

# Reviewing the effect of creative arts therapy on the development of cognitive and social skills in children and adolescents with autism spectrum disorder

SYDNEY BRANNEN

PROJECT SUPERVISOR: DR. JACKELINA PANDO-KELLY

## Abstract

Creative art therapy has been utilized for many years as a treatment regimen for certain mental disorders. Overall, results of studies on creative art therapy show a positive trend, with general improvements in mental health and reduction of neurological symptoms in the majority of cases. The results regarding the effectiveness of creative art therapies in treating autism spectrum disorder are unclear and varied, due to the range of symptoms involved in autism spectrum disorder, the effect of age on therapy, and the variety of creative art therapies available for use. Of all the creative art therapies chosen to review, music was the most investigated. The studies performed on music therapy showed positive results, however, a large-scale randomized controlled trial refuted the positive benefits, leading to an inconclusive overall result on the effectiveness of music therapy. Research on the benefits of creative art therapies for children with autism spectrum disorder is inconclusive. Studies generally demonstrate a positive effect on many different types of creative art therapies. However, these studies have major limitations in generalizability due to small sample sizes and their descriptive nature. Future research should focus on developing randomized controlled trial protocols that can be used on a larger scale to generate more definitive results on the benefits, or lack thereof, of creative art therapies. Research should also be performed on the effect of adolescence on creative art therapies, and whether targeting it at younger children with autism spectrum disorder would be more or less beneficial than targeting it towards adolescents.

## Introduction

Creative art therapy (CAT) has been utilized for many years as a treatment regimen for certain neurological and mental health disorders, becoming more of an attractive choice in recent years in order to avoid the unwanted adverse effects of pharmacological agents (1). CAT also comes in many forms, as it can be based around a multitude of art styles, including visual arts, dance, theatre, music, or, more recently, filmography (1). Various types of studies of the effects of CAT have been conducted on numerous conditions, including bipolar disorder, schizophrenia, depression, and post-traumatic stress disorder (PTSD), focusing mainly on disease-specific symptoms, as well as improving mental health, the satisfaction of care, and overall wellbeing of the patients (1,2,3). However, the effects of CAT on autism spectrum disorder (ASD) require more attention, and its effects are particularly important as there is a very limited pharmacological treatment for the condition and a rate of occurrence of approximately 1 in 100 children (4). The pathophysiology of ASD is yet to be fully understood, regardless of its high prevalence, due to the complex neurophysiology involved and the lack of suitable animal models, however current research suggests that both genetic and environmental factors play a role in the occurrence of the condition (4). The signs and symptoms of ASD vary amongst age groups, however, the symptoms that usually begin in childhood, include delayed and stunted development of social communication and interaction skills, therefore improvement of these skills through CAT may be beneficial for the symptomatic treatment of ASD (4).

Overall, results for the majority of cases tend towards a positive effect of CAT, with improvements in general mental health and a reduction in disease-specific symptoms in a multitude of conditions (1). The mechanisms with which CAT improves these symptoms are unclear. However, suggested hypotheses include the influence of an environment that fosters connection and communication between individuals and encourages creativity and the development of talents. Ultimately, these environmental conditions lead to increased self-

esteem, cognitive development, mood, and social functioning (5). CAT has also been shown to foster trust between the individual and the healthcare team in the in-patient setting, providing a better environment for patient care (1). This category of therapy would have the potential to be useful for treating ASD, which typically presents in patients with social interaction difficulties, as well as the tendency to restrict their behaviours and difficulty in dealing with emotional stressors (4).

The results regarding the effectiveness of CAT on numerous disorders are contradictory and diverse (6), which may be due to the range of variability present in psychiatric disorders, along with the scope of options available for the types of art used in therapy (7). Furthermore, the age of the individual undertaking CAT may have an effect on its treatment capabilities, as it may be more critical to develop the connections and enhance the brain plasticity, seen in the body and mind approach, at a younger age (8). A study performed in 2019 demonstrated that adolescents with mental health disorders undergoing drama therapy influenced the adaptation of the individuals to peer groups and enhanced the formation of normal behavioural patterns (9). Overall, although the effects of CAT have been widely studied, the effects on the paediatric population with ASD are less elucidated, and in particular, it has not been determined which types of CAT provide the greatest benefit to this population.

The aim of this literature review is to investigate the effect of different types of CAT on the social and cognitive outcomes of paediatric individuals with ASD. The objectives of this review include examining previously published research studies in order to

1. Investigate the effects of music therapy on the cognitive and social outcomes of children with ASD.
2. Investigate the effects of visual art therapy on the cognitive and social outcomes of children with ASD.
3. Investigate the effects of novel creative art therapy mechanisms (dance therapy, theatre therapy, and film therapy) on the cognitive and social outcomes of children with ASD.





# Methodology

## SEARCH STRATEGY

An electronic search was performed using two databases, Academic Search Complete and MEDLINE through EBSCOhost to identify literature relevant to the aims and objectives of this review.

The following search terms were used for Academic Search Complete and MEDLINE:

art therapy [All Text] OR art psychotherapy [All Text] OR creative arts therapies [All Text]  
 AND  
 children [All Text] OR adolescents [All Text] OR youth [All Text] OR child [All Text] OR teenager [Text]  
 AND  
 autism [All Text] OR asd [All Text] OR autism spectrum disorder [All Text]

The following filters were applied to Academic Search Complete and MEDLINE:

Table 1: List of filters applied to Academic Search Complete and MEDLINE

No.	Filter	Specifications
1	Limiters	Scholarly (Peer-Reviewed) Journals
2	Date of Publication	2011-2021
3	Source Types	Academic Journals
4	Language	English

## INCLUSION AND EXCLUSION CRITERIA

Articles selected had to be available in full-text in order to properly select and critically appraise appropriate articles, and

the articles had to be either written or translated in English for personal understanding of the contents of the article. Location was not limited to Ireland as the searches from these two databases yielded no articles of a relevant nature from Ireland. Articles that were published before 2011 were excluded in order to ensure the most relevant research was included. Studies performed on animals were excluded, and human subjects included in the study must be between the ages of 3 and 18 years old in order to exclude studies investigating the effects of CAT on neonates, infants, and adults. The remaining inclusion and exclusion criteria were selected in order to focus the review on the specific topic of the effects of CAT on the cognitive, verbal and social development of children with ASD. All types of primary research, both observational and interventional studies, were utilized in order to visualize all ranges of responses to CAT and reduce bias.

Table 2: Inclusion and exclusion criteria for studies selected for analysis in this review

Inclusion Criteria	Exclusion Criteria
Articles available with full text online or are available through UCC online library loans	Articles without full-text availability
Articles available in English	Studies auditing specific CAT programs
Articles published between 2011 and 2021	Studies looking at non-cognitive and non-social developmental milestones of children with ASD utilizing CAT
Studies performed on humans	Studies that examine children with multiple diagnosed mental and cognitive conditions
Studies performed on children aged between 3 and 18 years old	Studies that are review articles or meta-analyses
Studies that determine the cognitive outcomes of CAT on children with ASD	Studies that investigate the outcomes of CAT on the parent's care of the child
Studies that determine the social outcomes of CAT on children with ASD	Studies that investigate the outcomes of CAT on the artist
Studies that determine the verbal outcomes of CAT on children with ASD	Studies that investigate the outcomes of CAT on the healthcare team
Studies that are performing primary research	Studies that aim to propose a standard type of CAT for the treatment of ASD

## SELECTION CRITERIA

The initial search on Academic Search Complete yielded 1,107 results, and was reduced to 669 results after the filters were applied. On MEDLINE, the primary search yielded 85 results, and was then decreased to 75 results after the application of filters. The initial search was left with a large number of results, as after initial screening, many entries were not relevant to the objectives of this review. After the removal of the duplicate entries, 611 articles remained. Of the 611 abstracts screened, 572 did not fit the inclusion criteria. The remaining 39 articles were then read in full to determine their eligibility within the exclusion and inclusion criteria. 10 final articles were selected for the review.

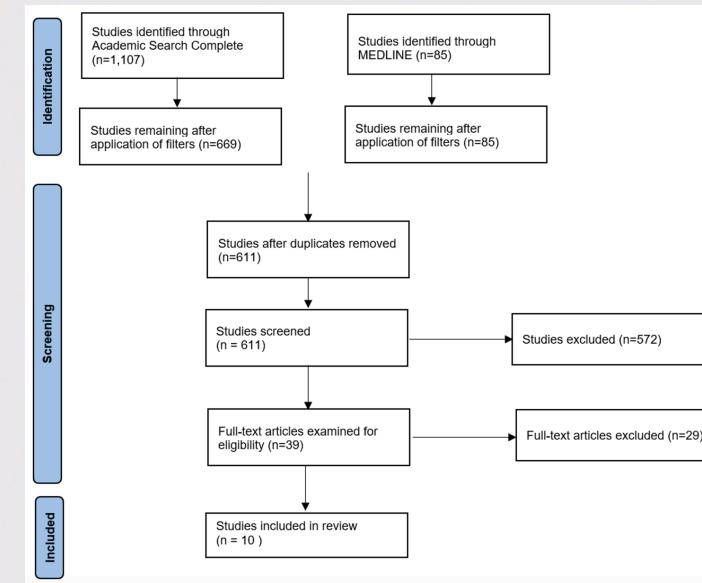


Figure 1: Search strategy for selecting relevant articles for inclusion in the literature review

## CRITICAL APPRAISAL

Due to the variety of study designs examined, 3 different checklists were utilized in order to critically evaluate the studies included in the review. The EBL checklist was utilized for quantitative studies, the CASP checklist was used for qualitative studies, and the mixed methods appraisal tool (MMAT) was used for mixed-methods studies. The results from these checklists are summarized in Table 4 (EBL), Table 5 (CASP), and Table 6 (MMAT). More detailed results are included in Appendix A (EBL).

Table 3: Reasons for exclusion of research articles throughout the screening process

Reason for exclusion	Number
Articles without full-text availability	5
Studies auditing specific CAT programs	89
Studies looking at non-cognitive and non-social developmental milestones of children with ASD utilizing CAT	201
Studies that examine children with multiple diagnosed mental and cognitive conditions	52
Studies that are review articles or meta-analyses	137
Studies that investigate the outcomes of CAT on the parent's care of the child	4
Studies that investigate the outcomes of CAT on the healthcare team	16
Studies including individuals below 3 years of age and above 18 years of age	23
Studies performed on animals	73
Studies that aim to propose a specific type of CAT for the treatment of ASD	1
<b>Total</b>	<b>601</b>

# Results

## OBJECTIVE 1: INVESTIGATE THE EFFECTS OF MUSIC THERAPY ON THE COGNITIVE AND SOCIAL OUTCOMES OF CHILDREN WITH ASD

Of the 10 studies that fit the criteria for this review, five were focused on music therapy (MT) (10, 12, 13, 15, 19). Music therapy encompasses more than just listening to music, and involves the creation of music, singing, discussing the lyrics and playing an instrument (10).

Overall the majority of studies that focused on MT found that it led to positive outcomes for children with ASD (10, 12, 15, 19). A case series of 4 children demonstrated that MT increased the quantity of overall vocal communication in all participants as therapy progressed, however, this growth was not in a linear pattern and did fluctuate throughout sessions (12). In further detail, vocal communication became focused on creating interpersonal relationships, and vocalization of other topics that were not aimed at connecting with others decreased over time (12). A more recent case series performed on 10 children observed that MT aided with



Table 4: Summary of articles

Author, year, location, title	Objectives	Study design, population, sample size	Study methodology	Key findings	Strengths and limitations
Rabeyron T <i>et al.</i> (2020) France "cars" (10)	To determine if music therapy (MT) is more effective than music listening (ML) on the outcomes of children with ASD	Single-blind randomized controlled trial (RCT) Children with ASD, ages 4-7 from Nantes, recruited from 5 psychiatric facilities, 31 boys, 5 girls n=36 (17 in ML, 19 in MT)	25 sessions of designated intervention over a period of 12 months Patients were randomly assigned to one of the two groups Outcome measures were Clinical Global Impression (CGI), Childhood Autism Rating Scale (CARS) and the Aberrant Behaviour Checklist (ABC)	1. Childhood Autism Rating Scale (CARS) scores decreased for both MT (39.3 to 35.9) and ML (36.4 to 33.8) groups with no significant difference between the two (p = 0.92) 2. Clinical Global Impression (CGI) scores decreased more for participants in MT (5.1 to 2.8) than in ML (4.6 to 3.4) [Odds Ratio (OR)=0.44, 95% Confidence Interval (CI) = 0.20-0.93] 3. Increased improvement of symptoms of ASD based on Aberrant Behaviour Checklist (ABC) subscales for MT group (58.7 to 48.6) than for ML group (53.1 to 48.8) [ABC scores were higher for MT group than ML group to begin with] (Mean difference (MD) 12.48, CI [0.35 -24.68], and a difference was no longer observed post-treatment (MD 6.83, 95% CI [-5.81-19.86])	<b>Strengths:</b> Detailed analysis, use of control group of ML for comparison from baseline, controlled for all foreseeable variables <b>Limitations:</b> Did not utilize the gold standard instrument for assessing ASD, no follow-up past the endpoint of treatment, bias of therapists involved in the ML group, not fully replicable due to the nature of MT, wide confidence intervals for ABC subscales
Parvathi G (2020) India "Arts based therapeutic intervention on an adolescent living in autism spectrum" (11)	Explore the value of CAT on the development and growth of a boy with autism Discuss the importance of arts-based therapy approaches and techniques as a therapeutic intervention Discuss how children diagnosed with autism will benefit from arts-based therapy	Case Report A 17-year-old male with ASD n=1	10 months worth of art therapy sessions, ranging from body movement, drawing, clay, and theatre	Arts-based therapy caused a gradual progression in the boy's behaviour, where he was able to develop object constancy, build relationships with others, and develop language skills. <b>Limitations:</b> Due to the nature of a case report, it is not able to be deciphered whether these observations are an anomaly, or how the development would compare to a child with autism undergoing typical therapy and treatment	<b>Strengths:</b> Detailed description of the art therapy sessions, and what was being taught in the session A detailed description of the boy's outcomes <b>Limitations:</b> Due to the nature of a case report, it is not able to be deciphered whether these observations are an anomaly, or how the development would compare to a child with autism undergoing typical therapy and treatment
Salomon-Gimmon M and Elefant C. (2019) Israel "Development of vocal communication in children with autism spectrum disorder during improvisational music therapy" (12)	Examine the development of vocal communication in children with ASD during music therapy Investigate trends and patterns of vocal development during music therapy	Case Series n=4 4 children (aged 4-5, diagnosed with ASD) were chosen from a previously run RCT (2 children had music therapy twice a week, 2 children had music therapy 3 times a week, 3 children out of the 4 were non-verbal)	Analysis of videos from children in a prior RCT who received MT sessions, 30 minutes each over a course of 5 months One session per month was analyzed, therefore a total of 20 sessions Vocal communication was encoded into categories from the VQR scale (vocal pre-speech quality of relationship) and frequency of speech in these categories was noted.	1. Vocal communication of children with ASD developed in a non-linear pattern in music therapy 2. A downward trend was observed in the development of vocal communication if it was not directed at creating contact with others, and an upward trend in vocal communication when creating interpersonal relationships 3. An upward trend in the quantity of communication overall <b>Limitations:</b> Small sample size, videos were only analyzed by one researcher therefore the analysis could be biased	<b>Strengths:</b> Therapy only performed by two therapists reduced variability, in-depth analysis of particular issues <b>Limitations:</b> Small sample size, videos were only analyzed by one researcher therefore the analysis could be biased
Bieleninik L <i>et al.</i> (2017) Australia, Austria, Brazil, Israel, Italy, Korea, Norway, United Kingdom, United States "Effects of improvisational music therapy vs enhanced standard care on symptom severity among children with autism spectrum disorder: the TIME-A randomized clinical trial" (13)	Evaluating the effects of improvisational music therapy on the development of social skills and communication of children with ASD	Assessor-blinded, RCT n=364, (182 in enhanced standard care (ESC), 92 in ESC plus low-intensity improvisational music therapy (IMT), 90 in ESC plus high-intensity IMT) Children aged 4-7 with ASD from 9 countries (Australia, Austria, Brazil, Israel, Italy, Korea, Norway, United Kingdom, United States)	Children were recruited from 2011-2015, follow up between 2012 and 2016. Autism severity was measured using the Autism Diagnostic Observation Schedule (ADOS) and Social Responsiveness Scale (SRS). Secondary outcomes were related to parents' visualization of changes in social skills of the children Outcomes were assessed at 2 months of therapy, at the end of therapy intervention (5 months) and 7 months post-therapy	1. Both groups of children undergoing IMT and the ESC group had reductions in the ADOS score, however, the difference in reduction was non-significant (MD 0.06, 95% CI[-0.70 to 0.81] p=0.88). 2. Of the 20 secondary outcomes in the SRS assessed by parents, 17 showed no significant differences between treatment groups (high-intensity IMT was associated with greater improvements in social motivation and autistic mannerisms, low-intensity IMT was associated with a greater improvement in social awareness) <b>Limitations:</b> Potential variable with cohort (83% boys, 17% girls), only 19 IMT sessions in addition to ESC, and more therapy in total for IMT group vs ESC group, the study was terminated early due to lack of funding, length of intervention may have been too small to see significant effects, arguments exist about whether symptom severity is less important than the well-being of the individual	<b>Strengths:</b> Large scale study in numbers and duration, a detailed protocol, narrow confidence intervals within results <b>Limitations:</b> Potential variable with cohort (83% boys, 17% girls), only 19 IMT sessions in addition to ESC, and more therapy in total for IMT group vs ESC group, the study was terminated early due to lack of funding, length of intervention may have been too small to see significant effects, arguments exist about whether symptom severity is less important than the well-being of the individual
Schweizer C <i>et al.</i> (2020) The Netherlands "Evaluation of 'Images of Self', an art therapy program for children diagnosed with autism spectrum disorders (ASD)" (14)	To evaluate the outcome of art therapy on children with ASD, including the sense of self, emotional regulation, flexibility, and social behaviour	Mixed-Methods n=12 Children aged 6-12 with ASD undergoing 15 weekly, individual art therapy sessions of 45 min duration	The improvement of the children was measured using the Behaviour Rating Inventory of Executive Functioning (BRIEF) and Children's Social Behaviour Questionnaire (CSBQ) instruments for measuring executive functioning and social behaviour respectively Measurements occurred before therapy, during the 3rd, 8th and 15th sessions, and 15 weeks post-treatment. Parents filled out qualitative surveys Therapists recorded three sessions and evaluated the recordings with parents and the researcher	1. 7 children strongly improved on the BRIEF and CSBQ measurements post-treatment, indicating improved social behaviour 2. All 12 children remained in the stable zone of the BRIEF and CSBQ measurements, indicating that none were negatively affected by the therapy <b>Limitations:</b> Small sample size limits the ability to generalize the results, only utilizing children that do not show resistance to art therapy may bias the results of the study	<b>Strengths:</b> Multiple perspectives are gathered using the mixed-methods approach, took baseline measurements before beginning treatment <b>Limitations:</b> Small sample size limits the ability to generalize the results, only utilizing children that do not show resistance to art therapy may bias the results of the study

Table 4: Summary of articles (continued)

Author, year, location, title	Objectives	Study design, population, sample size	Study methodology	Key findings	Strengths and limitations
Rickson D (2021) New Zealand "Family members and other experts' perceptions of music therapy with children on the autism spectrum in New Zealand: Findings from multiple case studies" (15)	To observe the perceived outcomes of MT on the emotion, cognition, and sensory regulation, as well as communication and relationships of children with ASD	Case Series n=10 Children with ASD aged 5 - 10 (7 boys and 3 girls) with no previous MT receiving up to 40 sessions	2-4 Family members and other experts with close connections to the child involved examined clinical materials from therapy and gave written feedback Six other experts who did not know the child also reviewed the material	1. MT allowed children to express emotions appropriately, involving increased expression of positive emotions, and increased regulation of negative responses, leading to decreased behavioural disturbances 2. MT supported the learning of new methods of communication in the cohort and the development of interpersonal interactions 3. MT aided in developing trusting and secure relationships between children with ASD and other individuals	<b>Strengths:</b> Variety of perspectives provided by both people who know and are strangers to the child, wide range of people involved throughout New Zealand <b>Limitations:</b> No perspectives from the children on their own experiences, limited detail in the manuscript
Saladino V <i>et al.</i> (2020) Italy "Filmmaking and video as therapeutic tools: case studies on autism spectrum disorder" (16)	To evaluate the behavioural and psychosocial outcomes of adolescents with ASD undergoing film therapy (FT)	Case Series n=4 Italian adolescents with ASD, aged 10-13 years old, 2 females and 2 males	Interview conducted prior to the start of the study, one with the parents and one with the child Six sessions of FT followed, where the four individuals worked in pairs to create short films Two sessions of cinematography, where the individuals watched and discussed the film with their peers and family Two follow-up sessions, one month later and three months later, with interviews conducted in the same fashion as prior to the start of the study	Participants improved their social skills throughout the study Mutual interaction, social-emotional reciprocity and play and behaviour regulation increased post-study Relationships amongst adolescents with ASD and between adolescents with ASD and neurotypical individuals (in this case, the researchers) increased	<b>Strengths:</b> Detailed description of results of each individual <b>Limitations:</b> Cannot generalize results due to the nature of the study, no overarching summary of the results post-study
Corbett BA <i>et al.</i> (2016) United States "Improvement in social competence using a randomized trial of a theatre intervention for children with autism spectrum disorder" (17)	To evaluate the impact of a theatre-based art therapy intervention on the social outcomes of children with ASD	RCT n=30 Children with ASD aged 8-14, randomly assigned to treatment (n=17) or wait-list control group (n=13)	Theatre intervention delivered over 10 4-h sessions. Theatre sessions included working towards creating a theatre performance, as well as peer-modelling practices and video training sessions Social functioning was measured using the SRS and Adaptive Behaviour Assessment System (ABAS), social interaction was measured using the Peer Interaction Paradigm (PIP), and social cognition was measured with Memories of Faces Delayed (MFD) and Theory of Mind (TOM) tools. Electroencephalograms (EEGs) were also performed.	Improvements were seen post-treatment in social ability (d=0.77) and communication symptoms, (d=0.86) and communication symptoms continued to improve after 2 months of follow-up (d=0.82). Theatre interventions result in improvement in social cognition compared to wait-list control groups (p=0.02). The Theatre intervention group had a greater time effect on changes in social cognition, brain amplitude differences, and social functioning (ABAS, p=0.04, TOM, p=0.02, EEG readings brain amplitude differences, p=0.016).	<b>Strengths:</b> control group for comparison was included, randomization between the groups reduced bias, groups were comparable at baseline, multiple measures were used, and effect sizes were large <b>Limitations:</b> Parents were aware of which treatment group their child was in, therefore leading to potential bias in parent-led measurements, the follow-up did not go further than 2 months, coordinating schedules of all participating parties may make this treatment method difficult to employ
Vaisvaser S. (2019) Israel "Moving along and beyond the spectrum: creative group therapy for children with autism" (18)	To investigate the effect of creative group therapy on children with ASD	Case Report n=3 Boys with ASD, aged 4.5-6 years old	Group met in 45 min sessions, once weekly for 30 weeks Four phases: 1: opening song, 2: drawing on paper, 3: free movement with stretch bands, 4: closing song. Groups were co-led by an occupational therapist and a dance therapist	Members of the group were able to develop social engagement through creative play, and discovered motivation to connect and be seen by their peers	<b>Strengths:</b> Very detailed observation of the group process and development of social cognition <b>Limitations:</b> Cannot generalize results due to the nature of the study, no clear statement of aims or objective
Sharda <i>et al.</i> (2018) Canada "Music improves social communication and auditory-motor connectivity in children with autism" (19)	Evaluate the effect of a MT intervention on social communication in school-age children with ASD	Assessor-blinded, RCT n=51 Children aged 6-12 years with autism, randomized into two groups (n=26 in intervention, n=25 in non-music intervention)	8-12 weeks of 45-minute music intervention or non-music intervention Music intervention involved use of improvisation in song and rhythm in order to target communication between peers Non-music intervention was structurally matched therapy but did not include musical elements Assessment of social communication and the functional connections between frontal and temporal lobes was performed pre and post intervention Assessment was performed through the SRS, the Children's communication checklist (CCC) and resting-state functional magnetic resonance imaging (rs fMRIs) for functional connectivity	1. Communication scores were higher in the music group than in the non-music group after intervention [CCC MD: 4.84 95%CI{0.76-8.92}, p=0.01] 2. Activity between the auditory and subcortical frontal regions in a resting state was higher post-music intervention than post-non-music intervention, along with lower brain connectivity between the auditory and visual regions for the music intervention compared to the non-music intervention 3. Covariate analysis showed that the change in communication scores was related to the increased activity between the auditory and subcortical frontal regions on rs fMRI (z=3.57, p < 0.0001), and lower brain connectivity between the auditory and visual regions (z=3.64, p < 0.001)	<b>Strengths:</b> Detailed study, the groups matched at baseline, studied functional effects of music on the brain, expressed calculations performed in order to ensure a proper sample size <b>Limitations:</b> Excluded older children from the study, could potentially have different effects in adolescents, particularly in the rsfMRI outcomes

emotional regulation in the children, as well as improved communication skills and development of interpersonal relationships (15). Overall, all studies agreed upon an improvement in the development of the children's communication skills post-MT (12, 15, 19).

Functional magnetic resonance imaging (fMRI) images performed on children (n=26) undergoing music therapy showed increased connectivity between the auditory and frontal subcortical centres compared to a non-intervention group (n=25) (19), as well as increased communication in the Children's Communication Checklist (CCC) (19). Current theories about the impaired development of communication skills in children with ASD point towards alterations and miscommunications between the sensorimotor and cognitive functions in the brain itself, therefore growth in the connections between these two centres may lead credence to this theory in the pathophysiology of communication skills in children with ASD (19). A more recent randomized-controlled trial (RCT), using the Clinical Global Impression (CGI) and the Aberrant Behaviour Checklists (ABC), showed increased communication, decreased behavioural upsets, and decreased severity of symptoms in children with ASD who were in the MT groups (n=19) compared to children undergoing simple music listening (n=17) (10).

However, one large RCT (n=364) found that MT in extension to enhanced standard care (ESC), did not provide any additional benefit to the children compared to those receiving ESC alone, as children in both groups received a reduction in their Autism Diagnostic Observation Scale (ADOS) and Social Responsiveness Scale (SRS) scores (13). However, there was a significantly higher result observed in the MT group compared to the ESC group in the subcategories of social motivation, social awareness and autistic mannerisms based on SRS scores (13).

### **OBJECTIVE 2: INVESTIGATE THE EFFECTS OF VISUAL ART THERAPY ON THE COGNITIVE AND SOCIAL OUTCOMES OF CHILDREN WITH ASD.**

Of the 10 studies that fit the criteria for this review, three studies focused on the outcomes of visual art therapy (VAT) on children with ASD (11, 14, 18). Prior studies have shown that visual art therapy tends to increase the connectivity between the amygdala and the prefrontal cortex, which works to decrease anxiety, whereas music therapy stimulates the excess release of dopamine, which may also work to decrease anxious emotions, as well as depression, therefore there may be differences in the effects of both types of therapy (20).

A case study on a boy undergoing VAT reported that it was able to help him develop object constancy, build relationships with others, and improve language skills (11). A case report on three boys also reported an increase in social engagement between the boys after VAT, as well as expanded motivation to seek out connections with their peers (18). Another mixed-methods study on 12 children

reported that the majority of children that underwent VAT improved on both the Behaviour Rating Inventory of Executive Functioning (BRIEF) and Children's Social Behaviour Questionnaire (CSBQ) measurement systems, and none of the children was negatively affected by the treatment (14).

### **OBJECTIVE 3: INVESTIGATE THE EFFECTS OF NOVEL CREATIVE ART THERAPY MECHANISMS (DANCE THERAPY, THEATRE THERAPY AND FILM THERAPY) ON THE COGNITIVE AND SOCIAL OUTCOMES OF CHILDREN WITH ASD.**

Of the 10 studies that fit the criteria for review, one focused on theatre therapy (TT) (17), and another focused on film therapy (FT) (16). Dance therapy was incorporated into two case studies focusing on art CAT (11, 18), the results of which are described above in the section referring to Theme 2.

The RCT showed that compared to the control group (n=13), a theatre intervention (n=17) observed an increase in social ability (d=0.07), social cognition (p=0.02) and improvement in communication symptoms (d=0.86) as measured by the SRS, Adaptive Behaviour Assessment System (ABAS), Peer Interaction Paradigm (PIP), Memories of Faces Delayed (MFD), and Theory of Mind (TOM) tools, as well as electroencephalogram (EEG) measurements (17). The social cognition further continued to improve at 2 months follow-up (d=0.82) (17).

A case series was performed in 2020 to analyse the effect of FT on children with ASD, and after completion of the sessions it was found that the social skills of the children had improved, not just amongst other children with ASD, but also with neurotypical adults (16). It was also reported by the parents and researchers during follow-up with the children, that mutual interaction, social-emotional reciprocity and play and behaviour regulation of the children had continued to improve post study (16).

## **Discussion**

The aim of this review was to investigate the effect of different types of CAT on the social and cognitive outcomes of paediatric individuals with ASD.

### **INVESTIGATE THE EFFECTS OF MUSIC THERAPY ON THE COGNITIVE AND SOCIAL OUTCOMES OF CHILDREN WITH ASD.**

The majority of the research performed on CAT for children with ASD has focused on MT, with five out of the 10 studies relevant to this review specifically addressing its effects. Furthermore, four out of the five studies provided evidence that MT did supply a benefit to the social and cognitive outcomes of children with ASD (10, 12, 15, 19). However, one study had a different finding and showed that although MT was not negatively affecting the children, it didn't provide any additional benefit when combined with enhanced standard therapy which is already recommended for children with

ASD (13). In particular, there were only minor differences in social motivation and awareness, as well as autistic mannerisms being reported post-MT completion (13).

The study refuting the benefits of music therapy does have the most strength, due to the number of participants, and the variety of countries that participated in the study, reducing the bias that may occur in geographic specific methods of how music therapy is performed (13). The other studies, although beneficial for the purpose they served and still critically of value, were much smaller scale, and therefore less generalizable to the population as a whole (10, 12, 15, 19). The RCT performed by Rabeyron et al., in particular, also did not receive a favourable "Population" score with the EBL checklist, due to the lack of comparison at the baseline of the two groups and a deficiency of clarity around the selection methods used for the participants (10).

Therefore, based on the findings, it may not be beneficial to implement MT as a therapy, due to the evidence of a potential lack of therapeutic benefit. Furthermore, studies show an increased economic burden on the healthcare system towards therapies for ASD, therefore it may not be financially beneficial to implement widespread MT, as studies show that behavioural therapies tend to cost significantly more than pharmacological therapies for the average ASD patient (21, 22).

### **INVESTIGATE THE EFFECTS OF VISUAL ART THERAPY ON THE COGNITIVE AND SOCIAL OUTCOMES OF CHILDREN WITH ASD.**

VAT has been less researched than MT, with only 3 studies total discussing the topic (11, 14, 18). In addition, the two case studies (11, 18), were also confounded by including dance therapy in the treatment regimens being investigated. Therefore, it is difficult to investigate whether the benefits observed were due to the VAT, dance therapy, or the combination. However, the mixed-methods study (14) which did not include dance therapy concluded that there was a benefit for the use of VAT in the treatment of ASD. Although, the study is limited in its generalizability due to small sample size and selection bias towards children who did not show resistance to VAT (14).

Therefore, further investigations need to be performed to understand the benefits of VAT, ideally with larger sample sizes and more RCT's rather than observational studies.

### **INVESTIGATE THE EFFECTS OF NOVEL CREATIVE ART THERAPY MECHANISMS (DANCE THERAPY, THEATRE THERAPY AND FILM THERAPY) ON THE COGNITIVE AND SOCIAL OUTCOMES OF CHILDREN WITH ASD.**

TT and FT are relatively new methods of CAT, and therefore only one study per therapy fits the criteria for review (23).

Both the studies on TT and FT showed improvements on the cognitive and social skills in children with ASD (16,17), however both studies have limitations. The study by Corbett et al. (17) on

TT had several strengths in its protocol including a large sample size, randomization of subjects, and diversity of statistical analyses. However, it was noted that some parents during this study managed to discover which cohort their child was allocated. As the parents were responsible for the measurements, this knowledge may have introduced the potential for bias. Furthermore, the therapeutic potential of this therapy may be limited by its feasibility to be organized and scheduled according to all participants' schedules and needs. Similarly, although the Saladino et al. (16) study on FT shows promising results for participants, the sample size is too small to generalize. Therefore, there is a need for additional investigations in this field with larger sample

There are several limitations to this review. Firstly, the word count restrictions limited the amount of detail that could be included in each investigation. Similarly, only studies written or translated into English could be included, limiting the findings that could be found in other countries. There were also no investigations into the impact of age on the study findings, which is particularly important due to the knowledge that the transition from childhood into adolescence impacts the effects of therapy due to the increased challenges faced by individuals in this period (24). Furthermore, all studies used a variety of different measurement tools, leading to difficulties comparing results directly between the studies. Finally, selection bias may have been introduced as a single researcher completed this review.

## **Conclusion**

In conclusion, evidence of the benefits of CAT for children with ASD is inconclusive, however even the small benefits may help children with ASD to avoid a multi-drug pharmacotherapy plan, particularly during a vulnerable period of brain development as children age. Studies generally demonstrate a positive effect for many different types of CAT, including MT, VAT, TT, and FT, however, these studies have major limitations in generalizability due to small sample sizes and their descriptive nature. Negative effects were not demonstrated, however, null effects were seen in some studies. Future research should focus on developing RCT protocols that can be used on a larger scale to generate more definitive results on the benefits, or lack thereof, of CAT. Research should also be performed to determine if CAT is more beneficial when used for younger children with ASD compared to adolescents. Furthermore, ensuing research should delve into other variables of creative arts therapy, such as the environmental setting, whether the therapy occurs virtually or in-person, and the number of instructors present, as these factors may play a role in the efficacy of creative arts therapy in the symptomatic treatment of autism. Depending on future results, it may still be worth suggesting such therapies as a treatment method for children with ASD in order to ensure safe, enjoyable and accessible therapies for the developing youth.



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