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REVIEW PAPER

Caregiver-Implemented Intervention for Young Children with Autism Spectrum Disorder: A Systematic Review of Coaching Components

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Abstract

Caregiver-implemented intervention, commonly facilitated via coaching, is an increasingly common approach to early intervention for infants and toddlers with or at risk for autism spectrum disorder (ASD). The present systematic review examines four coaching components across the literature on caregiver-implemented intervention models for children under 36 months with or at risk for ASD. Systematic search procedures resulted in 26 studies for review. Results showed that although most studies addressed building on caregivers' competence and guided practice, many neglected to address collaborative coaching components, including planning, reflection, and decision making. Less than a quarter of the studies reviewed described incorporating all four coaching components, highlighting remaining gaps in the literature. Implications of our findings and recommendations for future research are discussed.

Keywords Autism · Caregiver-implemented · Coaching · Early intervention · Infants · Toddlers

The most recent prevalence rate for autism spectrum disorder (ASD) in the United States is 1 in 59 children (Baio et al. 2018), reflecting a significant increase in diagnostic rates in recent decades. Advances in ASD research have led to earlier detection of ASD (e.g., Ozonoff et al. 2010) and a corresponding need for research in earlier interventions to support children identified at very young ages (Boyd et al. 2010). Likewise, children diagnosed with ASD before 3 years of age are more likely to receive early intervention services and demonstrate significantly improved outcomes compared to children diagnosed later, highlighting the importance of early detection, diagnosis, and intervention (Clark et al. 2018). Even though multiple early intervention approaches in ASD have displayed evidence of utility via efficacy trials (e.g., Dawson et al. 2010; Kasari et al. 2010; Wetherby et al. 2014), a gap between the research and community practice in early intervention for ASD remains (Stahmer 2007; Vivanti et al. 2018).

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Intervention for Young Children with ASD

The National Research Council (NRC; 2001) recommends at least 25 h per week of "active engagement in intensive instructional programming for a minimum of the equivalent of a full school day, 5 days (at least 25 hours) a week, with full year programming varied according to the child's chronological age and developmental level" (p. 219). This recommendation is for young children with ASD, which makes the statement about varying the programming according to the child's chronological age and developmental level especially salient (NRC 2001). Appropriate *instructional programming* for children 1 and 2 years of age is different from that for older preschoolers. The NRC clearly had in mind children who learn in classrooms, as shown by their reference to a full school day. Intervention for infants and toddlers, on the other hand, should occur in the context of their natural environments and routines (Division for Early Childhood 2014; IDEA 2004; Workgroup on Principles and Practices in Natural Environments 2008). This approach to services makes learning more contextual and functional for young children and naturally provides children with repeated learning

opportunities throughout the week, as opposed to solely during intervention sessions (Rapport et al. 2004). It can also foster learning in children with ASD, who are more likely to demonstrate difficulty with generalization of skills (NRC 2001; Schreibman et al. 2015), because the opportunities for learning are both meaningful and frequent. Moreover, research shows that when professionals facilitate natural learning opportunities for children and families in their existing, everyday activities, caregivers are more likely to report positive outcomes, including increased caregiver well-being and greater child progress across motor, communication, adaptive, and social skills (Dunst et al. 2006). On the other hand, when professionals insert interventions into families' lives, even within everyday activities, caregivers are more likely to report negative outcomes, including decreased caregiver well-being (Dunst et al. 2006). Thus, early intervention professionals should assume the role of *supporting* caregivers in interactions with their children in natural routines through collaboration with families to promote functional learning and optimal outcomes.

Caregiver-Implemented Intervention

In the field of ASD, this caregiver-focused approach to early intervention, as opposed to professional-led intervention, is often referred to as parent-implemented or caregiver-implemented intervention (e.g., Boyd et al. 2010; Woods and Brown 2011; Woods et al. 2004). We define caregiver-implemented intervention as an approach to support by which professionals use coaching (Rush and Shelden 2011) or collaborative consultation (McWilliam 2016) to support caregivers in fostering their children's learning in natural, everyday activities. Young children with ASD spend a significant amount of time with their caregivers in a variety of day-to-day activities, such as mealtimes, dressing, playing, and bedtime, among others. Thus, caregivers play an important role in facilitating their children's learning through their everyday interactions. Caregiver-implemented intervention makes it possible for caregivers to use strategies, naturally, in their family's daily routines, and professionals can help caregivers build their confidence, competence, and capacity as families enhance their children's development (Division for Early Childhood 2014; Dunst et al. 2006; Friedman et al. 2012; Woods and Brown 2011). Parents are already teaching their children, so caregiver-implemented intervention is a method of adding to the family's assets rather than suggesting they need training on how to teach their children (Tizard and Hughes 2008). As Woods and Brown (2011) note, when professionals include caregivers in intervention and build their capacity, families can feasibly achieve the recommended 25 h of engaged time per week with their children with ASD. *Caregiver-implemented intervention* can also be used to describe more structured interventions carried out by caregivers, such as supporting caregivers to implement discrete trial teaching (e.g., Fava and Strauss 2011). For the purpose of this paper, we distinguish between the two and focus on caregiver-implemented intervention reflecting naturalistic developmental behavioral interventions (NDBIs; Schreibman et al. 2015).

Zwaigenbaum et al. (2015) reviewed 24 studies of interventions for young children with ASD and recommended that, to be aligned with best practice, early intervention for young children with ASD should include active caregiver participation that capitalizes on natural learning opportunities throughout the family's day-to-day activities. The literature on caregiver-implemented intervention for young children with ASD is growing, and, in recent years, researchers have conducted multiple large-scale studies to examine the effectiveness of various caregiver-implemented intervention models for families of young children with ASD (e.g., Green et al. 2010; Kasari et al. 2015; Rogers et al. 2012; Wetherby et al. 2014). Despite some variability across studies and models, research shows that the use of caregiver-implemented intervention can result in positive outcomes for young children with or at risk for ASD and for their caregivers. These positive outcomes have included improved joint engagement in children (Kasari et al. 2010; Kasari et al. 2015), improved child social communication skills (Baranek et al. 2015; Brian et al. 2017; Turner-Brown et al. 2016; Wetherby et al. 2014), decreased caregiver stress (Turner-Brown et al. 2016), and increased caregiver self-efficacy (Brian et al. 2017). Nevertheless, researchers have recently noted that effectively and efficiently implementing these models with families of young children with ASD in the community at large remains a challenge because of a variety of barriers (Kucharczyk et al. 2018; Rieth et al. 2018a, b; Wainer et al. 2018).

Coaching Caregivers

Despite the growing evidence for caregiver-implemented intervention models with young children with ASD, research shows professionals seldom use caregiver-implemented approaches in the community (Hume et al. 2005; Thomas et al. 2007). For example, in one survey of 195 parents of young children with ASD, only 21% reported having received parent training (Hume et al. 2005), and another survey of 271 parents showed that less than 20% reported having received any sort of family services (Thomas et al. 2007). To bridge the research-practice gap, professionals must have clear knowledge of how to facilitate caregiver-implemented intervention. As Wainer et al. (2018) highlight, an understanding of adult-learning principles and ways to communicate and collaborate with caregivers are fundamental to successful implementation of caregiver-implemented intervention models. The support

professionals provide to caregivers to foster their children's learning within a caregiver-implemented intervention approach is often called *coaching* (Rush and Shelden 2011). According to Vismara and Rogers (2018), "coaching is an interactive process and builds on the learner's ideas, experiences, skills, and knowledge to integrate new information and skills with current ones" (p. 194). For this review, coaching is more specifically defined as the process by which professionals support caregivers to facilitate children's learning through collaborative and reflective practices that build caregiver competence and generalization of skills (Brown and Woods 2016; Rush and Shelden 2011; Woods et al. 2011).

Rush and Shelden (2011) have led the *coaching* movement in early intervention, focusing on the development of practices for professionals who coach other professionals and families of young children. Because coaching involves sharing knowledge among adults, the process of coaching is grounded in adult-learning principles (Knowles 1980, 1984). Rush and Shelden's (2011) approach to coaching highlights five practices: (a) joint planning, (b) observation, (c) action, (d) reflection, and (e) feedback. Although a variety of approaches to coaching in early childhood exist (e.g., collaborative consultation) and differ slightly in their specific practices and definitions (e.g., Basu et al. 2010; Friedman et al. 2012; McWilliam 2016; Salisbury et al. 2010; Snyder, Hemmeter, & Fox, 2015), all of these approaches significantly overlap in their theoretical underpinnings to foster collaborative coaching relationships between professionals and caregivers. Authors across the ASD literature most commonly refer to *coaching* when discussing caregiver-implemented intervention approaches; thus, we focused on this term for the present review.

To facilitate caregiver-implemented intervention with families of young children with ASD, professionals should coach caregivers to implement interventions in the context of caregiver-child interactions and daily routines (Vismara and Rogers 2018). In a coaching relationship, the professional assumes the role of a resource rather than an expert, and professionals and caregivers mutually share their knowledge and experience to create a balanced partnership (Vismara and Rogers 2018). Recent research has shown that coaching caregivers of young children with ASD can improve caregivers' capacity to reflect on and evaluate their own practices (Siller et al. 2018) and, in turn, can presumably improve child outcomes as well (e.g., Wetherby et al. 2014). Yet, limited research has examined the core components of the coaching *process* when working with families of young children with ASD. The purpose of this review is to examine coaching components as described in the literature on caregiver-implemented intervention models for families of young children with and at risk for ASD.

Method

Inclusion Criteria

This review included studies of caregiver-implemented intervention models for infants and toddlers with and at risk for ASD. These studies were published in peer-reviewed journals between January 2010 and July 2017. We describe the criteria for inclusion in the following sections.

Participants

The review focuses on infants and toddlers, so each study consisted of child participants with an average age of 36 months or younger. In addition, children in the included studies either had an ASD diagnosis or were at risk for ASD (i.e., showed early red flags for ASD or were younger siblings of children diagnosed with ASD). Despite some children not having a confirmed ASD diagnosis, this inclusion criterion is necessary owing to the common long wait times for diagnosis (Gordon-Lipkin et al. 2016) and the importance of *early* intervention for children suspected of having ASD (Zwaigenbaum et al. 2015).

Caregiver-Implemented Intervention Models

All studies included in this review examined specific caregiver-implemented intervention models for young children with and at risk for ASD. Studies of solely therapist-implemented models were excluded. Additionally, models that used both caregiver- and therapist-implemented intervention (e.g., Dawson et al. 2010; Landa et al. 2011; Wong and Kwan 2010) were excluded, as these studies focused primarily on the therapist-child interaction as opposed to the caregiver-child interaction. We included all studies that used solely caregiver-implemented intervention, regardless of the intervention approach and setting. Finally, follow-up studies and secondary analyses were omitted.

Empirical Studies

The present review examined only studies that used experimental designs, quasi-experimental designs, or case series. We included randomized controlled trials (RCTs), single-subject experimental designs, pre-post designs, mixed designs, and case series because they would provide quantitative information usually from experimental designs. All other study designs (e.g., qualitative, meta-analyses) were excluded from this review.

Systematic Search Procedures

The first author conducted an electronic database search in July 2017, using the search engines Academic Search Premier, Education Resources Information Center (ERIC), and PsycINFO. The search was limited to articles published in peer-reviewed journals between January 2010 and July 2017. This period was chosen to capture caregiver-implemented intervention studies in the present decade and reflect the most current state of the literature. Search criteria included the following terms: *autis** or *ASD* AND *caregiver implemented* or *caregiver mediated* or *parent implemented* or *parent mediated* AND *young children* or *infant* or *toddler.* The search was completed by August 2017, and 160 publications were identified (see Fig. 1). The first author screened the titles and abstracts of the articles and eliminated those not meeting the inclusion criteria, and 86 publications remained. The first author then reviewed the full-text articles of these 86 publications and removed the following types of articles: those with child participants with a mean age greater than 36 months,

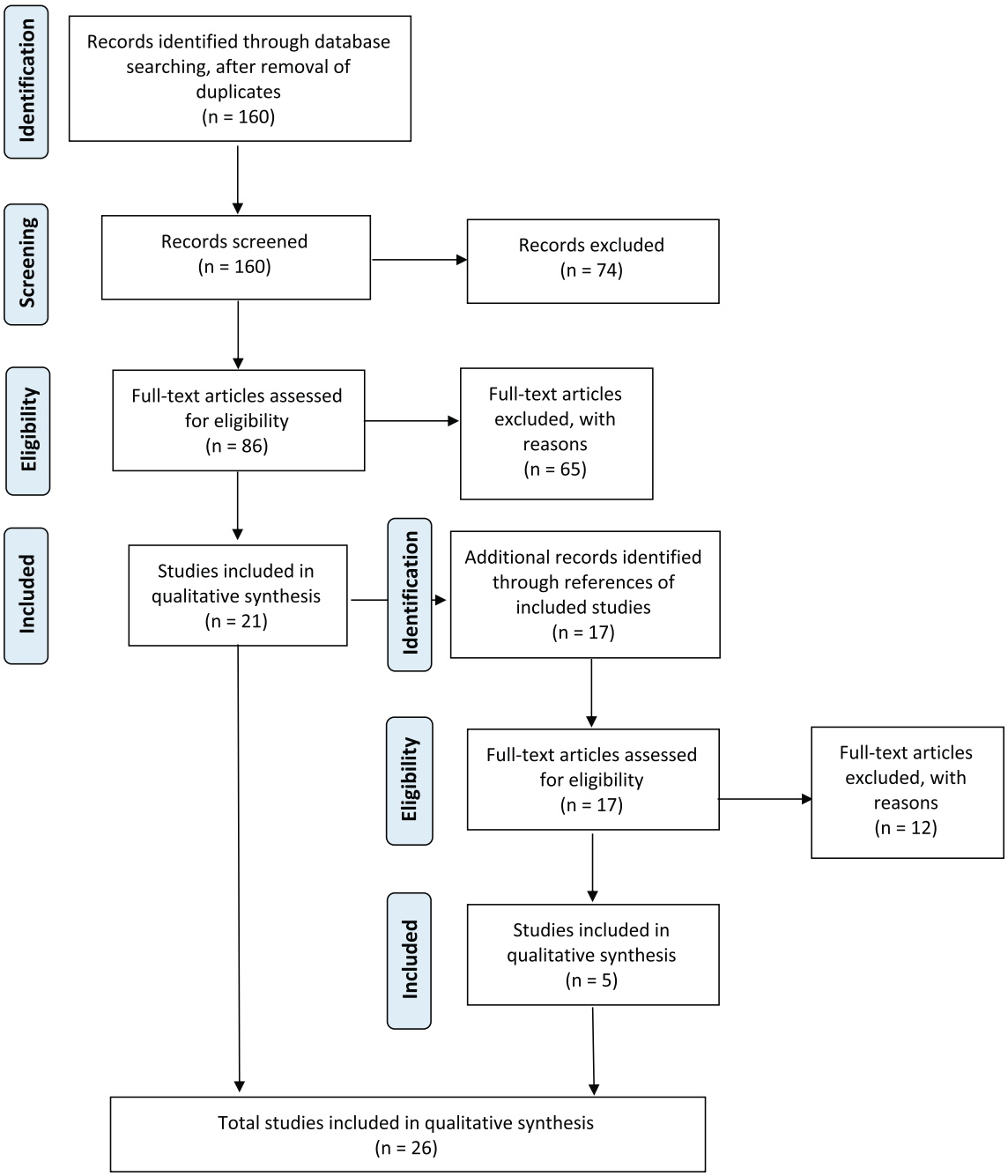

Fig. 1 Flow diagram of study selection adapted from Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, adapted from Moher et al. (2009)

those with child participants with disabilities other than autism (e.g., Down syndrome, language impairment), those of primarily therapist-implemented interventions with a secondary emphasis on caregiver training, those that did not include child participants, non-intervention articles, qualitative studies, and secondary analyses or follow-up studies. Articles were also excluded if the full text was not accessible or an article was written in a language other than English. If the mean age for child participants was not reported, we determined the median age and used the same inclusion criterion of 36 months or younger. Twenty-one publications from the database search met criteria for the current review.

Additionally, the first author conducted a manual search examining the reference lists of the 21 identified articles. She identified 17 articles for full-text review and removed articles for the reasons mentioned previously. This reference search resulted in the inclusion of five additional articles. Thus, a total of 26 studies met criteria for this review.

Coding Process

The final 26 studies were organized according to the characteristics listed in Table 1. Table 1 presents details about each study's design, participant characteristics, intervention model, intervention location, and fidelity measures.

Coaching Components

In reviewing the coaching literature in early intervention, five common components of coaching caregivers appeared to be important: (a) collaborative planning, (b) building on caregiver's competence, (c) guided practice, (d) collaborative decision making, and (e) reflection (Dunst and Trivette 2009; Friedman et al. 2012; McWilliam 2010b; Rush and Shelden 2011). We initially defined these five components and began coding using all five components. We found that we could not reliably distinguish collaborative decision making and reflection, because collaborative decision making usually also included reflection, and reflection was often used to make decisions collaboratively. Thus, we collapsed these two definitions into one coaching component. Our final four coaching components consist of the following: (a) collaborative planning, (b) building on caregivers' competence, (c) guided practice, and (d) collaborative reflection and decision making, see Table 2 for definitions of coaching components. Two of the authors independently assessed whether each study addressed the use of any of these four coaching components in the descriptions of the intervention models and procedures (see Table 3).

Interobserver Agreement

The first and third authors used a coding system adapted from Cieza et al.' (2005) publication on linking rules to determine reliability of the coding for coaching components. We independently coded three articles (~ 10%) and discussed any disagreements. We came to consensus on the codes and continued this process in sections by coding three articles at a time until all articles were reviewed. We determined interobserver agreement (IOA) by calculating percent agreement on occurrence and non-occurrence of the pre-discussion independent codes, yielding an overall agreement for coaching components of 92.3%.

Results

Study Details

Considering this review specifically examined different caregiver-implemented intervention models for young children with ASD, each reviewed study focused on a particular model (see Table 1 for list of models). Most of these studies used an experimental design, with half of the studies being RCTs ($n = 13$) and approximately one-third of the studies using single-case design ($n = 9$). In the RCTs, the number of participants ranged from 16 to 98. Five of the RCTs had fewer than 50 participants, and eight of the RCTs had more than 50 participants.

Participants

Children

The average age of child participants at the beginning of the reviewed studies ranged from 6.6 to 35.5 months. Some articles did not provide enough information to determine an average age of child participants (Meadan et al. 2016; Rogers et al. 2014). Rogers et al. (2014) were included in this review because the upper end of the age range fell below 36 months, and Meadan et al. (2016) were included because the three participants were reported to be 3 years or younger at the beginning of the study. Approximately one-third of the studies included child participants with an average age of less than 18 months ($n = 9$). Thirteen of the studies consisted of participants with an ASD diagnosis, 11 of the studies consisted of participants at risk for ASD, and two of the studies consisted of participants with or at risk for ASD.

Caregivers

Almost all of the reviewed studies indicated parents were the participating caregivers in the study ($n = 25$). One study

Table 1 Description of studies

Study	Study details		Child participants			Caregivers	Intervention location	Fidelity measure	
	Model	Design	*N*	Age (in months)	Risk or diagnosis or both			Providers	Caregivers
Baranek et al. 2015	Adapted Responsive Teaching (ART)	Randomized controlled trial	16	*M* = 15.41 Range = 13–17	Risk for ASD	Parents	Home	X	X
Bradshaw et al. 2017	Pivotal Response Treatment (PRT)	Non-concurrent multiple baseline design	3	*M* = 17.67 Range = 15–21	Risk for ASD	Parents	Home Community	X	X
Brian et al. 2017	Social ABCs	Randomized waitlist control design	62	*M* = 25.26 Range = 16–30	Combination of risk and diagnosis	Parents Grandparents	Home Community	–	X
Brian et al. 2016	Social ABCs	Pre-test post-test design	20	*M* = 22.05 Range = 12–32	Combination of risk and diagnosis	Parents	Home	X	X
Cardon 2012	Video Modeling Imitation Training (VMIT)	Multiple baseline design across participants	4	*M* = 35.5 Range = 24–50	ASD diagnosis	Parents	Home	–	X
Carter et al. 2011	Hanen's "More than Words" (HMTW)	Randomized controlled trial	62	*M* = 20.25 Range = 15–25	ASD diagnosis	Parents	Center Home	X	–
Green et al. 2015	Video Interaction to Promote Positive Parenting (iBASIS-VIPP)	Randomized controlled trial	54	*M* = 9.06 Range = 7–10	Risk for ASD	Parents	Home	X	–
Green et al. 2013	Video Interaction to Promote Positive Parenting (iBASIS-VIPP)	Case series	8	*M* = 8.55 Range = 8–10	Risk for ASD	Parents	Home	–	–
Jones et al. 2017	Promoting First Relationships (PFR)	Randomized clinical trial	33	*M* = 9 *SD* = 0	Risk for ASD	Parents	Home	X	–
Kasari et al. 2015	Joint Attention, Symbolic Play, Engagement, and Regulation (JASPER)	Randomized comparative efficacy trial	86	*M* = 31.5 Range = 22–36	ASD diagnosis	Parents	–	X	–
Kasari et al. 2010	Joint Attention Intervention	Randomized waitlist control design	38	*M* = 30.82 Range = 21–36	ASD diagnosis	Caregivers (not specified)	Laboratory	X	X
Kasari et al. 2014	Focused Playtime Intervention (FPI)	Randomized controlled trial	66	*M* = 22.37 Range = 15–31	Risk for ASD	Parents	Home	X	–
Koegel et al. 2014	Modified Pivotal Response Treatment (PRT)	Multiple baseline across participants design	3	*M* = 6.67 Range = 4–9	Risk for ASD	Parents	Home	–	X
Meadan et al. 2016	Internet-Based Parent-Implemented Communication Strategies (i-PiCS)	Multiple baseline across strategies design	3	*M* = unknown[a] Range = unknown	ASD diagnosis	Parents	Home (Telepractice)	X	X
Oosterling et al. 2010	Focus parent training	Randomized controlled trial	67	*M* = 34.4 *SD* = 6.2	ASD diagnosis	Parents	Center Home	–	–
Park et al. 2011	Mother-implemented Picture Exchange Communication System (PECS)	Changing criterion design	3	*M* = 30 Range = 29–31	ASD diagnosis	Parents	Home	X	X
Rogers et al. 2012	Parent delivery of Early Start Denver Model (P-ESDM)	Randomized controlled trial	98	*M* = 20.98 Range = 14–24	Risk for ASD	Parents	Clinic	X	X
Rogers et al. 2014	Infant Start	Case series	7	*M* = unknown Range = 6–15	Risk for ASD	Parents	Clinic	X	X
Rollins et al. 2016	Pathways Early Autism Intervention	Multiple baseline across participants design	4	*M* = 30.25 Range = 28–33	ASD diagnosis	Parents	Home	–	X
		Randomized controlled trial	23	*M* = 26.05	ASD diagnosis	Parents	Home	X	X

Table 1 (continued)

Study	Study details		Child participants			Caregivers	Intervention location	Fidelity measure	
	Model	Design	*N*	Age (in months)	Risk or diagnosis or both			Providers	Caregivers
Schertz et al. 2013	Joint Attention Mediated Learning (JAML)			*SD* = 3.7					
Stahmer et al. 2017	Project ImPACT	Mixed design	13	*M* = 15 Range = 8–21	Risk for ASD	Parents	Home Clinic	X	X
Steiner et al. 2013	Adapted Pivotal Response Treatment (PRT)	Multiple baseline across participants design	3	*M* = 12 *SD* = 0	Risk for ASD	Parents	Clinic Home	–	X
Turner-Brown et al. 2016	Family Implemented TEACCH for Toddlers (FITT)	Randomized controlled trial	49	*M* = 29.65 Range = 17–35	ASD diagnosis	Parents	Home Clinic	X	X
Vismara et al. 2012	Telehealth-mediated Early Start Denver Model (ESDM)	Multiple baseline across participants design	9	*M* = 28.89 Range = 16–38	ASD diagnosis	Parents	Home (Telepractice)	X	X
Welterlin et al. 2012	Home TEACCHing Program (HTP)	Multiple baseline design and randomized pre-post treatment design	6 20	*M* = 30.5 Range = 24–39	ASD diagnosis	Parents	Home	X	X
Wetherby et al. 2014	Early Social Interaction (ESI) Project	Randomized controlled trial	82	*M* = 19.61 *SD* = 1.68	ASD diagnosis	Parents	Home Clinic Community	X	–

Note. X, reported; –, not reported

[a] Three participants were included in this study. Authors described the children as "almost 3 years old…about 2 years old…and turned 4 years old during this study" (p. 5–6, Meadan et al. 2016)

Table 2 Definitions of coaching components

Coaching component	Definition	Example	Non-example
Collaborative planning	Professionals and caregivers mutually decide what they will work on during the session.	The professional asks the caregiver what he or she would like to focus on.	The professional chooses diaper change as the focus for the session without input from the caregiver.
Building on caregiver's competence	Professionals support caregivers to increase knowledge, skills, or confidence in helping their children.	The professional discusses how to make book reading an opportunity for promoting the child's language.	The professional leads a book reading activity with the child to promote the child's language.
Guided practice	Professionals provide caregivers with opportunities to use strategies with their children and provide appropriate levels of feedback or support to caregivers.	The professional asks the caregiver if he or she would like to try back-and-forth play with the child and supports the caregiver as needed.	The professional plays back and forth with the child.
Collaborative reflection and decision making	Professionals and caregivers think about and discuss their experience or practice, and together they generate and agree upon goals, strategies, or solutions.	The professional and caregiver discuss whether visual supports would work at lunch time and decide whether it is a feasible solution for the family.	The professional recommends the caregiver use visual supports at lunch time without input from the caregiver.

included grandparents in addition to parents (Brian et al. 2017), and one study did not specify details about the caregivers (Kasari et al. 2010).

Intervention Location

Most of the studies took place in the child and family's home to some degree ($n = 22$). Many of the studies occurred exclusively in the home ($n = 14$) or in a combination of home and community settings ($n = 2$), and two of these studies used telepractice to support intervention in the home setting (Meadan et al. 2016; Vismara, Young, & Rogers et al. 2012). Some studies took place in a combination of home and clinic/center settings ($n = 5$), and one study took place in the home, clinic, and community (Wetherby et al. 2014). Three studies occurred solely in a clinic or laboratory setting (Kasari et al. 2010; Rogers et al. 2012; Rogers et al. 2014), and one study did not specify the intervention location (Kasari et al. 2015).

Fidelity of Implementation

Most of the reviewed studies included information on fidelity of implementation for the providers ($n = 19$) or on fidelity of implementation for the caregivers ($n = 18$). Two of the studies did not include any information regarding fidelity of implementation (Green et al. 2013; Oosterling et al. 2010), and measures of fidelity varied across studies (e.g., fidelity checklists, rating scales).

Coaching Components

As mentioned previously, the four examined coaching components consisted of (a) collaborative planning, (b) building on caregivers' competence, (c) guided practice, and (d) collaborative reflection and decision making (see Table 3). Within their respective manuscripts, all the reviewed studies emphasized building on caregivers' competence ($n = 26$), and nearly all of the studies emphasized guided practice ($n = 23$). Fewer than half the studies highlighted collaborative reflection and decision making ($n = 11$), and fewer than one-third of the studies addressed collaborative planning ($n = 8$). Two of the studies emphasized only building on caregivers' competence and did not address any of the other coaching components (Green et al. 2013; Kasari et al. 2015). Six of the reviewed studies addressed all four of the coaching components (Bradshaw et al. 2017; Meadan et al. 2016; Rollins et al. 2016; Turner-Brown et al. 2016; Vismara et al. 2012; Wetherby et al. 2014).

Discussion

Coaching Components in Caregiver-Implemented Intervention Models

As Wainer et al. (2018) note, professionals often receive preservice training in providing services directly to children, but a caregiver-implemented intervention approach requires additional skills related to adult-learning principles to be able to support caregivers effectively. As such, coaching is an important aspect of caregiver-implemented intervention approaches because professionals collaborate with caregivers, who in turn work directly with the children to facilitate learning in their natural routines (for more on natural routines in early intervention, see DEC 2014; Dunst et al. 2000; Kashinath and Yu 2018; McWilliam 2010a). In examining coaching components in the 26 reviewed studies, we found that fewer

Table 3 Coaching components

Study	Coaching components			
	Collaborative planning	Building on caregivers' competence	Guided practice	Collaborative reflection and decision making
Baranek et al. 2015	–	X	–	X
Bradshaw et al. 2017	X	X	X	X
Brian et al. 2017	–	X	X	–
Brian et al. 2016	–	X	X	–
Cardon 2012	X	X	X	–
Carter et al. 2011	–	X	X	–
Green et al. 2015	–	X	X	–
Green et al. 2013	–	X	–	–
Jones et al. 2017	–	X	X	–
Kasari et al. 2015	–	X	–	–
Kasari et al. 2010	X	X	X	–
Kasari et al. 2014	–	X	X	–
Koegel et al. 2014	–	X	X	–
Meadan et al. 2016	X	X	X	X
Oosterling et al. 2010	–	X	X	X
Park et al. 2011	–	X	X	–
Rogers et al. 2012	–	X	X	X
Rogers et al. 2014	–	X	X	X
Rollins et al. 2016	X	X	X	X
Schertz et al. 2013	–	X	X	X
Stahmer et al. 2017	–	X	X	–
Steiner et al. 2013	–	X	X	–
Turner-Brown et al. 2016	X	X	X	X
Vismara et al. 2012	X	X	X	X
Welterlin et al. 2012	–	X	X	–
Wetherby et al. 2014	X	X	X	X

Note. X, reported; –, not reported

than a quarter of the studies described the use of all four coaching components (Bradshaw et al. 2017; Meadan et al. 2016; Rollins et al. 2016; Turner-Brown et al. 2016; Vismara et al. 2012; Wetherby et al. 2014). Additionally, fewer than a third of the studies emphasized collaborative planning, and fewer than half emphasized collaborative reflection and decision making. These results demonstrate gaps in published descriptions of caregiver-implemented intervention approaches across studies with young children with ASD. On the other hand, all of the studies addressed building on caregivers' competence and almost all addressed guided practice. Such findings show that some coaching components are widely accepted, described, and used across the literature. The coaching components less frequently mentioned across

studies, however, consist of the two components that emphasize collaboration. Experts agree that collaboration is an important aspect of adult learning (Dunst and Trivette 2009; McWilliam 2010b). The fact that the reviewed studies less frequently emphasized the collaborative coaching components (i.e., collaborative planning, collaborative reflection, and decision making) suggests that some caregiver-implemented intervention approaches might take a more direct, caregiver-teaching approach with limited collaboration with families on reaching decision points. Wainer et al. (2018) note that some caregiver-implemented intervention models merely adapted a clinician-implemented approach to a caregiver-implemented approach, and Wainer et al. caution that, as a result, "…misalignment between the values, needs, and daily lives of the family and traditional parent-mediated intervention approaches may contribute to a lack of implementation of such programs within community settings" (p. 426). Results of the current review demonstrate the need for stronger emphasis in these collaborative areas among caregiver-implemented intervention models to improve caregiver coaching and optimally meet the needs of individual families in the community.

The results of the present review provide a foundation for examining coaching components in caregiver-implemented intervention for young children with ASD, but gaps remain in the described coaching process across the literature. According to Kemp and Turnbull (2014), coaching is ill defined in early intervention, and our review indicates that many studies of caregiver-implemented intervention models for young children with ASD neglect to fully define and identify coaching components. As a next step, we recommend researchers further examine coaching components within various caregiver-implemented intervention models for young children with ASD to clearly define coaching and to solidify coaching practices.

Additional Study Details

In addition to exploring coaching components, we found that 13 of the 26 reviewed studies were RCTs, the so-called gold standard of clinical research, and eight of the RCTs had more than 50 participants. In approximately one-third of the studies, children's average ages were below 18 months ($n = 9$), and half of the studies included children considered at risk for ASD. Although diagnoses of ASD occur for many children after age four (Baio et al. 2018), researchers recommend intervention for very young children at risk for ASD because of evidence suggesting developmental trajectories can be changed in the first years of life (Boyd et al. 2010; Zwaigenbaum et al. 2009). With earlier detection, the promising evidence of the effectiveness of caregiver-implemented intervention models, and the importance of empowering families, the early intervention system must adopt best practice in caregiver coaching. The studies highlighted in the present review, examining caregiver-implemented intervention approaches with children at younger ages and showing risk for ASD, reflect the push for earlier interventions that appropriately match the needs of very young children and their families.

In alignment with Part C requirements to provide early intervention services in children's natural environments (IDEA 2004), many of the reviewed studies took place in the family's home. Some of these studies, however, included intervention sessions in a clinic or center in addition to sessions that occurred in the home (Carter et al. 2011; Oosterling et al. 2010; Stahmer et al. 2017; Steiner et al. 2013; Turner-Brown et al. 2016; Wetherby et al. 2014). Other studies took place entirely in a clinic or laboratory (Kasari et al. 2010; Rogers et al. 2012; Rogers et al. 2014). Such studies that include these clinic, center, or laboratory sessions do not reflect the legislative guidelines for community practice through Part C of IDEA (2004) and serve as a potential barrier to implementation in the existing Part C early intervention system. Although location is not necessarily the primary issue for quality coaching, it might have an impact on the nature of the relationship between the professional and the caregiver, including less collaboration. It also might explain, in part, the gap between practices in research and implementation in the community: What works in a laboratory setting might not work or be perceived to work in homes and communities, where early intervention services are provided (in the United States). Future research on intervention with young children with ASD should take place in children's natural environments to reflect best practice of services for infants and toddlers and to better support community implementation of caregiver-implemented intervention approaches.

Nineteen of the reviewed studies measured professionals' fidelity of implementation, and eighteen measured caregivers' fidelity. Because caregivers directly implement strategies with their children, it is important to examine both the reliability of professionals' coaching caregivers on strategies as well as the reliability of caregivers' implementing the strategies with their children. All of the eighteen studies that measured caregivers' fidelity reported moderate to high levels of caregiver use of strategies. A clear association between number of coaching components and caregiver fidelity did not emerge, and we are hesitant to draw firm conclusions about a potential relationship (or lack thereof) between coaching components and effectiveness for multiple reasons. First, many studies did not report on caregiver fidelity, and the measures of fidelity that were used were not directly comparable. Moreover, data on caregiver use of strategies between intervention sessions is unavailable, and it is possible that caregiver fidelity between visits, the outcome of most importance, is in fact associated with the quality of coaching. Because we are unable to gather a clear picture of caregiver implementation across studies, it is

premature to examine effectiveness of coaching on child outcomes as well. Due to the complexity of the interventionist-to-caregiver-to-child chain in caregiver-implemented intervention and the vast number of factors that might influence caregiver and child outcomes, more research focused on these processes is needed. Nevertheless, the results of the present review demonstrate movement toward more rigorous research, as many of the studies measured at least one of the two types of fidelity. We recommend, however, that future research more consistently measure both professional and caregiver fidelity to help strengthen evidence for the effectiveness of professional coaching and caregiver implementation.

Limitations and Future Directions

The present review identifies gaps in the literature on caregiver-implemented intervention models for young children with ASD and a need for future research related to coaching, but conclusions should be considered in light of the following limitations. First, studies with an average participant age over 36 months were excluded. Some studies on caregiver-implemented intervention models for toddlers with ASD were omitted because preschoolers also participated, leading to the average participant age being above 36 months. Furthermore, this review focused on caregiver-implemented intervention studies specific to children with or at risk for ASD. Thus, studies involving caregiver-implemented interventions for infants and toddlers not specific to ASD were excluded.

The present review aimed to examine whether authors addressed specific coaching components in publications of caregiver-implemented intervention studies. We recognize that some of the caregiver-implemented intervention models may indeed incorporate these coaching components in the associated intervention manuals and as part of standard protocol and that the authors may have omitted such information from the published manuscripts. Without explicit description of these coaching practices in manuscripts, however, readers are uncertain whether these practices were used when data were collected. Moreover, whereas these coaching practices may be standard procedures for some intervention models in their intervention manuals, some manuals are not available to the public and others are only available for purchase. To improve professionals' use of coaching in the community and to aid scientific replication, professionals and researchers should have readily available access to information on the procedures involved in the intervention approaches.

Additionally, we focused specifically on coaching and defined four coaching components based on previous research. Although we know coaching is a key component of caregiver-implemented intervention, further information is necessary. For example, we did not observe information about coaching versus another method of working with families, such as *family consultation* (McWilliam 2016). Furthermore, this review is limited to the four coaching components that we defined, and we do not know the relative importance of these components or their differential success according to different family characteristics. Further research on specific coaching components as they are related to family outcomes is essential to our understanding of early intervention practices.

In conclusion, this review shows that coaching is an established process for helping caregivers implement interventions with children, but variability in which coaching components are reported remains across studies of caregiver-implemented intervention approaches. As a next step, we recommend researchers further examine the coaching process and coaching components within various caregiver-implemented intervention models with infants and toddlers with and at risk for ASD. Furthermore, we recommend increased focus on the coaching process when described in the literature as well as continued integration of coaching components across caregiver-implemented intervention models to support successful, community-based implementation. With continued research and improvements specific to coaching across caregiver-implemented intervention models, researchers and interventionists alike can support high-quality service delivery within the community.

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Compliance with Ethical Standards

Ethical Approval This article does not contain any studies with human participants or animals performed by any of the authors.

Conflict of Interest The authors declare that they have no conflict of interest.

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