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Review Article

Use and effectiveness of musical social story therapy in children with developmental disorders (down syndrome, autism spectrum disorder, fragile x syndrome, fetal alcohol spectrum disorder, cerebral palsy and adhd)

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Abstract

When human nature is examined, we find evidence that humans have created themselves through art since prehistoric times. Man has always used art as a form of self-expression. The pictures drawn on cave walls in the lightless periods of the world are the biggest proof that people always use art as a means of self-expression. Experimental studies in the field of neuroart and neuroaesthetics in recent years clearly show how the human brain reaches a developmental line with artistic stimuli. At this point, it is important to support children in neurodevelopmental sense and to bring them together with artistic stimuli. Activation of the orbitofrontal cortex with the stimulations of art creates tremendous results in terms of increasing synaptic connectivity in the child's brain. One of the most effective methods that can be used on the subject is Musical Social Stories Therapy in this sense. Studies show the important outputs of the method in children with developmental disorders (down syndrome, autism spectrum disorder, fragile x syndrome, fetal alcohol spectrum disorder, cerebral palsy and ADHD). In this sense, the method in question is especially suitable for children to increase motivation, to gain experience in creative expression and emotional reactions, to express emotions, thoughts and experiences comfortably, to develop self-esteem, to calm down and rest, to increase self-worth, to develop listening skills, to develop auditory perception, attention span. It is effective in the development of language use, development in language, motor, cognitive, self-care, social development, effective and permanent learning processes. Our related research aims to make positive contributions to the dissemination of the related method by addressing the history and usage areas of musical social stories therapy.

Keywords: musical social stories therapy; developmental disorder

Entrance

History of Art Therapy and Musical Social Stories Therapy

Art therapy is a type of therapy that requires the joint work of an art educator and therapist and is based on continuing the treatment process with art. It has spread rapidly in the USA and Europe since the mid-20th century. Starting from 1940, it began to be defined as a separate profession in the USA. The use of art therapy began in the 1940s, and its effective use in the field of professional therapy dates back to the 1960s. The term art therapy was used by artist Adrian Hill in 1942 to describe his work with tuberculosis patients. In this study, Hill found that painting not only allows patients to pass the time, but also is a tool to express the anxiety and traumatic experiences of these patients (Akhan, 2012; Case and Dalley, 2014; Malchiodi, 2005). Art therapy; It is defined as the use of various art materials to cause improvement in people, reduce physical and mental problems, increase motivation, and help them cope with stress-causing factors, accompanied by an expert who has completed mental health and any art training (Case and Dalley, 2014; Coşkun). & Yazıcı 2010; Geue et al.,2010; Malchiodi, 2005). It covers all activities in the field of art practices such as painting, music, theatre, cinema, movement and dance (Malchiodi, 2003). Music has always had an important place in the lives of human beings in terms of entertainment, religion, health, education and art since the first ages of human existence on earth (Sun, 1997). Social stories are fictional short stories that are written in a certain format, with a certain rule, and objectively describe

the target skill, event or situation, in order to explain social situations to individuals with developmental disabilities, to teach social skills and to enable children to react appropriately to the social situations they encounter (Pektaş, 2020). The first social story was written by Carol Gray in 1991 for Tim, a kindergarten student with high-functioning autism (Pektaş, 2020). Gray (1991) started this practice by writing a story to a student who had difficulty in following the instructions in physical education class, explaining the reactions and behaviors he should give. When the story in question made significant progress in the student concerned, the idea that similar studies could be conducted on children with developmental disorders came to mind. In the future, Gray's method was used to acquire social skills for these children with developmental delays, and the effects of the relevant technique were reported as significant (Feinberg, 2001). With his research in this field, Gray shared his research findings that the use of social stories is an ideal method for individuals with borderline and mild intellectual disabilities and for the diagnosis of high-functioning autism spectrum disorder (ASD). Apart from these groups, positive and rapid change-making outcomes of social stories are also mentioned in children whose IQ level is over 70 (Pektaş, 2020). Music is an activity that produces very successful results for children with developmental delays. Although the scope of the teaching area that children can learn through music is quite rich in musical activity and intervention methods, it is also very valuable that children learn some processes without being aware of it (Kınalı, 2003). A rich stimulating environment is very supportive for children with developmental disabilities. There are studies showing that intervention methods, especially those using musical social stories, have both entertaining and developmental aspects for children in this group (Güler, 2008). There are prominent international studies in the literature on these interventions (Brownell, 2002; Travis, 2006; Schwartzberg & Silverman, 2013; Healy, 2013). Studies and research on this subject in our country are still limited. However, a study was conducted by Johnson et al. (2016) on children and adolescents, and the development of environmental stimuli in brain structures (hippocampus, amygdala, cortical areas, prefrontal cortex) was compared (Johnson et al., 2016). A study on this subject revealed that music, as an artistic activity, strengthens memory and increases the existing capacity and efficiency of the brain by using both the right and left lobes (Çetinkaya, 2014). Some practices and research conducted in our country on this subject date mostly to 2011 and later, and the prominent studies on the subject are (Avcıoğlu, 2001; Çadır, 2008; Emecan, 2008; Karşıyakalı, 2011; Gül, 2012; Turhan, 2015; Giray, 2015). ; Kutlu, 2016; Gebeloğlu, 2016; Terzioğlu, 2017; Türker, 2018; Pektaş, 2020). It would be very valuable to disseminate intervention techniques related to musical social stories in the social learning and skill development of children with developmental disorders in our country.

Uses of Social Stories with Music

Developmental disability is defined as a chronic disability in mental or physical activities that occurs before the age of 22. Developmental disability is defined as severe functional limitations in three or more of the vital activities (personal care, rapid comprehension, language development, learning, mobility ability, self-management, desire to live independently) (Eripek, 2009). Musical social stories appear as an intervention technique with proven effectiveness in the following syndromes: down syndrome, autism spectrum disorder, fragile x syndrome, fetal alcohol spectrum disorder, cerebral palsy and ADHD (Pektaş, 2020). Especially among these groups, children with autism spectrum disorder and intellectual disabilities are the groups whose independent living and social adaptation skills need to be supported the most. Musical social stories are very valuable in supporting children in the following ways and their areas of use are as follows (Sun & Seyrek, 2002); Language development, Cognitive development, Emotional and social development, Physical and psychomotor development. There are studies showing that the use of music in therapy processes visibly increases children's expressive powers, creative abilities, sense of responsibility and self-confidence (Çilingir, 1990; Gardner, 2010). In addition, musical intervention methods are very important for the development of sociocultural awareness, self-confidence, creative thinking and production processes, and academic success (Şendurur & Barış, 2002). According to some research, the areas of use of musical techniques support the development processes of children in the following areas (Eskioğlu, 2003; Akkuş, 2003; Kıvrak, 2003; Çoban, 2005; MEGEP, 2008);

(Eskioğlu, 2003)	**(Çoban, 2005)**	**(MEGEP, 2008)**
Emotional and Social Development	Gross motor muscle development	Motivation increase
Physical and psychomotor development	Extension of attention span	İncrease in creative and emotional stress
Language Body development	Development Self	Speed development
Cognitive development	Social development skills	Calming down - resting
Increased concentration	İmproved verbal communication	İncreased self-esteem
Healthy career choice	Non-verbal communication	Development Effective listening performance
(Kıvrak, 2003)	Concept and skill learning	Increased auditory perception
Self-confidence – harmony development	Removal of problematic behavior	Increase in attention span
Developing behavioral skills		Expressive language development
Vital teaching acquisition		Language, motor, cognitive, self-care development.
Multiple thinking		Social development- Permanent learning

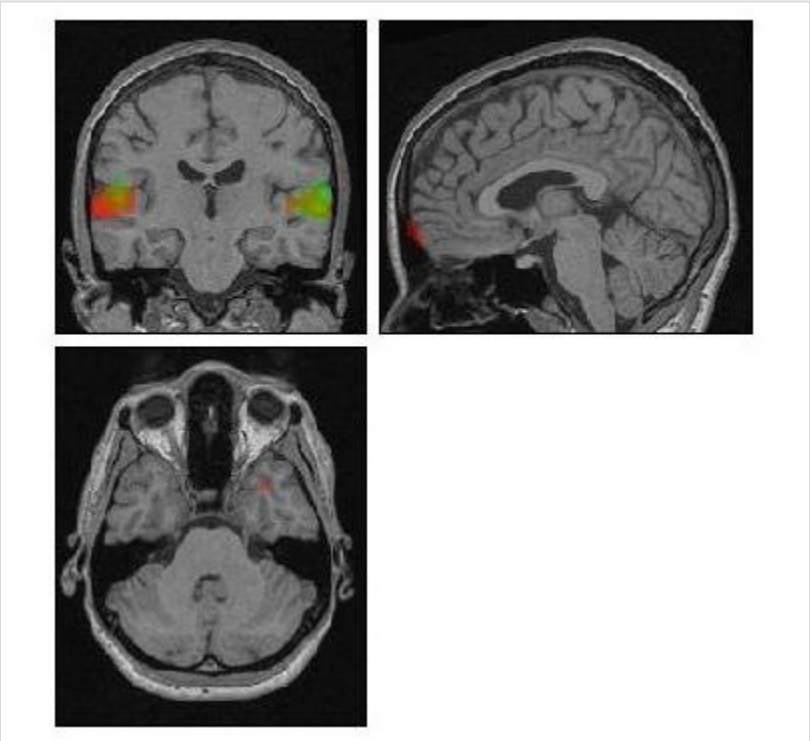
Dalcroze, who stands out in the music education approach, drew attention to the following areas of use (Choksy et al., 1986)

Mental and Sensory Domain	Physical Space	Musical Field
Awareness	Performance enhancement	Accurate and fast hearing
Concentration	Accuracy and clarity of performance	Reading and writing correctly
Social Integration	Use of music as time-motion-energy-weight-gravity	Analysis
Expression of musical changes		Improvisation

Neurology, Music and Brain

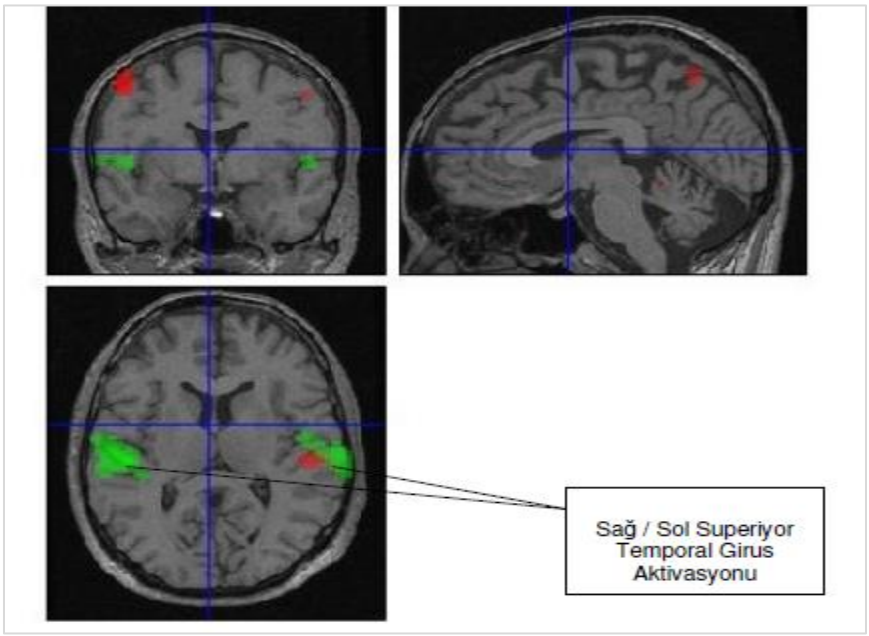
Engaging in music involves the person within society, involving evolutionary functions such as communication, cooperation, group coordination and social cohesion. At the same time, it is a versatile task that activates all mental functions of the brain such as perception, emotion, learning, teaching and memory. These processes make it an ideal tool for researching the brain. According to the data obtained by music biology research, the brain both has regions specialized in music-specific tasks such as frequency (pitch) analysis (right posterior superior temporal cortex) and combines different processes and areas to create new cognitive patterns (such as sound and time organization). Music is the art of bringing together different pitches in a harmonic order, with different duration, intensity and timbre. In other words, it is a phenomenon created by human intelligence and even the human brain (Sergent, 1993: 20-38). Music requires higher brain functions, just like mathematics or chess. Engaging in music also lays the foundation for well-developed “spatial” intelligence. Spatial intelligence is the ability to perceive the visual world, to create images of objects in the mind and to understand their differences (Boettcher et al., 1994: 53). Neuroimaging-supported studies on music cover a wide range of research areas such as music perception, music appreciation research, what kind of neural activations occur in musicians and non-musicians, and instrument timbre analyses. In a study on the neural correlates of music perception, it was stated that the region called Herchl's Gyrus is active in musical ability and aptitude for music, Broca's area provides the tonal perception of pitches, and the Planum Temporale region is associated with the "precise ear" phenomenon (Limb, 2006). In Takashi's study investigating the perception of music in musicians, it was revealed that different brain spheres are dominant between musicians and non-musicians. While left-dominant activations are observed during passive music listening in listeners who are musicians. It has been observed that the auditory regions in the right hemisphere are dominant in non-musicians (Ohnishi et al., 2001). Another study on music perception is the PET study conducted by Satoh. In his study, Satoh examined the activations in the ten parts of the temporal lobes with non-musician participants. In the study, participants were listened to a piano accompaniment and a solo (soprano) part separately. It was observed that the participants' cingulate gyrus and cerebellum regions were activated while listening to the accompaniment, while bilateral superior parietal lobules and right precuneus were activated while listening to the soprano part. The conclusion of the study group was that the front parts of the bilateral temporal lobe play an active role in the perception of melodies and chords (Satoh et al., 2003, Yazıcı, 2017). Another performance study was conducted with violinists. Professional and amateur violin. In this EMG study conducted with players, participants were asked to listen to Mozart's G major violin of the concerto first 16 measure stealing. And later dream to do requested. The EMG signal intensity of professional musicians is higher than that of amateur musicians and contralateral primary sensorimotor cortex, bilateral superior parietal lobes and activations are intense in the ipsilateral anterior cerebellar hemisphere. While playing right prime editor cortex activations seen in professional musicians players' Audi-motor-related connections, that is, connections related to movement and sensation, are more .It can give the result that it can establish a strong structure. These Audi engine connections are always in the imagination stage. It was not found in either group. These motor and auditory systems trigger each other in playing shows that they are activated (Lotze et al., 2003, Yazıcı, 2017)

In a thesis research conducted by Karşıcı (2007) in Turkey, the brain and related activation areas with music were investigated and the findings are quite remarkable here (Karşıcı, 2007); The right and left superior temporal gyri, which are mentioned in brain and music research, are the region with the most activation in this thesis study, as mentioned in the "Findings" section. In the fMRI shot of three files given below music "liked" by green color code problems in brain images, red color. The code indicates the brain region that is active during "dislike" music. **Figure 1.**



Example of rock music that A.G. dislikes (red) and Turkish folk music that he likes Right and left superior temporal gyrus activations in the music example (green) (Karşıcı, 2007).

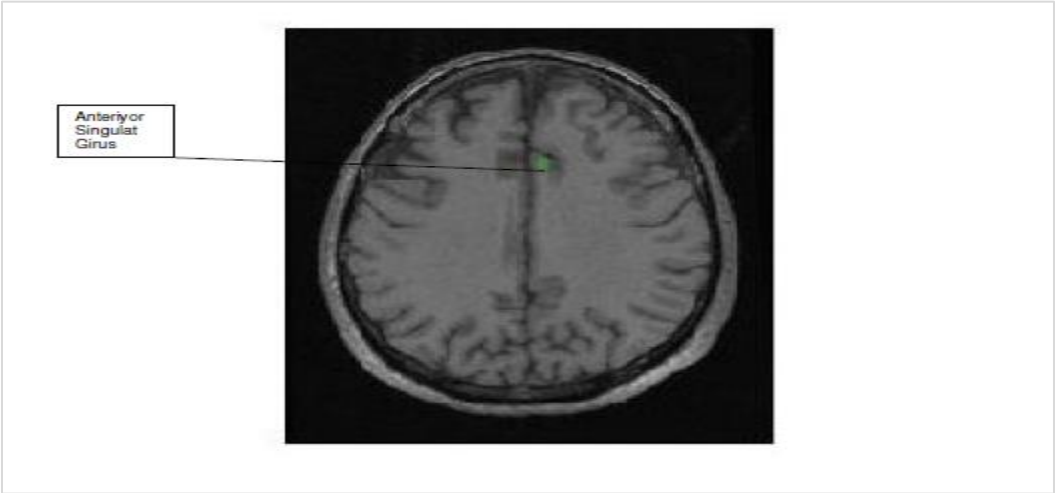
A G.; You like the example of Turkish folk music (green color), rock. He stated that he hated the music sample (red color). In Figure 1, in both music. Activations are noteworthy in both the right and left superior temporal gyri. rock. Observation of activation in the temporal region in the song indicates that A.G. did not like this song points out. The participant in Figure 2 (G.E.), unlike the previous one, liked the rock music example very much. He stated that he liked Turkish folk music but hated it. Both in rock song. While widespread activations were observed in the superior temporal gyrus (green color code), Turkish Activations in folk music (red color code) are less in this area is seen **Figure 2.**



Example of Turkish folk music that G.E. dislikes and rock music that he likes Right and left superior temporal gyrus activations in the example (Karşıcı, 2007).

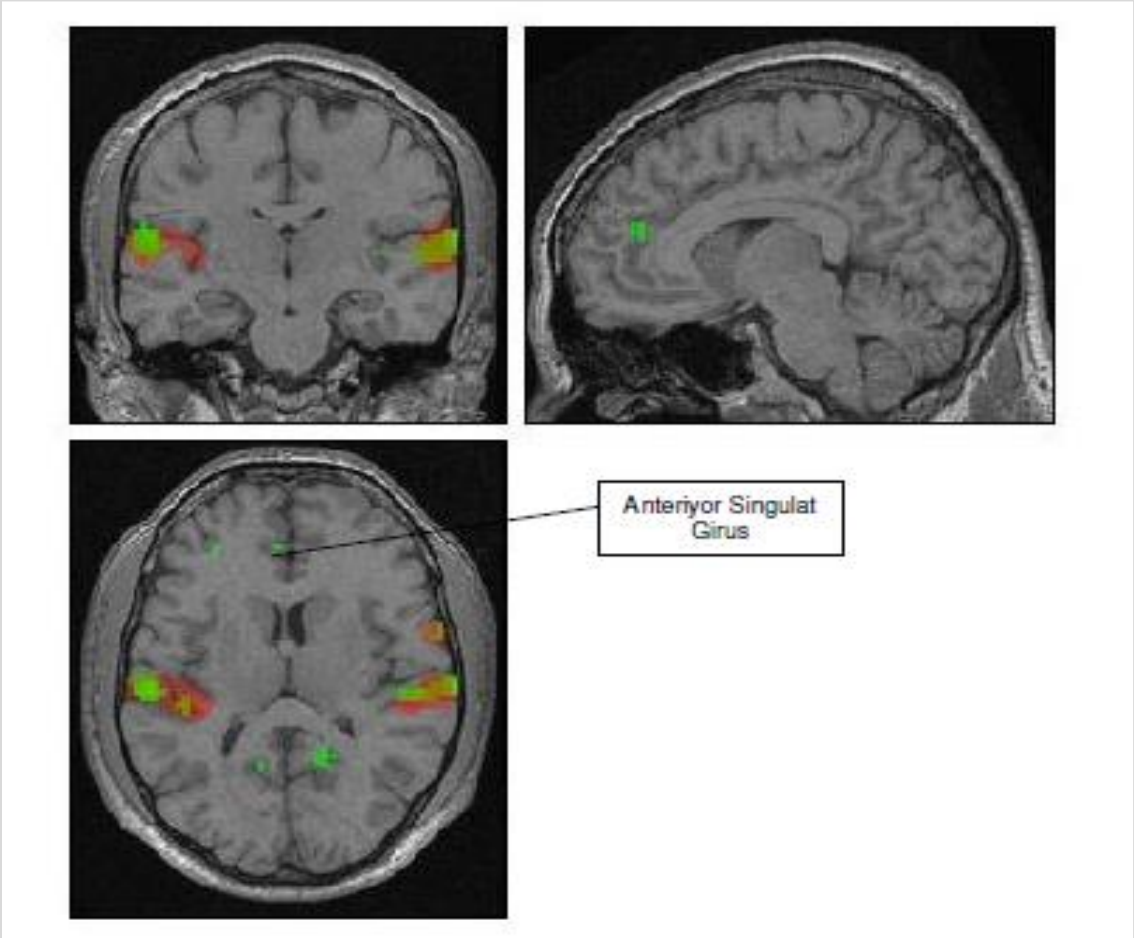
With the activations in the superior temporal region, you can see that you "like the music". An important region that is sure to be visible is the anterior cingulate gyrus. this thesis. Ten people who liked the music played among the twenty-four participants in the study also commented

cingulate gyrus activation was observed. In Figure 3, again G.E.'s. In addition to the superior temporal region, indicating that he likes White Snake's song activation in the anterior cingulate gyrus is seen with a green color code. **Figure 3.**



Anterior cingulate gyrus activation in the rock music example that G.E. likes (Karşıcı, 2007)

Anterior cingulate cortex, which is involved in decision-making and reward mechanisms, classified as liked (Menon 2005) and cheerful (Mitterschiffhaler 2006). Becomes active in music. Figure 4 is the brain images of A.K. This participatory rock that he hates music (red color code), Orhan Gencebay's Give Me a consolation. He stated that he loved the song very much (green color code). Both songs are right. Activations are observed in both the left superior temporal gyrus. But anterior activation is seen in the cingulate gyrus only in the song he/she likes (green color code). **Figure 4.**



A.K.'s superior temporal and anterior cingulate gyrus activations (Karşıcı, 2007)

In this study, studies were conducted for the brain regions with the highest activation. In the statistical analysis, except for two regions, left and right music in the music liked in other regions. Right activations were seen more frequently than disliked music. The activation rate in the inferior frontal gyrus (IFG), which is one of the regions, is also higher in liked music. More often than in disliked music. The right IFG is an area related only to movement. Left IFG, involved in speech; singing or wanting to sing the lyrics of a song
in the state, in the state of remembering the words and while listening to the favorite music. It is stated that it is active (Koelsch 2005; Menon 2005). Another region where the most intense activation was detected in the study was the right and left is the precentral gyrus. Planning, setting strategic priorities, planning action, keeping one's hands moving or just moving, pertaining to organization. Since it is, it may also be related to thinking about dancing. Menon and his friends (2005) middle temporal gyrus mentioned in his study (2005); Morrison et al. The middle frontal gyrus, mentioned in his study (2003), is also the most frequently activated region in this thesis. Other regions are visible (Karşıcı, 2007).

Relationship with Psychopathologies

Research draws attention to the importance of musical social stories in children with special needs. Musical social stories are a therapy method with proven effectiveness in the diagnosis of neurological diseases, especially autism and ADHD, as well as Down syndrome, fragile x syndrome, fetal alcohol spectrum disorder, and cerebral palsy (Pektaş, 2020). It has been supported by studies that the relevant therapy provides developmental benefits, especially in these pathology groups, in processes such as memory retention, imitation, and monitoring (Uslu, 2007). Some studies emphasize the function of music as an effective learning and psychological treatment (therapeutic) in relevant psychopathologies (Kınalı, 2003). Regarding psychopathologies, the relevant therapy method; motivation booster, gaining experience in creative expression and emotional reactions, being able to express feelings - thoughts and experiences easily, developing self-esteem, calming down and resting, increasing self-worth, developing listening skills, developing auditory perception, increasing attention span, improving the way of using language, language Support in motor, cognitive, self-care and social development areas, and effective and evidence-based outcomes in effective and permanent learning processes are mentioned (MEGEP, 2008). Ruth Zinar (1987) stated that relevant musical activities are effective in children with such pathologies; There are findings that it turns disadvantageous situations into positive ones and contributes to children's ability to succeed (Zinar, 1987).

Usage Methods and Techniques

Among the methods generally applied to children with developmental problems; Social reinforcement, opportunity teaching, providing clues, collaborative learning, shaping, behavioral rehearsal, direct teaching, modeling, feedback, musical social stories and video model applications take the lead (Gül & Vuran, 2010; Tekin & İftar, 2013). Developmental Eclectic approaches are preferred in intervention methods for children with disorders, without adhering to a single method (Pektaş, 2020). However, especially "scientifically based models" are preferred. The 'Social Story Practices Transformed into Musical Activities' technique, which is a combination of Story-Based Practices Technique and Music Therapy, has recently begun to stand out as an important and original intervention method that touches the lives of children with developmental disabilities (Pektaş, 2020). The methods used in the social learning processes of children with developmental disorders are generally (Avcıoğlu, 2005); role playing, show management, modeling, coaching, direct teaching, cognitive process approach, cognitive social learning approach, peer-supported learning, drama and collaborative learning methods (Avcıoğlu, 2005). The steps to be followed in such intervention methods are (Bacanlı, 2012); explanation, modeling, practice, feedback, homework and generalization (Bacanlı, 2012). According to Gray (2003), there are three main rules to be considered when writing social stories; The aim is to write the social story specifically for the person and take into account the language and understanding level of the person concerned, to prepare the social story using four different sentence types, and to use these four different sentence types in a certain proportion and throughout the story (Gray, 2003). These sentence types should be descriptive, perspective and directive sentences. Descriptive sentences; It explains objectively what the situation was, who was involved, what they did, and why. Perspective sentences describe other people's thoughts, while directive sentences are sentences that directly describe what is expected. In the social story technique; Determining the target behavior, collecting information, writing the story, and giving an appropriate title to the story are important. In addition, it should be prepared between 5 and 10 sentences, specific to the person and appropriate to the development level of the person concerned. Photographs and pictures can be added (Gray, 1998). The aim of Musical Social Stories Therapy is not to increase children's musical abilities but to contribute to their development in the areas they need through music. At this point, music is not the goal but a tool (Uslu, 2007). Some musical techniques used in this regard are; Orff-Schulwerk Approach, Kodaly Approach, Dalcroze Approach (Pektaş, 2020). In these music techniques, learning by doing and experiencing techniques are used by using movement, music and dance, and children transition from a passive state to an active state (Uçal & Bilen, 2006). The basic principle is to tell a thought and story with body language, movement, dance, words, song, movement and instrument. At this point, it is considered the most effective of the "learning by doing and experiencing" methods (Koçak & Lasio, 2013). The materials used in the Orff-Schulwerk Approach are body percussion or rhythm instruments, improvised human voice, musical instruments and dramatization (Uçan & Bilen, 2006). Kodaly Approach, on the other hand, uses tonic Sol – Fa, Hand Signs and Rhythm Duration Syllables (Yıldırım, 1995). The Dalcroze Approach works entirely on body and rhythm and aims to support the child in revealing his talents, using rhythmic gymnastics as a method. It places the natural rhythms created by the human body at the center (Choksy et al., 1986). Techniques generally used in musical social stories; Vocal exercises include singing-accompaniment with the body, dancing, rhythmic exercises and imitation, musical games, playing musical instruments and listening to music (Çoban, 2005).

Effectiveness Results of Musical Social Story Studies with Children with Developmental Disabilities

One of the pioneering studies on the subject belongs to Brownell (2002). In his study on children with autism, Brownell found that musical social stories created desired behavioral changes in children diagnosed with autism (Brownell, 2002). Another study was conducted by Travis (2006), and the meaningful outcomes of musical social stories in the processes of focusing on and retrieving information in children with autism were mentioned (Travis, 2006). According to the findings of two separate studies conducted in 2013, musical social stories therapy is a very effective method in understanding and generalizing social skills in children with autism (Healy, 2013; Schwartzberg & Silverman, 2013). According to the findings of a study conducted by Geboloğlu (2016), musical social stories are very effective in teaching "asking permission" and "asking for help" skills in children with autism (Geboloğlu, 2016). According to the findings of a study conducted by Pektaş et al. (2020) with a group with Down syndrome, autism and mild intellectual disability, social story applications transformed into musical activities are effective and have social validity. At this point, analyzes were made one by one in areas such as apologizing, greeting, taking turns and asking for permission, which are among the basic social skills of children, and the effectiveness of musical social story applications for each area was proven (Pektaş, 2020).

Originality

Musical Social Stories Therapy is a unique method that can benefit from three different fields of science, dance, music and literature. In this technique, children have the opportunity to effectively use the population area as well as their healthy abilities and experience the processes of expressing rates and communication methods. The technique, which is used extensively in this way, is a very original treatment method in terms of stimulating both the right and left brain, providing synaptic diversity and supporting movement development by incorporating dance therapy as well as comprehensive individual brain development. Putting an end to the dualistic body-brain dichotomy, training it in two areas and actually teaching distribution and programming until emotion and self-expression are separated from the classical areas (Pektaş, 2020).

Conclusion And Recommendations

Research on Musical Social Stories Therapy shows that this therapy method is very effective in terms of touching the lives of many children with developmental problems. In this sense, it will be very valuable to disseminate this method in order to support the brain and physical development of children. This method is valuable as it is an enjoyable activity for children because it will prevent drop-outs by ensuring the continuity of the therapy. In addition, with this method, therapy will turn into an enjoyable positive intervention activity for children with developmental problems and their families. Continuing the sometimes distressing therapy processes for families and children with musical activities is also an important outcome for supporting the family. An environment where children enjoy will serve as a kind of therapy for the families involved. In addition, this method will protect children from some negative processes in terms of labeling and stigmatization. Transforming the therapy environment into an activity environment is very important in terms of preventing stigmatizing environmental approaches. In summary, it is useful to emphasize the importance of disseminating the method in question in our country and to emphasize that more research and studies on this subject should be continued by mental health experts.

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