Journal of Modern Rehabilitation

Research Article

Investigating the Non-Verbal Communication in Iraqi Preschool Children with Normal Development and Autism Spectrum Disorder

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Citation Al-keweledy HAM, Soleymani Z, Alhaideri A, Zadeh Labbaf F, Shahhoseini F. Investigating the Non-Verbal Communication in Iraqi Preschool Children with Normal Development and Autism Spectrum Disorder. Journal of Modern Rehabilitation. 2023; 17(4):438-449. http://dx.doi.org/10.18502/jmr.v17i4.13893

http://dx.doi.org/10.18502/jmr.v17i4.13893

Article info:
Received: 22 Nov 2022
Accepted: 26 Dec 20222
Available Online: 01 Oct 2023

Keywords:
Autism spectrum disorder; Nonverbal communication; Preschool children; Iraq

ABSTRACT

Introduction: Autism spectrum disorder (ASD) is a neurodevelopmental condition characterized by difficulties with language, cognition, and social interaction. The diagnostic and statistical manual of mental disorder, fifth edition used "spectrum" to show the variability in etiology and phenotypic levels. This study aims to compare nonverbal communication skills in normally developing and autistic children in Karbala City, Iraq.

Materials and Methods: This was a cross-sectional study. Two sets of children (ASD and normal) were matched in terms of age and socioeconomic state. A total of 50 individuals were recruited with 25 ASD and 25 normally developing children without any history of psychological abnormalities. The child's parent/caregiver provided all the demographic information and medical history. The information was gathered from 10-min videos separately recorded for each child, regular contact with them, and continuous interviews with their parents and caregivers. The researchers developed a pre-designed data collection questionnaire according to the non-verbal skills of 3-5-year-olds, including body language, eye contact, and facial expressions. The questionnaire was filled out by the first author. Finally, the gathered data were analyzed by the SPSS software, version 25 (IBM Corp, Armonk, NY).

Results: Comparing the total scores revealed a significant difference between the ASD and normal group in gestures ($P \leq 0.001$), phonetics ($P \leq 0.001$), body language ($P \leq 0.001$), and artifacts ($P \leq 0.001$). Normally developed children scored significantly higher than ASD children in all 4 variables. However, in the maladaptive behavior ($P \leq 0.001$), the significant scores were for ASD children compared to normal children.

Conclusion: The results showed that ASD children experience difficulty in nonverbal communication skills. They also have maladaptive behaviors. The main reason for this behavior is their inability to communicate non-verbally.

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1. Introduction

Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by difficulties in language, cognition, and social interaction. The diagnostic and statistical manual of mental disorders, fifth edition (DSM-5) used the term "spectrum" to show the variability in etiology and phenotypic levels [1, 2]. ASD has increased almost 20-fold in the last 30 years [3]. ASD is characterized by difficulties in connecting with people, language delays, echolalia, confined and repetitive activities, ritualistic use of language, and resistance to change [3]. ASD is a phenomenon that arises during the development period, often in early childhood, according to the World Health Organization (WHO) in the international classification of diseases version 11 (ICD-11) [4]. Symptoms typically appear before the age of 2 mostly in the way babies respond to auditory or visual stimuli, as well as in linguistic issues. However, the symptoms became fully revealed later as the autistic child's capacities are exceeded by greater social demands. ASD is defined by a child's inability to start and maintain social connections and communication. These characteristics have a negative impact and hinder in a variety of areas, including personal, familial, social, and educational subjects. Some autistic children's traits may be utilized as diagnostic criteria [5-7]. The autistic kid has difficulty understanding, expressing in their desires, feelings, thoughts, and conversing [8, 9].

Communication skills begin with adult-child interaction and are classified as verbal and gestural (body and face movements). One of the aspects of ASD that impacts social interaction and learning may be the absence of vocal communication [10]. Typically growing children can learn multiple communication skills at the same time; however, the development of nonverbal communication abilities is more visible from 9-12 months of age; this is not the case in children with ASD [11]. Children with ASD should learn these abilities, and it is usual for them to reach their goals more effectively through body movements to compensate for difficulties in other types of communication, such as eye contact and gestures [12, 13]. Moreover, nonverbal communicative abilities in children with ASD should be encouraged by teaching so they can realize their full potential in terms of social interaction skills [10]. It is needed to encourage children to play and mix in with their peers and others to stimulate these skills to not be introverts [14].

Children with ASD have more difficulties making nonverbal expressions and communicating nonverbally, such as gestures, facial expressions, eye contact, and pointing to demonstrate something [11]. Many parents of children with ASD detect these signs as early as the first year. When compared to average development, children with autism have poorer intentional communication. Understanding nonverbal communication abilities in children with autism is vital in this regard, especially understanding how to stimulate them, either at school or at home [14-16]. However, it is required to know how to interpret the modes of communication that children with autism utilize as a unique resource of expression. Parents, teachers, and professionals who work with children with ASD should appreciate their language and provide meaning to the way they communicate (verbal and nonverbal communication) [17, 18]. According to research, nonverbal communicative abilities, such as gestures, show more commonly in autism than vocal and linguistic skills. Even in autism, gestures are a kind of nonverbal communication that can be used to express intentions [19, 20].

Verbal ASD individuals can communicate regularly and well while non-verbal autism patients cannot utter anything or say very little [10, 17, 20]. It is estimated that approximately 25% to 35% of children with ASD are nonverbal [21]. Some people with nonverbal autism learn to use a few words in meaningful ways; however, they are unable to hold a conversation [22]. As a result, nonverbal autistic children must be encouraged to engage with others, play, and participate in recreational activities. Gestures and eye contact can be extremely beneficial in language development. ASD children should be allowed to express themselves freely and without undue pressure [18]. Many academics are concerned about the issue of communication development in children with ASD. This is primarily because communication difficulties are a significant impediment to ASD children's social adaption [10-12, 17, 18].

By considering that no study exists about non-verbal communication skills in ASD children in Iraq, this study aims to find out the differences between nonverbal communication skills in ASD children and normal children in Karbala, Iraq.

2. Materials and Methods

Study participants

This was a cross-sectional study with analytic utility that was carried out in Karbala, Iraq. Two sets of children (ASD and normal) were grouped in terms of age. The participants in this research were 25 ASD patients and 25 normally developing children with no history of psychological abnormalities. Normal children were selected from preschools. The children with ASD were admitted to the Autism Center and Psychiatry Clinics at Al-imam Al-Hussain. Signed informed agreements were obtained from the children's parents/caregivers before their enrollment in the study. The study included children in the age range of 3 to 5 years. They were diagnosed with ASD

by a psychiatrist based on the DSM-5 criteria or autism diagnostic tests, such as the autism diagnostic observation schedule and the Gilliam autism rating scale. Both genders were represented in this study. Non-Iraqi children and children whose parents refused to sign the parental informed consent were excluded from the ASD and normal groups. Children with psycho-neurological conditions for health controls and ASD children whose treatment program included an augmentative system or nonverbal communication system (for instance pointing) were also excluded. The socioeconomic characteristics of the normal children who were included were nearly identical to the ASD group. The demographic information and medical history were collected from parents/caregivers.

Study materials

The information was gathered using a pre-designed data collection questionnaire. To develop this questionnaire, different materials, such as textbooks, papers, and existing checklists in English were studied. Among different skills that were related to nonverbal communication, the main and frequent items that are used by 3- to 5-year-old children were selected. The items were categorized into gestures (the ability to use signs, facial features, hand and body motions), phonetics (the ability to use vocal skills), body language (the ability to use physical behaviors to convey information), artifacts (the ability to use pictures and items to communicate with others). Moving the head up and down to say "yes," "okay," "I agree," and "hello," and holding the index finger straight while the other four fingers are closed are two examples of gesture variables. Expressing sounds along with changing the song to get attention, requesting, and protesting or rejecting something, or saying one-word or multi-word phrases to receive attention, requesting, objecting, or rejecting something are two examples of the phonetic variables. The child looks at the audience first and then at the object, looks at the audience again, or the child looks at the object first, then at the audience, and looks at the object again, and eye contact occurs when parent and child look at each other's eyes at the same time for longer than 1 second are examples for body language variables. Using objects or images to communicate with others is an example of artifact variables. Crying is often an example of a maladaptive behavior variable. The items on the checklist are in Appendix 1. We used a numerical rating scale to assess the validity of items regarding the following question: "To what extent do the children use these items during the meeting? [23]" This checklist was assessed by 4 specialists who are psychiatrists, speech therapists, efficient speech therapy trainers, and pediatricians. We required an agreement percentage of 80 among specialists to consider the result as a valid checklist. In the beginning, they read the checklist and give some suggestions, then we worked on their suggestions and inserted them into the checklist. Next, they were checked with the checklist with 80%. When the experts confirmed the elements on the checklist, the checklist was used to measure nonverbal communication skills.

Study procedures

The researcher got acquainted with the children and their parents by visiting each child. At least a 10-min movie in which the parent or the trainer interacted with the child was recorded for each child. The movies were divided into segments and checked based on the frequency of nonverbal skills. The first author completed the checklist for each ASD and normal child by watching the 10-min movie at the Al-Imam Al-Hussain Autism Center.

The inter-rater reliability of the checklist was investigated by measuring the agreement percentage between the checklist scores of the first author and a PhD student who studied speech therapy. They watched the movies and completed the checklist. The agreement percentage was calculated at 80%. The discriminant validity of the checklist was also calculated by comparing the scores of children with ASD and typically developed children. The comparison of nonverbal skills between both groups was also provided to find out the nonverbal communication abilities in Iraqi ASD children.

Data analysis

The dependent variables included nonverbal communication skills in both the ASD and control groups. The clinical characteristics were included as independent variables. The individual characteristics were explained by descriptive statistics. Meanwhile, gestures, phonetics, body language, and artifacts as well as maladaptive behavior were analyzed by comparing the frequencies between the two groups. The normality of the data was assessed by the Shapiro-Wilk test. The data significantly deviated from a normal distribution. The non-parametric Mann-Whitney U was used to compare the mean difference between ASD and normal children scores of the measured variables. A $P<0.05$ was considered statistically significant by analyzing the data via the SPSS software, version 25.

3. Results

The control group included 25 normal children without ASD or any congenital disorder while the experimental group consisted of 25 children with ASD. We considered gestures, phonetics, body language, artifacts, and maladaptive behavior for nonverbal communication skills to study the differences between the two groups. All children were in the age range of 3 to 5 years.

Gestures were signs, facial features, hand and body motions in depiction, and when each child interacted separately. It was shown that children with ASD cannot utilize these gestures and do not grasp what they signify, as shown in Table 1. The group with 25 normal children could use the gesture elements in the questionnaire with 11 as the lowest rate of use for one child, 24 by 5 children, and 27 as the highest rate of use for one child. This is while the highest rate of items used for children with ASD was 9 for one child out of 25 children with ASD participating in the study, and the lowest rate was 0 for 6 participating children.

After evaluating 3 phonetics items, it was discovered that individuals with ASD lacked the ability to develop vocal skills

Table 1. Gesture frequency in normal and autistic children

Group	No.	No. (%)	%	
	Gestures	Children Showing This Behavior	Valid	Cumulative
Normally developed children	11	1(4)	4	4
	13	2(8)	8	12
	16	1(4)	4	16
	17	1(4)	4	20
	19	3(12)	12	32
	20	3(12)	12	44
	21	2(8)	8	52
	22	2(8)	8	60
	23	3(12)	12	72
	24	5(20)	20	92
	25	1(4)	4	96
	27	1(4)	4	100
	Total	25(100)	100	
Autistic children	0	6(24)	24	24
	1	2(8)		32
	2	1(4)	4	36
	3	2(8)	8	44
	4	5(20)	20	64
	5	3(12)	12	76
	6	2(8)	8	84
	7	2(8)	8	92
	8	1(4)	4	96
	9	1(4)	4	100
	Total	25(100)	100	

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Table 2. Phonetics frequency in normal and autistic children

Groups	No.	No. (%)	%	
	Phonetics	Children, Showing This Behavior	Valid	Cumulative
Normally developed children	0	3(12)	12	12
	1	2(8)	8	20
	2	4(16)	16	36
	3	15(60)	60	96
	4	1(4)	4	100.
	Total	25(100)	100	
Autistic children	0	23(92)	92	92
	1	1(4)	4	96
	2	1(4)	4	100
	Total	25(100)	100	

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Table 3. Body-language frequency in normal and autistic children

Group	No.	No. (%)	%	
	Body Languages	Children Showing This Behavior	Valid	Cumulative
Normally developed children	0	1(4)	4	4
	1	1(4)	4	8
	2	2(8)	8	16
	3	3(12)	12	28
	4	16(64)	64	92
	5	2(8)	8	100
	Total	25(100)	100	
Autistic children	0	12(48)	48	48
	1	11(44)	44	92
	2	2(8)	8	100
	Total	25(100)	100	

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compared to normal children. Table 2 shows that only 3 of the 25 normal children did not demonstrate any vocal abilities during their interaction, such as altering the tone of voice or expressing what they wanted with one or more words. In contrast, only two of the 25 children with ASD could demonstrate vocal skills. This is an extremely low number when compared to normal children.

Table 3 shows that the development of body language skills in normal children is faster than in children with ASD, as the mean values of frequencies in normal children range from 0 to 5, whereas with ASD children, they range from 0 to 2, where the mean value of 0 in the group of normal children had 1 child compared to 12 children in the group with ASD.

Table 4. Artifacts frequency in normal and autistic children

Group	No.	No. (%)	%	
	Artifacts	Children Showing This Behavior	Valid	Cumulative
Normally developed children	0	3(12)	12	12
	1	22(88)	88	100
	Total	25(100)	100	
Autistic children	0	22(88)	88	88
	1	3(12)	12	100
	Total	25(100)	100	

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Table 5. Maladaptive behavior frequency in normal and autistic children

Group	No.	No. (%)	%	
	Maladaptive Behaviors	Children Showing This Behavior	Valid	Cumulative
Normally developed children	0	25(100)	100.0	100.0
Autistic children	0	1(4)	4.0	4.0
	1	10(40)	40.0	44.0
	2	7(28)	28.0	72.0
	3	5(20)	20.0	92.0
	4	2(8)	8.0	100.0
	Total	25(100)	100.0	

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Using pictures and items to communicate with others is one of the nonverbal communication abilities known as artifacts. It was used to compare normal children to those with autism. As indicated in Table 4, only 3 of the 25 normal children who participated in this study did not employ this skill, while the other 22 performed the skill. In contrast, only 3 of the 25 autistic children in this study employed the skill.

Crying is a maladaptive behavior that was noticed in children with autism who participated in this study but not in normal children (Table 5) which reveals crying behavior in children with autism and its absence in normal children.

Table 6 shows the results of mean ranks for the 2 groups in "gestures," the mean rank for normally developed children was 38, while the mean rank for autistic children was 13. In "phonetics," the mean rank for normally developed children was 36.18 while the mean rank for autistic children was 14.82. The significance (2-tailed) for all variables was <0.001, which is smaller than 0.05; accordingly, the mean difference between the two groups is significant for all 5 variables.

4. Discussion

This study aimed to evaluate the differences in nonverbal communication skills in children with ASD and normally developing children in the age range of 3 to 5 years. It was hypothesized that children with ASD would, for the most part, show more difficulty with nonverbal communicative skills compared to normally developed children. These hypotheses were confirmed. This result also revealed the discriminant validity of the checklist; therefore, the present study investigated nonverbal communication skills with a valid and reliable checklist.

The researcher assessed a variety of nonverbal communication skills (gestures, phonetics, body language, and artifacts) by watching recorded movies of interaction between child

Table 6. Comparison of nonverbal communication between normal and autistic children (n=25)

Variables	Group	Mean Rank	Sum of Ranks	Mann-Whitney U	Wilcoxon W	Z	Asymptotic Significant Value (2-tailed)
Gestures	Normally developed children	38	950	0	325	-6.078	0.000
	Autistic children	13	325				
Phonetics	Normally developed children	36.18	904.5	45.5	370.5	-5.681	0.000
	Autistic children	14.82	370.5				
Body language	Normally developed children	36.86	921.5	28.5	353.5	-5.697	0.000
	Autistic children	14.14	353.5				
Artifacts	Normally developed children	35	875	75	400	-5.32	0.000
	Autistic children	16	400				
Maladaptive behavior	Normally developed children	13.5	337.5	12.5	337.5	-6.308	0.000
	Autistic children	37.5	937.5				

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and parent. A valid and reliable checklist was developed for this assessment. According to the findings of this study, nonverbal communication skills development in typically developing children is more than in autistic children. After reviewing the recorded movies, the research team added maladaptive behavior. Similar to other studies [24], the present study discovered that the majority of ASD children cry and exhibit behavior that is unable to adjust to others. Maladaptive behaviors may be a way for conveying information that shows the child does not like the situation.

Arm and hand movements that coincide with speech are referred to as co-verbal gestures [25]. They enrich language content, regulate speech flow, keep the attention of a speaker and listener during a discussion, alter a conversational topic, facilitate the continuance of a topic, and emphasize a specific topic or material [26]. Normally developed children outperformed children with ASD of the same developmental age [27]. This study confirmed that the development of gestures in normally developed children is significantly greater than in autistic children. Phonetic fluency is measured by counting the number of words formed in 1 min [28]. Strategic searching, retrieval abilities, response initiation monitoring, shifting, and flexibility are all part of phonemic fluency [29]. Several researchers have reported that children with ASD can develop similar word recognition skills to the ones seen in typically developing children [30, 31]. The development of some letter-name knowledge and phonetics instruction may be beneficial to children with ASD [32, 33]. In this study, we noticed a difference in phonetic skills between normal and autistic children. All the statistics we used indicated higher scores in normal children compared to children with autism, even when using the Mann-Whitney U test, the mean rank for normal children was higher than that of autistic children.

Nonverbal communication, such as body language, is a way that could occur without the use of spoken words. This type of communication relies on nonverbal messages that people transmit to one another. These messages and behaviors include the use of facial expressions, body movements, posture or gestures, vocal qualities, time, place, and even fragrance [34]. A visually challenged child (effect of visual problems on communication) cannot perceive most of these communication cues, making it difficult to follow and interpret nonverbal behaviors [34]. Three recent thorough reviews of research in this field have been published. Each of these assessments found substantially different findings, reflecting the differences among individual studies. Uljarevic and Hamilton did a meta-analytic evaluation of studies primarily evaluating face perception and reported that there was a minor but statistically significant effect showing that ASD children had lower emotion perception than matched normal children [35], Begeer S, in terms of basic emotion perception skills, children with ASD did not differ from controls who did not have ASD [36]. In this study, we discovered that there is a small difference in body language skills between normal children and autistic children, similar to the study of Uljarevic and Hamilton [35].

Numerous studies have reported abnormal behavior of ASD children toward social stimuli. For instance, Volkmar and Mayes, 1990 [37] observed that ASD children look less frequently toward the face of others; however, other studies found that autistic children look at faces as much as normal children but showed abnormal timing of gaze behavior [38, 39]. In this study, we discovered that a measured difference between normal and autistic children in the artifact as the scores for normal children were significantly higher than those for autistic children.

Maladaptive behavior is a prevalent indication of autism. It is observed from the early stages of development, with up to 97% of children with autism demonstrating abnormal sensory processing that remains throughout their lives [40]. Several studies have looked into the relationship between various abnormal sensory traits and maladaptive behavior in children with autism. After controlling age and intellectual ability, abnormal sensory processing clarifies a significant amount of variance in such behaviors [41]. Notably, higher sensory avoidance strategies have been linked to increased irritation in multiple investigations [41], although sensory desire and sensitivity may be linked to hyperactivity and aggressive behavior [41, 42]. Other findings show the relationship between unusual sensory traits, such as avoidance and sensitivity, and internalizing and externalizing issues in children on the autistic spectrum [43]. In this research, we discovered that the maladaptive behavior (crying) in autistic children is greater compared to normally developed children which revealed that the mean rank for autistic children was greater than normal children. These abilities were chosen because they help children communicate and cooperate, as well as the challenge of dealing with 3 to 5-year-olds who tend to use nonverbal skills, such as head or hand signs during interviews.

There is no tool for the assessment of nonverbal communication in Iraq. Therefore, we developed a valid and reliable checklist for the assessment of this skill. However, because of time constraints, we could not assess some psychometric features, such as test re-test reliability. We will intend to assess nonverbal communication in larger samples of ASD children of different ages.

5. Conclusion

There is vast dissimilarity between normally developed children and autistic children in a variety of skills, such as gestures, phonetics, body language, and artifacts that are significant for normal children as well as nonverbal behavior disorders, namely maladaptive behavior (crying) that are significant for autistic children.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by the Common Ethics Committee of Tehran University of Medical Sciences (Code: IR.TUMS.FNM.REC.1401.062), and the Research and Ethics Committee of Karbala Health Directorate, Center of Training and Researches. All official agreements were also obtained accordingly.

Funding

The present research article was extracted from the MSc thesis of Hussein Ali Musa Al-keweledy, approved by Department of Speech Therapy, Tehran University of Medical Sciences.

Authors' contributions

Conceptualization: Zahra Soleymani; Methodology: Zahra Soleymani, Fariba Zadeh Labbaf, Amer Alhaideri and Faeghe Shahhoseini; Sampling and writing the original draft: Hussein Ali Musa Al-keweledy; Review and editing: All authors.

Conflict of interest

The authors declared no conflict of interest.

Acknowledgments

The authors would like to appreciate all individuals who took part in this research. The authors would like to also appreciate the assistance of the faculty and the staff of Tehran University of Medical Sciences, the School of Rehabilitation, and the Department of Speech Therapy.

Appendix 1. Child Communication frequency scale

The colleagues, in the video analysis of a 10-min sample of parent-child interaction, determine the frequency (number of occurrences) of the following communication variables in the child.

	Number	Communication Tools	Definition	Frequency
Gestures	1	Move the head up and down	Move the head up and down to say "yes," "okay," "I agree," and "hello."	
	2	Move the head to the sides	Move the head to the sides to say "no," "I do not want," "I cannot," and "I disagree."	
	3	To point	Hold the index finger straight while the other four fingers are gathered. The index finger points to an object.	
	4	To give	Putting an object in the hand of another person.	
	5	To show	Lifting something and holding it toward another person for 1 to 2 s. Shake something for someone to get their attention but not ask for help.	
	6	Pointing with open fingers	Fluid on the desired object with the palm of your hand while the fingers are open.	
	7	To pull	Pulling a person toward them by taking a part of their body (hand, arm, shoulder) or clothes to draw their attention to themselves.	
	8	Push	Pushing others with one hand to mean "no" or "get away from me."	
	9	Gentle blow	Gently tapping a part of the body (hand, arm, wrist) with the hand to draw their attention to themselves; these blows are not aggressive and violent.	
	10	Raise the hands to hug	Reaching out to others is a sign of hugging.	
	11	Clapping	Applause to express happiness.	
	12	Shaking hands	Shaking hands to say goodbye.	
	13	Swinging hands	Raising and lowering the arms to attract attention and draw others to them.	
	14	Kissing	Putting one hand on the lips and gently lifting and pulling it toward the other person means saying goodbye.	
	15	Saying "sh"	Put your index finger in front of the mouth and say "sh" to silence others.	
	16	Shaking hands to the sides	Shaking hands to say "no," "do not," and "reject."	
	17	Opening the hands	Holding hands while palms facing up to express "nothing" and "something is done."	
	18	Victory mark	Holding the index and middle fingers straight and gathering the other fingers to express "happiness."	
	19	Thumbs up	While the other fingers are gathered, the thumb is held high, meaning "excellent."	
	20	Iconic gestures	Use of iconic gestures to express the characteristics of objects or animals, such as fluttering with the hands meaning "bird."	
	21	Facial expressions	Depending on the situation, they smile or frown when necessary; trying to comfort someone upset.	

	Number	Communication Tools	Definition	Frequency
Phonetics	1	Singing along with changing the song	Express sounds along with changing the song to get attention, request, protest, or reject something.	
	2	One-word or multi-word phrases	Say one-word or multi-word phrases to get attention, request, object, or reject something.	
	3	Changing voice tone, loudness, and pitch	changing voice tone, loudness, and pitch to communicate with others.	
Body language	1	With familiar or strange people	The space surrounding each person. Broadly, the four distinct zones are intimate (0-2 ft.), personal (2-4 ft), social (4-12 ft.), and public (more than 12 ft.).	
	2	Gaze	To gaze is to look steadily and intently at something, especially at that which excites admiration, curiosity, or interest: To gaze at the scenery, at a scientific experiment. To stare is to gaze with eyes wide open, as from surprise, wonder, alarm, stupidity, or impertinence: To stare unbelievingly or rudely.	
	3	Three-point gaze	The child looks at the audience first—then at the object—looks at the audience again, or the child looks at the object first—then at the audience—looks at the object again.	
	4	Eye contact between child and parent while parent talks with the child	Eye contact occurs when parent and child look at each other's eyes at the same time for longer than 1 s.	
	5	Touching	Touching others to show their request, care, or power.	
Artifacts	1	Using objects and images	The child uses objects and images to communicate with others.	
			Maladaptive Behavior	
	1	Crying	Children cry because it's what their bodies need to do at that moment to release tension and emotion from feeling overwhelmed with emotions or sensory stimulations.	
Total				

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