

The Social Responsiveness Scale (SRS) in the Valuation of Social Skills in Music and Music Therapy research: A literature review

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Abstract

This literature review seeks to find out, if the Social Responsiveness Scale (SRS) could be a useful instrument in an inclusive scholastic context when music therapy-based interventions are applied. The aim is to compare studies in which the SRS is used to measure the impact of music-based interventions, and to deduce its usability in an inclusive scholastic context. A literature research on the databases *RomaTreDiscovery*, *Science Direct*, *Google Scholar*, *PubMed*, and *Cochrane* is conducted the 28.07.2017 and the 08.08.2017 using the keywords "social responsiveness scale", "autism", and "music". The following inclusion criteria are applied: the studies are either randomized controlled trials (RCT) or controlled trials (CT), use the SRS as outcome measure, utilize a music-based intervention, and target a population of children or adolescents with ASD. During the literature research 11 studies were identified, based on title and abstract. After studying the full articles 4 met the inclusion criteria (Bhatara et al., 2009; Geretsegger et al., 2012; La Gasse, 2014; Thompson, McFerran & Gold, 2013). An analysis aiming on the type of the music intervention, the population, and the frequency of interventions is conducted. Since the number of studies that met the inclusion criteria is rather small, there is only little evidence from this research. Since the SRS seems to be a useful tool confronting the influence of music on social skills in children and adolescents, it might be applicable to measure the impact of music therapy in an inclusive classroom.

Keywords: Social Responsiveness Scale, music intervention, music therapy, inclusion.

1. Introduction

This literature review seeks to find out, if the Social Responsiveness Scale (SRS) could be a useful instrument in an inclusive scholastic context when music therapy-based interventions are applied. Since the integration of children with ASD is of increasing importance, instruments to measure the success of interventions in this field are required. Therefore, this review compares studies which use the SRS to measure the impact of music-based interventions, and to deduce its usability in an inclusive scholastic context in which music therapy is utilized.

2. Background

Deficits in social and communications skills are characteristic for ASD. This includes problems with social interaction, non-verbal communication, understanding body language, and initiating and maintaining friendships. Since social skills and relationships play an important role in the whole life of a person, therapies and teaching methods are being developed and tested, to improve their social abilities and improve quality of life. Among these therapies is music therapy, that is already used in the work with children with ASD as an effective tool to improve social skills in children with ASD (Nordoff 1963; Alvin 1965; Berger 2002; Oldfield 2006; Brucia 2014), because they seem to react well towards music (Hollander, Juhrs 1974) and when confronted with different stimuli tend to prefer an acoustic one (Thaut 1978; Kolko et al. 1980). Music therapy has shown to have a positive effect on verbal and non-verbal communication (Stull et al. 1979; Gold et al. 2006; Silverman 2008), language skills (Lim 2012), behavior (Shi, Lin & Xie 2016), and self-esteem (Oldfield 2006).

Moreover, the social skills of children with ASD have been shown to improve when in an inclusive context. During an inclusive summer camp for example, social skills increased in children with ASD, as measured through direct observation and counselor questionnaires (Maich et al. 2015). Also, behaviorally-based interventions help to improve social interaction in children with ASD in an inclusive context (Camargo et al. 2014).

3. The Social Responsiveness Scale

The SRS (Constantino & Gruber 2005) targets children and adolescents aged from 4 to 18, and measures their social skills based on the parents' and/or teachers' observations. It takes about 15-20 minutes to complete, and is a 65-item rating scale that defines the level of impairment based on repetitive behavior, interpersonal behavior, and communication. The SRS offers five Treatment Subscales: Receptive, Cognitive, Expressive, Motivational aspects, and Autistic Preoccupations. These subscales are not used for diagnosis, but could be helpful in the evaluation of treatment programs. A lower score is associated with better social skills. It has been standardized based on a sample of more than 1600 children from the general population. The SRS is currently the most commonly used parent-reported scale in studies on social behavior in children with ASD in which music therapy is applied: Three out of five studies utilize this tool, while the second frequent tool is interview (LaGasse 2017). The preschool version for 3 year old children, the SRS-PS (Constantino & Gruber 2005), is used in one of the studies analyzed in this paper (Thompson, McFerrin, & Gold 2013).

4. Method

4.1 Overview

A literature research on the databases *PubMed*, *Cochrane*, *Science Direct*, *Google Scholar*, *RomaTreDiscovery*, and *ERIC* is conducted the 28.07.2017 and the 08.08.2017 using the keywords "social responsiveness scale", "autism" and "music". The following inclusion criteria are applied: the studies are either randomized controlled trials (RCT) or controlled trials (CT), use the SRS as outcome measure, utilize a music-based intervention, and target a population of children or adolescents with ASD. During the literature research 11 studies were identified, based on title and abstract. After studying the full articles 4 met the inclusion criteria.

4.2 Studies

4.2.1 Bhatara et al. (2009)

The objective of this study is to examine how adolescents with ASD perceive animated abstract scenes with or without music, and therefore the effect of music on social attribution. The animations are designed by Abdell et al. (2000) and show interactions between two triangles. Some interactions are random (Rnd), others Goal-Directed (GD), and some Theory of Mind (ToM). Bhatara et al. (2009) describes them like this:

"In the random animations, two triangles moved in random fashion and did not affect each other's movement. In the GD animations, the two triangles appeared to respond to each other's behavior thereby demonstrating intentionality. However, their putative intentions were to perform physical actions (e.g., chasing, leading, fighting) and so did not involve 'mind-reading'. In the ToM animations, the two triangles interacted in more complex ways, with one triangle demonstrating an intention to influence the other triangle's mental state (e.g., coaxing, mocking, surprising)."

To each set of animation they added a soundtrack. This resulted in two conditions, a silent animation clip and a musical animation slip. There are 2 from the Rnd, 3 from the GD and 3 from the ToM category, resulting in 8 silent animations. The 10 music animations consist of 2 Rnd, 4 GD and 4 ToM animations. The participants watch the animations randomized in two blocks, and describe them afterwards. These descriptions are then given scores for intentionality, appropriateness, and length, and social attribution is valued.

It is expected that music will alter the interpretation of the animations in typically developing adolescents, and that the ToM animations will be the mostly influenced, followed by those from the GD category. The aim is to see, if social attribution is changed by music in the adolescents with ASD.

The results suggest that deficits in social attribution in the present context cannot be influenced by music in the ASD group. In fact, it had no differential effects on the ASD and TD groups. Music was shown to change the appropriateness scores in all participants and animation types. Intentionality scores, however, decreased in all participants' on the more socially complex animations. The study found hints of differences regarding the subgroups of the ASD in the parameters appropriateness and intentionality.

Regarding the SRS measures this study found a significant negative correlation between SRS scores and intentionality scores for the ToM animations, and intentionality scores showed relation to parental report of social behavior (SRS). This makes the SRS an indicator for the intentionality as measured in this study, as summarized in Tab. 1.

Tab. 1: Overview of Bhatara et al. (2009)

Experimental group	adolescents with HFASD aged 10-19 n = 26 f = 6; m = 20 diagnosed according to DSM-IV criteria: Autism (3), AS (13), PDD-NOS (10)
Control group	typically developing children/adolescents aged 8-18 n = 26 f = 14; m = 12 matched for VIQ, PIQ, FSIQ, years of musical training, number of instruments played, digit span, and letter-number sequencing.
Method	abstract animations with either music or no-music all participants saw and described all animations in 2 blocks and in random order dependent variables: Music Matching (how well the music matched the cartoon), Length of Description, Appropriateness of Description, and Presence of Intentionality.
Frequency of interventions	2 blocks of 8/10 animations
Objective/Hypothesis	H1: deficits in social attribution are robust and cannot be influenced by the addition of music. H2: individuals with ASD are impaired in social attribution, but such deficits may show a shift in responses when music is added to the animations.
Outcome measures (SRS)	Significant negative correlation between SRS scores and intentionality scores for the ToM animations. Intentionality scores showed relation to parental report of social behavior (SRS)

Conclusion

deficits in social attribution in the present context cannot be influenced by music. music had no differential effects on the ASD and TD groups. Music altered appropriateness in all participants, and decreased intentionality scores of all participants' responses on the more socially complex animations. differences between subgroups within the autism spectrum in the effect music has on appropriateness and intentionality of descriptions. adolescents with ASD show no deficits in their ability to integrate music with moving visual displays or their ability to extract meaning from musical excerpts.

HFASD = High-Functioning Autism Spectrum Disorder; VIQ = verbal IQ; PIQ = Performance IQ; FSIQ = Full Scale IQ

4.2.2 Geretsegger, Holck and Gold (2012), and Geretsegger et al. (2016)

Geretsegger, Holck and Gold (2012) presents the study design of a larger study on social ability in children with ASD, however the completed study not published yet. In 2016 the results of a pilot study were published, using the same design but a smaller sample size (Geretsegger et al. 2016). The design of Geretsegger, Holck, and Gold (2012) is shown in Tab. 2, whereas Tab. 3 lists the data of the completed pilot study.

The study aims to children aged 4 to 6, and compares a high intensity condition in which they receive three interventions per week to a low intensity condition with only one intervention per week. An additional control group does not get any music therapy intervention. The music therapy intervention is based on improvisational music therapy (Bruscia 1987; Wigram 2004), and the level of ASD is moderate-severe. Over the course of 5 months the children in the experimental conditions receive 30 minutes of music therapy in an individual setting. The results of the pilot study reveal low consistency between the outcome measures SRS and ADOS (Lord et al. 2000; Ruehl et al. 2005), there are different outcomes in 60% of the cases.

Tab. 2: Overview of Geretsegger, Holck, and Gold (2012)

Experimental group	Children with ASD aged 4;0-6;11 years n = approx. 235 f = tba ; m = tba
Control group	As above
Method	Improvisational music therapy interventions
Frequency of interventions	EG1: 3x week EG2: 1x week CG: no intervention 30 minutes 5 months
Objective/Hypothesis	children's social communicative ability will increase over time. social communication skills may be better in music therapy conditions than in the standard care condition. more frequent music therapy may intensify the improvement in the skills assessed.
Outcome measures (SRS)	tba
Conclusion	tba

EG = experimental group; CG = control group

Tab. 3: Overview of Geretsegger et al. (2016)

Experimental group 1	Children with ASD aged 4;0-6;11 years n = 4
Experimental group 2	Children with ASD aged 4;0-6;11 years n = 3
Control group	Children with ASD aged 4;0-6;11 years n = 8
Method	individual improvisational music therapy interventions
Frequency of interventions	EG1: 3x week EG2: 1x week CG: no intervention 5 months 30 minutes
Objective/Hypothesis	evaluate feasibility of study procedures, safety, document concomitant treatment, and report consistency of individuals' trends in chosen outcome measures over time.
Outcome measures (SRS)	low consistency between outcome measures (ADOS and SRS) different outcomes 60% of cases
Conclusion	need for reports on feasibility of study designs

EG = experimental group; CG = control group ; ADOS = Autism Diagnostic Observation Schedule (Lord 2000)

4.2.4 LaGasse (2014)

This study compares the effect of both group music therapy (MTG) and social skill training (SSG) on the social abilities of children with ASD. In small groups of 3-4, the children join either the MTG or the SSG program twice a week for 5 weeks. The SRS is performed by the parents as a secondary measure.

The severity of the ASD is not specified in the text, however SRS scores ranging around 95 and 115 indicate a rather moderate form of impairment. The sample is very little, with a total of 17 children participating in the study. The music therapy interventions include exercises for cooperative play, sensory experience, turn taking and priming in the group music. A welcome and farewell song help structure the session.

On the SRS the study shows a significant effect for the interaction between time and group. There are significant differences for the MTG pretest and posttest. The SSG control group, however, showed no significant results.

The significant differences between MTG and SSG, with more improvement in the MTG, indicate that the learned behavior from the MTG has been transferred to the family situation. However, the sample size with a total of 17 participants is very small.

Tab. 4: Overview of LaGasse (2014)

Experimental group 1	ASD aged 6-9 n = 9 f = 2; m = 7 receive group-based music therapy (GMT)
Experimental group 2	ASD n = 8 f = 2; m = 6 receive training in a social skill group (SSG)
Method	Group-based music therapy (MTG) is compared to training in a Social Skill Group (SSG) performed in small groups (3-4)
Frequency of interventions	50 min. 10 sessions 2x week
Objective/Hypothesis	observe the effect of GMT on eye gaze, joint attention, and communication in children with ASD SRS and ATEC as secondary measurements
Outcome measures (SRS)	Significant interaction between time and group for SRS scores, with improvements for the MTG but not the SSG Significant differences between MTG and SSG, more improvements for the MTG Improvements in the GMT shown on the SRS, however not on the ATEC
Conclusion	Promising results for the use of GMT to enhance social skills in children with ASD
HFASD = High-Functioning Autism Spectrum Disorder; ATEC = Autism Treatment Evaluation Checklist	

4.2.5 Thompson, McFerran and Gold (2013)

The study is conducted with a sample of 23 children aged 3-6 with severe ASD, and limited or no verbal communication. Family-centered music therapy (FCMT) is applied in addition to early intervention programs. The children receive 30-40 minutes of FCMT once a week for a total of 16 weeks.

FCMT is a music therapeutical approach that is performed at the family's home. It follows family-centered principles, in which the collaboration between therapist and parent is emphasized. The therapist's role is to "provide support and guidance to enable the parent to interact with their child in music making activities" (Thompson, McFerran and Gold 2013). To structure the sessions an initial Hello-Song is applied, followed by a range of exercises targeting shared attention, eye contact, turn taking, initiation and response to joint attention.

Significant outcomes are reported for the *Vineland Social-Emotional Early Childhood Scales (VSEEC)* (Sparrow, Balla & Cicchetti 1998), but not for the SRS. The sample size with a total of 23 participants is very small.

Tab. 5: Overview of Thompson, McFerran, and Gold (2013)

Experimental group	Severe ASD Aged 3-6 years FCMT in addition to early intervention programs n = 12 limited or no functional verbal communication
Control group	severe ASD aged 3-6 years early intervention programmes only

	n = 11 limited or no functional verbal communication
Method	FCMT
Frequency of interventions	16 weeks of FCMT 1x week 30-40 min.
Objective/Hypothesis	Examine the impacts of FCMT on social engagement abilities
Outcome measures (SRS)	there was no significant difference for the SRS-PS, indicating that broader social responsiveness in the children remained stable. Significant results for the VSEEC
Conclusion	FCMT improves social interactions in the home and community and the parent-child relationship, but not language skills or general social responsiveness.

FCMT = family-centered music therapy; VSEEC = Vineland Social-Emotional Early Childhood Scales (VSEEC)

5. Analysis

5.1 Overview

An analysis aiming for the type of the music intervention, the sample, and the frequency of interventions is conducted. However, since the number of studies that met the inclusion criteria is rather small, there is only little evidence from this research.

5.2 Type of music intervention

Three studies base themselves on interventions of music therapy. The interventions, however, differ significantly. Even if all these interventions use music as key element, there are major differences. Improvisational music therapy uses musical, whereas MTG and FCMT use a predefined set of exercises that address problems in ASD specifically, such as eye contact. While MTG is performed in small groups of 3-4 children under guidance of the therapist, FCMT takes place in the family context. Therefore, only the interventions that are performed in groups(LaGasse 2014; Thompson, McFerran and Gold 2013), either a peer-group or family, show significant effects on parent-reported rating scales. Geretsegger et al. (2016), that uses an individual setting, does not show significant effects on any of the parent-reported scales. It could be that the skills learned within the therapeutic setting did not yet generalize to other areas of social life.

Tab. 6: Type of Music intervention

Bhatara et al. (2009)	Geretsegger et al. (2016)	LaGasse (2014)	Thompson, McFerran and Gold (2013)
Background music	Improvisational music therapy (IMT)	Group music therapy (MTG)	Family-centered music therapy (FCMT)

5.3 Sample

All studies target children with ASD. Only Bhatara et al. (2009) compares a adolescents with ASD to a normally developing control group. One study works on high-functioning autism, two focus on moderate and one on severe autism. The age groups are different, only Geretsegger et al. (2016) und Thompson, McFerran and Gold (2013) work on a similar range of age. Consequently, the studies are hardly comparable for their samples.

Tab. 7: Sample

Bhatara et al. (2009)	Geretsegger et al. (2016)	LaGasse (2014)	Thompson, McFerran and Gold (2013)
Adolescents with high-functioning ASD (10-19) Typically developing adolescents (8-18)	Children with moderate ASD (4-6)	Children with moderate ASD (6-9)	Children with severe ASD (3-6)

5.4 Frequency of Interventions

Among the music therapy studies one lasts 4 months, one 5 months and the last 5 weeks. The only study showing significant results on the SRS is the one lasting only 5 weeks, that also uses a much more time on each session (50 min.). Thompson, McFerran and Gold (2013) show significant results on the VSEEC.

Tab. 8: Frequency of Interventions			
Bhatara et al. (2009)	Geretsegger et al. (2016)	LaGasse (2014)	Thompson, McFerran and Gold (2013)
2 blocks of 8/10 animations	1) 30 min.; 3x week 2) 30 min.; 1x week 3) no music intervention → 5 months	1) 50 min.; 2x week (MTG) 2) 50 min.; 2x week (SSG) → 5 weeks	1) 30-40 min.; 1x week 2) no music intervention → 4 months

6. Results and Discussion

The number of studies that use both, music-based interventions and the SRS is small, as is the sample size in each study, which reduces the validity of this study. However, there is some data, that might hint towards possible challenges in the field. Individual music therapy has shown to have less effect on parent-based scales. The SRS usually measures the generalized social abilities of the child, meaning that skills learned in a therapy or teaching situation, such as individual music therapy, are transferred to another part of life, like family life, the playground or the classroom. A reason why achievements from music sessions do not translate into daily family life could be caused by the difficulties people with ASD with stimulus generalization. It can be difficult for them to convey abilities learned in a teaching situation to daily life activities that include different places or people (Plaisted 2001; Hundert, Rowe, & Harrison 2014). This can lead to the situation that skills learned during the therapy situation do not transfer to the family situation at home – and therefore cannot be measured by a scale that is based on parent report. Also, this is reflected by the fact that teacher and parent outcomes may differ on the SRS since one is performed in the school and the other one at home (Reszka et al. 2014), and might contribute to the diverging results in Geretsegger et al. (2016). Improvements that would have taken place in the individual music therapy session might not have been transferred to the family life situation and consequently have not been measured by the SRS or the ADOS.

Consequently, the application of a two-step-model might be useful when addressing the impact of music on social skills of children with ASD. In a first step the learning of the new skills could be addressed, whereas a second step aims to measure the level of generalization of the learned skills into other social situations. Instead of measuring the effect of an intervention only by a parent or teacher reported tool, it might be useful to add at least one measuring method that aims to the therapy or teaching situation as suggested by (Lopata et al., 2010; Lord et al., 2005), or to focus on either one or the other.

However, the outcomes can vary within two different parent report-based tests. LaGasse (2014) reports improvements on the SRS, but not on the ATEC, and Thompson, McFerran and Gold (2013) find results on the VSEEC, but not on the SRS-PS. A change of instrument might be a possible step. The *Childhood Autism Rating Scale* (Schopler et al. 2010) for instance has shown to be better at diagnosing children who are low functioning (Mayes et al. 2009).

Music therapy interventions are multilayered interventions, due to the wide nature of music and therapy (Bruscia 1998). So the identification of a factor that has influence on the measuring instruments is accordingly difficult. However, maybe addressing the problem of generalization might help to explain the problem of differing outcomes.

7. Conclusion

The current research situation has shown to be still rather small. So, further research is needed in the area of parent report-based instruments for measuring the efficacy of music interventions on social abilities. More research is needed as well, for music interventions in an inclusive scholastic context, as well as for the process of generalization in the context of music therapy.

In an inclusive classroom the SRS might be a good choice, if performed by the teacher. Since the child will learn and exercise its skills in the classroom, there is no need to wait for generalization into another environment in this setting. For the context of children with ASD in an inclusive classroom, in which the music therapy intervention will take place including the whole class, the SRS – especially the teacher-based version – seems to be promising.

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Tab. 1: Overview of Bhatara et al. (2009)

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