

Critical Review: Is Improvisational Music Therapy Efficacious in Fostering Social Communication Skills in Children with Autism Spectrum Disorder?

Rebecca Colini

M.Cl.Sc SLP Candidate

University of Western Ontario: School of Communication Sciences and Disorders

This critical review examines literature regarding the effects of Improvisational Music Therapy (IMT) on the development of social communication skills in children with Autism Spectrum Disorder. A literature search yielded six articles: three randomized control trials, one observational longitudinal design and two mixed methods designs. Overall, the findings from the studies reviewed are suggestive that IMT may help children with Autism foster social communication skills. Both strengths and limitations of the studies are discussed. In addition, clinical implications, such as how to best implement therapy, as well as recommendations for future research, are considered.

Introduction

Autism Spectrum Disorder, hereafter referred to as Autism, is a very prevalent disorder; it is estimated that 1 in 59 people in the United States have a diagnosis of Autism (Centre for Disease Control, 2018). This disorder can impact many facets of an individual's life. According to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, to be diagnosed with Autism, an individual must experience persistent deficits in interacting and communicating with others and have restrictive and repetitive interests that are intrusive in nature (Masi, DeMayo, Glozier & Guastella, 2017). These difficulties must arise in the developmental period and may worsen as the individual gets older with increasing social demands (Masi, et al., 2017). Due to these deficits, individuals with Autism often struggle with social communication, especially in areas of social-emotional reciprocity (or the back and forth social exchange), non-verbal communication, and in developing and maintaining relationships with others (Watkins, Kuhn, Ledvetter-Cho, Gubarter & O'Reilly, 2015).

Individuals with Autism also frequently display some relative strengths. Often, they show aptitude in skills that are thought to be lateralized to the right brain. (Sandiford, Mainness & Daher, 2012). This may include capabilities such as musical ability. Based on the principles of strength-based learning, it is effective for a clinician to incorporate the child's strengths in therapy to help work on the child's weaknesses. Thus, incorporating musical activities into interventions targeting social communication skills for children with Autism may be beneficial.

One type of music therapy that is thought to be effective for helping children with Autism develop a wide variety of skills is termed Improvisational Music Therapy (Kim, Wigram & Gold, 2008). A session of IMT involves the therapist and child freely creating music together by singing, playing and moving their bodies (Bieleninik, Gersetssegger, Mossler, Assmus, Thompson, Gustavo, &

Gold, 2017). The therapist follows the child's lead, keeping in mind their developmental level, and engages with the child in whatever way they choose to make music (Bieleninik et al., 2017). Through this, the therapist facilitates the enhancement of social communication skills (Bieleninik et al., 2017).

There is a vast amount of research available that investigates how music therapy can help children with Autism develop a variety of skills. By narrowing the search to a specific type of music therapy and focusing solely on social communication skills, this review can provide more specific information so those in clinical practice can implement this type of therapy most effectively. Thus, the goal of this paper is to review scientific evidence in order to address the hypothesis that IMT may help to facilitate social communication skills in children with Autism.

Objectives

The primary objective of this paper is to critically evaluate existing literature regarding the impact of improvisational music therapy on the social communicative behaviours of young children with Autism.

Methods

Search Strategy:

Computerized databases including PubMed and PSYCInfo were searched using the following terms: (children with autism) AND (improvisational music therapy) AND (social communication). The search was limited to articles written in English.

Selection Criteria:

Articles that were selected for this review were required to implement any type of improvisational music therapy to at least one child (under 12 years of age) with a diagnosis of Autism Spectrum Disorder. There were no exclusion criteria based on the characteristics of the diagnosis of Autism, demographics or outcome measures.

Data Collection:

The results of the literature search yielded six articles. The articles included three randomized control trials, one observational longitudinal design, and two mixed methods designs, both of which included a multiple baseline, n-of-1 design and a case study.

Results

Randomized Control Trials

Randomized control trials (RCTs) are considered the highest level of evidence, as they limit the effects of external variables on treatment. Because of this, RCTs are suitable for determining treatment effects in a population. However, they can be difficult to conduct as they may require a larger number of participants than other studies and are laborious in nature.

Bieleninik, Gersetsegger, Mossler, Assmus, Thompson, Gustavo, & Gold (2017) conducted an RCT to investigate the impact of IMT on symptom severity in children with autism. Participants included 364 children between the ages of 4:0 and 6:11 who met criteria for a diagnosis of autism using the International Classification of Disorders. Scores on the Autism Diagnostic Observation Scale and the Autism Diagnostic Interview-Revised were used as baseline assessments. Participants were recruited from international children's centres. Children were randomly split into three intervention groups, including high intensity IMT (three times a week) or low intensity IMT (once per week) plus standard care, and standard care alone. Intervention was provided over 5 months and follow up was assessed at 2 and 12 months post intervention. Primary outcome results were calculated by comparing the baseline ADOS social affect score to the post intervention score. Results indicated that both IMT groups did not show any significant change compared to the standard care group on this measure. Small significant differences were found between the groups when looking at secondary outcomes, such as the IMT group scored higher on ADOS Social Responsiveness Scales (SRS) of social motivation and scored lower on SRS scales of autistic mannerisms.

There are many strengths of this study. Selection criteria in this study was well defined. Children with autism are an inherently heterogeneous population, but researchers attempted to control for this as participants were all age-matched, without sensory disorders, and had not received music therapy in the last 12 months. In addition, participant characteristics were described in great detail to ensure the groups were representative of the population. The very large number of participants, appropriate for an RCT, increases the generalizability of findings of the study.

Bieleninik et al. (2017) clearly defined the primary outcome of their study. Measurement of results were conducted using gold standard tests. Appropriate statistical analyses were utilized, such as a minimal clinically important difference score of 1 between the IMT groups and the standard care groups (corresponds to a Cohen value of 0.2, which is a small effect size). The study used both two group and three group comparisons to separate the high intensity and low intensity IMT groups. A weakness of the study is that of the secondary outcomes of this study were not clearly listed; only the ones that there was significant change demonstrated by the IMT groups were mentioned. Further, using the SRS scales to measure secondary outcomes is another weakness as they are parent reported and not blinded. Assessors were adequately trained. Blinding of assessors was attempted and reported when unintentionally broken. Overall, this study provides compelling evidence that IMT does not promote more significant change in social communication than standard care.

Kim, Wigram and Gold (2008) conducted a randomized control trial investigating how IMT improved joint attention behaviours in children. These are often seen as foundational social communicative behaviours. Participants included 10 boys, ages 3:3 to 5:11, who met DSM-IV and Childhood Autism Rating Scale (CARS) criteria for Autism. The children were recruited from the Department of Psychiatry from Seoul National Hospital. Participants received both the experimental therapy (IMT) and the control therapy (play therapy) in separate, 12-week blocks. The therapy participants received first was randomized. Therapy sessions were once a week and 30 minutes in length. The article provided a clear description of the activities occurring in both play and music therapy, and sufficient controls were put in place to ensure therapy was delivered in the same way to each child.

The authors of the study provided clear information on recruitment and exclusion criteria. Participant characteristics beyond whether children were verbal or not were not reported, so similarity of the groups and representativeness of the population cannot be fully ensured.

The Pervasive Developmental Disorder Behavioural Inventory (PDDBI) and the Early Social Communication Scales (ESCS) were used as baseline, post treatment, and in between play and IMT measures of social communicative behaviours. The PDDBI is a parent or teacher completed measure to determine the response to intervention in children with Autism. The study compared parent response on the PDDBI to professional response to test agreement, and determined

it was low (intraclass correlation coefficient of 0.19-0.67), which may limit reliability of results. No other reliability or validity of the test were reported, which also limited applicability of findings. Appropriate statistical analyses were used to investigate results (repeated measures ANOVAs). Results indicated that both parents and professionals noticed some improvement after IMT. However, this did not yield significant effect sizes ($d=0.16$), suggesting that IMT may not promote significant change in social communicative behaviours compared to play therapy.

The ESCS is a non-verbal structured play assessment which looks at both Responding to Joint Attention behaviours and Initiation of Joint Attention behaviours. It is intended for infants 6-30 months but the authors state it has been adapted for children with autism, but do not elaborate further. Videos of 30% of ESCS assessments were rated by two independent, trained coders, with interrater reliability most often ranging from 0.89-0.97, suggesting this is a reliable measure. No validity information was reported, which may limit applicability of findings. Results of the ANOVA indicated that IMT was significantly more effective in increasing social communication behaviours like joint attention than play therapy, with a medium effect size of $d=0.65$.

In addition, both turn-taking and eye contact duration were measured, and a significant increase was noted after participants completed IMT. The study is limited by its small sample size, lack of information regarding generalization and lack of reliability and validity information regarding the assessments used. However, overall, the study provides some suggestive evidence that IMT may promote more significant change in pre-social communicative behaviours in children with Autism than play therapy.

Sharda et al. (2018) also conducted a randomized control trial studying how IMT improves social communication and auditory-motor connectivity in children with Autism. Fifty-one Canadian children, between the ages of 6:0 and 12:0, who met DSM-IV criteria for Autism were recruited. Participants were randomly, blindly allocated to receive either IMT or standard behavioural therapy for 1 45 minute session per week, for 8-12 weeks.

This study involved a relatively large number of participants compared to other studies investigating this population, which makes findings more valuable and clinically applicable. The authors of the study provided clearly defined, strict exclusion criteria. Participant characteristics were thoroughly reported to ensure representativeness of population and group

homogeneity. No information on recruitment was provided.

Group homogeneity was controlled for at baseline. An extensive battery of tests were used as baseline and post treatment assessments, including the ADOS, Autism Diagnostic Inventory (ADI-R) or Childhood Autism Rating Scale (CARS) to confirm diagnosis of Autism, as well as the SRS, Children's Communication Checklist (CCC), Vineland Adaptive Behaviour Scales (VABS) as well as many other tests of cognitive, and language. An MRI was also used to assess neurologic function. Results of the study indicated that those children in the IMT group showed statistically significant improvements (medium effect size of 4.84) in communication on the CCC, especially in areas of structural language, pragmatics and autism related behaviours. There was also a significant difference reporting in FQoL scores (a parent-report subtest of the VABS regarding observed quality of life) favouring IMT. Both groups showed a reduction of maladaptive behaviours on the VABS post treatment. There was no significant difference reported between groups on SRS Social Affect scores. Significant improvement was also shown in brain connectivity using MRI.

This investigation used gold standard pre and post treatment assessments which helps to validate findings. However, no reliability or validity information was included. The article provided a clear description of procedures of the study, how each therapy was conducted, and how blinding and controlling for the independent variable were accomplished. Appropriate statistical analyses were utilized in this article. A linear mixed effects model was used to determine significance on the assessment measures, where significance was limited to changes from pre-treatment to post treatment. This was confirmed by post-hoc Tukey tests at alpha level $p=.05$.

The study was limited by its lack of follow up to determine whether IMT facilitated long term gains in social communication, lack of information regarding generalization outside of the therapy session and lack of reliability and validity information. Overall, this study provides highly suggestive information that IMT fosters significant change in social communication, parent-reported quality of life and brain connectivity in children with Autism.

Mixed Method Designs

A mixed method design incorporates two or more different experimental designs into one study. Both of the studies listed below utilized a single subject design, which allows for manipulation of variables to compare treatment effects within a small sample size. These

types of designs are appropriate for the heterogeneous population of Autism as each subject can act as their own matched control. However, findings are often not as generalizable clinically, as RCTs because of the small sample size. A case study was used as the second method, which allows authors to elaborate on their quantitative results using qualitative observations.

Vaiouli, Grimmet & Ruich (2015) conducted a mixed method design which studied 3 children with Autism who were placed in a special education classroom. Two children were 5 years old and one child was 7 years old. Participants were already receiving social communication instruction and other speech and language services throughout the day, but had not been exposed to music therapy previously. For this study, children received IMT once a week for half an hour. The study was completed over 9 months, but each child received 21-22 sessions in total. Three variables were measured in 10 second intervals over a 10 minute period: focus on faces, response to joint attention and initiation of joint attention. A multiple baseline approach was used, where IMT was introduced to participants and between 5 and 15 instances of baseline behaviour were recorded. Subsequently, intervention data was recorded to see change. A follow up was conducted 1-month post treatment. The researcher and an independent, trained coder collected data. For the case study portion of the investigation, the researcher took weekly field notes and conducted pre study and post study interviews with parents. Results indicated that each participant showed increased levels of all three measureable variables, as well as qualitative improvements in social communication.

This study included a small number of participants, which limits generalizability of clinical findings; however, this was appropriate for the study design. Detailed information on participant baseline language and social communication levels was provided. No information on recruitment of participants was included. There was also no information on the criteria for diagnosis of Autism, which limits clinical applicability.

Good description of the quantitative and qualitative procedures of the study was included. The multiple baseline design was conducted appropriately and allowed time to establish a stable baseline before beginning intervention. The case study portion of the study is detailed and clearly written.

There are several weaknesses of this study. First, the researcher, who conducted baseline and post treatment measures and the intervention itself, was not blinded to participant progress. The study attempted to control for this by utilizing an independent coder, who watched

25% of videos from sessions. Interrater reliability between the researcher and the coder was high (0.91-0.96); however, this does not fully control for the lack of blinding and ensure unbiased results as 75% of sessions were still conducted by a non-independent observer. Additionally, participants continued to receive other social communication therapy throughout the duration of the study. As this variable was not controlled for, and there was no control group, it is difficult to determine the actual cause of change in the study. Intervention data was also reported in a confusing and unclear way, as graphs displaying results were not clearly labelled. No statistical analyses to determine significance of change were used, other than comparing the mean number of instances in baseline to post treatment; however, this is suitable for this type of study. Overall, due to lack of assessor blinding, controlling of variables and unclear intervention data, this study only provides some slightly suggestive evidence that IMT promotes increased social communicative skills in children with Autism.

Carpente (2016) also conducted a mixed method design study which included 4 children with Autism, recruited from a children's treatment centre between the ages of 4:0 and 8:0. An n-of-1, single subject design was used. For this, scores on the six different domains of the Functional Emotional Assessment Scale (FEAS) were used as a baseline measure of social communication. Scores were categorized into three different levels (deficient, at risk or normal) for each child. Participants received 26 sessions of IMT in a DIRFloortime model, which is a child-directed form of IMT. FEAS scores were used again a post-intervention measure. A case study format was also used to describe qualitative changes within participants. Results indicated that after receiving IMT, children most often increased one to two levels post treatment in all domains, although some stayed in the same category. Qualitative improvements in social communication were also noted.

The study design was appropriate for this population and for the number of participants included. Selection criteria was well defined and recruitment information was included. There was no information on the severity of Autism, which limits clinical applicability. Strengths of the study involve the inclusion of clearly labelled graphs to display data, detailed observations of participants in the case study portion and thorough discussion of future research ideas and study limitations.

There were also several weaknesses of the study. The author described the FEAS (baseline and post-test measure) thoroughly and reported that the test was reliable and valid. However, no specific values for its

statistical properties were included. The authors further report that a reliable and valid measure that could compare IMT to play based therapy is actually still in need of development. Thus, the true reliability and validity of the test for measuring IMT gains is unclear. Procedures for blinding the assessor were not reported. Additionally, in terms of results, the article only discussed where participants fell into the three categories; however, no statistical analyses were reported to determine the significance of change of moving up a category. Also, due to the use of categories, the data lacks specificity. Overall, the study provided some slightly suggestive evidence that IMT is effective for promoting social communication in children with Autism. Specifically, IMT conducted using a child-directed format may help to further promote good outcomes.

Observational-Longitudinal Designs

Observational longitudinal designs allow researchers to observe a group of participants over a long period of time. In the study discussed below, researchers took data from participants in a different study (Bieleninik et al., 2017) discussed for this review. This allows the researcher to observe different relationships than already studied but does not allow for a new variable to be manipulated. Reliability and validity of procedures used in the first study will be inherent to all studies that take data from it, as well.

Mossler et al. (2017) used the data from 48 children who participated in Bieleninik et al.'s RCT looking at the effects of IMT on children with Autism's social communicative behaviours. The primary objective of this study was to investigate how the therapeutic relationship, between therapist and child, affects the outcome of IMT. The children used for this review were allocated to either the high intensity IMT group or the low intensity IMT group; there was no control group included.

Three blind assessor groups watched videos of the selected participants from the sessions in Bieleninik et al.'s trial. Assessor groups consisted of music therapists with extensive Assessment of Quality of Relationships (AQR) training, and AQR developers. The AQR is based on attachment theories and assesses both the child's ability to engage in the interaction, and the music therapist's style of interacting with the child. The researchers used groups as opposed to individual assessors to encourage joint reflection. A 3-minute clip of a therapy session from every second week for every child was viewed by the assessors. Assessors rated the therapeutic relationship in each video using the AQR. There are several different modes (styles) of interaction for both the child and therapist. If assessors rate the

child and therapist in the same mode, the interaction is thought to be "matched" and a more meaningful therapeutic relationship is thought to be occurring than if there is a "mismatch" (therapist and child have two different modes). Researchers then compared match rates of participants to scores on the ADOS as well as SRS scores.

Results of the study indicated that a higher match rate indicated lower ADOS Social Affect score, and lower ADOS total score. This suggests that a higher-quality therapeutic relationship results in lower Autism symptom severity. Further, problems in Social Responsiveness on the SRS decreased over the course of therapy when there was a high match rate. No significant effects were found on SRS subscales. In addition, no significant difference was found whether participants were allocated to high intensity or low intensity IMT.

Strengths of the study include very thorough descriptions of procedures and participant characteristics. The study design was appropriate for the research question. Appropriate statistical analyses were used to compare scores on the AQR to scores on the ADOS and SRS (a linear mixed effect model). In addition, t-tests were used to compare AQR score to therapy intensity. Graphs clearly displaying data were also included.

There are also several weaknesses of the study. Although participant characteristics are well described, and the article asserts the high intensity and low intensity groups were similar, the selection criteria of the 48 chosen participants were not included. This sample may not be representative of the population of children with Autism, which undermines the validity and generalizability of results. In addition, assessors being able to engage in reflection with each other may stray them from their independent observations. They may change what they saw so that they conform with the ideas of the other assessors. No interrater reliability was reported within assessor groups or between groups. This may limit reliability and validity of results. In addition, although the background and procedures of the AQR were thoroughly described, no reliability or validity is reported. The researchers also discussed that this tool has never been used for verbal children with Autism or in areas outside of central Europe (this was a global study). The article provides little evidence that this is a statistically sound tool for evaluating this population. Overall, this study provides some slightly suggestive evidence that the therapeutic relationship is an important predictor of success in IMT for children with Autism.

Discussion

The primary goal of this paper was to determine if IMT is an effective method for fostering social communication skills in children with Autism. Overall, most reviews suggest that IMT is useful for fostering social communication skills in children with Autism. However, there are some mixed findings. Bieleninik et al. (2017), which was a highly statistically sound study, with a high level of evidence, actually indicated that IMT was not useful for this purpose. There are several possible reasons for this discrepancy. First, the sample size of the study was significantly larger than any of the other studies found for this review, and it included children from several different countries. This study may have had a more representative sample than the other studies included in this review, which supports their finding that IMT is not useful for promoting social communication skills for the overall population of children with Autism. Contrastively, Bieleninik et al. (2017) only used one primary measure of change (social affect scores on the ADOS), while other studies used multiple different measures of change, such as other standardized assessments, observational protocols and caregiver interviews. One measure may be insufficient to determine the overall efficacy of IMT because it is a multi-faceted therapy. Further, Sharda et al. (2018) also used the Social Affect scores on the ADOS as an outcome measure and did not see significant change, but used other methods that did show change. This suggests that this measure alone may not be an appropriate outcome measure for this research area. Multiple different measures may be needed to see the variety of effects that may be associated with it. Further research with large sample sizes and outcome measures with a wider breadth is indicated.

There were a few limitations common to all studies. First, children with Autism are an inherently heterogeneous population; no one person with autism exhibits the same symptoms as another person. In addition, symptoms may be of all different severities. None of the studies attempted to control for symptom differences, so it is difficult to determine the population for which IMT is actually the most useful. Future research should look to study individuals with similar types and severities of Autism symptoms to determine specifically who should be given IMT versus standard therapy. This may help to clarify some of the mixed results found in this review.

Moreover, it was not clearly indicated in all studies whether the children with Autism were verbal or not. Some behaviours studied indicate this aspect; for example, studying joint attention would suggest that the children are not verbal, as it is a precursor to spoken language. However, some studies it was less clear. This

is important to research as social communication looks very different in children who are verbal versus those who are non-verbal (for example, joint attention versus verbal turn taking). IMT may affect earlier and later developing social communication behaviours differently. Future research should consider studying children who are verbal and non-verbal separately to determine if this is a determining factor in the efficacy of IMT for this population.

Clinical Implications

Most findings from this review indicated that IMT may be a suitable method of treatment for children with Autism. As the primary provider of therapy for social communication in this population, Speech and Language Pathologists (SLPs) may want to consider becoming trained in the principles of IMT. Another option for SLPs may want to consider combining the principles of IMT; for example, singing, and moving their bodies to make music, with standard therapy. This may provide an effective method for fostering social communication for children with Autism. Future research may consider studying whether the full IMT program is necessary to foster skill development, or whether the basic principles delivered by SLPs are sufficient.

Additionally, findings from the review indicated specific ways that IMT therapists or SLPs should implement IMT to get the most effective results. Using a DIRFloortime model, a kind of IMT that places a focus on letting the child lead the session, was suggested to be effective (Carpente, 2017). This indicates that allowing the child to have a choice in what songs are sang, and what instruments are played may foster more success in social communication. This may be due to the child's increased motivation if allowed to choose the task themselves, or because he or she may choose tasks that are comfortable. Further, the therapeutic relationship was found to be a predictor of success (Mossler et al., 2017). It was found that when children and therapists had matched interaction styles, IMT promoted better results (Mossler et al., 2017). Therapists should consider asking the clients, or their caregivers, how they would prefer to be interacted with.

Lastly, IMT does not need to be conducted by an SLP. Support personnel; such as, communication disorders assistants or music therapists can administer this therapy. Typically, an SLP would be the primary professional involved in conducting all therapy for fostering social communication skills in children with Autism. However, it can be recommended that IMT be used as an adjunct to traditional therapy, and since it can be delivered by a paraprofessional, this may alleviate some of the burden of care from the SLP.

References

- Bieleninik, L., Geretsegger, M., Mossler, K., Assmus, J., Thompson, G., Gustavo, G., & Gold, C. (2017). Effects of improvisational music therapy vs enhanced standard care on symptom severity among children with autism spectrum disorder: The TIME-A randomized clinical trial. *Journal of the American Medical Association*, *318*(6), 525-535. doi: 10.1001/jama.2017.9478 .
- Carpente, J. (2017). Investigating the effectiveness of a developmental, individual difference, relationship-based (DIR), improvisational music therapy program on social communication for children with autism spectrum disorder. *Music Therapy Perspectives*, *35*(2), 160-174. doi: 10.1093/mtp/miw013
- Centre for Disease Control and Prevention. (2018). Autism spectrum disorder [Webpage]. Retrieved from: <https://www.cdc.gov/ncbddd/autism/data.html>
- Kim, J., Wigram, T., & Gold, C. (2008). The effects of improvisational music therapy on joint attention behaviours in autistic children: A randomized controlled study. *Journal of Autism Developmental Disorders*, *38*, 1758-1766. doi: 10.1007/s10803-008-0566-6
- Masi, A., DeMayo, M. M., Glozier, N., & Guastella, A. J. (2017). An overview of autism spectrum disorder, heterogeneity and treatment options. *Neuroscience Bulletin*, *33*(2), 183-193. doi: 10.1007/s12264-017-0100-y
- Mossler, K., Gold, C., Abmus, J., Schumacher, Claudine, C., Reimer, S.,... Wolfgang, S. (2017). The therapeutic relationship as predictor of change in music therapy with young children with autism spectrum disorder. *Journal of Autism Developmental Disorders* [e-publication before print]. doi: 10.1007/s10803-017-3306-y
- Sandiford, G., Mainess, K., & Daher, N. (2012). A pilot study on the efficacy of melodic based communication therapy for eliciting speech in nonverbal children with autism. *Journal of Autism aDevelopmental Disorders*, *43*(6), 1298-1307. doi: <https://doi.org/10.1007/s10803-012-1672-z>
- Sharda, M., Tuerk, C., Chowdhury, R., Jamey, K., Foster, N., Custo-Blanch, M., ... Hyde, K. (2018). Music improves social communication and auditory-motor connectivity in children with autism. *Translational Psychiatry* *8*(231), 1-13. doi: 10.1038/s41398-018-0287-3.
- Vaiouli, P., Grimmet, K., & Ruich, L. J. (2015). "Bill is now singing": Joint engagement and the emergence of social communication in three young children with autism. *Autism*, *19*(1), 73-83. doi: 10.1177/1362361313511709
- Watkins, L, O'Reilly, M., Kuhn, M., Gervarter, C., Lancioni, G. E., Sigafoos, J., & Lang, R. (2015). A review of peer-mediated social interaction interventions for students with autism in inclusive settings. *Journal of Autism and Developmental Disorders*, *45*(4), 1070-1083. doi: <https://doi.org/10.1007/s10803-014-2264-x>