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Measuring Parent Positive Support of Social Communication among Toddlers with Autism: A Systematic Review

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ABSTRACT

There are no systematic reviews of the use of parent-child interaction measures employed within studies examining the effects of parent-mediated intervention on toddlers with autism. Best practices recommend using parent-child interaction measures to assess whether interventions aimed at strengthening parent-child interactions are functioning as intended. A systematic review of parent-mediated early intervention studies of toddlers with autism was conducted. The purpose was to examine the use of parent-child interaction measures to assess parent positive support of toddler social communication and report feasibility characteristics for early interventionist practitioners. Experimental parent-mediated intervention studies of social communication among children with autism younger than 36 months were identified. Measurement approaches to parent support of social communication were quantified. Of 25 studies, only 7 studies reported parent and child outcomes using an instrument designed to measure the construct of parent support of child social communication during observed parent-child interaction. Measures reported are of limited relevance for early intervention practitioners due to administration burden and lack of feasibility for repeated measurement of progress toward increasing parent support of toddler social communication. This study highlights the need for feasible practitioner tools for monitoring progress of parent support of social communication for toddlers with autism.

La medición del apoyo parental positivo a las habilidades de comunicación social en niños pequeños con autismo: una revisión sistemática

RESUMEN

No hay revisiones sistemáticas acerca de las medidas de interacción padres-hijo que se utilizan en los estudios que analizan los efectos de la intervención en niños autistas mediada por los padres. Las mejores prácticas recomiendan controlar la medición de las intervenciones mediadas por los padres, las cuales han sido diseñadas para mejorar las habilidades de comunicación social de los niños con el fin de saber si dichas intervenciones funcionan según lo previsto. El propósito de este artículo es presentar los resultados de una revisión sistemática de la literatura que examina específicamente la medición de la interacción entre padres e hijos en estudios de intervención mediada por padres de niños pequeños con autismo. Se utilizó un enfoque PRISMA para identificar estudios experimentales de intervención mediada por padres, enfocados en la comunicación social de niños pequeños con autismo. Las formas utilizadas para medir el apoyo de los padres de la comunicación social en cada uno de estos estudios fueron cuantificadas. De 25 estudios solo 7 incluyeron una medida de observación directa de la interacción entre padres e hijos en la que se presentaron los índices de comportamiento de padres e hijos. Los métodos de evaluación utilizados para medir la interacción entre padres e hijos en los estudios experimentales publicados tienden a buscar profesionales altamente capacitados y especializados, que además requiere bastante tiempo para codificar. En consecuencia, estas herramientas de medición tienen una utilidad limitada para los profesionales que precisan de herramientas breves y confiables que además tengan una base psicométrica para medir la interacción entre padres e hijos para tomar decisiones basadas en datos sobre si sus intervenciones están teniendo los efectos previstos. El estudio destaca la necesidad de contar con instrumentos de medición con base psicométrica que permitan seguir de manera accesible el progreso del apoyo sobre comunicación social para padres de niños pequeños con autismo.

Palabras clave:
Apoyo mediado por los padres
Intervención
Autismo
Niños pequeños

Autism spectrum disorder (ASD) is a neurodevelopmental disorder that affects an estimated 1 in 54 children in the United

States (Maenner et al., 2020). The disorder manifests across diverse ethnic and socioeconomic backgrounds and is diagnosed 4 times

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more often in boys than in girls (Centers for Disease Control and Prevention [CDC, 2018]). Symptoms of autism appear during the first 3 years of life and can be reliably diagnosed by 18–24 months of age through a comprehensive evaluation that includes neurologic examinations, clinical observation, developmental assessments, and caregiver report (American Psychiatric Association, 2013). However, social developmental risk indicators for later autism diagnosis can be reliably identified as early as 6–14 months of age (Estes et al., 2015; Landa et al., 2013; Ozonoff et al., 2010). Social communication deficits, including impairments in reciprocal social interaction and repetitive interests, are core to the disorder. Prominent examples of social indicators include deficits in shared positive affect, directed vocalizations, gaze, social engagement, and joint attention (Bolton et al., 2012; Rogers & Talbott, 2016).

Social Communication as Core Concern

Social communication is the core limitation for children with autism (American Psychiatric Association, 2013). Emergent concerns within the first year of life include absence of shared positive affective behaviors such as social smiling and gaze as early as 6 months (Ozonoff et al., 2010). Absence of joint attention, the ability to share focus and coordinate gaze or interest between another person and an object for the purpose of social sharing, which is typically established by 11 months of age (Jones & Klin, 2013), are key markers. Joint attention is an important early precursor to social communication development with cascading effects on later cognitive, social, and language development (Mundy, 2018; Siller & Sigman, 2008). Outcomes of 20-year longitudinal examinations of adults with autism show that responding to joint attention at 3.5 years predicted adult social functioning and independence (Gillespie-Lynch et al., 2012), emphasizing the importance of targeting support of joint attention in early childhood. Moreover, without early intervention, absence of joint attention and shared positive affective behaviors continue to be a problem and communication deficits compound over time to include repetitive behavior patterns, verbal language delays, lack of social smiling and shared enjoyment, poor eye-contact, delayed symbolic and functional play skills, and limited response to one's name (Boyd et al., 2010; Murza, 2016).

Parent-mediated Early Interventions

Parent-mediated early interventions for toddlers with autism focus on facilitating conceptual learning to strengthen the capacity of parents to support their child's social communication development during active engagement in intervention (Schertz & Horn, 2017). Congruent with social learning theory in which learning is theorized to develop within natural, socially-transactional experiences, the parent-child relationship serves as a vehicle for creating embedded learning opportunities for children guided by knowledge of their child's intrinsic interests (Schertz & Horn, 2017; Schertz et al., 2018). Parent-mediated interventions aim to facilitate intentional parent positive support of their child's social communication attempts by recognizing child signals and responding to those signals in sensitive and responsive ways. As such, parent-mediated intervention is characterized by positive parent supports that scaffold social communication competencies of very young children (Baggett & Carta, 2010; Feil et al., 2020). Parent positive support strengthens child-directed learning by reinforcing both the parent and child's active participation in the learning process through mediation behaviors rather than through passive response to prescribed instruction (Schertz & Horn, 2017). Parent positive support includes following their child's lead, commenting, expanding on their child's interest, and showing positive affect (Baggett & Carta, 2010). Parent-mediated

support facilitates social and instrumental communicative functions by creating more opportunities for child-directed communication in the form of initiating and responding to joint attention (Schertz & Horn, 2018; Schreibman et al., 2015). Initiating and responding can include showing, pointing, gaze-shifting, vocalizing, and imitating, all which are major targets of interventions aimed at improving joint attention and social communication outcomes for children with autism (Schertz et al., 2017; Shire et al., 2016). Parent-mediation of pre-verbal social communication also involves support of shared positive affective behaviors such as social smiling, laughing, using a warm tone, affirming comments, and affectionate touch (Baggett et al., 2011; Hackworth et al., 2017; Steiner, 2011; Vernon et al., 2012).

In the past five years, a growing body of evidence has demonstrated that parent-mediated interventions can substantially improve social communication of toddlers with autism (Green et al., 2017; Schertz et al., 2017; Siller et al., 2014). A recent review highlights both proximal indicators of improved parent-child interaction, such as shared attention, and distal indicators of decreased autism severity and increased language comprehension (Oono et al., 2013). Outcomes of subsequent studies of parent-mediated interventions demonstrate significant increases in toddler joint attention (Schertz et al., 2013; Schertz et al., 2017), interactive play, gaze shift, shared positive affect, as well as gains in verbal communication (Green et al., 2015; Kasari et al., 2008; Kasari et al., 2014; Wetherby et al., 2014). Moreover, early intervention targeting social communication prior to age 2 is associated with reduced financial burden to families seeking services (MacDonald et al., 2014; Zwaigenbaum et al., 2015) and the most recent findings show that families who begin very early intervention use fewer cumulative intervention services overall (e.g., physical therapy, speech therapy) resulting in savings of about \$19,000 per child per year (Cidav et al., 2017). Children who receive early parent-mediated social communication focused intervention before age 3, in contrast to older children, show greater improvements in social communication outcomes and less severe autism symptoms two years after treatment (Estes et al., 2015; Green et al., 2017; Johnson & Meyers, 2007; Kasari et al., 2008; Wetherby & Woods, 2006; Zwaigenbaum et al., 2015). Consequently, the American Academy of Pediatrics recommends that families begin intensive intervention as early as possible following a positive risk assessment or autism diagnosis between the ages of 2 to 3 years of age (Anderson et al., 2014; Pierce et al., 2016; Rogers & Talbott, 2016). Accordingly, the U.S. Department of Education now reports that over 88% of children under age 3 served under Part C of The Individuals with Disabilities Education Act (IDEA) receive services in home-based settings where parent-mediated intervention is most suitable (U.S. Department of Education, 2016).

Research-to-Practice Gaps and Needs

While there is strong and growing evidence of the effectiveness of parent-mediated interventions for improving social communication of toddlers with autism, there are still substantial challenges to moving these researcher-implemented interventions into community practice. Part C of IDEA services aims to improve the capacity of caregivers to meet the needs of their infant or toddler. Moreover, best practices for community early interventionists recommend using parent-child interaction measures to monitor change in interventions aimed at improving toddler social communication via targeted caregiver supports (Baggett et al., 2011; Greenwood et al., 2011; Wetherby et al., 2018). Although Part C mandates that early intervention services be conducted in children's natural environments, including at home, in child care settings, and early intervention classroom settings, early interventionists often lack the technical training and support to ensure opportunities

for maximizing active parent participation (U.S. Department of Education, 2016). Part C services, provided in natural settings which do engage parents and other caregivers, often fail to engage them in evidence-based interventions, such as parent-mediated interventions demonstrated to scaffold child social communication competencies (Romano & Schnurr, 2020), underscoring a substantial research-to-practice gap. Community early intervention providers require not only ongoing support in implementing evidence-based parent-mediated interventions, they also require practical psychometrically sound measures that are brief and repeatable to provide rapid data-based information about whether parent-mediated interventions are having the intended effects of increasing positive caregiver support of child social communication competencies (Baggett & Carta, 2010; Wetherby et al., 2018). Such measures are especially important given that some of the most common constraints preventing application of evidence-based intervention in community practice settings are that existing measures and strategies are not feasible given their time burden and specialist training requirements (Aitken, 2017).

It is not clear to what extent the existing experimental studies of parent-mediated interventions include parent-child interaction measures that practitioners could use to monitor parent positive support of child social communication competencies. There are no systematic reviews of the use of parent-child interaction measures within parent-mediated intervention studies for children younger than 3. To address this need, a systematic review of the experimental literature of parent-mediated early intervention was conducted. In particular, measures of parent-child interaction within studies of parent-mediated intervention were examined within this literature.

Purpose

The purpose of this review was to address the extent to which this literature provides examples of feasible parent-child interaction assessment tools that practitioners can use as a brief, repeated measurement indicator of the construct of parent positive support of child social communication competencies, particularly non-verbal social communication competencies.

The objectives of this systematic review were to: (1) identify and describe published experimental, quasi-experimental, and single case design studies of parent-mediated intervention focused on social communication promotion among children with autism younger than 36 months of age; (2) quantify and describe approaches to measuring positive parent support of their children's social communication competencies within studies of parent-mediated intervention; and (3) evaluate the current status of this literature relative to brief parent-child interaction indicators for community practitioner use in monitoring parent positive support of child social communication, particularly non-verbal social communication.

To systematically identify studies that focused on parent-mediated interventions for promoting social communication among children under 36 months with autism, several procedural steps were taken. First, search terms were identified using relevant key words in order to conduct the electronic database and subsequent ancestral searches of relevant studies published since year 2000. Second, methodological criteria for final study inclusion were determined. Finally, a systematic review of the experimental literature was conducted to address the above study objectives. These steps are detailed in the following sections.

Method

Search Terms

Key words were extracted in September 2018 from prominent published studies and reviews to generate preliminary terms for

searching major electronic databases, including the following: Elton B. Stephens Company (EBSCO), Web of Science, and ProQuest, a multi-disciplinary, full-text database that includes dissertations, theses, primary source material, and scholarly content. Search terms included the following: AB (autis* OR "pervasive developmental" OR asperger*) AND AB (toddler OR infant) AND AB intervention AND AB (parent OR early).

Inclusion and Exclusion Criteria

For inclusion, studies met each of the following criteria: (1) an experimental or quasi-experimental design was employed to examine effects of parent-mediated interventions to promote social communication among toddlers; (2) the majority of study participants were younger than 36 months of age and met diagnostic criteria for autism. Mode age was used if available. Mean age was used if mode age could not be determined. Studies that were not available in English, not published in a peer-reviewed journal, or published before year 2000 were excluded.

Review Procedures for Study Inclusion

Titles generated from combined electronic searches EBSCOhost, Proquest, and Web of Science ($n = 1,426$) were coded by two independent reviewers as "relevant" or "irrelevant" relative to inclusion criteria. Titles coded as "relevant" ($n = 171$) via consensus progressed to the next level of review. This process was repeated with abstracts of studies with relevant titles. Ninety-four abstracts were initially identified. Through consensus review, researchers rejected 38 additional studies resulting in the identification of 56 abstracts that met inclusion criteria. Finally, published reports of manuscripts were reviewed for studies meeting inclusion criteria. After methodology review of the remaining 56 studies, 31 studies (55.4%) were excluded due to failure to meet all inclusion criteria. Of these, five studies (8.9%) failed to meet design criteria, nine studies (16.4%) contained subjects with average age > 36 months, six studies (10.9%) were not peer-reviewed, and six studies (10.9%) failed to use or mention a reliable or valid autism screening or diagnostic tool, five studies (8.9%) were excluded for lacking a parent-mediated intervention focus. Twenty-five studies, which met all inclusion criteria, comprised the final set of studies for systematic review (See Table 2). Twenty percent of these studies were randomly selected for independent review of inclusion criteria. Inter-coder agreement of inclusion status as "met" or "unmet" was calculated using the formula: $\text{number of agreements} \div (\text{number of agreements} + \text{number of disagreements}) \times 100$. Inter-coder agreement that studies met criteria for inclusion for systematic review was 100%. Upon completion of searches, references of identified studies were examined for the purpose of identifying relevant studies that were not captured in the original electronic search criteria.

Systematic Review Categories

The 25 studies, which met criteria for inclusion in the systematic review, were coded according to the following methodological categories: (1) study design including randomized controlled trials, single-subject, and quasi-experimental designs; (2) sample characteristics, including child gender, caregiver education, caregiver age, employment, household income, race, ethnicity, and language if reported; (3) autism inclusion method, including the use of a standard diagnostic measure (the Autism Diagnostic Observation Schedule, ADOS, or Autism Diagnostic Observation Schedule-2, ADOS-2) (Falkmer et al., 2013; Lord et al., 1999; Lord et al., 2012), another standardized assessment measure, a screening tool, or referral through regional intervention programs

Table 1. Variable Definitions for Systematic Review

Variable	Definition
Study design	RCT, Quasi-experimental, Single-subject
Autism inclusion	Diagnostic standard (ADOS, ADOS-2) Other standardized measure (e.g. ADI-R, CSBS, VABS, CARS) Screener (e.g. M-CHAT) Referral (referred from Part C or other regional services with fixed diagnostic protocol)
Sample characteristics	
Child gender	Majority ¹ male, female
Caregiver education	Majority ¹ less than high school, high school, some college/trade, college graduate, post-graduate school, unreported.
Caregiver age	Majority ¹ caregivers < 30 years or > 30 years
Employment	Majority ¹ unemployed, majority employed, unreported
Household income	Sample majority ¹ : < \$15,000 \$15,000 - \$40,000 > 41,000 - \$60,000 > \$60,000 unreported
Race	Majority ¹ White, Non-White, or unreported
Ethnicity	Majority ¹ Hispanic, Non-Hispanic, or unreported
Language	Majority ¹ language spoken at home reported as English, Spanish, other, or unreported
Direct observation	Child-only observation measure: Study reported measure of observed child behavior only and did not measure observed parent behavior. Parent and child (P-C) observation, separate measures: Study reported use of separate measures to assess observed parent behavior and observed child behavior. Parent and child (P-C) observation, single measure: Study reported use of a single measure for simultaneous observation of both parent and child during interaction with one another for the purpose of assessing the construct of parent positive support of child social communication.

Note. ¹Majority = mode or largest proportion was used to report majority if study only reported mode or percentage of sample. Mean was used if mode or proportion were not reported.

that required positive diagnostic screening for autism such as Part C regional intervention programs; and (4) method of parent-child interaction assessment, including observation of child only with no assessment of parent, separate observational measures of parent positive support and child social communication, or simultaneous observation of both parent and child during interaction with one another for the purpose of assessing the construct of parent positive support of child social communication. See [Table 1](#) for definitions of review categories.

Reliability Coding of Study Characteristics

After initial systematic review and coding of study characteristics according to the above criteria, an independent reviewer randomly selected 20% of studies for review. Inter-rater agreement for each of the four methodological categories was calculated using the formula: number of agreements ÷ (number of agreements + number of disagreements) x 100. Inter-coder agreement was 100%.

Results

Categories of Study Design

Systematic review revealed that among the 25 studies, 60% ($n = 15$) employed a randomized controlled trial design, 36% ($n = 9$) used a single subject experimental design, and 4% ($n = 1$) used a quasi-experimental design. See [Table 3](#) for a table of individual study characteristics.

Sample Characteristics

Sample characteristics of study participants were as follows. Female children were the minority in all but one study (4%) ([Brown & Woods, 2015](#)). Caregiver education level was reported in 76% (n

= 19) of studies. Only 4% of studies ($n = 1$) reported a majority with at most a high school education and no college degree ([Schertz & Odom, 2007](#)). A sample majority with at least some college was reported in 40% of studies ($n = 10$). A majority sample with a college degree or more was also reported in 32% of studies ($n = 8$). Caregiver age was reported in only 36% of studies ($n = 9$). One study reported a majority of caregivers who were younger than 30 years ([Schertz & Odom, 2007](#)). There were five studies (20%) that listed information regarding current employment of which only one (4%) included a majority unemployed sample. Household income was reported in only 16% of studies ($n = 4$). The largest proportion of participants reported income levels greater than \$60,000 in 12% ($n = 4$) of studies. One study reported a split majority between \$41,000 and \$60,000 and greater than \$60,000 ([Schertz et al., 2017](#)). Household income was not reported in the remaining 84% of studies ($n = 21$). Finally, a majority white demographic sample was reported in 68% studies ($n = 17$) while 12% ($n = 3$) reported a non-white majority. There were 5 studies (20%) that did not report race. Of studies that reported ethnicity, a majority of participants were of non-Hispanic origin 56% ($n = 14$) while 8% of studies ($n = 2$) reported a majority of participants of Hispanic origin. Surprisingly, only 12% studies ($n = 3$) reported information on language spoken at home. See [Table 3](#) for table of individual study characteristics.

Measures

Autism measure. Of the studies in this review, 76% ($n = 19$) used the standard diagnostic measure, the Autism Diagnostic Observation Schedule, to determine study inclusion (ADOS; [Lord et al., 1999](#)). In 8% of studies ($n = 2$) another standardized measure was used as the primary measure for study inclusion. In 8% studies ($n = 2$) a referral from regional intervention programs that required positive diagnostic screens for autism was used. Finally, 8% of studies ($n = 2$) employed screeners in addition to standardized measures for study inclusion.

Table 2. Systematic Review Study Categories

	(Bradshaw et al., 2017)	(Brian et al., 2017)	(Brown & Woods, 2015)	(Carter et al., 2011)	(Dawson et al., 2010)	(Drew et al., 2002)	(Gulsturd et al., 2016)	(Harrop et al., 2017)	(Kasari et al., 2015)	(Kasari et al., 2014)	(Kasari et al., 2010)	(Oosterling et al., 2010)	(Rogers et al., 2012)	(Rollins et al., 2016)	(Schertz & Odom, 2007)	(Schertz et al., 2013)	(Schertz et al., 2017)	(Shire et al., 2016)	(Steiner et al., 2013)	(Vernon et al., 2012)	(Vismara & Lyons, 2007)	(Vismara et al., 2013)	(Welterlin et al., 2012)	(Wetherby & Woods, 2006)	(Wetherby et al., 2014)	
<i>Study Design</i>																										
RCT		X		X	X	X	X	X	X	X	X	X	X			X	X	X							X	
Quasi- experimental																									X	
Single-subject	X		X											X	X				X	X	X	X	X			
<i>Autism Measure</i>																										
Gold-standard ADOS	X	X	X	X	X		X	X	X			X	X	X		X	X	X	X	X		X		X	X	
Other Standardized Measure						X	X	X	X	X	X	X	X		X	X			X	X	X					
Screeners										X					X											
Referrals																					X		X			
<i>Sample Characteristics</i>																										
<i>Child Gender</i>																										
Male	X	X		X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X
Female			X																							
Unreported																X										
<i>Caregiver Education Level</i>																										
<i>Less than High School</i>																										
High School															X											
Some College/ Trade				X		X	X	X					X			X	X						X	X	X	
College Graduate	X	X	X	X						X	X		X	X		X	X					X				
Post-graduate School		X	X										X					X				X				
Unreported					X	X						X							X	X	X					
<i>Caregiver Age</i>																										
<i>< 30 years</i>																										
> 30 years							X	X	X		X			X			X			X				X	X	
Unreported	X	X	X	X	X	X				X		X	X			X		X	X		X	X	X			
<i>Employment</i>																										
<i>Majority employed</i>																										
Majority unemployed	X		X																			X				
Unreported		X		X	X	X	X	X	X	X		X	X	X	X		X	X	X	X	X		X	X	X	
<i>Household Income</i>																										
<i>≤ \$15,000</i>																										
<i>\$15,000 - \$40,000</i>																										

Table 2. Systematic Review Study Categories (continued)

	(Bradshaw et al., 2017)	(Brian et al., 2017)	(Brown & Woods, 2015)	(Carter et al., 2011)	(Dawson et al., 2010)	(Drew et al., 2002)	(Gulstrud et al., 2016)	(Harrop et al., 2017)	(Kasari et al., 2015)	(Kasari et al., 2014)	(Kasari et al., 2010)	(Oosterling et al., 2010)	(Rogers et al., 2012)	(Rollins et al., 2016)	(Schertz & Odom, 2007)	(Schertz et al., 2013)	(Schertz et al., 2017)	(Shire et al., 2016)	(Steiner et al., 2013)	(Vernon et al., 2012)	(Vismara & Lyons, 2007)	(Vismara et al., 2013)	(Welterlin et al., 2012)	(Wetherby & Woods, 2006)	(Wetherby et al., 2014)
\$41,000 - \$60,000																	X								
> \$60,000									X			X					X					X			
Unreported	X	X	X	X	X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X
Race																									
Majority white	X	X	X		X	X	X	X	X		X		X			X	X	X			X	X	X	X	X
Majority nonwhite				X					X					X											
Unreported						X					X		X						X	X					
Ethnicity																									
Hispanic origin														X							X				
Non-Hispanic origin			X	X	X		X	X	X	X						X	X	X			X	X	X	X	X
Unreported	X	X			X						X	X	X		X				X						X
Language																									
English			X											X								X			
Spanish																									
Other																									
Unreported	X	X		X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X		X	X	X
Direct observation																									
Child-only observation					X	X		X						X	X	X	X							X	X
P-C observation, separate measures	X		X								X		X					X	X		X	X	X		
P-C observation, single measure		X		X		X	X		X		X										X				

Observational measures of parent positive support of toddler social communication. Nine studies (36%) reported data on observed child behavior exclusively and did not measure parent behavior. Nine studies (36%) reported on parent support of toddler social communication using separate observation measures of parent support and toddler social communication during parent-child interaction. Although one of the nine studies that used separate observation measures of parent support behavior and toddler behavior did incorporate a single measure designed to assess both parent and child behavior during parent-child interaction, only child behavior was reported (Kasari et al., 2010). Only 7 studies (28%) reported outcomes of both parent and child behavior using at least one instrument designed to measure both parent positive support and child social communication during observed parent-child interaction. Parent-child interaction measures were predominantly limited to a few constructs. Two studies focused on positive affect, one of which assessed shared

smiling using an instrument adapted from Koegel and Koegel's coding scheme (cited in Brian et al., 2017). The other used a measure that concentrated on synchronous engagement, highlighting time intervals in which both parent and child simultaneously directed positive affect at one another during the same activity (Vernon et al., 2012). Three additional studies focused primarily on categories of responsive acts. Carter et al. (2011) used the Parent-Child Free Play Procedure (PCFP) to observe levels of responsivity and child intentional communication. The next study employed the Caregiver Child Interaction measure (CCX; Harrop et al., 2017). CCX was used to code child positive social communicative acts and engagement behavior directed toward the caregiver while simultaneously observing caregiver responsive behavior (Harrop et al., 2017). The third study used Parent-Child Play (PCX) to evaluate parental interactions. PCX was used to categorize parent behavior as responsive, ignoring, or directive to the child's object manipulation following observed child play acts (Kasari et al.,

2014). Another study used Adamson et al.'s (cited in [Gulsrud et al., 2016](#)) coding scheme to evaluate parent-child interactions for supported and coordinated joint engagement behavior during shared play. The final study used the 7-point Erickson Scales to evaluate child compliance, non-negativity, and non-avoidance during interaction with the parent. The scales were used to observe change in the quality of parent supportive presence, respect for the child's autonomy, effective structure and limit setting, quality of instructions, and non-hostility ([Oosterling et al., 2010](#)). For details on measures used, see [Table 3](#) for individual study characteristics.

Discussion

Feasible measures of parent positive support of child social communication are crucial for assessing progress throughout parent-mediated interventions aimed at increasing parent positive support of child social communication competencies. It was initially suspected that few studies would employ measures designed for efficient simultaneous observation and assessment of both parent positive support and toddler social communication, which this systematic review confirmed. As exhibited in this review, there is no current standard practice reflected in the experimental parent-mediated intervention literature regarding simultaneous observational assessment of parent positive support and social communication of toddlers with autism.

Although parent-mediation was hypothesized as the mechanism for promoting child social outcomes in all of the studies included in the systematic review, only 28% ($n = 7$) used an efficient measure designed to simultaneously assess direct observations of parent and child behavior during parent-child interaction. Among these 7 studies, single measures that were used to assess both parent and child behavior tended to be narrowly focused. For example, two studies focused primarily on shared parent-child positive affect such as smiling, laughing, and elevated playful tone ([Brian et al., 2017](#); [Vernon et al., 2012](#)), which warranted reliance on supplementary, separate parent measures to account for additional support behaviors (as cited in [Brian et al., 2017](#)). Measures of simultaneous parent and child behavior also tended to rely on complex coding schemes requiring high levels of training and time commitment to score. Although feasible within experimental research, these assessment characteristics are infeasible for routine monitoring in early intervention practice ([Greenwood et al., 2011](#)).

Monitoring parent positive support of child social communication during parent-child interaction is crucial for practitioners to engage in data-based intervention planning and implementation. Mounting evidence suggests that delivering parent-mediated early intervention within the parent-child relationship in natural environments provides an important context for toddlers with autism to learn joint attention skills and improve other key social communication skills ([Pickles et al., 2016](#); [Siller & Sigman, 2008](#); [Wetherby et al., 2018](#)). Moreover, it is important that these targeted processes of parent positive support of child social communication are measured frequently throughout early intervention to maximize treatment efficiency. This systematic review highlighted the lack of practical examples of observation measures within the experimental literature with high relevance and feasibility for use by community early intervention practitioners, particularly those without advanced degrees. The findings of this review underscore the scarcity of and need for the study of practical measures for use in parent-mediated interventions that focus on the increasing targeted parent positive support of social communication competencies of toddlers with autism. Without such measurement indicators, it is impossible for practitioners to understand how

well their interventions are working and what modifications in focus and intensity are needed to enhance parent learning and thereby opportunities for toddler competency building ([Walker et al., 2008](#)). Furthermore, at the community level, measures must be feasible for frequent use by lay personnel in the field of child development.

Table 3. Methods, Sample Characteristics, and Measure

Variable	N	%
Study design		
RCT	15	60%
Quasi-experimental	1	4%
Single-subject	9	36%
Autism measure		
Gold-standard ADOS	19	76%
Other standardized measure	2	8%
Screeners	2	8%
Referral	2	8%
Sample characteristics		
Child gender		
Male	23	92%
Female	1	4%
Unreported	1	4%
Caregiver education level		
Less than High School	0	0%
High School	1	4%
At least some College/Trade	10	40%
College Graduate or more	8	32%
Unreported	6	24%
Caregiver age		
< 30 years	1	4%
> 30 years	9	36%
Unreported	15	60%
Employment		
Majority employed	3	12%
Majority unemployed	1	4%
Unreported	21	84%
Household income		
< \$15,000	0	0%
\$15,000-\$40,000	0	0%
\$41,000-\$60,000	0	0%
> \$60,000	3	12%
¹ Other	1	4%
Unreported	21	84%
Race		
Majority white	17	68%
Majority nonwhite	3	12%
Unreported	5	20%
Ethnicity		
Hispanic	2	8%
Non-hispanic	14	56%
Other	0	0%
Unreported	9	36%
Language		
English	4	16%
Spanish	0	0%
Other	0	0%
Unreported	21	84%
Direct Observation		
Child-only obs	9	36%
P-C obs, separate measures	9	36%
P-C obs, single measure	7	28%

Note. ¹Other = indicates the majority was split between groups.

Limitations and Implications for Research and Practice

This systematic review was conducted in response to the relatively recent proliferation of publications reporting results of experimental studies of caregiver mediated interventions, which are predominantly limited to parent-mediated interventions and their positive effects on toddler social communication outcomes. By virtue, our review is focused on measures of a highly specific subset of caregiver positive support, parent positive support of child social communication. It should be noted that while parent positive support of child social communication is certainly critical, other caregivers, including other familial caregivers, childcare providers, and early education teachers in classroom-based settings also play a crucial role in the social communication development of toddlers with autism.

Beyond systemic barriers that can interfere with parent engagement in EI, parents may experience situational factors that interfere with their ability to participate in EI, including work schedules that may be unamenable, substance abuse, acute mental health, or physical health crises. Therefore, community EI personnel require support to implement evidence-based caregiver mediated interventions across caregiving settings to maximally support social communication outcomes of toddlers with autism. Hence, measures of caregiver-child interaction, and particularly those that focus on caregiver positive support of child social communication, will be important for maximizing social communication competency development of toddlers with autism across caregiving settings. Regardless of whether the parent is able to directly participate in EI, measures of parent-child interaction are still of high importance for shedding light on child social communication opportunities provided and responded to within the parent-child relationship.

Conflict of Interest

The authors of this article declare no conflict of interest.

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