

The Effectiveness Of Vark In Rehabilitating Sensory Organ Afferent Disorder For Children With Autism Spectrum Disorder

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Abstract

The purpose of this study is to investigate the effectiveness of VARK in rehabilitating the sensory organs disorder to perceive the independent sensory input, and to perceive the different sensory organ afferent at synchronization, among children with autism spectrum disorder, and to track the effectiveness on the rehabilitation of the autism spectrum disorder itself. It is assumed that learning style rehabilitation program (VARK) will be effective in rehabilitating sensory organ afferent disorder for children with ASD. The participants of the study were two male students diagnosed with autism attending Riyadh Primary School in Jubail. Multiple-probe design with probe conditions across subjects was used in the study to test the effectiveness of the learning style rehabilitation program (VARK) in rehabilitating sensory organ afferent disorder for children with ASD. The two students were found to be successful at the end of the rehabilitating sessions, compared to the baseline.

Keywords: VARK , rehabilitation, sensory organ afferent disorder, simultaneous sensory afferent, children with autism spectrum disorder

Introduction

Autism spectrum disorders(ASD) are said to be a diverse group of conditions. It is one of the most ambiguous and complex developmental disorders, despite the efforts made by scientists and researchers at the medical and educational levels. Recent years have witnessed a noticeable interest in autism, but it has not yet commensurate with its rapid spread, as was noted by the researcher as a teacher in private centers and public education schools, in addition to what this category suffers from disorders that affect them in behavior and their relationship with society and the family in particular. Children with ASD are characterized by some degree of difficulty with social interaction and communication(Ebrahim, 2019 ;Eissa,

2015,2016, 2017a, 2017b,2018a,2018b; Eissa & Borowska-Beszta, 2019;WHO,2022).

Educators agree that learners differ in their abilities and motivation towards the learning style. They also differ in their methods of dealing with life problems. Modern trends emphasize learner-centered learning more than ever. That is why great attention has begun to take into account the individual differences between students and deal with them on the basis of their learning styles (Adli, Sarnou& Hamerlain,2019; Kılıç& Sökmen,2013;Eissa& Mostafa,2013; Tłuściak-Deliowska, Dernowska & Gruenert,2017).

During this period, the talk about the learner's learning styles theory as a single theory, like other learning theories, has become of concern to many educators, because it suggests providing educational experiences, teaching, and a curriculum that relates to the students' preferred learning styles and which can increase their academic achievement (Eissa & Mostafa, 2013; Rajbhandari, 2018).

The idea of learning styles arose from the fact that all students differ in their intelligence, personalities, way of thinking, and the learning styles they prefer. Knowing this difference helps provide the atmosphere and experiences that encourage students to achieve the maximum that their abilities can achieve and reach the highest degree of effective learning (Frackowiak, 2017).

Many theories dealt with learning styles and varied in how they dealt with these styles, as some of them focused on the personality traits of the learner (Çelikkaleli et al., 2022; Kader, & Eissa, 2015) and others focused on the learner's way of receiving, processing, organizing and storing information in memory, while others focused on the perceptual mediator that the learner prefers in receiving and processing information provided to him (Eissa, 2017c).

As a result of the increasing interest in learning patterns and their importance in facilitating and speeding up teaching and learning of students, many models for these styles have emerged, including: Dunn and Dunn model, McCarthy's format model, Kolb model, Hill model, VARK model, and others.

The current research relies on VARK styles, which depend on the foundations of information, which depend on physiological or biological foundations on the one hand, and on genetic factors on the other hand (Mozaffari et al., 2020).

The VARK model aimed to reveal four learning styles that may be preferred by students, and this shows the title of the four-letter model. Each letter indicates a particular style of student learning.

The model is based on the principle of focusing on the perceptual sensory media, according to which the learner tends to learn, and the way the brain represents the experience represents the practice, the methods of capturing stimuli in order to absorb them, and the individual's preferred way of organizing and processing experiences and information (Zamani & Kaboodi, 2017).

In the visual learning style, the learner relies on visual perception and visual memory, and learns best by seeing the educational material: such as drawings, shapes, graphic representations, cinematic displays, projectors, and other visual techniques (Mozaffari et al., 2020).

In the auditory learning style, the learner depends on auditory perception and auditory memory, and learns better by listening to the educational material: such as listening to lectures, recorded tapes, discussions, oral dialogues, and other oral practices (Zhu et al., 2018).

As for the reading / writing style of learning, the learner depends on the perception of read and written ideas and meanings, and learns better by reading ideas and meanings, or writing them that require books, references, dictionaries, pamphlets, articles, worksheets and written works (Mozaffari et al., 2020).

In the style of practical or kinesthetic learning, the learner depends on practical tactile perception and learning by using hands to learn ideas and meanings through manual work, making designs, models, experiments, motor activities, jaw, installation, applications, and other

practical actions and practices (Habibpour, Faeedfar, & Abdeli, 2016).

Current Study

Sensory inputs to the different organs at synchronization: the discovery of the study (as far as the researcher knows, the region in the head receives independent sensory input, and is responsible for regulating sensory inputs from different organs upon synchronization: this region was observed from the way the researcher deals with students with autism spectrum disorder, the beginning of dealing He was wiping on the head when communicating to relieve their sorrows (compared to the Sunnah of wiping on the head of an orphan), until it was noticed that the level of communication with students of the autism spectrum increased, and the skill of muscular and nervous compatibility when writing or drawing, and that when placing one or both hands on an area above ears and extending to the back of the head.

From the researcher's observation of many students of autism spectrum disorder when

he goes to embrace those with good relationships, he tries to turn his head in a strange way to put one side of his head (especially the upper left side) on the body of the hugger, which improves his psychological state in a quick way And translate the sensory afferents better, and thus it becomes clear about the following autism spectrum disorder:

1. Perception of the sensory input when directly touching the area of simultaneous sensory afferents is better than the perception of non-touch.
2. The sensory disturbance occurs before the sensory input reaches the common area.

In the scientific sources, there is support for the hypothesis and for this region, which is shown in (Fig. 1) and that it is related to the passage and delivery of information from the sensory organs to the center of the brain, but it did not mention its responsibility and role in regulating the arrival of sensory inputs to the synchronous organs simultaneously to the center of the brain.

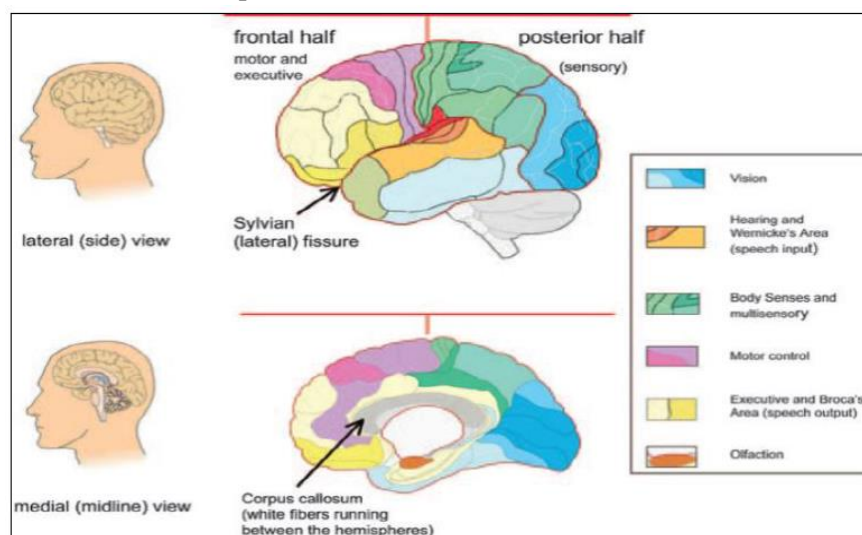


Fig.1. The parts of the brain responsible for hearing, speech, and feeling (touch) and related to vision (Bernard , & Nicole, 2010)

Cognitive domains were identified via functional imaging with their associated part of the temporal lobe:

1. Speech perception - posterior superior temporal gyrus
2. Speech production - posterior superior temporal gyrus
3. Hearing - posterior superior temporal gyrus
4. Episodic memory - medial structures
5. Phonological - dorsal and posterior structures
6. Semantic - ventral temporal lobe
7. Social - two areas in the temporal lobe
8. Visual - temporo-occipital junction (Anand et al.,2020).

According to COGNITION, BRAIN, AND CONSCIOUSNESS Auditory cortex is the region within cortex specialized for sound processing. It is located in each hemisphere within the Sylvian fissure on the surface of the supratemporal plane and the upper banks of the superior temporal gyrus... etc. (Bernard & Nicole,2010).

From the eye, retinal ganglion cells send their axons to a structure in the thalamus called the lateral geniculate nucleus (LGN). From the LGN, neurons send their signals to the primary visual cortex, sometimes called V1 because this region is the first cortical visual area. Then, V4 to the ventral temporal cortex, you can see that neurons gradually respond to more complex stimuli from one area to the next (Bernard & Nicole,2010).

According to MAYO CLINIC(2020), The parietal lobe processes information about temperature, taste, touch ,and movement.

Terms

1. According this study Autism Spectrum Disorder is defined it as a defect in one of the sensory organs' functions, which results in the transformation of the sensory afferents into incomplete symbols and irregular access. This hinders the brain's perception of them. This disorder is manifested by a deficiency in the perception of the independent sensory input, and the inability to perceive the inputs of the different sensory organs when synchronizing.

2. The simultaneous sensory afferent area: (mentioned in the theoretical framework of the rehabilitation program) is considered an area that is effective in stimulating and drawing attention to cases of ASD when touched by hand and helps to increase communication, perception, containment when emotional, and to form a relationship, and it was relied upon when applying the rehabilitation program for these The study, and for its effectiveness, the researcher sees (if he may) its importance in early intervention, and recommends relying on it when the mother or the family in general, has contact with a child on the ASD, and when any activity of the sensory organs, for example when talking to him, breastfeeding him, his excitement, fear, pain ,crying, directing, teaching, feeding, calling him by name, playing with him, singing to him, waking him from sleep, helping him fall asleep.

Problem Statement

The researcher observes that there is a defect in the functions of sensory organs for students with ASD. However when presenting an innovative program to teach art education to these students, to qualify their abilities for drawing and coloring, the results of the program with students with ASD were positive and interesting.

And when the researcher returns to the students' drawing files from the beginning

to the end of the program for comparing and evaluating the stages of transformation in the levels of drawing for these students, it is noted that the positive in balance and linear uniformity, and the reduction in the angle of return when coloring and with lower lengths of color lines, control of the movement of lines within closed spaces , interacting with the new lessons without adding the previous elements or the characteristics of drawing each student. After analyzing the above to find out the reasons, the researcher makes sure that the positivity is due to the rehabilitation of the educational style (reading / writing).

Study Question:

- 1.How effective is VARK in rehabilitating sensory organ afferent disorder for children with autism spectrum disorder?
2. How effective is the Educational Patterns Rehabilitation Program (VARK) in rehabilitating autism spectrum disorder?

Aims

To investigate the effectiveness of VARK in rehabilitating the sensory organs disorder to perceive the independent sensory input, and to perceive the different sensory organ afferent at synchronization, among children with ASD, and to track the effectiveness on the rehabilitation of the ASD itself.

Table 1. Demographic Features of the Participants

Name	Sex	Age	School	Grade	CARS score	IQ score	Diagnosis
A	Male	8	Riyadh Primary School in Jubail	2	44	84	ASD
B	Male	12	Riyadh Primary School in Jubail	5	40	92	ASD

Data Collection Instrument

Teacher's rating of child's Attention to Cues Scale. The test is developed to assess child's attention to cues. It is a 3 point rating scale

Significance of the study

Understanding the type of preferred learning styles enables teachers of students with ASD to design materials so that they can be well-learned these students. This will help students to master the skills required in accordance with students' preferences. This also will provide a basis for students to master new patterns of behavior.

Methods

Participants

Participants are two children aged 8 and 12 who attend the same school: Riyadh Primary School in Jubail . Parental informed consent forms were sent home by the school director and school psychologist to parents of two potential participants telling them about the study and requesting them to give permission for their children to participate. Through a previous comprehensive psychological evaluation each targeted child has received a primary diagnosis of ASD.

Each child also had the following characteristics: (1) A diagnosis of ASD from child psychologist based on CARS; (2) ability to read and comprehend words, and (3) ability to follow directions.

–Always (3), Sometimes (2) and Never (1). There are four subscales in the scale. They are : Eye Contact (5 Items) , Gesturing (5 Items) ,Follow the instructions (5 Items) , Initiating caressing/singing (5 items). The

Cronbach's alpha statistic is calculated to determine the internal consistency .It reported internal consistency of above .81

Experimental Design

A multiple baseline design is used to evaluate the effectiveness of VARK in rehabilitating sensory organ afferent disorder for children with autism spectrum disorder. In this type of design, two independent students that can learn attention to cues through the use of VARK are chosen. It comprises three phases: baseline (A) ,intervention phase (B) and maintenance phase (c).

Probe Sessions

Baseline probe sessions. Before introducing the rehabilitating procedures based on VARK, baseline data was collected for each of the two children to determine their performance levels on attention to cues. Baseline data was collected on a one-to-one basis using assessment worksheets that included examples.

Rehabilitating sessions

To enable the study to rehabilitate sensory organ dysfunction for autism spectrum cases according to educational methods, a curriculum has been prepared targeting the four learning styles of the VARK model, to qualify each educational style to increase the time period when learning in each style without interruption, and to rehabilitate educational styles when synchronization, to enable synchronous learning For two or more learning styles simultaneously.

Visual Learning Style: The visual learner receives information with the sense of sight and helps him to increase communication and speed for understanding and perception, such as photographs, graphics, visual presentations, mental maps, models, and others. **Auditory learning style:** The

auditory learner depends on the sense of hearing and masters the reception and linking of audible information and does not find it difficult, but rather enjoys when listening to learning and is provoked by good recitation and the overlapping of audible audio levels. **Reading/Writing Learning Style:** The literate learner responds to building information and association in an organized manner when reading and writing, and helps him to memorize and comprehend in a quick way, and enjoys silent reading and writing. **Kinesthetic learning style:** The kinesthetic learner responds to movement-supported learning and is generally provoked by movement when learning and helps him to increase communication as a signal giver and movement when teaching.

The curriculum includes a set of drawing and coloring exercises, as well as verbal and kinesthetic exercises, knowing that the program curriculum exercises are variable to correspond to what raises the state of the autism spectrum when implementing and in proportion to its levels of educational patterns. Synthesizing, evaluating, planning, gathering information, organizing information, describing, linking, observing and reconstructing (design).

Maintenance sessions. Maintenance sessions, on a one-to-one basis, were held for the two children on the 7th, 9th, and 12st days after introducing VARK model.

Generalization sessions. Data in generalization session which was run as one session for each child was collected in another place before introducing VARK model. More activities were presented to the two students .

Results

Figure 2 shows how successful were the two students from the baseline, to

intervention, and maintenance sessions, throughout which their performance were measured for Teacher's rating of child's Attention to Cues Scale.

Eye Contact (5 Items) , Gesturing (5 Items) , Follow the instructions (5 Items) , Initiating caressing/singing

Baseline

A: During the baseline , A 's scores for Eye Contact ranged from 5-6 for the first six sessions. He got five in all five days for Gesturing. However, for Follow the instructions, his scores increased from five during the first five days, to six point during the sixth and seventh baseline sessions. As for Initiating caressing/singing, he got six in all seven baseline sessions.

B: During the baseline , B 's scores for Eye Contact ranged from 6-8 for the first four sessions. He got eight in all five days for Gesturing. However, for Follow the instructions, his scores increased from seven during the first five days, to eight point during the sixth and seventh baseline

sessions. As for Initiating caressing/singing, he got eight in all seven baseline sessions.

Intervention and maintenance

A: A 's success rate increased from 15 - 24 % (during the baseline) to 70-95% at the end of sixteen rehabilitating sessions, and stability (at the beginning of the 15th till the final session, that is session 20 session) was maintained. Given the findings, it is concluded that VARK model was effective in Eye Contact, Gesturing ,Follow the instructions and Initiating caressing/singing for A.

B: B 's success rate increased from 24 - 32 % (during the baseline) to 80-96% at the end of 13th rehabilitating sessions, and stability (at the beginning of the 13th till the final session, that is session 20 session) was maintained. Given the findings, it is concluded that VARK model was effective in Eye Contact, Gesturing ,Follow the instructions and Initiating caressing/singing for B.

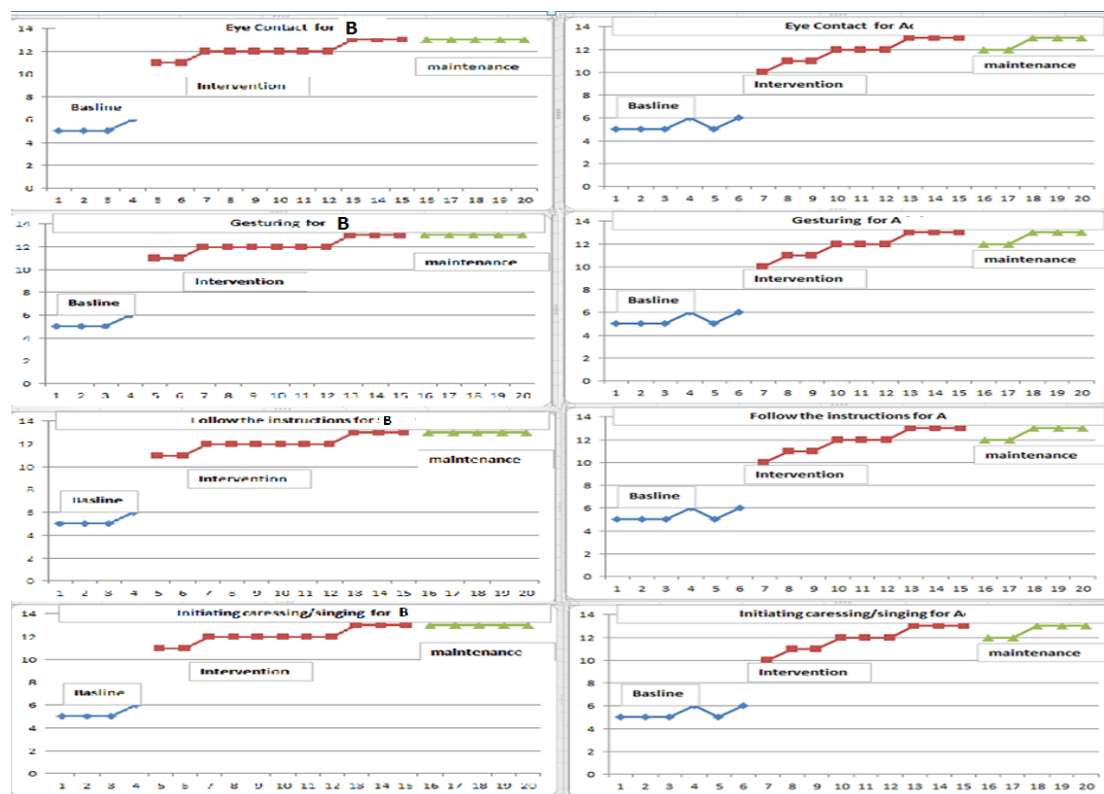


Figure 2. Teacher's rating of child's Attention to Cues Scale during the baseline (B), intervention (I), and maintenance (M) sessions for the two students.

Discussion

The purpose of this study is to investigate the effectiveness of VARK in rehabilitating sensory organ afferent disorder for children with autism spectrum disorder. The results of this study support the general experimental prediction: VARK model will make the difference, suggesting that students will have great gains in intervention phase (B) and maintenance phase (c) compared to baseline (A) .

It is noted that ; for the first student, the moment the rehabilitation is achieved (autism spectrum disorder at the average level of autism severity): sudden stop of training, rapid eye shaking for (3) seconds, then closing and opening the eyes in a manner similar to drowsiness for another (3) seconds, with apathy for the hands, lethargy and fatigue appear with facial expressions and a bowing of the head down, and all these symptoms disappear within about (10) seconds, and do not return again when re-training.

Using the Psychodiagnostic Scale to measure the severity of autism for the first student, the following was noted:

- at the end of the program, the sensory organs were working normally on the condition.
- his response to the commands that direct his behavior.
- decreased involuntary movement of his head and hands did not become clear until late at the end of the program. Pre-measurement after the response to the exercises and during the period of the program.

As for pre-test, his score was 44. At the post test, his score was 30. The decrease in the autism rating scale(CARS) is evident by 68.2%.

For the second student, a sudden cessation of training, very slight head twitching and eye rotation (3) seconds, then closing the eyes and lowering the head with a gradual bending of the back (similar to descending when severe drowsiness) within (5) seconds, then raising the head in amazement and a little smile. After re-training again, the symptoms will return, but with much less than the first. They will completely disappear after the third repetition. These previous symptoms were not accompanied by crying, tears or screaming.

Using the Psychodiagnostic Scale to measure the severity of autism for the second student, the following was noted:

- Achieving success in rehabilitating the functions of the sensory organs, and the ability to learn them naturally and with a clear result.
- Autism disorders and behavior modification are subjective, and this was clearly and accelerated before the end of the program. Pre-measurement / after the response to the exercises and during the program period.

As for pre-test, his score was 40. At the post test, his score was 27. The decrease in the autism rating scale(CARS) is evident by 67.5%.

The current study is a pioneer in examining the effectiveness of a learning style rehabilitation program (VARK) in rehabilitating sensory organ afferent disorder for children with autism spectrum disorder. The study found that the learning style rehabilitation program (VARK)intervention had a significant

impact on ASD symptom severity. Theoretically, the study supports the importance of learning new skills through challenging physical activities. The value of learning through adventure experiments is not only in acquiring the skills, but also, perhaps more importantly, in the participants' ability to internalize the communication requirements during enjoyable social situations and to apply them to future occasions (Zachor et al., 2017).

The study has clinical implications for the implementation of VARK in treatment protocols for people with ASD. Further development of VARK is needed to explore rehabilitation of sensory organ afferent disorder that most significantly affect progress in ASD.

The current study is innovative in its examination of the effectiveness of learning style rehabilitation program (VARK) in rehabilitating sensory organ afferent disorder for children with autism spectrum disorder. The study has several strengths. To my knowledge, no other studies, internationally or locally, investigated the effectiveness of a learning style rehabilitation program (VARK) in rehabilitating sensory organ afferent disorder for children with autism spectrum disorder.

This study suggests that VARK might be an important complementary intervention alongside more traditional treatments in people with ASD. In subsequent studies it will be important to use another source for the evaluations, such as an independent rater, which will add to the validity of the research and will reduce the potential for bias. Assessment of other variables such as executive function in addition to the study measures may increase understanding of the intrapersonal skills and could provide valuable information on the importance of

this intervention. Future studies should further examine the contribution to optimal outcome of this type of intervention delivered for longer periods, and evaluate the maintenance and generalization of skills over time.

Conclusion

An intervention framework of the learning style rehabilitation program (VARK) has promise to help students with ASD improve their attention to cues. The student's attention to cues improved when trained through the learning style rehabilitation program (VARK). The current data demonstrate the effectiveness of the learning style rehabilitation program (VARK) for students with ASD. This research is important for educators and psychologists to consider when they are working with students with ASD and suggests an effective technique for improving attention to cues for students with ASD.

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