



### **Music Therapy Intervention Across the Lifespan of Individuals with Autism Spectrum Disorder: A Meta-Analysis**

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Existing literature regarding music therapy intervention for individuals with Autism Spectrum Disorder (ASD) is comprised of numerous independent studies, as well as four related systematic reviews focused on child and adolescent populations (Gold, Wigram & Elefant, 2006; Geretsegger, Elefant, Mossler & Gold, 2013; Whipple, 2004, 2013). In support of the goals of the American Music Therapy Association Strategic Priority on Music Therapy and ASD, the purposes of this meta-analysis are to broaden the scope to include the entire lifespan, incorporate more recently published research studies not included in previous reviews, and apply the National Autism Center's (2015) evidence-based intervention guidelines to the music therapy studies meeting inclusion criteria for this meta-analysis.

Following a comprehensive search of existing literature, 12 studies, with 16 total variables analyzed, including a total of 170 participants were included. Using the Comprehensive Meta-Analysis software procedures and tool, data from these studies were analyzed as a whole, as well as by early childhood (ages 0-5;  $N=6$  studies, 111 participants) and child (ages 6-12;  $N=5$  studies, 51 participants) groupings. The one remaining study included adult (ages 22+) participants ( $N=8$ ). None of the included studies focused on the adolescent (ages 13-21) population.

Consistent with previous related meta-analyses (Whipple, 2004, 2013) for early childhood, as well as child and adolescent populations, the current analysis resulted in a medium effect size ( $d = .55$ ), using a fixed-effects model. Unfortunately, within the National Autism Center (2015) National Standards Project, Phase 2 report, music therapy is still listed at "emerging intervention" status. Results of the current meta-analysis provide support for offering music therapy services as an effective treatment option for individuals with ASD across the lifespan as well as guidance to move music therapy closer toward evidenced-based intervention status for this growing population.

**Keywords :** Music Therapy, Autism Spectrum Disorder, Evidence-Based, Lifespan, Meta-Analysis

# Abstract

Existing literature regarding music therapy intervention for individuals with Autism Spectrum Disorder (ASD) is comprised of numerous independent studies, as well as four related systematic reviews focused on child and adolescent populations (Gold, Wigram & Elefant, 2006; Geretsegger, Elefant, Mossler & Gold, 2013; Whipple, 2004, 2013). In support of the goals of the American Music Therapy Association Strategic Priority on Music Therapy and ASD, the purposes of this meta-analysis are to broaden the scope to include the entire lifespan, incorporate more recently published research studies not included in previous reviews, and apply the National Autism Center's (2015) evidence-based intervention guidelines to the music therapy studies meeting inclusion criteria for this meta-analysis.

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Consistent with previous related meta-analyses (Whipple, 2004, 2013) for early childhood, as well as child and adolescent populations, the current analysis resulted in a medium effect size ( $d = .55$ ), using a fixed-effects model. Unfortunately, within the National Autism Center (2015) National Standards Project, Phase 2 report, music therapy is still listed as "emerging intervention" status. Results of the current meta-analysis provide support for offering music therapy services as an effective treatment option for individuals with ASD across the lifespan as well as guidance to move music therapy closer toward evidenced-based intervention status for this growing population.

## Moving Toward Evidence-Based Intervention Status

Although one or more studies suggest that an intervention produces favorable outcomes for individuals with ASD, additional high quality studies must consistently show this outcome before we can draw firm conclusions about intervention effectiveness. - National Autism Center (2015)

MT is considered an **EMERGING** intervention for individuals under age 22 and **UNESTABLISHED** for adults age 22 & older (NAC, 2015).

## EMERGING:

- ✓ few published, peer-reviewed articles with scientific Merit-Rating scale (SMRS) scores of 2
- ✓ few 52 group design studies or 2 single subject design (SSD) studies with 26 participants for which no more than 10% of studies reported conflicting results are reported; group & SSD methodologies may be combined
- ✓ beneficial intervention effects reported for one dependent variable for a specific target
- ✓ may be supplemented by studies with lower SMRS scores

## UNESTABLISHED:

- ✓ interventions may or may not be based on research
- ✓ beneficial intervention effects are reported based on very poorly controlled studies (SMRS scores of 0 or 1)
- ✓ claims may be based on testimonials, unverified clinical observations, opinions, or speculation
- ✓ ineffective, unknown, or adverse intervention effects reported based on poorly controlled studies

- 1) to be **ESTABLISHED**, the MT profession will need
- 2) several published, peer-reviewed articles with SMRS scores of 3, 4, or 5
- 3) beneficial intervention effects for a specific target
- 4) may be supplemented by studies with lower scores on the SMRS

## Reasons for low SMRS scores:

- ➔ **Primary** - lack of generalization and maintenance data; 4-5 require both types of data; 3 require one type
- ➔ **Secondary** - small sample sizes, including SSD with 26 participants



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## Meta-Analysis Results

Study (Variable)	N	d	95% CI	P
Kern & Aldridge (play & engagement)	4	1.72	.02 ± 3.42	.047
Kern & Aldridge (peer interaction)	4	4.29	-.74 ± 9.31	.095
Kern et al (independent responses)	2	2.18	-1.37 ± 5.74	.229
Kim et al (joint attention)	10	.97	0.25 ± 1.69	.008
Kim et al (eye contact & turn taking)	10	2.08	.99 ± 3.17	<.0001
Lim (verbal production)	50	.24	-.42 ± .89	.472
Lim & Draper (verbal production)	22	.10	-.49 ± .69	.716
Thompson et al (social interaction)	23	1.96	.98 ± 2.94	<.0001
Wax (eye gaze) (V-S)		.79	.46 ± 1.11	<.0001
Brownell (challenging behaviors)	4	.79	.39 ± 1.19	<.0001
Gattino et al (nonverbal communication)	24	.39	.22 ± .56	<.0001
Gattino et al (social communication)	24	.39	-.05 ± .83	.085
LaGasse (joint engagement)	17	1.16	.13 ± 2.19	.027
LaGasse (eye gaze)	17	1.26	.21 ± 2.29	.018
Passal (challenging behaviors)	3	.65	-.14 ± 1.44	.105
Vainoli et al (joint engagement & social communication)	3	2.81	-1.45 ± 6.01	.231
Overall (Mean)	8	1.91	.34 ± .62	<.0001
Overall		.55	.42 ± .68	<.0001

N = 12 studies, 16 variables.  
Total N = 170 subjects in studies, 162 subjects by variables.  
Mean N/Study = 14.17, Mean N/Variable = 10.13

Study (Variable)	Intervention	Comparison	Age	Sex	Pre-post	Level	Quality
Psychomotor agitation, aberrant behavior, lack of interaction	General symptoms & Problem behaviors	23-Male, 16-Female (N=39)	Male (n=11)	Female (n=3)	Pre-post	1	Adequate
Challenging behaviors	Problem behaviors	6-Female	Male	Control/behavioral treatment (PABA/CABA)	1	Strong	Strong
Nonverbal communication	Social communication	7-12-Male	Male	Randomized control	1	Adequate	Adequate
Play & engagement	Play	3y, 4m-4y, 5m, 2m	Male	Multiple baseline	4	Strong	Strong
Peer interaction	Interpersonal	M = 3y, 11.5y, 2m	Male	ABA withdrawal	3	Adequate	Adequate
Joint attention	Interpersonal	M = 3y, 2.5m	Male	Randomized control, single subject	1	Strong	Strong
Joint attention for control & turn taking	Interpersonal	M = 4y, 6m	Male	Randomized control	3	Strong	Strong
Joint attention with peers	Interpersonal	6-9y, 10y-11.5y, 10y-11.5y	Male (n=13), Female (n=8)	Randomized control	3	Strong	Strong
Verbal production	Communication	M = 4y, 3m	Male (n=17), Female (n=1)	Within subject experimental	1	Adequate/Strong	Adequate/Strong
Verbal production	Communication	M = 4y, 3m	Male (n=17), Female (n=1)	Unspecified	1	Strong/Adequate	Strong/Adequate
Challenging behaviors	Problem behaviors	M = 4y, 3m	Male (n=17), Female (n=1)	Unspecified	1	Strong/Adequate	Strong/Adequate
Social interaction	Interpersonal	3-12y	Unspecified	Parallel randomized control trial, pre-post	3	Strong	Strong
Joint engagement	Interpersonal	5-7y	Male (n=2), Female (n=0)	Multiple baseline	4	Strong	Strong

## 14 NAC (2009, 2015) Identified Intervention Targets

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|--|--|
| <b>Skills Increased</b><br><b>Academic</b><br><b>Communication</b><br><i>Higher cognitive functions</i><br><b>Interpersonal</b><br><i>Learning Readiness</i><br><b>Motor Skills</b><br><b>Personal Responsibility</b><br><b>Placement</b><br><b>Play</b><br><b>Self-Regulation</b> | <b>Behaviors Decreased</b><br><b>General Symptoms</b><br><b>Problem Behaviors</b><br><i>Restricted, Repetitive, Nonfunctional Patterns of Behavior, Interests, or Activity</i><br><b>Sensory or Emotional Regulation</b> |
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Note: Intervention targets in *italic* italics are not addressed within the studies included in the meta-analysis

## Additional Studies Supporting MT as an EBI

- Finnigan, E., & Starr, E. (2010). Increasing social responsiveness in a child with autism: A comparison of music and non-music interventions. *Autism, 14* (4), 321-348.
- Katagan, J. (2009). The effect of background music and song texts on the emotional understanding of children with autism. *Journal of Music Therapy, 46*(1), 15-31.
- Kern, P., Wakeford, L., & Aldridge, D. (2007). Improving the performance of a young child with autism during self-care tasks using embedded song interventions: A case study. *Music Therapy Perspectives, 25*(1), 43-51.
- Kim, J., Wigram, T., & Gold, C. (2009). Emotional, motivational and interpersonal responsiveness of children with autism in improvisational music therapy. *Autism, 13*(4), 389-409.
- Schwartzberg, E.T., & Silverman, M.J. (2013). Effects of music-based social stories on comprehension and generalization of social skills in children with autism spectrum disorders: A randomized effectiveness study. *The Arts in Psychotherapy, 40*, 331-337.

Group	Intervention	Comparison	Level	Quality
Group	52 weeks Music making	Unspecified	Live	Active
Individual	Unspecified	Music paired with social stories	Original composition	Live
Individual	7 mos (6 sessions +4 assessment sessions)	"Relational music therapy"	Unspecified	Unspecified
Group	8 mos	Music making/play Cue	Original composition	Live
Group	2-3 mos	Toy/Guitar of Communication	Original piece to familiar children's songs	Live
Individual	24 weeks	Music making/play, sensory experience	Unspecified	Live
Group	5 weeks	Music making/play, sensory experience	Unspecified	Live
Individual	3 weeks (6 sessions)	Genre of information	Original compositions	Live
Group	3 days (6 training sessions)	Genre of information	Original compositions	Recorded
Individual	28 observation days	Music paired with social stories	Original compositions, live bar induction	Live
Individual	16 weeks	Music making	Unspecified	Live
Individual	21-29 weekly sessions	Music making/play	Age appropriate songs, instrumental, improvised rhythms	Live

## Inclusion Criteria

Studies meeting the following criteria are included in this meta-analysis:

- used group or individual subject experimental treatment designs with N≥2;
- design, procedures, and results allowed replicated data analysis
- used subjects diagnosed with ASD (consistent with DSM-V, 2013 criteria), but did not include studies that incorporated diverse special populations, regardless of inclusion of subjects with ASD;
- utilized music as a separate, independent variable contrasted with a no-music control condition
- music treatment procedures were conducted by a music therapist;
- quantitative results were reported with sufficient information to extract an effect size; and
- were in the form of articles published worldwide in peer-reviewed journals, with full-text available in English

Studies related to assessment of music skills or appropriateness for music therapy of individuals with ASD were not included in the effect size analysis, nor were articles that described treatment techniques for individuals with ASD, but did not include quantitative data. In addition, studies were excluded in which data analysis focused on parents or caregivers of individuals with ASD.

Identification of applicable literature included searches of PsycINFO, Academic Search Complete, Academic Search Premier, CINAHL Complete, ERIC, Social Sciences Full Text (H.W. Wilson), and PsycARTICLES databases, using music therapy and autism as keywords. Also searched were the reference lists of all collected articles, the National Autism Center (2009, 2015) National Standards Report and National Standards Project, Phase 2, and the four most recent systematic reviews related to this subject (Elefant, 2006; Geretsegger et al., 2013; Whipple, 2004, 2013).

## References

### Studies Included in Effect Size Calculations

Bell, M., Brockbank, E., Munn, K., Alvarado, M., & Smith, T. (2011). Effects of music therapy on sensory, verbal and nonverbal skills in young children with autism. *Journal of Music Therapy, 48*(2), 10-24.

Brownell, K. (2006). Musically-facilitated social interaction in children with autism. *Psychology of Music, 34*(2), 105-114.

Galbraith, D., Gattino, E., Gattino, T., & Gattino, J. (2011). Effects of music on the communication skills of children with autism. *Journal of Music Therapy, 48*(2), 10-24.

Kern, P., & Aldridge, D. (2007). Using embedded music therapy with a child with autism to play of a young child with autism. *Journal of Music Therapy, 44*(2), 10-24.

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Schwartzberg, E.T., & Silverman, M.J. (2013). Effects of music-based social stories on comprehension and generalization of social skills in children with autism spectrum disorders: A randomized effectiveness study. *The Arts in Psychotherapy, 40*, 331-337.

### Related Systematic Reviews & National Standards

National Autism Center. (2009). *National standards report: The national standards project addressing the need for evidence-based practice guidelines for Autism Spectrum Disorders*. Randolph, MA: Author.

National Autism Center. (2015). *Findings and conclusions: National standards project phase 2—addressing the need for evidence-based practice guidelines for Autism Spectrum Disorders*. MA: Author.

Reynolds, S., & Volkmar, F.R. (2015). Development of the analytic process for evaluating and describing evidence-based practices. *Autism: Journal of Autism and Developmental Disorders, 45*, 1311-1329.

Whipple, J. (2004). Music in interventions for children and adolescents with autism: A meta-analysis. *Journal of Music Therapy, 41*(2), 89-105.

Whipple, J. (2013). Music therapy as an effective treatment with Autism Spectrum Disorders: A meta-analysis. *Journal of Music Therapy, 50*(2), 10-24.

### Researcher/Author/Editorial Contributions: Authors of SMRS & EBI Ratings

1) SMRS is NOT a systematic evaluation between the 2 ratings (SMRS and EBI). It is a 3-5 score between the 2 ratings. EBI is a 1-5 score. 2) Development of the analytic process for evaluating and describing evidence-based practices. 3) SMRS & EBI ratings. 4) SMRS & EBI ratings. 5) SMRS & EBI ratings. 6) SMRS & EBI ratings. 7) SMRS & EBI ratings. 8) SMRS & EBI ratings. 9) SMRS & EBI ratings. 10) SMRS & EBI ratings.