Original Article
http://mjiri.iums.ac.ir
Medical Journal of the Islamic Republic of Iran (MJIRI)

Med J Islam Repub Iran. 2023 (25 Sep);37.104. https://doi.org/10.47176/mjiri.37.104

The Effect of Combined Intervention on Improvement of Early Lexical Development in Minimally Verbal Children with Autism Spectrum Disorder

Salman Abdi[1], Maryam Tarameshlu[1], Noureddin Nakhostin Ansari[2], Leila Ghelichi[1]*, Mitra Hakim Shooshtari[3]

Received: 20 Jul 2023 Published: 25 Sep 2023

Abstract

Background: Autism spectrum disorder (ASD) is a neurodevelopmental disorder defined by severe communication deficits and limited and repetitive behavioral tendencies. There are several treatment approaches and methods for minimally verbal children with ASD; nonetheless, there is inconclusive evidence about how early lexical development could be improved. The present study aimed to investigate the effect of combined intervention derived from the principles of different theories—including contemporary behaviorism, schemas, sociocultural, and event representation theories—to improve early lexical development in minimally verbal children with ASD.

Methods: In this single-group pretest-posttest study, 10 children with ASD (mean age, 47.9 ± 8.3 months), including 7 boys and 3 girls, participated. Participants received 16 intervention sessions in 8 weeks. The combined intervention consisted of various methods derived from contemporary behaviorism, schemas, sociocultural, and event representation approaches. The MacArthur-Bates Communicative Development Inventory 1 (Infant form) assessed early lexical development before and after intervention and after a 2-month follow-up. The Friedman test was used to analyze the data, and pairwise comparisons were performed with the Will-Coxon test. Cohen's d was used to investigate the effect sizes.

Results: Significant increases in expressive vocabulary ($P < 0.001$) and receptive language ($P < 0.001$) were seen after the end of the intervention and at the follow-up ($P = 0.005$). Large effect sizes were found for expressive vocabulary (d = 3.7) and receptive vocabulary (d = 2.17).

Conclusion: This study suggests that the combination of intervention based contemporary behaviorism, schemas, sociocultural, and event representation approaches improved receptive and expressive vocabulary in minimally verbal children with ASD.

Keywords: Autism Spectrum Disorder, Lexical Development, Combined Intervention, Verbal

Conflicts of Interest: *None declared*
Funding: *Iran University of Medical Sciences*

Cite this article as: Abdi S, Tarameshlu M, Nakhostin Ansari N, Ghelichi L, Mitra Hakim Shooshtari3. The Effect of Combined Intervention on Improvement of Early Lexical Development in Minimally Verbal Children with Autism Spectrum Disorder. *Med J Islam Repub Iran.* 2023 (25 Sep);37:104. https://doi.org/10.47176/mjiri.37.104

Introduction

Autism spectrum disorder (ASD) is a neurodevelopmental disorder defined by severe communication deficits, limited interests, and repetitive behaviors (1). The World Health Organization (WHO) estimated the prevalence of ASD at 0.76%, representing about 16% of the global child population (1, 2). Samadi et al reported that the prevalence

Corresponding author: *Dr Leila Ghelichi, ghelichi.l@iums.ac.ir*

1. Department of Speech and Language Pathology, Rehabilitation Research Center, School of Rehabilitation Sciences, Iran University of Medical Sciences, Tehran, Iran
2. Department of Physiotherapy, School of Rehabilitation, Tehran University of Medical Sciences; Research Center for War-affected People, Tehran University of Medical Sciences, Tehran, Iran
3. Mental Health Research Center, Tehran Institute of Psychiatry, Department of Psychiatry, School of Medicine, Iran University of Medicine Sciences, Tehran, Iran

↑What is "already known" in this topic:
Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by severe communication deficits. There are several evidence-based interventions that can be used alone to improve communication skills in children with ASD. There is not sufficient evidence to suggest that combining the principles of different theories can lead to the learning of rules that underlie language learning in children with ASD.

→What this article adds:
This study suggests that the intervention derived from a combination of the contemporary behaviorism, schemas, sociocultural, and event representation approaches improved receptive and expressive vocabulary in minimally verbal children with ASD.

[DOI: 10.47176/mjiri.37.104]

of ASD is 6.26 per 10,000 in Iran (2). Delay in language expression is a common feature in children with ASD, although this feature is not one of the diagnostic criteria for this disorder (3). While typically developing children (TDC) speak their first words at 12 months, children with ASD begin speaking on average at 38 months, and only 30% to 50% of these children can express phrases at 4 years old (4, 5). Compared with TDC of the same age, children with ASD have a much smaller expressive lexicon (6, 7).

Given that the ability to acquire new words and having lexical access in meaningful communicative contexts are 2 significant processes for language acquisition in children (8), and also considering that having sufficient vocabulary knowledge is a prerequisite for effective communication establishment and academic achievements in children (9), it seems that improving the development of receptive and expressive vocabulary is one of the most essential treatment priorities in minimally verbal children with ASD.

Various theories about language acquisition have been applied to develop different language intervention approaches (10-16). Behaviorism theories emphasize the conditioning process and the effect of reinforcement and punishment in language acquisition (10). Intrinsic theories hold that some fundamental aspects of knowledge are innate and that experience provides stimuli to fill preformed or hidden categories (10). According to schema theory and the psychological model of language acquisition, children establish rules for language acquisition that allow them to acquire language from the environment at a high speed (17). The schema refers to mental archiving units that enable us to process, encode, organize, and retrieve information and provide a framework in context for explaining objects and events. Their activation leads to understanding (18). Sociocultural theories state that language is acquired due to interaction with others during social activities (17).

According to the theories of language acquisition, at the beginning of the learning process, children try to understand and produce the whole speech of adults, create schemas about the relationship between adults' utterances and the context in which these utterances occur, and retrieve them during communication (19, 20). The event representation theory proposes that children learn early words according to the context and build a mental representation of events that includes 4 types of information—the hierarchy in which an activity occurs; the participants and their roles in this activity; objects involved in this activity; and certain subjects and objects that can replace these subjects and objects (21, 22). The representation of events is initially general, and words are context dependent. Then, at the beginning of the second year of life, the child begins to analyze the representation of events and divides the representations into participating subjects, actions, and objects, and desensitization to the context occurs. Therefore, many new reference words are suddenly added to the vocabulary (22-24).

The results of a comprehensive review of the literature revealed that several evidence-based interventions can be used alone to improve communication skills for any child with ASD (9, 22-25). As shown in the evidence-based studies, the most beneficial treatment may involve a combination of several empirically validated approaches (9, 25). There is not sufficient evidence to suggest that combining the principles of different theories can lead to the learning of rules that underlie language learning in children with ASD. Therefore, this single-group pretest posttest study aimed to investigate the effects of combined intervention derived from the principles of different theories, including contemporary behaviorism, schemas, sociocultural, and event representation theories, to improve early lexical development in minimally verbal children with ASD.

Methods

Study Design

The present study was a single group, pretest-posttest study with repeated measurements to evaluate the effects of a combined intervention to improve early lexical development in minimally verbal children with ASD. The Research Council, School of Rehabilitation, and the Ethical Committee of Iran University of Medical Sciences (IUMS) approved the study protocol. All participants' parents were informed about the study's aim and procedure, and written informed consent was obtained from them before the study.

Participants

Ten participants (7 boys and 3 girls) were recruited according to available sampling from the speech therapy clinics of Iran University of Medical Sciences in Tehran, Iran, between March 2021 and August 2022. The inclusion criteria were as follows: (1) having a definitive diagnosis of ASD based on the clinical judgment of a psychiatrist and the Gilliam Autism Diagnostic Scale Second Edition (Garz-2) (26); (2) age between 3 and 6 years; (3) having monolingual Persian language parents; (4) not receiving speech therapy from other clinical settings; (5) having no medical history of neurological problems, such as cerebral palsy, seizures, and concussions; (6) having no hearing impairment or obvious visual impairment that cannot be compensated with visual or hearing aids; (7) having the ability to imitate words; and (8) having less than 50 functional words. The exclusion criteria were as follows: (1) failure to attend 2 weekly therapy sessions at each stage of the research; (2) not doing 3 consecutive tasks outside the clinic; and (3) absence from 3 consecutive treatment sessions.

Intervention

The participants received 16 face-to-face treatment sessions, 2 times a week, conducted through the principal researcher. The duration of each session was 45 minutes. In each session, the target exercises were taught to the mother through a videotape, direct teaching to the mother, modeling, and direct practice with the child. The practice sessions at home were videotaped with the child's mother and then provided to the leading researcher to review. All the parents were requested not to participate in any other speech therapy program.

The combined intervention is consistent of the principles of different theories, including contemporary behaviorism, schemas, sociocultural, and event representation theories. The combined intervention was provided in 2 primary phases. In the first phase, the focus was on the natural liv-

[DOI: 10.47176/mjiri.37.104]

ing, environmental changes that facilitate the child's learning, and in the second phase, exercises were presented that created comprehension strategies, context-dependent speech, and then decontextualization of speech and language acquisition.

Exercises were created at the first stage of the combined intervention using contemporary behaviorism, schemas, and sociocultural principles (10-15). Parents were asked always to place all the objects, especially those that the child frequently deals with, in a fixed place according to a specific order and pattern. As an illustration, parents should always place their child's shoes on a certain shoe rack floor and their other family members' shoes on different designated racks. Another environmental change was related to how parents do their daily tasks. The parents were asked to perform their activities according to a specific and fixed pattern. For example, if they wear shirts, pants, and socks in order, they should always follow the same way. To create a routine for the child on how to conduct these activities, we also requested from the parents that all activities in which the child participates follow a set pattern. The most recent adjustment to the living space concerned the location of activities. In other words, we requested that the parents relocate the child's regular activities. For instance, parents were instructed to place the children's clothing in the living room before leaving the house and back in the same drawer when they got home (10-18).

The child's participation in the activities and affairs of daily life was facilitated using environmental changes. Depending on the child's level of linguistic and cognitive development, the amount of their independent participation in these activities varies. As the child's understanding of routines and daily affairs increases, the number of clues that are provided to them decreases. For instance, at the start of the intervention, when getting the child ready to leave the house, we assist them in bringing their clothes from their dresser to the living room and assist them in wearing their clothes in a particular manner. We help them in taking off and replacing their clothes in the living room after they get home. We ask the child to give us the clothes in the order we name so that we can put them on him, reinforcing the established routine of the way and sequence of wearing clothes. Let's put it on; as the child's perception and cognitive abilities develop, this method will gradually alter. A child should assist with other everyday tasks that they can perform, such as sweeping, dusting, and bringing and gathering food. In all these activities, parents are asked to talk about the current task and events with their children in 1 or 2-word phrases (10-18).

In the second phase of combined intervention, the principles of event representation theory were used to design exercises for language acquisition. According to this theory, the understanding and expression of children's primary words are based on context; each utterance of a child performs a function for them and words are not symbols of objects, people, or verbs. Then, the child will quickly expand their vocabulary by decontextualizing and symbolizing people, objects, and verbs. Therefore, comprehension techniques and child-based communication schemas were taught to ASD children in the early stages of the exercises, following the natural language development process. After learning the basic comprehension strategies and forming context-based comprehension and expression, the activities moved towards decontextualization. In the contextualization exercises, it was tried to make symbols for objects, people, and verbs. The progress of practices, how to do daily things, the amount of participation, and the type of participation of the child in the natural environment of life also changed. These exercises somehow facilitated the acquisition of rules related to participating in daily activities. Moreover, EMT communication and support strategies were used to improve parent-child relationships and enrich the language environment (15-17).

Outcome Measures

MacArthur-Bates Communicative Development Inventories: MacArthur-Bates Communicative Development Inventories (MCDIs) are parent-report instruments to investigate the children's communication and language skills and their developing abilities in early language, including vocabulary comprehension, production, gestures, and grammar. The MCDIs include 2 forms, CDI-I and CDI-II. The CDI-I investigates the vocabulary of comprehension and expression and collects basic linguistic information (27). The CDI-I includes understanding vocabulary, vocabulary production, activities, and gesture subscales. Separate scores are calculated for vocabulary production, understanding vocabulary, and gestures. Scores for the "understands and says" response category on the vocabulary production subscale are calculated. The number of items with the labels "understands" or "understands and says" was added to determine the score for the comprehending vocabulary subscale. Separate scores were determined for each gesture subscale in activities and gestures. Responses that have checked either the "sometimes" or the "often" option received credit. The MCDIs were measured by the leading researcher before treatment (T_0), after the end of the 16th session (T_1), and at the 1-month follow-up (T_2).

Statistical Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) Version 17. Means and standard deviations were used to describe the demographic characteristics of participants and outcome measures. The Kolmogorov-Smirnov test was used for normality analysis of the data. The nonparametric Friedman test was used to examine the effect of the treatment on the outcome measures with time—pretreatment (T0), posttreatment (T1), and at 1-month follow-up (T2)—as a within-subject variable because the majority of the data did not have a normal distribution, and on the other hand, the number of samples was small. Pairwise comparisons were performed with the Wilcoxon Signed Ranks Test. The significance level was set at $P < 0.05$. We considered the scores of 0.02, 0.05, and 0.08 as low, medium, and high effect sizes, respectively.

Results

Participants

A total of 10 children with ASD (3 girls and 7 boys) with

[DOI: 10.47176/mjiri.37.104]

a mean (SD) age of 47.9 (8.3) months were included in this study. The education level of most mothers was a high diploma, and most of them were homemakers. Demographic information of the participants is given in Table 1.

Table 1. Demographic characteristics of the participants (n = 10)

Variable	
Children's age, months ± standard deviation	47.9 ± 8.3
Participants	10 (7 boys &3 girls)
Mothers' age mean year ± standard deviation	37±6
Autism severity	
Mild	3
Moderate	5
Severe	2
Education level of mothers	
Diploma	4
Bachelor's degree	3
Master's Degree	2
Doctorate	1
Mothers' job	
Housewife	5
Employee	3
Teacher	1
Doctor	1

Receptive Vocabulary

After the intervention, the child's receptive words increased (mean pre, 65.60; post, 135.80; follow-up, 186.40) (Table 2). There was a statistically significant increase in receptive vocabulary at the posttreatment ($P = 0.005$) and follow-up ($P = 0.005$) versus the pretreatment. Also, there was a statistically significant increase in receptive vocabulary at the follow-up versus post treatment ($P = 0.005$). This variable had a high effect size (Cohen's d = 2.17)

Expressive Vocabulary

After the intervention, the child's expressive words increased (mean pre, 27.8; post, 93.4; follow-up, 144.90) (Table 2). There was a significant difference in expressive vocabulary after the intervention ($\chi 2\ (2) = 20$; $P < 0.001$). Furthermore, pairwise comparisons showed that the mean scores of expressive languages in the immediate postintervention and follow-up phase also significantly differed ($P = 0.005$). The effect size was high (Cohen's d = 3.7).

Agents

The mean scores of agents before the intervention, in the immediate post intervention phase, and the follow-up phase were significantly different ($P < 0.001$). The results of the pairwise comparisons showed that in the immediate post intervention stage and in the follow-up phase, the mean scores of the agents were significantly different from each other ($P = 0.005$); the effect size score was high (Cohen's d =1.86).

Verbs

Compared with before the intervention, the number of verbs increased significantly (mean pre, 1.60; post, 10.10; follow-up, 14.50). Before the intervention, in the stage immediately after the intervention, and in the follow-up stage, the mean scores of the verbs showed a significant difference ($P < 0.001$). The pair of comparisons indicated that the mean scores of the verbs in the immediate post intervention phase and the follow-up phase were significantly different ($P = 0.014$). This variable had a very high effect size (Cohen's d = 3.44).

Actions and Gestures

The average scores of basic communication gestures before the intervention differed significantly from the stage immediately after the intervention and the follow-up stage ($P < 0.001$). In addition, the pair of comparisons showed that the average of these scores in the immediate post intervention phase and the follow-up phase had a significant difference with each other ($P = 0.007$). The effect size was favorable (Cohen's d = 1.1).

A significant difference was observed between the average scores of games and routines in the stages before the intervention, immediately after the intervention, and follow-up ($P < 0.001$.). The pair of comparisons showed that the average scores of games and routines were significantly different in the intervention and follow-up phases ($P = 0.026$). The effect size score was high (Cohen's d = 1.35).

In the stages before the intervention, immediately after the intervention, and follow-up, the mean scores of working with objects showed a significant difference ($P < 0.001$). Also, the pair of comparisons showed a significant difference in the mean scores of working with objects between the 2 stages immediately after the intervention and follow-up ($P = 0.005$). The effect size score was high (Cohen's d = 1.48).

The mean scores of pretending to be parents in the stages before the intervention, immediately after the intervention, and follow-up showed a significant difference ($P < 0.001$).

Table 2. Mean (SD) of outcome measures in pre-intervention, post-intervention and follow-up

Outcome	T0	T1	T2
Word production	27.8 (13.06)	93.4 (27.24)	144.9 (34.58)
Word comprehension	65.6 (27.89)	135.8 (36.12)	186.4 (39.46)
Subject	1.9 (1.91)	5.5 (1.96)	8.8 (1.98)
Verb	1.6 (1.9)	10.1 (2.92)	14.5 (4.35)
Gesture	8.4 (5.98)	14.1 (4.12)	17.2 (3.61)
Routine	1.6 (1.71)	3.8 (1.55)	4.9 (1.52)
Functions	7.5 (3.13)	11.8 (2.65)	14.3 (2.45)
Pretending to be a mother or father	0.8 (1.47)	5 (2.66)	7 (2.3)
Imitation	3.9 (3.21)	8.8 (2.78)	11.5 (2.5)

SD: Standard Deviation, T_0: Pre-intervention, T_1: post-intervention, T_2: follow-up

[DOI: 10.47176/mjiri.37.104]

The pair of comparisons also showed a significant difference in the average of these scores between the 2 stages immediately after the intervention and follow-up (P = 0.007). The effect size was high (Cohen's d = 1.96).

A significant difference was observed between the average scores of imitating adults' activities in the stages before the intervention, immediately after the intervention, and follow-up ($P < 0.001$). The pair of comparisons showed a significant difference between the average of these scores in the 2 stages immediately after the intervention and follow-up ($P = 0.007$). The effect size in this variable was high (Cohen's d = 1.63).

Content and Face Validity of the Protocol

A panel of experts reviewed the decontextualization protocol's content and face validity quantitatively, using the content validity index and content validity ratio. The relative content validity coefficient for each item of the protocol was between 0.83 and 1.0, and for the entire protocol was 0.89. The value of the content validity index for protocol items was between 0.84 and 1.0, and for the entire questionnaire, it was 0.97.

Discussion

This study aimed to investigate the effects of combined intervention derived from the principles of different theories, including contemporary behaviorism, schemas, sociocultural, and event representation theories, to improve early lexical development in minimally verbal children with ASD. The findings indicated that the expressive and receptive vocabulary, actions, and gestures have all improved over time.

Receptive and Expressive Vocabulary

The receptive and expressive words improved after combined intervention with large effect sizes. These improvements are consistent with the results of the previous studies. An interesting finding of this study was the significant improvements in the mean scores of receptive and expressive words in the 2-month follow-up assessment. These findings showed that by teaching language rules to children, they can continue to acquire language from the surrounding environment, and there is no need to teach them words individually. These results align with studies that emphasize the importance of context in language acquisition (18). Indeed, children do not learn words at the beginning of the learning process. Instead, they try to understand and produce the whole speech of adults and create schemas from the relationship between adults' utterances and the context in which these utterances occur and recover these schemas during communication (19). Our results contrast a study by Goods et al (2013) that found no evidence of receptive or expressive vocabulary improvement in minimally verbal children with ASD following applied behavior analysis intervention combined with the Joint Attention, Symbolic Play, Engagement, and Regulation approach. However, the variety of games, the length of time spent playing, and the number of requests significantly increased (28).

Actions and Gestures

This study is in line with other studies (27, 29) in showing that the mean scores of all subscales of actions and gestures—including basic communication gestures, games and routines, working with objects, pretending to be parents, and imitating adults' activities—improved significantly after combined intervention with large effect sizes.

Gould et al (2015) found a direct correlation between symbolic games and receptive and expressive language, and the expansion of symbolic games might predict the development of receptive and expressive vocabulary (27).

In General, at the first phase of the combined intervention, after the natural development process of understanding strategies in normal children, meaningful activities were designed for the study children both during exercises and in the natural environment. At this phase, we aimed to create schemas based on nonlinguistic context for understanding others' speech. In the next step, after understanding and expressing context-dependent speech, decontextualization exercises were started to help expand children's vocabulary so that children could form the necessary schemas for labeling objects, people, and activities.

Limitations

There were some limitations in this study. First, the sample size was very small; therefore, large samples are needed to investigate further the effect of the combined intervention on early lexical development in minimally verbal children with ASD. Second, another treatment group was not considered; thus, comparing the combined intervention's effect with other treatment methods was not possible. It is suggested to conduct several clinical trials to compare the effectiveness of this combined intervention with other treatment methods in minimally verbal children with ASD.

Conclusion

This single group pretest-posttest study showed the beneficial effects of combined intervention derived from the principles of different theories, including schemas, contemporary behaviorism, and sociocultural and event representation theories on early lexical development in minimally verbal children with ASD.

Acknowledgment

This study was conducted at Iran University of Medical Sciences (IR.IUMS.REC.1399.1423), Tehran, Iran. The authors would like to thank the ASD children and their mothers who participated in this study.

Conflict of Interests

The authors declare that they have no competing interests.

References

1.American Psychiatric Association, A. and A.P. Association, Diagnostic and statistical manual of mental disorders: DSM-5. Vol. 10. 2013: Washington, DC: American Psychiatric Association.
2.Gernsbacher MA, Morson EM, Grace EJ. Language and Speech in Autism. Annu Rev Linguist. 2016;2:413.
3.Ellis Weismer S, Kover ST. Preschool language variation, growth, and

[DOI: 10.47176/mjiri.37.104]

predictors in children on the autism spectrum. J Child Psychol Psychiatry. 2015;56(12):1327-37.
4.Howlin P. Outcome in high-functioning adults with autism with and without early language delays: Implications for the differentiation between autism and Asperger syndrome. J Autism Dev Disord. 2003;33(1):3-13.
5. Charman T, Drew A, Baird C, Baird G. Measuring early language development in preschool children with autism spectrum disorder using the MacArthur Communicative Development Inventory (Infant Form). J Child Lang. 2003;30(1):213-36.
6. Luyster RJ, Kadlec MB, Carter A, Tager-Flusberg H. Language assessment and development in toddlers with autism spectrum disorders J Autism Dev Disord. 2008;38(8):1426-38.
7. Pickles A, Anderson DK, Lord C. Heterogeneity and plasticity in the development of language: A 17-year follow-up of children referred early for possible autism. J Child Psychol Psychiatry. 2014;55(12):1354-62.
8.Moody S, Hu X, Kuo LJ, Jouhar M, et al. Vocabulary instruction: A critical analysis of theories, research, and practice. Educ Sci. 2018;8(4):180.
9.Watkins L, Kuhn M, Ledbetter-Cho K, Gevarter C, O'Reilly M. Evidence-Based Social Communication Interventions for Children with Autism Spectrum Disorder. Indian J Pediatr. 2017;84(1):68-75.
10.Unrau N, Alvermann D, and Sailors M. Literacies and their investigation through theories and models, in Theoretical models and processes of literacy.7th ed. Routledge Publisher; 2018. pp. 3-34.
11.Siller M, Hutman T, Sigman M. A parent-mediated intervention to increase responsive parental behaviors and child communication in children with ASD: A randomized clinical trial. Autism Dev Disord. 2013;43(3):540-55.
12.Brignell A, Chenausky KV, Song H, Zhu J, Suo C, Morgan AT.Communication interventions for autism spectrum disorder in minimally verbal children. Cochrane Database Syst Rev. 2018 5;11(11):CD012324.
13.Kaiser A.P, Hancock T.B, and Nietfeld J.P, The effects of parent-implemented enhanced milieu teaching on the social communication of children who have autism. Early Educ Dev.2000;11(4):423-446.
14. Teymouri SM, Nakhostin Anasri N, Mohamadi R, Soleymani Z. A Preliminary Study of Telepractice Prelinguistic Milieu Teaching for Children with Autism Spectrum Disorders. J Iran Med Counc. 2022;5(3):471-77.
15.Hancock TB and Kaiser AP. The effects of trainer-implemented enhanced milieu teaching on the social communication of children with autism. Topics Early Child Spec Educ. 2002;22(1):39-54.
16.Hampton LH, Harty M, Fuller EA, Kaiser AP. Enhanced Milieu Teaching for Children with Autism Spectrum Disorder in South Africa. Int J Speech Lang Pathol. 2019;21(6):635-645.
17. Anderson JR. The Architecture of Cognition.1ed. Psychology Press; 2013.
18.Wojcik, EH. The development of Lexical–Semantic Networks in Infants and Toddlers. Child Dev. Perspect. 2018;12(1):34-38.
19. Tomasello M. Constructing a Language. Harvard University Press; 2009.
20. Ünal E, Ji Y, Papafragou A. From Event Representation to Linguistic Meaning. Top Cogn Sci. 2021;13(1):224-242.
21. Smith CA, Sachs J. Cognition and the verb lexicon in early lexical development. Appl Psycholinguist. 1990;11(4): 409-424.
22. Barrett MD. Early Semantic Representations and Early Word-Usage. In: Kuczaj SA, Barrett MD. (eds) The Development of Word Meaning. Springer Series in Cognitive Development. Springer;1986. p. 39-67.
23. Hancock TB, Ledbetter CK, Howell L, Lang R., Enhanced Milieu Teaching, in Early Intervention for Young Children with Autism Spectrum Disorder.1st ed. Springer;2016. p. 177-218.
24. Charlop MH, Lang R, Rispoli M, Keeping It Real: Naturalistic Teaching Strategies (NaTS) for Play and Social Skills with Children with Autism Spectrum Disorder. Play and Social Skills for Children with Autism Spectrum Disorder. 1st ed. Springer; 2018: p. 53-70.
25. Wong C, Odom SL, Hume KA, Cox AW, Fettig A, Kucharczyk S, et al. Evidence-Based Practices for Children, Youth, and Young Adults with Autism Spectrum Disorder: A Comprehensive Review. J Autism Dev Disord. 2015;45(7):1951-66.
26. Ahmadi S, Safari T, Hemmatian M, Khalili Z. The Psychometric Properties of Gilliam Autism Rating Scale (GARS).Research in Cognitive and Behavioral Sciences, 2011; 1(1):87-104.
27.Kazemi Y, Nematzade Sh, Hajian T, Heaidari M,Daneshpajouh T,Mirmoieni A.The validity and reliability coefficient of Persian translated McArthur-Bates Communicative Development Inventory. Journal of Research in Rehabilitation Sciences. 2008; 4(1).
28. Goods KS, Ishijima E, Chang YC, Kasari C. Preschool based JASPER intervention in minimally verbal children with autism: pilot RCT. J Autism Dev Disord. 2013;43(5):1050-6.
29.Gould HM. Teaching to Play or Playing to Teach: An examination of play targets and generalization in two interventions for children with autism. Los Angeles. University of California; 2015.

[DOI: 10.47176/mjiri.37.104]