*Article/Review*

# Music and Neurodivergent Children: What Does the Research Show?

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**Abstract:**
This narrative review examines research on music and neurodivergent children, with particular attention to autism and ADHD. It brings together findings from clinical studies, neuroscience, systematic reviews, and meta-analyses to examine whether music may support communication, social interaction, emotional expression, and participation. The evidence suggests possible benefits for some autistic children, but findings vary depending on the children studied, the type of musical activity, and the outcomes researchers measure. Research on ADHD and other forms of neurodivergence remains much more limited. Findings from autism research therefore cannot automatically be applied to all neurodivergent children. Rather than asking simply whether music "works," this review suggests asking what kinds of music may help which children, and with what. Music may offer some children another way to communicate, express themselves, participate, and connect with others.

**Keyword:** music therapy, neurodivergent children, autism, ADHD, social communication, neuroscience.

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## Introduction

My interest in music and well-being started during COVID-19. Our Aunt Margaret was 93 and lived in a senior living facility. When visitors were no longer allowed inside, we could only see her from outside her balcony. Sometimes I brought my violin and played for her. Before long, some of her neighbors began coming out onto their balconies to listen too. What started as playing for one person became a small outdoor concert. Seeing people smile, laugh, and applaud during such a lonely time made me think differently about music. It could be about more than practicing for a performance or competition. Music could also bring people together.

A few years later, I read Susan Magsamen and Ivy Ross's *Your Brain on Art: How the Arts Transform Us* [1]. The book introduced me to research on how music and other forms of art can affect the brain, emotions, and well-being. It was an "aha" moment. Something I had experienced personally was also something scientists were studying. The book helped inspire *Arts for Adversity*, a project I created to explore the role of art during difficult experiences. Later, through summer courses in neuroscience, I learned more about the brain and became interested in research on music and music therapy.

More recently, I began teaching weekend music classes to neurodivergent children in Tashkent with students from a local conservatory. This made my questions more specific. What does research actually tell us about music and neurodivergent children? Which children have researchers studied? What changes have they found? And how strong is the evidence?

One problem became clear as I read more of the research. "Neurodivergent children" is a broad category, but most of the studies I found focused on autistic children. Research on children with ADHD and other forms of neurodivergence was much more limited. This matters because findings about one group of children cannot automatically be applied to another.

This review examines what current research can and cannot tell us about music and neurodivergent children, with particular attention to autism and ADHD. Rather than asking simply whether music "works," it looks at which children have been studied, what kinds of music have been used, and what researchers have counted as improvement. The evidence suggests possible benefits for

communication, emotional expression, and social interaction, especially among autistic children. At the same time, important questions remain about who benefits, which musical activities are most useful, and whether these effects continue outside music sessions.

## Review Method

This is a narrative review of research on music and neurodivergent children, with particular attention to autism and ADHD. Studies were found primarily through searches of PubMed, with university library resources used to access the articles. Search terms included combinations of "music," "music therapy," "autism," "autistic children," "neurodivergence," "neurodevelopmental disorders," "ADHD," "social communication," "emotion regulation," and "music intervention." The review includes randomized controlled trials, systematic reviews, and meta-analyses, along with several earlier studies that helped shape research in this area.

Studies were included if they examined music or music-based interventions in children or adolescents with autism, ADHD, or other neurodevelopmental conditions. Studies on music, emotion, communication, and neurodevelopment were also considered when they were directly relevant to the questions in this review. Priority was given to randomized controlled trials, systematic reviews, and meta-analyses. Studies focused only on adults or not directly related to the questions of this review were excluded.

Because this is a narrative rather than a systematic review, it does not attempt to include every study published on the topic. Instead, it focuses on major findings, differences between studies, and gaps in the current research.

## What Does the Research Show?

### Why Start with Musical Strengths?

Music is often studied as an intervention, meaning something used to improve a certain difficulty or behavior. But another question is why music might be meaningful for some autistic children in the first place. Heaton [2] reviewed research showing that autistic children who are not musical savants can still have strong abilities in areas such as pitch, timbre, musical structure, and recognizing emotions in music. She also suggests that these abilities may sometimes be overlooked and need opportunities to develop, just like the musical abilities of other children.

More recent research supports some of these earlier findings. Navarro et al. [3] reviewed 45 studies of musical processing in autistic people. They found that musical processing is often preserved and that some autistic people show particular strengths in areas such as recognizing differences in pitch.

These findings suggest that it may be useful to start not only by asking whether music can "treat" autism, but also by recognizing that music may already be an interest or strength for some autistic children. Music can offer another way to express themselves, take part in an activity, or interact with other people. This leads to a more specific question: what can music actually help with?

### Can Music Help Children Connect?

Some smaller studies have found promising results for social interaction. Kim, Wigram, and Gold [4] compared improvisational music therapy with toy play. During the music sessions, the children had more and longer periods of eye contact and turn-taking. They also showed improvements in joint attention and nonverbal communication. LaGasse [5] studied music in a group setting. Seventeen autistic children took part in either a music therapy group or a nonmusic social-skills group. Children in the music group improved more in joint attention with peers and eye gaze, although they did not improve on every measure of communication.

These studies suggest that music may help children share attention and interact with other people. But they also show that "improvement" can mean different things. A child might show more eye contact or joint attention without showing the same improvement in other areas of communication.

Other researchers have looked at changes in the brain as well. Sharda et al. [6] studied 51 autistic children between the ages of six and twelve. The children took part in either a music intervention or a similar intervention without music. The music group showed greater improvement in communication. Researchers also found changes in connections between areas of the brain involved in hearing and

movement. Some of these changes were related to improvements in communication. However, not every measure improved.

**Table 1. Summary of Key Studies Included in the Review**

| Study | Study type | Participants | Music intervention/focus | Main findings | Limitations |
|---|---|---|---|---|---|
| Kim et al. 2008 | RCT | Small sample | Improvisational music therapy | Improvements in joint attention and nonverbal communication | Small sample |
| LaGasse 2014 | Controlled intervention | 17 | Group music therapy | Greater improvement in joint attention and eye gaze | Small sample; not all communication measures improved |
| Sharda et al. 2018 | RCT with neuroimaging | 51 | Music-based intervention | Improved communication; changes in auditory-motor brain connectivity | Not all measures improved |
| Bieleninik et al. 2017 | Multicenter RCT | 364 | Improvisational music therapy + standard care | No significant improvement in primary autism symptom measure | Effects may differ depending on outcome measured |
| Geretsegger et al. 2022 | Cochrane systematic review | 26 studies; 1,165 participants | Music therapy | Possible benefits for some outcomes, including quality of life | Evidence varied across outcomes and studies |
| Ke et al. 2022 | Systematic review and meta-analysis | 8 RCTs; 608 participants | Music therapy | Improvement in social reactions; no clear improvement in several other outcomes | Limited number of studies; mixed outcomes |
| Shi et al. 2024 | Systematic review and meta-analysis | 18 RCTs; 1,457 participants | Music therapy | Improvements in language communication and social skills | Considerable variation across studies |
| Navarro et al. 2025 | Systematic review and meta-analysis | 120 studies; 15 meta-analyzed | Music interventions in autism | Promising effects across several areas | Large differences in participants, interventions, and outcome measures |
| Saville et al. 2025 | Systematic review | 20 studies; 1,170 participants | Music and ADHD | Several promising findings across different uses of music | Major differences in diagnosis, medication, and study design |
| Goes et al. 2025 | Systematic review and meta-analysis | ADHD studies | Music therapy | Trend toward improvement in ADHD symptoms, but not statistically significant | High variation between studies |
| Jiang et al. 2025 | Systematic review and meta-analysis | 7 RCTs; 337 participants | Music interventions | Positive effects for some pediatric neurodevelopmental outcomes | Differences in populations, interventions, and outcome measures |

Some earlier research was fairly optimistic. Gold, Voracek, and Wigram [7] reviewed 11 studies with a total of 188 children and adolescents and found a medium-to-large overall effect of music therapy. But later studies included many more participants. Bieleninik et al. [8], for example, studied 364 autistic children across nine countries. Some children received standard care, while others

received standard care together with improvisational music therapy. The researchers did not find a significant difference between the groups in their main measure of autism symptoms. Most of the other measures did not show significant differences either.

At first, these results seem to conflict with studies showing improvements in joint attention or communication. But the studies were not always asking the same question. Joint attention, communication, quality of life, and autism symptoms are different outcomes. Music might help with one without helping with another. This makes the question "Does music therapy work?" harder to answer than it first seems.

A larger review by Geretsegger et al. [9] shows this problem more clearly. The researchers brought together 26 studies with 1,165 participants. They found that music therapy may help in some areas, including quality of life, but the evidence was less clear for some types of social interaction and communication. The strength of the evidence also varied across the studies.

More recent meta-analyses have not completely resolved these differences. Ke et al. [10] found improvements in social reactions but not in speech, social adaptive behavior, or overall autism symptom severity. Shi et al. [11], analyzing 18 randomized controlled trials involving 1,457 children, found stronger evidence for improvements in language communication and social skills. However, the results varied considerably across the studies. Navarro et al. [3] also found promising results in several areas but pointed to major differences in participants, music interventions, and the ways researchers measured outcomes.

Another question is whether improvements continue after the music sessions end. Geretsegger et al. [9] found that some changes in social interaction and nonverbal communication appeared during the intervention but were not clearly maintained afterward. A child may become more engaged or communicative during a music session, but does that continue at home, at school, or in other situations? Something that happens during a music session may not necessarily carry over into the rest of a child's life.

All in all, these studies suggest that asking whether music therapy "works" may be too broad. A more useful question may be what music can support, for which children, and under what conditions.

**Autism Is Not the Same as Neurodivergence**

There is also a problem with using the term "neurodivergent children" too broadly. Most of the research on music and neurodivergence has focused on autism. Mayer-Benarous et al. [12] reviewed 39 studies involving 1774 children with autism, intellectual disability, ADHD, communication disorders, and learning disorders. Of these studies, 22 focused on autism, while only five focused on ADHD and even fewer looked at some of the other conditions.

More recent research has begun to examine ADHD more closely. Saville et al. [13] reviewed 20 studies involving 1,170 participants. Music was studied in several different ways, including music perception and performance, listening to music, and music-based interventions. Many of the findings were promising, but the studies differed in diagnosis, medication use, other conditions, and how music was used. This made broad conclusions difficult.

A meta-analysis by Goes et al. [14] also found that the evidence is still limited. The researchers found a trend toward improvement in ADHD symptoms following music therapy, but the overall result was not statistically significant. There was also a great deal of variation between the studies.

These findings show why autism and neurodivergence should not be treated as the same thing. Research on music and ADHD is growing, but it is still much smaller and less consistent than the research on autism. Evidence from autistic children therefore cannot automatically be applied to all neurodivergent children. More research is needed to understand how children with different forms of neurodivergence may respond to music.

**Why Are the Findings So Different?**

There is one more complication. Asking whether "music" works may itself be too broad. Moore [15] reviewed 50 studies on music, the brain, and emotion regulation. She found that people's responses can depend on factors such as whether the music is familiar or preferred and whether they are listening, singing, or improvising. In other words, different musical experiences may not affect people in the same way.

A recent study by Yang and Zhang [16] shows this more clearly. They studied 60 autistic preschool children during a 12-week music program and found that different musical activities were

associated with different outcomes. Singing was most strongly associated with social communication. Rhythm activities were associated with social motivation and joint attention, while improvising with instruments was associated with emotional regulation and nonverbal expression. The authors also did not define success as making autistic children behave more "normally." Instead, they focused on giving children more ways to communicate, express themselves, and connect with others.

These difficulties are not limited to autism research. Jiang et al. [17] reviewed music interventions and neurodevelopment in children more broadly. They found positive effects for some developmental outcomes but not others. They also pointed to differences in the ages and needs of the children, the types of music interventions, and the outcomes researchers measured. These differences make it difficult to compare studies or draw one conclusion about whether music "works."

The evidence suggests that the effects of music may depend on several things: the child, the kind of musical activity, and what researchers are trying to measure. Children may also respond differently to the same activity. This makes a more specific question useful: what kind of music may help which children, and with what?

## Conclusions

The research reviewed here suggests that music may support communication, joint attention, social interaction, and emotional expression for some autistic children. However, the evidence is not consistent across all studies. Different studies use different musical activities, include different groups of children, and measure different outcomes. Some improvements also appear during music sessions but may not continue outside them.

Another important limitation is that most of the existing research focuses on autism. There is much less evidence on ADHD and other forms of neurodivergence, and the findings so far are less consistent. Research on autistic children therefore cannot automatically be applied to all neurodivergent children.

Overall, the evidence suggests that asking whether music simply "works" may be the wrong question. Success does not have to mean changing who a child is or making a child behave more "normally." Music may instead offer some children another way to communicate, express themselves, participate, or connect with others. Understanding when and how this happens may be a more useful direction for future research.

## Authors' contribution

Conceptualization, L.A.; methodology, L.A.; investigation, L.A.; resources, L.A.; writing—original draft preparation, L.A.; writing—review and editing, L.A.; project administration, L.A. The author has read and agreed to the published version of the manuscript.

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## Consent for publication.

Not applicable.

## Data Availability Statement

No new data were created or analyzed in this study. Data sharing is not applicable to this article.

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## Conflict of interest

The author declares no conflicts of interest.

## Abbreviations

| | |
|---|---|
| ADHD | Attention-Deficit/Hyperactivity Disorder |
| RCT | Randomized Controlled Trial |

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