

Effects of Listening Music on Cognitive Abilities of Children with Intellectual Disability

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Abstract

The study aimed to investigate how listening music affected the cognitive abilities of children with Intellectual Disability (ID) between the ages of 5 to 12. It also looks at how effective music education is when combined with a well-defined curriculum. The nature of the study was causal comparative. A convenient sampling technique was used to choose two institutes. There were two student groups. Group one had attended the music classes three times a week for three months while other group did not attend the music class. The results of the study showed that children with ID who took music classes had a significant effect on their cognitive capacities. The study provided a clear depiction of the use of music in the lives of children with ID not just as a form of entertainment and pleasure.

Keywords: *Music listening, cognitive abilities, children with Intellectual Disability*

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Introduction

Children must develop the best of their cognitive abilities since these traits are linked to survival, long-term health, and human capital (Casanova et.al., 2021). Components of cognition are awareness, focus, memory, working memory, pattern recognition, executive function, idea generation and reasoning, intelligence, and academic performance (Samuel et.al., 2017).

The term "cognitive" refers to everything concerning understanding, learning, and thought processes. As a result, when you hear individuals discussing cognitive abilities, they refer to many elements of brain function, such as learning new skills, paying attention, and digesting the vast amount of information that comes into our everyday lives. Music is one of the universal languages. The therapeutic advantages of music are being acknowledged by modern science and medicine. In the fields of special education, rehabilitation, mental, and physical health, utilizing of music as a therapeutic tool for individuals with special needs has growing interest (Sarkar & Biswas, 2015). The entire topic of music medical therapy is currently receiving attention from throughout the world (PV, 2018). Oxytocin is a neurohormone that the human body makes. It is a kind of love hormone, when a person is thrilled or feels a romantic relationship, their body releases oxytocin. Children with special needs develop as a result of abnormal brain due to deficiency of oxytocin. One useful strategy for raising oxytocin levels among these kids is raga therapy. There are differences in the effects of Vilambat (slow), Madhaya (mid), and Durt (rapid). Raga Ayeman revealed that it leads to a change in emotions from calm to happiness. Utilization of different tempos i.e. slow, medium, and fast have different effects (Chauhan et al., 2022).

Lyric reading is less successful than music therapy in helping individuals with Alzheimer's disease (AD) improve their verbal fluency, it was useful to reduce mental symptoms and anxiety of caregiver. According to analysis, music therapy can help patients with mild AD improve their memory and language skills, while patients with moderate or severe AD can experience fewer mental symptoms and caregiver discomfort (Lyu et.al., 2018). It is critical to keep promoting music as an affiliated therapy for older persons with dementia (Fusar et.al., 2018). The majority of research indicates that music therapy and other musical therapies are beneficial for improving mood, depressive symptoms, and quality of life in neurological patients (Raglio et.al., 2015). In the light of various research, it is concluded that music can be used as intervention to develop cognitive abilities of children with ID.

Statement of the Problem

Cognition is the core area for a child to move ahead in other developmental areas of life. Children with ID have to face difficulty in this area. Most of them have low IQ level and sometimes they are unable to perform daily living skills. Although different activities are designed to tackle this area, but music is one of the techniques to improve this area. Music is neglected in special education system, and it was less frequently used as instructional strategy. We have music teachers, instruments and children with ID but why we are not using it to develop cognitive abilities of these children. Music is a powerful tool to be used for various purposes. Cognition is the fundamental area of children with ID. Therefore, it is needed to use music as an intervention and teaching strategy to address this area for children with ID.

Objectives

The objectives of the study were:

- To examine the effects of listening music on cognitive abilities of children with Intellectual Disability.
- To compare the effects of cognitive abilities of listening music and non-music groups of children with Intellectual Disability.

Methodology

- **Research Design**

A causal comparative study was conducted in public and private schools in Rawalpindi and Islamabad to examine the effects of music on the cognitive capacities of children with ID.

- **Population**

All confirmed and diagnosed children with ID studying in public and private institutes in Rawalpindi and Islamabad. These children had gone through diagnostic criteria by the professional psychologists. There was a total of 425 children with ID from ten different institutes.

Table given below shows the number of children with ID in special education institutes in Rawalpindi and Islamabad. It can be examined that there were ten institutes in Islamabad and seven institutes in Rawalpindi.

Table 1

Number of children in Special education & selected normal Institutes in Rawalpindi and Islamabad.

Sr. No	Name of Institute	Region	No. of children with ID
1	Rehabilitation Centre for Children with Developmental Disorder (RCCDD), H-8/4 Islamabad.	Islamabad	130
2	National Training Centre for Special Persons, G-9/2 Islamabad.	Islamabad	20
3	Govt Special education centre for MCC, Shadab, Gulrez-II near Swan Adda, Rawalpindi.	Rawalpindi	70
4	Army Special Education Centre, Fort Road Rawalpindi.	Rawalpindi	80
5	Chambeli Institute for Mentally Challenged, Rehmanabad Rawalpindi.	Rawalpindi	45
6	Well, Being Centre (WBC), Mid City Apartments, Khokhar Road Azeem Town, Rawalpindi	Rawalpindi	20
7	Step to Learn, I-8, Islamabad	Islamabad	35
8	ASAS International School, Nazim-ud-Din Road, F/8-3 Islamabad.	Islamabad	15
9	Care for special persons, I/8 Islamabad	Islamabad	13
10	Umed-e-Noor Center for Special Children, H/8-1 Islamabad.	Islamabad	35
11	Bahria College of Special Education, Shangrilla Road, Naval Complex, E-8 Islamabad.	Islamabad	55
12	Center for Profound Education (CPE), 151-A Sir Syed Avenue, Gulrez 6 Rawalpindi.	Rawalpindi	10
Total			528

Sample

For the study, the purposive sampling technique was employed. Only institutes where children with ID attended music lessons were included in the study. The sample of the study were sixty children with intellectual disabilities, ages five to twelve, who were enrolled in public and private special education schools in Islamabad and Rawalpindi. Of these, thirty

pupils attended the music classes, and the remaining thirty students did not. Participants in both groups were male and female.

Procedure of the study

Two groups of research participants were formed. Children with listening music in the class were placed in group one and children without listening to music were put in a other group. A questionnaire was used to gather data. A set of seventeen items was developed to evaluate the participants' cognitive ability.

Ethical Consideration

Children with ASD in special education institutes and in a general education school were asked to participate in the study willingly. Surety of confidentiality was given to parents, teachers and the administrations of the institutes. Data were only used for research purposes. Data were not shared with any other person, institute, or department.

Instrument Procedure

A cognitive assessment tool for kids with intellectual disabilities was developed. The core area of the questionnaire's test items was cognitive skills, which addressed big/small, color concepts, open/close, over/under, full/empty, long/short, transportation modes, and similar concepts. These concepts were mentioned in Curriculum for the children with Intellectual Disability (1997), which was created by Senior Teacher Aqeela Begum of the National Institute of Special Education (NISE), Islamabad. Five experts with M.Phil qualification in special education and five years of experience teaching students with ID validated and approved the tool.

To validate the questionnaire, a pilot study on sixteen children with ID was conducted. Among the sixteen pupils, eight had participated in the music courses, and the remaining eight had not. The tool's reliability was determined by pilot testing and Chronbach alpha as 0.786. The sample did not include the children those participated in the pilot testing.

Data Collection

Data was collected through questionnaire made to compare the mean scores of subsections of cognitive abilities of children with ID for music and non-music group. Each respondent was invited to come in individually to provide their answers. After that, purpose and items of the tool was explained. They were able to react suitably to each item in this way. The

teachers of students were requested to be present at the time of form filling for the convenience and authentication of data. Various visual images were shown to the children with ID to get responses on big/small, color concepts, open/close, over/under, full/empty, long/short, transportation modes, and similar concepts. The children with intellectual disabilities provided the data directly. After analysis, the gathered data was shown in tabular form. Version 26 of the Statistical Program for Social Sciences (SPSS) was utilized to analyze the data.

Data Analysis

Table 1
Frequencies and Percentages for the children with ID (n=60)

Sr. #	Categories	F	%
1	Gender		
	Male	48	80
	Female	12	20
2	Age		
	5-6	6	10
	7-8	14	23
	9-10	19	32
	11-12	21	35
3	Music group		
	Male	25	42
	Female	5	8
4	Non music group		
	Male	23	38
	Female	7	12

Table 1 delineates that 12 respondents (20%) were female and 48 respondents (80%) were male. Children with exceptional disabilities ranged in age from 9 to 16. Six (10%) of the responses were in the 9–10 age bracket. According to the table, 14 (or 23%) of the responders were in the 11–12 age range. The special needs children, 19 (32%) were aged between 13 and 14 and 21 (35%) were aged between 15 and 16. There were two sets of children with special needs. The first group was who attended the music classes. There were 5 (8% female) and 25 (42%) male members in this group. The second group of students consisted of 23 (38%) male and 7 (12%) female children with ID who did not attend the music.

Figure 1

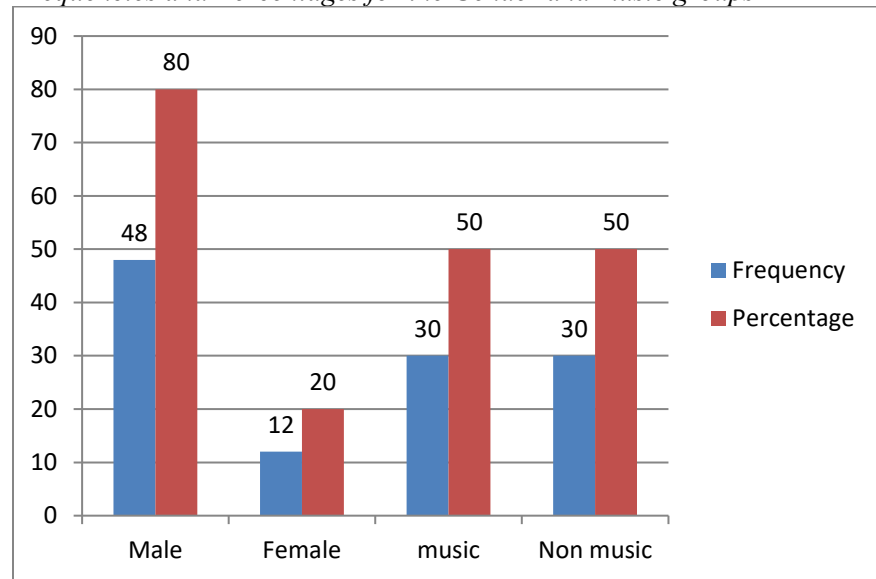
Frequencies and Percentages for the Gender and music groups

Figure 1 depicts prevalence and percentages of the gender and music groups among children with ID. There were 48 with 80.0 % males in the study. For females, the frequency was 12 and 20.0 %. For both music and non-music students, the frequency was 30 with 50.0 % respectively.

Table 2

Descriptive statistics of children with ID regarding gender and listening music

Category	Mean	SD	Variance
Male (48)	21.90	2.92	8.58
Female (12)	23.00	2.80	7.72
Music group			
Male (25)	25.50	2.08	4.35
Female (5)	23.00	1.64	2.70
Non- music group			
Male (23)	18.71	1.20	1.52
Female (7)	19.31	1.22	1.51

Table 2 displays the Mean, SD, and variance for the tool I and tool II groups related to gender, music, and non-music. For both tool I groups,

the mean value of the male is greater than that of the female. In comparison to female students, the mean value of male students who took music classes and those who did not is higher. It illustrates how music has a greater influence on male music students than female students. In the tool II non-music group, mean value for male students is lower. It expresses the idea that males in a music group are more influenced by music than females. Students in the non-music group have a lower mean value than those in the other group.

Analysis of Cognitive Abilities; Subcategories

The cognitive abilities of the children with ID are analyzed and displayed in the accompanying tables. Each subcategory of cognitive abilities i.e. conceptual abilities, sorting, classifying, visual memory, and auditory memory were analyzed. Mean, SD, and Variance are described in the following tables.

Table 3

Descriptive statistics of subcategories of Cognitive abilities

Tool-I	Mean	SD	Variance
Sorting	2.60	0.60	0.36
Shapes	2.02	.257	0.05
Auditory memory	2.37	0.77	0.60
Conceptual abilities	7.34	1.59	2.56
Visual memory	3.47	0.58	0.34
Classifying	4.07	0.26	0.06
Mean of Means	3.64	1.95	3.83

Table 3 presents the Mean, SD, and Variance for each subcategory of cognitive abilities. The table shows that the overall mean value of conceptual ability is greater, at 7.34. It demonstrates that music has the greatest impact on the cognitive ability subcategories in children with ID.

Table 4
Gender Difference on data (n=60)

Variables	Male (n=48)		Female (n=12)		t	p
	M	SD	M	SD		
	21.90	2.92	23.00	2.80	.098	.024

$\alpha = 0.05$

Table 4 reveals a significant gender difference between males and females at the $\alpha = 0.05$ level of significance. We can conclude that there are differences in the cognitive skills of men and women. As a result, children with ID exhibit cognitive differences based on gender.

Table 5
Overall Effects of listening music on cognitive abilities of children with ID

Variables	Music (n=30)		Non music (n=30)		t	p
	M	SD	M	SD		
Children with ID	24.35	3.88	19.55	1.50	8.85	.000

$\alpha = 0.05$

The level of significance of music at $\alpha = 0.05\%$ is seen in Table 5, which demonstrates the notable musical differences among the data related to children with ID. It is evident that children with ID experience strong, significant differences in their cognitive capacities between music and non-music groups.

Discussion

A recent study examined how music therapy affected the social skills of educable children with intellectual disabilities. The study employed a pretest-posttest control group design and was quasi-experimental in nature. The experimental group underwent 12 sessions of music therapy as part of the intervention plan, while the control group received no treatment at all. The study's findings demonstrated that music therapy enhanced the social skills of academically capable children with intellectual disabilities, with noteworthy effect on "cooperation" solely in the experimental group (Mansouri & Naseri, 2023). The present study has also found the similar results. It was causal comparative study. The results

explored that child taking music class had significant difference on their cognitive abilities as compared to non-music groups.

To examine the effects of music young adolescents between the ages of 12 and 15, music intervention was given four days a week, for sixteen weeks, the intervention was administered for one hour each. A t-test was used to determine the pre- and post-test scores. The study's conclusions showed that there was a significant difference between the experimental and control groups. It has been discovered that the Ragas' musical compositions Bilawal, Bhopali, and Khamaj are good for fostering learning objectives, self-assurance, and self-control (Tiwari et al., 2018). Resembling results were also seen in this study that children with ID taking classes had significant difference on cognitive abilities as compared to non-music groups.

Conclusion

Music was found an effective intervention to enhance the cognitive abilities of children with ID. Classroom performance of these children can be increased through listening music as they need to understand the use of cognitive abilities. So, these children will be able to perform Activities of Daily Living (ADL) which is the core area of these children. Once they learn the basic required skills of daily life, they will become autonomous. We can make them independent at home, school, society, and workplace.

Recommendations

Music listening is an effective strategy to develop the cognitive abilities of children with ID. It can be used as an instructional strategy in special education set up.

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