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Research Paper: Developing a List of Expressive Vocabulary for Farsi-speaking Children Aged 24-48 Months: Comparison Between Down Syndrome and Typically Developing Children

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ABSTRACT

Introduction: Expressive vocabulary plays a vital role in child language development, and its assessment can be one of the essential indicators to identify language developmental delay, especially in children with Down syndrome. We developed a list of expressive vocabulary and compared the size and class of expressive vocabularies between typically developing and Down syndrome children.

Materials and Methods: Expressive vocabulary of 150 children was examined in this study. A total of 120 typically developing Farsi-speaking children (in four age Groups, with a 6-month interval) and 30 children with Down syndrome (aged 24-48 months) participated in this study. The parents of the children filled out the form that included 636 words from different vocabulary classes. These classes were based on studies that investigated language development in Farsi-speaking children.

Results: The expressive vocabulary size in Farsi-speaking children was significantly higher than in Down syndrome children ($P \leq 0.001$). There was no statistically significant difference between boys and girls regarding expressive vocabulary size in two Groups of children. The size of nouns in all age Groups is more than other classes, and the size of conjunctions in all age Groups is less than the other ones. A direct correlation was found between age and the size of expressive vocabulary.

Conclusion: According to the study findings, the list of expressive vocabulary can detect delays in developing expressive vocabulary.

Keywords: Vocabulary, Language disorder, Children, Down syndrome, Assessment

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1. Introduction

At the age of 2 to 4, language acquisition is a dynamic part of a child's development [1]. A child's expressive vocabulary is a key indicator of a child's language development. Expressive vocabulary is considered a part of expressive language in the screening and assessment of children. A wealth of clinical evidence shows that limitations in expressive vocabulary are an essential aspect of the problem in children with language impairment, including children with speech and language development delays such as those with Down syndrome [2]. Assessment and screening of expressive vocabulary allow us to identify children with language developmental delays or disorders quickly. With a more accurate and comprehensive evaluation, these children can benefit from appropriate treatment programs, and their communication failures can be prevented. This course of action requires the right assessment tools so that the therapist can quickly obtain the correct information about the child's expressive vocabulary development.

Since the expressive vocabulary size plays an essential role in the complete development of oral and writing language, many longitudinal and cross-sectional studies have been done in this area. In these research studies, questionnaires or parental reports and sample analysis were used to investigate expressive vocabulary development. Trudeau and Sutton compared the MacArthur-Bates Communicative Development Inventories (MB-CDIs) (parental reporting) with sample analysis to study expressive vocabulary in 826 children aged 16-30 months. They found no significant difference in the results of these survey methods. The results of the parent's questionnaire showed a steady increase in the expressive vocabulary, which had a high correlation with sample analysis. Thus, the parental report was valid [3]. Stolt et al. studied the development of receptive and expressive vocabulary with the French version of MB-CDI in 35 French children. The children's receptive vocabulary was studied at the ages of 9, 12, and 15 months and their expressive vocabulary at the ages of 9, 12, 15, 18, and 24 months. The result of this study showed acquisition of receptive vocabulary was faster compared to expressive vocabulary. Just a gender difference was seen in expressive vocabulary. These findings support the existence of a universal sequence in the growth of lexical classes [4]. Children express nouns much earlier than verbs [5].

Stolt et al. studied 66 French 2-year-old children born with low weight and 87 French 2-year-old children with normal weight using the French version of MB-CDI. The result showed that the two Groups did not differ in terms of the number of words, but there was a significant difference between the percentage of nouns and functional words [6]. Rescorla and Mirak studied vocabulary growth in 28 late talker children of 24-36 months old using a language development survey. The results showed that children used 18, 89, and 195 words at 24, 30, and 36 months, respectively. They divided children into two Groups. One Group with 11 children showed a quick vocabulary increase at 26 to 32 months. They used 150-180 words at 30 months and about 300 words at 34 months. The other Group with 17 children expressed less than 50 words at 30 months. They did not show a vocabulary spurt with the word acquisition, and they had 150-180 words at the age of 3 years [7].

Forty to fifty percent of words they expressed from 9 months to 24 months were the names of objects. Naming these items is not related to vocabulary spurt [8]. A longitudinal study of 18 children showed that vocabulary growth was fast in 13 out of 18 children at the age of about 19 months. Five children had gradual learning curves, and nouns were less prominent. In the early stages of language development, children use nouns more frequently than other word classes (verbs and adjectives). Besides, the number of verbs and adjectives is low at these stages. After the noun vocabulary has grown sufficiently, using other classes (verbs, adjectives, adverbs, conjunctions) increases [9].

Cross-linguistic investigations have studied the language acquisition patterns in different languages [10]. These studies have shown a general pattern of vocabulary growth in different lexical classes as one of the developmental milestones of the lexicon. This pattern is very similar in different languages. Despite these similarities, differences have been reported. Cultural and morphological differences in various languages cause these differences [6, 11].

Studies conducted in Farsi in the field of expressive vocabulary are limited. Some are investigations done by Kazemi et al., Mehdipour et al., Zarei Mohammad Abadi et al., Ebtedaei et al., Khoshhal et al., and Bakhtiari et al. [12-17]. In all of these studies, the MB-CDI was used for measuring expressive vocabulary in children because the purpose of these studies was cross-linguistic comparisons. The age range used in these studies is different from the present study and must be explained. MB-CDIs is a tool for the assessment of expressive vocabulary in children from 8 to 30 months. Most studies of expressive language are related to this range of age in the Farsi language. Since there is no instrument for assessing ex-

pressive language in older children, there is no information on the development of expressive vocabulary in children 24 to 48 months old.

The main objective of this study was to develop a list of expressive vocabulary. This list was created according to the normal vocabulary development in children. To evaluate the effectiveness of the list for diagnosis of delayed language development, we assessed children with Down syndrome by this list because Down syndrome delays language development [18].

Although assessing the size and variety of expressive vocabulary is an essential developmental aspect in children aged 24 to 48 months, there were no appropriate tools for assessment in this field in Farsi-speaking children aged 24 to 48 months. Therefore, the present study is designed to fill the existing gap with the following objectives:

Developing a list of expressive vocabulary for 24- to 48-month-old Farsi- speaking children,

Comparing the size and class of expressive vocabulary based on age in Farsi-speaking children aged 24 to 48 months and studying the effect of age on the development of expressive vocabulary,

Studying the effect of gender on the development of expressive vocabulary in children of 24 to 48 months old,

Checking the effectiveness of the vocabulary list through a comparison of vocabulary size and class between children with typical development and children with Down syndrome.

2. Materials and Methods

Study design and participants

This study was a cross-sectional descriptive-analytic study. A total of 120 Farsi-speaking normal children (57 girls and 63 boys) aged 24 and 48 months (Mean±SD = 36.71±7.24 months) and 30 children with Down syndrome (15 girls and 15 boys) aged 24 and 48 months (Mean±SD = 42.13±7.67 months) participated in the study.

The typically developing children were divided into 4 age Groups with a 6-month interval. To control the socioeconomic status, we recruited the participants from kindergartens in 5 regions of west, east, center, south, and north of Tehran City, Iran. Three girls and three boys from each kindergarten were selected. The kindergartens were selected whose principals, teachers, and children's parents agreed to participate in this study. The inclusion criteria included kids of 24 to 48 months old; monolingual; and without delay in speech and language development, cognitive and motor disorders, hearing problems, structural problems in the mouth and face.

Children with Down syndrome were selected by a convenience sampling method from educational and rehabilitation centers in Tehran. They were 24 to 48 months old, monolingual, and had no hearing and neurological impairment. The information of the typically developed and Down syndrome children was collected through interviews with parents and teachers about the child's developmental stages, pediatric medical records, and informal assessments.

The study objectives were explained to mothers. They became familiar with filling out the expressive vocabulary forms and signed the consent form before completing the vocabulary list. They were assured that their information would remain confidential and the test was completely safe and noninvasive.

Test materials

Development of expressive vocabulary lists

To assess expressive vocabulary in children aged 24 to 48 months, a list of vocabulary was developed, and its content validity was calculated. Content validity of the expressive vocabulary list was determined by reviewing the sources and experts' and parents' views. To create an expressive vocabulary list, words were selected from different sources, including age-appropriate storybooks and previous studies that investigated expressive language in 24 to 48 months old children [19]. A list of 636 words from different parts of speech (nouns, verbs, adjectives, adverbs pronouns, conjunctions) was prepared. Five parents and 5 speech-language pathologists, who had children aged 24 to 48 months old, confirmed that all words are necessary for assessing expressive language in 24-48 months of children. Speech and language pathologists were also asked to select the words used by children at this age. They rated each word from 25 to 100 points. For the rating of each word, the correct pronunciation of consonants and vowels in all words was not considered. Scoring of the vocabulary was as follows: 100 (this word is used by all children aged from 24 to 48 months), 75 (this word is used by 75% of these children), 50 (this word is used by 50% of these children), 25 (this word is used by 25% of these children),

and 0 (this word is not used by children aged between 24 and 48 months) [20]. Because most of the words were rated above 25% by experts, they were considered essential words that 24 to 48 months old children used.

It was decided to select various words with different frequencies from low to high to show the difference between different age Groups and the effect of age on the development of expressive vocabulary. The frequency of words was determined based on comments of parents and experts. Given the number of words received, The number of words that received the mean score of zero was less than 10. Therefore, these words were not removed from the final list; these words were not removed from the final list. Therefore, the final list had 636 words. These words were the total number of words that were gathered from the sources. Based on the available sources, we could not find more words. The list included 446 nouns, 70 verbs, 77 adjectives, 12 adverbs, 14 pronouns, and 17 conjunctions. All possible lexical classes were selected according to Amiri and Jalilevand's studies, and no lexical classes were excluded [19, 21] (see Appendix 1 for samples of each lexical class).

Study procedure

The final list was given to the mothers of children who met the inclusion criteria. The vocabulary list was completed at home by parents for a maximum time of one month. This period was considered based on experts' opinions. In this way, the parents had enough time to complete the list of words, and there was no need to use memory.

Mothers did not use any kind of stimulation or prompt the children to express words. They were asked to mark words spoken by the child in spontaneous speech. When the child said each word in the vocabulary list, his/her mother marked the "Yes" column; otherwise, they marked the "No" column. Parents were asked to write words spoken by the child in the third column if that word was not in the vocabulary list. It is worth noting that the number of words not on the list and written by parents was minimal. Therefore, these words were not added to the final list. The frequency of each class of words was analyzed based on the parents' reports.

Statistical analysis

Descriptive statistics (means, standard deviation, range, minimum, and maximum) were calculated for expressive vocabulary size in typically developing children. The normal distribution of data was tested using the Kolmogorov-Smirnov one-sample test. The Mann-Whitney U test was applied to compare expressive vocabulary size in typically developed and Down syndrome children. First, one-way analysis of variance test and the least significant difference were used to compare expressive vocabulary size between 4 age Groups of typically developing children. In addition, the independent t-test was used to compare the classes of expressive vocabulary in children with typical development and children with Down syndrome. The independent t-test was also used to compare expressive vocabulary size in different lexical classes based on gender. The relationship between age and lexical classes was calculated using the Spearman rank-order correlation.

3. Results

In the present study, 120 children with typical development between the ages of 24 and 48 months were divided into 4 age Groups with a 6-month interval: Group 1) 24–30 months old, Group 2) 31–36 months old, Group 3) 37-42 months old, and Group 4) 43- 48 months old. The demographic information of the subjects is shown in Table 1. We have different findings in this section, which we have presented in separate paragraphs.

The size and type of expressive vocabulary in typically developing children

Expressive vocabulary size in Farsi-speaking children with typical development is shown in Table 2. The size of nouns in all Groups is more than in other classes, and the size of conjunctions in all Groups is less than the other ones (Figure 1). The results of comparing expressive vocabulary size among different lexical classes (nouns, verbs, adjectives, adverbs, pronouns, conjunctions) in four different age Groups of children with typical development are shown in Table 3. There were no statistically significant differences among 3 other Groups of children with normal development. There was statistically significant difference between Group 1 and all three other Groups of children with typical development for size of verb class, however there were no statistically significant differences among 3 other Groups of children with normal development for this variables.There was no statistically significant difference among other Groups. There was a statistically significant in expressive vocabulary size for verb class between Group 1 and all three other Groups of children in Groups of 1, 3, and 4 showed statistically significant difference in size of adjective class. There was no statistically significant difference among other Groups. There was only a statistically significant in expressive vocabulary size for adjective class among Group 1, Group 3, and Group 4. There was a statistically

Table 1. Demographic characteristics of the subjects

Demographic Characteristics		Groups	
		Typically Developing Children (n=120)	Down Syndrome Children (n=30)
Age, mo (Mean±SD)		36.7±7.24	42.13±7.67
Gender, No.(%)	Boy	63(52.5)	15(50.0)
	Girl	57(47.5)	15(50.0)

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significant difference in expressive vocabulary size for adverb class between Group 1 and all three other Groups of children with typical development. There was no statistically significant difference among other Groups. There was only a statistically significant difference in expressive vocabulary size for pronoun class between Groups 1 and Groups 3 and 4. There was a statistically significant difference in expressive vocabulary size for conjunctions class between Group 1 and Groups 3 and 4 as well. In addition, there was a statistically significant difference between Group 2 and Group 4. In addition, a direct and low correlation between age and expressive vocabulary size was found (Table 4).

The effect of gender on the development of expressive vocabulary in children

Expressive vocabulary size in different lexical classes was compared based on gender. The results showed no statistically significant difference in typically developing children between boys and girls regarding nouns (t=0.407, P=0.684), verbs (t=0.987, P=0.330), adjectives (t=1.105, P=0.272), adverbs (t=0.439, P=0.661), pronouns (t=1.651, P=0.101) and conjunctions (t=0.188, P=0.851). There was also no statistically significant difference between boys and girls in Down syndrome regarding nouns (t=0.923, P=0.364), verbs (t=1.007, P=0.323), adjectives (t=0.940, P=0.356), adverbs (t=0.439, P=0.311), pronouns (t=0.049, P=0.961) and conjunctions (t=0.452, P=0.655).

Comparison of expressive vocabulary in children with typical development and Down syndrome

Expressive vocabulary size in typical Farsi-speaking children was significantly higher than for Down syndrome children (P≤0.001) (Table 5). There was no statistically significant difference between boys and girls in expressive vocabulary size in both typically developing children and Down syndrome children (P>0.05) (Table 4). Comparison of expressive vocabulary size on different lexical classes between children with typically developing and Down syn-

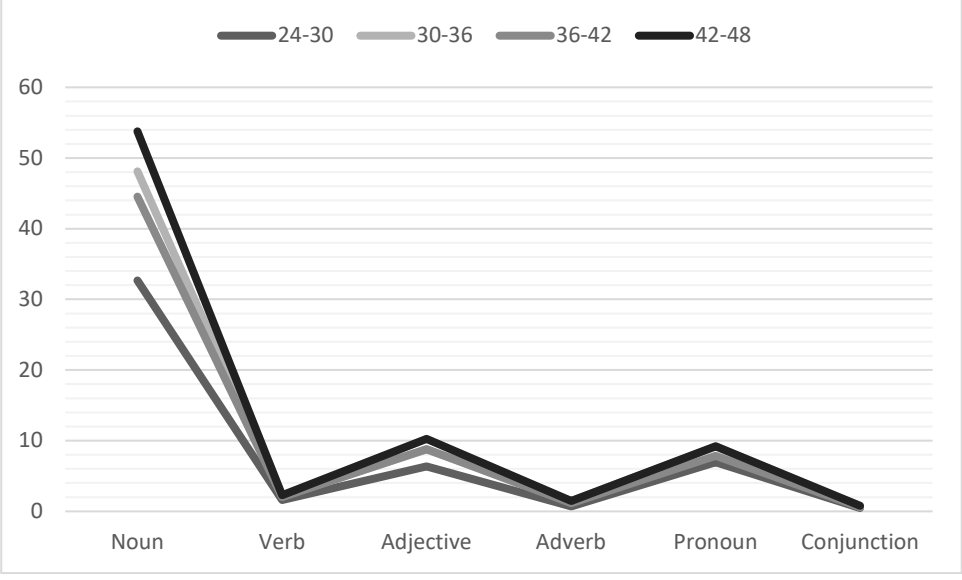

Figure 1. Percentage of expressive vocabulary among different age Groups (month)

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Table 2. Mean and standard deviation of size of expressive vocabulary in typically developing children based on percentage of use

Age Groups	Lexical Class	N	Mean±SD	Min.	Max.
24-30 mo	Nouns	35	32.69±21.18	0.79	65.72
	Verbs	35	1.58±1.04	0	2.67
	Adjectives	35	6.34±5.20	0	12.89
	Adverbs	35	0.69±0.71	0	1.89
	Pronouns	35	6.03±4.45	0.16	11.16
	Conjunctions	35	0.48±0.37	0	0.94
30-36 mo	Nouns	32	48.12±16.07	6.92	66.19
	Verbs	32	2.10±0.82	0.31	2.67
	Adjectives	32	8.75±4.25	0.47	12.89
	Adverbs	32	1.45±0.61	0	1.89
	Pronouns	32	9.15±2.61	0.94	11.16
	Conjunctions	32	0.58±0.36	0	0.94
36-42 mo	Nouns	37	44.54±20.97	1.26	66.19
	Verbs	37	2.00±0.92	0	2.67
	Adjectives	37	8.81±4.74	0	12.89
	Adverbs	37	1.14±0.77	0	1.89
	Pronouns	37	7.83±4.36	0	11.16
	Conjunctions	37	0.61±0.38	0	0.94
42-48 mo	Nouns	16	53.8±14.22	17.45	66.19
	Verbs	16	2.29±0.65	0.47	2.67
	Adjectives	16	10.26±4.02	0.79	12.89
	Adverbs	16	1.44±0.64	0	1.89
	Pronouns	16	9.19±1.84	4.40	11.16
	Conjunctions	16	0.80±0.32	0	0.94

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drome are presented in Table 6. The expressive vocabulary size of all lexical classes in typically developing children was significantly higher than that of Down syndrome children (P≤0.001).

4. Discussion

This study aimed to develop a list of expressive vocabulary for Farsi-speaking children aged 24 to 48 months and check its content validity. Also, we intended to study the effect of age and gender factors on the development of expressive vocabulary. Another study objective was to evaluate the effectiveness of the expressive vocabulary list for diagnosing children with delays in language development. Also, we wanted to study the size and class of expressive vocabulary and compare them between children with typical development and children with Down syndrome.

Regarding the first objective, the content validity of the list of expressive vocabulary was confirmed based on parents' and experts' opinions. The word list could as-

Table 3. Expressive vocabulary size in different lexical classes in four Groups of the children with typical development

Lexical Class	Groups		Mean Difference	Std. Error	95% Confidence Interval		P
					Lower Bound	Upper Bound	
Nouns	Group1	Group 2	83.0	23.89	130.33	35.66	0.001*
		Group 3	88.5	23.70	135.49	41.59	≤0.001*
		Group 4	113.3	23.89	160.66	66.00	≤0.001*
	Group 2	Group 3	5.54	23.70	52.49	41.40	0.815
		Group 4	30.33	23.89	77.66	16.99	0.207
	Group 3	Group 4	24.78	23.70	71.73	22.16	0.298
Verbs	Group1	Group 2	17.1	4.76	26.59	7.73	≤0.001*
		Group 3	13.6	4.72	23.05	4.33	0.004*
		Group 4	17.5	4.76	26.99	8.13	≤0.001*
	Group 2	Group 3	3.47	4.72	5.88	12.82	0.464
		Group 4	0.40	4.76	9.83	9.03	0.933
	Group 3	Group 4	3.87	4.72	13.22	5.48	0.414
Adjectives	Group1	Group 2	12.3	6.31	24.79	0.19	0.054
		Group 3	19.3	6.26	31.79	6.99	0.002*
		Group 4	23.4	6.31	35.96	10.96	≤0.001*
	Group 2	Group 3	7.09	6.26	19.49	5.30	0.259
		Group 4	11.16	6.31	23.66	1.33	0.079
	Group 3	Group 4	4.07	6.26	16.47	8.32	0.517
Adverbs	Group1	Group 2	4.7	0.97	6.63	2.76	≤0.001*
		Group 3	3.5	0.96	5.43	1.59	≤0.001*
		Group 4	4.5	0.97	6.50	2.63	≤0.001*
	Group 2	Group 3	1.18	0.96	0.73	3.10	0.223
		Group 4	0.13	0.97	1.80	2.06	0.892
	Group 3	Group 4	1.05	0.96	2.97	0.86	0.279
Pronouns	Group1	Group 2	2.23	1.17	4.56	0.10	0.061
		Group 3	3.17	1.16	5.48	0.85	0.008*
		Group 4	3.6	1.17	6.00	1.33	0.002*
	Group 2	Group 3	0.94	1.16	3.25	1.37	0.422
		Group 4	1.43	1.17	3.76	0.90	0.226
	Group 3	Group 4	0.49	1.16	2.80	1.82	0.674

Lexical Class	Groups		Mean Difference	Std. Error	95% Confidence Interval		P
					Lower Bound	Upper Bound	
Conjunctions	Group1	Group 2	0.36	0.51	1.39	0.66	0.481
		Group 3	0.67	0.51	2.06	0.02	0.044*
		Group 4	1.06	0.51	2.46	0.40	0.007*
	Group 2	Group 3	0.67	0.51	1.69	0.33	0.189
		Group 4	1.06	0.51	2.09	0.03	0.042*
	Group 3	Group 4	0.38	0.51	1.40	0.63	0.454

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The children with typical development were divided into 4 age Groups with a 6-month interval: Group 1) 24–30 months old, Group 2) 31–36 months old, Group 3) 37-42 months old, and Group 4) 43- 48 months old.

*The significant differences.

sess the expressive vocabulary of children aged 24 to 48 months. In terms of usage, the words scored from 25% to 100%. This range is acceptable because the frequency and the size of words for younger children (24 months) are different from older ones (48 months). Moreover, the finding that showed the size of expressive vocabulary grows with increasing age in typical children confirmed selecting the proper words for our assessment.

Regarding the second objective, the study results showed that the expressive vocabulary size based on the percentage of use was higher in the class of nouns compared to other classes in all age Groups, and the lowest percentage belonged to the conjunctions class. It seems that mothers extracted more nouns in communication with their children than other lexical classes. These findings are consistent with the studies conducted by Bloom, Gentner, Benedict, Brown, Andersson et al., Zarehi et al., and Kaat-van den Os et al. They showed that acquiring nouns is easier and faster than other lexical classes because they are less complex and more fundamental. Hence, their learning and expression are easier for children [8, 18, 22-27]. The main theoretical argument for the predominance of nouns emphasizes conceptual aspects. It has been proven that labels acquisition for objects is easier than for verbs because the nouns are distinct and coherent perceptual units. They are also stable and consistent over time and context.

Table 4. The correlation between age and lexical classes in children with typical development

Lexical Class	Nouns	Verbs	Adjectives	Adverbs	Pronouns	Conjunctions
Correlation	0.353	0.255	0.327	0.284	0.294	0.289
P	≤0.001	0.005	≤0.001	0.002	0.001	0.001

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Table 5. Expressive vocabulary size in typically developing children and Down syndrome children

Groups		Mean±SD	Z	P
Typically developed children	Girls	496.4±139.9	0.532	0.595
	Boys	464.9±149.5		
Down syndrome	Girls	204.9±186.6	1.528	0.126
	Boys	96.2±127.8		
Typically developed children		479.9±145.3	7.407	≤0.001
Down syndrome		150.5±166.6		

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Table 6. Comparison of expressive vocabulary size on different lexical classes in children with typical development and Down syndrome

Lexical Class	Mean Difference	Std. Error Difference	df	t	P	95% Confidence Interval of the Difference	
						Lower Bound	Upper Bound
Nouns	240.39	20.408	148	11.77	≤0.001	200.06	280.72
Verbs	44.24	4.012	148	11.02	≤0.001	36.31	52.17
Adjectives	51.74	3.689	70.85	14.02	≤0.001	44.38	59.09
Adverbs	7.53	0.562	82.04	13.40	≤0.001	6.41	8.65
Pronouns	10.91	0.792	53.86	13.75	≤0.001	9.32	12.50
Conjunctions	4.00	0.253	101.42	15.77	≤0.001	3.50	4.50

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In contrast, label learning for actions is cognitively more complex because the child needs to abstract stable elements in the various contexts labeled as verbs and understand the specific relationship between the subject and the object [28]. In the present study, the conjunction class has the lowest use in expressive vocabulary, which is consistent with the study of Stolt et al. They argued that the growth of functional words begins when the total child's expressive vocabulary is between 300 and 500 words, and the acquisition of this class of words represents a change in grammatical growth [4]. Therefore, it seems that children at the age of 24 to 48 months in this study started acquiring conjunctions, and they are beginning to make grammatical changes in their sentences. The study results of the expressive vocabulary size in the four age Groups of typically developing children showed a significant difference between Group 1 and other Groups in nouns, verbs, and adverbs. This result can be due to the increased vocabulary acquisition rate at the age of 24-30 months, known as the period of vocabulary spurt [7, 9]. Therefore, the present study provides evidence of a change in the rate of lexical growth in the second year of life. Rescorlaet al. and Goldfield et al. reported similar findings in children's expressive vocabulary. They explained that most children show vocabulary spurt between 26 and 32 months of age [7, 9].

There was no statistically significant difference between Group 1 and Group 2 in both adjective and pronoun classes. However, there was a statistically significant difference between Group 1 and 3 and 4 Groups. Regarding the conjunction class, the difference was significant between all Groups except for consecutive Groups (between Group 1 and 2, Group 2 and 3, and Group 3 and 4). According to the findings from the adjective class, the acquisition rates appear to be slower from 24 to 36 months and increase between the ages of 36 and 48 months. It seems that children have begun to grow their pronouns and conjunctions since the age of 24 months, but their growth has slowed down. The Mean Length of Utterance (MLU) was not investigated in the present study, but it is predicted that from the age of 3 to 4 years old and simultaneous with the growth of grammar and the length of the sentence, the speed of the growth of pronouns and conjunctions also increases. These results are consistent with the study of Rowe et al., Bates et al., Caselli et al., and Urm et al. They found that grammatical functional words such as pronouns are rarely seen in early childhood vocabulary, and the growth of these words begins after the growth of verbs [29-32]. The growth of functional words starts when the total size of words in the child's expressive vocabulary is between 300 and 500 words [33, 34].

There was a positive correlation between age and vocabulary size in 6 lexical classes. These results are consistent with the study of Stolt et al., Kauschke et al., Rescorla et al., Zarehi et al., Core et al., and Fernald et al., which suggested that child expressive vocabulary size increases with age [4, 5, 7, 26, 35, 36]. This increase can be related to the child's cognitive development and his/her more encounter with vocabulary in the growth process.

Regarding the third objective, the findings showed no statistically significant difference in size and class of expressive vocabulary in both typically developing children and Down syndrome based on gender. This result is consistent with the study of Andersson et al., Zarehi et al., Rowe et al., Hawa et al., and Rescorla et al. [22, 26, 29, 33, 37]. Accordingly, Normand showed that up to the age of 3, there is a difference in expressive vocabulary between girls and boys [38]. Therefore, it can be argued that the one-year difference between the pres-

ent study and Normand is due to the study method. In the Normand study, data were extracted from the analysis of 20-minute recorded language samples of children, while the present study used a parental report based on an expressive vocabulary checklist. In addition, the difference between the present study and the Normand study may be because these two studies have been done at different times. In recent years, the size and content of children's expressive vocabulary have changed due to technology development and access to various media tools.

Regarding the fourth objective, the findings showed that the expressive vocabulary in typically developing children was significantly bigger than that of children with Down syndrome. This difference was observed in all lexical classes. This finding is consistent with the results of Chapman and Rowe et al., which showed that children with Down syndrome have a smaller expressive vocabulary than typically developing children, which can be due to weakness in auditory short-term memory in these children [29, 39]. There are some similarities between vocabulary development in typically developing children and Down syndrome, but lexical development in children with Down syndrome is hidden behind cognitive issues.

According to the obtained results, the Farsi version of McArthur-Bates communicative development inventory can assess the expressive vocabulary of children aged from 8 to 30 months. Regarding the vital role of expressive vocabulary development, the study list was developed to evaluate this skill in older children (24-48 months). Therefore, Iranian speech therapists can assess expressive vocabulary from 8 to 48 months with MB-CDIs and the list of this study. However, Further study is highly recommended for providing the norms for the list of expressive vocabulary in the present study.

5. Conclusion

The list of expressive vocabulary can detect delays in the development of expressive vocabulary. It can also show differences in expressive words in different age Groups from 24 to 48 months. The expressive vocabulary size varies in different lexical classes in typical children aged between 24 and 48 months. The percentage of content words (nouns, verbs, adjectives, and adverbs) was high in the early stages. The percentage of functional words (pronouns and conjunction) was high at the later stage. Paying attention to this issue is essential in evaluating and designing intervention programs.

In interpreting the findings of this study, its limitations should be considered for future studies. We did not have access to parental demographic information such as age, occupation, and education, which should be considered in interpreting the findings. We were unable to conduct the study longitudinally due to time constraints. It is suggested that future studies investigate the development of children's expressive vocabulary from 24 to 48 months in a longitudinal study. In this study, we could not consider the MLU to evaluate expressive vocabulary. It is also suggested that future studies consider children's MLU and its relationship to their expressive vocabulary. We could not find more samples for the Down syndrome Group. Children with Down syndrome did not match with typically developing children based on intellectual and language ages. Further study is highly recommended for providing the norms for the extended list of expressive vocabulary.

Ethical Considerations

Compliance with ethical guidelines

This study was registered and approved with the number 260/1425 by the Research Council of School of Rehabilitation, Tehran University of Medical Sciences.

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Authors contributions

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Conflict of interest

The authors declared no conflict of interest.

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Appendix 1. Samples of each lexical class

Lexical Class	Sample Words
Nouns	Hand, chicken, slipper, red, doctor, child, rain, yard, egg, glass
Verbs	Sleeping, going, listening, telling a story, falling, playing
Adjectives	Unhappy, empty, bad, healthy, big
Adverbs	Yesterday, now, tonight, day, night
Pronouns	I, this, myself, those
Conjunctions	But, when, if

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