

Integrated Sensorial Development Program Applied to Students with Autism Spectrum Disorders: Relations between Emotion and Global Behavior Development

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Abstract: This study aimed to show the significant relationships between emotion and behavior variables among throughout the behavioral modification learning processes in individuals with Autism Spectrum Disorder (ASD).

A quasi-experimental research design pre-tests - post-test was realized. A total of 10 years old children with ASD level 1, who have been distributed into two groups, an experimental group (n= 5), whom a sensory integrated behavior program was applied and a control group (n=5), whom a behavioral modification "Stimulus"- "Response"- "Readjustment" (S-R) program has been applied.

Results found through Mann-Whitney U Test and Pearson Correlation Test showed that there're significant differences between both groups and, above all, great relationships are indicated between the emotional and behavioral variables found as a result of the learning process.

Keywords: Autism Spectrum Disorders, Behavior, Emotion, Sensory Integration.

INTRODUCTION

People with Autism Spectrum Disorder (ASD) exhibit restrictive, stereotyped behavior; one subtype of restricted, repetitive behavior is restricted interests in actions, which describe the shape in which people interact with the context. Individuals with ASD might engage in a narrow range of actions or an exclusive behavioral activity in order to develop their social interaction, meaning this deficit might lead to limited sources of stimulation in achieving social, communication and educational goals. Furthermore, interrupting the engagement of an individual with restricted interests might evoke severe limitation general behavior [1].

Social and emotional interactions represent an individual's ability to interpret behavioral cues, as well as to effectively communicate and interact socially, to which end he or she must be able to successfully process the emotional cues received and apply them to everyday behavior.

In this sense, Hudepohl, Robins, King & Henrich [2] examined the role of emotional perception as related to the adaptive functioning of people with ASD, concluding that the ability to perceive emotions is partially mediated by socialization skills.

Williams & Gray [3] investigated the relationship between emotional recognition ability and social skills,

and a final study demonstrated the association between social skills and the recognition of a range of emotions. The results showed that recognition of sadness but not happiness, anger or fear was significantly associated with greater social skills, and this will influences behavior.

Samson, Hardan, Lee, Phillips & Gross [4] also related maladaptive behavior to the role of emotion experience and emotion regulation. Emotional reactivity can be seen as a behavioral response, meaning an emotion can be considered as adaptive or maladaptive in accordance with the context. The findings suggest that people with ASD tend to experience increased negative emotions, in turn leading to levels of maladaptive behavior.

Nevertheless, Gross [5] affirms that cognitive reappraisal is a strategy involving cognitive change, and is generally seen as adaptive and has consequences on applied behavior, since emotions can be extremely helpful when they direct attention to key features of the context and facilitate behavioral responses.

A study by Sofronoff *et al.* [6] suggests that interventions targeting ability to use cognitive reappraisal may improve emotion experience and also decrease maladaptive behavior in relation to cognitive behavioral therapy, thus easing anxiety.

Bons *et al.* [7] carried out a study that aimed at describing the overlap and relationships and the specificity of motor, emotional and cognitive aspects of empathy on the behavior of children with ASD.

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Diverse findings [8-10] might explain these relations in terms of reduced processing global in autism, and how reduced perceptual global processing could also account for the difficulties people with autism have in understanding behavior and adaptation to social situations.

For this reason, Ojea [11] believes these diagnostic features are not an isolated process, limited to observable behavior, but rather share the functioning interrelation of the sensory system, in which all neuropsychological processes are interrelated as a whole.

In consequence, learning programs should not be limited to teaching isolated behaviors and improving disconnected goals, i.e., restricted interests might develop from individuals' behavioral repertoires based on reinforcing emotional interactions with behavior learning, making restricted behavior more flexible and promoting positive development of general behavior. This requires all interrelated sensorial processes to be activated throughout learning, which involves cognitive learning practices that include emotional and motivational dimensions to increase behavioral skills by improving flexibility and behavioral interests.

The aim of this research was to provide set of components to improve global behavior in individuals with ASD, and to establish whether there might be any differences between two participant groups.

Our hypothesis is to verify whether an interactive program with sensory integration of different components (behavior-emotion-motivation) involves greater global behavior development in relation to the Stimulus-Response (S-R) behavior learning program.

METHOD

Design

Study was based on a quasi-experimental pre-test-post- tests design of two groups, one experimental and one control group.

Participants

A total of ten 12 years old children with "degree 1" ASD [12] of which 8 are males and 2 are females, were distributed in two groups, an experimental group (n= 5), whom a sensory integrated behavioral program was applied to and a control group (n=5), whom a standard behavioral modification program was applied to (S

"stimulus"-R "response"), based on a structure of positive/ negative reinforcements.

Study development was carried out in the Autism Specific Association that belong to several secondary education centers.

Variables

To examine the differences in relation to the effectiveness of the program, we adjusted for three basic variables:

- 1) Emotion variable pre-tests- post-tests scores, that have been measured through the Empathy Quotient Test -EQC-SQC- [13].
- 2) *Behavior* variable pre-tests and post-tests scores, that have been analyzed through the restrictive behavior sub-tests of the Autism Diagnostic Interview- Revised Test -ADI-R- [14].
- 3) Binary Group variable: this variable indicates whether a child belongs to the experimental or the control group.

The sex variable was not included in the analysis since only two participants were females.

Procedure

After getting the authorization of the parents, the emotional level and restrictive behavior (pre-tests) were analyzed. Participants were homogeneously distributed in both groups: an experimental and a control group. A sensory integrated emotional- behavioral program was applied to the participants of the experimental group, while participants of the control group developed a standard behavioral program S- R ("stimulus"- "response"- "reinforcement"). After 6 months, the tests scores were again measured in all the participants (post-tests). Finally, results were compared to identify possible differences between groups, as well as the consequent correlation analysis.

The Experimental Program

The applied experimental program was based on the interaction of emotional and behavioral aspects adapted to the readjustment of the behavior of the participants, according to the following phases:

- 1) Understand the meaning of objective- behavior.
- 2) Learn positive behavior through personal imitation or role play.

- 3) Develop behavior by body movements, using music, psychomotricity, game, dance or song.
- 4) Relate positive behavior with positive emotions experienced.
- 5) Develop links between objective- behavior and positive emotion learned.
- 6) Provide behavioral repertoires that would be an alternative to the behavior that is to be reduced or suppressed.
- 7) Allow the generalization of learned behavior to other situations.
- 8) Enhance improvisation levels in interactive social action in the context.
- 9) Do not use awards/punishments relationships during behavior adjustment.
- 10) Continuous monitoring of the process in different contexts.

Data Analysis

Comparative and relational analysis between both groups in relation to the different variables were analyzed through the following tests statistics: 1) Mann-Whitney U Test for the comparative analysis, and 2) Pearson Correlation Test for the correlational study.

RESULTS

Therefore, the scores found in the study were grouped according to the comparative and correlational analysis.

Comparative Analysis

Significant differences were found between pre-intervention and post-intervention data in both corresponding group, as well as significant differences

were also found between the experimental and control group in relation to the improvement of the post-intervention behavioral variable.

Indeed, after 6 months, all the children had improved scores the comparative level of greater depth between the experimental and control group found by the Mann-Whitney U Test (Seen Table 1).

The scores reflected the higher partial significant differences in relation to the analysis of the variable post-intervention Behavior2 (Sig= .01), nevertheless no partial significant differences were found between the other variables: pre-test Emotion1 (Sig= 1.00), post-test Emotion2 (Sig= .31), pre-test Behavior1 (Sig= 1.00).

Therefore, the data indicates the influence strength of the program shape applied along the intervention, in which significant differences were found in the post-tests behavior (Sig.= .01) as a consequence of the application of the integrated sensory program of behavior in relation to the standard program of the control group (S-R).

Likewise, Graph 1 reflects the data evolution indicated, in which the comparative levels of both groups were observed: pre-test emotion (1), post-tests emotion (2), pre-tests behavior (3), post-tests behavior (4), in which evident differences were observed between the groups throughout the research process (pre-tests- post-tests).

Correlational Analysis

Correlational analysis among the variables showed that there is significant correlation between the emotional and behavioral variables (Seen Table 2).

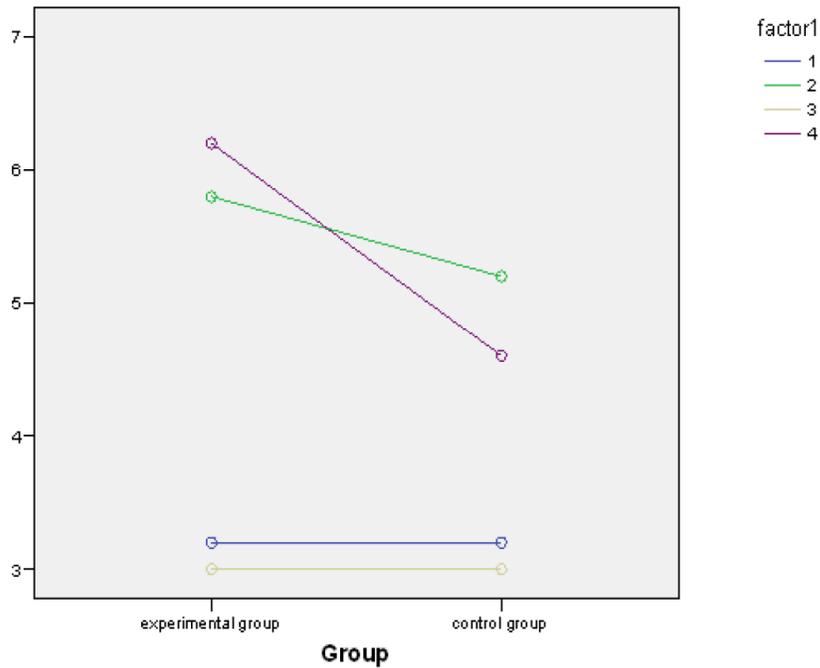
The Behavior2 variable (post-test) shows an important percentage correlation with Emotion1 variable: 67% (Sig= .04), with Emotion2 variable: 76% (Sig= .01) and with Behavior1 variable: 75% (Sig= .02).

Table 1: (a) Test Statistics (b). Comparative Analysis

	Emotion1	Emotion2	Behavior1	Behavior2
Mann-Whitney U	12.50	8.00	12.50	1.50
Z	.00	-1.00	.00	-2.39
Asymp. Sig. (2-tailed)	1.00	.31	1.00	.01
Exact Sig. [2*(1-tailed Sig.)]	1.0(a)	.42(a)	1.00(a)	.01(a)

a) Not corrected for ties.

b) Grouping variable: Group.



Graph 1: Comparative analysis between groups.

Table 2: Correlational Analysis

Control Variables		Emotion1	Emotion2	Behavior1	Behavior2	
Group	Emotion1	Correlation	1.00			
		Significance (2-tailed)	.			
		df	0			
Emotion2		Correlation	.89	1.00		
		Significance (2-tailed)	.00	.		
		df	7	0		
Behavior1		Correlation	.84	.84	1.00	
		Significance (2-tailed)	.00	.00	.	
		df	7	7	0	
Behavior2		Correlation	.67	.76	.75	1.00
		Significance (2-tailed)	.04	.01	.02	.
		df	7	7	7	0

Also, Behavior1 variable indicate a strong correlation with Emotion1 variable: 84% (Sig.= .00), and Emotion2 variable: 84% (Sig.= .00).

Logically, the relationship between the emotional variables (Emotion1 and Emotion2) found had a high correlational percentile: 89% (Sig= .00).

These data indicated the importance of the relationships between emotions and behavior to design improvement programs of the development of adjusted behaviors in the selected participants.

Thus, these data indicate that there is a strong interdependence between the emotional and behavioral variables along the adjustment of the behavioral of individuals with ASD.

In conclusion, the basic aim of the analysis was proved since it has been shown that emotional variables are statistically related to the behavioral variables, that allows to concluded the development of integrated emotions in behavioral learning improve global behavior of students with ASD.

DISCUSSION

The study showed that, after intervention, experimental group children with level 1 ASD showed greater improvement in global behavior compared to their control group peers.

It is important to determine, in particular, the strong correlation between emotion and global behavior found in this study, which explains the improvement in global behavior of the experimental group participants.

This confirmation is important as it implies that behavior modification programs tailored to people with ASD cannot be limited to learning based on the Stimulus-Response (S-R) sequence designated by Lovaas [15], but rather must involve the psychological factors of psychosocial development, with the aim of creating one's own neuronal and cognitive relationships [16].

In this regard, it is necessary to link together emotions during the behavior acquisition and adjustment process, thus ensuring that the correlational findings support the experimental studies, which have found that individuals who learn from the experience significantly improve their global behavior.

The reason for the specific association between social skills and recognition and regulation of emotions is related to the functioning of the cognitive system. For example, the socialization domain includes items related to empathy for behavioral adjustment, meaning isolated behavioral regulation would have no effect on learning [17].

Given the evidence that brain areas activated simultaneously during the acquisition process are activated by both images of faces and abstract animated stimuli, different functioning of the brain could lead to a deficit in emotion recognition. Indeed, for the participants with ASD, emotion and recognition performance are very closely correlated with social interaction skills [18].

According to Samson [19], one of the basic problems of ASD is how to regulate one's own emotions, meaning emotional deficits may be due to difficulties in interpreting others' feelings or empathy ability and, in consequence, behavior could be defined as a response of the cognitive system to different stimuli in the environment, meaning that poor social communication is one of the factors that lead to behavioral problems. It is therefore crucial to understand emotional development in children, since

individuals with ASD are defined based on socialization impairment associated with poor emotional control or regulation.

Mazefsky, Herrington, Siegel & Scarpa [20] and Park, Yelland, Taffe & Gray [21] explain that poor social communication and emotional regulation lead to behavioral problems. Understanding emotional development and how to regulate emotions in children is therefore paramount, since emotional behavior and associated feelings are important for communication and social behavior.

In the future, applied research for behavioral improvement and development in individuals with ASD should be based not only on behavior modification programs that use S-R, but rather rely on all interaction psychoneurological components through an integrated sensory program that includes:

1. Perceptive-cognitive understanding of objective-behavior.
2. Understanding of learning behavior.
3. Functional reconstruction of the behavioral situation.
4. Emotional expression related to behavior.
5. Associated emotion-motivation-behavior relationships.
6. Application in the natural context.
7. Generalization of learned behavior.
8. Improvisation of learned behavior in different environments.
9. Feedback of the consequences perceived throughout their action.
10. Behavior readjustment.

These findings point to a deficit in the recognition of emotions in autism which goes beyond the recognition of facial expressions (which are associated with functional impairment in social interaction skills), meaning behavior can be defined as a response of the interrelated system to the inputs and the variety of actions by the system in relation to oneself and the environment.

In summary, adaptive behavior and emotional problems are associated with social and daily living skills, which suggest that emotional communication ability is closely linked to the behavioral development of individuals with ASD.

STUDY LIMITATIONS

One limitation of this study was that only ten children participated, which is usual in research of these characteristics who are based on the analysis of the effectiveness of the programs applied to people with special educational needs, but this aspect does not invalidate the findings found in relation to the adapted programs evaluation to improve the behavior in students with ASD and contribute to the future of research of the specific programs relating emotional and behavioral aspects.

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