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Music therapy for children with Autism Spectrum Disorder

Pater, Mathieu

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CHAPTER 4.

The development of social behavior during Papageno Music Therapy Program: a child case report

This Chapter is based on:

Pater, M. and van Yperen, T. The Development of Social Behavior During Music Therapy: A Child Case Report. *International Journal of Psychiatry Research*, 2020; 3(2): 1-6.
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Abstract

Music therapy is often used to improve the social skills of children with autism. In this study, the development of social skills of an 8-year-old boy, diagnosed with an Autism Spectrum Disorder (ASD), was monitored before and during music therapy. At the start, he experienced many difficulties in his contact with other children, which made him lose more and more of his own self-confidence. He was offered 20 weeks of the Papageno Music Therapy Program. The development was monitored by means of a weekly questionnaire completed by the boy's mother. In addition, social behavior was assessed prior to, after 10 weeks and at the end of therapy with the Questionnaire for the Inventory of Social Behavior of Children (VISK) by multiple informants.

The weekly scores show significant progress compared to baseline in the areas of 'Making eye contact', 'Concentration', 'Coping with changes', 'Verbal communication', 'Joint Attention', 'Taking the other person into account', and 'Taking Initiative'. This progress is confirmed by the VISK scores of different informants, all showing significant progress. This case description offers an indication that music therapy may support development, although further research is required.

Theoretical and Research Basis for Treatment

An Autism Spectrum Disorder (ASD) is already noticeable at an early age and has lifelong consequences. The most distinctive consequences are generally the limitations experienced in social interaction. The characteristics of ASD in DSM-5 (APA, 2013) include permanent limitation in the areas of social communication and social interaction in various situations, as well as limited and repetitive patterns in behavior, interests, and activities. Music therapy is very regularly applied with children and adolescents with ASD. There are various studies that report significant effects that music therapy can have on this target group. The study conducted by Ghasemtabar et al. (2015) showed that the use of music therapy has a significant effect (*SMD* 1.06) on the social skills of children and adolescents with ASD. This is in line with the results of similar studies conducted by Edgerton (1994), Gattino et al. (2011), Katagiri (2009), Kern and Aldrige (2006), Kern et al. (2007), Kim et al. (2008), Vaiouli et al. (2015) and Wimpory et al. (1995). Music is used to make contact and it offers the child unique opportunities to use ways of non-verbal communication (Kim, Wigram, & Gold, 2009) and to take on the alternating role of initiator and imitator in a playful manner (Holck, 2004). For children with ASD, it is often difficult to have direct social interaction. Music therapy can create a safe environment in which this can be practiced in an indirect way, through music. Furthermore, these children experience music as very pleasant and relaxing (Geretsegger, Elefant, Mössler, & Gold, 2014).

Music therapy already has long been used as an intervention with children and adolescents with ASD who experience serious problems in social and societal areas (Reschke-Hernandez, 2011). Music therapy is a form of therapy that is classified as a so-called non-verbal therapy. This treatment method uses music to offer the child experiences that may stimulate the developmental process. The therapist has the expertise to identify and interpret human reactions to music, by applying the musical elements of tempo, rhythm, melody, harmony, and tone by making use of musical instruments, voice, types of musical play, improvisation, and existing repertoire (Kern & Humpal, 2012).

The studies conducted so far were mainly aimed at the social interaction and communication skills of this target group. Based on these studies, it is not possible to determine which intervention would be the most suitable one for working with children and adolescents with ASD. There is insufficient information available about the types of music therapy available. Further research is required to make targeted choices regarding the type of intervention and the working methods that would be most suitable in this case.

Pater and Van Yperen (2017) concluded that the many studies that were conducted so far show a number of shortcomings: they lack a clear description of the target behavior and it raises the question as to whether the right research designs were used to study the intervention adequately.

Even though a large majority of the studies include case studies or multiple case studies, research designs such as Controlled Clinical Trials (CCT) and Randomized Controlled Trials (RCT) are increasingly applied to study the effectiveness of music therapy with people with ASD. These trials also confirm the positive effect of music therapy on the social interaction of children and adolescents with ASD. RCTs are often considered to be the golden standard in

experimental of intervention research (Offringa, Assendelft, & Scholten, 2003). However, we need to ask ourselves whether this standard applies to every intervention study. Music therapy has yet to be developed into a more systematic intervention that can be tested for efficacy with rigorous research methods. In the meantime we have to clarify what music therapy is and if there are any indications that it has an effect on the child's development of social behavior. $N=1$ or single case research allows us to gain insight in the elements of music therapy and the change in the condition of an individual person during treatment.

By opting for the $N=1$ approach as a method, it is possible to monitor one child very intensively, before treatment (baseline) and during this process. The hypothesis is that, if the development of e.g. social behavior improves (accelerates) significantly during treatment, compared to baseline, this is an indication that music therapy may have an effect. This claim of causality is still very weak. Repeating this study for different cases builds preliminary evidence that helps to decide whether or not the intervention is promising enough to test it in further and more rigorous research.

Case Introduction

At the start of the music therapy intervention, Simon (a pseudonym) was an 8-year-old boy diagnosed with ASD according to DSM IV.

Simon attends a school for children with special needs. This school provides education to pupils between the ages of four and twelve years old. The students at the school have behavioral, psychological, and/or psychiatric problems. The school offers these students an appropriate and individual education so that they can develop at their own level in a safe and comfortable educational environment.

Simon was born in the Netherlands. His parents originate from Suriname but have been living in the Netherlands for most of their lives.

Presenting Complaints

Simon's parents are concerned about his development. His behavior is mainly that of a follower and he displays no individuality. He also finds it difficult to make contact with others and is unable to identify emotions. He displays hyperactive behavior and, even though he gives the impression of being a self-confident boy, he is actually very insecure, which also seems to be the reason for his hyperactive behavior. The Papageno Music Therapy Program was initiated at the request of the school psychologist.

History

Simon's parents noticed at an early stage that he was making less contact with others compared to the other children of parents they know. Being a young child, Simon has difficulty with sleeping and is often hyperactive and restless. The child health clinic has referred them to a pediatrician.

Because Simon displays very little playful behavior, it is difficult to test him, but the pediatrician suspected early on that he might suffer from ASD. The first toy he starts to play with is a toy that makes a sound and he soon gathers other toys that are musical instruments. Because of Simon's interest in music, his parents would like to give Simon the opportunity to develop his musical skills. However, they do realize that it would be difficult for him to attend regular music or dance lessons. He finds it very difficult to play with others and there is little reciprocity in communication. Because it is difficult for Simon to connect with other children at a regular school, he attends a school for children with special needs. The structure offered at this school helps Simon, but his parents also notice that, in addition to his hyperactive behavior, he copies other people's behavior and takes little or no initiative himself.

Assessment

For the case study, it is important to observe the child in his natural environment. His mother was asked to complete a questionnaire once a week. Because his mother need to complete the questionnaire every week, for a period of 23 weeks, we tried to find a questionnaire that would not burden her too much. Since no suitable questionnaire could be found, the decision was made to use a personalized questionnaire created by the researchers. The Questionnaire for the Inventory of Social Behavior of Children (VISK) was used as a basis for this questionnaire.

In addition, people from Simon's personal network were approached to complete the VISK at three specific moments. Simon's parents have given their consent to participate in this study. They also suggested three observers who see Simon very regularly, so that they can observe him as well. These are his mother, his grandmother, and a counselor of the Medical Orthopedic Center. The fourth observer is the music therapist who offers Simon the music therapy. By using his personal network, Simon's behavior can be observed and rated from different perspectives, which will create the most realistic picture.

The Social Behavior Questionnaire

Since no suitable validated questionnaire could be found for weekly monitoring social behavior by mother, we decided to compile a short questionnaire. The Social Behavior Questionnaire (SBQ) consists of ten observational behavior items that most closely match the goals of PMTP, on a 'never' to 'always' five categories Likert scale. The mother had the option to nuance her observation ticking multiple boxes.

The Social Behavior Questionnaire has the following ten items:

1. Makes eye contact
2. Is able to focus for 5 minutes
3. Is able to cope with changes
4. Behavior has adapted to the situation
5. Communicates verbally
6. Communicates non-verbally
7. Is able to focus on something together
8. Is able to take another person into account
9. Takes initiative
10. Has rigid behavioral patterns

VISK

In 2003, the Dutch Committee for Testing (COTAN) rated the quality of the testing material and the manual of the VISK as good, and both the principles of the test construction and the reliability as adequate. The VISK consists of 49 items that are valued on a three-point scale, retrospectively assessing the child's condition over the past months.

The VISK questionnaire measures the following six aspects (subscales):

1. Emotion/behavior is not optimally attuned to the situation (11 items).
2. Tendency to withdraw from social situations, little need for contact (12 items).
3. Orientation problems, insufficient "automatic" orientation towards a time, place, activity or person (8 items).
4. Difficulty understanding and sensing social information (7 items).
5. Stereotype movements and responses to sensorimotor information (8 items).
6. Fear of change and resistance to change (3 items).

The brief questionnaire SBQ was scored by the mother. To rule out that out that the effect that Simon's mother reported was based by a wish to see a positive development, three other people from Simon's network completed the VISK questionnaire (i.e. his music therapist, his teacher and his grandmother).

Case Conceptualization

An intake interview is conducted prior to the intervention. The purpose of this interview is twofold; on the one hand it provides the opportunity to get acquainted with each other and also to obtain a clear idea of the specific need.

The music therapy then starts with an observation period. This phase is intended to observe the child's behavior. The therapist looks at whether it would be feasible to achieve the treatment goals within the set period of time and to identify the child's musical preferences. This phase is also used to build a relationship between the child and the therapist. At the end of the observation period (five sessions), the therapist makes an observation report in which the findings are described, and which includes the objectives of the therapy.

The activating music therapy begins in the treatment phase. Activating music therapy can be defined as jointly making rhythms, melodies, or music within a therapeutic relationship with the objective to obtain developmental improvement. This can be done by applying various methods to make music. Using percussion instruments to produce rhythm is an accessible method that is often used for this reason. Other methods are singing or the use of other instruments. The therapy will regularly focus on improvisation, but it is also possible to use existing compositions. After making music, a conversation is often initiated about the experiences and/or feelings that were a result of making this music. Therefore, with active music therapy, the child goes through an experience by making music. The therapist chooses the work methods that focus on the problem(s) the child is coping with. These work methods often correspond to the different elements that people adopt in their development. Examples are playing, playing together, experimenting, improvising, and fantasizing. Within the active music therapy setting, a large variety of musical instruments is used. The therapist chooses or changes the instruments that are offered, based on the child's interests and the work methods that are used within the framework of the goals of the treatment.

In this case description, the music therapy includes both improvisation and fixed work methods. The used work methods are described in an intervention plan or manual (Pater, 2016). This plan contains 30 work methods that focus on the improvement of the social behavior of children and adolescents with ASD through music therapy (see Chapter 3).

The intervention is completely centered on the child and the therapist's approach is based on the child's capabilities. By linking the intervention to their capabilities, changes can be realized in the areas where the inhibitions are experienced. The music therapy focuses on the unconditional acceptance of the musical style and musical coordination. From this acceptance, the music therapist offers methods with which the child can connect. An example of this is the therapist copying the child's musical expressions by adjusting his own pace and dynamics to those of the child. This way, the music therapist communicates with the child on a musical level, often by improvising with the child. This work method often creates a safe foundation in a short period of time, in which the therapy can develop further. In the next phase, the therapist can also use a more stimulating approach and challenge the child to do new things.

The therapist keeps a log to monitor the child's progress. This log describes which work methods are used and what the results are. The work methods for the next session are based on this information.

Course of Treatment and Assessment of Progress

A retrospect from the log and the video analysis:

After the intake interview and the observation phase, the music therapist and Simon's mother establish the following goals during the evaluation: learning to focus his attention on what is being asked and improving his ability to make and maintain contact. The music therapy also focused on providing Simon with a way to express himself, in order to relieve his feelings of restlessness.

Because Simon, as described before, is an energetic and somewhat restless boy, it was extremely important to set clear boundaries during therapy. The beginning and end of the session were always clearly marked by an intro song and an ending song. In the 'intro song', Simon and the therapist were alternately welcomed to the session by the line 'Hello Simon, we are going to make music again today, hello Simon, we are going to make music again today'. The 'end song' was to say goodbye by singing the lines 'Goodbye Simon, this was your music lesson, we are now finished, see you next week, goodbye Simon'. The sessions also largely followed a fixed pattern, from which could be deviated every now and then. After the intro song, played on the piano or guitar, during the main part of the session they would use recurring instruments and methods, often based on improvisation. Because Simon likes to play the harmonica, the therapist made sure that she brought one for Simon and that it was used in therapy. Furthermore, they would mainly sing songs that he liked together. At the end of the session, and if Simon had participated well, they would listen to a song from Simon's favorite TV show as a reward. In all, the therapy was well-structured and at the same time geared towards Simon's individual interests.

Within the setting of music therapy, it is also important to establish clear boundaries. In Simon's case, for example, he sat on a chair during the first sessions, instead of on a stool, which gave him more support, so that he would not get up from his seat too quickly. The therapist and Simon also made an agreement about handling the instruments with care and that Simon would not lie on the ground. To hold Simon's attention, the music therapist often varied in the musical parameters: when she was playing the guitar and she noticed that Simon's attention started to wane, she would start to play significantly louder or faster. Simon would often notice this change in music, which would draw his attention back to the therapist to see where the change was coming from. The therapist would also very often use large movements. When copying Simon's actions, she would enlarge his movements, or she would show him how to do something by using large movements. This would draw his attention and it often made him laugh.

As described before, music therapy often uses improvisation exercises. These are mainly focused on mimicking, taking turns in playing, and on playing together. One of the exercises that was often repeated during the therapy was mimicking a rhythm made by the other person on the djembe or hapi drum in order to work towards the objective of social interaction. This work method was first used during the second session of the observation phase. The therapist and Simon were each sitting on one side of the djembe and the therapist told Simon that she would play something and that he had to mimic what she played. While she begins with a rhythm of Pam Pampampam, Simon already starts to beat the djembe while the therapist is still playing. The therapist says: 'Wait a minute, how do you know what to play if you've already started?' and she tries again. This time, Simon also starts too early and the therapist gently takes his hands and explains what he needs to do. The third time, Simon manages to wait a bit longer and he is able to mimic most of the rhythm, Pam Pampampam. The therapist complements him by saying 'Yes, well done'. However, after two more efforts, Simon's attention wanes and the therapist then says that he can play first and that she will mimic him. Simon plays the rhythm Pampam, and the therapist does the same. When the therapist mimics what Simon does, he looks up and smiles. He is watching her closely to see if she really mimics what he does. This exercise is repeated often during therapy, on different percussion instruments, and is

gradually extended. At the start of the therapy, Simon still found it hard to wait for his turn. Over the course of the therapy, during the treatment phase, he managed to do the exercises longer, he was more and more able to await his turn, and he also used more variations in his own play. He played more complex rhythms and he varied in volume and pace. Pam tatatam PAMPAM. In session 18, he was even capable of alternating between who would play first, meaning that he had become more flexible in adjusting to what was asked of him. This shows a significant development in his ability to concentrate and an improvement of the reciprocity in the contact.

One of the objectives of the therapy was to offer Simon a way to express himself. A good example of where Simon was able to express himself through music, were the moments where they made sound recordings with the help of a microphone and a *loop station*, while Simon improvised with his voice or harmonica. A loop station is a recording device that repeats short sound fragments which then creates a rhythm. By combining different loops, you get a complex rhythm. During the session, different sound fragments can be recorded, which can then be used to create your own unique song. The first time, Simon was a bit anxious to record the sounds and his attitude was hesitant. By showing him what to do and by complimenting him, the therapist encouraged Simon to experiment in making the sounds for the recording. Simon really enjoyed doing this and listening to what he had played, and he seemed to be proud of the recording. The recording was also shared with Simon's parents, so that they could listen to what he had done in the music therapy sessions.

Statistical Analysis

In order to assess the development of Simon's social behavior before and during treatment, a quantitative analysis was conducted by using the Nonoverlap of All Pairs (NAP) (Parker & Vannest, 2009), Simulation Modeling Analysis (SMA) (Borckardt & Nash, 2014, Crosbie 1993, 1994) and the Tau-U index (Parker & Vannest, 2009). These techniques assess whether the trends in the data during the intervention phase differ from those during the baseline phase. For the VISK, the nonparametric Friedman Test was used to detect differences across the three measurement times. The agreement between the multiple observers was analyzed by the Gower's similarity measure (Gower, 1971). The Gower coefficient takes a value between 0 (no agreement between evaluators) and 1 (perfect agreement between evaluators).

By taking the measurement errors of the instruments into account and comparing the initial and final measurements, the Reliable Change Index (RCI) was calculated to decide whether the child showed an improvement or decline in social behavior (Jacobson & Truax, 1991). The RCI makes it possible to examine, on an individual level, whether observed changes are or are not the result of errors of measurement. If not, then progress or deterioration is a reliable outcome. For interpreting the scores, we use the rule of thumb according to the Dutch Youth Care (VNG et al., 2016), which indicates that we may speak of a strong (i.e. reliable) change when the difference between initial and final measurements is greater than or equal to an RCI of + or -1.96.

Results

The NAP measures the overlap of the measurements in the baseline phase with those of the intervention phase. When the score is between 0 and 0.65, the improvement compared to baseline is weak, a score between 0.66 and 0.92 shows moderate improvement, and if the score is between 0.93 and 1.0, the improvement is considered to be strong (Walker & Snell, 2013). When we look at the scores in Table 1, we see that Simon shows a significant improvement in the areas of ‘Concentration’, ‘Verbal communication’, ‘Joint attention’, ‘Taking the other into account’, and ‘Takes initiative’. Additionally, he shows a moderate improvement in the areas of ‘Making eye contact’, ‘Coping with changes’, and ‘Adjusted behavior’. Hence, an moderate or significant improvement is noticeable on eight of the ten items.

Table 1, scores Social Behavior Questionnaire

	NAP	SMA Level change		SMA Slope 1	
		<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>
1. Makes eye contact	0,992	0,691	*	0,759	*
2. Is able to focus for 5 minutes	1,000	0,853	*	0,742	*
3. Is able to cope with changes	0,789	0,350	*	0,736	*
4. Behavior has adapted to the situation	0,672	0,026	*	-0,003	
5. Communicates verbally	0,978	0,824	*	0,723	*
6. Communicates non-verbally	0,378	-0,138	*	-0,720	*
7. Is able to focus on something together	0,993	0,644	*	0,645	*
8. Is able take another person into account	0,967	0,795	*	0,821	*
9. Takes initiative	0,961	0,659	*	0,782	*
10. Has rigid behavioral patterns	0,406	-0,182	*	-0,534	*

* = $p > 0,0001$

SMA can be used to assess a slope from two phases. In doing this, we used the pattern that we can expect in this study: after a stable baseline phase, the desired behavior increases during the intervention phase. This may be an indication of a therapy effect. In Table 1 we can see that the areas ‘Making eye contact’, ‘Concentration’, ‘Coping with changes’, ‘Verbal communication’, ‘Joint attention’, ‘Taking the other into account’, and ‘Takes initiative’ for the slope show a significant progression in the intervention phase compared to the baseline phase. To get a clear idea of whether this occurs during the intervention phase or if this trend had already started during the baseline, we examined this in more detail using the Tau-U.

Tau-U is an index that is used to specifically measure changes in trends between two phases, the baseline (A) and the intervention (B; in our case the intervention and final phase) (Parker & Vannest, 2009). Tau-U is calculated based on the percentage of data that improves over time, taking both the non-overlap between the phases and the trend in phase B into account, after testing the trend in phase A. When the outcome of the Tau-U is significant, this is an indication of an acceleration of development in the intervention phase. None of the scores

showed a significant trend in the baseline, whereas scores of the intervention phase did show a significant trend in the data. Based on this, we conclude that development has improved during music therapy.

Because development was measured with the self-compiled questionnaire SBQ, the results were compared with the results from the VISKS of mother and the other informants, that they completed at the start of the therapy, after 10 weeks, and upon completion. For Simon, the RCI indicated a reliable improvement (>1.96) of the VISK score for initial measurement (T1) and the final measurement (T3), this was the same for the measurements T1 - T2 and T2 - T3.

We see for the VISK a decrease in the score, which means that there is noticeable improvement in the behavior. The total VISK score of the mother, in figure 1, also showed significant progress ($p < .05$) for Simon. The same was found for the other informants: all showed a significant improvement in the total score of the VISK. Gower coefficient was calculated to determine the consistency (i.e. inter-rater reliability) of the scores for each individual VISK item given by the observants, i.e. mother, Simon's grandmother, the counselor of the Medical Orthopedic Center and the music therapist. For 78% of the items, the consistency ranged between 0.81-1, which indicates a good consistency. For 22% of the items, the consistency ranged between 0.61-0.80, which indicates a reasonable consistency. This indicates that the scores of the mother on the self-compiled questionnaire SBQ give a reliable view on Simon's behavioral development.

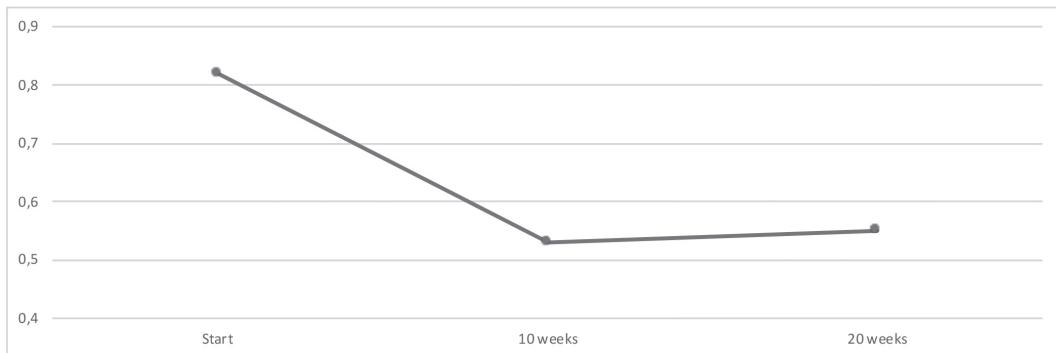


Figure 1, total score Friedman Test VISK

Follow-Up

The music therapy intervention included 20 sessions, after which it is ended. Simon's mother completed also the VISK questionnaire again 6 months after the music therapy, as a follow-up measurement.

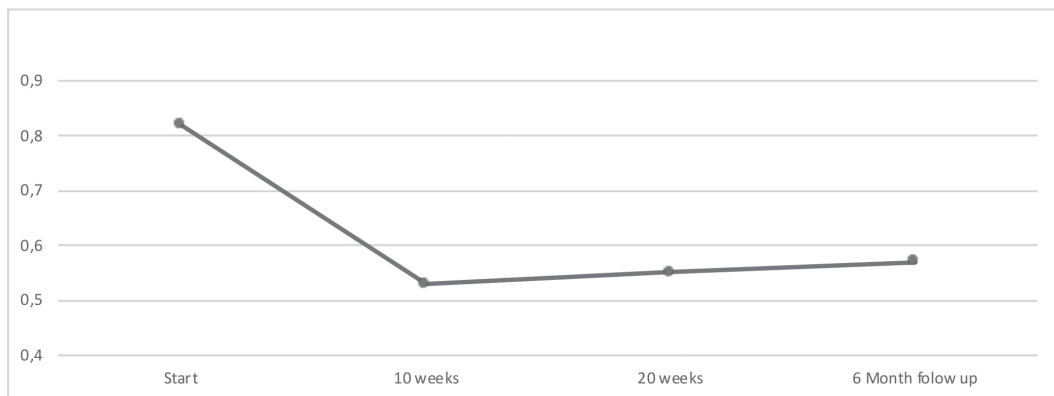


Figure 2, follow-up meeting VISK

At follow-up, the VISK showed a mean of 0.57, a slight increase compared to the measurement after the 20 weeks of music therapy (0.55; see Figure 2). This demonstrates that 6 months after ending music therapy, Simon shows a similar score and that he has been able to retain the learned skills.

Treatment Implications of the Case

It is very important, and it will become increasingly so, to provide insight into how music therapy interventions are structured, how they are applied, and why. So far, this has been quite difficult; the literature in this area does not provide all the answers and music therapists indicate that they initially work from their own intuition. Nevertheless, it appears that this practical knowledge can provide a lot of input for the development of an intervention and/or its guidelines. The substantiation from the available literature offers a good foundation, which can be complemented and assessed in practice.

The music therapeutic intervention has to be further and thoroughly researched in practice. By making use of the intervention manual, music therapists can offer the intervention in a uniform way, which will provide more insight into what is taking place during the intervention. This may help to raise hypotheses about the effective elements within this type of intervention.

Recommendations to practitioners and researchers.

It is crucial to further investigate the results of music therapy. This way, it can provide more clarity about the extent to which music therapy can contribute to the treatment of children and adolescents with ASD. This article discusses one case study. To obtain sufficient evidence, it is important that studies like these are repeated. If the same type of improvement can be found over and over again, indications that music therapy may have an effect are getting stronger and stronger. It will be important to investigate if this same pattern occurs with other types of treatment, or if this is especially the case for music therapy. The latter may indicate that music therapy is especially suitable for the treatment of children with ASD, and make it worthwhile to test the efficacy of this intervention with more rigorous research.

In order to get a good overview of the effects of the music therapy as it is now given in practice, it is important that the data is collected in this natural setting. A repeated single case study would be a good method for this. Practitioners may benefit from this type of study in two ways. In the first place, they learn how to assess the progress of the children in a detailed way. This is facilitated if they are trained to keep a log of the therapy and assess the target behaviors of the child prior, during, and after therapy. Second, by this training and this type of research, they are increasingly able to substantiate the value of their work. This may be a good step towards more extensive research, like a RCT, that may help to further build a firm foundation of music therapy.