

Original Article**Can the socio-economic status of young children influence their language performance?****An Indian study**

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Abstract

Background: Language development during early childhood is crucial to a child's overall development. The socioeconomic status (SES) is a major contributing factor to development, whose impact on language is less explored in young children especially in a multicultural country like India. This research focussed on assessing the semantic language of children from lower socio-economic (LSE) and higher socio-economic (HSE) status.

Method: Sixty typically-developing Kannada speaking children between 2 and 5 years of age were classified into 3 groups (Group I: 2.0 – 2.11, Group II: 3.0 – 3.11, and Group III: 4.0 – 4.11 years), with each group being further divided into HSE and LSE subgroups. Language samples were collected using a picture description task and were analyzed for the semantic (total number of words and different words-TTR) measures. Descriptive statistics was done to determine mean and SD of both measures for each of the participants of the HSE and LSE subgroups. Non-parametric tests determined the level of significance between and across the HSE and LSE subgroups (between each of the 3 groups).

Results: The results indicated a significant difference ($p < 0.05$) across the HSE (I-HSE, II-HSE, and III-HSE) and LSE (I-LSE, II-LSE, and III-LSE) subgroups for the semantic measures. Comparison between the HSE and LSE subgroups indicated a significant difference ($p < 0.05$) only between the 3 year-olds.

Conclusion: These findings provide an insight into how early and to what extent SES impacts language development in 2, 3, and 4 year-old children.

Key words: semantic, socio-economic status, children, language, picture

Introduction

The development of language is influenced by the gender, intelligence and personality of the child, as well as their environment and upbringing by their parents. Out of the several variables which were assumed to be associated with speech delays, the highest risk factors were associated with maternal education and gender, followed by certain risk for family history of developmental communication disorders and low socioeconomic status [1, 2]. The socioeconomic status (SES) refers to the social standing or social class of an individual [3]. It is an important aspect to determine the health and nutrition conditions of an individual or family. Researchers in India have majorly used the Kuppuswamy Scale which assesses the SES based on the education and occupation of the head of the family, and the income per month from all sources. This scale has been in use for over three decades, with subsequent modifications being made, with the income subscale being the most frequently revised domain [4, 5]. Studies have described the effects SES have on home environment which consequently affects the neurocognitive performances [6] of a child, particularly their language and executive functions [2]. Parents belonging to lower SES were found to spend a smaller amount of time or energy in playing with or engaging in

conversations with their children [7]. They exhibited more restraining and authoritarian parenting [8], and spent less time talking to their children, using a more directive approach [9], with a heightened use of prohibitions as opposed to parents from high SES families. This directive form of speech has been associated with poorer language skills of the children belonging to the lower SES background, thereby putting them at a disadvantage when compared to their peers coming from a more favorable home environment. This facilitative home environment [10], included the family members to play an integral role in the development of language in children [11].

It was observed that by 4 years of age, children from a professional family would be exposed to approximately 45 million words; those from a working class family would be exposed to 26 million words; while children from the lower SES families were exposed to a mere 13 million words by the same age [12]. This slow vocabulary growth in children from lower SES backgrounds [13] may be attributed to the difference in vocabulary input received by the two SES classes, which was described by Hart and Risley [14] as the '30 million' word gap. Research [15] have found that the associations between SES and vocabulary were mainly observed during their first three years of life [16]. The slower vocabulary growth evident in children from lower SES when compared to their high SES peers [13], continued to persist into their academic years [17] as well. The influence of SES on play skills was investigated in 3 and 4 year-old children between the SES groups, indicating no difference in any types of play except for the relational play which was seen more frequently in the HSE group [18]. Hagans and Good [19] found children from lower socioeconomic backgrounds to be at greater risk of reading problems in the future [20]. Researchers have established SES as a key indicator of the presence of language delays in Indian children between 12 to 35 months of age [21], while others found no such relationship between SES and language delay [22]. The SES was found to have an

impact on the learning abilities of primary school Bengali children, with children from lower SES exhibiting lower language recall and recognition than children from middle and high SES groups [23]. The communication deficits encountered by low SES children may go unnoticed, due to the use of standardized language tests that may not be sensitive enough to identify differences in language disorders arising from linguistic and cultural variations [24].

Inglebret et al. [25] examined language focussed scientific articles published in the American Speech-Language-Hearing Association journals, and reported the concern and importance of considering the SES background of research participants. With the SES of the child's family having been found to be a major contributing factor affecting the development of their language, an understanding of this influence is essential in a multilingual and multicultural country like India, wherein 42% and 26% of the citizens live in rural and urban communities respectively. The period of early childhood being fundamental for understanding socioeconomic and other social inequalities throughout life [26], it would be interesting to study the linguistic changes in Indian children coming from different socio-economic backgrounds. Therefore, the present study is targeted to study the semantic language skills of typically developing Indian Kannada speaking children between 2 and 5 years of age from different SES (lower and higher SES) backgrounds. This study attempts to provide an insight in considering SES as a possibly influencing variable for the development of semantic language.

Method

The participants included in this study were typically developing children speaking Kannada as their first language. A cross-sectional design along with a non-probability sampling procedure was employed in order to assess the language abilities across different age groups. The study was conducted in the Dakshina Kannada district, in the state of Karnataka, India between December

2015 and January 2017. Ethical approval was received from the Institutional Ethical Board prior to its commencement.

Participants

The target population for the present study consisted of three groups (Group I: 2.0 – 2.11, Group II: 3.0 – 3.11, and Group III: 4.0 – 4.11 years) based on their age. The methodology followed for this study was adopted from Prasad and Prema's [27] work on the language corpora of older Kannada speaking children using narration. The sample size was determined using $n = 2(z\alpha + z\beta)^2 \cdot \Sigma^2/d^2$; wherein $z\alpha=1.96$ at 95% confidence level, $z\beta=1.28$ at 90% power, and Σ and d are standard deviation and mean respectively.

Since the study was done in the Mangalore taluk of the Dakshina Kannada district, the participants were selected from residential homes within Mangalore city. Prior to the commencement of the study, the parents of the children were explained the purpose of the study and written consent was obtained from them. The participant's SES was ascertained using the latest version of the Kuppuswamy's Scale for measuring SES [28].

Sixty participants were selected for the study and allocated into 3 groups, with each age group being further classified into High Socio Economic (HSE) and Low Socio Economic (LSE) subgroups. Table 1 illustrates the number of participants identified under each age group (Group I, Group II, and Group III) and further under each socio-economic subgroup (HSE and LSE), based on the Kuppuswamy's socio-economic classifications (lower, upper lower, lower middle, upper middle, and upper) and their corresponding SES scores.

Table 1-Distribution of participants under each SES subgroup (Group wise) based on the Kuppuswamy's scores.

Kuppuswamy's SES (scores)	Total number of participants					
	Group I		Group II		Group III	
	SES					
	LSE	HSE	LSE	HSE	LSE	HSE
Lower (<5)	0	-	0	-	0	-
Upper lower (5 – 10)	7	-	7	-	5	-
Lower middle (11 – 15)	3	-	3	-	5	-
Upper middle (16 - 25)	-	0	-	1	-	5
Upper (26 - 29)	-	10	-	9	-	5
Total participants	10	10	10	10	10	10

Each participant attained age appropriate language skills based on the Assessment of Language Development (ALD) [29]; age appropriate cognitive skills based on The COM-DEALL developmental checklist [30]. Participants who did not meet the age appropriate language and cognitive level were excluded from the study. Participants with a history of hearing deficits, and/or those with an uncorrected visual impairment putting them at risk of developing typical speech and language skills were also excluded from the study. Table 2 includes details of the parents (father and mother) based on the three domains of the Kuppuswamy's Scale – the highest educational qualifications received, current occupation, and family income per month.

Table 2- Details of the parents based on their highest educational qualifications received, current occupation, and family income per month (based on the Kuppuswamy's Scale)

Variables	Total number of parents			
	HSE		LSE	
	Father	Mother	Father	Mother
Highest Educational Qualification				
Profession or Honors	9	7	-	-
Graduate or post graduate	15	18	-	-
Intermediate or post high school diploma	6	5	-	-
High school certificate	-	-	12	15

Middle school certificate	-	-	13	10
Primary school certificate	-	-	5	5
Literate	-	-	-	-
Occupation				
Professional	16	14	-	-
Semi-professional	12	9	-	-
Clerical, Shop-owner	2	1	-	-
Skilled worker	-	-	13	2
Semi-skilled worker	-	-	10	11
Unskilled worker	-	-	7	17
Unemployed	-	6	-	-
Family income per month (INR)				
>39, 174		28		-
19,587-39,173		2		-
14690-19,586		-		22
9794-14,689		-		7
5876-9793		-		1
1978-5875		-		-
<1977		-		-

Stimuli

Two pictures (*'A lively city street'*, and *'A bustling railway station'*) encompassing a central theme with multiple events taking place at a given time, were shortlisted for the current study. Each event consisted of various characters taking part in a dialogue with a communication partner having a particular objective, or were engaged in a specific activity. Since tasks that incorporate picture descriptions have been found to be an effective measure to elicit language production in children with communication disorders, compared to single pictures that primarily target comprehension [31], the present study followed a similar line. One of the selected pictures was designated to be a trial stimulus (*'A lively city street'*), while the other a test stimulus (*'A bustling railway station'*).

Table-3 shows the multiple events taking place, with characters involved in the scene in the trial and test stimulus. Both the stimuli provided scope for the participants to generate dialogues via

labeling, describing attributes, describing agent –action, describing action-object, and by making inferences. Probe questions (in Kannada) were devised for both the trial and test stimuli. A total of 10 questions (5 open-ended and 5 closed-ended) were formulated for each the trial stimulus, and the test stimulus. The trial and test stimuli were evaluated by two experienced speech language pathologists (judges) for its appropriateness to the objective of the study. This was followed by the judges rating the probe questions using a 5-point Likert scale for its potentiality to generate a rich language sample.

Table 3- The type of events, and the characters involved in the event in the trial and test stimuli

	Event no.	Type of event	Characters involved
Trial stimulus	1.	Moving vehicles on the road	Bikers/Drivers
	2.	People sitting and eating at a restaurant	Diners/waiters
	3.	People in a fire engine	Firemen
	4.	People in a truck.	Truck drivers/passengers
	5.	People crossing the road.	People
	6.	Some activity happening at a distant park.	People
	7.	A bus stop	People
	8.	A gas station.	Vendor/customers
	9.	People entering a shop.	Vendor/customers
	10.	A newspaper stall.	Vendor/customers
	11.	Policemen in a police vehicle.	Policemen
	12.	An adult male cycling on the street.	Adult male
	13.	People in an ambulance.	People
	Event no.	Type of event	Characters involved in the event
Test stimulus	1.	Stationmaster examining the ticket of a family leaving the railway station.	Stationmaster/Adult female/ Adult male/Children/Porter
	2.	Family near the door of the train waving at a man on the departing train	Two adult males/Adult female/Child
	3.	Adult male purchasing a book at a bookstall.	Vendor/Adult male
	4.	People buying food at a food stall.	Vendors/People
	5.	Family waiting at the station. Children sitting on the luggage while parents are standing. Another child is pushing a	Adult female/Adult male/ Children

		suitcase.	
6.		Young girl filling water	Young girl
7.		Men sitting on the bench and men standing near the bench with their luggage and waiting for the train.	Adult men sitting/Adult men standing/Child
8.		Porter pushing luggage on a trolley	Porter
9.		Adult male climbing up the stairs with luggage; Adult female walking down the stairs with luggage.	Adult male/Adult female
10.		Stationmaster waving flag to indicate departure of train	Stationmaster

Each question was evaluated for the semantic measures and its comprehensibility in order to meet the objectives of the study. The suggestions by the judges were limited to simplifying the vocabulary used, as well as modifying certain questions aiming at generating a targeted response. The suggested modifications were incorporated and the stimuli were ready for administration.

Instructions and Settings

The instructions for the task aimed to elicit a spontaneous language sample. The instruction for the test and trial stimulus was, “Look at this picture over here. There are many things happening here. You need to tell me what is happening in this picture. Let us now start”. Instructions were prepared in the Kannada language with the participants requiring to respond in Kannada. Each participant’s home was considered as the target setting for the conduction of the procedure. This was done to account for the naturalness and comfort the child would be in during their spontaneous productions. Conducive environments within each of the participant’s homes were identified for this purpose. Each setup was ascertained to have a floor mat for the seating of the examiner and the child for the interactive session. A hand held voice recorder (Sony ICD-UX533F/SCE) was placed at a distance of 8-10 inches from the participant.

Procedure

The information pertaining to the quality and quantity of parental stimulation were collected prior to the data collection. Parents were asked details pertaining to the time spent with the child, kind of activities their child was engaged in, and the reciprocative language used by the parents during these interactions. This was followed by the examiner participating in a rapport building session with the child, which included interactive play activities (picture books and puzzles) which were performed within the prepared setting. After establishing a good rapport, the examiner provided the instructions before beginning with the trial stimulus. All 10 probe questions were provided in order to elicit a language sample. After getting familiar with the trial stimulus, the examiner introduced the test stimulus along with the 10 probe questions. With the presentation of each probe question, each participant was given sufficient time to respond. Questions were repeated once, if there was an inappropriate or absent response obtained from the participant. Further if the participant failed to comprehend or respond to the question, the examiner proceeded to the next question. At instances wherein the participant responded non-verbally, they were encouraged to provide the verbal counter-part before moving on to the next question. Each verbal attempt by the participant guaranteed a verbal praise. With the completion of the task, each participant was given a tangible reinforcement (such as a chocolate, or a preferred toy). Each participant took 15-20 minutes to complete the task. All narrative samples elicited from each probe question from each participant were recorded using the voice recorder.

Analysis

The recorded narrative samples from each of the participants were phonetically transcribed by the examiner and subjected to further analysis. Semantic [number of words and different words – type/token ratio (TTR)] measures were extracted from the language samples generated from each

probe question. These samples were analyzed without the consideration of maintaining a common text length across the age groups. This method of analysis was followed in order to account for the quantitative information generated by the participants, and to avoid the underrepresentation of the individual's linguistic abilities. The total number of words generated by the participant in response to each question was measured along with the total different words in that response. The ratio of the two was used to calculate the TTR. One participant from Group I (LSE sub-group) was excluded from the study as the generated sample was not quantitatively suitable for analysis, thereby making the total sample size of N=59. An example of a language analysis done is mentioned as follows.

Trial stimulus. Event: No 1.

Utterances generated by the participant:

1. /na:nu/ /dɔɔ/ /ga:di/ /no:diðene/ (I have seen a big car)
2. /ʌvʌgu/ /ʌp/ /hoguθa/ /Iðare/ (They are going up)
3. /ʌp//hogu/ (Go up)

Analysis

Semantic measures:

Total number of words generated: 10

Total number of different words generated: 9

TTR: 0.9

Caution was taken to avoid considering utterances for analysis, that were unintelligible, irrelevant and unrelated to the central theme. However, utterances were included which were related to the central theme but deviated from the focused response, incomplete utterances

related to the central theme, utterances having the presence of acceptable phonological processes (substitutions, syllable structure processes and assimilations), and utterances which were related to the central theme but of a different language. The total number of words and total different words were identified to be the dependent variables. In order to obtain the developmental trends across the two dependent measures, descriptive statistics was done using SPSS software (version 16.0). The data was subjected to normality based statistical measures which included Kolmogorov-Smirnov and Shapiro-Wilk tests. Non-parametric tests were performed using Kruskal-Wallis test to obtain the level of significance of the language measures across the groups. Mann-Whitney U test was done to compare the dependent variables between the HSE and LSE subgroups of each Group I, II and III.

Results

The present study aimed at assessing the semantic language development in typically developing children between 2 and 5 years of age, belonging to higher and lower SES. The results are discussed based on the development of the number of words and different words with SES as the independent variable. An overall increase in the total number of words and different words was observed across groups (I, II and III) for the HSE and LSE participants. The below figure illustrates the mean and SD scores obtained by the three age groups (HSE and LSE) for the semantic measures.

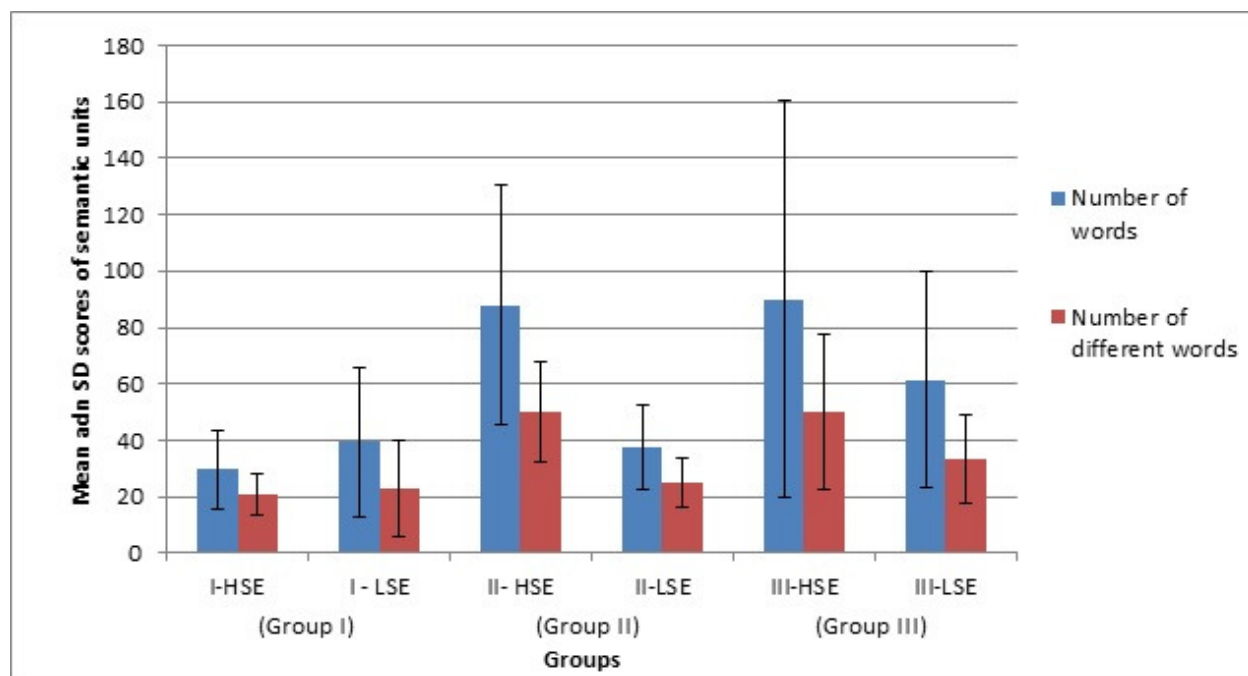


Figure-1: The mean and SD of the total number of words and different words obtained by the three groups comprising of both HSE and LSE subgroups. This figure illustrates the development of the semantic units generated by the participants aged between 2, 3, and 4 years, belonging to high and low SES subgroups.

Table 4- The level of significance for the semantic measures between HSE & LSE groups

SES	Group	Level of significance	
		Total no. of words	Total no. of different words
HSE	I-II	0.000	0.000
LSE	I-II	0.967	0.595
HSE	II-III	0.473	0.677
LSE	II-III	0.054	0.289
HSE	I-III	0.004	0.003
LSE	I-III	0.253	0.141

Note: The level of significance is maintained at $p < 0.05$

SES: Socio-Economic Status; *HSE:* High Socio-Economic; *LSE:* Low Socio-Economic

The results of the Kruskal-Wallis test indicated a significant difference ($p < 0.05$) across the HSE (I-HSE, II-HSE, and II-HSE) and LSE (I-LSE, II-LSE, and III-LSE) subgroups for the total number of words and different words. Mann-Whitney U test was done to determine the level of

significance between the HSE and LSE subgroups (under Group I, II, and III) for the total number of words and different words. Table 4 depicts the level of significance obtained for the total number of words and different words generated between the subgroups of the HSE and LSE under Group I, II and III.

The HSE and LSE subgroups were compared under each group (I, II, and III). Mann-Whitney U test was done for each group (I, II and III) to assess the significant difference between the SES subgroups. The results revealed a no statistical difference between Group I HSE ($p=0.513$) and LSE ($p=0.870$) participants in their production of the total number of words and different words. Group II-HSE and LSE showed evidence of significant difference ($p<0.05$) in their semantic productions, while Group III-HSE ($p=0.494$) and LSE ($p=0.102$) portrayed no significant difference in the total number of number of words and different words generated.

Discussion

This study aimed at assessing the semantic development of Kannada speaking children between 2 and 5 years of age from higher and lower socio-economic statuses. The results revealed several similarities along with some striking differences in the semantic measures between both the socio-economic subgroups (HSE and LSE). The developmental increase in the total number of words and different words at each stage varied between the two SES groups. The HSE subgroup showed an accelerated vocabulary growth between the 2 and 4 year-olds, while the LSE subgroup showed a rapid growth in their semantic measures between 3 and 5 year-olds. This rapid growth across the age could be attributed to the language exposure received at home [32], and with the commencement of early schooling [33] and Anganwadi [34].

The different lexicons used by the children included nouns, verbs, prepositions, and other grammatical categories. A few adjectives and adverbs were used, which lent a descriptive,

textual and conceptual richness to their discourse [35]. The HSE subgroup depicted a consistent reduction in the TTR with increasing age (2 year-olds-HSE, 3 year-olds-HSE, and 4 year olds-HSE scored 0.70, 0.57, and 0.55 respectively). Since the TTR is negatively associated with the number of tokens (words generated), it can be assumed that with increase in the number of tokens, there was a corresponding decrease in the TTR (lexical diversity) measure. This indicated that with age, there was a resultant decrease in the lexical diversity measure, though there was a growing number of different words that were generated [36]. However, when compared to the HSE subgroup, the 3 year-olds secured the maximum TTR (0.67), while the 4 year-olds secured the lowest TTR (0.54). The 2 year-olds obtained a TTR value of 0.58. These discrepancies in the developmental pattern of the LSE subgroup may be attributed to the lack of use of a larger sample size [36].

When the HSE and LSE subgroups were compared under each group, a poor significance was obtained between the HSE ($p=0.513$) and LSE ($p=0.870$) subgroups of 2 and 4 year-olds which could be due to the subtle differences between the mean scores and restricted sample size of the study [37]. With the mean scores (total number of words and different words) being compared between the 2-year-olds (HSE and LSE), the HSE sub group secured lower scores than LSE counter-part. Similar changes in vocabulary measures were reported between high and low SES children, sometimes as early as 18 months [15], 2 years [38] or 3 years of age [39]. Although Fernald et al. [15] studied participants from infancy, their results did indicate the SES differences to be evident in vocabulary measures, which were comparable to the measures used in the present study. The mean scores of the 2 year-olds-LSE were strongly influenced by the performance of one participant whose language skills were evidently stronger than his peers.

The three year-olds (HSE and LSE) showed statistically significant differences in their semantic measures, which was in accordance with Hart and Risley's study [14] which revealed three year-old HSE children to have drastically larger vocabularies (number of different words) than children from middle and low SES families. Although all participants had Kannada as their first language (L1) and English as their second language (L2), the HSE participants in particular exhibited the use of more L2 vocabulary than L1, compared to the LSE counter-parts who predominantly used L1 over L2. This shift in the usage of L2 over L1 in the HSE group, could be attributed to the sequential change in the preferred language, possibly due to favorable contextual demands [40].

The raw scores of 4-year-olds (HSE and LSE) revealed some differences although not statistically significant. This may be warranted to the reduced sample size [37]. The scores illustrated an enhanced performance by the HSE subgroups in comparison to their LSE counterparts. Hart and Risley [14] attributed these effects of SES on children's vocabulary to the differences in the amount of language the children heard. They reported that, by 4 years of age, LSE children could have been exposed to 32 million words lesser than their HSE peers. It was also noted that the HSE children's parents were highly educated, and thus used rare word tokens and types along with abstract utterances, leading to greater vocabulary scores by their children [41]. Similar to the 3 year-olds-HSE of the present study, several participants of the 4 year-old-HSE group generated English vocabulary indicating a negative effect on language development in the Kannada language.

In the present study, the LSE children from Anganwadis, exhibited less knowledge about concepts such as lexical categories, color, shapes, and alphabet knowledge [42]. These differences could be attributed to the differences in teaching aids, amenities as well as the

provision of fewer opportunities to encourage their creativity and intellectual growth [42] in these set ups. Children in preschools on the other hand are equipped with early enrolment, several amenities, aids and activities which stimulate the overall (motor, cognitive, linguistic, social, and creative) development of the child [34]. This difference was supported by the findings of this study wherein the 3-year-old LSE participant who attained the highest score, attended a regular preschool from 1.11 years of age, in contrast to the other children in the subgroup who attended Anganwadi schooling only after 3 years of age. Additional investigations during this study did indicate children who had obtained higher scores were generally described to be more talkative and outgoing, attended school regularly, and were exposed to a more interactive communicative environment at home. With the educational qualification being an important factor in child development [2], the present study observed the parents from both subgroups (HSE and LSE) having prominent differences in their qualifications. The qualifications of the parents of the HSE subgroup ranged from having a post high school diploma to honors; while the LSE subgroup had qualifications ranging from a primary to high school certificate. Irrespective of the type of qualifications of the parents of both the subgroups, all of them were working professionals. Considering the type of language used by the children from the HSE and LSE subgroups, children from the former subgroup heard more positive language (affirmations and encouragement) through continuous conversations, while those from the latter group were exposed to more prohibitions (discouragements) and directive communication as observed by other research as well [12,43]. Parents report that the use of this reciprocative language was more during meal time, story-telling and reading, watching TV, and other play activities. The frequency of conversations held between parents and children, the duration of these

conversations, and the time spent by the parents in play with their children were quite similar between the two subgroups.

To conclude, multiple influencing factors may affect the development of language in children, and the identification of them are essential. This study throws light upon the influence of lower and higher SES on the development of language, and brings out the differences between the two subgroups. The findings provide an insight into how early and to what extent SES impacts language at each age group. Further research is required to ascertain whether a similar finding prevails in the larger population and in different regions of our country.

Conflict of interest: None declared.

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