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# Child-directed communication behaviours during mother-child interaction in children with autism spectrum disorder and typically developing children in south India

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ABSTRACT

Child-directed verbal and non-verbal behaviours play a crucial role in the development of communication skills in young children. This study compared child-directed utterances and pragmatic acts used by mothers of 2-4 year old children with autism spectrum disorder (ASD) (n = 50) with that of two groups of typically developing (TD) children: one matched for chronological age (TD-CA; n = 50) and other for language level (TD-LL; n = 50). Forty minutes mother-child interaction during free play at home was analysed. Results indicated that the the number of utterances used by mothers in the three groups were similar. However, the type of sentences used by each group varied distinctly. Mothers in the ASD (49.1%) and TD-LL group (35.47%) predominanlty used imperatives, while mothers in TD-CA group used more of interrogatives (50.12 %). Among the three groups, declarative and exclamatory sentences were more in TD-LL group; and negative sentences were more in mothers of ASD children. Analysis of pragmatic acts indicated that mothers in ASD group initiated more and took a dominant role during the interaction, while mothers of TD children were engaged predominantly in responding to their children. The study concluded that, in addition to children's language profiling, a comprehensive assessment of child-directed speech would provide directions for child-oriented assessment and management. Considering the era of globalisation and migration, this language and culture specific findings may be of interest to several practitioners catering to Tamil population.

## 1. Introduction

One of the earliest and crucial factors that influence children's early language development is the stimulation provided by the environment through child-directed communication. Children's immediate environment comprises of the primary caregiver who is often the parents or grandparents. Communication acts or behaviours during caregiver-child interaction are interactional and directed with a specific purpose through gestures, vocalization or verbalization (Wetherby & Prizant, 2002). Such drive between communication partners to interact and respond appropriately facilitates a healthy caregiver-child interaction. During such interactions, the partners typically engage in recognising and interpreting each other's verbal and non-verbal cues (Heath, 2008) to reciprocate and respond appropriately (Pettit & Mize, 1993). This synchrony between reciprocation and response influences co-

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ordinated joint attention and language development to a great extent (Feldman & Eidelman, 2004; Rollins, 2003; Schmidt & Lawson, 2002). Research reports that both caregivers and children do not interact with each other in a fixed manner, but in mutually regulated conversational styles which are dynamic and adaptable (Bretherton, 1994).

Conversational styles can either be 'child-centered' by following child's focus of attention (e.g., saying "that's a red ball" when the child holds and looks at a ball) or 'directive', when child's attention is driven and/or changed by caregiver (e.g., saying "look at the ball" when the child is looking elsewhere). During these interactions, caregivers regulate their social behaviour according to their child's communication profile. They interact by providing linguistic and situational cues through scaffolding props. These are dependent on child's efforts to communicate and errors made during these attempts. They might move an object closer to the child, point to something, or name an action to assist children to overcome an obstacle in the child's attempts to express a word or situation (Feinman, 1991). These child-directed communication behaviours and activities are not only crucial for the development of communication, but also for early cognitive growth and development (Trautman & Rollins, 2006). Maternal interactions with children which are supportive and nurturing may lead to positive socio-emotional and language outcomes, while controlling and intrusive interactions may lead to negative outcomes (Thompson, 1998), including language acquisition (Rollins, 2003).

Caregiver-child interaction may be altered in the case of children with developmental delay. In such scenarios, the caregivers adopt different strategies during interactions in order to compensate for the communication difficulties in these children (Meirsschaut, Warreyn, & Roeyers, 2011). These caregivers often control the children through interfering and intruding strategies more than caregivers of typically developing (TD) children (Green, Caplan, & Baker, 2014). They also maintain closer physical proximity and tend to physically hold their children during any activity (Lemanek, Stone, & Fishel, 1993). Among various disorders with developmental delay, the one with significant challenges in social communication is autism spectrum disorder (ASD). Children with ASD are known to have shorter joint engagement; inadequate intent to communicate; restricted gestures and consonant production (Landa, Holman, & Garrett-Mayer, 2007). Linguistic development of these children is largely dependent on the quantity and quality of verbal input provided by caregivers (Girolametto, Weitzman, McCauley, & Fey, 2006). Research reports that children with ASD continue to have less frequent eye contact, turn-taking skills and referential looking from a very young age (Wimpory, Hobson, Williams, & Nash, 2000). Initiations and responses by these children are also unpredictable and inconsistent (Spiker, Boyce, & Boyce, 2002). Parent-child interactions contribute to approximately 20% of variance in the development of communication, socialisation, emotion, and cognition in TD children, and around 30% in children with developmental delays (Mahoney & Nam, 2011). During interaction, children with ASD and their mothers smile at each other less frequently when compared to TD peers and their mothers (Dawson, Hill, Spencer, Galpert, & Watson, 1990). Siller and Sigman (2002) observed a general tendency to display low levels of synchrony with reference to doing or talking about the same activity/object/person; and high levels of demanding behaviours in these parents. Hetzroni and Ohn (2012) noted that parents, who perceived their children with ASD as less competent communicators, used more directives in the form of questions, requests and commands for attention to objects and activities. A study by Meirsschaut et al. (2011) reported that mothers of children with ASD's social initiatives and directives were not significantly different from those used by mothers of TD children. However, they also reported that mothers' responsiveness with TD sibling was better than that with the child with ASD. In addition to this, research also reports that even parents of TD children do not remain in sync with their children at times (Tronick, 2007).

Study by Doussard-Roosevelt, Joe, Bazhenova, and Porges (2003) reported variation in the styles of parenting within families of children with ASD. Mothers of children with ASD do not differ in the variety of approaches. They use relatively lesser social verbal approaches and greater physical contact with their children. These mothers took more leads while communicating with their children with ASD than while communicating with their TD children (Lemanek et al., 1993; Meirsschaut et al., 2011).

Caregivers' language is often related to particular event, and objects present in the child's visual field, thereby nurturing word learning (Mundy & Newell, 2007). Such input language is influenced by generational, social, and media images of caregiving, children, and family life (Bornstein & Lansford, 2009). Based on cultural norms and family values, some parents play with their children and see children as interactive partners, while others do not consider playing with young children as an adult's job (Bornstein, Tamis-LeMonda, & Haynes, 1999). Caregiver-child interaction, in both TD children and children with ASD is often influenced by linguistic and cultural differences (Desai, Divan, Wertz, & Patel, 2012; Tamis-LeMonda, Song, Smith-Leavell, Kahana-Kalman, & Yoshikawa, 2012). Studies on mothers living abroad have indicated that Indian mothers use more scaffolding as most Indian languages are verb-dominant (Gogate & Maganti, 2016; Sethuraman & Smith, 2010). Despite globalisation and migration of Indians to several parts of the world, most of them continue to follow family beliefs and culture, mainly at home (Jambunathan & Counselman, 2002; Saraswathi & Dutta, 2010). Thus, a thorough understanding of communication behaviours used by Indian Tamil speaking parents with empirical evidence may be useful for clinicians and researchers.

Evidence based practices indicate that caregiver-implemented intervention produces positive results in children with ASD (Aldred, Green, & Adams, 2004; Boyd, Odom, Humphreys, & Sam, 2010; Siller & Sigman, 2002). Therefore, to empower caregivers to be effective communicators, an understanding of the strategies used by them is essential. Studies have compared mother-child interaction in children with ASD and other developmental disorders, with that of chronological age matched dyads in Western population (Dissanayake & Crossley, 1997; Doussard-Roosevelt et al., 2003; Siller & Sigman, 2002; Willemsen-Swinkels, Bakermans-Kranenburg, Buitelaar, Van IJzendoorn, & van Engeland, 2000). Such extensive published literature on communication behaviours in Indian children, especially from Tamil speaking families is unavailable. Hence, the current study explored child-directed communication during interaction in mothers of children with ASD and compared the same with mothers of TD children. Further, an exploration to determine whether child-directed communication correspond to chronological age (CA) or language level (LL) will provide valuable information for clinical purposes. The study hypothesized that communication behaviours of mothers of children with ASD and TD children may be similar in most aspects.

Specific objectives of the study were:

- To profile and compare verbal utterances (types and functions)
- To profile and compare pragmatic acts (verbal and non-verbal communication acts with specific purpose), under broad categories of initiations and responses

in mothers of children with ASD and mothers of two groups of TD children (matched for CA and matched for LL).

## 2. Method

### 2.1. Study design

The study implemented a cross-sectional design. Ethical approval was obtained for the conduct of the study from Institutional Ethics Committee. Prior to recruiting participants to the study, informed consent was obtained from all mothers who participated in the study.

### 2.2. Participants

The primary participants of the study were mothers of children with ASD whose CA ranged between 2 and 4 years (n = 50); and mothers of TD children (n = 100). The objective of the study was to compare the communication behaviours of these mother-child dyads with that of mothers of TD children. Thus, a total of three groups were included in the study as mentioned below,

ASD groups (n = 50) : Mothers of children with ASD and their children

TD-CA group (n = 50): Mothers of TD children matched for chronological age (2–4 years) and their children

TD-LL group (n = 50): Mothers of TD children matched for language level and their children

Among the 50 dyads in each group, six of them were girls and 44 were boys. Mothers and children's descriptives are mentioned in Table 1. These dyads belonged to middle socio-economic status in India according to Modified Kuppuswamy Socioeconomic Rating Scale (2014). The mother-child dyads of ASD group were recruited from a private medical centre with facilities for early identification and intervention in Chennai. Children in ASD and TD-CA groups were matched for chronological age and sex; while children in ASD and TD-LL groups were matched for language levels and sex.

### 2.3. Brief description of the tests used

#### 2.3.1. Childhood Autism Rating Scale 2 (CARS 2)

CARS 2 is a widely used diagnostic tool in India for diagnosing children with ASD. It considers children's behaviours with reference to relationship to people, imitation, emotional response, body language, use of objects, adaptation to change, response to sensory stimulation, communication (verbal and non-verbal), activity level and so on. The rating is done on a scale of 1–4, depending on the level of deviance of the specific behaviour. Scores range between 15 and 6. A score of $\geq 30$ was considered for diagnosing children with ASD. CARS 2 scores of children in the current study ranged between 30 and 52 (M = 4.12; SD = 3.527).

#### 2.3.2. DSM 5 criteria

The DSM 5 criteria by American Psychiatric Association (APA) in 2013 has a list of behaviours broadly classified under social communication and interaction and restricted and repetitive behavior. The checklist provides minimum number of behaviours to be present under each category to diagnose a child with ASD.

#### 2.3.3. Assessment of Language Development (ALD)

ALD is a standardized test developed for assessing language levels of children between 0 and 8 years of age in Indian population. Specific picture manual and materials in accordance with criteria specified for each age range was used to administer this test. The test provides information about children's receptive and expressive language level/age based on their performance to the stimuli provided.

**Table 1**
Description of age of mother-child dyad in the three groups.

| Age | ASD | | TD-CA | | TD-LL | |
|---|---|---|---|---|---|---|
| | Child (in months) | Mother (in years) | Child (in months) | Mother (in years) | Child (in months) | Mother (in years) |
| Mean (SD) | 31.16 (4.25) | 32.15 (4.00) | 31.51 (4.40) | 29.13 (3.15) | 2.18 (3.57) | 28.71 (4.89) |
| Range | 24–39 | 27–37 | 24–40 | 25–36 | 11–24 | 22–33 |

#### 2.3.4. Hanen's stages of communication development

Hanen's stages of communication development (Girolametto et al., 2006) categorises children as discoverer, communicator, first word user, combiner based on their intentionality and expressive language skills.

- 'Discoverer', refers to children who react to stimuli, but do not possess an intent to communicate corresponding to less than 9 months of language age.
- 'Communicator', refers to children who possess the intent to communicate and do through gestures, corresponding to 9–11 months of language age
- 'First word users', refers to children using single words to communicate, corresponding to 12 months of language age
- 'Combiners', refers to children who combine 2–3 words to form simple sentences, corresponding to children above 15 months of language age

### 2.4. Group description

#### 2.4.1. ASD group

Children with ASD were diagnosed using Childhood Autism Rating Scale 2 (CARS 2; Schopler, Van Bourgondien, Wellman, & Love, 2010) and DSM 5 (APA, 2013) criteria. CARS assessment was carried out as a part of regular assessment for diagnosing ASD, by Clinical Psychologists. DSM 5 criteria was administered by the researcher as a part of inclusion criteria.

##### 2.4.1.1. Inclusion criteria

*2.4.1.1.1. Children.* In addition to the above mentioned criteria, the following inclusion criteria were considered for recruiting children to the ASD group:

- Age of the child between 2 and 4 years
- Newly identified children with no prior investigations or intervention. The maximum duration between diagnosis and inclusion of participants for the study was six days
- Normal hearing sensitivity based on hearing screening done with behavioural observation audiometry at the level of 25dBHL
- No specific parental concerns related to vision, motor and cognitive skills
- Exposed to Tamil as primary language of communication
- Belonging to middle socio-economic status

*2.4.1.1.2. Mothers*

- Primary caregiver of the children with ASD
- Tamil as the primary language
- No significant concerns related to hearing, vision, motor and cognition.

##### 2.4.1.2. Exclusion criteria

*2.4.1.2.1. Children*

- Children who may be categorized as Childhood Disintegrative Disorder, Asperger's Syndrome, Rett's Syndrome, Pervasive Disorder Not Otherwise Specified according to DSM IV criteria's classification
- Children with seizures and/ or syndromic conditions
- Children with siblings with developmental disorders

*2.4.1.2.2. Mothers*

- Mothers who were working during the time of data collection
- Mothers with psychiatric conditions, seizures and other severe health conditions
- Mothers with education or work exposure related to behavioural sciences, psychology and rehabilitation

#### 2.4.2. Assessment of language levels in children with ASD

Language ages of the 50 children in ASD group were evaluated using Assessment of Language Development (ALD; Lakkanna, Venkatesh, & Bhat, 2008) and was observed to range between 12 and 40 months with scattered scores. In addition to ALD, Hanen's stages of communication development (Girolametto et al., 2006) was used to assess the language levels of these children and categorise as discoverer, communicator, first word user, combiner. The investigator is a Hanen certified speech language pathologist (SLP) and thus was able to categorise these children under the respective category based on their communication profile.

Categorization of children under these stages was validated by another Hanen trained SLP, in addition to the researcher. All children in TD-CA group were 'combiners', while ASD children were predominantly communicators (n = 21), followed by first word users (n = 18), discoverers (n = 8) and a few combiners (n = 3). TD children in the other group, i.e. TD-LL, had similar number of children in each category (Table 2). Among the 150 mother-child dyads, most of the children were first born (80%) and the family structure was predominantly joint family (64.6%).

**Table 2**
Distribution of mother-child dyads across various stages of language levels.

| Language levels | No. of dyads | | |
|---|---|---|---|
| | ASD group | TD-CA group | TD-LL group |
| Discoverers | 8 | 0 | 8 |
| Communicators | 21 | 0 | 21 |
| First word users | 18 | 0 | 18 |
| Combiners | 3 | 50 | 3 |

### *2.5. Typically developing groups (TD-CA & TD-LL)*

#### *2.5.1. Inclusion criteria*
##### *2.5.1.1. Children*

- Children with typical motor, cognitive and sensory development with no specific parental concerns
- Age adequate language levels assessed using ALD

##### *2.5.1.2. Mothers*

- Mother and primary caregiver of TD child
- Tamil as primary language used
- No significant concerns related to hearing, vision, motor and cognition.

#### *2.5.2. Exclusion criteria*
##### *2.5.2.1. Children*

- Children with seizures
- Children with siblings having developmental disorders

##### *2.5.2.2. Mothers*

- Mothers who were working during the time of data collection
- Mothers with psychiatric conditions, seizures and other severe health conditions
- Mothers with education or work exposure related to behavioural sciences, psychology and rehabilitation

In addition to the above, each child in the TD-LL group was matched for the language level of children in ASD group based on Hanen's stages of communication development. Thus, the children in TD-LL group were younger to children in both ASD and TD-CA groups. For example, when there was a child with ASD whose CA was 3 years but language level corresponded to 10–12 months, the TD-CA group had a CA matched 3 year old TD child and the TD-LL group had a LL matched 10–12 month TD child and their respective mothers.

### *2.6. Procedure*

Interaction between mothers and children in each group was observed and video recorded for 60 min by the primary investigator who is a Speech Language Pathologist (SLP). Forty minutes of the recording was considered for analysis. First few minutes of the recording and instances when other family members were involved in talking to the child or mother were not analysed. Since mother-child interaction is likely to be influenced by context and environment (Bornstein & Putnick, 2012), the recording was done at every child's home, which was familiar and comfortable to them. Video recording was done using Sony HDR-XR550 camcorder. The investigator hand held the camera or alternatively placed it on a stable surface during the recording process.

Mothers were instructed to engage in free play with the children as done regularly, using the toys and objects available at home. There were no restrictions placed to the mothers and children with respect to materials, activities and space to be utilized. They were aware of the presence of the investigator and the interaction being video recorded. A few children took time to get used to the presence of investigator and camera. Two recordings were done on different days. All recordings were done prior to providing any sort of intervention and guidance to families of children with ASD. The average number of days between the diagnosis and recording was 1–4 days and the maximum number of days between the first and second recording was three days.

### *2.7. Data analysis*

Constant 40 min recording of each mother-child dyad was coded for mothers' communication behaviours mentioned in Appendix

1 using frequency based coding method. Broadly, the following parameters were analyzed

- Types and functions of verbal utterances used by the mothers
- Pragmatic acts (communicative acts with a specific purpose) used by the mothers in the form of initiations and responses

These were formulated based on literature (Adamson, Bakeman, Deckner, & Nelson, 2012; Ferm, Ahlsen, & Bjork-Akesson, 2005; Humber & Moss, 2005; Ruser et al., 2007). Coding was done using ELAN annotation software version 5.1 (2017) for language transcription and coding, by the primary investigator. Frequency of occurrence of each type and function of utterance (phrases and sentences) and pragmatic acts were noted for every mother in three groups. Percentage of each of these categories of communication behaviour was also calculated. Five samples from each group of TD and five from ASD group (10% of the total sample) were coded by another experienced SLP. Statistical analysis was done using SPSS software. The overall inter-rater reliability between these two raters was .869 on Interclass Correlation Coefficient. Shapiro-Wilk Test was used to check for normality check. Among the mothers' verbal utterances, the percentage of 'What' type of question; and the frequency count of total initiations and responses, followed normal distribution. Thus, these parameters were compared between groups using ANOVA's Tukey Post Hoc analysis. Bonferonni correction was applied as required. The remaining parameters under verbal utterances and pragmatic acts which did not follow normal distribution, were compared using Kruskal Wallis and Post Hoc Mann Whitney *U* tests.

## 3. Results

### 3.1. Types of verbal utterances and functions used by mothers

Tables 3 and 4 represent the type and function of verbal utterances used by mothers in the three groups, i.e.one ASD group and two TD groups. Results indicated that mothers in the ASD (Median = 336.50, IQR = 77.00), TD-CA (Median = 331.00, IQR = 57.25) and TD-LL (Median = 348.00, IQR = 84.75) groups had similar (all ps > .63) number of utterances. Though the total number of verbal utterances were similar, the types observed in mothers among the three groups varied distinctly. Mothers in ASD group used more imperatives compared to mothers in TD-LL and TD-CA groups. This difference was significant (all ps < .001) across the three groups, both in terms of overall count and its percentage, i.e. median of 49.1% in ASD, 35.47% in TD-LL and 20.95% in TD-CA groups. Imperatives were predominantly used by mothers in all the three groups to provide commands and instructions.

Mothers in the TD-CA group used more interrogatives, i.e. questions than mothers in TD-LL and ASD groups. Among the several types of interrogations, 'What' type of questions were common among mothers in all the groups, with higher median in TD-CA group, as indicated in Table 4. It was also observed that use of imperatives and interrogatives were significantly different (all ps < .001) among the three groups. The study indicated that question forms using 'When', 'Which', 'Who', intonation based questions; choices, negative sentences in the form of requests were not used by most mothers in the ASD group. Functionally, usage of imperatives as suggestions, negatives as requests or to provide information and negative exclamatory utterances were negligible in the CA matched TD group (TD-CA group). In contrast, utterances such as 'When' and intonation based questions; negatives in the form of suggestions were negligible in the mothers in TD-LL group.

Table 4 also indicated that declarative and exclamatory types of utterances were often used by mothers in TD-LL group, while negatives were used more by mothers in ASD group. This declarative type of sentences were used by mothers in all the three groups often to provide information. The frequency of using declaratives by the mothers in ASD and TD-LL groups was significant. However, the same was observed to be similar between mothers of children with ASD and CA matched TD children; and the mothers in both TD groups. Negative utterances were relatively similar between mothers in ASD and TD- LL groups, while the difference was significant between ASD and TD-CA group; and the two TD groups (ps < .001). Negative utterances in ASD group was predominantly used by mothers to instruct children on what not to do. Exclamatory sentences were used by mothers to provide reinforcement and information, with significant difference between ASD and TD-LL; and the two TD groups (both ps < .001).

Similar results were observed with reference to the percentage of the various types of verbal utterances, as indicated in Table 4. Results with reference to percentage of time spent on rhymes indicated that ASD and TD-CA groups were similar (p = .11; r = .23), while the other two groups were significantly different (both ps < .001). Though the duration was similar, in the ASD group, mothers were singing the rhymes, while in TD-CA group, children were singing.

The results of the study with reference to the function of utterances as represented in Table 4 indicated that using imperatives for request and suggestion; 'When', 'Where', intonation and information interrogatives; declarative for providing suggestion were similar (all ps > .21) between mothers in ASD and TD-LL groups. Percentage of using exclamatory utterance for providing reinforcement was similar among mothers in ASD and TD-CA groups. Other parameters such as 'Why' type of questions, information and suggestion function of negation were similar among mothers in the three groups (all ps > .09). Interestingly, most functions of verbal utterances used by mothers such as imperative for providing commands, 'What', 'Which', 'Who', 'How', 'Choice based', 'Yes/No' questions; command and request function of negations; informative, negative, question and general non-word exclamatory utterances were distinct among the mothers in the three groups (all ps < .02).

### 3.2. Pragmatic acts in mothers

#### 3.2.1. Initiation

Table 5 indicated that the frequency of pragmatic acts was distinct with significant difference at p < .00 in ASD vs TD-CA, ASD vs

**Table 3**
Mean (SD), median (IQR) and group comparison of frequency (in count) of verbal utterances used by mothers in ASD, TD-CA and TD-LL groups.

| Verbal utterance | ASD | | TD – CA | | TD – LL | | p value | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean (SD) | Median(IQR) | Mean (SD) | Median (IQR) | Mean SD) | Median (IQR) | ASD vs TD - CA | | ASD vs TD - LL | | TD - CA vs TD - LL | |
| | | | | | | | r | p | r | p | r | p |
| Imperative | 17.80 (53.56) | 164.00 (75.50) | 72.10 (19.05) | 65.50 (27.75) | 121.00 (38.59) | 121.00 (39.50) | .78 | < .001* | .47 | < .001* | .63 | < .001* |
| Interrogative | 64.66 (18.55) | 60.50 (24.25) | 169.40 (28.60) | 172.00 (41.00) | 92.18 (3.42) | 83.00 (48.00) | .91 | < .001* | .48 | < .001* | .79 | < .001* |
| Declarative | 68.38 (21.03) | 63.50 (31.00) | 73.02 (24.72) | 68.00 (32.25) | 77.46 (18.02) | 73.00 (31.25) | .10 | .42 | .23 | .02* | .10 | .16 |
| Negative | 24.76 (13.08) | 24.00 (14.50) | 6.28 (4.73) | 5.00 (6.25) | 21.52 (11.77) | 21.00 (14.25) | .68 | < .001* | .13 | .14 | .65 | < .001* |
| Exclamatory | 17.54 (8.31) | 17.50 (10.25) | 15.60 (7.09) | 16.50 (9.00) | 29.28 (8.05) | 28.50 (12.00) | .12 | .34 | .58 | < .001* | .67 | < .001* |
| Rhymes | .96 (2.22) | .00 (.00) | .20 (.70) | .00 (.00) | 2.42 (2.89) | 1.50 (4.25) | .11 | .11 | .27 | < .001* | .47 | < .001* |
| Total | 346.14 (79.37) | 336.50 (77.0) | 336.40 (41.79) | 331.00 (57.25) | 341.44 (57.07) | 348.00 (84.75) | .08 | .90 | .03 | .78 | .05 | .63 |

SD – Standard Deviation; IQR – Interquartile range; r – Effect size; p – Level of significance; *Significant at 95% CI.

**Table 4**
Comparison of frequency (in percentage) of types and functions of verbal utterances used by mothers in ASD, TD-CA and TD-LL groups.

| Verbal utterances | ASD | | TD - CA | | TD - LL | | p value | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | ASD vs TD – CA | | ASD vs TD - LL | | TD - CA vs TD - LL | |
| | Mean (SD) | Median (IQR) | Mean (SD) | Median (IQR) | Mean (SD) | Median (IQR) | r | p | r | p | r | p |
| **Imperative** | 48.94 (7.92) | 49.10 (12.31) | 21.40 (4.69) | 20.95 (5.96) | 35.02 (8.75) | 35.47 (10.21) | .90 | < .001* | .64 | < .001* | .70 | < .001* |
| Request | 2.92 (1.73) | 2.86 (1.85) | 1.64 (1.55) | 1.10 (2.72) | 3.15 (1.44) | 2.91 (1.87) | .36 | < .001* | .07 | .25 | .45 | < .001* |
| Command | 47.15 (8.24) | 46.67 (13.71) | 19.80 (4.23) | 19.99 (6.68) | 31.22 (7.94) | 31.37 (8.45) | .90 | < .001* | .70 | < .001* | .67 | < .001* |
| Suggestion | 1.79 (1.33) | 1.60 (1.92) | .39 (.74) | .00 (.37) | 2.14 (1.88) | 1.91 (2.27) | .55 | < .001* | .11 | .63 | .52 | < .001* |
| **Interrogative** | 19.05 (5.03) | 18.30 (7.35) | 50.43 (6.41) | 50.12 (8.07) | 26.78 (6.53) | 25.12 (11.57) | .94 | < .001* | .55 | < .001* | .88 | < .001* |
| What | 7.82 (3.42) | 8.24 (6.07) | 26.97 (6.04) | 26.30 (6.77) | 11.32 (4.58) | 10.66 (5.46) | .89 | < .001* | .40 | < .001* | .83 | < .001* |
| When | .36 (.65) | .00 (.57) | 1.01 (1.29) | .47 (1.74) | .36 (.68) | .00 (.56) | .30 | < .001* | .00 | .98 | .30 | < .001* |
| Why | .70 (.98) | .30 (1.08) | .86 (1.05) | .53(1.58) | .71 (1.07) | .28 (1.09) | .08 | .52 | .00 | .99 | .07 | .47 |
| Where | 3.58 (1.89) | 3.29 (1.97) | 6.41 (2.16) | 6.18 (3.05) | 4.12 (2.36) | 3.70 (3.46) | .57 | < .001* | .13 | .38 | .45 | < .001* |
| Which | .30 (.43) | .00 (.54) | 2.07 (.92) | 2.04 (1.45) | 1.63 (1.34) | 1.34 (2.04) | .78 | < .001* | .56 | < .001* | .19 | .03* |
| Who | .47 (.74) | .00 (.76) | 3.97 (1.63) | 3.62 (2.04) | 2.07 (1.59) | 1.89 (1.79) | .81 | < .001* | .54 | < .001* | .51 | < .001* |
| How | .93 (.94) | .79 (1.3) | 3.42 (1.16) | 3.19 (1.54) | 1.54 (1.05) | 1.43 (.57) | .76 | < .001* | .29 | < .001* | .45 | < .001* |
| Choice | .14 (.37) | .00 (.00) | .70 (.73) | .56 (1.00) | 1.78 (1.32) | 1.72 (1.56) | .43 | < .001* | .65 | < .001* | .58 | < .001* |
| Yes/No | 2.03 (1.43) | 1.77 (2.45) | 2.90 (1.68) | 2.70 (2.19) | .93 (.97) | .82 (1.54) | .27 | .01* | .41 | < .001* | .59 | < .001* |
| Intonation | .05 (.20) | .00 (.00) | 1.56 (.92) | 1.39 (1.00) | .14 (.39) | .00 (.00) | .75 | < .001* | .15 | .21 | .71 | < .001* |
| Information | 2.66 (2.20) | 2.33 (2.83) | .54 (.88) | .00 (.82) | 2.21 (1.71) | 1.87 (2.08) | .53 | < .001* | .11 | .52 | .52 | < .001* |
| **Declarative** | 19.82 (4.59) | 18.96 (7.93) | 21.50 (5.85) | 20.60 (8.33) | 23.24 (6.57) | 22.53 (9.46) | .16 | .22 | .29 | .01* | .14 | .23 |
| Information | 13.74 (4.46) | 13.08 (7.10) | 16.32 (4.80) | 15.12 (7.00) | 17.51 (5.89) | 16.02 (8.47) | .27 | .01* | .34 | < .001* | .11 | .36 |
| Suggestion | 6.08 (2.08) | 5.76 (3.30) | 5.19 (2.38) | 4.83 (2.61) | 5.73 (2.30) | 5.14 (3.13) | .20 | .02* | .08 | .30 | .11 | .18 |
| **Negative** | 7.08 (2.87) | 7.26 (4.11) | 1.90 (1.46) | 1.44 (1.85) | 6.24 (3.07) | 5.68 (5.01) | .75 | < .001* | .14 | .11 | .67 | < .001* |
| Command | 5.88 (2.67) | 5.83 (3.39) | .82 (.91) | .57 (1.48) | 5.18 (8.07) | 3.59 (3.54) | .79 | < .001* | .06 | < .001* | .35 | < .001* |
| Request | .11 (.26) | .00 (.00) | .00 (.00) | .00(.73) | .68 (.86) | .24 (1.30) | .09 | < .001* | .40 | < .001* | .49 | < .001* |
| Information | .56 (.68) | .36 (.78) | .55 (.92) | .00 (.78) | .80 (.95) | .55 (1.67) | .01 | .21 | .14 | .59 | .13 | .14 |
| Suggestion | .53 (.56) | .35 (.75) | .53 (.58) | .40 (.86) | .49 (.74) | .00 (.87) | .01 | .95 | .03 | .09 | .04 | .18 |
| **Exclamatory** | 5.10 (2.26) | 5.00 (3.27) | 4.77 (2.37) | 5.17 (3.13) | 8.72 (2.61) | 8.27 (3.35) | .07 | .57 | .60 | < .001* | .62 | < .001* |
| Reinforcement | 1.52 (1.05) | 1.29 (1.77) | 1.80 (1.29) | 1.96 (2.39) | 3.62 (2.43) | 2.92 (2.90) | .12 | .28 | .49 | < .001* | .42 | < .001* |
| Providing information | 1.72 (1.34) | 1.51 (1.90) | .77 (.88) | .55 (1.25) | 2.28 (1.13) | 2.33 (1.40) | .39 | < .001* | .22 | .01* | .60 | < .001* |
| Negative | .97 (.93) | .66 (1.20) | .12 (.38) | .00 (.00) | 1.37 (1.06) | 1.41 (1.59) | .51 | < .001* | .20 | < .06 | .62 | < .001* |
| Question | .68 (0.95) | .39 (1.42) | 1.96 (1.24) | 2.02 (.82) | 1.00 (.92) | .81 (1.28) | .58 | < .001* | .03 | .04* | .56 | < .001* |
| Non-words | 1.34 (1.17) | 1.10(1.60) | 1.38 (1.04) | 1.15(1.80) | 1.71 (1.05) | 1.47 (1.87) | .61 | .64 | .13 | .04* | .64 | .11 |
| Rhymes | 2.40 (5.55) | .00 (.00) | .50 (1.75) | .00 (.00) | 6.05 (7.22) | 3.75 (10.63) | .23 | .11 | .27 | < .001* | .47 | < .001* |

SD – Standard Deviation; IQR – Interquartile range; r – Effect size; p – Level of significance; *Significant at 95% CI.

**Table 5**
Mean (SD), Median (IQR) and group comparison of frequency (in count) of pragmatic acts used by mothers in ASD, TD-CA and TD-LL groups.

| Pragmatic acts | Median (count and percentage) | | | | | | p value | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ASD | | TD - CA | | TD - LL | | ASD vs TD-CA | | ASD vs TD- LL | | TD-CA vs TD -LL | |
| | Mean (SD) | Median (IQR) | Mean (SD) | Median (IQR) | Mean (SD) | Median (IQR) | r | p | r | p | r | p |
| Initiation | 434.14 (46.90) | 424.50 (42.00) | 349.44 (41.93) | 350.50 (42.00) | 431.16 (46.94) | 427.50 (71.00) | .69 | < .001* | .03 | .80 | .68 | < .001* |
| Response | 86.32 (15.85) | 83.00 (22.00) | 114.78 (20.74) | 114.00 (29.50) | 132.36 (18.34) | 132.00 (25.00) | .61 | < .001* | .80 | < .001* | .41 | < .001* |
| Total acts | 52.46 (53.64) | 508.00 (56.25) | 464.22 (41.55) | 471.50 (62.50) | 565.04 (43.85) | 564.00 (74.50) | .52 | < .001* | .41 | < .001* | .77 | < .001* |

SD – Standard Deviation; IQR – Interquartile range; r – Effect size; p – Level of significance; *Significant at 95% CI.

TD-LL and TD-CA vs TD-LL comparisons. Frequency of pragmatic acts (initiations and responses) in count and percentage was highest among mothers in TD-LL group and relatively less in TD-CA group. Quantitatively, pragmatic acts observed in mothers in ASD group was less than the results observed in TD-LL group, however, more than the ones observed in TD-CA group. Qualitatively, with respect to facilitation of communication behaviours, mothers in both the TD groups were better than mothers in ASD group. The difference between ASD and TD-CA with reference to initiation acts; and between both the TD groups was significant (both ps < .001). The comparison between ASD and TD-LL groups was similar (p = .80; r = .03). The response acts were distinct among the three groups (all ps < .001).

Among the several initiation acts, mothers' initiations with reference to percentage of instructions (Median = 19.59, IQR = 3.85), questions (Median = 14.70, IQR = 5.39), commenting and descriptions (Median = 15.09; IQR = 5.31) were more common in ASD group. In addition to these initiation acts, other acts such as seeking attention, providing choices, naming, request for object and action were significantly different among the three groups (all ps < .01). With reference to both the TD groups, Table 6 indicates that among the several acts, mothers of TD-CA children used more questions, which were often age appropriate. Acts such as percentage frequency of directing attention, demonstrations, prompting, request for naming, demonstration and repetitions were similar (all ps > .19) between mothers of ASD and TD-LL groups. Among mothers' total utterances in each group, mothers of children with ASD did not provide sufficient opportunities for the children 11.24% (IQR = 4.66) of the time, while it was lesser in the case of both TD-CA and TD-LL groups.

#### *3.2.2. Responses*

Most of the response acts observed in mothers in ASD group was to negate, acknowledge and console, as indicated by a higher median and mean in Table 7. Mothers in the chronological age matched group responded predominantly with acknowledgements, repetitions and negations. The mothers in language level matched group responded predominantly as a response to request, question and reinforcement. Further, mothers of children with ASD were observed to imitate mothers of TD-CA children; while repetition as a response act was similar to mothers of TD-LL children (both ps > .10). Most of the responses such as negation, reinforcement, acknowledging, response to request; question and consoling were different among the three groups (all ps < .001). Mothers of children with ASD were predominantly using negations, while that of mothers of TD children in both the groups were observed to be using acknowledgements, reinforcements, confirmation and a few negations as indicated in Table 7. Interestingly, mothers' usage of confirmation and apologies were present only in a few mothers and was similar among the three groups (all ps > .23).

## 4. Discussion

The current study analysed various types and functions of verbal utterances; and pragmatic acts used by 50 mothers of 2–4 year-old children with ASD; and compared the same with mothers of chronological age (n = 50) and language level (n = 50) matched TD children. Several findings emerged from the study.

### *4.1. Types and functions of sentences used by mothers*

The results indicated that mothers of children with ASD were more directive by providing instructions which is often not a facilitative strategy (Meirsschaut et al., 2011; Spiker et al., 2002) for communication. Mothers of CA matched children used more interrogations as these children were verbal and responded well to the questions, while mothers in TD-LL group used more exclamatory sentences which augmented their engagement with the mother. Research reports that such utterances are likely to facilitate joint engagement (Bottema-Beutel, 2016).

Mothers of children with ASD commented on objects, people and activities; used exclamatory sentences, reinforcements; and indulged in rhymes activity corresponding to children's chronological age. This was indicated by insignificant difference in the frequency of these parameters between ASD and TD-CA groups. Similarly, these mothers modified few other utterances such as imperative utterances for requesting and providing suggestion; questions such as 'when', 'where', using intonations and as

**Table 6**
Mean (SD), Median (IQR) and group comparison of frequency (in count) of initiations observed in mothers in ASD, TD-CA and TD-LL groups.

| Pragmatic acts | ASD | | TD – CA | | TD - LLs | | p value | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean (SD) | Median (IQR) | Mean (SD) | Median (IQR) | Mean (SD) | Median (IQR) | ASD vs TD-CA | | ASD vs TD-LL | | TD-CA vs TD-LL | |
| | | | | | | | r | p | r | p | r | p |
| Total initiations | 83.42 (2.52) | 83.56 (3.45) | 75.17 (4.61) | 75.87 (6.13) | 76.39 (3.65) | 76.32 (4.42) | .74 | < .001* | .74 | < .001* | .16 | < .001 |
| Directing attention | 7.67 (2.57) | 7.54 (3.28) | 2.99 (1.11) | 2.77 (1.67) | 7.43 (2.13) | 7.62 (3.38) | .76 | < .001* | .05 | .95 | .79 | < .001 |
| Seeking attention | 6.15 (1.64) | 6.11 (2.11) | 2.70 (1.22) | 2.55 (1.81) | 3.35 (.84) | 3.25 (1.55) | .77 | < .001* | .73 | < .001* | .30 | < .001* |
| Commenting & descriptions | 15.54 (3.94) | 15.09 (5.31) | 20.74 (5.90) | 18.84 (8.50) | 17.91 (3.86) | 17.91 (6.39) | .46 | < .001* | .29 | .01* | .27 | .01* |
| Instructions | 19.67 (4.31) | 19.59 (3.85) | 8.10 (2.71) | 7.96 (3.60) | 12.11 (2.75) | 12.33 (3.11) | .85 | < .001* | .72 | < .001* | .59 | < .001* |
| Questions | 14.76 (3.41) | 14.71 (5.39) | 48.48 (5.82) | 48.81 (7.45) | 21.16 (5.72) | 20.00 (8.18) | .96 | < .001* | .56 | < .001* | .92 | < .001* |
| Demonstrations | 3.50 (1.73) | 3.28 (2.69) | 2.06 (1.56) | 2.11 (2.50) | 3.58 (1.74) | 3.56 (2.20) | .40 | < .001* | .02 | .85 | .42 | < .001* |
| Providing choices | .19 (.40) | .00 (.23) | .75 (.73) | .61 (.92) | 1.44 (1.00) | 1.33 (1.33) | .43 | < .001* | .63 | < .001* | .37 | < .001* |
| Naming | 2.85 (1.37) | 2.90 (2.21) | .98 (.94) | .77 (1.73) | 3.74 (1.41) | 3.64 (1.92) | .62 | < .001* | .30 | .01* | .76 | < .001* |
| Prompting | 4.63 (2.18) | 5.15 (3.58) | 2.51 (2.07) | 2.27 (2.63) | 5.17 (1.86) | 5.22 (2.78) | .45 | < .001* | .13 | .00* | .56 | < .001* |
| Request for naming | 6.39 (1.64) | 6.72 (2.38) | 2.25 (1.19) | 2.38 (1.55) | 5.97 (1.78) | 5.78 (2.63) | .82 | < .001* | .12 | .19 | .77 | < .001* |
| Request for object | 6.34 (2.04) | 6.27 (2.54) | .78 (1.06) | .00 (1.50) | 4.83 (1.41) | 4.52 (2.23) | .86 | < .001* | .40 | < .001* | .85 | < .001* |
| Request for action | 3.12 (1.85) | 2.76 (2.59) | 5.31 (1.90) | 5.35 (2.89) | 4.12 (1.53) | 4.06 (1.44) | .50 | < .001* | .28 | < .001* | .33 | < .001* |
| Request for Demonstration | 5.03 (2.12) | 4.85 (2.85) | .60 (.97) | .00 (1.11) | 5.43 (1.62) | 5.36 (2.50) | .80 | < .001* | .11 | .28 | .88 | < .001* |
| Repetition | 4.15 (2.11) | 4.24 (3.04) | 1.76 (1.07) | 1.96 (1.50) | 3.76 (1.13) | 3.93 (1.33) | .58 | < .001* | .11 | .39 | .67 | < .001* |
| No opportunities | 11.24 (4.66) | 10.28 (4.86) | 3.50 (1.90) | 3.35 (2.63) | 2.71 (1.85) | 2.27 (2.78) | .74 | < .001* | .77 | < .001* | .21 | .03* |

SD – Standard Deviation; IQR – Interquartile range; r – Effect size; p – Level of significance; *Significant at 95% CI.

**Table 7**
Mean (SD), Median (IQR) and group comparison of frequency (in count) of responses observed in mothers in ASD, TD-CA and TD-LL groups.

| Pragmatic acts | ASD | | TD – CA | | TD - LLs | | p value | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean (SD) | Median (IQR) | Mean (SD) | Median (IQR) | Mean (SD) | Median (IQR) | ASD vs TD-CA | | ASD vs TD-LL | | TD-CA vs TD-LL | |
| | | | | | | | r | p | r | p | r | p |
| **Total responses** | 16.58 (2.52) | 16.44 (3.45) | 24.83 (4.61) | 24.13 (6.13) | 23.62 (3.65) | 23.68 (4.48) | .75 | < .001* | .75 | < .001* | .14 | .35 |
| Repetition | 10.54 (5.20) | 10.41 (6.68) | 19.62 (4.76) | 19.38 (6.27) | 8.89 (5.40) | 8.60 (7.12) | .67 | < .001* | .15 | .09 | .73 | < .001* |
| Negation | 37.19 (8.23) | 37.09 (11.01) | 14.53 (4.18) | 14.52 (6.38) | 10.17 (3.75) | 10.20 (4.69) | .87 | < .001* | .90 | < .001* | .48 | < .001* |
| Reinforcement | 10.14 (4.68) | 9.60 (5.81) | 7.52 (3.79) | 7.90 (4.89) | 14.47 (5.12) | 13.30 (7.90) | .29 | < .001* | .40 | < .001* | .61 | < .001* |
| Imitation | 1.91 (3.27) | .00 (2.51) | 1.10 (2.15) | .00 (1.89) | 5.35 (5.10) | 4.78 (7.72) | .14 | .29 | .37 | < .001* | .48 | < .001* |
| Confirmation | 10.43 (6.64) | 8.86 (10.22) | 8.56 (3.86) | 8.59 (5.84) | 8.64 (4.53) | 8.30 (7.05) | .17 | .25 | .16 | .23 | .01 | .92 |
| Acknowledging | 12.10 (8.31) | 10.37 (10.56) | 24.02 (8.08) | 21.06 (11.33) | 17.37 (6.10) | 17.53 (8.02) | .59 | < .001* | .20 | < .001* | .25 | < .001* |
| Response to questions | .10 (0.52) | .00 (.00) | 13.32 (4.80) | 12.50 (5.66) | 16.43 (4.74) | 14.89 (7.58) | .89 | < .001* | .92 | < .001* | .31 | < .001* |
| Response to request | 7.0 (3.96) | 6.19 (5.05) | 11.16 (5.14) | 10.48 (5.13) | 17.79 (4.60) | 17.68 (7.37) | .41 | < .001* | .78 | < .001* | .56 | < .001* |
| Apologies | 1.14 (3.57) | .00 (.00) | .16 (.46) | .00 (.00) | .28 (.68) | .00 (.00) | .19 | .40 | .17 | .96 | .10 | .37 |
| Consoling | 9.44 (5.87) | 9.38 (8.17) | .02 (.16) | .00 (.00) | .61 (1.38) | .00 (.00) | .75 | < .001* | .71 | < .001* | .28 | < .001* |

SD – Standard Deviation; IQR – Interquartile range; r – Effect size; p – Level of significance; *Significant at 95% CI.

information; declaratives for providing suggestion; and negation according to children's language level. However, a lot of sentence types (such as imperatives as commands and in total; other types of interrogatives, and total number of interrogatives; declaratives for providing information, negatives as commands and requests, exclamatory utterances for providing information, as negation, for questioning and through non-words) used by mothers of ASD children were neither corresponding to the child's CA, nor their LL.

### 4.2. Pragmatic acts used by mothers

Mothers of children with ASD initiated and took a dominant role during the interaction as children initiated and responded less. Such initiations by the mothers were predominantly to gain children's attention, provide instructions and request for naming. However, research report that such initiations often do not have long term facilitatory impact on communication skills (Rowe, Coker, & Pan, 2004). In contrary to the results in mothers of children with ASD, pragmatic acts used by mothers of TD children were predominantly to respond than initiate. Such responsiveness is often the recommended strategy in parent empowerment programmes (Girolametto et al., 2006) for communication. Frequent verbal engagement by caregivers, facilitate vocabulary development in young children (Hurtado, Marchman, & Fernald, 2008; Weisleder & Fernald, 2013). However, excessive intrusiveness by the mother can lead to slower and smaller receptive vocabulary development in young children, especially till 3 years of age (Pungello, Iruka, Dotterer, Mills-Koonce, & Reznick, 2009; Tamis-LeMonda, Shannon, Cabrera, & Lamb, 2004). Such excessive intrusions were obvious in mothers of children with ASD in the current study as well.

Additionally, acknowledgement of children's verbal and non-verbal behaviour was better in mothers of TD children. Mothers of younger TD children used more choices and reinforcements which encouraged them to increase the occurrence of the behaviour (verbal and non-verbal). Very few mothers of children with ASD provided choices, imitated their children or apologized for their act which hurt or upset their child. Mothers in TD-CA group had minimal requests for demonstration, imitation and consoling, while mothers in TD-LL group had minimal consoling acts. The study also reported that reinforcements provided by mothers in ASD and TD-CA groups were similar.

Dynamic nature of parent-child interactions through which parents modify their strategies to meet changing needs and demands of children from time-to-time facilitates acquisition of new skills (Hirsh-Pasek & Burchinal, 2006). It is also known that mothers' verbal responses to children's vocalization influence the development of vocabulary and emerging communication skills (Goldstein, Schwade, & Bornstein, 2009; Huttenlocher, Vasilyeva, Waterfall, Vevea, & Hedges, 2007; Smith, Landry, & Swank, 2006).

### 4.3. Indian parenting and mother-child interaction

Facilitative strategies used by any parent while interacting with their children may depend on socio-economic status and cultural norms (Gogate, Bahrick, & Watson, 2000; O'Neil-Pirozzi, 2006). Indian languages which are predominantly verb dominant might lead to increased scaffolding by parents while talking to their children, when compared to other nationals such as British or American mothers (Gogate, Maganti, & Laing, 2013). This verb dominant language exposure is reflected in Indian children comprehending verbs earlier than other national children (Reddy, Liebal, Hicks, & Jonnalgadda, 2013). Few studies on mothers living abroad have also indicated that Indian mothers use more scaffolding due to verb-dominance (Gogate, Maganti & Bahrick, 2016; Sethuraman & Smith, 2010). Such cultural differences in Indian parents adds to the existing directive nature of parents of children with developmental disorders (Doussard-Roosevelt et al., 2003).

### 4.4. Differences in child-directed communication between mothers of TD children and children with ASD

The current study reported that mothers of TD children were predominantly engaged in questioning through a variety of interrogations which were used directly or indirectly to provide opportunity for children to respond. Like a vicious cycle, the verbal responsiveness of TD children probably increased the use of such interrogations by mothers. These mothers also used statements (declaratives) to provide information and instructions (through imperatives). Exclamatory sentences were used mainly to gain attention. Overall, the utterances used by mothers of TD children were in sync with children's utterances or activities. Such parenting styles which are responsive and contingent to children's utterances are most conducive to language (Girolametto et al., 2006) and literacy developments (Hancock & Kaiser, 2006; Zevenbergen & Whitehurst, 2003).

On the other hand, mothers of children with ASD predominantly used commands and a few requests and suggestions in the form of imperatives. Declarative sentences were used to provide information or indirect instructions. Similarly, a few of their interrogation type of utterances were produced with an imperative or declarative function. These mothers also used more 'What' and 'Which' questions among other Wh- questions through verbalisation or "Hmm" with a rising intonation. Further, their usage of exclamatory sentences was minimal. These mothers were observed to be using more gestures to gain attention than mothers of TD children. Such use of gestures by mothers is reported to facilitate learning of new actions in children through observation (Rowe & Goldin-Meadow, 2009). Further, when such gestures are combined with verbalisations its effectiveness in gaining children's attention than verbalisation alone (Stack & Muir, 1992).

Longer duration of time spent in rhymes by ASD group could probably be attributed to the intonation and interest of these children. Most of these rhymes were common unaccented English rhymes used at home and schools in India. Mothers of children with ASD were observed to be shifting topic of discussion more often than mothers of TD children. This was mainly due to inadequate involvement of children with ASD in the topic of conversation. Overall, mothers of children with ASD kept providing instructions or commands to their children during the 40 min interaction at home, while mothers of TD children of same age range were focussing

more on asking questions. The results are in concurrence with studies in the past (Meirsschaut et al., 2011; Spiker et al., 2002) which indicate that parents of children with developmental disorders use more directive strategies with an assumption that such utterances would yield more joint engagement and responsiveness in their children. Research also reports that directive style of communication is obvious even in parents of children who are at risk for language delay and autism. Such interactions followed over a longer period of time may lead to an increasingly atypical developmental trajectory (Wan et al., 2012). In addition, Siller and Sigman (2002, 2008) reported positive correlation between usage of responsive verbal strategies by mothers with joint attention and language skills in children with ASD.

## 5. Conclusion

The current study reported quantitative and qualitative differences in the mother-child interaction between children with ASD and TD children. Among the several child-directed communication behaviours analysed, a few utterances and acts were modified according to chronological age level, while a few others according to language level. The number of utterances used by mothers in the three groups were similar, however, the type of sentences used by each group varied distinctly. Mothers of children with ASD were highly directive (using imperative sentences), while mother in TD-CA group used more questions (interrogations) with their children. Mothers in TD-LL group predominantly used declarative type of utterances during the interaction. A few paramaters such as time spent on rhymes, reinforcing acts and confirmation were similar between ASD and TD-CA groups. Mothers in all the three groups were distinct with reference to the total pragmatic acts. Frequency of initiations by mothers in ASD group were similar to mothers in TD-LL groups. Response acts were distinct among the three groups. Literature reports that mothers of children with ASD are likely to be more directive and taking leads during interaction compared to mothers of TD children. This is often done to compensate for children's communication difficulties. The current study reports that directive and predominantly authoritative style of parenting among Indian families has resulted in mothers of children with ASD to be more directive.

## 6. Implications

Parental verbal responsiveness is one of the pre-requisite for development of communication in young children with ASD (Flippin & Watson, 2018). In addition to profiling children's communication skills, profiling child-directed communication in respective mother/caregiver(s) will provide specific information on the extent of stimulation provided. It is anticipated that application of these specific information in clinical practice would augment child-centered approach for assessment, management and providing adequate guidance for families of children with ASD. Additionally, the findings from this study provides culture specific leads for counselling and empowering parents of children with ASD with Tamil speaking Indian background.

## Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:https://doi.org/10.1016/j.rasd.2019.101423.

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