Music Therapy as a Potential Treatment Approach for the Patients With ASD: A Systematic Review

By

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A thesis submitted to the School of Pharmacy in partial fulfillment of the requirements for the degree of
Bachelor of Pharmacy (Hons.)

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Declaration

It is hereby declared that

1. The thesis submitted is my own original work while completing a degree at Brac University.
2. The thesis does not contain material previously published or written by a third party, except where this is appropriately cited through full and accurate referencing.
3. The thesis does not contain material which has been accepted, or submitted, for any other degree or diploma at a university or other institution.
4. I have acknowledged all main sources of help.

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Approval

The project titled "Music Therapy as a Potential Treatment Approach for the Patients With ASD: A Systematic Review" submitted by Abdullah Al Noman (19346025) of Summer, 2019 has been accepted as satisfactory in partial fulfillment of the requirement for the degree of Bachelor of Pharmacy on July 2023.

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Ethics Statement

The project does not involve any clinical trial or human participants, no animals were used or harmed.

Abstract

Autism spectrum disorder is a neuronal developmental disorder which is commonly established in the early age of life and persist throughout the lifespan. Currently, there are very little option of pharmacological therapies approved for use in ASD. Mainly the treatment approach is different type of therapies are used like behavioral therapy, occupational therapy, Psychological, Cognitive etc. Music therapy is a kind of occupation approach, which we have systematically reviewed in the article. We have screened the PubMed database for last 10 years RCT under certain criteria we have included keywords such as music, music therapy, RCT, autism, ASD, outcome, masures etc in our search. Over 325 articles were screened and 9 articles were included in the study after application of all criteria of flirtation. We found out music therapy effective in patients with ASD specially in social communicational development which includes social intersection skills, nonverbal communicative skills, parent interaction and social-emotional reciprocity.

Keywords: “ASD”, “Autism”, “Autism spectrum disorder”, “Music therapy”, “Systematic review”, “Social communication”.

Dedication

Dedicated to my faculty members, family and friends

Acknowledgement

I would like to start by thanking Almighty Allah for giving me the courage to get through this entire time. I would also like to thank Dr. Mesbah Talukder, an associate professor at the school of pharmacy at Brac University, for being a constant inspiration to me while I was studying and for being so encouraging, kind, and motivating throughout the process.

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List of Acronyms

ASD	Autism Spectrum Disorder
ADOS	Autism Diagnostic Observation Schedule Development Inventories
SRS-II	Social Responsiveness Scale Second Edition
PPVT-4	Peabody Picture Vocabulary Test Fourth Edition
CCC-2	CCC-2 Children's Communication Checklist-2
PSI-SF	Parenting Stress Index
ATEC	Autism Treatment Evaluation Checklist
CARS	The Childhood Autism Rating Scale
ABC	Autism Behavior Checklist
MBCDI	MacArthur-Bates Communicative

1.1. Detailed explanation of the disorder:

According to CDC, “Developmental impairment known as autism spectrum disorder (ASD) is brought on by variations in the brain. People with ASD may struggle with confined or repetitive activities or interests, as well as social communication and engagement. Additionally, people with ASD may learn, move, or pay attention in various ways”(*What Is Autism Spectrum Disorder? | CDC*, n.d.). The DSM-5 and ICD-10 (Association, 2000; Organization, 1993). Manual defines autism spectrum disorder as “persistent difficulties with social communication also social interaction” and “restricted and repetitive patterns of behaviors, activities or interests” (this includes sensory behavior), in existence since childhood, to the extent that these “limit and impair everyday functioning”.

People with ASD have trouble with different parts of social interactions. They also have a limited mind and limited ways of interacting with other people. This is often seen as obsessive behavior and stiffness in their own actions and in the actions, they expect others to take in response to their own. In the last 20 years, the "triad of impairment" has been the most important idea.. This concept looks at social interaction, language and speech, and behavior and thought (Cohen, n.d.). It can be found by looking at how a person was when they were young and how they are now (Wing et al., 2002). The ICD-10 defines the concluding component of the triad, restricted, repetitious, and stereotypical routines of behavior, interests, and activities (*International Statistical Classification of Diseases and Related Health Problems*, n.d.) and the DSM-IV-TR (*Psychiatry.Org - DSM*, n.d.). However, the first two domains have been merged into one in the recently released DSM-5 and the soon-to-be-published ICD-11. Therefore, there are only two main parts of ASD: (1) social contact or connection with other people, and (2) restricted, repetitive habits and interests. (Lord & Jones, 2012). People with ASD also have a hard time "reading minds," which means they cannot

figure out what other people are thinking, feeling, or feeling. This makes it hard for them to act in the right way (Baron-Cohen, 1995). This has a big effect on social skills and how people get along with each other (Howlin, 1998).

The clinical presentation is influenced by varying levels of cognitive proficiency, ranging from notable cognitive impairment to a spiky cognitive profile characterized by exceptional abilities in particular domains. Asperger's syndrome, which resides at the high-functioning end of the autism spectrum, shares the same fundamental deficits as autism. As noted by Asperger in 1979, it also exhibits distinct variations in language development, motor abilities, and originality of thought (Asperger, 1979). In accordance with recommendations made by the American Psychological Association in 2013, Asperger's syndrome is now classified as an autism spectrum disorder (ASD) in the DSM-5. Current prevalence rates for autism spectrum disorders vary between 60 to 157 children per 10,000 individuals, indicating a significant increase from previous estimates (Chakrabarti & Fombonne, 2001; Fombonne, 1999)

1.2. Intervention description:

According to one definition, "music therapy is a systematic process of intervention in which the therapist assists the client in promoting health by means of the client's musical experiences and the relationships developed through them as dynamic forces of change" (Alvin & Warwick, n.d.). Listening to recorded and live music, as well as engaging in both spontaneous and organized improvisation, singing, and vocalization, are all central to music therapy (figure 1). Music therapy is often given to an individual, however there are studies of group-based and peer-mediated therapies for persons with ASD (Boso et al., 2007; Kern et al., 2007; Kern & Aldridge, 2006). Music therapy for kids on the spectrum has come a long way in recent years, and it now includes activities that involve the whole family (Pasiali, 2004; G. Thompson, 2012).

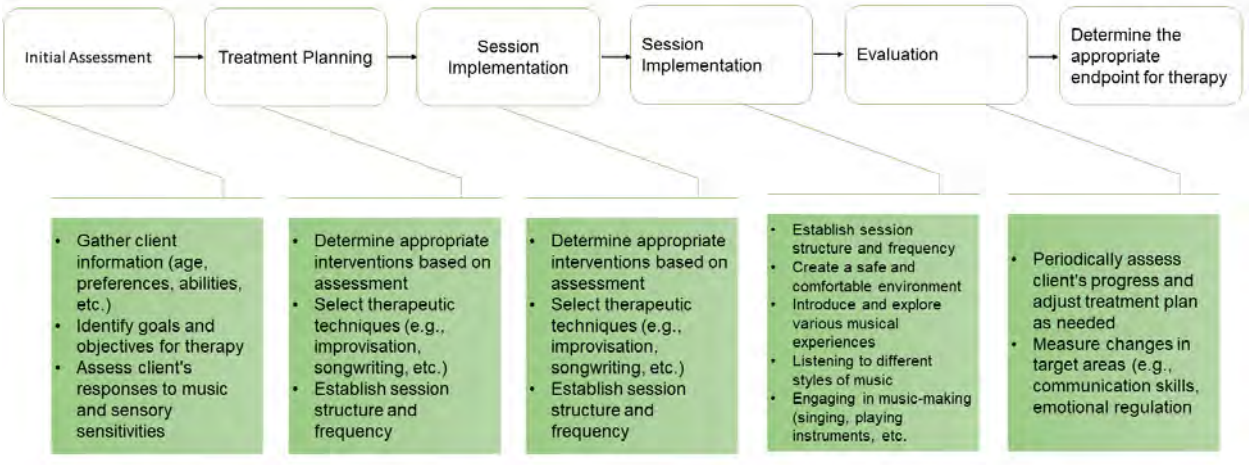

Figure 1: Process involved in music therapy

1.3. Probable working mechanism of the intervention:

People with ASD may benefit from the processes that take place during musical engagement in terms of communication abilities and social interaction capabilities. Musical interaction in music therapy, particularly musical improvisation, can be understood and described as a nonverbal and pre-verbal language that enables verbal people to access pre-verbal experiences, nonverbal people to interact communicatively without words, and all of them to interact on a more emotional, relationship-oriented level than may be possible via verbal language (Alvin & Warwick, n.d.). Music therapy listening is a participatory process in which the listener makes musical selections that are important to them (e.g., pertaining to an issue with which they are preoccupied) and when appropriate, reflects on personal concerns linked to the music or connections made by the music. For those who are competent, verbal commentary on musical processes is a regular aspect of music therapy (Møller et al., 2002a).

The findings of early childhood researchers like Stern and Trevarthen, who employ "musical" terminology to describe the sound exchanges between mothers and newborns, support the use of music therapy for adults with communication problems (Frosch et al., 2021). Researchers use the terms pulse, tempo, rhythm, and timing to describe temporal elements, whereas pitch, timbre, and tonal movement are used to describe tonal qualities (Møller et al., 2002b) . Trevarthen (Trevarthen, 1999) argues that because humans are born with the ability to participate in the "communicative musicality" of conversation, very young toddlers are sensitive to the rhythmic and melodic elements of their mothers' speech, as well as its emotional tone. According to this reasoning, both children and adults with ASD may find music to be a helpful instrument for non-verbal social connection. Communication skills including turning over the other person's focus, maintaining eye contact, and sharing attention are essential for collaborative, active music production as well as music therapy procedures. Wigram and Elefant explain how music therapists can use music, particularly improvisational music-making, to give ASD children opportunities to experience grounding structure combined with measured flexibility, helping them find ways to handle less predictable situations that will typically present challenges for them (Wigram & Elefant, 2009). In addition, music has the ability to encourage dialogue.

Music is utilized as a stimulus to increase the speed with which speech and language are produced and processed, and to strengthen behavioral communication skills that make advantage of the potential for predictability and anticipation afforded by musical rhythms. People tend to pay more attention to and be more satisfied by musical stimuli than verbal ones, which is another argument in favor of utilizing music in this context (Lim & Draper, 2011a, 2011b; therapy & 2010, n.d.).

1.4. Importance of this review:

Previous studies conducted by Edgerton 1994 (Edgerton, 1994), shown the effectiveness of music therapy by examining the intervention on 11 children with ASD. Furthermore, multiple Cochrane review on music therapy have conducted the positive effects of music therapy on ASD patients which was first conducted on 2006 (Gold et al., 2006) and updated on 2014. In addition, Schumacher see effects on relationship attachment on ASD Childs. On the other hand, a study from 2004 by Ball provides a different conclusion from that of the earlier studies as he came to the conclusion that the impact of music therapy is mostly undefined. According to a recent systematic study, music therapy may help young children with ASD improve their communication, interpersonal skills, sense of responsibility, and playfulness. So, it is necessary to conduct a more comprehensive study on this intervention.

From 2013 to 2023, which is the time period in which no systematic review has been done, we improved our literature searcher. The effectiveness of music therapy for ASD has also been the subject of several RCTs in this period. Our work is the cutting-edge over view and summary of the studies conducted in these years with almost all up to date information available.

Chapter 2

Methods

2.1. Search design and data source

Author has conducted an electronic search on PubMed from the year 2013 (1st January) to 2023 (25th May) using multiple keyword and combination of keywords (table 1) in advance search on PubMed. Author has set and select the key words such a way that maximum number studies can be detected and included. The search strings are follows:

(Autism OR autism spectrum disorder OR asd OR Asperger's syndrome) AND (Music OR musically OR music therapy OR music s OR musicality OR musics OR musicals) AND (predictor OR predicting outcome OR outcome)

Table 1: Search terminology

Population	**Topic**	**Other terminologies**
Autism OR ASD OR autistic OR autistic disorder OR Asperger's syndrome Limited to human Limited to children and youth	Music OR musically OR music therapy OR music s OR musicality OR musics OR musicals	Predictor OR outcome OR assessment

2.2. Study selection and management:

All the initially identified studies were taken in to Rayyan software to perform the deduplication and initial title and abstract screening to identify the potential studies for full text screening eligibility (figure 2). Author has selected the studies from title and abstract screening which has at least two or more than two keyword in their title or abstract.

2.3. Inclusion and exclusion criteria:

2.3.1. Types of studies:

Only the relevant randomized control trials under the level I of level of evidence (table 4) were considered to be included in the systematic review. The RCTs were assessor blinded, single blinded and few non-blinded studies in the review need to be included due to its significance and considering the limitations of working along with the parent and therapist to provide the therapy. Randomizations need to be generated computer operated or random numbers table, or coin tossing. Number of patients need to be more than 10 (n>10) to be considered in the review. Finally, the studies published in English language was only considered included.

Table 2: Inclusion exclusion criteria

Inclusion criteria	Exclusion criteria
i. Available in English language ii. Contain two or more terminologies from the search strategies table in the title or abstract iii. Study conducted between 2013-2023	i. Other language other than English ii. Did not contain two or more terminologies from the search strategies table in the title or abstract. iii. Non RCT iv. Patients without ASD

iv. Children with ASD according to ICD-10, DSM-IV, V, Autism Diagnostic Observational Schedule (ADOS), Autism Diagnostic Interview-Revised (ADI-R) v. Must be RCT vi. Number of participants must be over 10 patients with ASD vii. Received music therapy	v. Did not received music therapy vi. Outcome measured did not performed for social emotional or any aspects of behavioral development

2.3.2. Types of participants:

RCTs conducted on children with ASD according to ICD-10, DSM-IV, V, Autism Diagnostic Observational Schedule (ADOS), Autism Diagnostic Interview-Revised (ADI-R) were included in the study. Participants had to be never treated with music therapy before (table 2).

2.3.3. Type of intervention:

The patients need to be treated with music therapy in regular sessions the session design maybe varied depending on the protocol. The intervention maybe compared with “placebo” group which maybe non-treated group, standard care group, enhanced standard care group or different type of music sessions (table 2).

2.3.4. Outcome measures:

The main focus was on the broad spectrum of social communicational development in ASD patients, which includes communication skills (non-verbal and verbal), social interaction, and social-emotional reciprocity. Adverse effects, initiating behavior, Social adaptation skills (including outcomes that were summarized as behavioral problems, quality of life in school, home, and other environments, Quality of family relationships, and cognitive ability (including attention and concentration) (table 2).

2.4. Risk of bias assessment:

Methodological quality was judge using the Cochrane risk of bias tool (ROB 2). I have included two figures from the ROB assessment tool. One of which is the risk of bias summary (Figure 3) another one is the table of risk of bias. The summary gives a brief overview of the total scenario of biasness and the risk of bias table categories the methods of the study as high low, high and clear risk of bias (Figure 4).

Author assessed the following items:

- Allocation concealment;
- Selective reporting;
- Blinding of participants and personnel;
- Random sequence generation;
- Blinding of outcome assessment;
- Completeness of outcome data;
- Other sources of bias.

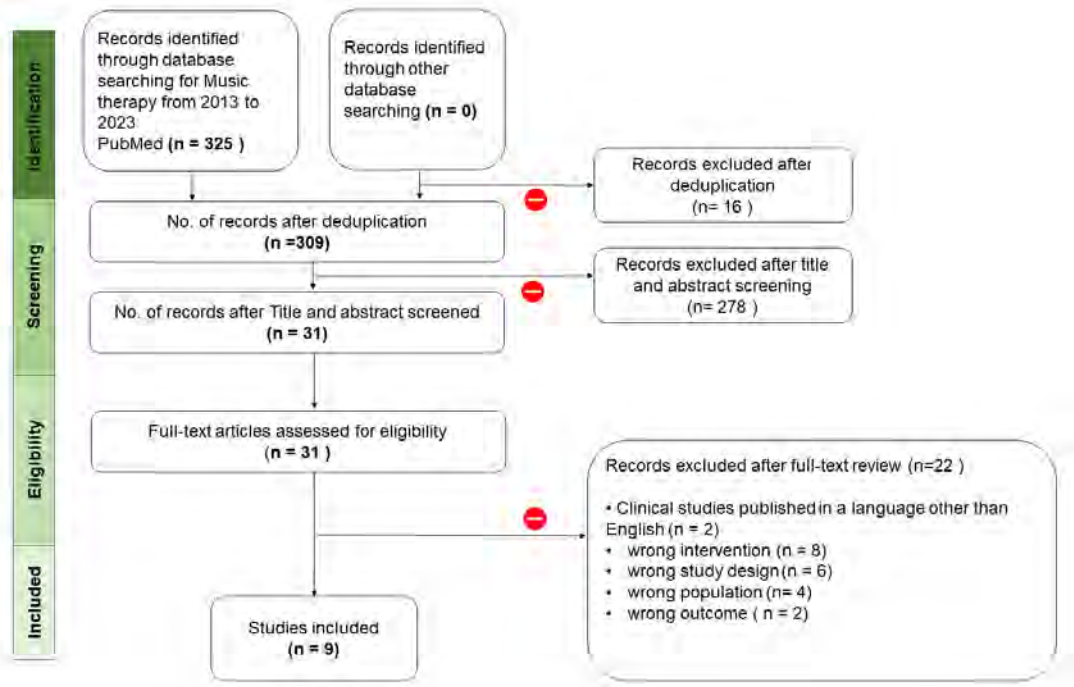

Figure 2: Modified form of PRISMA flow diagram showing step-by-step process of the review (Moher et al., 2009).

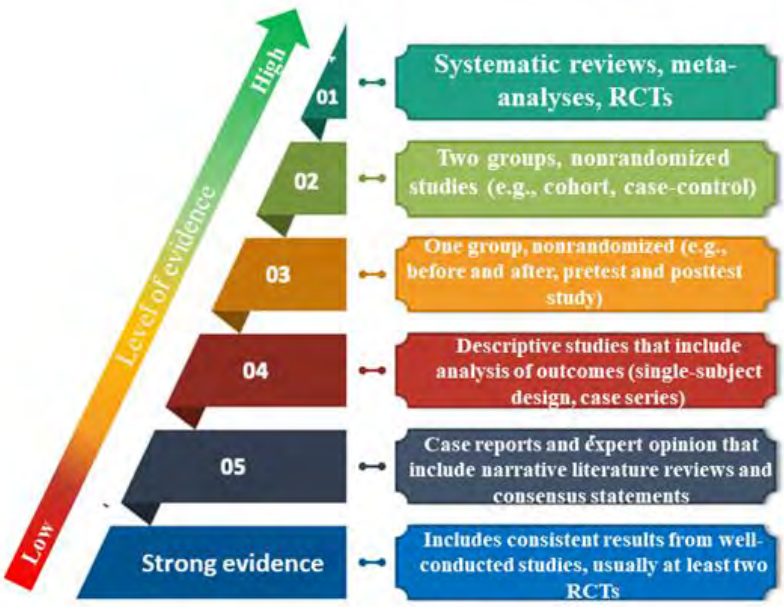

Figure 3: Adopted version of AOTA level of evidence guidelines for Systematic Reviews (Kuhaneck et al., 2020).

Chapter 3

Results:

Sharda et al., 2018: The study conducted by (Sharda et al., 2018) has examined 51 children aged 6-12 years with ASD. The study method was assessor blinded randomized controlled trial, which falls under level of evidence I according to the AOTA guidelines for systematic reviews. They used SRS-II, PPVT-4, CCC-2 scales for outcome measures and found that there was significant change in post intervention group with music therapy in terms of social communication improvement (difference score= 4.84, P = .01).

Bieleninik et al., 2017: Bieleninik et al., 2017, evaluated 364 ASD-affected children between the ages of 4 to 7 years in the study (Bieleninik et al., 2017). According to the AOTA guidelines for systematic reviews, the study method an assessor-blinded randomized controlled trial falls under level I of evidence. The effectiveness of music therapy was evaluated during a 5-month intervention. However, the results were quite striking because there was only a very slight improvement in social communicational skills, as shown by the linear mixed-effects models, which dropped from 14.08 to 13.23 in the music therapy group and from 13.49 to 12.58 in the standard care group (mean difference, 0.06 [95 percent confidence interval, 0.70 to 0.81]; P =.88).

Geretsegger et al., 2016: The next study, which was, also a level I of evidence conducted in Austria by Geretsegger (Geretsegger et al., 2016) among autistic children aged 4-6 years and home-based weekly sessions for 5 months. They also used ADOS-SA for their reference scale and found that positive improvement in social intersection, communication and responsiveness all mean rating was SD<1.

Mössler et al., 2020: The Mosslers (Mössler et al., 2020) group also conducted a double-blinded RCT on 110 children with ASD and divided them into 2 different groups (low sensitivity high sensitivity), the participants were aged between 4-7 years and received school or NIH special care setting based therapy for 5months. They were found to improve in improved intrapersonal and social communication, which was assessed in different modules. They found attunement scores in the range of modi (3-5) and better result were observed in the AQR scale ($p<0.001$).

Crawford et al., 2017: Another international another international multicenter RCT was conducted in 9 countries to check the effectiveness of improvisation music therapy on ASD. It was a special care setting-based setup therapy session for 12 months, 3 session per week model, which examined 364 children into 2 different groups and found no significant difference improvement in social engagement and mental wellbeing (Crawford et al., 2017). They used the ADOS, SRS, and Warwick-Edinburgh Mental Well-Being Scale, and the results were as follows: for the first five months and after a year, the mean difference between music therapy and standard care was 0.06, with a 95 percent confidence interval (CI) of -0.70 to 0.81. Standard care vs. music therapy = -3.32, 95% CI: -7.56 to 0.91.

LaGasse, 2014: An RCT conducted by LaGasse (LaGasse, 2014) in 2014 in USA on 17 autistic children for 5 weeks demonstrate that 5weeks music therapy was more beneficial in overall improvement in social behavior. The music group's pretest and posttest scores ($M = 114.25$ and $SD = 18.61$, respectively) and SRS scores ($t(7) = 3.091$, $p = .018$; 95 percent CI = -4.88 and 36.62) were improved.

Sandiford et al., 2013: For estimating the efficacy of melodic based communication therapy in children (5-7years) with autism. They were assigned into two different group from them one received home based music therapy for 5 weeks and found out faster rate of communicational improvement in verbal attempts ($p = .04$) MBCT group measured in ADOS (Sandiford et al., 2013).

Rabeyron et al., 2020: The most recent study conducted in France by Rabeyron (Rabeyron et al., 2020)in 2020 was a single-blinded randomized control trial of 8 months and 25 sessions on 4-7years aged ASD patients comparing music therapy vs music listening in care facilities. They found positive results in overall mental health improvement in CARS, ABC and CGI scores. The MT condition improved CGI scores more at t1 ($d = 0.80$) than the ML condition ($d = 1.36$). Since 63.2 percent of kids in the music therapy group lost at least two CGI points, compared to 29.4 percent of kids in the music classes group, this improvement was clinically significant.

G. A. Thompson et al., 2014: The final study indicated in the review was conducted in Australia on Family-centered music therapy. It was an RCT that involves 23 children with autism, the trial was continued for 16 weeks home-based sessions and found social interaction improvement, especially in parent-child relationships (G. A. Thompson et al., 2014). The Vineland Social Emotional Early Childhood Scale was used to measure it, and the results showed that FCMT significantly improved ($P < 0.001$) with a very large effect size ($d = 1.96$; 95 percent confidence interval = 0.92 to 3.00).

Table 3: Summary of all included studies.

Reference	**Country**	**Study Design & level of evidence**	**Intensity**	**Sample Size**	**Age**	**Intervention**	**Setting**	**Diagnosis**	**Results**	**Main Findings**	**Limitations**
(Sharda et al., 2018)	Canada	Assessor-blinded parallel-group RCT Level 1	45-minute/week 8-12 week	51 children with ASD	6-12 years	Music therapy efficacy	Not mentioned	SRS-II, PPVT-4, CCC-2	The music intervention improved social communication and resting-state functional connectivity of frontotemporal brain networks. Communication scores were higher in the music group post-intervention (difference score= 4.84, P = .01)	Social communication improvement. Reduction of inappropriate initiations Better social relations and interests.	Lack of long-term follow-up

(Bielenini k et al., 2017)	Australia, Austria, Brazil, Israel, Italy, Korea, Norway, United Kingdom , United States	Assess or-blinded RCT Level 1	5 months	364 children with ASD	4-7 years	Music therapy efficacy	clinics, kindergart ens, family homes	ADOS	From baseline to 5 months, mean ADOS social affect scores estimated by linear mixed-effects models decreased from 14.08 to 13.23 in the music therapy group and from 13.49 to 12.58 in the standard care group (mean difference, 0.06 [95% CI, −0.70 to 0.81]; P =.88), with no significant improvement. 17 of 20 exploratory secondary outcomes were not significant.	minimal social communica tion improveme nt	Music therapy for children with ASD was not tightly controlled, early termination may have affected the study's ability to detect an MCID, duration of intervention and follow-up may have been too short, focus on symptom severity as an outcome has been disputed, and secondary outcomes were exploratory. Shifting focus on other outcomes my results is significant improveme

											nt such as well-being and adaptive functioning
(Geretsegger et al., 2016)	Austria	Assessor-blinded RCT Level 1	1session /week, 5 months Total of 20-60 sessions dividing in low or high intensity group	30 children with ASD	4-6.11 years	Improvisational music therapy	Home or care facilities	ADOS-SA	Social communication and relationship improvement was observed (Mean ratings for each of the items were as follows: (1) musical and emotional attunement: 3.4 (SD = 1.1); (2) scaffolding interaction musically: 3.7 (SD = 1.1); (3) tapping into shared musical history: 3.3 (SD = 1.3); (4) positive therapeutic relationship: 3.7 (SD = 1.1); (5) secure environment: 3.5 (SD = 1.2); (6) following the child's lead: 3.7 (SD = 1.2); (7) treatment goals:	Improvement of communication Social interaction skills Social responsiveness	The subsample is too small for inferential statistics and should be used with caution in other clinical and research situations. The researcher led music therapy and parent counseling sessions, establishing a unique clinical situation. Music treatment for children with ASD focuses on improving social

									3.6 (SD = 1.0); and (8) enjoyment of interaction: 3.7 (SD = 1.0)		communication skills, which this experiment investigated.
(Mössler et al., 2020)	Australia, Austria, Brazil, Israel, Italy, Korea, Norway, UK, and USA	Assessor-blinded RCT Level 1	Low-intensity one session/week High intensity 3 session/week 5 months	110 children with ASD	4-7 years	Attunement in Music Therapy	Not specified	ADOS, SRS	These findings suggest that therapists and children are more likely to meet on the same modus when the child is functioning on relatively higher modi (3–5) than when they are on lower modi (1–2).	Improved intrapersonal relationship with the therapist Social communication improvement	Music therapy may have short-term impacts that the ADOS cannot detect. For future research, intervention duration, measurement time points, and clinical results should match the sample population. That means that successful AQR attunement

											was mainly captured for (emerging) inter-personal aspects of communication and engagement (modi 3, 4, and 5), but not for intra-personal and bodily aspects that might have been most relevant for the majority of the population with no or very limited verbal language and high RRB symptoms.
(Crawford et al., 2017)	Australia, Austria, Brazil, Israel, Italy, Korea, Norway	Single-masked randomized controlled trial	Low-intensity one session/week	364 children with ASD	4 - 7 years	ESC with IMT	schools or NHS facilities	ADOS, SRS, PSI-SF, Warwick – Edinburgh Mental Well-	From baseline to 5 months, mean ADOS social affect scores declined from 14.1 to 13.3 in music therapy and from 13.5 to	No significant improvement in social engagement, mental wellbeing after	Single masked study, no long-term effect was measured

	and the USA	Level 1	High intensity 3 session/week A session was 30 minutes long 5 months and 12 months					Being Scale	12.4 in standard care [mean difference: music therapy vs. standard care = 0.06, 95 percent CI –0.70 to 0.81], with no meaningful change. There were no differences in the parent-rated social responsiveness score, which declined from 96.0 to 89.2 in the music therapy group and from 96.1 to 93.3 in the standard care group (mean difference: music therapy vs. normal care = –3.32, 95 percent CI –7.56 to 0.91).	incorporating IMT	
(LaGasse, 2014)	USA	RCT Level 1	5 weeks	17 children	6-9 years	Music Therapy Group Intervention on	School based	SRS, ATEC	The MTG demonstrated greater gains in joint attention and eye gaze. A paired samples	More improvements in overall	Non blinded and small sample size

						Enhancing Social Skills			t-test indicated significant differences for the music group pretest scores (M = 114.25, SD = 18.61) and posttest (M = 93.5, SD = 17.57), SRS scores (t(7) = 3.091, p = .018; 95% CI = -4.88 – 36.62). There were no significant differences for the SSG group	social behaviors	
(Sandiford et al., 2013)	USA	RCT (scorer blinded) Level 1	5 weeks, with four 45 min individual sessions a week	17 children with ASD	5-7 years	Efficacy of Melodic Based Communication Therapy for Eliciting Speech in Nonverbal Children with Autism	Home based	ADOS	MBCT appears to be a valid form of intervention for children with autism, with significant progress in verbal attempts and correct words. Participants in the MBCT group (p = .04) had	Possible faster rate of improvement with greater overall gains in verbal attempts and imitative attempts	Sample size and lack of follow-up may have been a limitation of the study.

									more imitative attempts.		
(Rabeyron et al., 2020)	France	single-blind RCT Level 1	8 months 25 session MT and ML	4-7years	37 patients	comparing music therapy and music listening in ASD patients	care facilities	CARS, ABC, CGI	the MT condition had a larger impact size at t1 (d = 0.80) than the ML condition (d = 1.36) for CGI score improvements. This improvement was clinically significant since in the music therapy group, 63.2% of the kids showed a drop of at least 2 points at the CGI, compared to 29.4% in the music lessons group. Additionally, a significant improvement in autistic symptoms as measured by the ABC subscales for lethargy and	Improvement of overall mental health	Complete neuralization, skilled therapist. The Autism Diagnostic Observation Schedule (ADOS) was not used in this study, which may have revealed the difficulties mentioned and lack of follow-up.

									stereotypical symptoms was connected with clinical improvement.		
(G. A. Thompson et al., 2014)	Australia	Parallel randomized controlled trial Level 1	16 weeks	23children with sever ASD	preschool aged	Family-centred music therapy to promote social engagement	Home based	VSEEC, MBCDI, SRS-PS	FCMT significantly improved ($P < 0.001$) with a very large effect size ($d = 1.96$; 95% confidence interval = 0.92 to 3.00; the Vineland Social Emotional Early Childhood Scale in intention-to-treat analysis. Parent–child relationships strengthened according to parent interview thematic analysis	Social interactions in the home and community Improvement parent–child relationship	small sample size, parent-report assessments is another as they could be biased

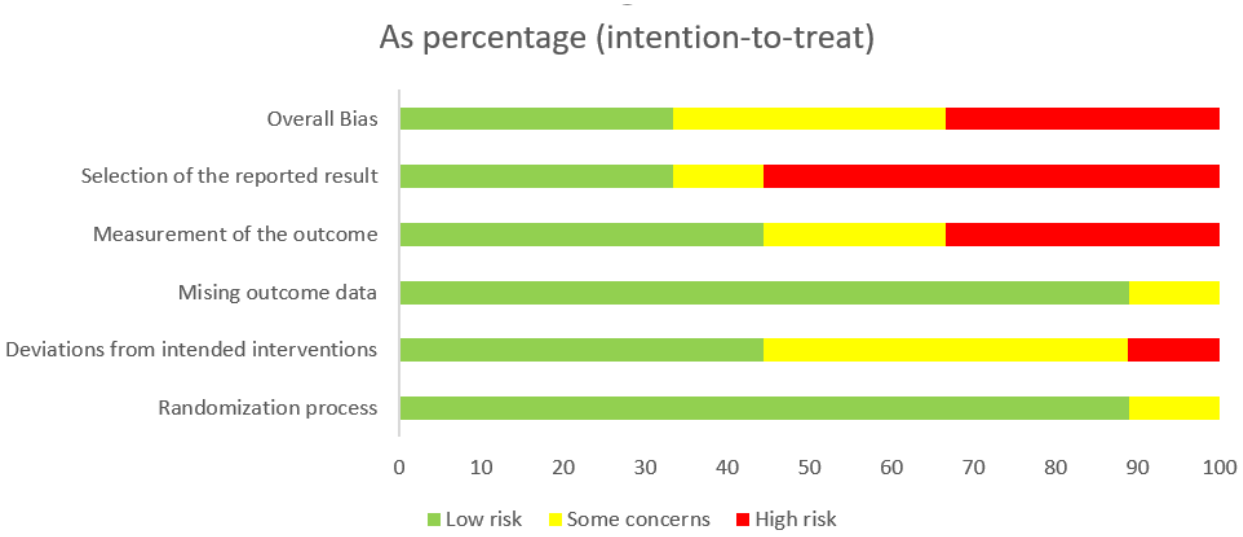

Figure 4: Summary of risk of bias

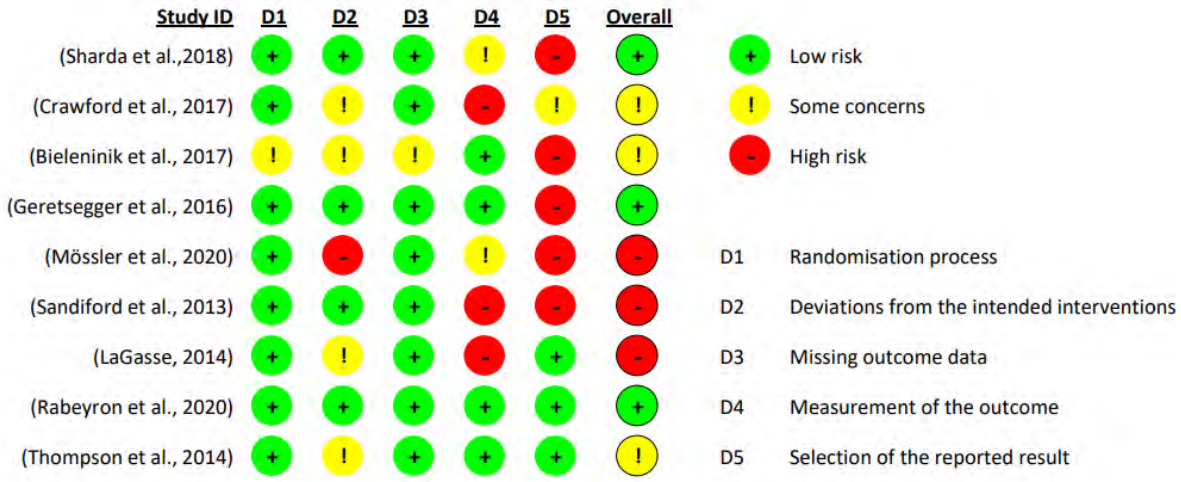

Figure 5: Risk of bias table

Chapter 4

Discussion:

The previous Cochrane review (Geretsegger et al., 2014) published in 2014 which was an updated version of 2006, ultimately found music therapy improved social communicational skills, which include social intersection skills, nonverbal communicative skills and social-emotional reciprocity. Our results were not any different, as we also found out about social communicational development in a border scene where 7 out of 9 included studies found to have positive results on social intersection, mental wellbeing, improved interaction in the family, increased parents' relationships, increased verbal attempts and social relationship. It indicates that, music therapy could be an effective treatment approach for computational problems in autistic children as last 10 years scientists have improved and music therapy has not lost its potency on ASD. However, there were 2 studies where we did not see any significant difference in standard care versus music therapy, which also indicates more intensive work is needed to further strengthen the claim. As in terms of ASD research, multiple scales of reference used where they may create differences. In addition, working with children is difficult and mainly blinding may be an issue in developing methods for the trial, which mentioned in most of the studies. Another noticeable thing was that the sample size in some studies was very small, which may not represent the real scenario. Follow-up was also an issue in music therapy research, as in the short-term work we may overlook look overall long-term benefits. Our result can put light to the effect of music therapy research on children, considering the outcome as a positive result and taking into consideration of previous studies. However, studies that are more thorough anticipated in this area, which will strengthen our conclusions and emphasize our results.

Chapter 5

Conclusion:

Our findings significantly suggest music therapy can be an effective approach to the treatment of ASD. Our results have positive evidence of music therapy in terms of overall social communication improvement. Our study also finds music therapy has a superior effect on standard care. Moreover, our findings suggest music therapy emphasizes rational improvement and involves personal interest. However, when applying the finding it needs to be taken into consideration that, trained and skilled therapists need to be employed and as family plays a huge role in ASD treatment family-based approach could be more significant and follow-up of the therapy is required to have an optimal effect.

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