

# The Efficacy of Improvisational Music Therapy as a Treatment Method for Children Ages 3-14 with Autism Spectrum Disorder

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## **Abstract:**

**Introduction:** Provides an overview of current research on the efficacy of improvisational music therapy (IMT) as a treatment method for children ages 3-14 with autism spectrum disorder (ASD).

**Methods:** This review consists of 7 papers which were selected from the McMaster Database, Google Scholar and by reviewing the citations of relevant excluded and included papers and systematic reviews. The inclusion criteria consisted of; music therapy sessions facilitated by an accredited Music Therapist, IMT as the primary intervention, participants aged 3-14, and a confirmed ASD diagnosis.

**Results:** 71% (5/7) of papers focuses on interpersonal skills and 29% (2/7) of papers focuses on intrapersonal skills as the primary intervention. However, both categorization of interventions indicated that more, valid, research is required before establishing generalizable results.

**Discussion:** A common limitation was the lack of external validity due to an inappropriate sample size—this should be further investigated by increasing the sample size to better understand the true effect of IMT on a general population of children with ASD. Papers often neglected other

confounders that may impact the results of the efficacy of IMT such as regulating the activities that occur outside of assigned therapy sessions.

**Conclusion:** Although all 7 papers indicated positive outcomes from IMT sessions, more research is required with larger sample sizes, and a variety of ethnic backgrounds, to provide reliable and generalizable results. IMT may be an effective treatment, however, more research is necessary to be confident that a positive correlation truly exists and to influence future policies in health.

## **Introduction:**

Both the DSM IV and DSM V defines autism spectrum disorder (ASD) as a neurodevelopmental disorder which significantly hinders an individual's social abilities.<sup>1</sup> Communicative and social skills are frequently characterized by repetitive tendencies, restrictive socio-emotional interactions, and impaired speech.<sup>1</sup> It is important to understand that both verbal and social skills vary on a case-by-case basis.<sup>2</sup> Unfortunately, individuals diagnosed with autism tend to have difficulty maintaining positive relationships due to symptoms such

as delayed speech and their inability to interpret nonliteral language and emotion—in many cases, these symptoms worsen as an individual ages.<sup>1,2</sup> Management of auxiliary symptomatology has been a focus of current ASD research as a way to improve quality of life, social interactions, and psychological well-being for individuals with ASD.

Currently, research is focusing on improving and managing interpersonal and intrapersonal skills of children with autism. Increased interpersonal and intrapersonal skills has been noted in literature with the use of improvisational music therapy (IMT).

IMT is a type of music therapy, in which the client and an accredited music therapist are able to understand each other through unstructured musical sessions.<sup>3</sup> The client takes charge to make up music (by singing, playing etc.) to create a melody, rhythm, or song. This process allows the client to have full freedom and control over the sounds that they make—the immediacy, involvement and unpredictability of improvisations focus on the individuals attention and listening to their own activity, creativity, awareness and presence.<sup>3</sup> Typically, IMT allows for the therapist to better understand the feelings and emotions of the client as the sounds they make represent them; IMT provides a framework for an interpersonal relationship between the client and the therapist.

Music therapists have been using music as an intervention since the 1950's in Canada; specifically the use of music therapy helps to facilitate skills such as communication, behaviour, and social engagements.<sup>3</sup> Many papers have been published regarding the benefits of music

therapy interventions with individuals diagnosed with autism. Multiple studies indicate that individuals with autism demonstrate a preference and greater understanding with auditory stimuli in the form of music—often, children with autism engage with auditory stimuli longer than neurotypical children.<sup>4,5</sup> Through further research on this correlation, it has been noted that musical perception is indeed equal, if not enhanced, in children with autism.<sup>5</sup>

To address these literature gaps, this paper aims to describe and evaluate the literature available before December, 2018 on the efficacy of IMT on children ages 3-14 diagnosed with autism. This paper investigates the research objective through analyzing literature and evaluating the efficacy of the studies while also recognizing the methodological limitations present. The primary objective is to establish generalizability of the effectiveness of IMT in comparison to a control group. Furthermore, the examination of discrepancies in regards to gender, racial, socioeconomic biases, and study-types used is noted for the overall validity of the papers. We hope that the discrepancies and biases discussed will provide recommendations and strive for further, improved research in the domain of IMT on children with autism.

## **Methodology**

Peer-reviewed literature was extracted from various databases: McMaster Database, BASE, Social Sciences Citation Index, Music Index, Science Citation Index, CINAHL, MEDLINE, Open Access Journals, Academic OneFile, Arts and

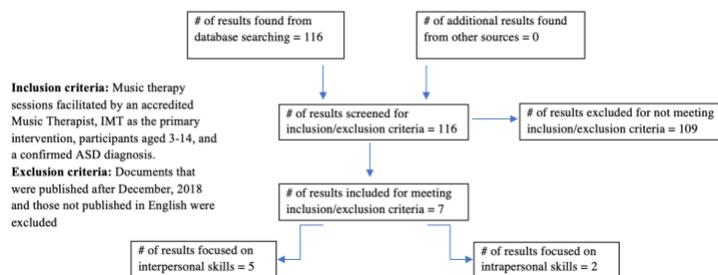
Humanities Citation Index, Pubmed and Google Scholar. These databases were searched through the use of the following string of keywords: “all(Children ASD Autism Improvisational Music Therapy)”. Additionally, reference lists of primary articles were manually evaluated and investigated to conduct a comprehensive search of all available literature on this topic that may not have been found within these databases.

In order for a paper to be included in this literature review an inclusion criteria was required to be met. The paper was required to have a focus on IMT with children diagnosed with autism. Moreover, it was mandatory that a music therapist facilitated the sessions and that a DSM IV or V definition of ASD was used to diagnose the individual. Documents that were published after December, 2018 and those not published in English were excluded. Through the primary search, 116 articles were found, however, only 7 of these papers met the inclusion criteria (figure 1). The limited number of studies that fit this criteria suggests that IMT still requires more attention and research. Additionally, through the process of shifting through the research available, the research question became more refined; it was noted that many research papers do not focus on the target audience of children ages 3-14. Therefore, this target age group was used to explore the reason behind this lack of research.

The 7 studies were evaluated based on the validity of the results obtained and the types of study methodologies used. Furthermore, the tools used to evaluate the efficacy of IMT also aided in determining

the validity of the paper. Generalizability was a key objective of this research, therefore, studies with larger, diverse populations allowed for more concrete, confident results that could be generalizable to a larger population.

All 7 papers are briefly mentioned within the results and discussion section of this paper to highlight the overall availability and efficacy of IMT for children diagnosed with ASD. Limitations and further improvements are highlighted in this paper to hopefully provide further guidance on how changes in the research methodology could be more effective to create concrete correlations between IMT and children diagnosed with ASD.



**Figure 1:** Chart of filtering process for inclusion in this review.

## Results:

Of the 116 studies found, 7 met the inclusion criteria described above (Figure 1). The included studies were then categorized according to the focus of the intervention; interpersonal or intrapersonal skills. Interpersonal skills refer to skills needed in order to interact between 2 individuals, including communication, social and behavioral skills. Intrapersonal skills focus on an individual’s awareness of their own identity and personality.

### *Interpersonal Skills*

With regards to interpersonal skills, social interaction and communication is one of the specific skills evaluated. The study by Bieleninik et al. uses a randomized control trial (RCT) of 364 participants ages 4-6 with IMT interventions and a control group.<sup>6</sup> Although the results of this study indicated that no significant differences were found, the trial reported the children's enjoyment and benefit from IMT; parents also experienced positive, personal involvement. This was evaluated through the qualitative aspect of this study.<sup>6</sup> The paper concludes that the mean changes with the participants quality of life at 5 months of receiving IMT interventions was significantly more positive than those in the control group.<sup>6</sup> This paper represented a first attempt to implement IMT consistently and internationally. The study indicated that the therapist was able to provide a positive environment for both the parent and the child.<sup>6</sup>

Although positive outcomes are noted for both the parent and child within this study, it is important to recognize the tools used to assess symptom severity.<sup>6</sup> This paper used the Autism Diagnostic Observation Schedule (ADOS) tool to assess symptom improvements/severity – this tool is often disputed; therefore, the lack of significant results on the effectiveness of IMT on these specific symptoms are inconclusive (discussed further in the discussion section of this paper).<sup>6</sup>

Another study that confirms this association is one conducted by Carpenete et al.<sup>7</sup> The primary purpose of this study was to examine IMT and its effectiveness with a DIRFloortime framework to address social

communication in children with ASD.<sup>7</sup> Although a different framework was used to perform IMT in this study, the use of the Functional Emotional Assessment Scale (FEAS) to evaluate changes in social communication showed positive results. Within these case studies, each child was initially classified as 'deficient' in a specific area of development. It was noted that each participant improved in at least one area of development to 'normal' levels, according to the FEAS tool, after partaking in IMT sessions—concluding that IMT is effective.<sup>7</sup> The increase in developmental areas included improvements in self-regulation, engagement, behavioral organization and two-way purposeful communication.<sup>7</sup>

Another aspect of interpersonal skills include joint attention, body language, engagement/disengagement, eye contact and imitation. The study by Venuti et al., indicated that IMT is efficacious and an adequate indicator for children with ASD.<sup>8</sup> Throughout a session of IMT, the amount of synchrony activity was noted to increase. This led to a significant increase in behavioral synchrony and emotional attunement.<sup>8</sup> With the increase in behavioral synchrony and emotional attunement, the children with ASD were better able to connect with adults after 20 IMT sessions.<sup>8</sup> This study uses the interactive ADOS as a method of measuring—however, as mentioned previously, the use of this tool is highly disputed, leading to inconclusive results.<sup>6,8</sup>

Moreover, a RCT by Kim et al. also focuses on joint attention—the study compared IMT to play sessions (control group), where the IMT group demonstrated

lengthier eye contact and turn taking.<sup>9</sup> This further confirms that IMT is effective with joint attention, body language, engagement/disengagement, eye contact and imitation. This study used a Pervasive Developmental Disorder Behavior Inventor (PDDBI) scale to evaluate adaptive and maladaptive behaviours.<sup>9</sup> This tool has been deemed both reliable and valid by providing information that is not usually available in most tools to assess participants diagnosed with ASD.<sup>9,10</sup>

A study conducted in Brazil by Gattino et al., also showed improvement in behavioural skills with the use of IMT – this was monitored through KAMUTHE, a video microanalysis system which observes preverbal communication in a music therapy setting specifically for children with ASD.<sup>11</sup> To assess the validity of KAMUTHE, two other tools were used to evaluate the participants improvements: Brazilian Childhood Autism Rating Scale and the Children’s Communication Checklist revised. Although reliable and valid tests were used with a larger than average sample size, the tools are specific to the Brazilian population and have not yet been tested in other countries/regions (further discussed in the discussion section of this paper).<sup>11</sup>

Overall, these studies demonstrate the efficacy of IMT in increasing non-verbal and verbal social communication behaviours.<sup>6-11</sup>

### *Intrapersonal Skills*

In addition to interpersonal skills, IMT offers children diagnosed with ASD a sense of awareness, acknowledgement, development of their own personality, and

provides a secure environment.<sup>12</sup> Through a survey (with a response rate of 71% between 10 countries) conducted by Geretsegger et al., it was noted that IMT provides a safe, comforting environment for these children.<sup>12</sup> Moreover, although IMT is typically known as unpredictable, these IMT sessions occur in a predictable environment; this allows for the child to feel safe and more willing to express their emotions.<sup>12</sup> The result of this study shows an international consensus on the importance of IMT and its effectiveness for children with ASD.

Social-motivation is a type of intrapersonal skill that a child with ASD may develop through the use of IMT. The study by Kim et al. evaluates intrapersonal skills through measuring emotional and motivational skills.<sup>13</sup> According to this paper, IMT produces longer events of happiness, emotional synchronicity and initiation of engagement behaviors—more so than individuals in the “play” control group.<sup>13</sup> Through assuring that inter-rater reliability is present while measuring emotional and motivational abilities within the two groups, the study concluded the importance of IMT and its role in intrapersonal skills.<sup>13</sup> However, the lack of ethnic diversity and the amount of participants within the study made it challenging to draw generalizable results from this research paper.

<b>Author</b>	<b>Positive Aspects</b>	<b>Limitations</b>
Bieleninik et al. <sup>6</sup>	<ul style="list-style-type: none"> <li>• 364 participants</li> <li>• International locations (Australia, Austria, Brazil, Israel, Italy, Korea, Norway, United Kingdom, United States)</li> <li>• Randomized Control Trial</li> <li>• Control Group</li> </ul>	<ul style="list-style-type: none"> <li>• ADOS tool</li> </ul>
Carpente <sup>7</sup>	<ul style="list-style-type: none"> <li>• Detailed case study</li> <li>• Improved in at least one of the developmental areas</li> <li>• Effective with improving social communication</li> <li>• FEAS tool</li> </ul>	<ul style="list-style-type: none"> <li>• 4 participants</li> <li>• Short duration of study</li> <li>• No control</li> </ul>
Venouti et al. <sup>8</sup>	<ul style="list-style-type: none"> <li>• Increases the ability of children to be behaviourally and emotionally connected with the adult</li> </ul>	<ul style="list-style-type: none"> <li>• One location, North of Italy</li> <li>• 25 participants</li> <li>• ADOS tool</li> <li>• No control</li> </ul>
Kim et al. <sup>9</sup>	<ul style="list-style-type: none"> <li>• Toy play sessions as control group</li> <li>• PDDBI scale</li> </ul>	<ul style="list-style-type: none"> <li>• One location, Seoul</li> <li>• 13 participants</li> <li>• Short duration of study</li> </ul>
Gattino et al. <sup>11</sup>	<ul style="list-style-type: none"> <li>• 39 participants</li> </ul>	<ul style="list-style-type: none"> <li>• One location, Brazil</li> <li>• KAMUTHE assessment is specific to Brazilians</li> <li>• Short duration of study</li> </ul>
Geretsegger et al. <sup>12</sup>	<ul style="list-style-type: none"> <li>• International locations (Australia, Brazil, Korea)</li> <li>• IMT provides a safe, comforting environment for these children.</li> <li>• Inter-rater reliability for survey</li> </ul>	<ul style="list-style-type: none"> <li>• 11 Participants</li> <li>• No control</li> </ul>
Kim et al. <sup>13</sup>	<ul style="list-style-type: none"> <li>• Toy play control group</li> <li>• Successful findings of the efficacy of IMT in improving social-motivational aspects</li> </ul>	<ul style="list-style-type: none"> <li>• 10 participants</li> <li>• Short duration of study</li> <li>• One location, Seoul</li> </ul>

**Table 1:** Table outlining significant positive components and limitations of the research conducted.

**Discussion:**

Analysis of the literature as indicated in this paper, showed an emerging prevalence on the effectiveness of both interpersonal and intrapersonal skills of IMT on children diagnosed with ASD (Table 1). However, although it was difficult to establish external validity of these papers once evaluated, these studies provided insight on the benefits of IMT on children diagnosed with ASD. Each paper demonstrated positive outcomes for the child (either interpersonal or intrapersonal); therefore, it provides an opportunity for future research to improve upon the limitations indicated in the papers evaluated, in order to better draw generalizable conclusions.

As seen with the types of study methodologies used, it is noted that many of them do not use the gold standard—RCTs. As RCTs are the gold standard of drawing generalizable conclusions, it is important that studies on the topic of IMT for children diagnosed with ASD are also primarily RCT’s in order to assure that valid conclusions are being drawn. Although CBT is currently the gold standard in this field (the best possible treatment at this moment), studies on CBT often have low quality and/or weaker comparators (such as a waitlist rather than an active control) thus challenging its status.<sup>14</sup> Therefore, to assure certainty amongst academic programs and practitioners, stronger, more reliable and valid studies must be conducted. A plausible solution to this may be to combine rigorous RCT methodology with IMT intervention conditions similar to clinical practice—this may become more feasible and allow for a

more accurate representation of external validity.

Moreover, scheduled sessions for IMT in these studies are often extremely rigorous—this is difficult and unrepresentative of the population as many families are unable to sacrifice multiple hours in a week for these sessions.<sup>15</sup> This concern may be due to parents who have full time jobs, job instability, low income families, etc. Therefore, it may be more beneficial to create longer duration studies with more flexible IMT schedules (Table 2). A longer study would allow the participants to have the same amount of IMT sessions, however, spread over a longer period of time so that it does not hinder their personal schedules or impact the participants commitment to the study.

Author	Time Period of Sessions
<u>Bieleninik et al.</u> <sup>6</sup>	<ul style="list-style-type: none"><li>• 5 months</li><li>• Frequency not described</li></ul>
<u>Carpente</u> <sup>7</sup>	<ul style="list-style-type: none"><li>• 15-30 minutes, twice a week</li><li>• 13 weeks</li></ul>
<u>Venuti et al.</u> <sup>8</sup>	<ul style="list-style-type: none"><li>• 50 minutes per week</li><li>• 20 sessions</li></ul>
<u>Kim et al.</u> <sup>9</sup>	<ul style="list-style-type: none"><li>• 30 minute sessions</li><li>• 12 weeks</li></ul>
<u>Gattino et al.</u> <sup>11</sup>	<ul style="list-style-type: none"><li>• 30 minute sessions</li><li>• 7 sessions total</li></ul>
<u>Geretsegger et al.</u> <sup>12</sup>	<ul style="list-style-type: none"><li>• N/A - Session details are not explicitly written</li></ul>
<u>Kim et al.</u> <sup>13</sup>	<ul style="list-style-type: none"><li>• 30 minute sessions</li><li>• 12 weeks</li></ul>

**Table 2:** Outlining the duration, length and frequency of each IMT session as indicated in the research papers.

Moreover, the type of evaluation tools used within the papers were often unreliable. For example, the ADOS was used by Bieleninik et al. and Venuti et al., to test symptom severity; however, the focus

on symptom severity with the use of the ADOS tool has been disputed.<sup>6</sup> The ADOS tool tends to over classify other diagnostic groups as ASD—this is an issue as the evaluator tends to rely on this tool for diagnosis, however, approximately 10% of this group is concerned that the measure does not discriminate well within ASD subgroups.<sup>16</sup> Moreover, the questionnaires used within the ADOS, does not allow the clinician to directly observe and rate the child's behaviour (an aspect of social interaction and communication).<sup>15,16</sup> Therefore, even though the results were not directly supported—it's important to note that if a less controversial tool was used to evaluate symptomatology, different results may have been obtained.

On the other hand, Grennspar et al., utilized the FEAS tool to measure the efficacy of IMT and identified that this tool is both reliable and valid.<sup>17</sup> However, with only 4 participants in this study, generalizable results are unattainable. Moreover, a control group would be necessary to confirm that the changes in FEAS scores were significant. These two modifications to this study may help determine more generalizable and conclusive results.

KAMUTHE is another tool that has been proven to be valid (concurrent and convergent validity) and reliable (intra-rater reliability) in Brazil.<sup>11</sup> As reliable and valid as this tool may seem, cross-cultural adaptation is necessary as this tool was created and used solely in Brazil and used only on Brazilians diagnosed with ASD.<sup>11</sup>

Moreover, sample sizes within these studies were often too small—no study

evaluated indicated that a sample size calculation was used to determine participant sample size. In general, larger sample sizes are more representative of the general target population. This is a concept that is well established and has been proven to be true.<sup>18</sup> By ignoring the ideal statistical power of a study, it increases the likelihood of false conclusions thereby limiting external validity. As ASD is a disorder that lies within a spectrum, understanding that various levels of this disorder exists is essential to assuring that the population size is large enough to represent each level within this spectrum. One solution to this would be to perform a meta analyses to pool the statistical power of the studies using a similar IMT schedule. Another solution may be to pool the RCT's together to create a larger sample size. Once statistical power is met, it better allows for the results to be generalized and applicable to a larger populations.

Furthermore, although studies such as the one by Geretsegger et al. showed that 71% of Music Therapists in the study responded to this survey, this only comprises of 30 individuals.<sup>15</sup> This shows how important it is to increase the population sizes in order to demonstrate external validity and to thoroughly understand and evaluate the data available. The guidelines presented in this study show the support of IMT on intrapersonal skills with the help of a music therapist. However, these guidelines need to be followed and require a larger sample size to assure that the results are generalizable to a larger population.<sup>15</sup>

**Conclusion:**

Based on the studies examined, 7 papers highlighted the efficacy of IMT for children with ASD. However, it is difficult to conclude its true effectiveness of a general population due to the average sample size and/or study methodology used. Each paper lacks at least one of the following: a control group, a diverse population (gender, ethnic, socioeconomic) and/or large sample sizes. It was noted that certain papers neglected to incorporate information on ASD diagnoses, and a clear breakdown of the IMT session schedule. In order to improve the quality and relevance of research, future studies must include control groups, appropriate/larger sample sizes based on sample size calculations, valid/reliable evaluation tools and sample participants that can represent a more generalizable population. It is imperative that these steps are considered in order to concretely determine the effects of IMT on children with ASD and hopefully create treatment protocols on its use in the future.

The primary purpose of this literature review is to evaluate the research available on IMT for children diagnosed with ASD and to establish future protocols and guidelines for further research on this topic. It has been noted in these studies that there is a need for researchers to provide detailed examination of the feasibility of the study procedures on IMT with children diagnosed with ASD. Comprehending trial feasibility will help expand on the knowledge about successful strategies and establish meaningful, generalizable results. It is also important to assure that the studies created are the most beneficial and convenient for

the individuals with ASD and their family members; clinical conditions present within these studies must imitate everyday practice.

This review confirms that most studies demonstrate that IMT is effective in improving both interpersonal and intrapersonal skills for children with ASD. However, because there are several factors that limit the validity and generalizability of the results, research with better methodological quality is required before health policy change may be considered.

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