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Examining Early Communication Profiles in Preschool Children with Autism Spectrum Disorders in Dubai, U.A.E.: A Comparative Analysis of Cognitive, Language and Symbolic Play Abilities

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ABSTRACT

Effective communication skills in young children encompass a diverse range of abilities crucial for early autism spectrum disorder (ASD) identification. This study aims to analyse communication skills in 36 preschool children (ages 1.6 to 4.6 years) diagnosed with autism in Dubai, employing the Early Communication Assessment (ECA) tool developed by Coupe O'Kane and Goldbart (1998). The ECA evaluates 13 areas of early communicative functioning categorised into 3 to 5 developmental stages, ranging from Reflexive to Intentional Conventional. Communication abilities were assessed, and the 5 ECA levels were condensed into 3 for comparative analysis. Key communicative areas, such as joint referencing, social organisation, turn-taking, and imitation, were identified as significantly delayed in this cohort. Conversely, affective behavior, audio-visual behaviors, and physical production of sound exhibited relatively lesser impact. Contrary to common assumptions, poor eye contact was not the predominant indicator of communication challenges. Comparative analyses were conducted between communication skills and perceptive cognitive abilities, language proficiency, and symbolic play. No substantial correlation was found between perceptive cognitive abilities and communication skills. However, a significant association was observed between communication abilities, language proficiency, and symbolic play. These findings underscore the complexity of early communication profiles in preschool children with ASD in Dubai, emphasising the need for comprehensive assessment and targeted interventions beyond conventional indicators.

INTRODUCTION

Autism Spectrum Disorder is a common neurodevelopmental disorder which prevails from early on in life. It is characterised by difficulty in speech, communication, language, and social interactions and restricted and repetitive patterns of behaviours, interests or activities, which may vary in individuals (Campisi *et al.*, 2018). Since it is a spectrum disorder, each person's symptoms severity and manifestation will differ substantially, resulting in various clinical presentations(Lord *et al.*, 2020). Over the past few decades, the prevalence of ASD has increased considerably, drawing the attention of researchers, clinicians, and policymakers worldwide. Just under 1% of people globally are thought to have autism, while estimates are higher in high-income nations(Lord *et al.*, 2020).

There has been a discernible rise in the prevalence of ASD worldwide, making it a major public health concern. Numerous studies have consistently shown an increased trend in the prevalence of ASD, even though variances in reported rates are influenced by cultural, environmental, and diagnostic factors (Salari *et al.*, 2022). The global prevalence of ASD has increased four to five times, with a higher prevalence in boys than in girls. The average prevalence in Asia, Europe, and North America is 1%(Durkin & Wolfe, 2020). In the United States, the prevalence of ASD among 8-year-old children was 1.59 in 2014 and 1.54 in 2016, while in Italy, it was 1.15% (Narzisi *et al.*, 2020). In Asia, it was 3.9%; in the Arab countries around the Gulf, it was 0.14 to 2.9% (Qiu *et al.*, 2020). As a result of increased awareness and improved diagnostic techniques, the Centers for Disease Control and Prevention (CDC) reports that new estimates in the United States indicate that roughly 1 in 44 children have received an ASD diagnosis (Prevention, 2024). The fact that prevalence rates differ throughout nations and areas emphasises the necessity of having an adequate understanding of the disorder's worldwide effects.

ASD is characterised by difficulties in social communication, restricted behaviors, and lack of understanding and use of gestures. It can also lead to a restricted range of interests, reliance on sameness, and repetitive activities. However, the diagnostic criteria for ASD have evolved, with the fifth edition of the DSM-5 consolidating several distinct disorders into a single term, ASD, acknowledging the diverse presentation and individual variability in symptomatology(Sharma *et al.*, 2018; Tsai *et al.*, 2020). Many first-contact carers and physicians in Dubai focus on these while ignoring others, such as joint referencing and turn-taking. This may delay the diagnosis of autism and thus hinder effective early intervention. Early communication is transparent with overt intentions, but in children with ASD, they remain opaque (Fuller & Kaiser, 2020). However, communication is a broad concept that involves multiple components, both lingual and para-lingual (Maljaars *et al.*,

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2011). Autism causes a reduction in the frequency and diversity of early communication forms, which results in a wide range of clinical images and challenging diagnoses, particularly in children under the age of four (Bradshaw *et al.*, 2021). For instance, not all children have poor eye contact or dislike being cuddled. Communication skills include joint attention, social referencing, mutual gaze, imitation, communication intentions, turn-taking and social interaction, social organisation, communication in context, and audio-visual behaviour (Chung, 2020).

LITERATURE REVIEW

Joint Attention/Social Referencing

Babies learn to make eye contact, or "look," at their caregiver as early as two hours after birth. Infants begin to display their need to share other people's attention between the ages of 9 and 14 months, showing that they wish to join points of reference (such as the light or fan). In addition to pointing out the objects, children simultaneously glance at other individuals to see if they share their interest in the same subject. One could refer to this urge as social attention (Mundy, 2023; Mundy & Bullen, 2022). Social referencing is similar to the notion of shared attention and is defined as a process of emotional communication in which one's perception of another individual's interpretation is used to form one's understanding of the event (Cornew *et al.*, 2012). Four abilities (Lawson *et al.*, 2018)have been proposed, including the ability to discriminate emotional expressions on the caregiver's face, recognise their meaning, respond to them emotionally, and finally, use them to regulate one's behaviour. The first level is already observable in a 6-month-old baby (Berger & Ingersoll, 2013).

Imitation

Imitation is crucial in understanding others and is the earliest form of social-communicative interaction (Berger & Ingersoll, 2013) . Imitation starts with adults attributing imitation to the infant's undifferentiated behaviour, then imitating the baby, stimulating the child to copy. Imitation then progresses from sporadic imitation through immediate and systematic copying to deferred imitation, which is not automatic but involves cognitive processes, and the child chooses what to copy (McAuliffe *et al.*, 2020). A child's decision about what to imitate and cognitive processes play a key role in the process of imitation, which is essential to language development. Adults begin by assuming that a baby's actions are imitations and move from intermittent to delayed imitation. The inability of people with ASD to pay attention to and form an internal representation of behavior makes it difficult for them to mimic it. They display "parasitic" aberrant imitation, which is predictive of children with autism having poor expressive abilities (McAuliffe *et al.*, 2020; Mundy & Bullen, 2022).

Mutual Gaze

It is proposed that mutual gazing is a basic type of human communication behavior that provides a foundation for other communication modes. The adult and youngster look at each other for extended periods. There is a great deal of face-to-face and eye-to-eye communication during these times. Gaze coupling, a turn-taking exchange that mimics later gaze patterns observed in mature discourse, modifies the reflexive gaze (Wiklund, 2023). Intentional communication occurs in the setting of mutual gaze, which develops into mutual orientation or attention. The behavior consists of looking, making an interested facial expression, and positioning oneself with movement and posture. Throughout early infancy, people with ASD exhibit disruption of mutual gaze, regardless of their intellectual ability. One of the main areas of difficulty associated with ASD is mutual gazing (Rollins *et al.*, 2021; Wiklund, 2023).

Social Organisation

Various organisational strategies are used for communication. These are needed to initiate, maintain, or terminate communication (Baron-Cohen, 1988). Strategies required to initiate communication include eye contact, proximity, and vocalisation. Maintaining communication needs strategies like question/answer and statement and reply. Breaking off or terminating a communication entails strategies like moving away or breaking eye contact (Erturk *et al.*, 2021). Skills acquired through infancy through interpersonal interactions underpin the skills needed for conversational and discourse management. Individuals with ASD lack strategies to organise communication. It is probably more evident in high-functioning verbal individuals capable of conversation (Loukusa, 2021).

Turn-Taking and Social Interaction

Turn-taking, seen in social interaction or dialogue, starts with the adult leaving space for children to fill their turn with sounds or actions. The adult utilises the child's existing repertoire of behaviours by imitating them. This produces reciprocation behaviours in the child. These reciprocal behaviors are imitations of various adult and altered and novel responses. Hence, the adult allows the child to take turns, but the child also gives reinforcing feedback to maintain and change adult responses (Ramey *et al.*, 1978).

Individuals with ASD have difficulty taking turns at a very early age, both in vocal interactions and physical tasks (Baren-Cohen, 1988).

Communicative Intentions

Intention is the speaker's motivation for communication, often expressed through gestures and vocalisations. Early communication, such as proto-imperative and proto-declarative, involves using another person to obtain something or draw attention. By 9 months, infants can express intention using gestures and vocalisations. Other behaviors include gaining attention, drawing attention, and regulating social contact. Communication intentions include greeting, protesting, rejecting, naming, and

informing. Individuals with ASD lack communication intentions due to impairment in perception and mentalising ability (Schütz *et al.*, 2020).

Comprehension in Context

Autism disrupts the normal development of language, leading to delayed and deviant language development. The primary reason for learning a language is communication, which is the primary reason for communication. Neonatal infants are biologically tuned to person-mediated events, responding more to speech than non-speech sounds. In the first six months, infants start to read signals and expressions of others' behavior, gradually developing into a highly developed area of expertise. Individuals with ASD have difficulty in early communicative behaviors, affecting their language development, socialisation, and self-expression(Elbeltagi *et al.*, 2023).

Language Problems

ASD often affect communication rather than language, with around half of all children failing to develop functional speech. Spoken language ability in ASD ranges from muteness to apparent facility, with a persistent impairment in communicative use and understanding of complex concepts. Autism-related speech is non-productive, echolalic, pedantic, and monotone, with limited use for sharing experiences or conversing. Early communication trajectory demonstrates a relationship to language acquisition, and studies on symbolic play in children with ASD vary. Some children show cognitive abilities in symbolic play, while others show less interest and ability(Vogindroukas *et al.*, 2022).

ASD greatly impacts preschool-aged children's communication abilities; therefore, early identification and intervention are essential. These children frequently display distinctive communication profiles, including delayed language learning, unusual language use, and trouble interacting with others on a reciprocal basis. Early indications of ASD usually show up in toddlerhood, when parents and other caregivers notice changes in their child's communication style. These include a lack of interest in social relationships, restricted gesture use, delayed or absent language milestones, and issues with shared attention.

This study aimed to investigate children with autism and their communication profiles. To ascertain which components of preschoolers' communication are more likely to be impacted, the study examined various aspects of their communication. In addition to inadequate eye contact and aversion to making physical contact, other communication issues were investigated. The relationship between communication and children's cognition, symbolic play, and language development was explored.

MATERIALS AND METHODS

Study Participants

The study included children aged from 1.6 to 4.6 years diagnosed with autism spectrum disorder (ASD) at a Dubai clinic between 1998 and 2008. Diagnoses were made based on DSM IV criteria, considering communication, cognition, symbolic play, and language assessments. Cases with incomplete assessments were excluded, resulting in the analysis of 36 children.

Early Communication Assessment (ECA)

Communication abilities were assessed using the Early Communication Assessment (ECA) developed by Coupe O'Kane and Goldbart (1998). The ECA comprises 13 areas of early communicative functioning, which are categorised into five levels: Reflexive, Reactive, Pre-intentional, Primitive Intentional, and Intentional Conventional levels. The 13 regions include Affective Communication, Mutual Gaze, Social Organization, Joint Reference, Turn-taking and Social Interaction, Comprehension in Context, Communicative Intentions, Cognitive Roles, First Meaning, Imitation, Auditory and Visual Behaviors, Vocal Production, and Physical Production.

The 5 levels were condensed into 3 for comparison purposes: Group 1 (not developed), Group 2 (growing), and Group 3 (developed). Each child's ability was assessed concerning these groups for the 13 areas.

Cognitive Abilities

Perceptual cognitive abilities were evaluated using the Munich Functional Developmental Test, specifically focusing on concepts like object permanence, copying, matching, and sorting. This individually administered test assessed gross motor, fine motor, perceptual, cognitive, language expression, comprehension, social skills, and self-reliance abilities.

Language Skills

The Reynell Developmental Language Scales (Reynell, 1978) were employed to measure oral expressive and receptive language skills in children aged 1 to 7. Language categorised into severe delay, moderate delay, mild delay, or no delay was determined based on the difference from chronological age.

Symbolic Play

The Lowe-Costello Play Test assessed the symbolic play (Lowe & Costello, 1998), focusing on early concept formation symbolisation. They utilised four sets of toys in free play, which were scored according to guidelines, and the raw score was converted to play age in months. Play age was categorised into severe delay, moderate delay, mild delay, or no delay based on the difference from chronological age.

Data Analysis

Demographic data, symbolic playtest results, language age, non-verbal development, and communication assessments were comprehensively analysed. Descriptive statistics and comparative analyses were performed to discern patterns and relationships among variables.

RESULTS AND DISCUSSION

The study investigated the relationship between communication, language development, and non-verbal cognitive and perceptual development in children with ASD. The total number of children investigated was 36, of which 25 were boys and 11 were girls. Table 1 shows the distribution of children in the study, ranging from 1.6 to 4.6 years. The largest age group had 13 children aged 1.6 to 2 years, while the smallest group contained 2-4 children aged 4.1 to 4.6 years. The study also categorises children into three main groups: Asians, Arabs, and Europeans. The majority of the children are of Asian nationality (22 children), followed by Arabs (10 children) and a smaller representation of Europeans (4 children).

Table 1: Age distribution and nationality profile in the cohort

Age bands (in years)	**Number of children**
1.6 to 2	13
2.1 to 2.6	3
2.7 to 3	10
3.1 to 3.6	4
3.7 to 4	4
4.1 to 4.6	2
Nationality Profile in the Cohort	
Nationality	**Number of children**
Asians	22
Arabs	10
European	4

Symbolic Play

The study used the Lowe-Costello Play Test to evaluate the pretend play abilities of children with ASD. The results showed that 17 children had a play age more than 12 months behind their chronological age, indicating a significant delay in their play skills. 12 children had a play age 6-12 months behind their chronological age, showing some delay, while 3 children had a play age less than 6 months behind their chronological age, showing minimal delay. No children showed no delay, and data was unavailable for 4 children.

Symbolic and most delayed communication skills showed no significant difference between the delayed and not delayed groups, as shown in Table 3.

Table 2: The difference between chronological age and ability in symbolic play in months

Difference between the chronological age and the play age in months	**Number of children**
Severe delay - a difference of more than 12 months	17
Moderate delay - a difference of 6 to 12 months	12
Mild delay - difference of less than 6 months	3
No delay	0
Missing data	4

Table 3: Symbolic play and communication

Symbolic play	**Most Delay Communication skills**	**P value**
Symbolic Play	Social organisation	1.246
Symbolic Play	Joint Referencing	1.000
Symbolic Play	Imitation	0.4016
Symbolic Play	Turn-taking	0.0003*
Symbolic skills and most delayed of communication skills showed no significant difference between the delayed and not delayed group hence were not correlated.		

Cognitive Delay

Non-verbal cognitive and perceptual development was measured using the Munich Functional Development Test. The difference between the chronological and cognitive ages was calculated and tabulated. Severe delay was found in 13 children, while no delay was seen in 11 children in their chronological and cognitive age, as seen in Table 4.

Table 4: The difference between the chronological age of each child with cognitive-perceptual development in months

Difference between the chronological age and the cognitive age in months	Number of children
Severe delay - a difference of more than 12 months	13
Moderate delay - a difference of 6 to 12 months	9
Mild delay - difference of less than 6 months	3
No delay	11

The study found no significant correlation between perceptual cognition and communication areas in children with ASD. The children struggled with joint referencing, social organisation, turn-taking, and imitation. However, their development was not significantly linked to their non-verbal cognitive skills. This suggests that despite having typical cognitive abilities, they still had significant delays in specific communication areas.

Table 5: Perceptual Cognition versus Communication

Perceptual Cognition	Most Delay Communication skills	P value
Perceptual Cognition	Social organisation	0.0913*
Perceptual Cognition	Joint Referencing	0.0179*
Perceptual Cognition	Imitation	0.2322
Perceptual Cognition	Turn-taking	0.7795
Perceptual Cognition and most delayed of communication skills showed significant difference between the delayed and not delayed group hence were not correlated.		

Language Delay

The child's language was assessed in their mother tongue on the Reynell Language Development Test. The difference between the chronological and language ages was calculated and tabulated. Results showed that 25 children had a language age 18 months behind their chronological age, 8 had a 12-17 month delay, 2 had a 3-12 month delay, and 1 had no delay. Most children had some language delay, with severe delay affecting over two-thirds of them.

Table 6: The difference between the chronological age of each child with language age in months

Difference between the chronological age and the language age in months	Number of children
Severe delay- a difference of more than 18 months	25
Moderate delay - a difference of 12 to 17 months	8
Mild delay - a difference of 3 to 12 months	2
No delay	1

Table 7: Language and communication

Language	Most Delay Communication skills	P value
Language	Social organisation	0.4
Language	Joint Referencing	0.1
Language	Imitation	0.2
Language	Turn-taking	0.025*
Language skills and most delayed of communication skills showed no significant difference between the delayed and not delayed group hence were not correlated.		

The figure shows that Language and most delayed communication skills showed no significant difference between the delayed and the most delayed groups.

Analysis of Communication

To facilitate analysis, the levels in each communicative area were divided into three categories once each child's abilities were determined to be one of the three to five levels: In Group 1, the child was at level 1 or lower, meaning that the communication area was not developed. In Group 2, the child was at levels 2 to 3 (when there were five levels in that region) and level 2 (when there were three levels in that area), indicating that the communication area was developing. In Group 3, the child reached the highest level (either 3 or 5) in that communication area, indicating that the communication area had been developed.

Table 8: Analysis of each of the 13 communication abilities on the ECA in the cohort

Communication area	Not developed	Developing	Developed	Missing data
Communication in context	7	18	6	5
Communicative intentions	6	14	7	8
Cognitive Roles	5	14	6	11
Meaning	5	9	4	18
Mutual Gaze	6	23	1	6
Social Organisation	18	8	4	6
Joint Reference	18	9	2	7
Turn-taking	13	10	7	6
Imitation	15	9	4	8
Affective Communication	0	16	20	0
Audio-visual behaviour	0	14	13	9
Physical production	0	13	8	15

**A lack of information in that area in the records causes discrepancies in the numbers.*

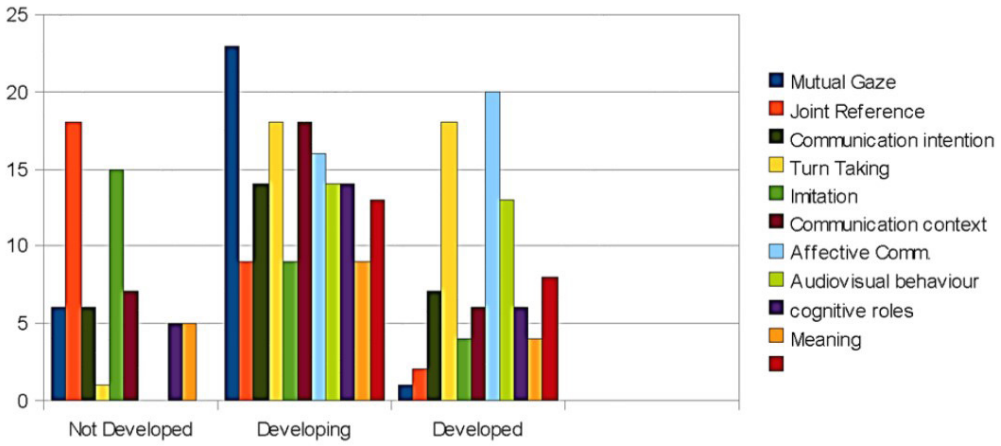

Figure 1: Analysis of each of the 13 communication abilities on the ECA in the cohort as developed, developing, or not developed

The communicative areas that were most delayed or affected were joint referencing, social organisation, turn-taking, and imitation, as seen in Table 9.

Table 9: Further Analysis of each of the most delayed of the 13 communication abilities on the ECA in the cohort

Communicative areas	Developed	Not developed
Joint Referencing	2	18
Social Organisation	4	18
Turn-taking	7	13
Imitation	4	15

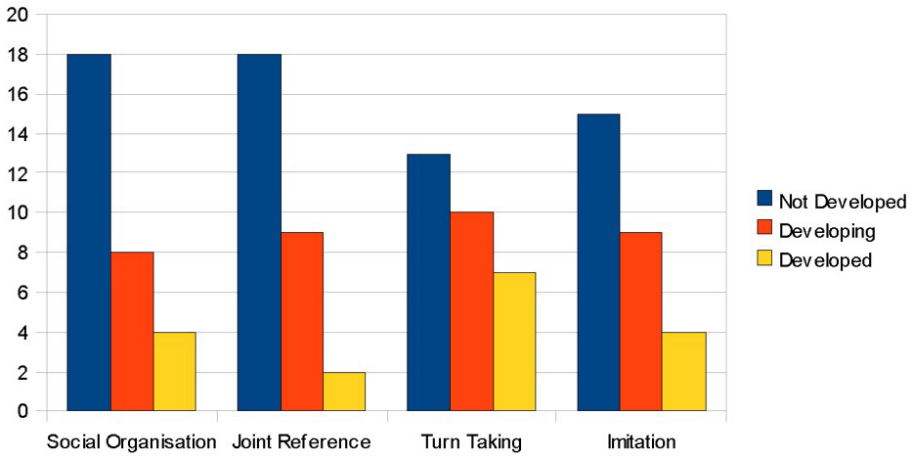

Figure 2: Further Analysis of each of the most delayed of the 13 communication abilities on the ECA in the cohort

The communicative areas that were least affected were affective behaviour, audio-visual behaviours, and physical production, as seen in Table 10.

Table 10: Further Analysis of each of the least delayed of the 13 communication abilities on the ECA in the cohort – Group C

Communicative areas	Not Developed	Developing	Developed
Affective behaviour	0	16	20
Audio-visual behaviour	0	14	13
Physical Production	0	13	8

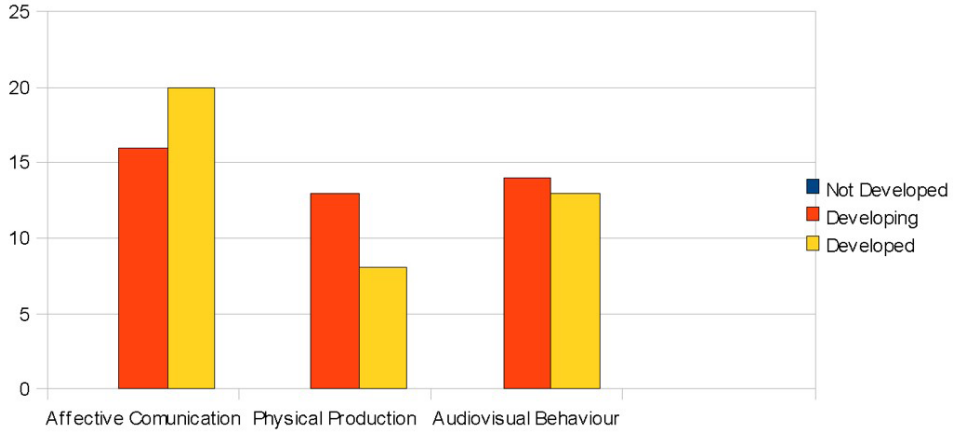

Figure 6: Further analysis of each of the least delayed of the 13 communication abilities on the ECA in the cohort – Group C

Those communicative areas that were moderately affected were – communicative intentions, communication in context, mutual gaze, and cognitive roles, as seen in Table 11.

Table 11: Further Analysis of each of the moderately delayed 13 communication abilities on the ECA in the cohort – Group B

Communicative areas	Not Developed	Developing	Developed
Communicative Intentions	6	14	7
Communication in context	7	18	6
Mutual gaze	6	23	1
Cognitive Roles	5	14	6
Physical production	0	13	8

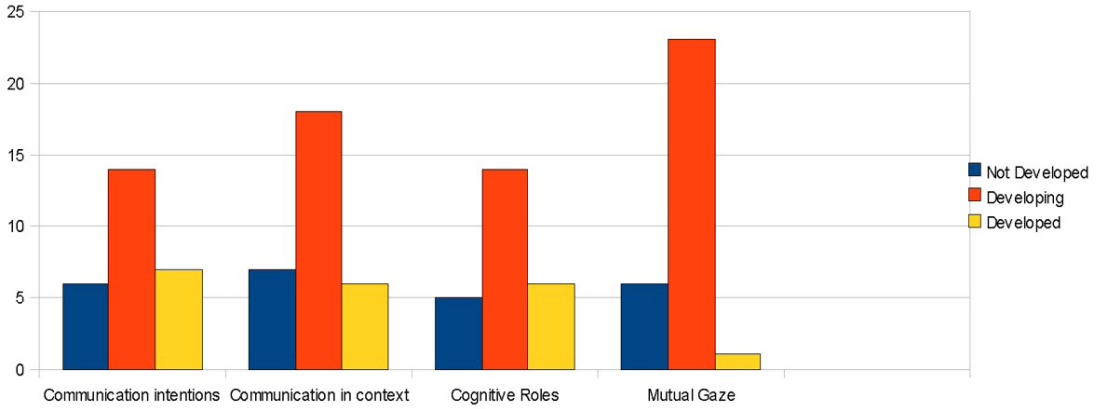

Figure 4: Further analysis of each of the moderately delayed 13 communication abilities on the ECA in the cohort – Group B

The total number of 'not developed' and "developed" levels in Groups A, B, and C were scrutinised and compared, as shown in Table 12. The Table compares the communication abilities of both parameters in three groups (A, B, C) based on ECA. Group A has the most affected communicative areas, Group B has moderately affected areas, and Group C has the least affected areas.

Table 12: Comparison of 'Not Developed' and 'Developed' Communication Abilities in Groups A, B, C

Communication Area	Group A (Most Affected)	Group B (Moderately Affected)	Group C (Least Affected)
Total 'Not Developed' Levels	64	29	0
Total 'Developed' Levels	17	24	41

Comparing Communication to Language Development and Non-Verbal Cognitive and Perceptual Development

Communication in children with normal or mildly delayed non-verbal cognitive and perceptual development on the MFT was investigated. Table 13 presents a comprehensive analysis of communication levels in 12 children with normal to near normal cognitive and perceptual development categorised into three groups (A, B, C) based on their communication abilities. The results show that the most affected group has not developed communication levels, while the moderately affected group has not developed communication levels but is showing progress. The least affected group has not developed communication levels but has reached the developing stage.

Table 13: Number of 'developed,' 'developing,' and 'not developed' communication abilities in Group A, B, and C in the 12 children with normal to near normal cognitive perceptual ability on the MFT

	Group A Communicative areas	Group B Communicative areas	Group C Communicative areas
Number of children with 'Not developed' levels	6	3	2
Number of children with 'developing' levels	2	5	6
Number of children with 'developed' levels	0	0	0

The communication in children of different non-verbal, cognitive, and perceptual development groups was accessed. There were 3 groups – the severely delayed, the moderately delayed, and mildly delayed + the no delay. Table 14 compares 'not developed' and 'developing' communication levels in children with autism across various non-verbal, cognitive, and perceptual development groups. The study found that Group A has the highest number of 'not developed' levels, while Group C has a substantially less number. Developing levels are more prominent in Groups B and C, indicating progress in communication abilities despite cognitive delays.

Table 14: Comparison of 'Not Developed' and 'Developing' Communication Levels in Children of Varying Non-Verbal Cognitive Perceptual Development

Cognitive Development	Communicative Areas	Group A (No to Mild Delay)	Group B (Moderate Delay)	Group C (Severe Delay)
'Not Developed' Levels	Group A	6	3	2

	Group B	5	3	4
	Group C	6	6	5
'Developing' Levels	Group A	2	5	6
	Group B	2	5	4
	Group C	0	0	0

Communication among children of different language development groups was accessed as well. There were 3 groups – the severely delayed, the moderately delayed, and mildly delayed + the no delay. Table 15 compares 'not developed' and 'developing' communication levels in children with autism across different language development groups. Severe language delay (Group C) has the highest number of 'not developed' levels. Groups A and B show more pronounced 'developing' levels, indicating progress in communication abilities despite language delays. Group A, representing no to mild language delay, has no children with 'not developed' communication levels.

Table 15: Comparison of 'Not Developed' and 'Developing' Communication Levels in Children of Varying Language Development

Language Development	Communicative Areas	Group A (No to Mild Delay)	Group B (Moderate Delay)	Group C (Severe Delay)
'Not Developed' Levels	Group A	0	0	0
	Group B	2	1	1
	Group C	16	10	10
'Developing' Levels	Group A	0	6	6
	Group B	4	4	5
	Group C	1	1	1

Communication and language delay are related. The number of non-developers is highest in all 3 with severe language delay. Group A had the highest number of non-developers and had no developing communicators in the severe language delay group.

Analysis of Communication

The EC categorised communication skills into three groups: underdeveloped, developing, and developed. The analysis found that the most affected communication areas were social organisation, joint referencing, turn-taking, and imitation. The least affected areas were affective communication, audio-visual behavior, and physical production. Moderately affected areas were communication intentions, context, mutual gaze, and cognitive roles. The study used a Fisher Chi-Square Test to assess the relationship between a child's ASD diagnosis and communication skills, as seen in Figure 5.

Results – Analysis of Communication
P Value from Fishers Chi Square Test

Most Delayed Skills	Least Delayed Skills	P Value
Social Organisation	AudioVisual Behaviour	<0.0001
Social Organisation	Affective Behaviour	<0.0001
Social Organisation	Physical Production	<0.0001
Joint Referencing	AudioVisual Behaviour	<0.0001
Joint Referencing	Affective Behaviour	<0.0001
Joint Referencing	Physical Production	0.0670
Turn-Taking	AudioVisual Behaviour	0.0002
Turn-Taking	Affective Behaviour	<0.0001
Turn-Taking	Physical Production	0.0025
Imitation	AudioVisual Behaviour	<0.0001
Imitation	Affective Behaviour	<0.0001
Imitation	Physical Production	0.0002

Figure 5: Analysis of communication P value from Fishers' Chi-square Test

The study results reveal that mutual gaze is a communication area where children with ASD show some developmental delay but to a lesser extent than other social communication skills. Children with ASD show more difficulty with mutual gaze than expressing emotions or using gestures but less difficulty compared to skills like initiating shared focus or taking turns in conversation.

Analysis of Communication- Mutual gaze versus Least and Most delayed communicative skills- P Values

Mutual Gaze	Other Communicative Skills- Most Delayed	P Value
Mutual Gaze	Joint Referencing	1.000
Mutual Gaze	Social Organisation	1.000
Mutual Gaze	Turn Taking	0.6334
Mutual Gaze	Imitation	1.000
	Least Delayed	
Mutual Gaze	Affective Behaviour	0.0001
Mutual Gaze	AudioVisual Behaviour	0.0002
Mutual gaze	Physical Production	0.0014

Figure 6: Analysis of communication- Mutual gaze vs. Least and most delayed communicative skills- P-value

No significant difference was found between the developed and not-developed groups regarding the most delayed skills as they were summed up and compared to the developed and not-developed aspects of symbolic language play. However, a significant difference was found between the developed and not developed groups regarding the most delayed skills and perceptual cognition, as seen in Figure 7.

Communication versus language, Symbolic Play, Cognitive Perceptual

Total of most delayed Communication skills	Others	P Value
Total of most delayed Communication skills	Language	0.1148
Total of most delayed Communication skills	Symbolic Play	0.1792
Total of most delayed Communication skills	Perceptual Cognition	0.06

When the developed and not developed groups of the most delayed skills were totaled and compared to the developed and not developed aspects of language, symbolic play and perceptual cognition there was no significant difference between them for language and symbolic play but there was an almost significant difference between them and Perceptual cognition.

Thus language and symbolic play were as delayed as the aspects of communication but cognitive perceptual aspects were not

Figure 7: Communication vs language, symbolic play, and perceptual Cognition

Discussion

In this analysis of a preschool cohort with ASD at a Dubai clinic, substantial results were gathered. Boys dominated the cohort. Asians were the most common race, followed by Arabs and Europeans. Most children showed delays in language and symbolic play, with most showing significant delays, while about half demonstrated normal to mild cognitive-perceptual abilities. Most cases showed marked delays in language development, and different areas of communication showed varying degrees of growth. In particular, the least developed behaviors were joint reference, social organisation, turn-taking, and imitation; in contrast, the most developed behaviors were reciprocal gaze, comprehension in context, communication aims, and cognitive roles. The two most advanced communication behaviors were found to be affective and audio-visual. Crucially, language and symbolic play correlate strongly with the development of all communication components, although perceptual-cognitive capacity did not show any significant correlation.

Most of the pre-school children with ASD who came to the clinic were boys with ages ranging from 1.6 to 2

years and then from 2 years 7 months to 3 years. The sex ratio corresponds to that found by other studies. Various studies consistently observed a male-to-female ratio of 4:1 in classical autism, a trend also reflected in relatives exhibiting a broader autistic phenotype (Loomes *et al.*, 2017; Maenner, 2021). Studies with expanded definitions indicated a linear variation in gender ratio with IQ, approaching 2:1 in individuals with severe cognitive impairment. However, cognitively capable girls faced challenges in diagnosis due to milder social impairments compared to boys (Doi *et al.*, 2022; McQuaid *et al.*, 2021). However, According to a study, there is no significant correlation between gender, race and severity of ASD. It is reported that girls are better at masking their ASD symptoms and imposing delayed diagnosis (Napolitano *et al.*, 2022).

Autism, though a highly heritable disorder, predisposing loci on the sex chromosomes have not been found. A genetic mechanism hypothesises that an imprinted X-linked gene(s) influences the threshold for phenotypic expression of many autistic characteristics and is thus protective (May *et al.*, 2019). The gene is expressed only on the X-chromosome inherited from the father, raising the threshold for phenotypic expression. It is normally silenced when transmitted maternally. Because only females have a paternal X chromosome, the threshold for phenotypic expression is higher in them than in males (Ferri *et al.*, 2018). The ``extreme male brain" theory suggests that the behaviours seen in autism are an exaggeration of typical sex differences. Evidence supports female superiority in humans in the ability to read non-verbal signals, specific language-related skills, and theory of mind. Prenatal and neonatal testosterone exposures impact social development and are risk factors for autism spectrum conditions (van Eijk & Zietsch, 2021).

Most of the children in the study belonged to the Asian ethnicity, mirroring the demographic distribution of Dubai, where Asians constituted the largest group, followed by Arabs and Europeans/Americans. However, race showed no correlation with the severity of autism. Additionally, nearly half of the children exhibited normal to mild delays in cognitive perceptual ability, indicating that their non-verbal skills mostly fell within the normal range. This aligns with findings from other studies suggesting that children with autism tend to excel in tasks involving perceptual-motor organisation and rote memory skills (Sodano, 2022). A study discovered a substantial connection between IQ and ASD, especially among people with above-average intellect. Significant cognitive deficits are present in high-IQ individuals with ASD, especially in the areas of social cognition, verbal working memory, and visual pattern recognition (Rommelse *et al.*, 2015). In children with autistic spectrum disorder, symbolic or representational play exhibited considerable delay, with the majority experiencing severe delays. However, 50 percent of the children demonstrated some evidence of symbolic play, with three showing only mild delays. Language delay was prevalent among nearly all children, with most experiencing delays ranging from 12 to 18 months. This is in line with the findings of other studies as well. A study found that children with ASD have significant impairments in their spontaneous expressive language abilities, with syntax and narrative skills increasing with age. Pragmatic skills improved from toddler to preschool but remained stable.

Longitudinal data showed significant improvements in Observation of Spontaneous Expressive Language (OSEL) syntax scores over time (Thomas *et al.*, 2021). The least developed aspects of communication, including joint reference, social organisation, turn-taking, and imitation (Group A), were most affected by autism. Conversely, affective behavior, audio-visual behavior, and sound production (Group C) were the best-developed aspects. Another study found that an initial imitation deficit in toddlers with ASD at age 2 improved gradually until age 5. These skills were linked to cognitive and language abilities, and addressing early imitation deficits, joint reference, and social organisational skills could improve the broader competence of young children (Pittet *et al.*, 2022). These communication aspects demonstrated varying degrees of development, emphasising the heterogeneous nature of communication difficulties in children with autism.

Additionally, communication challenges were strongly associated with language development, with Group A showing a clearer relationship to language delay than Groups B and C. However, communication difficulties were not significantly related to non-verbal ability, indicating that even the most able children faced similar challenges in certain aspects of communication, particularly those in Group A. Another study examined language profiles in 104 children with ASD and found that Nonverbal cognition and joint attention significantly predicted receptive and expressive language scores, suggesting the importance of multiple assessment methods and joint attention as an intervention target (Nevill *et al.*, 2019).

The study indicates that while assessing young children with ASD, several aspects of early communication should be kept in mind. Poor eye contact and dislike of cuddling may not be seen in all these children. The most sensitive indicators were poor joint referencing, turn-taking, social organisation, and imitation.

CONCLUSION

In conclusion, the study evaluates the communication abilities of children with ASD and reveals distinct patterns across different cognitive and language development levels. The study categorised children into three groups (A, B, C) with varying levels of nonverbal cognitive, perceptual, or language development. Group A showed the most complications, including joint reference, social organisation, taking and imitation. Communication difficulties in group A are strongly associated with language delay, highlighting the complex relationship between these parameters.

REFERENCES

Baron-Cohen, S. (1988). Social and pragmatic deficits in autism: Cognitive or affective? *Journal of autism and developmental disorders, 18*(3), 379-402.

Berger, N. I., & Ingersoll, B. (2013). An exploration of imitation recognition in young children with autism spectrum disorders. *Autism Research, 6*(5), 411-416.

Bradshaw, J., McCracken, C., Pileggi, M., Brane, N., Delehanty, A., Day, T., Federico, A., Klaiman, C., Saulnier, C., & Klin, A. (2021). Early social communication development in infants with autism spectrum disorder. *Child development, 92*(6), 2224-2234.

Campisi, L., Imran, N., Nazeer, A., Skokauskas, N., & Azeem, M. W. (2018). Autism spectrum disorder. *British medical bulletin, 127*(1), 91-100.

Chung, E. (2020). *The Development of Turn-Taking and Gaze Behaviour.*

Cornew, L., Dobkins, K. R., Akshoomoff, N., McCleery, J. P., & Carver, L. J. (2012). Atypical social referencing in infant siblings of children with autism spectrum disorders. *Journal of autism and developmental disorders, 42,* 2611-2621.

Doi, H., Kanai, C., & Ohta, H. (2022). Transdiagnostic and sex differences in cognitive profiles of autism spectrum disorder and attention-deficit/hyperactivity disorder. *Autism Research, 15*(6), 1130-1141.

Durkin, M. S., & Wolfe, B. L. (2020). Trends in autism prevalence in the US: A lagging economic indicator? *Journal of autism and developmental disorders, 50,* 1095-1096.

Elbeltagi, R., Al-Beltagi, M., Saeed, N. K., & Alhawamdeh, R. (2023). Play therapy in children with autism: Its role, implications, and limitations. *World Journal of Clinical Pediatrics, 12*(1), 1.

Erturk, B., Hansen, S. G., Machalicek, W., & Kunze, M. (2021). Parent-implemented early social communication intervention for young children with autism spectrum disorder. *Journal of Behavioral Education, 30,* 641-663.

Ferri, S. L., Abel, T., & Brodkin, E. S. (2018). Sex differences in autism spectrum disorder: a review. *Current psychiatry reports, 20,* 1-17.

Fuller, E. A., & Kaiser, A. P. (2020). The effects of early intervention on social communication outcomes for children with autism spectrum disorder: A meta-analysis. *Journal of autism and developmental disorders, 50*(5), 1683-1700.

Lawson, R. P., Aylward, J., Roiser, J. P., & Rees, G. (2018). Adaptation of social and non-social cues to direction in adults with autism spectrum disorder and neurotypical adults with autistic traits. *Developmental cognitive neuroscience, 29,* 108-116.

Loomes, R., Hull, L., & Mandy, W. P. L. (2017). What is the male-to-female ratio in autism spectrum disorder? A systematic review and meta-analysis. *Journal of the American Academy of Child & Adolescent Psychiatry, 56*(6), 466-474.

Lord, C., Brugha, T. S., Charman, T., Cusack, J., Dumas, G., Frazier, T., Jones, E. J. H., Jones, R. M., Pickles, A., State, M. W., Taylor, J. L., & Veenstra-VanderWeele, J. (2020). Autism spectrum disorder. *Nature Reviews Disease Primers, 6*(1), 5. https://doi.org/10.1038/s41572-019-0138-4

Loukusa, S. (2021). Autism spectrum disorder. *Handbook of pragmatic language disorders: complex and underserved Populations,* 45-78.

Maenner, M. J. (2021). Prevalence and characteristics of autism spectrum disorder among children aged 8 years—autism and developmental disabilities monitoring network, 11 sites, United States, 2018. MMWR. *Surveillance Summaries, 70.*

Maljaars, J., Noens, I., Jansen, R., Scholte, E., & van Berckelaer-Onnes, I. (2011). Intentional communication in nonverbal and verbal low-functioning children with autism. *Journal of Communication Disorders, 44*(6), 601-614.

May, T., Adesina, I., McGillivray, J., & Rinehart, N. J. (2019). Sex differences in neurodevelopmental disorders. *Current opinion in neurology, 32*(4), 622-626.

McAuliffe, D., Zhao, Y., Pillai, A. S., Ament, K., Adamek, J., Caffo, B. S., Mostofsky, S. H., & Ewen, J. B. (2020). Learning of skilled movements via imitation in ASD. *Autism Research, 13*(5), 777-784.

McQuaid, G. A., Pelphrey, K. A., Bookheimer, S. Y., Dapretto, M., Webb, S. J., Bernier, R. A., McPartland, J. C., Van Horn, J. D., & Wallace, G. L. (2021). The gap between IQ and adaptive functioning in autism spectrum disorder: Disentangling diagnostic and sex differences. *Autism, 25*(6), 1565-1579.

Mundy, P. (2023). Research on social attention in autism and the challenges of the research domain criteria (RDoC) framework. *Autism Research, 16*(4), 697-712.

Mundy, P., & Bullen, J. (2022). The bidirectional social-cognitive mechanisms of the social-attention symptoms of autism. *Frontiers in Psychiatry, 12,* 752274.

Napolitano, A., Schiavi, S., La Rosa, P., Rossi-Espagnet, M. C., Petrillo, S., Bottino, F., Tagliente, E., Longo, D., Lupi, E., Casula, L., Valeri, G., Piemonte, F., Trezza, V., & Vicari, S. (2022). Sex Differences in Autism Spectrum Disorder: Diagnostic, Neurobiological, and Behavioral Features. *Front Psychiatry, 13,* 889636. https://doi.org/10.3389/fpsyt.2022.889636

Narzisi, A., Posada, M., Barbieri, F., Chericoni, N., Ciuffolini, D., Pinzino, M., Romano, R., Scattoni, M., Tancredi, R., & Calderoni, S. (2020). Prevalence of Autism Spectrum Disorder in a large Italian catchment area: A school-based population study within the ASDEU project. *Epidemiology and psychiatric sciences, 29,* e5.

Nevill, R., Hedley, D., Uljarević, M., Sahin, E., Zadek, J., Butter, E., & Mulick, J. A. (2019). Language profiles in young children with autism spectrum disorder: A community sample using multiple assessment instruments. *Autism, 23*(1), 141-153.

Pittet, I., Kojovic, N., Franchini, M., & Schaer, M. (2022). Trajectories of imitation skills in preschoolers with

autism spectrum disorders. *Journal of Neurodevelopmental Disorders, 14*(1), 2. https://doi.org/10.1186/s11689-021-09412-y

Centers for Disease Control and Prevention. (2024). *Centers for Disease Control and Prevention.* https://www.cdc.gov/

Qiu, S., Lu, Y., Li, Y., Shi, J., Cui, H., Gu, Y., Li, Y., Zhong, W., Zhu, X., & Liu, Y. (2020). Prevalence of autism spectrum disorder in Asia: A systematic review and meta-analysis. *Psychiatry Research, 284,* 112679.

Rollins, P. R., De Froy, A., Campbell, M., & Hoffman, R. T. (2021). Mutual gaze: An active ingredient for social development in toddlers with ASD: A randomized control trial. *Journal of autism and developmental disorders, 51*(6), 1921-1938.

Rommelse, N., Langerak, I., van der Meer, J., de Bruijn, Y., Staal, W., Oerlemans, A., & Buitelaar, J. (2015). Intelligence may moderate the cognitive profile of patients with ASD. *PLoS One, 10*(10), e0138698.

Salari, N., Rasoulpoor, S., Rasoulpoor, S., Shohaimi, S., Jafarpour, S., Abdoli, N., Khaledi-Paveh, B., & Mohammadi, M. (2022). The global prevalence of autism spectrum disorder: a comprehensive systematic review and meta-analysis. *Italian Journal of Pediatrics, 48*(1), 112. https://doi.org/10.1186/s13052-022-01310-w

Schütz, M., Ciaramidaro, A., Martinelli, A., Öller, R., Hartmann, D., Hein, G., Iotzov, V., Colle, L., Becchio, C., & Walter, H. (2020). Communicative intentions in autism spectrum disorder. *Research in Autism Spectrum Disorders, 79,* 101666.

Sharma, S. R., Gonda, X., & Tarazi, F. I. (2018). Autism Spectrum Disorder: Classification, diagnosis and therapy. *Pharmacology & Therapeutics, 190,* 91-104. https://doi.org/https://doi.org/10.1016/j.pharmthera.2018.05.007

Sodano, J. (2022). *Effectiveness of music-infused ABA strategies on children with autism spectrum disorder* (Master's thesis, Seton Hall University).

Thomas, H. R., Rooney, T., Cohen, M., Bishop, S. L., Lord, C., & Kim, S. H. (2021). Spontaneous expressive language profiles in a clinically ascertained sample of children with autism spectrum disorder. *Autism Research, 14*(4), 720-732.

Tsai, C.-H., Chen, K.-L., Li, H.-J., Chen, K.-H., Hsu, C.-W., Lu, C.-H., Hsieh, K.-Y., & Huang, C.-Y. (2020). The symptoms of autism including social communication deficits and repetitive and restricted behaviors are associated with different emotional and behavioral problems. *Scientific reports, 10*(1), 20509.

van Eijk, L., & Zietsch, B. P. (2021). Testing the extreme male brain hypothesis: Is autism spectrum disorder associated with a more male-typical brain? *Autism Research, 14*(8), 1597-1608.

Vogindroukas, I., Stankova, M., Chelas, E.-N., & Proedrou, A. (2022). Language and speech characteristics in autism. *Neuropsychiatric Disease and Treatment,* 2367-2377.

Wiklund, M. (2023). Gaze behavior. In *Speech and interaction of preadolescents with autism spectrum disorder: Focus on prosody, disfluencies and comprehension problems* (pp. 95–115). Springer.