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Examining Communication Development in Young Children with Significant Developmental Delays Receiving Family Guided Routine Based Intervention and Caregiver Coaching

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Running Head: COMMUNICATIVE ACTS IN TODDLERS WITH DEVELOPMENTAL DELAYS

THE FLORIDA STATE UNIVERSITY
COLLEGE OF COMMUNICATION AND INFORMATION

EXAMINING COMMUNICATION DEVELOPMENT IN YOUNG CHILDREN WITH
SIGNIFICANT DEVELOPMENTAL DELAYS RECEIVING FAMILY GUIDED ROUTINE
BASED INTERVENTION AND CAREGIVER COACHING

By

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Examining Communication Development in Young Children with Significant Developmental
Delays Receiving Family Guided Routine Based Intervention and Caregiver Coaching

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Abstract

Children with significant developmental delays are likely to incur substantial communication delays or disorders which negatively impact their opportunities to learn and interact with their families. While early intervention has demonstrated improved communication and social interaction in young children, less is known about the merits of parent implemented intervention and coaching, an emerging service delivery approach in early intervention, for children with significant communication delays. The purpose of this study is to review the literature on early children's communication and to develop and test a behavioral coding system using video observation data collected during home visits. Rates and relative frequencies of child communication acts with caregivers during typical routines across three different time points, will be coded for 31 parent child dyads divided into two groups, one with a manualized parent implemented intervention and coaching approach, and one business as usual. It is important to begin to explore the impact of parent implemented interventions and to determine if systematic coaching has an effect on children with significant developmental delays.

Examining Communication Development in Young Children with Significant Developmental Delays Receiving Family Guided Routine Based Intervention and Caregiver Coaching

Communication skills are integral to forming human connections, learning, and participating in everyday life. An important role for caregivers is being a responsive and engaging communication partner to their children as their communication develops. These early interactions between parent and child support the child's ability to engage with others and the environment and serve as the foundation for future learning and interaction opportunities. A child with a significant disability or delay may be challenged to accomplish basic communication skills such as responding to others, vocalizing, making requests or sharing feelings that generally develop through typical interactions (Guralnick, 2017). Over 20% of children enrolled in IDEA Part C services have diagnosed congenital, neurological or other biological/health conditions and are receiving early intervention services such as special instruction, speech language therapy, or physical therapy to enhance development (Windsor, Woods, Kaiser, Snyder, & Salibury, 2019). Research highlights the importance of early intervention, including parent implemented intervention, as a tool to support communication development in young children with delays or disabilities (Akamoglu & Meadan, 2018; Brown & Woods, 2015.). This paper will review the literature on early communication, and it will describe the coding approach that is being used to measure child communication across intervention conditions in this study.

Communication Development

Interactive engagement at a young age, specifically between a parent and child, fuels language development (Tamis-LeMonda, & Bornstein, 2002). Young children thrive off responsive and consistent conversation with their parents (Tamis-LeMonda, Bornstein,

Baumwell, & 2001). The simple back and forth exchanges between the parent and child strongly contribute to the language acquisition and communication skills of the child (Tamis-Lemonda et al., 2001). Although progress has been made in developing effective practices aimed at improving these basic back-and-forth exchanges, there is little research on infants and toddlers with significant disabilities who might be in the prelinguistic stage of development.

Prelinguistic Communication

Prelinguistic skills refer to intentional preverbal communication before the use of single words (Watt, Wetherby, Shumway, 2006). Research suggests that interventions aimed at encouraging the use of prelinguistic communication may have long-term benefits which include better language outcomes (Brady, Marquis, Fleming, & McLean, 2004). Prelinguistic skills include gestures, vocalizations, and shared or joint attention, and also involves communicative function, or why children communicate. The development of early communication is imperative; it is the foundation of relationships and is ultimately essential for social interactions, learning and conveying messages. The types of early communication this paper will explore include gestures, vocalizations, and communicative function.

Gestures. A child's profile of gesture use, compared with other skill areas, can be used in intervention planning for children who have early communication skills (Crais, Watson, & Baranek, 2009). Research suggests that the children's use of these gestures encourages the parent to provide additional linguistic input (Kaiser et al., 2019). This input, along with strong parent responsiveness, ultimately increases the child's language development. Within the early years of development, it is typical to see a child use a variety of gestures. At such a young age when words are limited, gestures offer a way to extend their communicative range (Goldin-Meadow, 2015). Gestures not only precede the onset of linguistic milestones; they also predict it (Goldin-

Meadow, 2015). These gestures typically begin between the ages of 8 and 12 months (Bates, 1976). The initial gesture that is produced in young children is called a deictic gesture. These establish reference by calling attention to or indicating an object or event (Bates, 1976). Deictic gestures include pointing at objects, places or people in the environment, or holding up objects to call attention to them (Iverson, Capirci, & Caselli, 1994). Examples of deictic gestures include reach-object, reach-person, give, push/pull away, show, tap/pat, point-to-touch, and point-distal. These gestures can be shown during a variety of routines in the home and must be in conjunction with a communicative function, which will be discussed below. A deictic gesture would be present, for instance, if a child points distally at a sippy cup to indicate the desire to drink. Children typically produce deictic gestures first and iconic gestures a little later in development. An iconic gesture captures aspects of the objects, action or attributes they represent (Iverson, Capirci, & Caselli, 1994). Baby signs, for instance, signing “more” or “eat”, can also be represented as an iconic gesture.

In addition to deictic gestures, children may also use representational and contact gestures. A representational gesture is used to establish reference and carry some fixed semantic content (Iverson & Thal, 1998). These gestures include head shakes, head nods, waves, claps, and depictive gestures or signs (Shumway & Wetherby, 2009). This study looks specifically at those representational gestures; in addition to shake arms/body, blow a kiss, “shhh”, thumbs up, hand up, shrug, and high five. A contact gesture is referred to as a gesture used to direct communication but not involving objects or carrying fixed semantic content; this includes reaching toward or touching an adult or self-injury (Shumway & Wetherby, 2009). This study looks at contact gestures with the inclusion of hand-as-tool and push/pull person.

These gestures allow children to communicate, despite their inability to express messages with the use of speech yet. This ability to convey a message with the use of gestures facilitates language learning and can predict the child's linguistics later in life. The more gestures a child uses early on, the more words they are likely to have in their spoken vocabularies later in development (Acredolo & Goodwyn, 1988). These gestures ultimately pave the way for children's early words and are imperative for interaction and expression. Children with significant disabilities often evidence delays in communication, including gestures (Windsor et al., 2019). These lack of skills hinder their participation in everyday routines and limit their independence. This can negatively impact their development and hinder their linguistic competence in the future.

Vocalizations. In addition to single words and gestures, children can also increase their language development with the use of vocalizations. These include, but are not limited to, sounds, grunts, and unintelligible speech. Vocal development, specifically well-formed consonant-vowel syllables, typically emerge early in the second half of the first year, before the onset of word use (Fagan, 2009; Fenson et al., 1994; Jusczyk & Hohne, 1997). These variations in vocalizations can be presented solely by themselves or paired with a gesture for the purpose of a communicative function: behavioral regulation, social interaction or joint attention. A vocalization may be presented in various forms; this can include a laugh during a social interaction, or a cry to indicate the refusal of an object. Typically developing children may have limited to no difficulty incorporating vocalizations into their everyday routines. However, children with a speech or language delay may require different levels of responsiveness from their caregivers to facilitate vocal development (Goldstein & Schwade, 2008). It has been supported that children with down syndrome vocalized at a lower rate than their peers who are

typically developing (Thiemann-Bourque, Warren, Brady, Gilkerson, & Richards, 2014). For the population this specific study focuses on, it will be unlikely to see a large quantity of single words and/or phrases (word combinations). Children with down syndrome typically use less than 50 words until about 30 months, and their pace of growth between 24 and 30 months is relatively slow (Zampini & D'Odorico, 2013). Word combinations also emerge slowly within this population (Iverson et al., 2003; Zampini & D'Odorico, 2011). The amount of prelinguistic vocalizations produced by toddlers, aged 17–34 months with developmental delays, regardless of complexity, was significantly correlated with expressive vocabulary 12 months later (McCathren, Yoder, & Warren, 1999). Children (typically developing and those with disabilities) who gesture earlier in life, with higher frequencies, have larger vocabularies and stronger language outcomes (Iverson, Longobardi, & Caselli, 2003). These vocalizations are an integral part of a child's life and ultimately set the stage for an independent and successful future. Children with significant disabilities and their parents typically have this goal, independence. There is a need for the development of effective interventions to accelerate the growth of symbolic language in children with Down syndrome (Romano, Kaiser, Lounds-Taylor, & Woods, 2020), amongst other disabilities.

Communicative Function. By the end of the first year of life, most children intentionally communicate using means such as those explained above (gestures and vocalizations) to express three communicative functions (Shumway & Wetherby, 2009). These common communicative acts, behavioral regulation, social interaction and joint attention, are typically impacted in young children with disabilities (Bruner, 1981). These functions are imperative for everyday life, as they are used to intentionally express a message towards another individual. Having a range of these functions allows a child to communicate in diverse ways; this

includes protesting, requesting, participating in a social game or keeping interest on a specific object or person. Behavioral regulation acts are used to regulate the behavior of another person to obtain a specific result (Shumway & Wetherby, 2009). This includes protesting or requesting something with the use of words, vocalizations or gestures (Bruner, 1981). This communicative act can be present in a broad range of activities; however, it is extremely common during meal related routines. A social interaction includes acts that are used to attract or maintain another's attention to oneself; the child's goal is to get another person to look at or notice him or her (Shumway & Wetherby, 2009). Social interaction includes, but is not limited to, singing, hide-and-seek, tag, or any sort of playful interaction (Bruner, 1981). The shared focus between a parent and child by means of eye-gazing, pointing or other indications is joint attention (Bruner, 1981). It refers to acts used to direct another's attention to an object, event, or topic (Shumway, & Wetherby, 2009). During this communicative act, the child's goal is to get another person to look at or notice something; this involves commenting on an object/action or requesting information (Shumway & Wetherby, 2009). Joint attention is often displayed when reading books. It can also be observed in interactions when the child/caregiver are both focusing on any given object, person, or thing; for instance, while looking at a toy together. These functions can be used verbally or non-verbally; typically, children with significant disabilities are limited when it comes to speech. However, these functions can be paired with vocalizations, single words, or phrases. These communicative acts, which come natural for typical children, can be extremely difficult for a child with a significant disability to incorporate into their every-day lives.

Early Intervention and Coaching

Early intervention is defined as services provided for young children with developmental delays or disabilities (Individuals with Disabilities Education Act, 2004). These specialized services provided for children and their families can include speech therapy and counseling, amongst other things. It is a systematic effort to improve how individuals comprehend communication in various contexts and express themselves to others. EI is provided at a very young age to improve developmental outcomes. These services can have a significant, positive, impact on the child, allowing for improvements in daily routines and/or an overall better quality of life (Guralnick, 2017).

In the past, family-centered practices were encouraged with the goal of having active parent participation (Dunst, & Espe-Sherwindt, 2016). Recommended practices in the field of Early Intervention (EI) included the use of parent-implemented intervention, teaching the caregiver to embed intervention in everyday routines and activities (Brown & Woods, 2015). The goal is to ultimately support the parent in promoting their own child's development, while giving them the tools to do so. This type of EI includes programs in which the parent is guided by a trained early interventionist with the use of various coaching strategies. These strategies are used to assist the parent and encourage him/her to independently carry out intervention with their child. With parent-implemented intervention, a provider is needed to carry out the coaching of the child's parent. Strictly defined coaching strategies are necessary in this intervention to allow the provider to assist and guide the parent. The need exists to have an operational coaching definition and to reach a consensus on that definition (Kemp, & Turnbull, 2014). Although there is some research on coaching strategies for EI providers, there is still a question of whether these strategies directly affect the parent-implemented intervention and eventually benefit the child.

The field of EI does know, however, that the parent and child relationship is key to making any progress in the child's communication skills.

Due to children's various communication needs, it is important the provider and parent come to a consensus on what they decide the child's priorities and targeted skills are. The focus should then be placed on daily activities and routines in the home, where communication is immediately functional and meaningful for the child. Coaching strategies need to be flexible and able to adapt to any situation for this reason. Providers, however, need to strengthen their knowledge on how to collaborate with parents during intervention sessions. Previously, early intervention was directly between the provider and child rather than the provider, parent and child as a triad (Friedman, Woods & Salisbury, 2012). The parent assumed a passive role in most home visits and simply watched the EI provider work with the child, rather than participating (Woods, Wilcox, Friedman, & Murch, 2011). With limited evidence based professional development and no consensus on coaching strategies, providers fell short when it came to coaching parents (Kemp & Turnbull, 2013).

The first 3 years of life are critical for language acquisition due to the maturing and developing of the brain. Mastering the skills of language comes in a natural progression and is typically tracked in milestones. Within these early stages of development, an enormous amount of information is learned and retained. This knowledge and development will eventually lead to more growth opportunities later in life. From setting the foundation for social interactions and allowing for the expression of needs and wants, language acquisition is ultimately necessary for a successful life. Failure to learn how to communicate can have severe consequences for a child. Although a child's ability to acquire language is innate, the parent's role has a major influence on the quality of language that they develop.

As a parent of a typical child or a child with a disability, the role that is taken on is an important one. The parent's role is imperative to the linguistic competence of the child. They serve as models and teachers for their children in this malleable period of development. A parent is the initial person to expose language to their newborn and they continue to expose them to daily communication throughout these formative years and beyond.

An interaction between a caregiver and child, specifically one with a significant delay or disability, may not come naturally. Unfortunately, a parent may not know that they need to encourage this interaction and if they do know, they may not know how. The speech-language pathologist (SLP) or provider will have to step in for this exact reason. It is their role to try and coach the parent in encouraging this exchange between their child and his or her peers. It is important that this early intervention is conducted in meaningful contexts; real-world, interactive, social settings with responsive partners to communicate with.

Embedded Practices and Intervention with Caregivers (EPIC)

Archived video data collected from the children and their caregivers who participated in the Embedded Practices and Intervention with Caregivers Project (EPIC) will be used for this study. EPIC is a multisite Goal 2 project funded by the Institute of Education Sciences for developing, refining, and evaluating an intervention to increase the capacity of caregivers to embed learning opportunities in their everyday activities to enhance learning outcomes for children with significant disabilities (www.epicintervention.com). The EPIC approach includes two distinct components drawn from Family Guided Routines Based Intervention (FGRBI) (Woods, Kashinath, & Goldstein, 2004; www.fgrbi.fsu.edu) and Caregiver Coaching (Woods, Wilcox, Friedman & Murch, 2011). FGRBI is an early intervention approach that uses a collaborative process for building consensus and coaching the caregiver within the home visit to

support their child's learning in the context of daily routines. The FGRBI coaching framework, SOOPR (Setting the Stage, Observation & Opportunities, Problem-Solving & Planning, Reflection & Review) (Brown & Woods, 2015; Romano & Woods, 2018; Salisbury, et al, 2017; Woods, Wilcox, Friedman & Murch, 2011; Windsor et al., 2019), aligns with recommended adult learning and family capacity building strategies by engaging the caregiver as the decision maker, gaining consensus on the child's learning priorities, using everyday routines and activities as contexts for embedding instruction, providing ongoing practice and support with feedback, and engaging the caregiver in problem-solving and reflection (Bransford, Brown, & Cocking, 2000; Knowles, Holton, & Swanson, 2011). FGRBI is a flexible framework for delivering child intervention strategies to caregivers and allows the caregiver to embed different types of targets within and across the routine using naturalistic instructional strategies. Recent studies have shown FGRBI is a promising approach for increasing caregiver capacity and competence for supporting the communication of young children with varying disabilities (Brown & Woods, 2015, 2016; Friedman & Woods, 2015, Romano & Woods, 2018).

The rationale for this study, which builds upon a larger study examining the changes over time in parents and early intervention providers, is to examine the development of child communication over time within parent-implemented intervention. It is important to understand whether parent coaching has an effect, if any, on children with significant developmental delays. The aim of this paper is to establish communicative codes that will then be used to code the observational data from the project home visits to evaluate whether there are differences in growth rates for children across home visiting approaches.

Methods

This current study will review videos collected as part of the EPIC study and focus on child communication with their caregiver within two groups. The EPIC Caregiver Coaching group includes 18 EI providers who completed professional development (PD) on family guided routines, caregiver coaching and the use of a 5-Question (5Q) Visual Model to support and guide parents to embed early intervention into their daily routines and activities. EI Providers in the EPIC condition also received video conferencing coaching after each 3-4 home visits as a component of the PD. The other condition, referred to as “business as usual” (BAU), includes 13 early intervention providers coaching families as they usually do within the local early intervention program.

Participants

Participants for the EPIC study included early intervention providers, caregivers and their children and were identified by Part C Early Intervention agency administrators in regions of Iowa and Pennsylvania based upon the child’s diagnosis for eligibility in the program. Families were contacted and recruited into the study by agency administrators and then randomized to either EPIC caregiver coaching or BAU. Providers, also recruited by the agency, met inclusion criteria of providing early intervention services using a coaching approach for at least two years and willingness to participate in research that included video recording home visit sessions. Once families were identified and consented, providers serving children in the BAU condition continued their services as usual with the exception that they collected video of their home visit at three time points. Providers were assigned children not on their current caseloads and participated in EPIC professional development. Children enrolled in the EPIC treatment were identified with moderate to severe disabilities as confirmed by the ABILITIES Index

(Simeonsson & Bailey, 1991). There was no significance between group differences on the ABILITIES Index between EPIC Caregiver Coaching and BAU.

As part of the larger EPIC investigation, demographic data was collected and compared across experimental conditions for child gender, child ethnicity, primary language spoken in the home, type of complications experienced by the child during birth, type of major surgeries the child had experienced, if the child had a history of ear infections, if the child had P-E tubes, if the child had been re-hospitalized or had surgery after birth and the reasons for the hospitalization or surgery, if the child was taking medications or supplements, and the child's eligibility category for Part C and the child's diagnostic category. The family or primary caregiver variables included on the demographic survey included mother and father ethnicity, mother and father level of education, mother and father employment and if employment status had recently changed, family yearly income, if the family was receiving additional supports (e.g., Medicaid, food stamps) and the type of supports being received, area in which the family resided (e.g., urban, rural, suburban), if the family had moved recently, and marital status. See Table 1. For caregiver demographics.

There were statistically significant differences for only two of the child-focused demographic or attribute variables for children assigned to the EPIC Caregiver Coaching versus BAU condition: (1) complications during delivery, with eight children in the EPIC condition being premature versus two children in the BAU condition; and (2) prescriptions for health-related issues, with 13 children in the EPIC condition receiving medication versus 5 in the BAU condition. For family/caregiver variables, there were no statistically significant differences for families/caregivers assigned to the EPIC Caregiver Coaching versus BAU condition with all p calculated values $>/.05/$.

Procedures

Video observation. The first step will be to identify video segments for coding. Segments from the approximately 60-minute videos of home visits will be reviewed to capture parent child communication as it occurs within their everyday routines. Every portion of the video containing a routine will be coded for communicative acts and functions. Using the routine as the context increases the opportunity to observe caregiver and child communication rather than EI provider and caregiver conversation. These routines include: hygiene-related like washing hands, getting a diaper change, caregiving routines like getting dressed and putting on shoes, play with objects, playing social games like peek a boo, and others. Routines coding was conducted prior to this investigation.

Observational coding scheme for child communication. The observer/coder will use the coding scheme described below using Noldus Pro Observer XT Version 12.5. The coding scheme that will be used to collect data on child communication consists of gestures, vocalizations/words/phrases, and functions of the communication. See Table 3 for definitions. The coder will first identify that a communication act has occurred. They will then decide if a gesture is present and if it is, whether it is a deictic, representational or contact gesture. Deictic gestures include giving, a push/pull away, reach-object, reach-person, showing, a tap/pat, point to touch, or a point distal. A representational gesture is split into two types, conventional and iconic. A conventional gesture includes the shaking of the head/arms/body, a wave, clapping, blowing a kiss, “shh”, a nod, thumbs up, hand up, shrug, and a high five. An iconic gesture refers to a gesture that represents an attribute of something. This is typically visually related; for instance, bouncing up and down to represent a bunny hopping. Baby signs and American Sign Language also apply to this communicative act. A contact gesture is contact without an object.

This includes self-injurious, the push/pull of a person, and hand as a tool. When a child is self-injurious, they may hit themselves or bang themselves on an object. A child is displaying push/pull of a person when they push or pull on an adult's arm, hand, body, face, or legs. Hand as tool refers to a child leading an adult's hand or body with their hand in order to achieve something.

The coder will then observe the child and determine whether the behavior was a vocalization, single-word or phrase. A vocalization can include any pre-speech sounds that are not recognizable as words: babbling, laughs, cries. A single-word refers to a single word, like "mama" or "water", while a phrase refers to the combination of two or more spoken words. An example of a phrase could be, "want it" or "mama up".

The coder will choose between three communicative functions: behavioral regulation, social interaction, or joint attention. Behavioral regulation is displayed when the child requests or protests an object or event. Social interaction refers to any sort of playful interaction; for instance, counting numbers, playing tag, tickling, etc. Joint attention is displayed when the child attempts to call attention to an object/event or is focused on something with the parent. The coder can also choose "unclear" if the purpose of the communicative act cannot be determined.

Training and Inter-rater Reliability. The author of this study, along with one undergraduate research assistant, will serve as coders. They will both be blind to the group that the children are in. Coding procedures and definitions will be carefully reviewed prior to coding for this study to ensure consistency. In addition, the author and research assistant will practice coding in-home sessions from videos not included in this study. The coders will move forward with the videos from this current study when they have completed inter-rater reliability. Inter-rater reliability represents the extent to which the data collected is an accurate representation of

the variables measured. This will be assessed by using Cohen's kappa coefficients which states that the coders must be in agreement of a kappa $>.60$ (Landis & Koch, 1977). If reliability measures are below the kappa criterion level, the coders will need to complete additional training until the kappa criterion level is met.

Proposed Analyses

After the coding is complete, the data will be analyzed using Noldus and Microsoft Excel or a statistical package like Statistical Package for the Social Sciences (SPSS). Noldus calculates descriptive statistics on rate per minute of communication acts coded, which can be exported to Excel. Noldus also provides a count of child communication acts, which will allow for calculating relative frequencies (proportions) of different communication acts that occur during observations.

The distribution of the data will be examined using histograms. If appropriate, independent samples t-tests will be used to compare the two groups on different communication variables. If the data is skewed, a non-parametric Mann-Whitney test of independent samples will be used. Once these are complete, it will be crucial to analyze the change over time within each group. For instance, did the BAU group increase their own rates of communicative acts over time? This will be completed using a dependent sample t-test or a Wilcoxon signed rank test. If possible, given the data that is ultimately collected, analyses examining change across the three time points may be explored.

Results

It is anticipated that the frequency of communication acts between the caregiver and child will be greater in the EPIC group. However, the types of communication acts may not differ between the groups because of the short duration of the study.

Table 1
Caregiver participant demographics

	EPIC (n=18)	BAU (13)
		Female = 12
Gender	Female = 18	Male = 1
Age, M (range)	33 (22-43)	32 (23-41)
	PA = 10	PA = 4
State of residency	A = 8	Iowa = 9
	Some HS = 1	Some HS = 1
	HS Graduate = 7	HS Graduate = 2
	Associate's = 2	Associate's = 3
Highest level of education	Bachelor's = 5	Bachelor's = 4
	Post-grad = 3	Post-grad = 3
		Mother = 11
		Father = 1
Role/Title	Mother = 18	Guardian = 1
	Black = 1	
	Hispanic = 2	Asian = 1
	White = 14	Hispanic = 1
Race/Ethnicity	Multiracial = 1	White = 11
		English = 9
		English+Spanish = 1
	English = 16	English+Tagalog = 1
	English+Spanish = 2	English+ASL = 2
Languages used in the home		

Note. EPIC = Embedded Practice for Intervention with Caregivers; BAU = business as usual; M = mean; HS = high school; ASL = American sign language

Table 2
Child demographic variables

Variable	Categories	BAU N = 20	EPIC N = 22	X ² or d	p			
Child's Gender	Male	10	13	0.14	0.745			
	Female	7	7					
Child's Ethnicity	Black/Not Hispanic	1	1	2.24	0.942			
	Hispanic/Latino	1	2					
	White/Not Hispanic	14	16					
	Asian/White	1	0					
	Black/White	0	1					
Language	English	13	18	3.92	0.263			
	Spanish	1	2					
	Filipino	1	0					
	Sign Language	2	0					
Complications during delivery	No	6	7	17.55	0.006			
	Hydrocephalus	2	0					
	Respiratory difficulties	1	0					
	Congenital heart defects	0	1					
	Labor complications	2	0					
	Genetic condition	0	1					
	Blood disorder	0	1					
	Prematurity	2	8					
	Major Surgery	Multiple (e.g., prematurity +hear or other)	4			0	11.35	0.097
		Congenital, not heart	0			2		
None		9	10					
Heart		1	5					
Not specified		0	1					
Multiple		4	1					
Shunt		2	0					
Hernia		0	1					
Ear Infection	Feeding	0	1	2.49	0.204			
	Brain	1	0					
	Debulking Surgery	0	1					
	No	15	20					
Ear Tubes	Yes	2	0	1.13	0.428			
	No	17	20					
Hospital	No	12	17					

	Yes	5	3		
	Do not know	0	1		
Reason for eligibility	Established Eligibility	8	5	1.96	0.188
	Developmental Delay	9	15		
State Eligibility	Established Eligibility	10	12	0.09	1
	Developmental Delay	10	10		

Table 3
Communicative Acts

Vocals	Definition	Examples	Non-Examples
Vocalization	Any pre-speech sound that is not recognizable as a word	Consonant I, vowel (V), or CV, Babbling, cries, laughing, whining	Any noise that isn't paired with a communicative function Ex: Child babbles to himself while caregiver isn't looking
Single Word	Any single word or approximation that is recognizable as a word	"mama", "wawa" (water), "ball", "uh-oh", "da-da"	Unrecognizable word
Phrase	Any combination of two or more words	"up please", "big train", "want it"	Unrecognizable phrase

Gestures

Deictic Gesture	Definition	Examples	Non-Examples
Give	Giving an object to someone	Child gives a book to mom to indicate wanting to read the book	Child throws something across the room

Push/Pull Away	Pushing or pulling an object or self away from someone	Child pushes a ball away to reject playing	Child pushes a button
Reach-Object	Reaching toward an object to request	Child reaches for a sippy cup to indicate wanting a drink	Child simply picks something up
Reach-Person	Reaching toward a person by holding arms out or up	Child reaches up towards caregiver to indicate wanting to be picked up	Child throws hands up for no purpose
Show	Holding up an object to bring attention to it	Child holds up a toy and shows caregiver	Child is simply holding a toy in front of him/her
Tap/Pat	Tapping or patting an object with fingers or a hand	Child taps a toy during a social game	Child places hand on something and keeps it there
Point to touch	Pointing to an object and clearly touching it with the index finger	Child points to a letter with his/her index finger	Child puts whole hand on letter
Point distal	Extending the index finger to point at an object or person that is out of reach	Child points distally at a toy to indicate wanting to play with it	Child uses whole hand rather than index finger to indicate wanting something

Representational Gesture	Definition	Examples	Non-Examples
Shake head/arms/body	Shaking the head/arms/body to refuse, protest or call attention to themselves	Child shakes arms/body during a tantrum to indicate refusal to eat	Child shakes body with no communicative intent
Wave	Waving for a greeting or a goodbye	Waving hello when another caregiver enters the room	Shaking hand
Clap	Clapping hands	Clapping hands during a social game	
Blow a kiss	Blowing a kiss	Blowing a kiss towards the caregiver	
Shhh	Bringing a finger to the lips to indicate “Shh”	Showing “Shh” when the caregiver is too loud	Child is pointing to lips
Nod	Nodding the head to indicate “yes”	Clear head nod after the caregiver asks the child a question	Child is simply shaking head around
Thumbs up	Holding a thumbs up to indicate “yes”, “good”, or any other form	Caregiver asks child if he/she is having fun and he/she gives a thumbs up	
Hand up	Putting a hand up to mean “wait” or to	Child puts hand up to caregiver when caregiver tries to grab a toy	Child is reaching for an object

	express something in a dramatic way		
Shrug	Shrugging shoulders or holding hands up to indicate "I don't know"	Caregiver asks child a question and child shrugs	No communicative function correlated with shrug
High five	High five or fist bump	Caregiver asks for a high five and child returns one	Child is tapping the caregiver's hand

Representational Gesture: Iconic	Definition	Examples	Non-Examples
Baby Sign	A gesture that depicts aspects of a referent, usually visually related	Flapping arms to represent a bird, bouncing up and down for "horse" or "bunny", waving arm by nose to represent an elephant, baby signs	Child simply jumping up and down for fun rather than to represent something
Multiple Sign Combination	Two recognizable signs used as a phrase	Signing, "more please"	
Contact Gesture	Definition	Examples	Non-Examples
Self-injurious	The child hits or bangs self on an object, typically the ground or a seat	Biting oneself, hitting head on car seat	Child is shaking body for attention but not injuring him/herself

Push/pull person	Pushing or pulling on a person's arm, hand, body, face or legs	Child pulls caregiver's arm to indicate being angry	Child is trying to use the caregiver's hand as a tool
Hand as tool	Child leads the adult's hand or body with their hand to achieve something	Child guides the parent's hand to a door to try to get them to open it	Child is simply grabbing the caregiver for no purpose

Communicative Function	Definition	Examples
Behavioral Regulation	The child requests or protests something	Child reaches up to indicate his/her desire to be picked up, child screams to protest food
Social Interaction	The child continues a social interaction, attracts or maintains the adult's attention to notice oneself	Playing a social game like peek-a-boo, teasing, tickling
Joint Attention	Child directs the adult's attention to an object or event, not to request	Child points at dog to get mom to notice it, mom and child are naming animals in a book together
Unclear	The purpose of the communicative act cannot be determined; however, the judgment is made that the child was directing communication	

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