

Music and Movement in Improving Academic Outcomes in Autistic Preschoolers

Sophia DeOliveira^{1,3}, Donielle Walters, M.Ed²

¹William P. Clements High School, Sugar Land, TX

²Early Intervention Academy, Quail Valley Elementary School, Missouri City, TX

³Gifted and Talented Mentorship Program, Fort Bend ISD, TX



Abstract

- This study examined the possible relationship between music and movement activities and academic success in autistic preschoolers.
- Observational data was collected during classroom instruction using field notes, a checklist with academic criteria, and a Likert independence scale to assess students' ability to complete educational tasks.
- Results showed a positive correlation between music and movement activities, particularly mathematics, with movement appearing to have a greater influence than music.
- Findings suggest testing students after music and movement activities may improve retention of academic material, and ensuring group and individual participation may improve activities' effectiveness on learning academic material.

Introduction

- Autism spectrum disorder (ASD)** is a neurodevelopmental disorder characterized by **challenges** in social skills, communication, repetitive behaviors, and sensory processing [1].
- Sensory processing** is how the brain interprets sensory information [2]. Autistic individuals experience **hypersensitivity** (being more sensitive to stimuli) and/or **hyposensitivity** (being less sensitive to stimuli) [2]. Processing **auditory information** is the most difficult sensory information to process for those with ASD [3,5].
- Autistic individuals also struggle with **multisensory integration (MSI)** or integrating sensory information across multiple sensory systems [3]. The hardest senses to integrate for those with ASD are **auditory and visual information**. The autistic brain perceives the two different sensory inputs as separate events rather than inputs that need to be combined and interpreted as one event [3].
- One way to target this for autistic children is through **multisensory instruction**, an educational approach that engages multiple senses simultaneously. Multisensory instruction stimulates various areas of the brain, **creating and strengthening neural pathways** that make learning resilient and more effective [4,5].
- Music and movement activities** are a form of multisensory integration used through multisensory learning, **strengthening cognitive and social skills**, and **bolstering academic success** [6,7,8,9].

Summary

- This study will investigate **how music and movement activities affect preschool students with ASD**, specifically whether they are **positively associated with strong academic performance and improved learning outcomes**.
- Prior Limitation #1:** most research in music and movement interventions/activities involve elementary or middle school students, with few including preschoolers.
- Prior Limitation #2:** most research prioritizes behavioral, social and cognitive outcomes over academic outcomes.

Methodology

- This study will take place at the **Early Intervention Academy (EIA) at Quail Valley Elementary School**, a special needs program supporting preschoolers and kindergartners in developing the skills necessary to thrive in neurotypical classrooms.
- This study involves a **Pre K 3 - 4 class** with one female teacher, one female paraprofessional, and **six children**: four males and two females.
- This **naturalistic observational study** collected data during music and movement activities, and during music and speech therapies, within a **two-hour window each day across five selected days over two weeks**.
- Music and movement activities:** activities containing a song or music where students are encouraged to make movements, gestures, or finger motions.
- Academic success:** students' ability to perform learning intentions independently, or when prompted with music and/or movement from prior music and movement activity.
- Data collected using **field notes, a checklist with academic criteria, and a Likert scale** rating the **independence** of the students' academic performance.
- Interviews** also conducted with **teacher, paraprofessional, and music and speech therapist** to understand connection between music and movement and student development.
- All participants of study were informed, and consent was provided to conduct observations and interviews. Students are only referred to as numbers to maintain confidentiality of their identities.

Results

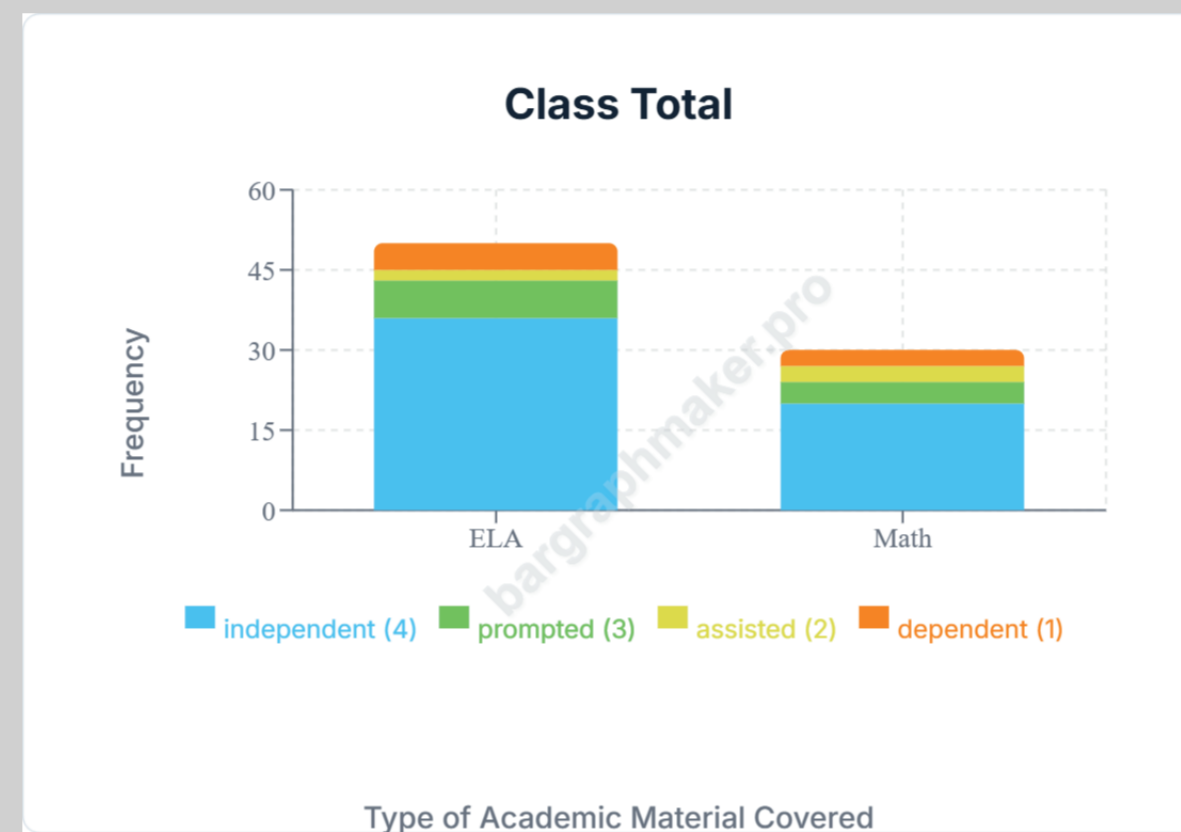


Figure 1: The total class number of tasks and the independence score given to those tasks, split by the type of academic material covered in the educational tasks. The majority of the tasks and learning intentions were labeled independent (4).

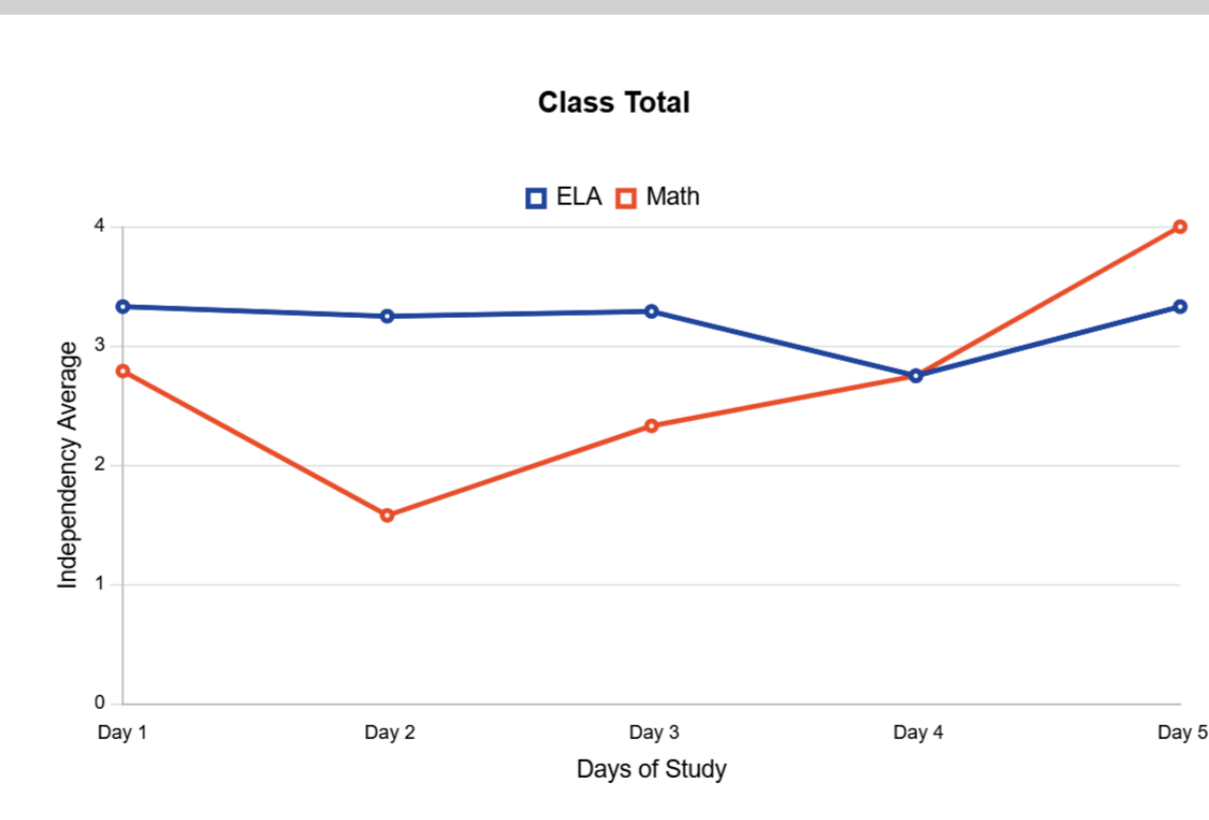


Figure 2: The total class average independence score on each day of the observational study. Most of the students showed improvement in mathematics, while fewer showed improvement in ELA.

Findings

- ELA curriculum:** vocalizing/verbalizing all letters of the alphabet and their sound; identifying the letter of the week and its sound.
- ELA music and movement activities:** an alphabet song with the letters and their sounds with movement for every sound, a song for the letter of the week and its sound.
- Mathematics curriculum:** counting numbers from 1 - 10 or from 1 - 20; identifying and counting to the number of the week.
- Mathematics music and movement activities:** a number song with claps counting from 1 - 20, two different songs with dancing movements from each number from 1 - 10.
- Overall, the students showed mostly independence after music and movement activities in both ELA and mathematics tasks** (Figure 1). They also **improved in mathematics** while staying about the same in ELA throughout the study (Figure 2).
- Might be a positive association** between music and movement activities and the academic outcomes of autistic preschoolers; however, memorization and repeated exposure could have a confounding influence.
- Some students **did not have data collected** on certain days, either due to **absences or disruptive behavior in class**, which interfered with classroom instruction and assessment of students. The researcher had to intervene on multiple occasions.
- When the teacher tested students on ABCs and their sounds, some students were not able to associate a letter with its sound or vocalize the sound; however, when the **teacher demonstrated the movement for the letter, the students responded almost immediately** and often imitated the movement while saying the sound.
- The music and speech therapist emphasized the importance of **music and movement in capturing attention** and as a tool to **communicate and participate in social events** with peers. They also utilized music and movement in therapy as a dynamic, effective learning strategy.

Discussion

- Limitation #1: short duration;** a longer study would show more comprehensive progress and development of the students in using music and movement activities. Future studies should span throughout the school year and track the students' academic progression monthly.
- Limitation #2: naturalistic observational study;** restricted the ability to determine a causal relationship between music and movement activities and academic success. Future studies should be experimental to determine causation and strengthen results.
- Limitation #3: small sample size;** due to age of participants and difficulty finding a large, representative sample of young autistic children.
- Limitation #4: disruptive behavioral issues** of autistic children and the **age of the participants;** led to difficulty in collecting data, which reduced effectiveness of results.
- Constant testing** after the music and movement activity may help **increase long term retention of academic information** and should be added after music and movement.
- Since students usually responded correctly when teacher demonstrated a movement rather than singing the music from the activity, **movement may have a greater influence than music on learning for autistic preschoolers**. Future studies should experiment by using music and movement as separate treatments rather than combining them like in this study.
- Ensuring **group and individual participation is key** to effective results from music and movement activities along with the repeated testing.

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