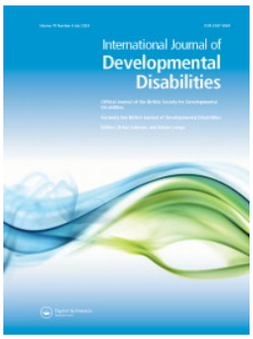

International Journal of Developmental Disabilities

ISSN: (Print) (Online) Journal homepage: www.tandfonline.com/journals/yjdd20

The effectiveness of a training program based on the assessment of basic language and learning skills- revised tool 'ABLLS-R' in reducing stereotyped behaviors among children with autism spectrum disorder

Muhammad Rababa & Samer Ayasrah

To cite this article: Muhammad Rababa & Samer Ayasrah (18 Jul 2024): The effectiveness of a training program based on the assessment of basic language and learning skills- revised tool 'ABLLS-R' in reducing stereotyped behaviors among children with autism spectrum disorder, International Journal of Developmental Disabilities, DOI: 10.1080/20473869.2024.2380942

To link to this article: https://doi.org/10.1080/20473869.2024.2380942

Published online: 18 Jul 2024.

INTERNATIONAL JOURNAL OF DEVELOPMENTAL DISABILITIES
https://doi.org/10.1080/20473869.2024.2380942

Taylor & Francis
Taylor & Francis Group

The effectiveness of a training program based on the assessment of basic language and learning skills- revised tool 'ABLLS-R' in reducing stereotyped behaviors among children with autism spectrum disorder

Muhammad Rababa and Samer Ayasrah

Faculty of Educational and Psychological Sciences, Amman Arab University, Amman, Jordan

ABSTRACT

This study investigates the efficiency of a developed training program based on ABLLS-R in reducing stereotypical behaviors among children with autism spectrum disorder (ASD). The experimental approach is employed specifically the single experimental group. The study population consists of 7 children with simple ASD. A measuring stereotypical behaviors was developed which includes two dimensions (motor stereotypical and routine stereotypical behaviors), in addition, a training program based on the ABLLS-R is developed. The findings reveal statistically significant differences between the pre and post treatment of stereotypical behaviors among Jordanian children with ASD in favor of the post-treatment in terms of motor stereotypical behaviors and Routine stereotypical behaviors. The findings indicate that there is an impact and a direct effect on lessen stereotypical motor and routine behaviors among Children with ASD improvement rate (66.6%).

ARTICLE HISTORY
Received 3 April 2024
Accepted 8 July 2024

KEYWORDS
Autism; ABLLS tool; stereotypical and motor behaviors

Introduction

Autism spectrum disorder (ASD) is considered as one of the developmental disorders with 12% yearly prevalence rate, as one out of every 35 children diagnosed with ASD (Lurie Center for Autism 2023). Moreover, ASD does not attached to a specific social group or geographical region rather it is a social disorder that affects a wide range of different social groups, particularly youngsters. This disorder affects mainly communication and behavior as it is detected before the age of three. It may last to the rest of a person's life, but symptoms may improve with time (Center for Disease Control and Prevention 2022).

Children with ASD usually do not reply when calling them by their names, thus Children with ASD encounter difficulty interacting with others and communicating effectively. Children with ASD do not like to be hugged and they prefer to play alone by isolating themselves in their own universe. They lack facial expressions and do not make eye contact. Some Children with ASD might no longer be able to pronounce words and sentences correctly, struggle to initiate conversations, and have trouble naming objects. Their speech has an irregular tone or rhythm and may sound monotonous or as if speaking in an automated way, repeating words or phrases without understanding how to use them (Thapar and Rutter 2020; Almandil et al. 2019; Bai et al. 2019; Goin-Kochel et al. 2020; Kodak and Bergmann 2020; Shkokani and Al-Smadi 2018; American Psychiatry Association 2022; Nadeem et al. 2021).

The most prevalent behaviors among Children with ASD are stereotypical behavior that is characterized by repetitive body movements (shaking, gazing), flapping hands, repetitive sounds and forward and backward head movement. To elicit that these stereotypical activities are considered repetitive, non-functional, and self-stimulating (Ghoniem 2021; Aliwa, Mohamed, and Hassan 2020).

Keller et al. (2021) & Péter, Oliphan, and Fernandez (2017) defined stereotypical behaviors (known as motor stereotyping or stereotypical movement disorder) as a neurological condition that is characterized by uncontrollable and repetitive body movements. These repetitive behaviors may occur throughout the day for a few seconds or several minutes. Moreover, stereotypical movements are frequently rhythmic, steady and aimless which appear in case of excitement, exhaustion, tension, and boredom. The stereotypical movements are noticeable among

CONTACT Samer Ayasrah s.ayasrah@aau.edu.jo Faculty of Educational and Psychological Sciences, Amman Arab University, Irbid-Idoun district, Jordan

Children with ASD aged 3–4 years and may continue into adulthood.

Children with ASD are frequently engaged with repetitive vocal and physical stereotypical behaviors. For example, Children with ASD, who use echolocation, repeat words or phrases heard in the past or lately when attempting to interact with others. This can develop into stereotypical vocal mannerisms. As for kinetic behaviors, they can be in the form of hand flapping, body shaking, or moving fingers in front of the face so these movements may differentiate Children with ASD from their peers. In addition, head nod and repetitive body movements to express 'yes' or 'no' can be more complex, such movements include head up-and-down, side-to-side or even shoulder to shoulder. Head nods and movements may also be accompanied by eye gazing or coordinated hands or feet movements (Kodak and Bergmann 2020; Abu Halima and Al-Rahmanah 2020; Treweek et al. 2019; Wood and Freeth 2016).

Stereotypical behaviors have a negative impact on Children with ASD as they hinder their learning opportunities. Children with high level of stereotypical behaviors face difficulties in learning simple tasks and skills because they concentrate on body stereotypical movements that distract their attention for thinking and learning. Moreover, some stereotypical behaviors increase the risk of harming themselves, such as hitting their heads or biting with painless feeling that may lead to serious injury unless someone interferes. In addition, excessive amount of stereotypical behaviors may distract the communication with Children with ASD as they are preoccupied with their stereotypical behaviors which may result in social isolation or mental health problems in severe cases. (Lin et al. 2023; Ghoniem 2021; Li et al. 2020; Ghazali, Sakip, and Samsuddin 2018; Liu, Fedak, and Hamilton 2015).

Behavioral therapy training programs for Children with ASD reveal progress due to communication and interaction skills as well as lessen unwanted stereotypical behaviors (Salem 2022; Shtayyat and Al-Owaidi 2018). ABLLS-R (a skills-based system of assessment curriculum and a tracking system that addresses language and functional skills of an individual with autism and other developmental delays) is considered one of the most significant training programs which aims to develop fundamental skills among ASD kids. ABLLS-R includes many tasks that are necessary for successful communication and learning such as: domains of independence, basic learning skills, academic skills, and the domain of motor skills. ABLLS-R is an integrated method of assessing and presenting skills based on a child's needs. It tracks the skills of children who suffer from language and learning difficulties. It includes a range of skills that are spread over different areas designated for Children with ASD in a manner that addresses all facets of language acquisition and use (Bolkanater and Zaarour 2022; Ghonimi, Ismail, and Abdel Nabi 2020).

ABLLS-R covers 544 skills distributed on 25 areas (Partington 2010). Moreover, ABLLS-R is commonly used with Children with ASD with developmental disabilities or anyone with delay in basic communication or life skills. ABLLS-R aims to evaluate and pinpoint language, communication, academic learning, self-help, and motor skills with a focus on fundamental linguistic and functional abilities. Moreover, ABLLS-R aims to help, identify and prioritize the educational goals of each Children with ASD.

ABLLS-R determines the child's current skills, the level of acquisition, and continuous development, which is conducted by specialist who observes the behavior in 25 areas and provides an incentive to evaluate the skills based on what is or isn't done. In addition, input from parents and other coaches is taken into consideration (Nouriya 2022; Mahmoud 2021; Ovsyannikova et al. 2018).

ABLLS-R is preferred to be used with Children with ASD aged 3–9 years as a reference and a guide to curricula and individual plans. In addition, it can also be used to evaluate kids every (6–12) months. By analyzing the ongoing evaluation, specialists and parents can identify the encountering challenges in learning new skills. The (25) areas are divided into four main domains: Basic skills for learning with (15) areas, Academic skills with (4) areas, self-care skills with (4) areas, and motor skills with two areas. ABLLS-R helps in developing individual curricula with concrete and actionable educational goals. It is a great resource for determining the level of student performance, areas of teaching, and future goals. Moreover, it provides a variety of environmental stimuli (verbal and non-verbal) (Fahmy 2022; Bolkanater and Zaarour 2022; Partington, Bailey, and Partington 2018; Rispoli 2013)

Literature review

In this section, a review of studies that focused on (autism, stereotypical behaviors, and the ABLLS-R) is presented with more focus on Arab studies. Furthermore, to the best knowledge of the researcher, Arab studies that are in alignment with this research

goal of reducing stereotypical behaviors among Children with ASD with the ABLLS-R may be seldom.

Bolkanater and Zaarour (2022) conducted a study to identify the effectiveness of the ABLLS-R Language Assessment and Learning Skills Program in developing basic skills among Children with ASD in Algeria. Rawi and Hassanein (2022) tried to identify the effectiveness of a program based on the assessment of ABLLS-R for developing the motor-sensory cognitive abilities and its effect on reducing impulsivity in children with Asperger syndrome in Egypt while Karima and Abdel-Bary (2020) conducted a study to determine the efficacy of a redesigned ABLLS-R program for developing receptive language in young Egyptian children with language delays.

Bouregaa (2019) aims to demonstrate the effectiveness of a training program derived from the ABLLS-R program in developing verbal communication for Children with ASD in Algeria. Moreover, Shtayyat and Al-Owaidi (2018) conducted a study to demonstrate the effectiveness of assessing linguistic and educational skills program. The researchers employed ABLLS-R in improving basic skills for Jordanian children with ASD.

Significance of the study

This study highlights the most common stereotypical behaviors in order to find the best programs for adjusting the stereotypical behaviors that corporate in reducing such behaviors. This study is significant as it provides critical indicators about the training programs related to Children with ASD. In addition, this study will provide insights for special education educators and parents to benefit from the training program applied in this study to reduce or stop the stereotypical behaviors among Children with ASD and enhance their abilities to communicate, activate and express their needs in a proper way. Eventually, this study will encourage other scholars to develop other training programs that help in enhancing different skills among Children with ASD such as: language, communication skills, reducing stereotypical behaviors based on ABLLS-R.

Problem statements

It is assumed that the majority of Children with ASD exhibit stereotypical behaviors that appear as immersion or complete absorption in a particular behavior or several behaviors at the same frequency by repeating them at unusual rates according to the Diagnostic and Statistical Manual of Mental Diseases IV (DSM-4). In addition, performing non-functional routine rituals and useless body movements such as spinning, jumping, moving the hands randomly, and being attached to objects and tools for prolonged periods of time, as the child cannot be forced to abandon these behaviors except under coercion. As a result of stereotypical behaviors, Children with ASD are unable to obtain the necessary learning and to acquire the skills and behaviors due to distracting attention resulted in limiting their ability to interact and communicate with others which slow the development of their language. Inability to integrate into the surrounding environment is due to stereotypical behavior.

Furthermore, stereotypical behaviors hinder Children with ASD from engaging in daily activities which make their lives more difficult. To this point, it is necessary to develop a training program designed for improving the basic skills among Children with ASD in order to reduce their stereotypical behaviors by employing the ABLLS-R, which is a skills-based system of assessment curriculum and a tracking system that addresses language and functional skills of an individual with autism and other developmental delays in Children with ASD. To this point, the problem of the study is framed in the following main question: How effective can a training program based on the ABLLS-R reduce stereotypical behaviors in Children with ASD?

Study hypothesis

H1: There is a statistically significant effect of a training program based on ABLLS-R in reducing stereotypical behaviors (Motor stereotypical behaviors and Routine stereotypical behaviors) in Children with ASD.

Methodology

Study design

The experimental approach is employed specifically the single experimental group. This experimental approach designated to examine the effectiveness of a training program based on ABLLS-R in reducing stereotypical behaviors in Jordan. While the training program represented (independent value) and stereotypical behaviors are considered as (dependent value). The following chart represents the study design:

$$E_G\ O_1\ X\ O_2$$

AS

E_G	Single experimental group.
O_1	Pre-test for stereotypical behaviors and their domains among Children with ASD.
X	Treatment (a training program based on ABLLS-R).
O_2	Post-test for stereotypical behaviors and their domains among Children with ASD.

Due to the existing challenges in splitting Children with ASD into two groups with similar characteristics, the experimental approach is chosen.

Sample design

Participants in the study were subjected to the pre-stereotypical behavior scale and post-stereotypical behavior scale before and after the implementation of the program. Seven Children with ASD were selected as a planned sample. They are registered at the Pediatric Neurology and Brain Physiology Clinic in Amman- capital of Jordan. The Children with ASD ages range from 5 to 6 years during 2022/2023. Every child exhibits stereotypical conduct that is noticeable by parents or the case manager. In addition, the study sample was subjected to the (CARS-2) scale to assess their degree of autism due to the trusted validity and stability of the scale in Arab and Jordan environment. In addition, Numerous studies have also recommended this scale (Mohammad 2021; EL-Hawary and Belmihoub 2020; Al-Sqour and Zaza 2016; Al-Daman and Tall 2013). Table 1 shows the scores of Children with ASD on (CARS-2) scale, and their degree of autism.

As noticed from Table 1, every child obtains scores between 31 and 37 which indicates that they all have ASD at the basic level.

Building and implementing the study

This study employed the training program developed from ABLLS-R and the stereotypical behavior scale.

Table 1. The scores of the children on CARS-2 scale and degree of autism.

Name	Child mark on the scale	level of autism score
M	31	Simple
L	35.5	Simple
LE	33	Simple
E	37	Simple
EW	31	Simple
MH	36.5	Simple
A	34.5	Simple

Stereotypical behavior scale

To prepare the stereotypical behavior scale, a number of scales related to stereotypical behaviors were examined, including: Al-Bahnasawi and Abdel-Khalek 2020; Al-Mutairi, Hadeh, and Al-Behairy 2019; Al-Habashi and Al-Aqraa 2017; Siddig and Molokhia 2015. After careful review of these scales, a scale was developed relying on stereotypical behavior scale published by Al-Habashi and Al-Aqraa (2017) as it is compatible with these study objectives. The final draft of the scale is composed of 27 dimensions after adding two dimensions. There are ten paragraphs and typical motor behaviors in the first added dimension. The second dimension is composed of common stereotypical behaviors which include seventeen elements.

Reliability and stability of scale used. The scale is attested according to how well its words and meanings are expressed in the paragraphs with correspondence to its dimensions in the study. As part of this process, specialists in special education and educational psychology revised specific statements to demonstrate that the suggested items were appropriate for the test. In order to determine the association between each paragraph's degrees and the field to which it belongs as well as between the paragraph and the scale's overall score. The researchers also calculated the values of (Person Correlation) coefficients by exposing the exploratory sample to the scale as this sample is not included in the study, as shown in Table 2.

As noticed from Table 2, all the values of the Pearson correlation coefficients between the Items and the dimension to which they belong ranged between (0.683–0.972) while the values of the correlation coefficients between the Items and the scale as a whole ranged between (0.781–0.951). All values were high and statistically significant at the significance level ($\alpha \leq 0.05$). This indicates the strength of the internal consistency between the paragraphs of the scale. In addition, the stability of the internal consistency of the scale and its dimensions were verified among the sample using Cronbach Alpha. Table 3 illustrates that.

Table 3 indicates that by using the Cronbach alpha equation, the stability of the internal consistency of the stereotypical behavior scale as a whole is (0.986). In addition, the Motor stereotypical behaviors dimension's score is (0.967) and it reached (0.980) for the field of Routine stereotypical behaviors. these values indicate the stability and accuracy of the results when

Table 2. (Person Correlation) coefficient values between the items, the dimension to which they belong, and the scale as a whole.

The dimension and items	Items correlation coefficient with dimension	Items correlation coefficient with scale
Motor stereotypical behaviors		
1	0.931*	0.927*
2	0.851*	0.833*
3	0.947*	0.912*
4	0.863*	0.781*
5	0.947*	0.912*
6	0.683*	0.781*
7	0.947*	0.912*
8	0.851*	0.833*
9	0.813*	0.888*
10	0.947*	0.912*
Routine stereotypical behaviors		
11	0.882*	0.794*
12	0.927*	0.888*
13	0.882*	0.794*
14	0.927*	0.888*
15	0.927*	0.888*
16	0.882*	0.794*
17	0.834*	0.912**
18	0.923*	0.941*
19	0.910*	0.951*
20	0.834*	0.912*
21	0.875*	0.901*
22	0.927*	0.888*
23	0.875*	0.901*
24	0.882*	0.794*
25	0.882*	0.794*
26	0.972*	0.888*
27	0.822*	0.794*

Significant statistically ($\alpha \leq 0.05$).

Table 3. Cronbach's alpha stability coefficients for the stereotypical behavior scale.

Scale dimensions	Cronbach's alpha	The items
Motor stereotypical behaviors	0.967	10
Routine stereotypical behaviors	0.980	17
Total	0.986	27

Table 4. The estimation of severity of stereotypical behavior according to the arithmetic mean.

Level	Mean
low	1–2.33
moderate	3.67–2.34
High	5.00–3.68

applying the scale. This indicates that the study scale is stable as Vaske, Beaman, and Carly (2017) recommended if the Cronbach's alpha exceeds 70%, the test achieves the stability requirements, the validity of scale, and the reliability of data.

Correction of the stereotypical behavior scale. Upon the validity of this study scale, the final form of the scale is composed of 27 items. The questionnaire is answered on a 5- Likert scale. To estimate the degree of severity and strength of the child's stereotypical behaviors, the alternatives are given weights ranging from (1–5) as follows: always 5 degrees, often 4 degrees, sometimes 3 degrees, rarely 2 degrees, and never (1) a degree. The list was corrected by giving the child an estimation on each paragraph of the scale by choosing one of the five alternatives, and thus the degree of severity of stereotypical behavior can be judged, by adopting the statistical criterion according to the following equation:

$$\frac{\text{Upper limit of scale} - \text{Minimum scale}}{\text{Number of categories}} \frac{5-1}{3} = \frac{4}{3} = 1.33$$

(1.33): represents the amount of transition from one category to another.

Thus, the estimation of severity of stereotypical behavior is divided into three levels, as shown in Table 4.

(ABLLS-R) based training program. To reduce stereotypical behaviors in Children with ASD, a training program based on the Assessment of Basic Language and Learning Skills-Revised (ABLLS-R) is developed. The program consists of the following main skills and sub-skills:

1. Motor imitation:
   a. Motor imitation using objects.
   b. Motor imitation of significant actions aided by verbal cues.

2. Receptive language:
   a. Responding when the children are called by their name.
   b. Following directions for an enjoyable activity while they are in a different location.
3. Request:
   a. A childish request.
   b. A request reinforced by help
4. Recreational play abilities:
   a. Playing game independently with verbal-integrated games.
5. Social engagement:
   a. Approaching and sharing one's interests and games with others.
   b. Adhering to straightforward instructions.
6. The everyday routine in the classroom:
   a. Following daily routine.
7. Cooperative behavior and boosting efficiency:
   a. Waiting for instructions without interacting with the tools in front of them.
8. Response generalization:
   a. Generalization based on similar stimuli.
   b. Generalization based on various environmental

Table 5 illustrates an overview of the major eight areas of the training program, the sub-skills and their symbols, as well as an explanation of the function and name of each skill

Intense behavioral therapy serves as theoretical base underpinning ABLLS-R-based training program (Malkin et al. 2017). It is used to enhance the fundamental abilities of Children with ASD through training, repetition, and appropriate indoctrination. Numerous tasks are required for effective communication while learning are included in the application. The program's main objective is to improve the skills and abilities of Children with ASD to interact, communicate, play cooperatively, express needs verbally and request rewards, imitate movements, adhere to instructions, pay attention, lessen their level of distraction, and display stereotypical behaviors.

The most important foundations on which the researchers relied in designing the program:

1. Relying on the developed ABLLS-R scale and choosing the appropriate skills to achieve the goal of the program, which is to reduce stereotypical behaviors.
2. Taking into consideration the individual differences between Children with ASD and the characteristics of each child, his/her needs, tendencies, abilities, strengths and weaknesses.
3. Taking into consideration the developmental characteristics of the Children with ASD participated in this study.
4. Designing flexible program to be applied easily and choosing different elements according to the needs and characteristics of each Children with ASD.
5. Using materials and moral reinforces and stimuli that are childish in nature.
6. Using safe tools and means to be used by Children with ASD.
7. Providing wisely stimuli and reinforces in a way that makes the Children with ASD value them.
8. Applying tasks and activities gradually from the easiest to the most difficult and from tangible to abstract.
9. Preparing the training location such as: ventilation, lighting, avoiding noise and distractions, places for children to sit, and appropriate tools and means to implement activities and tasks.
10. Relying on tools that promote more effective results such as color, models and images.

General description of the application of the program. The program is implemented over a period of three months with three sessions per a week. The number of training sessions reached 36 for each individual child, and the period of each training session is 45 min. The sessions are divided into two stages, namely the introductory and familiarization stage, and the reduction stage. Table 6 illustrates the description of the program.

Validity of training program content. The validity of the training program is attested through a jury of experts specialized in the fields of special education, measurement, and evaluation. The experts are working in Jordanian and Arab universities. Their inquiries are solicited regarding the program's goals, the number of sessions, sessions titles, the application procedures, the length and content of the sessions, as well as any observations and amendments that may be proposed.

Findings and discussion

A detailed discussion of the study findings based on answering the hypothesis of the study, which is: H1: *There is a statistically significant effect between a training program based on ABLLS-R in reducing undesired stereotypical behaviors (Motor stereotypical behaviors and Routine stereotypical behaviors) among*

Table 5. The main areas and sub-skills covered by the developed training program.

Field	Skill symbol	Skill's name	The aim of the skill	Examples
A- Cooperative behavior and boosting efficiency.	A8	Waiting for instructions without interacting with the tools in front of children	The children waits quietly, keeping their hands away from the tools, until the teacher gives them the required instructions.	The children remains calm with their hands on the table in front of them without touching the tools and waits until they are asked to perform a task.
C- Receptive language.	C1	Responding when the children are called by their names.	The children will look or come to the person who calls their names.	When the teacher calls the children, 'Ya …. (by name), the children respond and look at the teacher with their eyes.
	C6	Following directions for an enjoyable activity while they are in a different location.	The children will follow instructions to do a fun activity even if it is not happening at that time or place.	While the children are in the classroom, they follow instructions to go and play on the trampoline, and they follow instructions to play or jump inside the classroom, etc.
D- Motor imitation.	D1	Motor imitation using objects.	The child will imitate a motor activity using an object when asked to do it	Pretending to drink from a cup, rolling a toy wheel down a slope.
	D3	Motor imitation of significant actions aided by verbal cues.	The child will imitate major movements when provided with verbal stimuli when asked to do so.	Jumping, clapping hands and waving
F-Request.	F1	Childish request.	The children are able to identify the things and activities they want by pointing, attracting, or standing next to them when they are unable to use words or sign language.	In the presence of the apple, the teacher says, 'What do you want?' The children request in any way as long as they targets the apple.
	F2	A request reinforced by help	The children ask for what they want when the reinforce is available or when getting help by imitating the word, sign language, or giving them the picture.	In the presence of an apple, the teacher says, 'What do you want?' (Apple). The child says apple, makes a descriptive gesture for the apple, or show a picture of an apple.
K- Recreational play abilities.	K6	Playing game independently with verbal-integrated games.	The child makes appropriate verbal responses while playing.	The child drives a car saying: Beep … Beep Watch out, I'm fast.
L- Social engagement.	L6	Approaching and sharing one's interests and games with others.	The child will approach others and try to participate in their activities and games even when they do not have a reinforce.	The child approaches a group of children playing with cubes and plays with them.
	L8	Adhering to straightforward instructions	The child will be able to follow simple instructions given by another person.	Come here …. turn around … Stand … Sit …
N- The everyday routine in the classroom.	N1	Following daily routine	The child will independently follow a daily routine in the classroom.	Bringing food, hanging up a coat, putting away personal items.
P- Response generalization.	P1	Generalization based on similar stimuli.	The children will use skills learned with one object and make the same response with items similar to that object.	The children practice naming the word 'cup' on a brown cup, as well, the children name the word 'cup' on a green, yellow, or striped cup.
	P3	Generalization based on various environments	The children will be able to use the skills acquired in training situations in other situations.	The child learns to name the word 'cup' at school and can then name it at home.

Table 6. General application procedures.

Step	Process	Description
1	Problem Identification	Identifying the problem of the study, which is the majority of Children with ASD have undesired stereotypical behaviors.
2	Literature Review	Reviewing previous studies, research, and theoretical literature related to the subject of Children with ASD, stereotypical behaviors, and the ABLLS-R.
3	ABLLS-R Review	Reviewing the ABLLS-R and the most important skills included in it. .
4	Sample Determination	Determining the study sample to be 7 Children with ASD.
5	Baseline Assessment	Applying the CARS scale on the study sample to verify the homogeneity of the sample.
6	Program Design	Designing the training program based on the ABLLS-R and identifying the main skills and sub-skills.
7	Validity Check	Verifying the validity of the content of the training program based on the ABLLS-R.
8	Behavior Measure Development	Developing a scale for undesired stereotypical behaviors.
9	Psychometric Assessment	Verifying the psychometric properties of the Stereotypical Behaviors Scale.
10	Preliminary Scale Application	Applying the developed stereotypical behavior scale on the study sample.
11	Training Program Application	Applying the training program on the study sample through individual training sessions.
12	Post-Assessment.	Applying the post-stereotypical behavior scale on the study sample.
13	Data Collection and Analysis.	Collecting, coding data and performing appropriate statistical treatments.
14	Results and Recommendations.	Extracting the results, discussing findings, and presenting recommendations in light of the findings.

Table 7. Arithmetic averages and standard deviations for pre- and post-measurements of stereotypical behaviors.

Scale dimension's	Scale	Items	Mean	Standard deviation
Motor stereotypical behaviors	Pre	7	3.83	0.53
	post	7	1.30	0.29
Routine stereotypical behaviors	pre	7	3.96	0.52
	post	7	1.32	0.34
total	pre	7	3.89	0.55
	post	7	1.30	0.31

Children with ASD. For pre- and post-measurements of stereotypical behaviors in Jordanian children with ASD, arithmetic averages and standard deviations are determined with its both components Stereotypical Motor Behaviors and Stereotypical Routine Behaviors. Table 7 illustrates arithmetic Averages and Standard Deviations for Pre- and Post-Measurements of Stereotypical Behaviors.

Table 7 indicates that there are significant differences between the arithmetic averages of the pre- and post-measurements of stereotypical behaviors among ASD Jordanian children. Moreover, there are significant differences between both dimensions; motor stereotypical behaviors and routine stereotypical behaviors. To find out whether these differences are statistically significant, One-way ANCOVA is used, as shown in Table 8.

The findings reveal that there are significant differences between pre- and post-measurements of stereotypical behaviors among Jordanian children with ASD at significance level of (0.000). The value of (F) for the training program found to be (72.790). The differences are in favor of the post-measurement, which had a lower arithmetic average.

Table 8 indicates that the improvement percentage resulting from the use of the ABLLS-R in reducing undesired stereotypical behaviors among Jordanian children with ASD is (0.858). According to Cohen's classification of effect size (Cohen 1977), this value found to be high. In addition, there are statistically significant differences between the pre- and post-measures for each of the two stereotypical behavior dimensions (motor stereotypical behaviors and routine stereotypical behaviors). The value of (F) for the training program's in terms of motor stereotypical behaviors dimension is 60.367 at a significance level of (0.000) and an impact size of (0.834) while the training program's component of common stereotypical behaviors has a value of 86.427 at a significant level of (0.000) and an impact size of (0.878). Table 9 illustrates the improvement percentage of post-measurement to pre-measurement.

Table 9 indicates the overall level of stereotypical behaviors among Children with ASD to be 3.89 on the pre-measurement and 1.30 on the post-measurement this indicates a decrease of stereotypical behaviors by 2.59 and an improvement rate of 66.6%. While the level of stereotypical motor behaviors among Children with ASD in the pre-measurement is (3.83) compared to the level on the post-measurement (1.30) which indicates that motor stereotypical behaviors decreased by (2.53) with an improvement rate (66%). The level of routine stereotypical behaviors among Children with ASD on the pre-scale is (3.96), while on the post-measurement found to be (1.32), which indicates that the routine stereotypical behaviors decreased by (2.64) with improvement rate (66.7%). Table (9) illustrates that Children with ASD totally exhibit stereotypical behaviors at a level of (3.89) on the pre-scale and on the post-measurement

Table 8. One-way ANCOVA analysis.

Scale dimension's	Source	Type III sum of squares	df	Mean square	F	Sig	(η^2)
Motor stereotypical behaviors	Training Program	14.201	1	14.201	60.367	.000*	0.834
	Error	2.823	12	.235			
	Total	128.470	14				
Routine stereotypical behaviors	Training Program	16.351	1	16.351	86.427	.000*	.878
	Error	2.270	12	.189			
	Total	134.686	14				
Total	Training Program	15.247	1	15.247	72.790	.000*	.858
	Error	2.514	12	.209			
	Total	131.418	14				

Significant statistically ($\alpha \leq 0.05$).

Table 9. Improvement percentage of post-measurement to pre-measurement.

	Mean		
Scale dimension's	Pre-measurements	Post-measurements	The improvement percentage
Motor stereotypical behaviors	3.83	1.30	66%
Routine stereotypical behaviors	3.96	1.32	66.7%
total	3.89	1.30	66.6%

Table 10. Pre- and post-measurements of the level of motor stereotypical behaviors for each participant.

	Mean		
No	Pre-measurements	Post-measurements	The percentage of improvement
1	4.50	2.30	49%
2	4.50	2.30	49%
3	4.10	2.00	51%
4	3.70	1.70	54%
5	3.60	1.60	56%
6	3.40	1.40	59%
7	3.00	1.40	53%

at a level of (1.30) which indicates a decrease in stereotypical behaviors of (2.59) with improvement rate (66.6%).

Table 10 indicates the findings of the pre- and post-measurements for each participant in terms of the level of stereotypical motor behaviors and the percentage of improvement.

Table 10 illustrates that the improvement rate is acceptable as child number 6 scores the highest improvement rate (59%) while the two youngest children 1 and 2 score the lowest improvement rate (49%). Figure 2 illustrates the pre- and post-measurements of each child with the individual improvement rates.

Table 11 indicates the findings of the pre- and post-measurements of Routine stereotypical behaviors level as well as the improvement rates according to post- and pre-measurements.

Table 11 illustrates that all improvement rates are in the right direction. Children 4 and 6 gain the highest improvement rates with 57% while children with numbers 1 and 2 gain the least improvement rates with 53%. Figure 3 exhibits the findings of pre- and post-measurements of typical stereotypical behavior and the percentage of improvement rates.

Table 12 indicates the total findings of pre and post measurements of stereotypical behaviors level and the percentages of improvement rates of post and pre measurement.

Table 12 illustrates that all improvement rates are positive. Child number 6 gains the highest improvement rate with 58% while children number 1&2 gain the least improvement rate with 51%. Figure 4 indicates the total findings of the pre and post measurements of stereotypical behaviors level and the improvement rates.

The findings reveal statistically significant differences between the pre and post treatment of stereotypical behaviors among Jordanian children with ASD in favor of the post-treatment in terms of motor stereotypical behaviors and Routine stereotypical behaviors. This indicates that there is an impact of the developed training program based on ABLLS-R in reducing motor stereotypical behaviors and routine stereotypical behaviors among Jordanian children with ASD. This finding resulted from the accuracy and flexibility in preparing the training program through choosing crucial skills represented by 8 competencies out of 25 ones from ABLLS-R. The developed training program found to lessen the stereotypical motor and routine

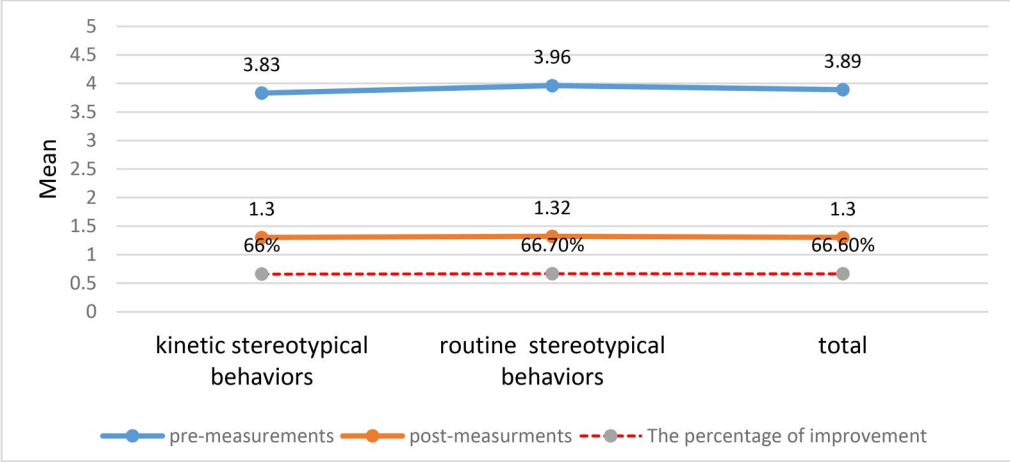

Figure 1. A graph of the pre- and post-measurements.

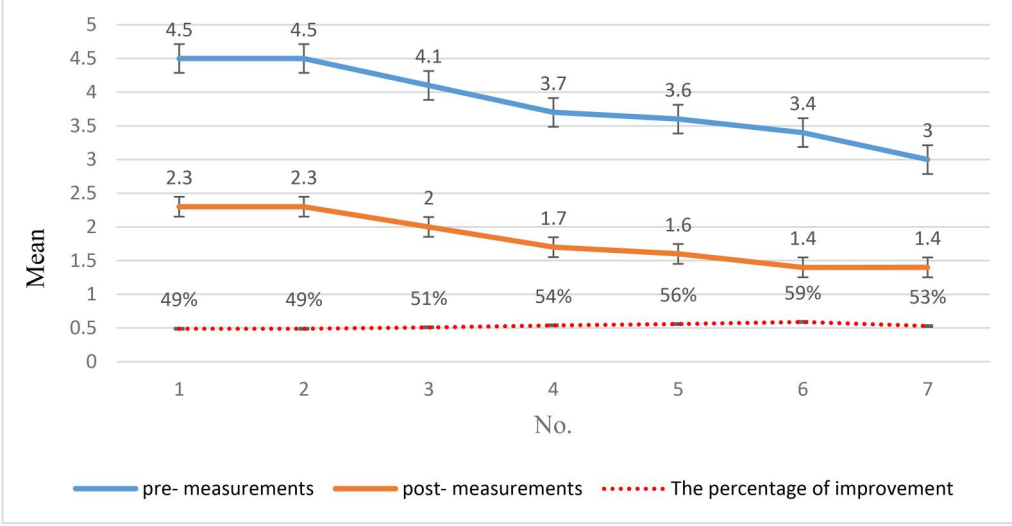

Figure 2. Pre- and post-measurements of the level of stereotypical motor behaviors and the improvement rates.

Table 11. Pre- and post-measurements of Routine stereotypical behaviors level & the rates of improvement.

	Mean		
No	Pre-measurements	Post-measurements	The percentage of improvement
1	4.59	2.18	%53
2	4.47	2.12	%53
3	4.24	1.94	%54
4	4.06	1.76	%57
5	3.71	1.65	%56
6	3.59	1.53	%57
7	3.06	1.41	%54

behaviors among Children with ASD through emphasizing increasing harmony, interactive play, the capacity for verbal expression and reinforcement requests, the capacity for imitating movements and following instructions, enhancing attention and decreasing levels of distraction in children. The findings indicate that there is an impact and a direct effect on lessen stereotypical motor and routine behaviors among Children with ASD improvement rate (66.6%).

The training program takes into consideration the gradual application of the tasks and activities from the easiest to the most difficult by relying on tools and means that promotes more effective results, such as figures and colorful pictures, and the use of physical and moral reinforces and stimuli that are childish

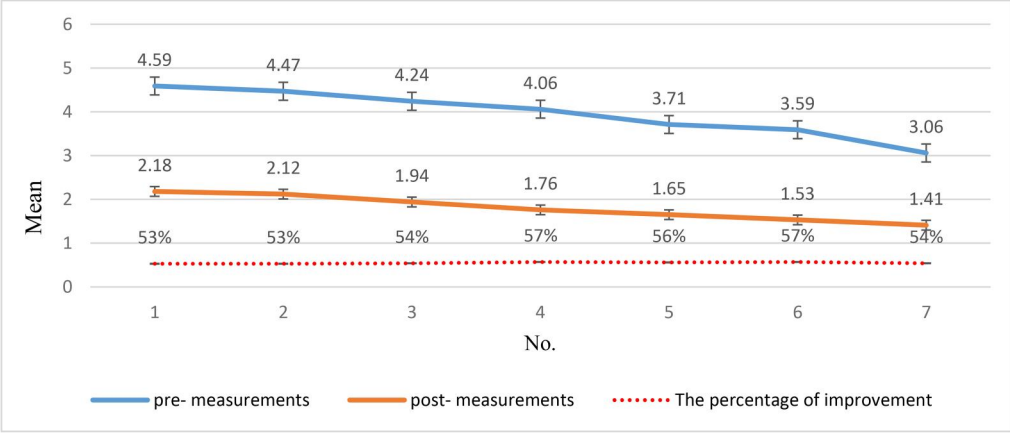

Figure 3. Pre- and post-measurements of stereotypical routine behaviors level and improvement rates.

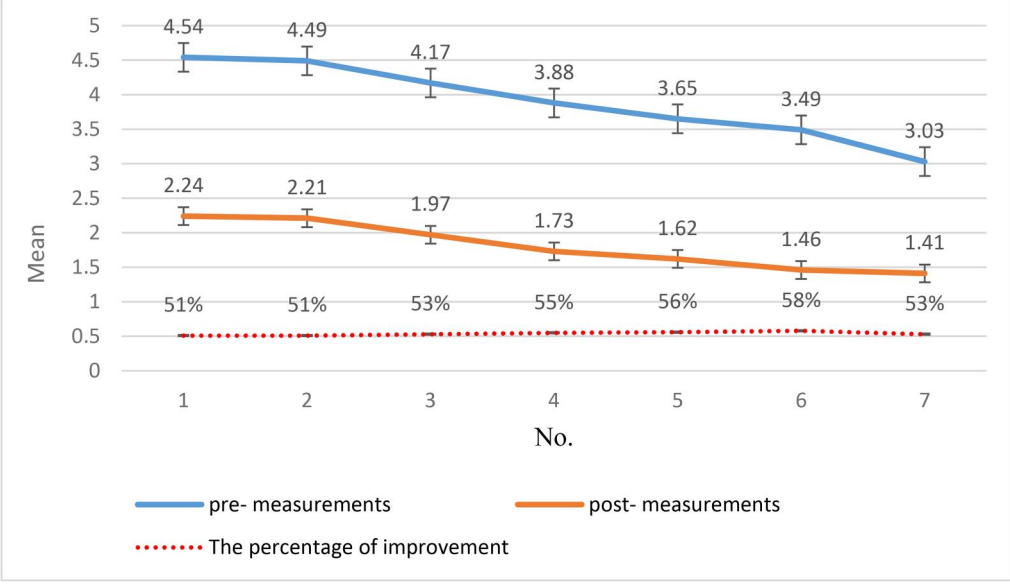

Figure 4. Results of the pre and post measurements of stereotypical behaviors level as a whole and the improvement rates.

Table 12. Pre- and post-measurements of stereotypical behaviors level as a whole the improvement rates of the post and pre measurement.

	Mean		
No	Pre-measurements	Post-measurements	The percentage of improvement
1	4.54	2.24	51%
2	4.49	2.21	51%
3	4.17	1.97	53%
4	3.88	1.73	55%
5	3.65	1.62	56%
6	3.49	1.46	58%
7	3.03	1.41	53%

in nature which attract children, and develop the level of concentration and their interaction. In addition, the findings reveal that the impact of the training program is due to selecting appropriate numbers of training sessions amounted to 36 for each child, through which appropriate indoctrination, repetition, follow-up evaluation, and training were used which resulted in developing communication and interaction skills among children leading to reduce the stereotypical behaviors. These findings are compatible with the findings of the following studies (Bolkanater and Zaarour 2022; Mohammad 2021; Azeem et al. 2020; Shtayyat and Al-Owaidi 2018; Ovsyannikova et al. 2018) which reveal the importance of ABLLS-R

training program in enhancing communication skills and the limit unwanted stereotypical behaviors among Children with ASD.

To sum, the training program based on ABLLS-R has significant positive effects on Jordanian children with ASD as it reduces the stereotypic behaviors in all dimensions which are motor stereotypical behaviors and routine stereotypical behaviors. This developed training program will positively enhance the family life, communication, social interaction, and continuous learning among children. The developed training program reduces negative behaviors such as; indulging in stereotypical behaviors and routine activities, stress and anger. The negative behaviors are reduced through training to use anger and stress control strategies and promote positive behavior.

In addition, the developed training program improve communication and social interaction through teaching basic social skills such as verbal and non-verbal communication, understanding feelings and emotions, and participating in social conversations and activities. This resulted in helping Children with ASD to build correct interactive relationships with family members and society. Ultimately, the program enhances independence among Children with ASD through making use of their abilities in daily life and becoming able to organize and manage time, and carry out daily tasks independently. It is known that training and behavior modification programs aim to improve the quality of life of Children with ASD by building a supportive and loving environment that provides the necessary support to develop their skills and abilities (Bolkanater and Zaarour 2022; Salem 2022; Ferreira et al. 2019; Shtayyat and Al-Owaidi 2018)

Conclusion and recommendations

Upon the findings of this study, it highlights the importance of the developed training program based on ABLLS-R in reducing undesired stereotypical behaviors including motor and routine behaviors among Jordanian children with ASD. The developed training program lessen the common stereotypical behaviors which leads to enhancing communication and social skills and promotes learning and adjusting skills. Some of the undesired stereotypical behaviors that the developed training program lessen are: head hitting, head and hands moving, biting, shaking, jumping, spinning and echo sound repeating.

The developed training program leads to improve the quality of Jordanian children with ASD life in short and long term. All the participants of Jordanian children with ASD show enhancement in communication skills, learning skills and decreasing in stereotypical behaviors so they become less resistance to change such as eating and drinking habits, wearing clothes, feeling more safe and comfortable and interactive with the environment.

The developed training program is considered a guide model with a practical application that contributes in a distinctive way in reducing stereotypical behaviors among Jordanian children with ASD. It is also noticeable that there is a large gap between the treatment provided to Children with ASD in the developed and the poor countries such as Jordan either in the diagnosis processes, care, rehabilitation or the integration programs, but rather goes beyond prevention and early intervention programs. This developed training program is considered the first to be applied in Jordan environment that will guide future scholars and educators to use and build on it in order to reduce the undesired stereotypical behaviors and it can be applied in special education centers for Children with ASD as it can be as individual treatment plans for Children with ASD. To conclude, current training programs based on the ABLLS-R should be developed and built to lessen stereotypical behaviors and used more extensively inside training and rehabilitation programs among Jordanian children with ASD.

It is highly recommended to depend primarily on training programs based on the ABLLS-R in care and rehabilitation programs among Children with ASD. Moreover, it is recommended to develop more training programs based on ABLLS-R taken into consideration increasing the number of competencies and the application period. Eventually, it is worthy to apply this developed program in Arab environment and compare the results with the existing one. This developed program concentrates on treating undesired stereotypical behaviors therefore future scholars are recommended to concentrate on other domains such as communication skills as the findings expected to be promising.

Disclosure statement

No potential conflict of interest was reported by the authors.

ORCID

Muhammad Rababa http://orcid.org/0009-0005-0236-7935

Samer Ayasrah http://orcid.org/0000-0002-8541-7774

Data availability statement

The data that support the findings of this study are available upon reasonable request from the corresponding author.

References

Abu Halima, A., and H. Al-Rahmanah. 2020. "The Effectiveness of a Sports Training Program Using Small Games in Improving Stereotypical Behaviors and Linguistic Communication Among a Sample of Children with Autism in Jordan." *Journal of Educational and Psychological Studies* 28 (3): 653–672. https://doi.org/10.33976/1443-028-003-031.

Al-Bahnasawi, A., and Z. Abdel-Khalek. 2020. "The Factor Structure of the Repetitive Behavior Scale-Revised (RBS-R) among a Sample of Children with Autism in the Egyptian Environment." *Journal of Education Sohag University* 69 (69): 28–61. https://doi.org/10.21608/EDUSOHAG.2020.64373.

Al-Daman, A., and S. Tall. 2013. "Developing Jordanian Version of the Childhood Autism Rating Scale (CARS)." (Thesis), Faculty of Educational and Psychological Sciences - Amman Arab University.

Al-Habashi, p., and A. Al-Aqraa. 2017. *A Measure of Stereotypical Behavior for People with Autism Spectrum*. Egypt: Anglo- Egyptian Bookshop.

Aliwa, S., S. Mohamed, and A. Hassan. 2020. "The Effectiveness of a Program Based on Sensory Integration to Modify Stereotypical Behaviors in Children with Autism." *Journal of the Faculty of Education, Kafrelshikh University* 20 (3): 181–202.

Almandil, N., D. Alkuroud, S. AbdulAzeez, A. AlSulaiman, A. Elaissari, and F. Borgio. 2019. "Environmental and Genetic Factors in Autism Spectrum Disorders: Special Emphasis on Data from Arabian Studies." *International Journal of Environmental Research and Public Health* 16 (4): 658. https://doi.org/10.3390/ijerph16040658.

Al-Mutairi, M., F. Hadeh, and M. Al-Behairy. 2019. "Stereotypical Behavior and Its Relation to Emotional Control and Response Inhibition in a Sample of Children with Autism." *Childhood Studies* 22 (28): 31–43. https://doi.org/10.21608/JSC.2019.34154.

Al-Sqour, E., and H. Zaza. 2016. "Derivation of Performance Norms for the Jordanian Arabic Version of the Gilliam Autism Spectrum Disorder Rating Scale for Ages 3 To 13 Years." *The Jordanian Journal of Educational Sciences* 12 (2): 159–207.

American Psychiatry Association. 2022. *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, Text Revision (Dsm-5-)Tr))*. 5th ed. Amer Psychiatric Pub Inc.

Azeem, A., Z. Faiz, S. Z. Jafri, Y. Warraich, and S. Virk. 2020. "Effects of Applied Behavior Analysis Treatment in Children with Autism Spectrum Disorder to Develop Social Interaction Skills." *Elementary Education Online* 19 (4) : 5889–5908. https://doi.org/10.17051/ilkonline.2020.04.764993.

Bai, Dan, Benjamin Hon Kei Yip, Gayle C. Windham, Andre Sourander, Richard Francis, Rinat Yoffe, Emma Glasson, et al. 2019. "Association of Genetic and Environmental Factors with Autism in a 5-Country Cohort." *JAMA Psychiatry* 76 (10): 1035–1043. https://doi.org/10.1001/jamapsychiatry.2019.1411.

Bolkanater, N., and L. Zaarour. 2022. "The Effectiveness of the ABLLS-RLanguage Assessment and Learning Skills Program in Developing Basic Skills for Children with Autism Spectrum Disorder." *Al-Hikma Journal for Philosophical Studies* 10 (3): 1392–1419.

Bouregaa, M. 2019. "The Effectiveness of a Training Program Derived from the ABLLS-R Program in Developing Verbal Communication for Children with Autism, a Quasi-Experimental Study at Al-Saada Association in El Oued State." (Thesis), Echahid Hamma Lakhdar University – El Oued. http://dspace.univ-eloued.dz

Center for Disease Control and Prevention. 2022. "Autism Spectrum Disorder (ASD): What is Autism Spectrum Disorder?." Centers for Disease Control and Prevention, website was Visited in 3/11/2022. https://www.cdc.gov/ncbddd/autism/index.html

Cohen, J. 1977. *Statistical Power Analysis for the Behavioral Sciences*. Revised edn. New York, NY: Academic Press.

EL-Hawary, S., and K. Belmihoub. 2020. "Study the Psychometric Properties of the Childhood Autism Rating Scale (CARS.T)." *The Journal of Psychological and Educational Sciences* 6 (1): 276–290.

Fahmy, A. 2022. "The Effectiveness of the Assessment of Basic Language and Learning Skills Program (ABLLS-R-R) in Improving Some Basic Skills of Different Groups of Children with Developmental Disorders." *Childhood and Education Journal* 49 (1): 385–428. https://doi.org/10.12816/FTHJ.2022.220472.

Ferreira, José Pedro, Thaysa Ghiarone, Cyro Rego Cabral Júnior, Guilherme Eustáquio Furtado, Humberto Moreira Carvalho, Aristides M. Machado-Rodrigues, and Chrystiane Vasconcelos Andrade Toscano. 2019. "Effects of Physical Exercise on the Stereotypical Behavior of Children with." *Medicina* 55 (10): 685. https://doi.org/10.3390/medicina55100685.

Ghazali, R., S. R. Sakip, and I. Samsuddin. 2018. "The Effects of Sensory Design on Children with Autism." *Asian Journal of Behavioural Studies* 3 (14): 68–83. https://doi.org/10.21834/ajbes.v3i14.165.

Ghoniem, W. 2021. "Sensory Disorders and Their Correlation with to Stereotypical Behavior and Anxiety Disorder in a Sample with Autism Spectrum Disorder." *Journal of Education Sohag University* 89 (89): 1457–1527. https://doi.org/10.21608/EDUSOHAG.2021.187334.

Ghonimi, A., A. Ismail, and M. Abdel Nabi. 2020. "The Effectiveness of an Apples-Based Training Program (ABLLS-R) in Developing the Demand and Naming Skills of Children with Autism Disorder." *Alqraah and Al Maarefah Journal* 221: 141–183. https://doi.org/10.21608/MRK.2020.100644.

Goin-Kochel, R., E. Fombonne, S. Mire, C. Minard, L. Sahni, R. Cunningham, and J. Boom. 2020. "Beliefs about Causes of Autism and Vaccine Hesitancy among Parents of Children with Autism Spectrum Disorder." *Vaccine* 38 (40): 6327–6333. https://doi.org/10.1016/j.vaccine.2020.07.034.

Karima, A., and R. Abdel-Bary. 2020. "The Effectiveness of a Program Based on a Modified ABLLS-Rfor the Development of Receptive Language for Children with Language Delay in Early Childhood." *Childhood and*

Education Journal 12 (43): 179–238. https://doi.org/10.21608/FTHJ.2021.209283.

Keller, R., T. Costa, D. Imperiale, A. Bianco, E. Rondini, A. Hassiotis, and M. Bertelli. 2021. "Stereotypies in the Autism Spectrum Disorder: Can We Rely on an Ethological Model?" *Brain Sciences* 11 (6): 762–784. https://doi.org/10.3390/brainsci11060762.

Kodak, T., and S. Bergmann. 2020. "Autism Spectrum Disorder: Characteristics, Associated Behaviors, and Early Intervention." *Pediatric Clinics of North America* 67 (3): 525–535. https://doi.org/10.1016/j.pcl.2020.02.007.

Li, B., G. Bos, L. Stockmann, and C. Rieffe. 2020. "Emotional Functioning and the Development of Internalizing and Externalizing Problems in Young Boys with and without Autism Spectrum Disorder." *Autism: The International Journal of Research and Practice* 24 (1): 200–210. https://doi.org/10.1177/1362361319874644.

Lin, X., L. Lin, X. Wang, X. Li, M. Cao, and J. Jing. 2023. "Association between Mothers' Emotional Problems and Children with Autism's Behavioral Problems: The Moderating Effect of Parenting Style." *International Journal of Environmental Research and Public Health* 20 (5): 4593 https://doi.org/10.3390/ijerph20054593.

Liu, T., A. Fedak, and M. Hamilton. 2015. "Effect of Physical Activity on the Stereotypic Behaviors of Children with Autism Spectrum Disorder." *International Journal of School Health* 3 (1): 17–22. https://doi.org/10.17795/intjsh-28674.

Lurie Center for Autism. 2023. 30 Facts to Know about Autism Spectrum Disorder, Patient Education. https://www.massgeneral.org/children/autism/lurie-center

Mahmoud, H. 2021. "Using Teaching Activities for Developing Some Receptive Language Skills Determined in the Light of The (ABLLS-RR) at Children with Autism Spectrum Disorder Integrated in Primary Schools." *Journal of Education Sohag University* 1 (86): 1–38. https://doi.org/10.21608/EDUSOHAG.2021.168158.

Malkin, A., R. Dixon, C. Speelman, and N. Luke. 2017. "Evaluating the Relationships between the PEAK Relational Training System–Direct Training Module, Assessment of Basic Language and Learning Skills–Revised, and the Vineland Adaptive Behavior Scales–II." *Journal of Developmental and Physical Disabilities* 29 (2): 341–351. https://doi.org/10.1007/s10882-016-9527-8.

Mohammad, S. 2021. "Psychometric Properties of Jordanian Version of the Gilliam Autism Rating Scale." *Dirasat: Educational Sciences* 48 (3): 400–420.

Nadeem, M., N. Murtaza, M. Al-Ghamdi, A. Ali, M. Zamzami, J. Khan, A. Ahmad, M. Rehman, and I. Kazmi. 2021. "Autism - A Comprehensive Array of Prominent Signs and Symptoms." *Current Pharmaceutical Design* 27 (11): 1418–1433. https://doi.org/10.2174/1381612827666210120095829.

Nouriya, L. 2022. "The Effectiveness of a New Treatment Program Based on the ABLLS-Rin the Development of the Oral Linguistic Skills for Children Who Suffers from Autism Spectrum Disorder." *Journal of Human Development and Education for Specialized Research* 8 (2) 66–97. https://jhdesr.misd.tech.

Ovsyannikova, M., A. Lapshina, Y. Tyzhinova, and A. Berdnikova. 2018. "Examination of a Child with ASD in PsychologicalMedical-Pedagogical Commission with the Use of Assessment of Basic Language and Learning Skills, Revisited (ABBLS-R)." *Autism and Developmental Disorders* 16 (2): 29–37. https://doi.org/10.17759/autdd.2018160204.

Partington, J. 2010. "ABLLS-R- The Assessment of Basic Language and Learning Skills - Revised." *Partington Behavior Analysts* (3): 12–126.

Partington, J., A. Bailey, and S. Partington. 2018. "A Pilot Study on Patterns of Skill Development of Neurotypical Children as Measured by the ABLLS-R-R: Implications for Educational Programming for Children with Autism." *International Journal of Contemporary Education* 1 (2): 70–85. https://doi.org/10.11114/ijce.v1i2.3619.

Péter, z., M. Oliphan, and T. Fernandez. 2017. "Motor Stereotypies: A Pathophysiological Review." *Frontiers in Neuroscience* 11: 171. https://doi.org/10.3389/fnins.2017.00171.

Rawi, W., and A. Hassanein. 2022. "A Program Based on The Assessment of ABLLS-Rfor the Development of the Motor-Sensory Cognitive Abilities and Its Effects on Reducing Impulsivity of Children with Asperger Syndrome." *Journal of Education and Child Culture* 20 (1): 31–49. https://doi.org/10.21608/JKFB.2022.236584.

Rispoli, J. 2013. *Assessment of Basic Language and Learning Skills—Revised (ABLLS-R-R)*. Hoboken NJ: John Wiley & Sons Inc. www.CDC.org

Salem, A. 2022. "The Effectiveness of a Training Program Based on Some Executive Functions to Improve Verbal Communication and Reduce Restricted Repetitive Stereotypical Behaviors among Children with Autism Spectrum Disorder." *Journal Special Needs Science* 4 (7): 3915–3987. https://doi.org/10.21608/JSHM.2022.121339.1182.

Shkokani, H., and J. Al-Smadi. 2018. "Evaluation of Autism Spectrum Disorder Programs in Jordan According to Quality Assurance Indicators." *Dirasat: Educational Sciences* 45 (4): 1–26.

Shtayyat, S., and A. Al-Owaidi. 2018. "The Effectiveness of an Assessment Linguistic and Educational Skills Program (The ABLLS-R-R) in Improving Basic Skills for Jordanian Children with Autism Spectrum Disorder." *Jordanian Educational Journal* 14 (3): 315–328.

Siddig, E., and M. Molokhia. 2015. "A Program Based on Kinetic Activities to Reduce Some Repetitive Stereotypical Behaviors and Improve Social Interaction Among a Group of Children with Autism Spectrum Disorder." *Childhood Studies* 7 (24): 109–186. https://doi.org/10.12816/FTHJ.2015.224291.

Thapar, A., and M. Rutter. 2020. "Genetic Advances in Autism." *Journal of Autism and Developmental Disorders* 51 (12): 4321–4332. https://doi.org/10.1007/s10803-020-04685-z.

Treweek, C., C. Wood, J. Martin, and M. Freeth. 2019. "Autistic People's Perspectives on Stereotypes: An Interpretative Phenomenological Analysis." *Autism: The International Journal of Research and Practice* 23 (3): 759–769. https://doi.org/10.1177/1362361318778286.

Vaske, J., J. Beaman, and C. Carly. 2017. "Rethinking Internal Consistency in Cronbach's Alpha." *Leisure Sciences* 39 (2): 163–173. https://doi.org/10.1080/01490400.2015.1127189.

Wood, C., and M. Freeth. 2016. "Students' Stereotypes of Autism." *Journal of Educational Issues* 2 (2): 131–140. https://doi.org/10.5296/jei.v2i2.9975.