



The Effectiveness of a Cognitive Behavioral Program in Developing Some Functional Language Skills and Executive Functions among Educable Intellectually Disabled Adolescents

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Abstract

The current study aimed to: Verify the effectiveness of a cognitive-behavioral program in developing some functional language skills and executive functions in educable intellectually disabled adolescents, and Verifying the continued effect of the program on the experimental group. The study included 20 intellectually disabled adolescents, evenly divided into an experimental group (n=10) and a control group (n=10). Their IQ ranged between (50:70), and their chronological ages ranged between (12:15) years old, with mean age of (13.35) years, and a standard deviation of (1. 089). The researcher used The Functional Language Skills Observation List for the Educable intellectually Disabled Adolescents (by the researcher), The Executive Functions Rating Scale for both the Normal children and Special Needs Children (by Al-Shakhs & Morsi , 2013), and The Cognitive Behavioral Program (by the researchers). The results showed that the cognitive behavioral program significantly improved functional language skills and executive functions among educable intellectually disabled adolescents. The effect size of the program is large. This indicated the continued positive effect of the program used in the current study.

Keywords: *Functional Language Skills - Executive Functions - Intellectually Disabled*

Introduction

Cognitive delays in language and adaptive behavior are critical challenges for intellectually disabled adolescents, impacting their ability to integrate into society (Marrus & Hall, 2017). This study explores how a cognitive-behavioral program can address these challenges.

In its DSM-5 Manual, the American Psychiatric Association (APA) defines "Intellectual Disability" as "a disorder that begins during development which is characterized by a notable deficit or deficiency in both intellectual functioning and adaptive behavior in Conceptual, social, and practical domains" (American Psychiatric Association, 2013,p. 33).

The ratio of intellectually disabled children in society is (2,5: 3%). The ratio of those capable of learning is about 80% of cases (Abdel Salam, 2013,p. 15). The "Educable Intellectually Disabled" are those whose IQ ranges between (50-70), and their mental age ranges between (6-9) years. They are able to learn basic skills such as reading, writing, and arithmetic. That is the individual is able to secure academic achievement equals the fourth or fifth grade level. Additionally, they are able to learn and work (Ibrahim,2000; Black, & Andreasen, 2014). **However, they**

do not receive adequate attention to be integrated into the society (Abdel Salam, 2013, p. 15).

The current study paid attention to developing some functional language skills necessary for the educable intellectually disabled adolescents. Such functional language skills including functional listening, functional speaking, functional reading, and functional writing, are essential for increasing their independence.

Functional language skills training for intellectually disabled adolescents aims to increase their integration into societal environments and increase their independence (Storey & Miner, 2017, p. 10). Despite the significant negative impact of inadequate functional language skills on intellectually disabled adolescents, it has not received much scholarly attention. Therefore, language skills are very essential in the field of mental disabilities for its role in achieving interaction between members of society (Al-Ghurair, Asaad, and Al-Nawaisah, 2009).

Some scholars postulate that language mediates executive functions, while others believe that executive functions are the basis of communication skills (Whitehouse, Watt, Line, & Bishop, 2009; Akbar, Loomis, & Paul, 2013; Long, Horton, Rohde, & Sorace, 2018).

Al-Shakhs & Morsi (2013) defined "Executive Functions" as "the child's ability to stop undesirable behavior, initiate appropriate behavior and organize and direct behavior to achieve the goal. Moreover, it depends on many cognitive functions such as attention, perception, memory, and language, and influences and directs them simultaneously because of their important role in daily life activities and social interaction".

Children with intellectual disabilities have deficiencies in response inhibition functions, planning and non-verbal working memory. Danielsson Henry, Messer, & Rönnberg (2012) indicate that the development of numerous types of executive functions may be related to different degrees with mental age and experience. Therefore, many studies referred that there is a link between executive functions and IQ among individuals.

Deficiencies in executive functions result in several problems among individuals of mental disabilities such as: attention distraction and the inappropriate response due to a lack of understanding of the required task. This results in deficits in both verbal memory and the development of verbal and non-verbal communication (Marrus, & Hall, 2017).

Hutchison, Müller, & Iarocci (2020) found that improving areas of executive function improves language skills, functional communication, and verbal communication among individuals with intellectual disabilities.

Blom, & Boerma (2019) observed that intervention programs aimed at improving effectively linguistic abilities and executive functions and children's linguistic development. Among the executive functions that help in linguistic development are selective attention, response inhibition, distraction prevention, and working memory.

Cognitive-behavioral counseling plays an important role in improving functional language skills and executive functions among intellectually disabled people. Abdel Rahim, Al-Sheikh, and Nasser (2011) indicated the effectiveness of a behavioral program in developing some adaptive behavior skills among educable intellectually disabled adolescents. These skills are: discrimination, understanding, linguistic communication, and verbal expression.

Kirk, Gray, Riby, & Cornish, 2015; Al-Ateeq and Abu Zaid (2018) pointed out the effectiveness of cognitive training in improving executive functions among people with mental disabilities. They recommended the importance of training teachers and parents to use cognitive activities when teaching and training children and adolescents with mental disabilities because of their effective impact in improving executive functions. Al-Halafawi (2022) also showed the effectiveness of a cognitive-behavioral training program in improving independence skills and reducing language disorders in educable intellectually disabled children.

Literature Review:

In this section researchers organized past studies by theme as follows:

▪ Previous Interventions for Functional Language Development

Among the past studies that focused on developing language skills was the study of Abed (2019), which aimed to improve functional language in educable intellectually disabled children in integration schools, through a training program. The study sample consisted of 20 children, aged between (9-13) years. The results showed the effectiveness of the training program in improving functional language skills among intellectually disabled children. The study indicated the effectiveness of the modeling technique (Video modeling), as video modeling helped children practice the skill and targeted behavior in a correct way. Video modeling is more controlled than live modeling, as distractions in the child's environment can be removed.

Zanati (2020) sought to prepare a program based on performance activities for the female student teacher to raise her performance to develop functional language skills for children with mild mental disabilities. Su, Rogers, Estes, & Yoder (2021, p. 244) defined "Functional Language" as "the linguistic performances that individuals need to interact correctly in different life situations". Zanati (2020, p. 78) defined functional language skills as "a set of linguistic performances and practices that an intellectually disabled person needs and uses while addressing daily life situations properly and in clear and comprehended language".

Al-Jarhi (2020) in her study aimed to verify the effectiveness of a program using social stories to treat pragmatic language disorder in children with mild intellectual disability. The study sample consisted of one group (n= 10) children with mild intellectual disability

who suffer from pragmatic language disorder. Their ages ranged between (7-10) years. Their IQ ranged between (55-70). The results of the study showed the effectiveness of the program used in the study in reducing pragmatic language disorder in children with mild intellectual disability, as the program helped develop eye contact, attention, initiating greetings, and apologizing.

Kashif and Abu Al-Majd (2021) sought to develop a scale to evaluate the social use of language among intellectually disabled children. The study highlighted the significance of the social use of language among intellectually disabled people, as it helps them organize and interconnect conversations. Moreover, it helps them to improve the skill of self-surveillance and correcting mistakes, taking the turn, identifying the topic, initiating, continuing and maintaining the conversation, and ending it appropriately. Social interaction with language also helps intellectually disabled people to communicate and express their emotions to others. It develops their ability to understand other people's true and false feelings and emotions and the ability to predict their behavior.

Salem (2023) diagnosed and compared the social use of language among children with intellectual and developmental disabilities and their normal peers. The study showed that children with mild intellectual disabilities have deficiencies in the social use of language, as they find it difficult to initiate and change conversation (whether by asking questions or commenting on something). They also have difficulty with the skill of reasoning, which enables the listener and speaker to extract the true intended meaning of speech. They suffer from difficulties in understanding symbolic speech such as humor and sarcasm.

Salem, Al-Tahawi, and Aliwa (2023) aimed to present a proposed vision for developing the functional performance of some listening skills in light of the adaptive approach for adolescents with intellectual disabilities in the preparatory stage. The study indicated some functional performances of the listening skill which are: implementing audio prompts while shopping, applying audio instructions and instructions such as the doctor's instructions, and while using transportation (metro, train, airport). The study recommended the importance of linking listening to functional topics from real life, and providing models of original texts used in society so that students can become familiar with these audio materials that they need in daily life.

▪ Previous Interventions for Executive Functions

Ringenbach, Holzapfel, Mulvey, Jimenez, Benson, & Richter (2016) aimed to investigate the impact of a motor training program using bicycle riding to improve some cognitive executive functions among intellectually disabled adolescents and adults with Down syndrome. The study showed the effectiveness of the training program in improving executive functions related to reaction time, response inhibition, the ability to switch between tasks, and fluency in linguistic connotation.

Also, Madi (2022) aimed to verify the effectiveness of an electronic training program to improve executive functions among children with mild mental disabilities (response inhibition, organization, cognitive flexibility, and attention), and its effect in reducing the severity of some apparent behavioral problems (attention problems, aggressive behavior, breaking rules, interaction social problems). The study showed the effectiveness of the program in reducing the incidence of unacceptable external behavior and attention problems. The study also indicates that improving the function of the response inhibition contributed significantly to reducing the severity of aggressive behavior and increasing self-control and emotional control. The improvement of executive functions also helped improve social interaction skills, reduce impulsivity, and reduce rule-breaking behavior as a result of increased attention to verbal and non-verbal instructions.

Telmsani (2021), in her study combined executive functions and linguistic skills, aimed to explore the effect of some executive functions (mental flexibility and inhibition) on the development of oral language among autistic children. The study showed a positive relationship between executive functions (flexibility and inhibition) and the development of oral language among children.

Additionally, Makari and Shawqi (2021) aimed firstly to investigate the relationship between executive functions and psycholinguistic abilities and secondly to reveal the predictive executive functions of psycholinguistic abilities among children with mild mental disabilities. The study showed that the cognitive executive functions (cognitive flexibility, working memory, and planning) are more closely related to psycholinguistic abilities than the emotional executive functions (self-control, emotional regulation, behavior control, and organization of tools). The study also manifested that some executive functions (cognitive flexibility, working memory, self-control, and behavioral inhibition) can predict psycholinguistic abilities among children with mild intellectual disability

Study problem:

Researchers in this study set out to answer the following research questions:

- 1- What is the effectiveness of the cognitive-behavioral program in developing functional language skills and executive functions in educable intellectually disabled adolescents?
- 2- Does the effect of the program used in the current study continue (if found) in developing functional language skills and executive functions in the educable intellectually disabled adolescents after two months of its application?

Study Objectives:

The present study aimed at:

1. Reducing deficits in functional language skills and executive functions among for the educable intellectually disabled adolescents.

2. Verifying the effectiveness of the cognitive-behavioral program to develop some functional language skills and executive functions among for the educable intellectually disabled adolescents.
3. verifying the continuity of the program's effect on the pilot study sample two months after its implementation.

Study Hypotheses:

In light of the theoretical framework and the current study questions, the study hypotheses were formulated as follows:

1. The program will significantly improve functional language skills scores in the experimental group compared to the control group.
2. The program will significantly improve executive function scores in the experimental group compared to the control group.
3. The program will significantly improve functional language skills scores in the experimental group in post-measurements compared to pre-measurements.
4. The program will significantly improve executive functions skills scores in the experimental group in post-measurements compared to pre-measurements.
5. There are no significant differences between the experimental group's scores in functional language skills in the post and sequential measurements.
6. There are no significant differences between the experimental group's scores in executive functions in the post and sequential measurements.

Method

Study Sample:

The study included 20 intellectually disabled adolescents, evenly divided into an experimental group (n=10) and a control group (n=10) aged (12:15) years, (mean age 13,35 , SD= 1,089), Their IQ scores (ranging from 50 to 70) and this information was found in the students' educational records.

Procedure and instruments:

Teachers filled in the questionnaires for those students for whom we had signed parental consent forms. In order to be selected as informants, teachers had to know the students for at least six months.

Study instruments

The researchers used the following instruments:

- 1- Functional Language skills Observation List for educable intellectually disabled adolescents (prepared by the researchers).
- 2- Executive Function Rating Scale for normal and special needs children, prepared by (Al-Shakhs and Fathi, 2013).
- 3- A cognitive-behavioral program to develop some functional language skills and executive functions among for educable intellectually disabled adolescents prepared by the researchers).

Calculating the Psychometric Competency of the Study Scales:

Firstly : Observation List of functional language skills for educable intellectually disabled adolescents, prepared by the researchers.

By reviewing some previous studies (Stewart, 2007; Goberis, Beams, Dalpes, Abrisch, Baca, & Yoshinaga-Itano, 2012; Diken, 2019; Su, Rogers, Estes, & Yoder, 2021, & Andreou, Lymperopoulou, & Aslanoglou, 2022) the researchers formulated forty-five statements for measuring the functional language skills of educable intellectually disabled adolescents were. The researchers developed an answer scale to respond as follows: (Always =3, sometimes=2, rarely = 1, never = 0). Thus, the total score of the Observation List of Functional Language Skills among the educable intellectually disabled adolescents in its initial form ranges between (45-135) scores, with higher scores indicating a better level of functional language skills. While low scores indicate a lower level of functional language skills in intellectually disabled adolescents. To ensure the validity of the list, the researcher applied on the following calculations:

a. The list Validity:

The researcher verified the validity of the list by calculating factorial validity, where exploratory factorial analysis in their initial form was conducted for the items of the functional language skills observation list for the educable intellectually disabled adolescents. Conducting the factorial analysis resulted in saturation of the items in the list based on (4) factors, the latent root of which is greater than (1), from (4,07) and more. Such degree explains 56,40 % of the total variance value of the four factors, including : firstly, functional listening, secondly functional speaking, thirdly functional reading, and fourthly functional writing.

The researcher also calculated the internal consistency of the items with dimensions, where the correlation coefficients were calculated between the score of each item and the total score of the dimension to which this item belongs. It is evident that there are significant and acceptable correlation coefficients between the score of each word and the score of the dimension to which it belongs to the Functional Language Skills Observation List, as they ranged between (0,702 -0,864). It was significant with ($p < .01$), except for five items (No. (5), (6), (17), (22), and 29) that were significant with ($p < .05$), with correlation coefficients ranged between (0.272–0.368). It is likely that the level of significance is weak and cannot be trusted, and therefore they were deleted. In its final form, the functional language skills observation list consists of (40) items, with a total score ranging between (40-120) grades. The researcher calculated the validity of the internal consistency of the dimensions with each other and with the total score of the list. Accordingly, the correlation coefficients ranged between (0.702 - 0.860) with significance level ($p < .01$). This indicated the internal consistency of the list's items and dimensions.

B- The reliability of the list

To ensure reliability of observation list of functional language skills among the educable intellectually disabled adolescents, the researchers calculated the Cronbach's-Alpha reliability coefficient for each dimension of the list and the total score of the list. All reliability coefficients for the dimensions of the list and its total score were high and acceptable, ranging between (0.801 and 0.853), while the reliability coefficient for the total score of the list reached (0.915). Reliability was also calculated by applying and re-applying the Test-Retest. The values of the correlation coefficients between the scores of the first and second applications of the list of functional linguistic skills (dimensions and total score) were significant with ($p < .01$), and ranged between (0.731, 0.846). Hence, the validity and reliability of the list were confirmed, and the data obtained can be trusted.

Secondly: Executive Function Ranking Scale for Normal Children and People with Special Needs Prepared by (Al-Shakhs and Fathy, 2013).

The researchers used the executive functions ranking scale to evaluate the various aspects involved in executive functions tasks among the educable intellectually disabled adolescents in intellectual education schools by applying the scale to (6) teachers the educable intellectually disabled adolescents as a measurement to estimate the executive functions of their students (59 male and female students). The scale consists of (72) items, divided into (8) sub-dimensions. Each dimension represents one of the executive functions as follows: The first dimension: inhibition, the second dimension: transformation, the third dimension: emotional control, the fourth dimension: initiative, the fifth dimension: the working memory, the sixth dimension: planning, the seventh dimension: organizing tools, and the eighth dimension: self-monitoring.

To calculate the psychometric efficiency of the executive functions ranking scale, the scale's authors verified the scale's validity through four methods: reviewers' validity, internal consistency of the scale's items, discriminative validity, and factorial validity. The scale's developers also verified its reliability, as the value of the reliability coefficient for the scale's overall score indicated (0.95) to confide in the score of the executive functions ranking scale. To verify the validity of the scale on the sample of the current study, the researcher calculated the following:

A. Validity of the scale:

The internal consistency of the items within each dimension was calculated to assess validity. The correlation values coefficients for the degree of each item with the degree of the dimension to which it belongs were significant with ($p < .01$). Yet, three items only were significant at the level of with ($p < .05$), as statement No. (4), stated as: "he causes problems for others," and statement No. (50), stated as: "He has good ideas but cannot express or implement them," and the statement No. (55) stated "he focuses on the part and leaves the whole of

things", as its correlation coefficients ranged between (0.278–0.342). It is likely that the level of its significance is weak and cannot be trusted. Hence it was deleted. In its final form, the scale for estimating executive functions for normal children and those with special needs used in the current study consists of (69) items. The internal consistency of the dimensions with each other and with the total score of the scale was also calculated. The correlation coefficients between the total scores of the eight dimensions with each other on one hand and the total score of the scale were significant at the level of with ($p < .01$), and ranged between (0.701 - 0.848). This indicates the internal consistency of the scale, and that its statements and dimensions are used to measure one thing, indicating that the scale has an appropriate degree of consistency.

B. Scale reliability

To verify the reliability of the scale, the researcher calculated the Cronbach's Alpha reliability coefficient for each dimension and for the total score. All reliability coefficients for the dimensions of the executive functions ranking scale for normal children and those with special needs and its total score were high and acceptable, ranging between (0.700 -0.865) for the dimensions and (0.955) for the total score. Reliability was also calculated through application and re-application of the scale to the same sample to calculate psychometric efficiency. The values of the correlation coefficients between the scores of the first and second applications of the executive functions ranking scale (dimensions) ranged between (0.754 –0.889), and the total score (0.915), which are significant with ($p < .01$). This indicates that the scale has an appropriate degree of stability. Accordingly, it was confirmed that the scale was valid and reliable, that it could be applied to the students in the current study sample.

The Cognitive Behavioral Program

In the current study it means "a set of methods, techniques, strategies, and activities that have been developed in accordance with cognitive-behavioral principles and techniques to train intellectually disabled adolescents who are capable of learning, with the aim of developing some functional linguistic skills, which are: functional listening skill, functional speaking skill, functional reading skill, and writing skill" and developing some of their executive functions, through (56 training sessions), each session includes one or more general goals depending on the content of each session, and the general goal of the program at the School of "Vocational Intellectual Education in Mahalla al-Kubra".

Results and Discussion:

1. Results of the First Hypothesis:

The first hypothesis states that: "The program will significantly improve functional language skills scores in the experimental group compared to the control group."

To verify the validity of this hypothesis, the researchers calculated the differences between the mean ranks of scores of the experimental and control groups in the post-

measurement on the Functional language skills observation checklist (Dimensions and Total score) using the non-parametric test (Mann-Whitney) to measure differences between two independent groups.

As shown in Table 1, the researchers also calculated the mean and standard deviation of the post-measurement for the experimental and control groups in Functional language skills observation checklist (Dimensions and Total score).

Table 1 The mean and standard deviation of the post-measurement for the experimental group and control group on Functional language skills (Dimensions and total score) (n=20)

Dimensions and total score	Experimental group		Control group	
	Mean	standard deviation	Mean	standard deviation
Functional listening	29,90	1,663	23,90	2,513
Functional speaking	26,40	2,221	20,50	3,629
Functional reading	15,30	0,675	13,30	0,675
Functional writing	13,60	1,174	12,40	1,075
Total marks	85,20	3,393	70,10	6,402

As shown in Table 1, the experimental group showed significantly higher performance than the control group across all functional language skills, with ($p < .01$) in the total score and in all dimensions except for the functional writing with ($p < .05$) indicating statistical significance. Higher grade means indicate a higher level of performance of functional language skills among the experimental group than the control group which confirm the first hypothesis.

The researchers suggest that the significant differences between the experimental and control groups in functional language skills can be attributed to the fact that the control group received no intervention, while the experimental group participated in the cognitive-behavioral training sessions to develop functional language skills and the various methods, strategies, and techniques used in the program sessions, in addition to the nature of the program's content and activities for each session.

These findings are consistent with (Abdel Rahim, Al-Sheikh, and Nasser ,2011; Othman ,2018; Abed ,2019; and Ashour ,2019), which indicated an improvement in the language skills of children with intellectual disabilities, and a reduction in their language disorders. Additionally, the results of the first hypothesis are consistent with Al-Halafawi (2022), which highlighted an improvement in receptive language and expressive language skills among children with intellectual disabilities using a cognitive-behavioral program. It also agrees with Salem (2023), which indicated that children with intellectual disabilities

find difficulty in initiating and exchanging conversation (whether by asking questions or commenting on something). They also have difficulty understanding symbolic speech such as humor and sarcasm.

The paper could further elaborate on how these findings might influence broader practices or policies. For instance, "These findings suggest that implementing cognitive-behavioral programs in special education curriculums could significantly improve the social integration and daily functioning of intellectually disabled adolescents, highlighting the need for education reforms targeting this group.

2. Results of the Second Hypothesis:

The second hypothesis states that "The program will significantly improve executive function scores in the experimental group compared to the control group."

To verify the validity of this hypothesis, the significance of differences between the mean ranks of the experimental group and control group in the post-measurement was calculated on the executive functions skills observation list (dimensions and total score) using the non-parametric test (Mann-Whitney) to measure differences between two independent groups.

As shown in Table 2 , the researchers also calculated the mean and standard deviation of the post-measurement for the experimental group and control group in executive functions skills observation checklist (Dimensions and Total score), and table (2) shows this as follows:

Table 2 The mean and standard deviation of post-measurement for the experimental group and control group on Executive function (n=20)

Dimensions and overall grade	Experimental group		Control group	
	Mean	standard deviation	Mean	standard deviation
Behavior Inhibition	11,90	1,449	20,00	4,472
Cognitive flexibility	9,50	0,850	14,50	2,369
Emotional control	11,00	1,633	19,30	3,592
Initiation	10,70	1,337	15,60	2,119
Working memory	13,00	1,491	20,30	3,335
Planning	14,30	2,406	23,40	2,547
Arranging and organizing tools	8,40	0,966	11,70	1,494
Self-monitoring	9,90	1,197	16,90	3,872
Total marks	88,70	3,831	141,70	12,623

As shown in

Table 2, the experimental group showed significantly higher performance than the control group across all executive functions skills, in the total score and in all dimensions with ($p < .01$) indicating statistical significance.

Higher mean indicate a higher level of deficiency in the performance of executive functions in the control group, while lower mean indicate a low level of deficiency in the performance of executive functions, which indicates the improvement in executive functions in the experimental group. Accordingly, the second hypothesis is confirmed.

This result is consistent with (Danielsson, Henry, Messer, &Rönnberg, 2012; and Jacola, 2012) that intellectually disabled adolescents have weak executive functions. Moreover, Ringenbach, Holzapfel, Mulvey, Jimenez, Benson, & Richter, (2016) indicated an improvement in executive functions related to reaction time, response inhibition, and the ability to switch between tasks among intellectually disabled adolescents. The second hypothesis is consistent with (Amadó, Serrat, &Vallès-Majoral, 2016; Tomaszewski, Fidler, Talapatra, & Riley, 2018) which indicated that people with Down Syndrome and the intellectually disabled suffer from deficiencies in executive functions and social knowledge.

Schuringa, van Nieuwenhuijzen, Orobio de Castro, & Matthys, (2017) highlighted the presence of deficiencies in the three executive functions (control, cognitive flexibility, and working memory) in children with mild intellectual disabilities. Moreover, Hosseini, & Al-Shaflot, (2021) manifested that the most deficient tasks in students with intellectual disabilities are: planning, working memory, Inhibition, emotional control, and self-monitoring, and then comes the task of initiating, shifting, and organizing tools.

The researchers suggest that the significant differences between the experimental and control groups in executive functions skills can be attributed to the intervention's effectiveness, as the control group didn't receive any form of treatment. Thus, the program sessions helped increase students' ability to plan and set goals, organize and arrange tools to improve working memory performance, and the initiative behavior, cognitive flexibility between alternatives, behavior inhibition, emotional control, and self-monitoring.

These findings indicate that implementing cognitive-behavioral programs in special education curriculums could effectively enhance executive functions and improve the social integration and daily functioning of intellectually disabled adolescents, which may lead to enhanced social integration.

Results of the Third Hypothesis:

The third hypothesis stipulates that "The program will significantly improve functional language skills scores in the experimental group in post-measurements compared to pre-measurements".

To verify the validity of this hypothesis, the researchers used the non-parametric (Wilcoxon) test and the Z value to measure the differences between two related groups to calculate the significance of differences between the mean ranks of the experimental group's scores in the pre- and post-measurements on the functional language skills observation list.

The researchers also calculated the mean and standard deviation for pre- and post-measurements for the experimental group in functional language skills observation checklist (Dimensions and total score) as shown in table 3:

Table 3 The mean and standard deviation for the pre- and post-measurements of the experimental group in functional language skills (n=10)

Dimensions and total score	Pre-measurement		Post-measurement	
	mean	standard deviation	mean	standard deviation
Functional listening	25,10	3,725	29,90	1,663
Functional speaking	21,00	4,397	26,40	2,221
Functional reading	11,00	0,943	15,30	0,675
Functional writing	11,90	1,663	13,60	1,174
Total score	69	8,576	85,20	3,393

As shown in Table 3, the experimental group's Post-measurement scores outperformed the pre-measurement scores in all language skills, with significant differences noted in functional language skills ($p < .01$). This result confirms the third hypothesis.

The results showed that all the means of the experimental group in the post-measurement are greater than the means of the pre-measurement functional language skills (Dimensions and total score). This finding indicates that there is an effect of the cognitive-behavioral program used in the current study in developing of functional language skills in educable intellectually disabled adolescents.

Cohen's r was calculated to determine the effect size of the program in improving functional language skills (Fritz, Morris, & Richler, 2012,p. 12; Tomczak, & Tomczak, 2014,p. 23) using the following equation:

$$(r) \quad r = \frac{Z}{\sqrt{n}}$$

is the correlation coefficient and extends from (- 1.00 to 1.00), while (z) is the value of differences between the ranks of the groups, and (n) is the number of the study sample members.

Cohen suggested interpreting the effect size according to the following criteria:

- If the effect size >0.100 and < 0.300 , the effect size is weak.
- If the effect size ≥ 0.300 and < 0.500 , the effect size is medium.

- If the effect size ≥ 0.500 , the effect size is large.

Accordingly, table (4) illustrates correlation value (r) and the impact of the program used in the study in improving functional language skills (dimensions and total score) among the experimental group in the educable intellectually disabled adolescents as follows:

Table 4 Correlation value (r) and the effect size in improving functional language skill

Dimensions and total score	Correlation value	Effect size
Functional listening	0.889	large
Functional speaking	0.888	large
Functional reading	0.892	large
Functional writing	0.806	large
Total marks	0.888	large

As shown in table 4 Cohen's r was calculated to determine the effect size of the program used in the current study indicating a large effect (ranging from 0.806 to 0.892). This indicates that the program used has a large impact on developing functional language skills in educable intellectually disabled adolescents (functional listening, functional speaking, functional reading, and functional writing). This increases confidence in the effectiveness of the program used in the current study.

This result is consistent with (Abdel Rahim, Al-Sheikh, & Nasser, 2011; Othman, 2018; Abed, 2019; and Ashour, 2019). Additionally, the results goes in line with Al-Halafawi (2022), which indicated the effectiveness of a cognitive-behavioral training program in improving independence skills and reducing language disorders in the educable intellectually disabled adolescents. Also, the study agrees with Baqoush (2022) that there is a clear deficiency in receptive and expressive language skills in the educable intellectually disabled adolescents.

The improvements of functional language skills among the experimental group after implementing the program, can be attributed to their participation in the program sessions and benefiting from the techniques strategies used to improve functional language skills in educable intellectually disabled adolescents, and the various individual and group cognitive and motor activities that the program used to increase students' linguistic interaction with each other during the program sessions. Such improvement may be additionally consolidated through increasing auditory attention to the instructions of the researcher and colleagues while performing the activity in order to avoid obtaining a violation, and in order to obtain material and emotional reinforcement. In addition, students use language skills (functional speaking and functional listening) during program sessions and outside school in the social environment while practicing daily life activities through the technique of homework.

4. Results of the Fourth Hypothesis:

The fourth hypothesis stipulates that " The program will significantly improve executive functions skills scores in the experimental group in post-measurements compared to pre-measurements."

To verify the validity of this hypothesis, the researchers used the non-parametric Wilcoxon test and Z value to measure the differences between two related groups in order to calculate the significance of the differences between the mean ranks of the experimental group's scores in the pre- and post-measurements.

The researchers also calculated the mean, standard deviation, and effect size for the pre- and post-measurements of the experimental group in executive functions (dimensions and total score) as shown in table 5:

Table 5 The mean, standard deviation, and effect size for the pre- and post- experimental group measurements in Executive functions

Dimensions and total score	Pre-measurement		Post-measurement		Correlation value(r)	Effect size
	mean	standard deviation	mean	SD		
Behavior inhibition	20.40	3.777	11.90	1.449	0.889	large
Cognitive flexibility	16.30	2.452	9.50	0.850	0.898	large
Emotional control	19.80	4.392	11.00	1.633	0.887	large
Initiation	16.70	2.627	10.70	1.337	0.888	large
Working memory	21.40	3.836	13.00	1.491	0.889	large
Planning	25.00	3.197	14.30	2.406	0.889	large
Arranging and organizing tools	11.20	1.398	8.40	0.966	0.894	large
Self-monitoring	17.90	4.483	9.90	1.197	0.888	large
Total marks	148.70	13.841	88.70	3.831	0.887	large

As shown in Table 5, the experimental group's Post-measurement scores outperformed the pre-measurement scores in all executive functions, with significant differences noted in executive functions skills ($p < .01$). This result confirms the fourth hypothesis.

The results also showed that all means of the experimental group in the post-measurement are lower than in the pre-measurement. That lower scores and means indicate a lower level of deficiency in executive functions, which indicates an effect of the cognitive-behavioral program used in the current study in reducing executive functional skill deficiencies and improved those skills in the experimental study sample.

As shown in table 5 Cohen's r was calculated to determine the effect size of the program used in the

current study indicating a large effect (ranging from 0.887 to 0.898) in reducing deficiencies in executive functions and improving them in educable intellectually disabled adolescents. This increases confidence in the effectiveness of the program used in the current study.

The results of the fourth hypothesis are consistent with Ringenbach, Holzapfel, Mulvey, Jimenez, Benson, & Richter, (2016) which showed the effectiveness of the training program in improving executive functions related to reaction time, response inhibition, and improvement in the ability to switch between tasks, in addition to improving fluency in linguistic significance among intellectually disabled adolescents and adults with Down Syndrome. Additionally, Al-Ateeq and Abu Zaid (2018) highlighted the effectiveness of the cognitive program in improving executive functions among people with moderate intellectual disability.

The significant improvements in the experimental group suggest that cognitive-behavioral interventions can effectively enhance executive functions in intellectually disabled adolescents, potentially facilitating better social integration.

The researchers interpreted the improved scores in executive functions of the experimental group members by the positive impact of the Cognitive-Behavioral Program used in the current study. The experimental group members participation in the program sessions helps benefiting from the techniques and strategies used, and the various activities that the program used to increase students' interaction with each other during the program sessions. This sort of interaction improves their executive function skills, such as initiating conversation, asking for help when needed, analyzing the task and identifying the steps to complete it, and changing appropriate alternatives to solve problems, whether individually or in groups, improving the skills of behavior inhibition, self-monitoring, and correcting mistakes. While performing the activity to avoid getting a violation, and the desire to obtain material and moral reinforcement. In addition, students benefit from improved executive function skills during the program sessions and outside of school in social environment during daily life activities through the technique of homework.

Results of the Fifth Hypothesis:

It stipulates that "There are no significant differences between the experimental group's scores in functional language skills in the post and sequential measurements." To verify the validity of this hypothesis, the researchers used the non-parametric test (*Wilcoxon*) and *z* value to measure the differences between two related groups in order to calculate the significance of the differences between the mean ranks of the experimental group's scores in the post and sequential measurements (two months after the post-measurement) on the linguistic functional language skills observation list.

The researchers also calculated the mean and standard deviations for the post and sequential measurements for

the experimental group functional language skills observation checklist (dimensions and total score) as manifested in table 6 :

Table 6 The mean and standard deviations for the post and sequential Measurements for the experimental group in functional language skills (dimensions and total score) (n=10)

Dimensions and total score	Post-measurement		Sequential measurement	
	mean	standard deviation	mean	standard deviation
Functional listening	29.90	1.663	29.70	1.337
Functional speaking	26.40	2.221	26.50	1.716
Functional reading	15.30	0.675	15.30	0.483
Functional writing	13.60	1.174	13.50	1.179
Total marks	85.20	3.393	85.45	2.945

The results of the fifth hypothesis showed that there are no statistically significant differences between the mean scores of the experimental group in post and sequential measurements in functional language skills. This result indicates the continued positive impact of the cognitive-behavioral program used in the current study in developing functional language skills. As a result, the fifth hypothesis is confirmed.

Abdel Rahim, Al-Sheikh, and Nasser(2011) are consistent with the study results in terms of the impact of a behavioral program in developing language skills of among the educable intellectually disabled adolescents. These skills are discrimination, understanding, linguistic communication, and verbal expression. It is also consistent with Abed (2019) in terms of the effectiveness of the training program in improving language skills in intellectually disabled children. The study indicated the effectiveness of modeling technique (video modeling), that video modeling helped children practice the target skills and behavior correctly. Video modeling has the advantage of being more controlled than live modeling, as distractions in the environment surrounding the child can be removed.

Also, (Baqoush ,2022; and Al-Halafawi , 2022), go in line with the study in terms of the effectiveness of cognitive-behavioral program in developing receptive and expressive language skills in children with intellectual disabilities. The result of the fifth hypothesis also agrees with the study of Salem, Al-Tahawy, and Aliwa (2023), which recommended the importance of improving listening skills through functional topics from real everyday activities.

6. Results of the sixth hypothesis:

It stated that "There are no significant differences between the experimental group's scores in executive functions in the post and sequential measurements."

To verify the validity of this hypothesis, the researchers used the non-parametric test (*Wilcoxon*) and *Z* value to

measure the differences between two related groups in order to calculate the significance of differences between the mean ranks of the experimental group's scores in executive functions in post- and sequential measurements (two months after the post-measurement).

The researchers also calculated the mean and standard deviation for the post and sequential measurements for the experimental group in executive functions as shown in table 7:

Table 7 the mean and standard deviation for the post and sequential measurements for the experimental group in executive functions rating scale (n=10)

Dimensions and total score	Post-measurement		Sequential measurement	
	mean	standard deviation	mean	standard deviation
Behavior inhibition	11.90	1.449	12.00	1.414
Cognitive flexibility	9.50	0.850	9.60	0.843
Emotional control	11.00	1.633	11.10	1.524
initiation	10.70	1.337	10.70	1.252
Working memory	13.00	1.491	12.80	1.229
Planning	14.30	2.406	14.30	2.406
Arranging and organizing tools	8.40	0.966	8.40	0.699
Self-monitoring	9.90	1.197	9.90	0.994
Total score	88.70	3.831	88.80	3.615

Results of the sixth hypothesis showed that differences between the mean scores of the experimental group in the post and sequential measurements (two months after the post-measurement) in executive functions are not statistically significant. This indicates the continued positive impact of the cognitive-behavioral program in developing functional language skills and executive functions in educable intellectually disabled adolescents. As a result, the sixth hypothesis is confirmed.

This result is consistent with Kirk, Gray, Riby, & Cornish, (2015), that some important considerations must be taken into account when designing cognitive training programs to improve executive functions, including the number of repeating training, especially in the field of working memory, and the average duration of the training session that should be no more than 40 minutes, as it is difficult to expect individuals with intellectual disabilities who have attention difficulties to maintain their attention for more than 40 minutes. This result is also consistent with (Ringenbach et al, 2016; Al-Ateeq and Abu Zaid ,2018; and Madi ,2022) in terms of the effectiveness of cognitive training in improving executive functions in students with intellectual disabilities.

Conclusion:

The aim of the current study was to identify the manifestations of deficiencies in both functional language skills and executive functions among the educable intellectually disabled

adolescents, and to reduce the severity of deficiencies in these skills among the main study sample, through intervention with a training program based on the cognitive-behavioral approach. In addition to verifying the effectiveness of the program, and the extent of the continued effect of the program on the main study sample two months later after its implementation. The researcher recommends raising awareness among parents, teachers, and specialists about the necessity of intervention to develop the executive functions of educable intellectually disabled individuals early in childhood, because of their importance and impact in the following stages of development, on all their interactions in various daily life situations. The researchers also recommended studying daily life skills that are related to specific executive functions, to design and form different strategies and activities to help improve them among normal and special needs individuals. In addition to developing training programs and educational activities to develop functional language skills among intellectually disabled individuals, according to their different stages of development, and what they need in daily life situations.

Ethical Approval Declaration

"All procedures involving human participants in this study were conducted in accordance with the ethical standards set by applicable research guidelines and the principles of the 1964 Declaration of Helsinki and its subsequent amendments. Ethical approval was secured before the commencement of data collection."

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Data availability:-

The datasets generated and analysed during the current study will be available from the author upon reasonable request.

Consent for publication:-

I hereby provide consent for the publication of the manuscript detailed above.

Competing interests:-

The authors declare no competing interests

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