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**INFLUENCE OF MUSICAL EXPERIENCES DEVELOPMENT OF**  
**CHILDREN WITH AUTISM SPECTRUM DISORDER**

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*Abstract*

During the first years of life, the pillars of human development are consolidated; for this reason, child development must be adequately stimulated, more so if we are dealing with disabilities or disorders. Children with Autism Spectrum Disorder (ASD) require innovative treatments to rehabilitate and positively affect their quality of life. Thus, musical interventions imparted through early stimulation develop psychomotor aspects in children with ASD and become a nonverbal communication method which fosters a relationship with these members of society. Objective: To determine the influence of musical experiences as early stimulation activities for the psychomotor development of children with ASD at the Center for Child Development of the University of Cuenca, 2017. Methodology: The research method used is descriptive, quantitative with a quasi-experimental, pre-test/post-test and a non-equivalent control group. The results were analyzed with statistic package SPSS 15.00; using frequencies, percentages and probability rate. The instrument that was used before and after the intervention was the scale for motor and cognitive assessment Brunet Lezine. Results: Within the intervention group, the effectiveness of the use of the musical experience was 11.60%, with a correlation of 0.975 and a significance of  $p < 0.005$ .

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**Keywords:** Autism spectrum disorder, early stimulation, musical intervention, psychomotor development.



## 1. Introduction

The use of music in early childhood has vital meaning for development and learning. According to Bernal, Espelde, & Rodríguez (2010), music, as a universal way of expression, is an indispensable tool in child development, because it “*acts over the central nervous system provoking relaxing and stimulating effects*” (p.1).

Soria, Duque, & Garcia (2011) express that musical activity is attractive and multi-sensorial, with a neuronal base because it affects different brain areas including the pre-frontal cortex, pre-motor cortex, motor cortex, somatosensory cortex, temporal lobes, parietal cortex, occipital cortex, cerebellum and limbic regions including the amygdala and the thalamus, being different from any other stimuli or cognitive process.

Authors of international studies, such as Overy & Molnar-Szakacs (2009), who used music in the treatment of children with ASD, found that the performance of musical activities in autistic groups develops imitation skills, respect for turn taking, social reciprocity, group attention and empathy. So, they concluded that independent of the style, form or musical activity used, the children with ASD are benefited by the different musical expressions.

For Martínez (2009), early stimulation is considered as the group of actions that: (i) promote physical, mental and social development of the child, (ii) prevent and/or intervene in psychomotor delay, (iii) heal and/or rehabilitate motor alterations, sensory deficits, intellectual disabilities, language disorders (iv) achieve the immersion of these children in their environment (p.4). It is important to consolidate and draw together musical experiences as a cross curricular topic for early stimulation.

In the paper by Saldaña & Saquicela (2014), all the chronic and early onset episodes that have a problem in the acquisition of motor, language and social skills in common, are defined as psychomotor development disorders. These cause a meaningful impact in the developmental progress of a child. The delays in early stages can be associated to disabilities, such as intellectual disability, brain paralysis, autism spectrum disorders, language disorders and learning problems. Thus, the need for early rehabilitation.

The scope of the present study was to carry out a musical intervention on children with ASD in the Center for Childhood Development of the University of Cuenca (CEDIUC). One of the limitations that restricted the present study was the fact that we could not count with a bigger number of participants for the research, due to the technical characteristic of working with a vulnerable group. Therefore, the obtained results cannot be generalized for all the ASD population. Because of the lack of research in this subject, we consider that the obtained information in the present study will benefit the different institutions for childhood attention. Also, through the obtained research, musical experiences could be proposed and organized to the satisfaction of the different needs of children. Also, we could understand the extent of the use of music as a variable that influences in the development of children with ASD.

Thus, this study examined and described the influence that the use of music generates in the intervention of early stimulation in the psychomotor development of children with ASD in the studied context. A contribution to the appreciation of musical experiences in childhood development as a way of learning will be made creating a base line for the intervention in different aspects of early stimulation, as well as a guide for following research about the answers that the use of music provokes in development and human treatment.

## 2. Problem Statement

Healthy Children Organization (2016) mentions that one out of 68 infants is affected by ASD. This rate is 5 times greater in male children than in female children.

Ecuador does not have clear data regarding the prevalence of ASD. According to data published by (SETEDIS) Technical Secretariat for Disabilities and supported by world prevalence 21 out of 100 thousand children are born with autism. It is estimated that there are about 140 thousand people with this condition. Due to the work carried out by organizations from the civil society which have generated different projects, ASD is known in the country. SETEDIS is developing action plans since 2015 in the following areas: Early onset, diagnosis, education, total or integral inclusion, research and generation of new knowledge about this syndrome.

*“ASD is a severe neurodevelopment disorder produced by abnormal development of the brain during prenatal stages and during the first years of life. This disorder is considered to be manifested throughout life”* (Pineda, 2014, p. 1). For this reason, it needs to be diagnosed early and adequately in order to give the appropriate therapy which will prevent, and/or reduce the difficulties of this disturbance.

Martos & Llorente (2013) agree that the importance of early intervention has a significant impact in the progress and prognosis of children with ASD. Early quality attention favors the development of the child, reduces the severity of the symptoms and improves the quality of life of the child and the family.

A proposal that helps to face the difficulties produced by ASD is using music which facilitates pre-verbal interaction to establish interpersonal contact, attention, understanding, communication and sociability between the two parts. Korejwo (2012) says *“music has been used by therapists to facilitate communicative behaviors and social commitment on autistic people”* (p. 15). Using music with children with ASD has produced positive results. According to Benenson (2012) the systematic use of music “opens communication channels” because people with autism communicate by using non-verbal systems; he affirms that people with autism announce themselves by means of their bodies, their movements, the way they stare. This therapy improves these people’s quality of life. For Schumacher & Calvet (2007) musical language is used as an alternative form of communication, based on its most primitive elements (rhythm and percussion) and is able to generate joined attention stages between the child with ASD and the therapist.

## 3. Research Questions

- 1) How does the use of musical experiences influence the psychomotor development of children with ASD?
- 2) What is the variation in the Development Quotient (DQ) of children with ASD from the experimental group and the control group before and after the intervention?
- 3) What are the characteristics (classification, severity level and participation) in each of the researched samples before and after the musical intervention?

## 4. Purpose of the Study

The purpose of the present study is to describe and learn about the influence of musical experiences as tools for early stimulation therapies in ASD children’s psychomotor development that attend the Center

for Child Development at the University of Cuenca. In this sense, we tried to demonstrate the improvement in the Psychomotor Development Quotient after the intervention by using musical experiences. We also carried out individual characterizations of each participant about the emotional traits and the child's participation in each work session.

## 5. Research Methods

### 5.1. Research Design

According to Hernández, Fernández, & Baptista (2010), the present study was carried out under a positivist paradigm; considered as a dominant model in social sciences with the objective of explaining, describing, controlling phenomena and verifying theories. A quantitative approach was used because it follows a sequential and descriptive process by means of a numerical analysis of the obtained data and thus, is able to answer the research questions. Its scope is exploratory because it deals with an innovative perspective and prepares the ground for further studies. It has a quasi-experimental design with pre and post-tests with non-equivalent control groups (Sousa, Driessnack, & Mendes, 2007).

### 5.2. Research Hypothesis

Musical experiences used for early stimulation present a positive effect in the psychomotor development of children with ASD from the Center for Child Development at the University of Cuenca.

### 5.3. Population and Sample

The population for this study are all the children with ASD from the Center for Child Development at the University of Cuenca (N= 10). They have a confirmed clinical diagnosis and must be between the ages of 3 and 6 years old.

The sample corresponds with the universe, carried out in 10 cases, establishing: (n=5) experimental group, (n=5) control group. The type of sampling is randomly stratified because it assigns each group of participants of similar age, analogous level of severity and similar degree of difficulty according to the pre-test.

- Inclusion criteria: All the children with a confirmed diagnosis of ASD whose legal representatives accept the child to be part of the intervention prior to their informed consent.
- Exclusion criteria: (i) All the children whose diagnosis does not belong to ASD. (ii) All the children whose ASD diagnosis is associated to another type of syndrome (West syndrome, Down syndrome, etc.). (iii) Children with ASD diagnosis whose parents refuse their participation in the study.

### 5.4. Research Variables

**Independent variable.** - Music as an early stimulation activity. The use of musical intervention in individualized therapies, during 12 sessions twice per week for 30 minutes each, using personalized plans is specified. Musical intervention does not refer only to listening to music but interacting with it by producing sounds, rhythms and harmonies through the body and musical instruments. For this effect we

followed the previously explained process from the adaptation stage (to learn about the sound identity of the children (musical history) and each one of the interventions according to their needs and individualities.

Regarding the control group, they had 12 early stimulation sessions twice per week, for 30 minutes per session. Integral methodology was employed (ludic techniques, art, corners, multisensory stimulation) which is the usual way of working at the institution according to the needs of each individual child. The only difference was that music was not used at all.

The time allotted for intervention is justified by the time assigned by the institution for each therapeutic session in each area (30 minutes). The 12 sessions were organized according to the time the university assigned. Additionally, scientific studies were found that encompass similar sessions regarding the time allotted for them (Arce, Catellanos, & Flores, 2015; Maider, 2012) among others.

**Dependent variable.** - The impact of music in the psychomotor development of the intervention group in the present study. It refers to, according to Costas (2009), the developmental level reached by the children considering the following areas: i) Postural control and general movement, ii) visual motor coordination and adaptability to the objects, iii) language and its comprehensive and expressive functions, and, iv) social and personal relations

**Intervening variables.** - The severity level of ASD and the typology of each case.

**Control variables.** - Sex and chronological age.

## 6. Findings

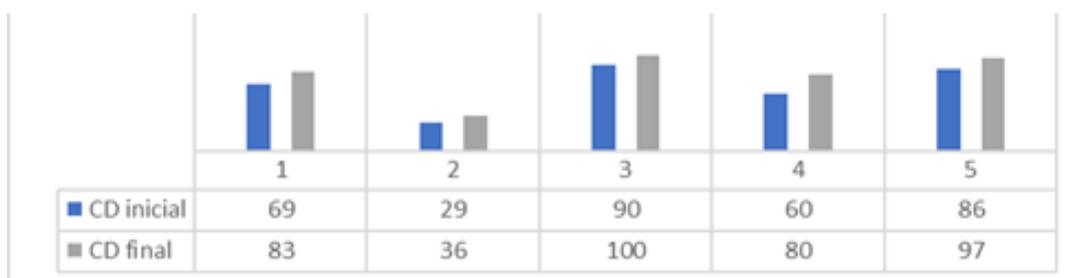
### Impact of musical experiences in the psychomotor development of children with ASD after the intervention

**Table 01.** Initial and final DQ scores – Development profile for the intervened group

Case no.	Sex	Initial DQ	Final DQ	Initial Profile	Final Profile
1	Male	69	83	Global delay	Normal
2	Female	29	36	Global delay	Global delay
3	Male	90	100	Normal	Normal
4	Male	60	80	Global delay	Normal
5	Male	86	97	Normal	Normal

Source: Own compilation

Interpretation: On table No. 1 we can see the punctuations for each case regarding initial and final DQs as well as the initial and final development profiles. In the first case, the child increases his DQ from 69 to 83, his development profile goes from global delay to normal psychomotor development. In the second case, the child goes from 29 to 36 DQ retaining the global delay in her psychomotor development. The third case goes from 90 to 100 maintaining a normal psychomotor development. In the fourth case his DQ goes from 60 to 97, and his development profile changes from global delay to normal psychomotor development. In the fifth and last case the DQ changes from 86 to 97 maintaining a normal psychomotor development profile.



**Figure 01.** Initial and final DQ punctuation for the intervened group

On the third graphic the increase in each case stands out by observing the variation of the DQ.

**Table 02.** General psychomotor development results according to the development profile in the pre and post-tests. Source: Own compilation

Psychomotor development	Pretest	Post-test
	N (%)	N (%)
Global delay in psychomotor development	3 (60%)	1 (20%)
Normal psychomotor development	2(40%)	4(80%)
N= 5		

Interpretation: Table No. 2 highlights psychomotor development, regarding the global delay profile in psychomotor development on the pre-test is 60% whereas the post-test shows that it decreased to 20%. On the normal profile the pre-test showed 40% and increased to 80% on the post-test. Such results allow us to say that there are significant differences in psychomotor development on the experimental group after the intervention when using “musical experiences as activities for early stimulation in children with ASD”.

Comparison of the psychomotor development progress in children with ASD between the experimental and control groups before and after the intervention.

T test was used for this effect for related samples taking the pre-test and post-test results both in the experimental and in the control group.

**Table 03.** Statistics of related samples. Source: Own compilation

	Intervened group		Control group	
	M DQ	DE	M DQ	DE
Pretest	66.80	24.427	60.80	13.142
Post test	78.40	25.006	64.60	12.341

Interpretation: After the research, the results obtained in the T-test for related samples in pre-tests and post-test show that both groups presented advances: the intervened group obtained a pre-test average (mean on the initial DQ) of 66.80 (24.427) and a post-test average (mean on the final DQ) of 78.40 (25.006). This refers to the DQ obtained before and after the intervention on children with ASD. The control group obtained an average pre-test (mean on the initial DQ) of 60.80 (13.142) and the average on the post-test was (mean final DQ) 64.60 (12.341) again referring to the DQ obtained in each phase, we can see greater effectiveness in the group that received the intervention based on musical experiences.

**Table 04.** T-test for related samples: differences between the research groups' pre-test and the post-test based on the average of the pre-test and post-test. Source: Own compilation

Intervened group	Control group
11.60	3.80

Interpretation: Taking the results obtained on the T-test for related samples as a reference, a greater effectiveness may be observed in the experimental group which received musical intervention as part of the early stimulation therapies achieving an 11.60 improvement (average difference between the pre-test and the post-test) in three months. Whereas the group that received early stimulation therapies without musical experiences during the three months obtained a 3.80 effectiveness.

**Table 05.** Sample correlations. Source: Own compilation

PRE-TEST – POST-TEST.	Intervened group			Control group		
	N	Correlation	Sig.	N	Correlation	Sig.
	5	.975	.005	5	.995	.000

Interpretation: The results on Table 5 show a correlation of the experimental group of .975 with a significance of  $p=.005$  in the 5 cases. Whereas the control group show a correlation of .995 with a significance of  $p=.000$ .

There is a significant difference in psychomotor development of the experimental group after the intervention with musical experiences within the examined group.

## 7. Conclusion

Throughout the research, we have highlighted the importance of childhood development, of attending and setting the foundations that will sustain the future development of our children affecting their quality of life. We have also highlighted the integrity of these processes by looking at childhood disabilities and among them, ASD with innovating proposals, in this case, musical experiences as a way of learning. The reference material in this study and the generated experience through musical intervention confirm the importance of music in the global development of children through the following conclusions:

\*Musical experiences as a tool for early stimulation based on improving and/or enhancing the psychomotor development of children with ASD that attend the Center for Childhood Development of the University of Cuenca showed a significant influence.

\*It was proven, in the researched group, that by using different musical experiences, based on a sequential systemic therapeutic process that respects the individualities of each child, there was an impact in their psychomotor development, increasing their Development Quotient.

\*Music was beneficial in the intervened group by opening up different communication channels between the child and the therapists. It also developed motor and social skills.

\*The intervention based on musical experiences established to enhance the psychomotor development of children with ASD that attend the Center for Childhood Development at the University of Cuenca showed favorable and encouraging results, not only for the objective established for this research,

but it also affected the quality of life of the participants improving their development level by increasing their communication and attention.

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