow the child's lead; c) pacing;	_____	_____
<i>Define pretend play target</i>		<i>Primary coach will discuss definitions and share power point with secondary coach to discuss:</i> a) state target pretend play (FPP, IOA, AAA, OS) b) give at least two examples of the type of play.	_____	_____
<i>Define the SLP (SLP)</i>		<i>Primary coach will discuss definitions and share power point(s) with secondary coach to discuss one power point per CMI.</i> A. 1. Imitate your child's play actions. B. VM 1. Verbally describe your child's play.	_____	_____

	C. When child isn't demonstrating play, (10-20s)		
	<ol style="list-style-type: none"> 1. model target, if not play within 5s 2. physically prompt target play 3. reinforcement, verbally describe the child's play action with a "happy voice." 		
<i>Deliver Power Point presentation</i>	<i>Primary coach will share expectations of delivery of information provided to caregiver via email within 24 hours.</i>		
Caregiver coaching	<p><i>Primary coach will share expectations of information provided and format of coaching during intervention sessions.</i></p> <p>Coach will ask caregiver to adjust, camera, microphone, and lighting as needed for sessions.</p>		
<i>Coach caregiver prior to play</i>	<p>Coach will:</p> <ol style="list-style-type: none"> a) answer questions b) discuss play review sheet c) state, "Today we will use (target CMI). d) provide two examples of target CMI with toy set. 		
<i>Provide caregiver instructions to start play</i>	"Now use what you learned today to help your child play," and start timer.		
<i>Coach during play</i>	Complete feedback form		
<i>Conclude play session</i>	When the timer "rings," the coach will state, "The session is over you can end your play now."		
Summary	A) Number of items demonstrated:	<i>Total number of items demonstrated by primary coach:</i>	<i>Number of items demonstrated by secondary coach:</i>
		<u>11</u>	<u>10</u>
Fidelity of Training	B) Total number of items possible during training: A/B in percentage.		

Table 7*Coach-Caregiver Collaboration*

Study condition /timeline	Collaboration	Intended outcome	Research Evidence for Practice	Collaboration Supported by Research / Policy
Prior to baseline	Caregiver and coach complete PSI SF	Obtain baseline rating of caregiver’s stress	Barroso et al., (2016); Reitman, et al., (2002)	ASHA, IDEA (2004), DEC (2014)
	Caregiver interview	Obtain information about child’s play and caregiver’s comfort with potential strategies.	Freedman & Woods (2012); Wolf (1978) in Barton et al., (2018)	ASHA, IDEA (2004), DEC (2014) Tucker & Schwartz (2013) Woods et al., (2011)
	Caregiver assists in toy selection	Select toys relative to child’s interests.		ASHA, IDEA (2004), DEC (2014) Tucker & Schwartz (2013) Woods et al., (2011)

Coaching prior to play session	Caregiver and coach practice CMI use specific to caregiver's goals for child	Focus intervention on play skills relevant and meaningful to family. <i>Caregiver feels heard.</i>	Freedman & Woods (2012) Brown-Gorton & Wolery (1988); Belser (2016)	ASHA, IDEA(2004), DEC(2014) Tucker & Schwartz (2013) Woods et al., (2011)
At study mid-point	Caregiver and coach complete PSI SF	Obtain mid-study rating of caregiver's stress	Barroso et al., (2016); Reitman, et al., (2002)	ASHA, IDEA (2004), DEC (2014)
Feedback	Feedback provided specific to caregiver goals for child or caregiver questions about strategy use.	Focus feedback to address caregiver's goals for his/her child and answer questions. <i>Caregiver feels heard.</i>	Freedman & Woods (2012); Barton & Fettig (2013); Brown-Gorton & Wolery (1988); Powell et al., (1983).	ASHA, IDEA(2004), DEC(2014) Tucker & Schwartz (2013) Woods et al., (2011)
At the conclusion of the study	Caregiver and coach complete PSI SF	Obtain rating of caregiver's stress at the end of the study.	Barroso et al., (2016); Reitman, et al., (2002)	ASHA, IDEA (2004), DEC (2014)
	Masked interviewer completes final interview with caregiver	Determine if caregiver's goals, questions and concerns were addressed by coach.	Wolf (1978) in Barton et al., (2018)	ASHA, IDEA(2004), DEC(2014) Tucker & Schwartz (2013) Woods et al., (2011)

Caregiver Training

The goals of the caregiver training were to teach caregivers (1) to use CI ; (2) to use VM during play with their child; (3) to discriminate non-pretend and pretend play behaviors; and (4) to successfully use the SLP prompting sequence to prompt pretend play types (FPP, IAO, AAA, OS) using a variety of toys. Caregiver training sessions were scheduled at the caregiver's convenience prior to the introduction of each new CMI. Caregivers were asked to select a 10-15-minute time that they were available for a meeting via zoom when children were taking a nap, or another adult was present to allow the target caregiver to concentrate on the materials being presented. The coaches initially thanked the caregivers for their participation in the study and let them know that questions were welcome throughout the training. The coaches presented information to caregivers using PowerPoint™ presentation software. During the presentation, the coach shared the importance of play, discussed the importance of setting up an environment conducive to play, defined and provided examples of the types of pretend play, and defined and demonstrated the use of the target CMI. A video example of the use of the targeted CMI was shown to the caregiver during every training. At the conclusion of the training, the coach answered any questions from the caregiver. Finally, the coach asked the caregiver to demonstrate the use of the targeted intervention strategy using the child's toy set. At the conclusion of the training the coach stated, "During the next play session, use what you learned today to help your child to play." The coach emailed the training PowerPoint™ to the caregiver after every training session so that she had access for future reference. The coach also emailed a "play summary" to the caregiver for her own review prior to play sessions. See Figure 6 for an example of the caregiver "Play summary."

Figure 6

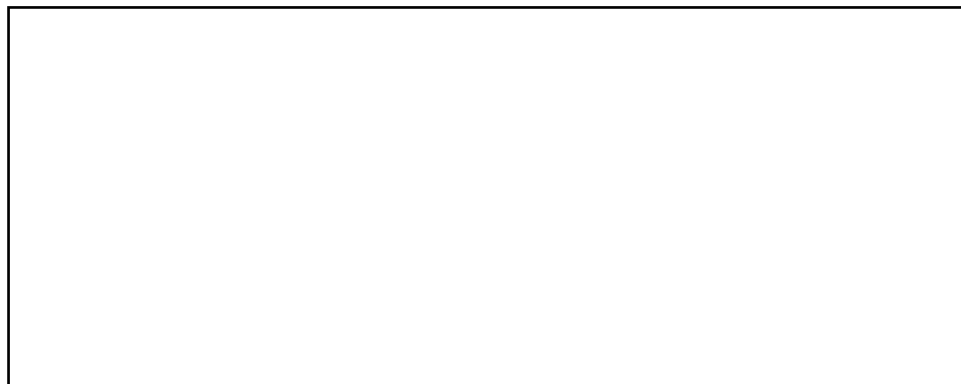
Caregiver Play Summary (for caregiver use)

1. Set environment (carpet, toys, lighting, noise)
2. Follow my child's interests
3. Match pace.
4. Use strategy _____.

Notes:



Questions for my coach:



Caregiver coaching. Prior to the caregiver starting the play session, the coach asked the caregiver to adjust the camera, lighting, and rug as needed to make sure everything was in view on the video camera. The pink (Megan) and blue (Wesley) toy sets were used for every primary play session. There were three types of coaching strategies used. First, prior to starting the session, the coach answered any questions the caregiver had, reviewed the “play summary,” and modeled at least two examples of the use of the target CMI. After the review, the caregiver was instructed to, “Play with your child.” The caregiver and child played together for 8 min. Second, during the session, the coach recorded examples of the correct use and errors observed specific to the use of the target CMI. This information was recorded on the caregiver feedback form (see Figure 8). Feedback forms were sent to the caregivers via email, their preferred means of communication to receive feedback, (determined during the pre-study interview) within 24 hours of the intervention session. With exception of issues related to view or recording, the coach did not communicate with the caregiver during play. Third, after every intervention session, the coach sent the feedback form to the caregiver via email. The coach provided positive statements such as, “You did a wonderful job following her interests in play,” or “You did a great job describing her actions!” Or when targeting the use of SLP, “You followed up with a physical prompt immediately when Megan didn’t follow your model-excellent!” Figure 7 is an example of the post-session feedback form. At the conclusion of all play sessions, the coach thanked the caregiver for her participation that day and confirmed the scheduling for the next session.

Adaptations to SLP play sessions (Wesley). Although a rug was initially used for all play activities, Wesley had a difficult time following models and prompts provided by his caregiver due to his relatively short reach. Thus, after session 20, we had his caregiver sit him at a

Figure 7

Caregiver Feedback Form

Feedback Delivered Via: _____ (mode)

Coach: _____ Tier: (1, 2, 3) Session # _____

Date: _____

Tally the number of times that the caregiver used _____ (target strategy):

Responses to ? / concerns

Some great things I saw you do today with your child:

Helpful hints:

Something great that I saw your child do:

breakfast tray so that toys used when modeling play were now within his reach. His caregiver moved around his tray as interests and play required.

Generalization

Generalization sessions were conducted throughout across all conditions of the study. During generalization sessions, the caregivers were asked to use the grey (Megan) and green (Wesley) play sets (known to coaches as the generalization play set) during the play session. The caregiver was told, “Play with your child as you normally would.” The coach requested that adjustments to the carpet, sound, or light be made for video clarity but did not provide coaching. The “Play summary” was not reviewed nor mentioned, though caregivers could choose to use it independently. If the caregivers asked questions, the coaches only stated that they should play like they normally would. If caregivers asked if they could use the “Play summary” or the CMI method that had been taught, the coach stated, “That is up to you.” Feedback was not provided. At the conclusion of the session, the caregiver was thanked for their participation that day, and the next session was scheduled and confirmed.

Maintenance

Maintenance sessions were introduced across the tiers in a time lagged manner. After the caregiver demonstrated a sustained change in her use of the target CMI after coaching, the maintenance condition commenced. Maintenance sessions for CI began one-week after coaching concluded and continued with period probes until the final week of the study. Maintenance sessions for VM occurred after coaching concluded, across the final two phases of the study. Maintenance sessions for SLP occurred in the final week of the study, following the removal of all coaching. During maintenance sessions, the coach reminded caregivers to use the strategies that they had learned: CI, VM, and SLP to play with their child. The coach requested that

adjustments to the carpet, sound, and light be made for video clarity but offered no other directives about the environment. The “Play summary” was not reviewed nor mentioned, though caregivers could choose to use it independently. If the caregivers asked questions, the coaches only stated that they should play like they normally would. Feedback was not provided. At the conclusion of the maintenance session, the researcher thanked the caregiver for their participation that day, and the next session was scheduled and confirmed verbally.

Social Validity

Assessments were used to measure three aspects of social validity: goals, procedures, and outcomes (Wolf, 1978 in Barton et al., 2018). Caregivers were interviewed prior to the start of the study and at the completion of the study. We determined the social importance of the goals for this study in two ways: (a) we asked caregivers if their goals for their child’s play were incorporated into the study and into the use of the strategies that they were taught to use with their child, and (b) we obtained ratings from graduate students, masked to the study’s purpose, to determine if they view a caregiver’s ability to support their child’s play as an important skill. To determine if the study procedures were relevant/important, we interviewed caregivers about their comfort with and use of targeted CMI strategies prior to and after intervention. Additionally, we assessed the level of stress that the caregiver was experiencing prior to, during, and after the study using the Parenting Stress Index Short Form (PSI-SF). These data were used to determine the effect that participation in this CMI coaching study had on the level of caregiver stress throughout the duration of the study. The post-study caregiver interview (Figure 8) was used to further assess the social validity of the study. We asked caregivers to report any changes in their own behavior and changes they observed in their child’s play. We also asked caregivers whether they used SLP to teach skills other than play to their target child or other children. Finally, we

Figure 8

Caregiver Interview at study completion

Family ID _____ Child age _____ Date of interview _____

Please answer the following questions about yourself and your child. This information will be used to plan our intervention. No answers are right or wrong, this is for informational purposes.

1. Please describe how you see your child playing?
2. What actions do you generally see?
3. Who is near to your child, when he/she plays?
4. How long will your child engage in a play activity with you?
5. How does your child respond to your own play?
6. What specific toys is your child most interested in?
7. What toys (if any) are aversive to your child?
8. What is reinforcing to your child? (edibles, hugs, praise, high fives)
9. How comfortable are you:
 - a) showing your child how to play with a toy/object?
 - b) guiding your child physically to play with a toy or object?
 - c) showing your child that you are happy with his/her play?
 - d) imitating your child's play?
 - e) describing your child's play while he/she is playing?
10. When you play with your child do you generally engage in the play that he/she is demonstrating or use this as play as an opportunity to teach your child something new?
11. Did the coaches of this study listen to and address your questions and concerns and ask about **the goals** that you had for your child for play?
12. Have you used the SLP to teach any other skills to your child?

asked masked raters, master's students in special education, concealed to this study's purpose, to review videos of caregivers playing with their children during baseline and intervention sessions and rate the caregiver's support of their child during play.

Procedural Fidelity

Training the Coach

After training was completed, the primary and secondary coach signed off on the training checklist indicating that the power point was reviewed and discussed in preparation for the presentation, the "play summary" was reviewed and discussed, and the self-assessment and rater checklists were reviewed and discussed. Fidelity ratings from the practice presentation and the practice play session were completed to ensure that coaches adhered to procedures. Coaches demonstrated 100% fidelity during practice prior to the study.

All Sessions

Across sessions, we measured the coaches' adherence to all experimental procedures. The coach used a self-checklist to record her adherence to the following procedures. The coach recorded that she asked the caregiver to make adjustments to ensure clear audio and video recording. The coach recorded whether she provided coaching prior to play or didn't provide coaching prior to the play session, per the type of session. The coach recorded whether she provided the correct verbal instructions to begin play per the type of session and started the timer. The coach coded whether she stated that the play session was over, when the timer went off. The coach coded if feedback was or was not provided after play, according to the session type. The coach recorded whether she thanked the caregiver for the session and confirmed time for the next session. The other coach reviewed videos of all sessions and completed the fidelity checklist. Table 8 provides a list of fidelity measures across the study.

Table 8*Fidelity Rating Across Caregivers and Conditions*

Participant /CMI	Baseline% (range%)		Intervention% (range%)		Maintenance% (range%)		
	self	rater	self	rater	self	rater	
Kristen	CI	100	100	100	100	99 (93-100)	99 (93-100)
	VM	100	100	98 (93-100)	95 (93-100)	100	100
	SLP	99 (93-100)	98 (93-100)	100	96 (80-100)	100	100
	GEN TS	100	100	100	98 (93-100)	100	93 (80-100)
Alexandra	CI	100	100	100	100	99 (93-100)	98 (93-100)
	VM	100	100	100	100	99 (93-100)	98 (93-100)
	SLP	100	100	99 (92-100)	98 (93-100)	100	100
	GEN TS	100	100	100	99 (93-100)	100	100

Note: Fidelity data taken on 100% of sessions; data rounded

Fidelity During Intervention Sessions

Caregiver training. The coaches' adherence to training procedures during intervention was assessed two ways. First, after the coaching session targeting the use of each new target CMI was completed, the coach used a self-assessment checklist to ensure that she adhered to all training procedures. Additionally, the second coach viewed the video of every training and used a rater checklist to rate the adherence to the procedures used to train the caregiver. See Table 8 for fidelity measures across the study.

Caregiver coaching. The coaches' adherence to coaching procedures during each play session (100% of sessions), across conditions, was measured two ways. First, the coach providing the training used a self-assessment checklist in every session to ensure that the video clearly was capturing the play area, the caregiver's questions were addressed, the "play summary" was reviewed, two examples of the target CMI were modeled, and the coach said to the caregiver, "Now play with your child." The coach's adherence to feedback procedures were also measured. The coach coded whether she stated that the play session was over, when the timer went off. The coach coded if feedback was or was not provided after play, according to the session type. The coach recorded whether she thanked the caregiver for the session and confirmed time for the next session. The coach used the fidelity checklist to record her adherence to the planned non-occurrence of coaching during all baseline, generalization, and maintenance sessions. Additionally, the secondary coach either attended the coaching session or watched videos after their completion. While viewing the session or video, the secondary coach completed the fidelity checklist to record the primary coach's adherence to all coaching procedures. Fidelity ratings were not compared for IOA, but errors in fidelity were reported verbally to the coach so that modifications in the practices could be made. This included suggestions like, "Confirmation for the next session was not caught on video, remember to confirm the next session prior to stopping the video." Figures 9 and 10 provide examples of fidelity rating forms. See Table 8 for fidelity rating across coaches, caregivers and conditions.

Figure 9

Fidelity: Caregiver Training

Coaches initials: _____
 Self-checklist: _____
 Rater checklist: _____
 Date: _____

Caregiver Training	Rate of occurrence	Information covered	Adherence
<i>Discuss the importance of pretend play</i>	Once per tier	a) social skill development b) cognitive skill development c) opens up opportunities for interaction and engagement with peers.	_____ _____ _____
<i>How to develop caregiver responsive play</i>	Once per tier	a) set up the physical environment b) follow the child’s lead c) pacing;	_____ _____ _____
<i>Define pretend play target</i>	Once per tier	a) Explain pretend play (FPP, IOA, AAA, OS) b) give at least two examples of the type of play.	_____ _____
<i>Define the target CMI</i>	Once per tier (One CMI per tier)	a) -imitate your child’s play actions. b) VM-verbally describe your child’s play. c) SLP-when child isn’t demonstrating play, (10-20s) 1. model target, if not play within 5s 2. physically prompt target play 3. reinforcement, verbally describe the child’s play action with a “happy voice.”	_____ _____ _____ _____
<i>Collaborate with caregiver</i>	Once per tier	Ask caregiver to identify at least 2 examples of target CMI use and then practice using target CMI together. Incorporate use of CMI to address caregiver’s goals for child.	_____ _____
<i>Power Point presentation delivered to caregiver</i>	Once per tier	Power point and play summary sheet has been emailed to caregiver via preferred mode of communication.	_____

Figure 10

Fidelity: Caregiver Coaching Sessions

Coaches initials: _____
 Self-checklist: _____
 Rater checklist: _____
 Date: _____
 Session Type: B I M G _____

Caregiver Training	Rate of occurrence	Information covered	Adherence: X=completed N=Not completed
Caregiver coaching	Every session	Coach will ask caregiver to adjust, camera, microphone, and lighting as needed for sessions.	All conditions
Caregiver coaching prior to play	Every intervention session	a) answer questions b) discuss play review sheet c) will state, “Today we will use (<i>state CMI</i>). d) provide two examples CMI with toy set.	_____* _____* _____* _____*
Caregiver instructions to start play	Every Intervention session	“Now play with your child,” and start timer.	_____
During Play	Every intervention session	Complete feedback form during caregiver-child play.	_____*
End of play session	Every session	When the timer “rings,” the coach will stop recording and text or state, “The session is over you can end your play now.”	_____
Feedback	After every intervention session	a) review feedback form; b) state positively and specifically at least one caregiver behavior that was completed well, “I love how you modeled XXX!” c) If needed, provide informative feedback and an opportunity to practice delivery of target CMI. d) Feedback addresses caregiver’s goals for child and/or caregiver’s questions. e) Thank caregiver for session. f) Confirm date and time of the next session.	_____* _____* _____* _____*

Note: * indicates that during Baseline (B), Maintenance (M), and Generalization (G) sessions, step should **NOT** be completed.

CHAPTER 3

Results

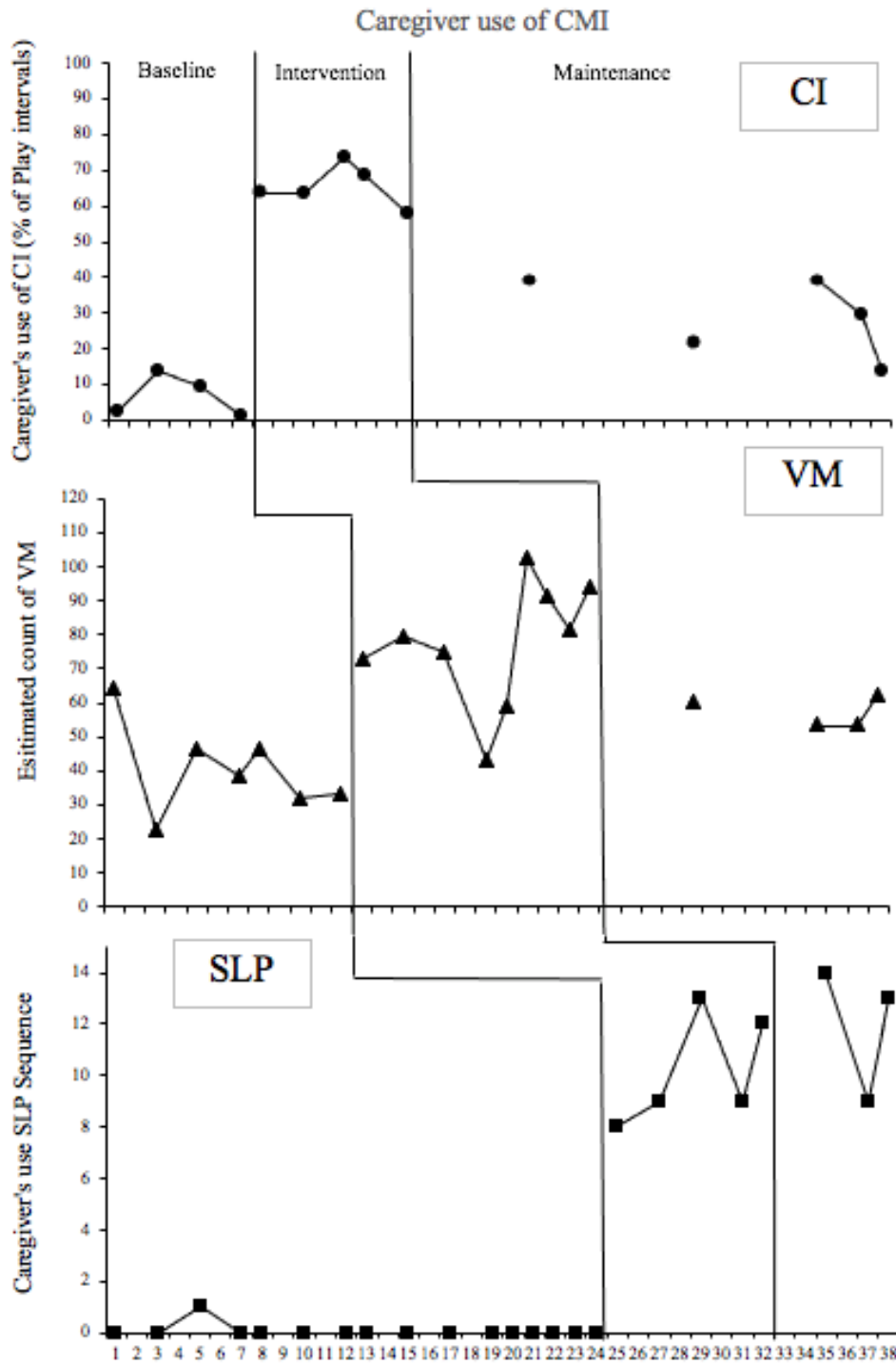
Caregiver Mediated Interventions

Kristen

Kristen demonstrated a low rate of (Tier 1) of her child's play during initial baseline sessions, with CI ranging from 1% to 13.9% (see Figure 11 for primary data). After she received coaching, her rate of CI increased immediately to 63% and remained high and stable, ranging from 57% to 74% throughout the remainder of intervention. CI remained at levels above baseline during four of five maintenance probes, ranging from 13.7% to 39%. Kristen demonstrated higher than expected levels of VM (Tier 2) during baseline. The estimated count for VM ranged from 22.4 to 64.5 during baseline. After she received coaching, Kristen's estimated count of VM immediately increased to 72.7 and remained high for three sessions. At that point, VM decreased to pre-intervention levels for two sessions. As coaching continued, Kristen's use of VM again increased and remained high throughout intervention, estimated count ranging from 81.7 to 102.5. During maintenance, Kristen's use of VM overlapped considerably with the estimated count of VM obtained during baseline data (estimated count ranged from 53.47 to 62.62). Kristen's use of the SLP remained low and stable (count ranged 0-1) through baseline (Tier 3). After Kristen received coaching, her use of the SLP immediately increased to 8 full sequences of SLP during the play session. Her use of the SLP maintained at levels ranging from 9 to 13 full sequences used per play session. When coaching was removed, Kristen's use of the SLP maintained at levels well above baseline (range 9 to 14). A secondary measure, Kristen's correct timing for initiation of SLP, ranged from 20%-50% during SLP intervention sessions and from

Figure 11

Kristen's use of CMI across study (primary sessions)



Note: contingent imitation (CI); verbal mapping (VM) or system of least prompts (SLP).

29% to 80% during maintenance sessions. Introduction of the intervention in one tier did not affect the levels of CMI in subsequent tiers, indicating that experimental control was established. Further, Kristen's use of CMI increased immediately when coaching was introduced across all three tiers, demonstrating a functional relation.

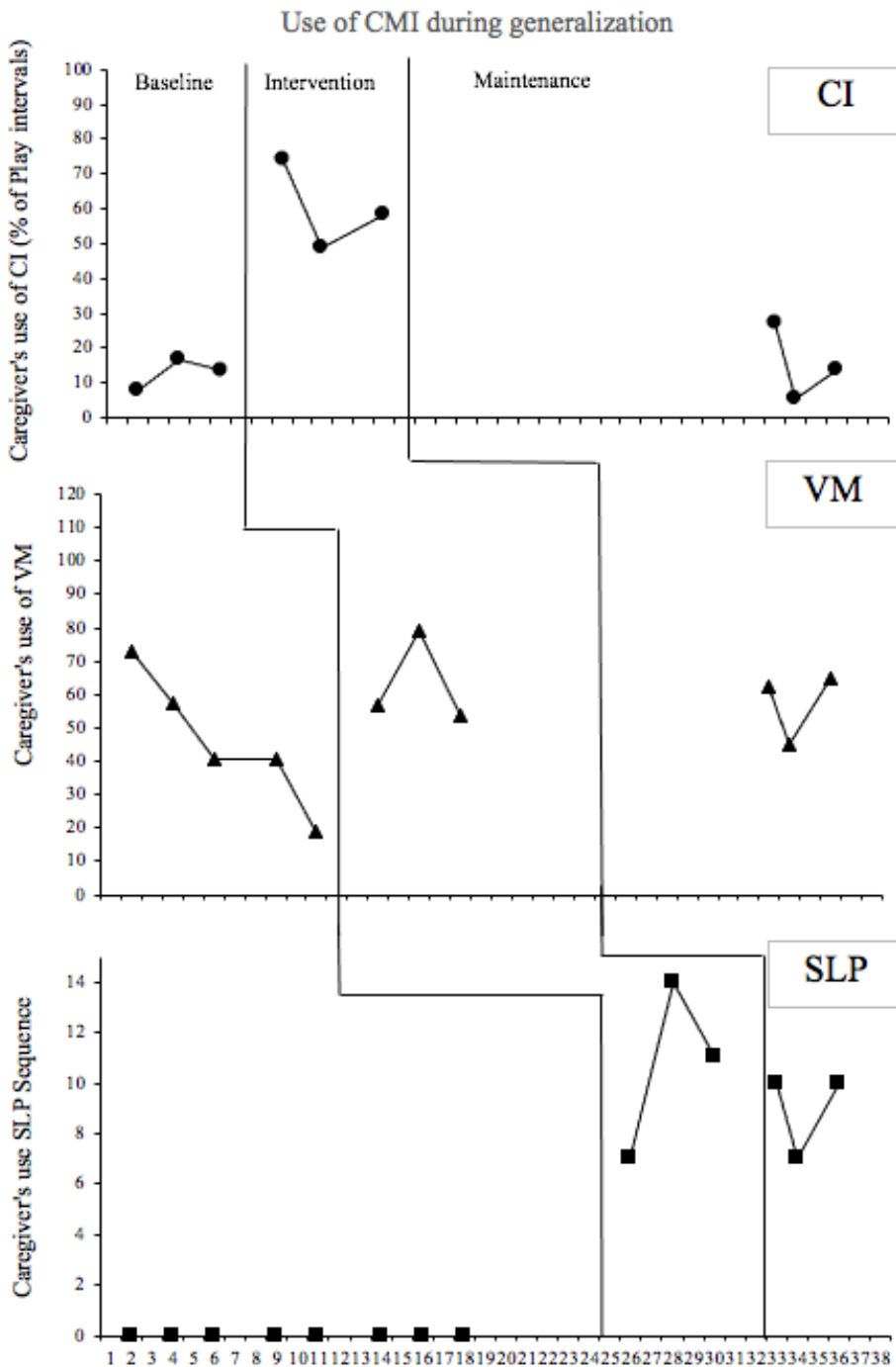
Generalization. Generalization probes (see Figure 12 for generalization data) during baseline yielded levels similar to those observed across primary sessions during baseline for all CMI. Generalization probes during intervention yielded data where CI and SLP rose immediately to levels well above baseline and remained high throughout intervention, which indicates that caregivers performed the strategies that they had been taught with new materials. However, only one generalization session yielded results above baseline for VM. Generalization probes during maintenance indicate that Kristen's use of CI did not maintain across play sets, data from two of three sessions overlapped with baseline data. Similarly, generalization probes during maintenance indicate that Kristen's use of VM did not maintain across play sets. Kristen maintained her use of SLP during generalization sessions at intervention levels, after coaching was removed.

Alexandra

Alexandra demonstrated low levels of CI during baseline (Tier 1); CI ranged from 6.09 to 18.6% during baseline sessions (see Figure 13 for primary data). After she received training, and began to receive coaching and feedback, her use of CI immediately increased and remained high during intervention (range 54 to 73.9%). After coaching and feedback were removed, Alexandra's use of CI maintained at levels above baseline in eight of nine probes (range 15.9 to 83.1%). Alexandra's baseline levels (Tier 2) for estimated count of VM were moderate, ranging from 17.5-41.9. After she received training, and began to receive coaching and feedback, she

Figure 12

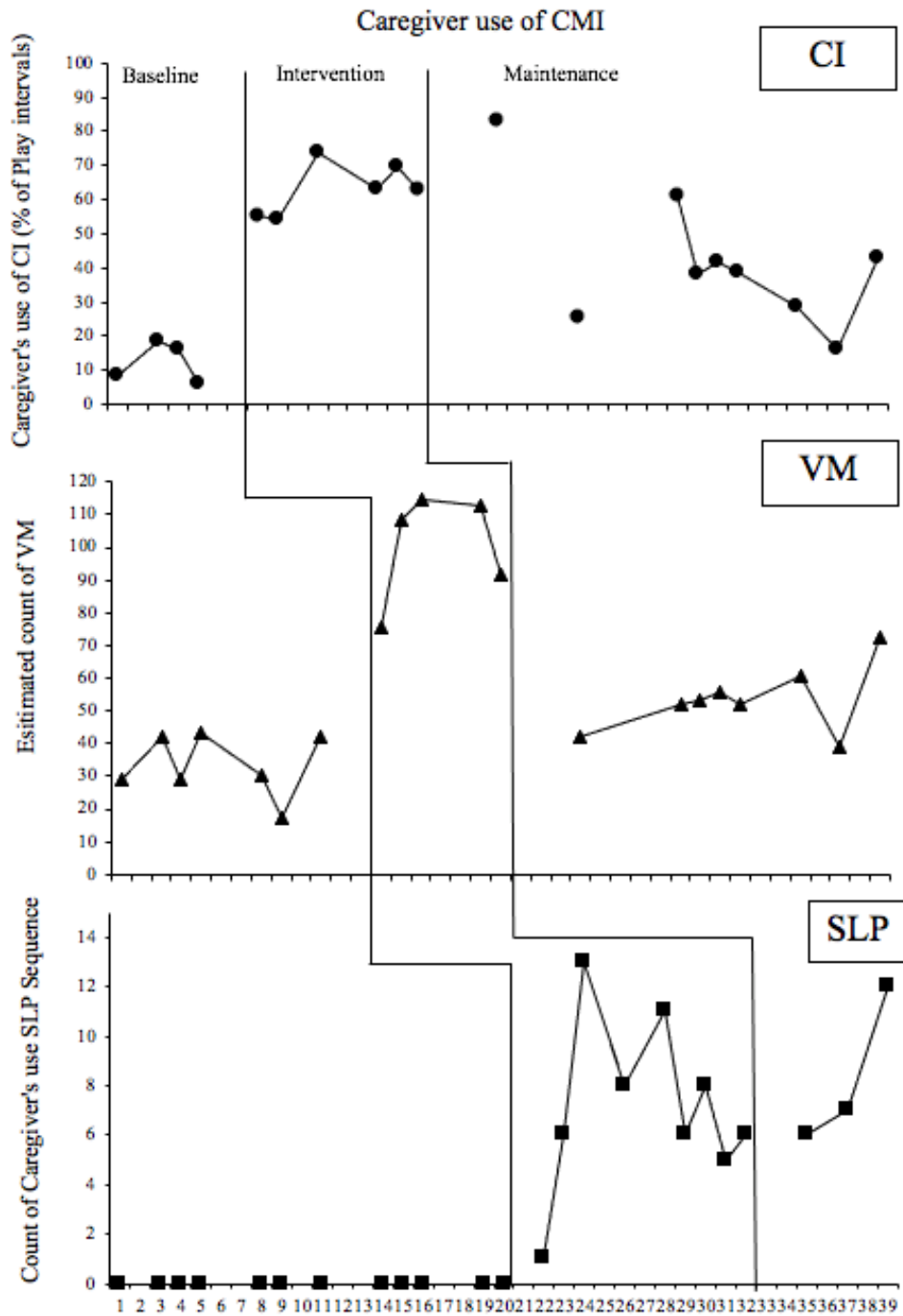
Kristen's use of CMI across study (generalization sessions)



Note: contingent imitation (CI); verbal mapping (VM) or system of least prompts (SLP).

Figure 13

Alexandra's use of CMI strategies across the study (primary sessions)



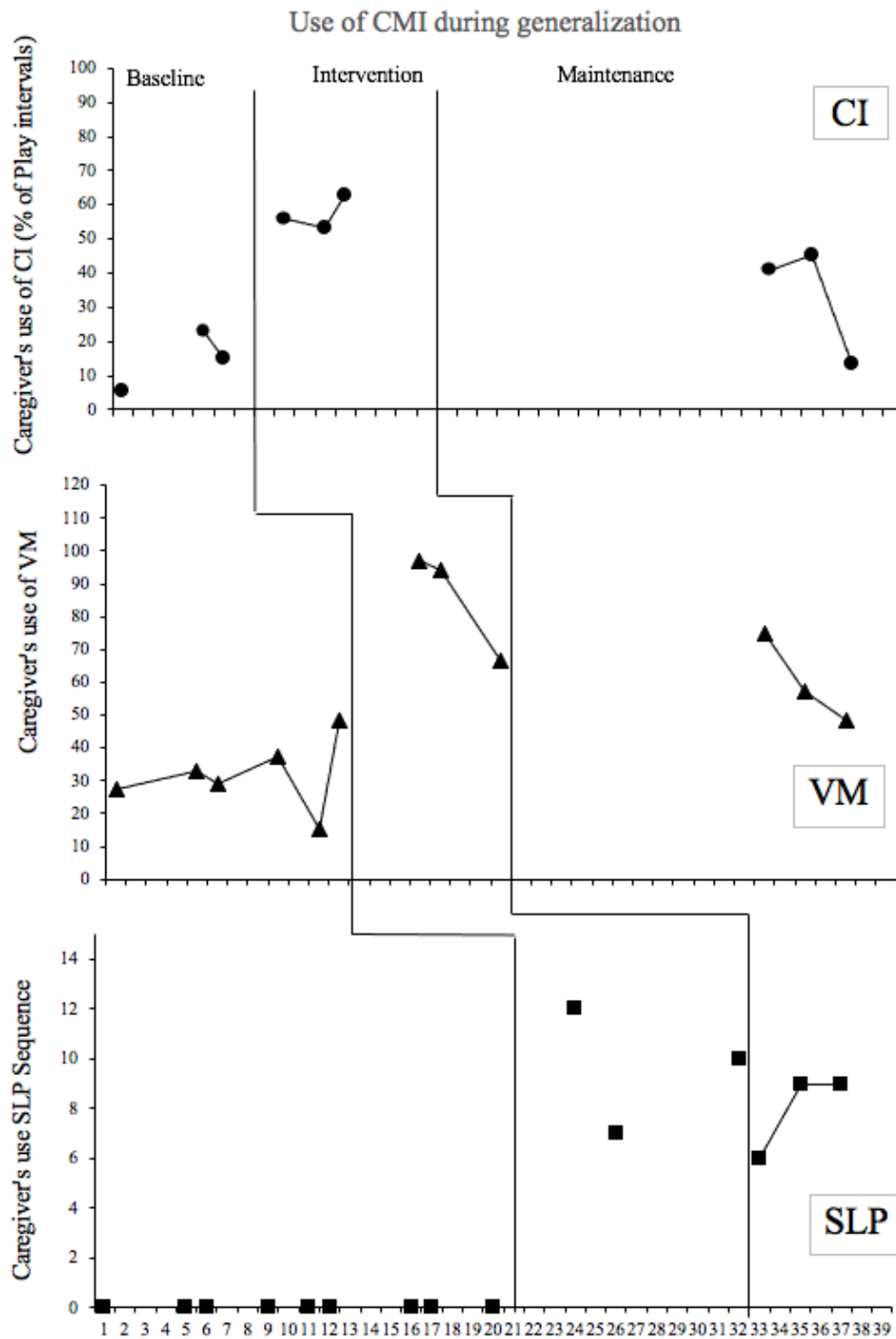
Note: contingent imitation (CI); verbal mapping (VM) or system of least prompts (SLP).

immediately increased her use of VM, estimated count ranged from 75.3 to 114.9. When coaching and feedback were removed, her use of VM decreased and her estimated count ranged from 38.9 to 72.7 during maintenance. Data from two of eight maintenance sessions overlapped with estimated count of VM data observed during baseline. Alexandra did not use SLP (Tier 3) during baseline. After she received training, and began receiving coaching and feedback, Alexandra's use of SLP increased. During the session immediately following training and the introduction of coaching and feedback, Alexandra used one full sequence of SLP. Alexandra's use of SLP immediately increased and remained well above baseline after session one (range 5-13 full SLP sequences used per session). When coaching and feedback were removed, Alexandra's use of SLP maintained (ranging from 6-12 full sequences of SLP used per session). Alexandra's correct timing of SLP sequences ranged from 0-100% across SLP intervention sessions and 33-43% during maintenance sessions. Alexandra's use of CMI increased immediately when coaching was introduced across all three tiers—demonstrating a functional relation. The introduction of the intervention in one tier did not impact the levels of use of CMI in subsequent tiers, indicating that experimental control was established.

Generalization. Generalization probes, see Figure 14 for generalization data, indicate that Alexandra used all three CMI at levels consistent with primary baseline data collected prior to coaching. Generalization probes during intervention yielded data where CI, VM and SLP rose immediately and remained well above baseline throughout intervention. Generalization data during intervention did not overlap with baseline. This indicates that Alexandra used CMI strategies that she had been taught with new materials. SLP generalization probes remained above baseline data probes throughout maintenance and two of three maintenance data points remained above the levels of CI and VM use observed during baseline. Data indicates that

Figure 14

Alexandra's use of CMI strategies across the study (generalization sessions)



Note: contingent imitation (CI); verbal mapping (VM) or system of least prompts (SLP).

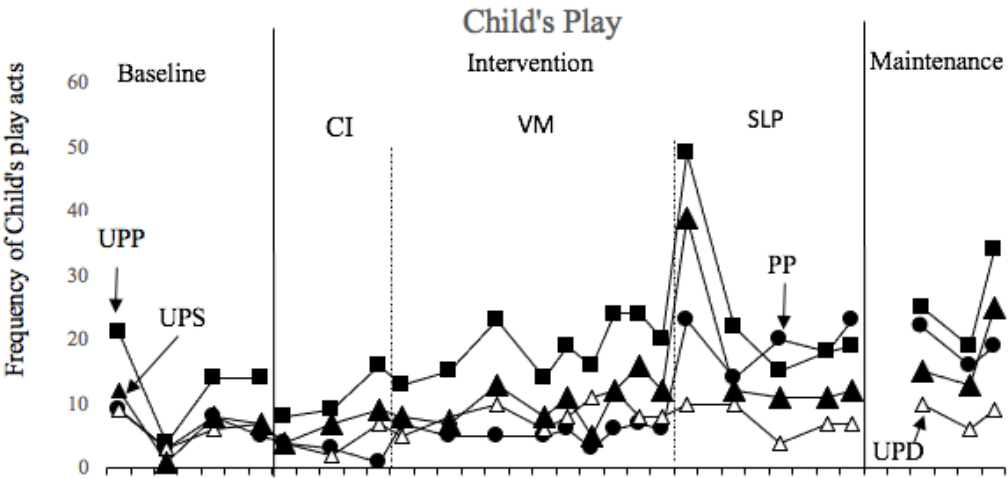
Alexandra generalized the use of CMI skills across materials and maintained the use of CMI with new materials after coaching was removed.

Child Play

Megan. During baseline Megan used a range of 4 to 21 unprompted acts of pretend play per session. After Kristen, Megan’s caregiver, began to use CMI during her play with Megan, the number of unprompted pretend play acts per session increased, ranging from 8 to 49 per session. Megan’s use of unprompted play acts surpassed the highest baseline point in 7 intervention sessions. Considerable variability in the number of unprompted play acts was observed across sessions. The diversity of Megan’s unprompted pretend play was also variable across sessions and did not increase across time or conditions. The highest number of unprompted diverse play acts seen in baseline was 12, equal to the highest number of unprompted diverse play acts observed after Kristen began to use CMI. See Figures 15 and 16 for graphs of Megan’s play data.

Figure 15

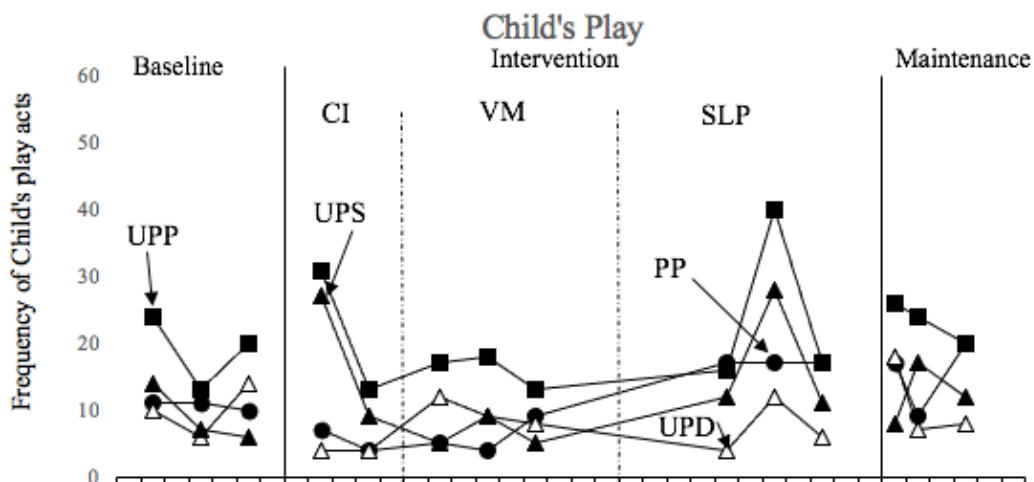
Megan’s demonstration of pretend play across the study (primary sessions)



Note: contingent imitation (CI); verbal mapping (VM); system of least prompts (SLP); unprompted play (UPP); prompted pretend play (PP); diverse unprompted pretend play (UPD); unprompted pretend play-same (UPS).

Figure 16

Megan's demonstration of pretend play across the study (generalization sessions)



Note: contingent imitation (CI); verbal mapping (VM); system of least prompts (SLP); unprompted play (UPP); prompted pretend play (PP); diverse unprompted pretend play (UPD); unprompted pretend play-same (UPS).

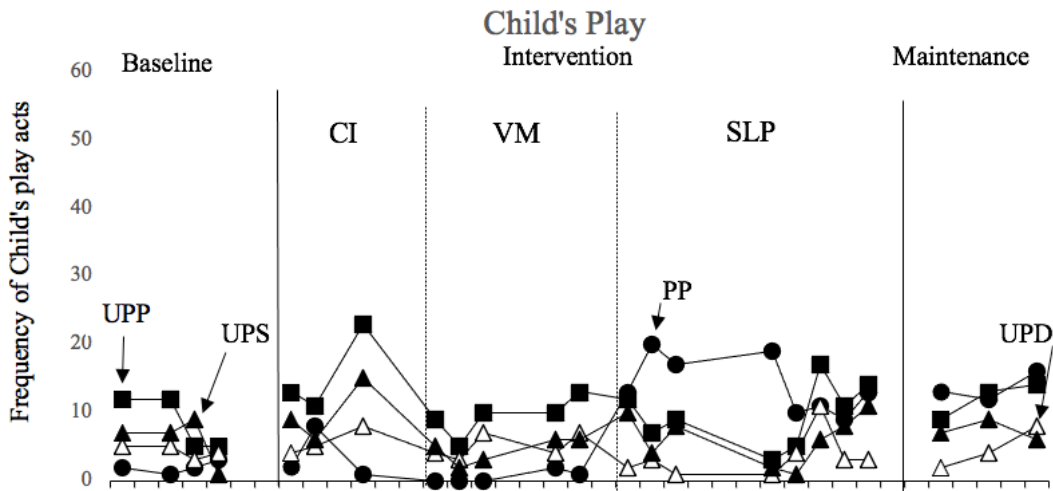
Wesley. During baseline, Wesley demonstrated variable numbers of unprompted pretend play acts, ranging from five to 12 per session. After Alexandra, Wesley's caregiver, started to use CMI during play sessions, the number of unprompted play acts increased, ranging from 8 to 23 occurrences per session. When SLP was introduced, the number of unprompted pretend play acts observed ranged from 3 to 15 per session, while the number of prompted play acts rose to levels exceeding previous data, ranging from nine to 20 acts per session. The diversity of Wesley's play remained variable throughout the study, ranging from 2 to 8 diverse pretend play acts per session. See Figures 17 and 18 for graphed play data.

Social Validity

Eleven students in a graduate level special education course, concealed to this study's purpose and procedures, were surveyed regarding their agreement with the statement, "A

Figure 17

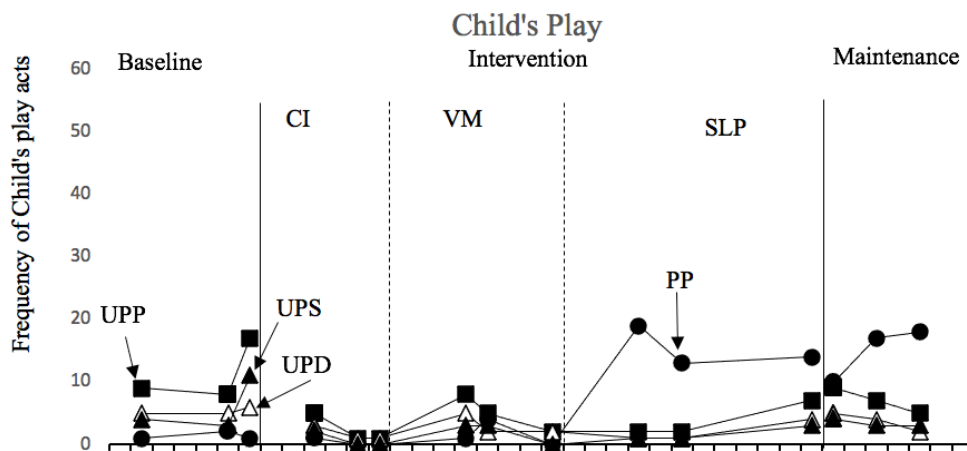
Wesley's demonstration of pretend play across the study (primary sessions)



Note: contingent imitation (CI); verbal mapping (VM); system of least prompts (SLP); unprompted play (UPP); prompted pretend play (PP); diverse unprompted pretend play (UPD); unprompted pretend play-same (UPS).

Figure 18

Wesley's demonstration of pretend play across the study (generalization session)



Note: contingent imitation (CI); verbal mapping (VM); system of least prompts (SLP); unprompted play (UPP); prompted pretend play (PP); diverse unprompted pretend play (UPD); unprompted pretend play-same (UPS).

caregiver's ability to support their child's play is an important skill." Results suggest that graduate students agree that it is important for caregivers to support their child's play and that 9/11 strongly agree with this statement. Additionally, the same graduate students were asked to view two videos, a randomly selected baseline and intervention video, of each caregiver. Students were instructed to identify the video in which Kristen provided stronger support to her child during play (video A or B) and then to identify the video (video C or D) in which Alexandra provided stronger support to her child during play. Fifty-four percent of the graduate students rated Kristen's support of Megan's play stronger during video B (i.e., after intervention), and 100% of the students rated Alexandra's support of Wesley's play stronger during video C (i.e., after intervention).

Caregivers completed a questionnaire prior to study participation and at the conclusion of the study. Caregivers were asked about their goals related to play for their children. Kristen's goals centered around the development of interactive and social play skills in Megan, while Alexandra reported that her goals for Wesley's play included the development of skills to engage in play for periods of longer duration, the development of pretend play, and the development of play skills so that he can play more independently. The final slide of the three power point presentations was developed to facilitate collaborative planning. Prompts included questions such as, "How can the use of this strategy help to address the goals that you have for your child's play?" An additional prompt requested that the caregiver plan with the coach the use of strategies. The coach supported and shaped the caregiver's ideas with information specific to CMI use throughout the discussion. During the initial pre-study zoom interview, both caregivers were asked about their own level of comfort showing their child how to play, describing their child's play acts verbally, guiding their child physically in play, and reinforcing their child's

play. Both caregivers reported that they were comfortable with these tasks, though both reported that they had not verbally described their child’s play prior to the study. At the conclusion of the study, both caregivers reported that they had used SLP to teach skills other than play to their children. They reported using SLP to support their other children’s ability to sign, to cut vegetables, and to use a latch. Finally, when asked if this study was feasible and effective, both caregivers stated that this study was feasible due to the flexible scheduling and coaches’ willingness to work around their families’ needs. Kristen added that, although this was a feasible and effective study, in person coaching continues to be her preference.

To measure and monitor caregiver stress during the study, the PSI-4-SF was administered to the caregivers prior to the start of the study, mid-way through the study, and after the study concluded. The scores for the PSI-4-SF fell in the average range for both caregivers, across the administrations, indicating that caregivers were experiencing stress at rates commensurate to other caregivers. Kristen’s reported stress rose slightly at the mid-point of the study but stayed well below average throughout the study. Alexandra’s level of stress was slightly variable across probes, and lower than baseline during the mid-point and end of study probes. Her scores also fell within the average range throughout the study (data are provided in Table 9). Their stress did not increase as a result of receiving virtual coaching or of participating in this study.

Table 9

Parenting Stress Index Scores

Caregiver	Prior to Study (percentile)	During Study (percentile)	Conclusion of Study (percentile)
Kristen	36	42	42
Alexandra	74	62	68

Note: scores falling between the 16th and 84th percentile fall within the normal range according to the PSI-4 SF.

CHAPTER 4

Discussion

This study was conducted to evaluate the efficacy of virtual coaching to increase caregivers' use of CMI strategies: CI, VM, and the SLP. We identified a functional relation between coaching provided virtually and caregivers' increased use of CMI strategies. Both caregivers (Kristen and Alexandra) demonstrated immediate increases in their use of the CMI strategies when coaching was introduced.

Coaching Practices

Multiple researchers have reported the efficacy of caregivers use of CMIs to support their children with disabilities (Althoff et al., 2019; Barton & Fettig, 2013; Ono et al., 2013). Virtual coaching provides an additional, feasible delivery mode to support coaching caregivers of children with disabilities (Meadan & Daczewitz, 2015). However, few studies have measured the use of CMI strategies to support play following virtual coaching. During a recent review of the literature, only Wainer and Ingersol (2015) measured and reported that a functional relation existed between virtual coaching provided to caregivers and their use of CMI strategies to support play (Bancroft et al., 2021). The results from the current study provide additional evidence that virtual coaching provided to caregivers to teach the use of CMI strategies focused on play is effective.

We provided specific components of coaching to caregivers delivered at designated time periods. Specifically, coaches introduced the target CMI strategy to caregivers, and provided caregivers practice opportunities during the initial training. Coaches modeled CMI use and provided practice opportunities prior to caregiver play sessions with their child. The use of these

practices replicates the components of coaching used in previous successful studies (Besler & Kurt, 2016; Brown-Gorton & Wolery, 1988; Cardon, 2012; Lane et al., 2016; Solomon et al., 2014). Specific performance feedback, a critical component of caregiver coaching (Barton & Fettig, 2013), was provided via the caregiver's preferred mode of communication (email for both participants) following all intervention sessions.

Caregiver Use of Strategies

In tiers 1 and 2, caregivers were taught to use two specific strategies, CI and VM, respectively. Both strategies have been successfully taught to caregivers to support the play of their children with disabilities (Brown-Gorton & Wolery 1988; Lane et al., 2016; Zaghawan and Ostrosky, 2016). In the present study, both caregivers responded to the training provided to imitate their child's play, as evidenced by an immediate shift in their level of CI use. Similarly, both caregivers responded immediately to training targeting the use of VM, surpassing the level of VM used during baseline sessions. Kristen's level of VM dropped to baseline levels twice during intervention, possibly due to the fact that her use of VM during baseline was considerably high. Her levels of VM then rose above baseline for the remainder of intervention. During tier three, caregivers were taught to use SLP to teach their children with disabilities pretend play. Though SLP has been successfully used to teach young children with disabilities pretend play (Barton et al, 2019; Barton & Wolery, 2010; Qiu et al., 2019; Sarai &Ulke-Kurkcuoglu, 2020), this is the first study to train caregivers to use this prompting method to support the play of their own children. Additionally, this study extends the evidence that virtual coaching is an effective delivery modality to teach parents to use multiple CMI.

Timing of SLP

To measure the caregiver's use of SLP, we measured the caregiver's sequential presentation of a model, followed by specific positive reinforcement for the play act completed by the child or the caregiver's provision of a model, followed by the controlling (hand-over-hand) prompt, followed by specific positive reinforcement for the play act. A secondary measure, the timing of the caregiver's initiation of the SLP sequence, was also recorded. Timing was recorded as a descriptive measure given the fact that the exact timing of SLP might differ across participants and contexts. Kristen's timing for initiation of SLP within the recommended 12-20s time frame, absent of pretend play, ranged from 20%-80% across sessions. Similarly, Alexandra's use of the recommended timing of SLP sequences ranged from 0-100% across sessions. Both caregivers were most likely to deliver the play model early (i.e., waiting fewer than 12s absent of pretend play to deliver the model). Although the recommended timing of SLP was included and reviewed in the coaching, it was not stressed due to the complexity of the SLP sequence and the likelihood that this timing might not be consistently appropriate. Additional studies are warranted that explore the effective timing of caregiver delivery of SLP prompts, to better understand how appropriate timing impacts caregiver and child outcomes.

Anecdotally, we observed caregivers using SLP to teach both discrete functional pretend play acts and to teach complex pretend play (e.g., assigning absent attributes, imagining absent objects, or to teach play sequences). Both parents used SLP to teach their children to blow on "hot" food during play and to pour water from a kettle to a cup and then to drink from the cup. Alexandra also used SLP to teach Wesley to blow the "dirt" off the toy pizza that had fallen on the tray. Though caregivers were provided models of SLP targeting only discrete play acts and were only taught to teach discrete play acts, both caregivers spontaneously used SLP to teach

sequential acts during their play sessions. It is quite possible that caregivers do not perceive play sequences as more sophisticated but modeled the acts to promote their child's interest and enjoyment. The fact that caregivers provided models of complex play and play sequences may prove beneficial to their children. Research indicates that children benefit from instruction that targets the use of sequential acts of play (Barton et al., 2019).

Research has indicated that SLP has been successfully used to teach children with a variety of developmental needs to play (Barton & Wolery, 2008). This study extends those findings by providing evidence that caregivers of children with different skills can be taught to apply SLP to address the specific needs of their children. Megan had strong imitation skills at the beginning of the study. Once SLP was introduced, Megan often responded to her mother's model immediately and did not require a controlling prompt. Wesley had minimal pretend play skills at the beginning of the study. His development of pretend play was likely impacted by his history of medical needs and limited physical stature. When Alexandra used SLP, she intentionally gave him time to manipulate the toys for play, and often provided him with physical support, or a prompt as needed. Once trained, both caregivers consistently provided their children with immediate specific reinforcement.

Maintained Use of Practices

One of the primary purposes of this study was to examine if caregivers continued to use the CMI strategies that they had been taught, when coaching was faded. Data indicate that both caregivers maintained their use of all targeted CMI strategies. During maintenance, Kristen used CI at levels above baseline in four of five probes. Alexandra maintained her use of CI above baseline levels in eight of nine probes. After coaching was removed, VM use decreased to below intervention levels in both caregivers. The lower levels of VM use may be explained by the

introduction of the use of SLP to caregivers. Though levels in VM use decreased, caregivers generally continued to use VM at levels above baseline. With the exception of one outlier during baseline, Kristen maintained her use of VM at levels surpassing baseline. Kristen's high level of VM noted prior to intervention may account for the small degree of overlap noted in the data. Alexandra maintained her use of VM at levels above baseline in six of eight probes. Maintenance data indicate that both caregivers continued to use SLP at intervention levels after coaching was removed. These data add to evidence that both CI and VM skills are maintained by caregivers after the intervention is removed (Brown-Gorton & Wolery, 1988; Lane et al., 2016; Wainer & Ingersoll, 2015) and provide new evidence that caregivers continue to use SLP after coaching is removed.

Fidelity of Coaching Provided Virtually

Coaching fidelity measures the degree to which coaching procedures are provided to recipients of the intervention as planned (Barton & Fettig, 2013). Variations in coaching fidelity may affect the outcome of interest (Dunst et al., 2013). For that reason, fidelity was measured for 100% of sessions by both the coach providing the intervention and then reviewed and measured again by the secondary coach viewing the session live or via a video of the session. Fidelity ratings indicate that training was provided at 100% fidelity across CMI strategies and caregivers. Additionally, fidelity ratings for all CMI intervention sessions averaged 95% or above, indicating that virtual coaching to teach CMI was delivered with fidelity. Equally important, fidelity ratings for baseline, generalization, and maintenance sessions also indicate that the coaches adhered to the planned non-occurrence of specific coaching components. The number of sessions measured during this study, and the frequency of measurement per session surpass current fidelity data reported in similar CMI studies (Bancroft et al., 2021). Fidelity ratings were high across all study

conditions and coaches; thus, we conclude that virtual coaching to teach caregivers to use CMI was provided with fidelity.

Children's Play

Though previous literature has focused on the use of CMI to support a variety of play types and skills in children with disabilities, none have focused specifically on the child's demonstration of pretend play (Bancroft et al., 2021). In this study, we focused solely on the child's demonstration of pretend play: unprompted pretend play (including novel and similar play acts) and prompted pretend play. The use of CMI by caregivers during play resulted in variable increases in the number of unprompted and prompted play acts across children. The highest level of unprompted play recorded for Megan occurred after SLP was introduced, while the highest level of unprompted play recorded for Wesley occurred after CI was introduced. Previous studies that used the SLP to teach pretend play to children with disabilities ranged in duration from 40-100 sessions (Barton & Wolery, 2010; Barton et al., 2019). We concluded after 5 baseline and 34 sessions that targeted caregiver use of 3 CMI strategies, only one of which specifically targeted pretend play. Thus, children were exposed to CMI for no more than 34 sessions and exposed to SLP targeting their development of pretend play for 13 sessions (Megan) and 17 sessions (Wesley). Future studies should focus on the changes in the pretend play of children after they have been exposed to CMI targeting pretend play provided by a trained caregiver for a sustained duration.

Collaborative Practices

We planned opportunities for developing a collaborative relationship between caregivers and coaches (Tucker & Schwartz, 2013). Caregivers were given the opportunity to choose their

on pseudonyms. Similar to work by Kasari and colleagues (2014), caregivers were asked about their child's current play skills and interests prior to baseline. This information was used to provide caregivers with models of play behavior during training that could prove useful in play with their child. Coaches modeled and discussed examples of play that were within the child's interest and specific to the toys chosen by the caregiver. Understanding that parents know their child and their child's interests better than we do, we engaged parents in study planning from the beginning. We extended current research practices by requesting that both caregivers select toys from a list of equitable subsets. Their choices were used to develop two independent sets of equitable toys for use within this study. While Kristen chose dolls for Megan, Alexandra chose stuffed bears for Wesley. Kristen chose an airplane and cars for the transportation set for Megan, while Alexandra chose a set of dump trucks for Wesley. Similar to work by Cardon (2012), we asked caregivers about their goals for their child's play and discussed with the caregiver how the use of CMI might support those goals. Prior to teaching caregivers the CMI, we discussed their comfort with use of the targeted skills. During training we provided instruction (models, examples, and feedback) to extend their comfort with the targeted skill use. Further collaboration occurred after intervention sessions, when caregiver questions and concerns were addressed.

Social Validity

We also explored the social validity of the intervention. We intentionally focused on establishing collaborative relationships with care givers by using materials chosen by the caregivers, conducting the study in their homes, and addressing goals that were important to the caregivers (Barton et al., 2018). We specifically asked caregivers if they found the virtual coaching provided during this study to be feasible and effective. Both caregivers stated that the flexible scheduling of the coaching and play sessions made participation feasible. Additionally,

caregivers were coached in their own home and were free to play using schema familiar to their child and their family. Further, at the conclusion of the study, both caregivers reported using SLP to teach their other children skills other than play: to teach a child a sign, to cut vegetables in preparation for dinner, and to latch a door. These data suggest that caregivers may have generalized the use of SLP across children and skill sets.

Caregivers in this study were college educated and did not work outside the home. Both caregivers had large families, four or more children, and enrolled in this coaching study to work with one of their younger children. Both caregivers had received “in home” intervention services for their children in the past. Thus, they may have been more comfortable with this coaching intervention from the start. They had previously experienced interventionists working in their home with their child, they were well versed on their child’s medical and developmental needs, and they both were comfortable working with professionals. Future research should include a variety of home caregivers, in addition to mothers. Particular effort should be made to include caregivers with diverse educational and cultural backgrounds, as well as new parents, to broaden our understanding of the diverse needs of caregivers and strengthen our coaching.

Overall, we documented two dimensions of social validity: (a) the importance of the goals of this study and (b) the perceived effectiveness and feasibility of the intervention (Barton et al., 2018). All of the graduate students rated the goal of this study, teaching caregivers to support their child’s play as important. While only 54% of those surveyed indicated that Kristen’s support of her child’s play was stronger after she received coaching, 100% of graduate students rated Alexandra’s support of her child’s play as stronger after she received coaching. Kristen’s use of verbal mapping during baseline may have added to the perception of her strong support of her child’s play even prior to intervention. Whereas Alexandra’s use of verbal

mapping was low during baseline and increased after intervention. Thus, the difference in Alexandra's skill use, after she received coaching, may have been more apparent to raters.

The world is just beginning to recover from the impacts of COVID-19. For the previous 18 months, children and caregivers have experienced increases in stress and the disruption of services (Neece et al., 2020). Thus, it is critical that as we continue to investigate interventions to improve the lives of children with disabilities and their families, while preventing undue stress. Not only was this study planned with flexibility and collaboration with caregivers in mind, we intentionally monitored the stress of our participants. Results of the PSI-4-SF, administered across caregivers prior to, during, and after the study indicate that both caregivers reported levels of stress that were well within the average range. Importantly, this indicates that the coaching intervention did not add to the stress of participants.

Limitations

There are several limitations to this study. We must consider the fact that we do not know what levels of CMI use are required to increase a child's play. Additionally, it is quite possible that coaching and training targeting the use of SLP perpetuated the decrease in the levels of CI and VM during maintenance. Simply stated, it is difficult to imitate a child and use a prompting hierarchy at the same time, so levels of CI were likely to decrease. VM levels were also likely affected by the use of SLP, due to the fact that verbal descriptions of a caregiver's own actions, often provided during a model in SLP, did not qualify as VM. Another limitation to this study is the fact that once caregivers learned to use SLP they often initiated the prompting hierarchy earlier than recommended. These prompts may have limited the child's spontaneous play. Further, we did not teach caregivers to verbally reinforce their child's demonstration of pretend play when it was different than the act targeted by the prompting sequence. This too may have

limited the number of unprompted pretend play acts observed in the children. Furthermore, children in this study were exposed to CMI targeting pretend play for a limited amount of time, which impacts the conclusions.

Finally, there were several areas where IOA fell below current standards. Averages for IOA for the measurement of CI during intervention ranged from 79% (primary sessions) to 74% (generalization sessions) for Alexandra. Alexandra often assisted Wesley physically during play. This may have made it difficult for coders to determine when her use of an object met the definition of contingent imitation. This difficulty in coding may have been alleviated had the table to accommodate Wesley's physical needs been provided earlier in the study. Additionally, IOA for the measurement of children's play and the timing of the initiation of SLP were lower than current standards, which should be addressed in future studies. In the present study, consensus coding was used to address all coding disagreements.

Future Research

The results of our study, the first study to teach caregivers to use SLP to support the play of their children with disabilities, are promising. Additional studies are warranted to address the limitations and extend our knowledge. Specifically, we must determine the level of CMI needed to result in increases in child play. Additionally, SLP is a complex prompting method, and may be best taught to caregivers in a study specific to the use of SLP. Caregivers may benefit from coaching that shapes their use of timing, and their response to their child's spontaneous play actions after the SLP sequence has been initiated. In future studies, child data collection should be designed to ensure that the children are sufficiently exposed to the use of SLP by their caregivers. Studies also are needed to evaluate the effectiveness of the use of SLP by caregivers to teach their children with disabilities to play.

Conclusion

The data from our study demonstrated that virtual coaching is effective for teaching caregivers to use CI and VM to support their child's play and new evidence that virtual coaching is an effective means to teach caregivers to use SLP to support their child's development of pretend play and does not increase caregiver stress. Caregivers generalized their use of CMI across toy sets and maintained their use of SLP at intervention levels when coaching was removed. Maintenance data for CI and VM indicate minimal overlap with baseline, likely influenced by the demands of SLP. Additional studies are warranted to continue to develop feasible means to teach caregivers to support the development of play in their children and specifically to determine the long-term effects that sufficient exposure to the use of CMI by caregivers has on the play of their children.

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Appendix A

Coaching Manual

Training, Monitoring, & Ongoing Support of Coaches

Training

All coaches will receive initial and ongoing training (as needed) to support implementation of CMI coaching procedures with fidelity. Coach training details are outlined below.

- **Initial Coach Training (30-60min)**
 - Overview of coaching procedures for each area (i.e., coaching, observations, feedback)
 - Discussion
 - Defining critical terms
 - CMI: (CI), VM (VM), SLP (SLP)
 - Modeling, prompting, reinforcement
 - Overview of coaching timeline
 - Overview of fidelity documents
 - Procedural considerations

- **Refresher Coach Training (15-30-min)**
 - If, at any point, a coach's fidelity in any area falls below 90% a refresher training will be scheduled. The contents of the refresher training will emphasize and discuss the relevant coaching component procedures with individualization specific to those elements that were missed
 - Procedural fidelity will be collected via self-checklist for 100% of sessions using recordings and preferred mode of communication for caregiver (Table 4).
 - **IOA will be collected for at least 100% of PF sessions** across conditions, areas, and tiers for all participants (Table 4).

Training Implementation Fidelity

Fidelity will be collected via checklist using a recording for **all** initial and refresher coach trainings.

Monitoring & Ongoing Coaching Support

Monitoring of fidelity and ongoing support to coaches will be completed by the PI and occur in the following ways:

1. The coaching team will meet weekly to review and discuss the following
 - a. Fidelity

- b. Successes/celebrations
- c. Challenges
- d. Share relevant resources, as needed
- e. Refresher trainings and/or individual consultation will be scheduled as needed to support implementation fidelity

General Coaching Responsibilities

Coaching Calendar

- Coaches will keep their family’s weekly observations updated in the shared google “CMI” calendar.

Coaching Log

- Coaches will enter /update all coaching sessions and family contacts on the [coaching log](#) spreadsheet daily.

Data Collection & Graphing

- Coaches will view all recorded observations for their assigned family and collect data relevant to the condition and/or tier
- Coaches will collect and graph data throughout the study as follows:

DV (frequency)	Pre-baseline	Baseline	Focused Observations	Generalization	Maintenance
(CI)	N	Y	Y	Y	Y
VM (VM)	N	Y	Y	Y	Y
SLP (SIP)	N	Y	Y	Y	Y
Functional Pretend Play (FPP)	Y	Y	Y	Y	Y
Imagining Absent Objects (IAO)	Y	Y	Y	Y	Y
Assigning Absent Attributes (AAA)	Y	Y	Y	Y	Y
Object Substitution (OS)	Y	Y	Y	Y	Y

- Coach will view all recorded observations across conditions and complete a notes form. Contents of notes form may vary based on what seems most relevant but should include at least the identified data for a given condition, any relevant information re: CMI use or child’s play and any specific notes about session (noise, distraction, sick child)
- Notes form will be uploaded to Coach’s box folder within 24 hours of observation.
- Data should be plugged into graphing template within 24 hours of observation.

Data Collection Priorities

The following is a hierarchical list of data collection priority behaviors corresponding to the type of session.

Baseline Sessions

1. Caregiver use of strategy
2. Caregiver use of VM strategy
3. Caregiver use of SLP
4. Child's unprompted play
5. Child's prompted play

Intervention Sessions

1. Caregiver behavior targeted in current tier (e.g., CI, VM, SLP)
2. Child's unprompted play
3. Child's prompted play

Sessions Close to Decision-Making

1. Caregiver behavior targeted in current tier (e.g., CI, VM, SLP)
2. Caregiver behaviors in nontargeted tiers
3. Child's unprompted play
4. Child's prompted play

Generalization Sessions

On generalization graph, the following will be recorded, when caregiver-child dyad play with generalization toy set. (no coaching is provided)

1. Caregiver use of strategy
2. Caregiver use of VM strategy
3. Caregiver use of SLP
4. Child's unprompted play
5. Child's prompted play

Maintenance sessions

Graphed per tier after intervention has been provided and caregiver's use of strategy has stabilized:

1. Caregiver behavior targeted in current tier (e.g., CI, VM, SLP)
2. Child's unprompted play
3. Child's prompted play

Coaching

CMI Study Orientation

Following intake and prior to pre-baseline observations, the PI will contact the family the copy the assigned coach.

- **Initial Contact with Family**

- Coach replies to family within 48 hours to:
 - Introduce themselves
 - Briefly describe their role
 - Schedule CMI Baseline Zoom meeting

Baseline, Generalization, and Maintenance Observations

(10-minutes, once daily)

All observations will be scheduled by the coach. An email will be sent by the coach to the family daily to confirm the dates, times, for recording each observation.

• Before Observation

- Coach sends zoom **personal meeting link** to parent the day of baseline session (enable waiting room in zoom link)
- Coach begins recording & allows family in from waiting room
- Pre-session interaction with family
 - Brief check-in
 - Answering questions
 - ◇ Simple logistical questions: coach answers
 - ◇ Coach will ask caregiver to adjust, camera, microphone, and lighting as needed for sessions.
- Coach puts zoom into speaker view.
- Coach states, “Now play with your child,” and starts timer (indicates beginning of coding).

• During Observation

- Session duration procedure
 - Record play. Coach’s sound and video are muted
 - ◇ Start timer once play starts – do not include pre-session check-in
 - ◇ When time indicates that play session duration has hit 8 minutes, stop recording. Text caregiver, “The session is over you can end your play now.”
- No in vivo feedback

• After Observation

- After duration requirements are met, coach puts camera into gallery view and ends zoom session
 - Hang up and text family the session is over
 - Remind family of next scheduled observation/ zoom meeting.
 - Coach downloads recording and immediately uploads it to the participant folder in Jen’s dissertation file.
 - Naming Conventions: Fam#Session#monthday
 - ◇ Example: Fam1_S1_May1
 - Coach completes Caregiver coaching PF checklist (even for baseline, maintenance and generalization sessions)

- Coach organizes notes
 - ◇ Enter notes to the coaching notes file, under the tab corresponding to family#
 - ◇ Code and graph all caregiver and child data within 24 hours.

CMI Coaching Meeting (Intervention only-up to 30minutes; once per tier)

- Introduction and overview of coaching role (2-3 min)
 - Communication modes (zoom and feedback provided using mode of caregiver’s choice)
- Identify and document family communication preferences in notes on [coaching log](#) (5 min)
- Introduce the use of CMIs and play as the targeted child behavior (20 min)
 - Discuss the importance of pretend play
 - ◇ social skill development
 - ◇ cognitive skill development
 - ◇ opens up opportunities for interaction and engagement with peers.
 - How to develop caregiver responsive play
 - ◇ set up the physical environment
 - ◇ follow the child’s lead
 - ◇ mirror child’s pacing
 - Define pretend play targets
 - ◇ state and define target pretend play (FPP, IAO, AAA, OS)
 - ◇ model at least two examples of each type of play.
 - Define the use of CMI specific to tier: (CI, VM, SLP)
 - ◇ model at least one example of use of CMI (per that tier: CI, VM or SLP).
 - ◇ Show video of use of target CMI (across play types)
 - Ask caregiver to practice / demonstrate target CMI.
 - ◇ model at least one example of use of CMI per play type (VM and SLP)
 - ◇ coach to provide specific feedback to caregiver’s attempts and reinforcement
 - Collaborate with caregiver
 - ◇ Discuss caregiver’s goals for child’s play relative to coaching. “How will you use XX (CMI) to help your child to play?”
 - ◇ Ask caregiver to practice / demonstrate use of target CMI.
 - ◇ Schedule next meeting.
 - ◇ Send caregiver power point and play summary doc.
- Complete caregiver training fidelity document (Figure 10)

Upload recording of meeting.

CMI Play Session

- **Coach will ask caregiver to adjust, camera, microphone, and lighting as needed for sessions.**
- Caregiver coaching prior to play*

- answer questions*
- discuss play review sheet*
- will state, “Today we will use (state CMI) *
- provide two examples CMI with toy set*
- Caregiver instructions to start play
 - **“Now play with your child,” and start timer.**
- During Play
 - Complete feedback form during caregiver-child play*

After Observation

- After duration requirements are met, coach puts camera into gallery view and ends zoom session
 - Hang up and text family the session is over, “The session is over you can end your play now.”
 - **Thank caregiver and remind family of next scheduled feedback meeting.**
- Coach downloads recording and immediately uploads it to the participant folder in Jen’s dissertation file.
 - Naming Conventions: Fam#Session#monthday
 - ◇ Example: Fam1_S1_May1
- Coach completes Caregiver coaching PF checklist (even for baseline, maintenance and generalization sessions)
- Coach organizes notes
 - Enter notes to the coaching notes file, under the tab corresponding to family#
 - Code and graph all caregiver and child data within 24 hours.

Feedback After Play Session*

- Contact caregiver via his/her preferred mode of communication
 - review feedback form*
 - state positively and specifically at least one caregiver behavior that was completed well, “I love how you modeled XXX!” *
 - If needed, provide informative feedback and an opportunity to practice delivery of target CMI*
 - Feedback addresses caregiver’s goals for child and/or caregiver’s questions *
- Thank caregiver for session*
 - ◇ Confirm date and time of the next session*
 - ◇ Send feedback form to caregiver*
- Complete coaching log*
- Download and then Upload video file to box. (feedback folder)
- Naming Conventions:
 - ◇ Fam#Session#monthday
 - ◇ Example: Fam1_S1_May1
- Code file within 24 hours and graph data.
- Complete Caregiver coaching fidelity document (Figure 11)

Note: * indicates that during Baseline (B), Maintenance (M), and Generalization (G) sessions, step should **NOT** be completed.

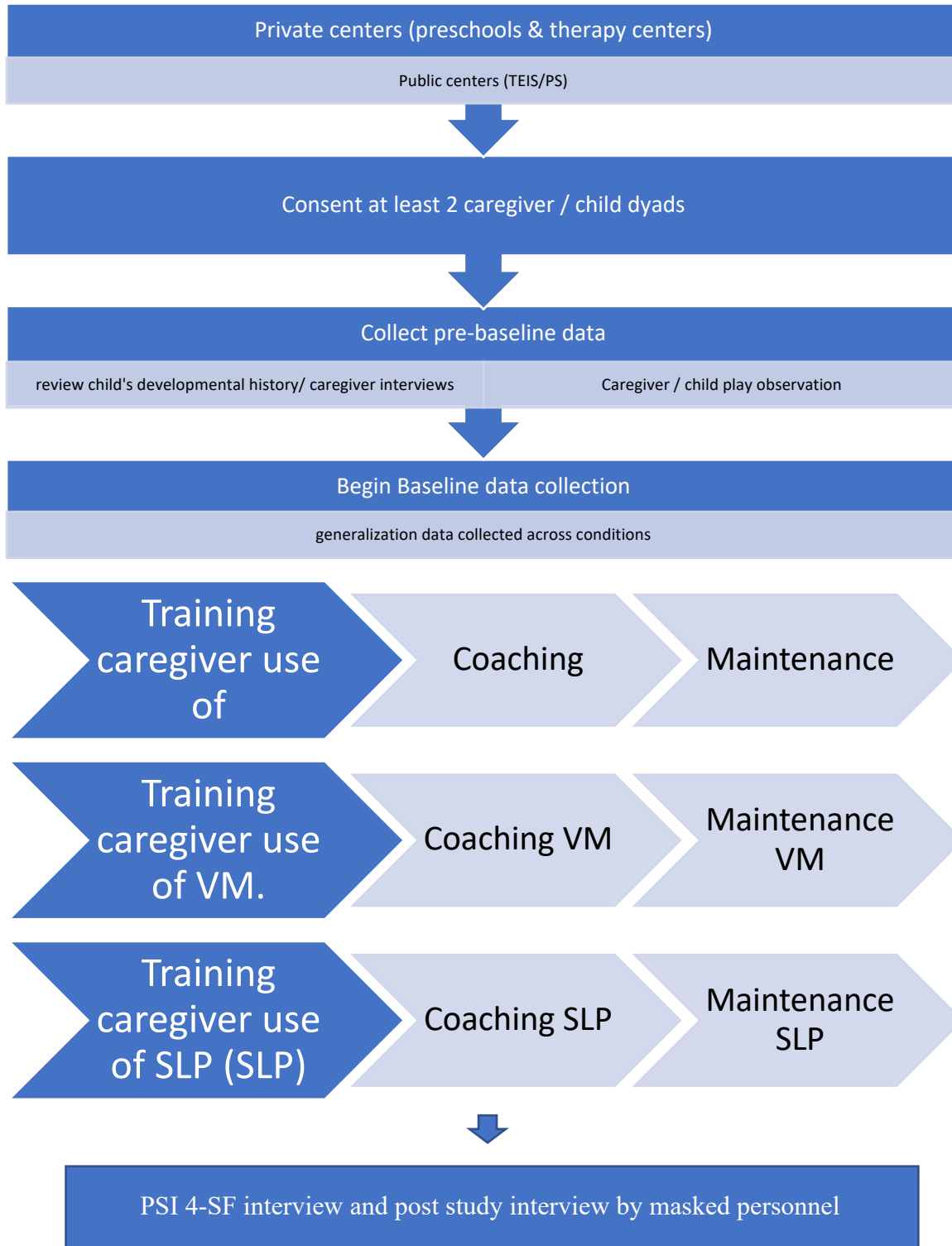
In Session prior to final meeting:

- Complete PSI-4 Short form
- Complete final interview (masked interviewer)

Final Review Session/Checkout - Coaches do this during final meeting

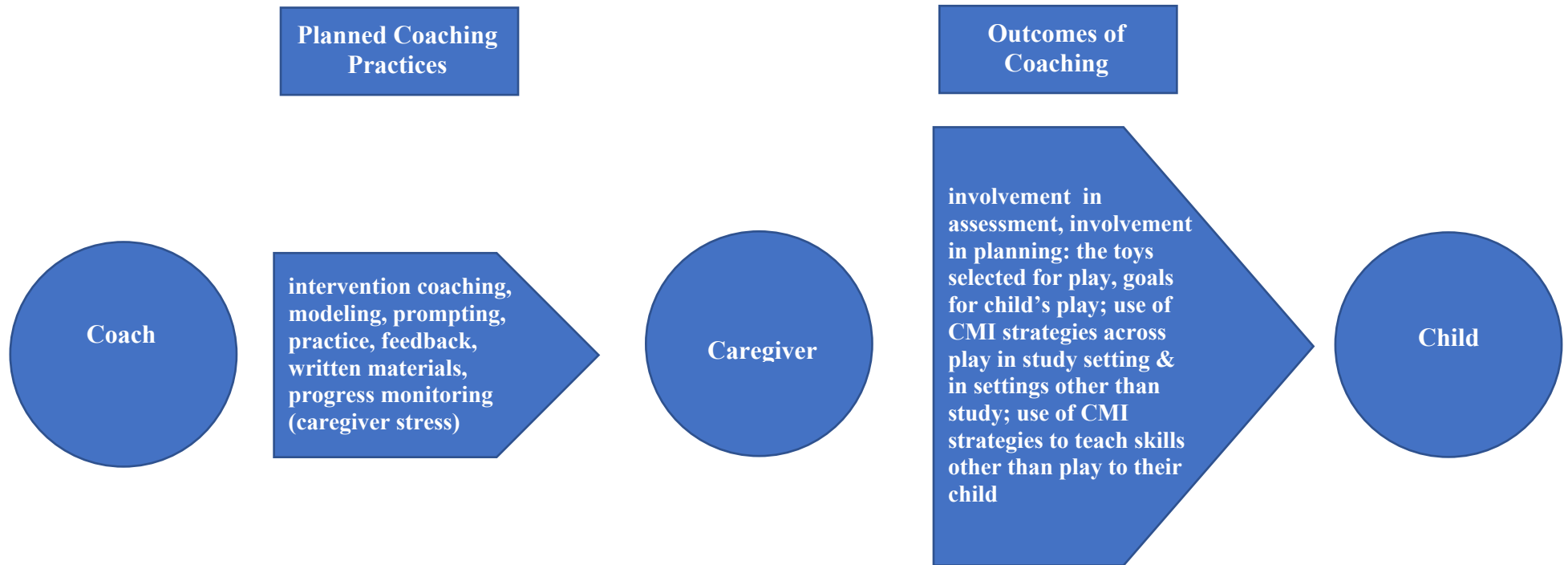
- Review:
 - Use of CMI to support play
 - CMI strategies the parent learned
- Discuss how parent can generalize strategies specifically SLP to other routines
- Provide resources, specifically Erin's lab web page and social media.

Appendix B
Study Timeline



Appendix C

Planned Coaching Practices and Possible Outcomes



Note. The use of coaching practices and caregiver outcomes. Lists of possible practices and possible outcomes (practices and outcomes are not limited to those included on lists). Adapted from IDEA (2004), Freidman & Woods (2012), Barton and Fetting (2013) and DEC Recommended Practices (2014).