

The effect of listening to music on the psychological responses of children with special needs



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Abstract: The aim of the work is to study the ability of children with a mild ID and children with a normal level of development to perceive and differentiate emotions received while listening to music. Group 1 included 100 schoolchildren with a mild ID, group 2 - other 100 schoolchildren with a normal level of development. There were no significant changes in the intellectual development of children with a mild ID due to long-term listening to music, but this method is suitable for correcting the psycho-emotional state of children from group 1. Productivity was higher with musical accompaniment.

Keywords: adagio, allegro, children with mild ID, classical music, music therapy.

Resumo: O objetivo do trabalho é estudar a capacidade de crianças com DI moderado e crianças com nível de desenvolvimento normal em perceber e diferenciar as emoções recebidas ao ouvir música. Grupo 1 incluiu 100 escolares com ID leve, grupo 2 - outros 100 escolares com nível de desenvolvimento normal. Não houve mudanças significativas no desenvolvimento intelectual de crianças com DI leve devido à escuta

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prolongada de música, mas esse método é adequado para corrigir o estado psicoemocional de crianças do grupo 1. A produtividade foi maior com acompanhamento musical.

Palavras-chave: adagio, allegro, crianças com DI leve, música clássica, musicoterapia.

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Introduction

In the modern world, one of the priority tasks of society is to ensure the full adaptation of new members of society, in particular children. The adaptation of children with special needs takes a special place. Children with special needs, including those with a mild Intellectual Disability (ID), should painlessly integrate into modern society (DVIR et al., 2020).

A specific feature of children with a mild ID is low cognitive activity. This is a consequence of organic brain syndrome (YOSHIOKA et al., 2019, 2020). An additional significant factor providing such children with the possibility of adaptation in the sociocultural space is the presence of a developed emotional sphere. This issue was touched upon by a number of researchers, noting its importance for special education (LEE and LIN, 2020; MCCORD and LEE, 2012). At the same time, an unbalanced situation has developed, when the structure of cognitive activity has been studied in sufficient detail, but the emotions of children with special needs have been studied rather poorly (WFMT, 2011).

Organic brain syndrome can have a significant negative impact on the mental activity of children with special needs, including those with ID. In particular, this category has the following features: emotional immaturity, emotional dysregulation, the intensity of dynamics and adequacy of emotions, a limited number of emotions, ways in which they can be expressed, and partial understanding or misunderstanding of the emotions of people with a fully developed psyche (KAIKKONEN and KIVIJARVI, 2013). Children with special needs, including those with ID, are also characterized by the polarized expression of emotions, the inability to identify and manifest emotional 'semitones', as well as emotions associated with conflicting and complex experiences.

In addition, some researchers note the primitivism and limited emotional experiences of such children (KIVIJARVI, 2012; LAES and WESTERLUND, 2018). Their emotions are often closely tied to a

specific situation. In general, emotional disturbances most often occur during adolescence, not only in children with special needs but also in mentally developed peers (NISHIKIORI et al., 2020). According to some data, some of the violations may appear for the first time, while the existing ones may only get worse (BANDO et al., 2020). Therefore, this age is extremely important for the emotional correction of children with special needs. The number of people diagnosed with ID is quite large - according to the World Health Organization, it is from 1 to 3% of the total. Therefore, this issue is extremely important for in-depth study, given the significant number of such people (DONALD and PINSON, 2012). As well, children represent the potential for the future of both a single country and the entire human society as a whole. Often, children with a mild ID do not achieve a high quality of life, their families are socially and economically disadvantaged. Therefore, monitoring and correcting the emotional and mental reactions of such children are of great sociocultural importance.

Among modern technologies of correctional psychology, the following are considered the most promising: fairy tale therapy, dance therapy, psychodynamic therapy, hippotherapy, phototherapy, and music therapy. In this aspect, researchers analyze the problematic issues of music psychology (LEVITIN et al., 2018; TAN et al., 2017; THOMPSON, 2015), the impact of music on the psychological state of man (HUTCHINSON et al., 2015; RAGLIO et al., 2015), opportunities for the treatment of mental illness and nervous disorders through music (GUTIÉRREZ and CAMARENA, 2015). Most modern research on the subject of music therapy confirms its positive effect on the dynamics of mental development of children and adolescents with special needs (BANDO et al., 2019; CASSIDY, 2009; WARTH et al., 2019). Moreover, music therapy effectively manifests itself in various forms of deviations - visual impairment, cerebral palsy, ID, autism, and others. Music has a softening effect, in the most striking cases, completely removes developmental disorders, through the dynamic development of the psychoemotional sphere in children with special needs. First

of all, motor activity and emotions of a child with impairments develop. Thus, music has a regulatory and stimulating effect on the psyche of children and adolescents with special needs. Music helps to increase their sociability not only in terms of contact with children with similar developmental defects but also increases the chances of mastering new types of activities and the ability of emotional regulation.

It has been found that music therapy primarily has a therapeutic effect for children and adolescents who have difficulties in verbal communication (ISTVANDITY, 2017). This category of children with special needs includes not only children with mental or speech disorders but also children with mild ID. In this regard, the effect of music is primarily aimed at regulating child's emotions. In particular, there is a well-known methodology of A. Wittenberg (USA), who worked with autistic children, as well as children with a mild ID. These children were characterized by self-destructive behavior and aggression in communication with peers. During a session, a therapist improvised playing musical instruments, during which children had to sing in accordance with the rhythm of drums or piano. The results of such music therapy were strictly individual for each child, however, there was a positive shift - the degree of aggression and self-destructive behavior decreased, and interest in communication appeared.

There are two opposite views on the effectiveness of music therapy for children with mild ID. According to one of the opinions, music therapy is ineffective for such children since their perception is imperfect and the recognition of sound signals of music is reduced (HIRAI et al., 2020; RUOKONEN et al., 2012). As a result, this can significantly reduce the effectiveness of the applied method of music therapy. The main thesis is that children with a mild ID are not capable of differentiating the semantic content of a work, are unable to give this work a verbal characterization, and also do not have the ability to compare the image of the world around them and the image inspired by music (DARROW, 2011). It is also noted that there is not always a correspondence of emotional behavior

while listening to music (OSTENSJO et al., 2003). However, still, there is an opportunity to get positive results, having previously prepared such children for listening to music, through conversations about music, observations, and demonstration of illustrative material. The selection of a piece of music is important. It is this factor that determines failure, increasing anxiety, or increasing fear in children with mild ID.

Another view of the validity of the use of music therapy is directly opposite to the first (LEE and LIN, 2012; VIKMAN, 2001). Representatives of this system of views rely on the research of E. Seguin, who proved that even children with a severe ID have good musical and auditory abilities. In particular, some of them showed good singing performance, despite the fact that these children had a speech disorder. These studies were confirmed by the results of MYSKJA and LINDBAEK (2000), which showed the presence of musical abilities in children with ID.

The main objective of this study was to find out if music therapy has a real positive impact on ID children. The study suggests that music therapy has a positive impact on the emotional development of children and adolescents with ID.

The purpose of this work is to determine the ability of ID children to perceive and differentiate emotions received while listening to music. The objectives of the study are as follows:

- a) to analyze how the studied ID children and children with normal development perceive and express such emotions as joy, anger, sadness, and calmness when listening to music;
- b) to identify changes in activity in ID children and children with normal development when listening to music at different tempos (slow and fast).

Materials and methods

Research design and sample

The study was conducted in 2019 in Beijing, People's Republic of China. The sample was selected from children enrolled in 4 schools for children with special needs. Besides, a parallel similar study was conducted among children from 4 secondary schools. The average age of children was 12.3 ± 1.1 years (group 1, 100 children with special needs, mild ID) and 11.9 ± 1.3 years (group 2, 100 children with normal development). IQ (intelligence quotient) was measured in all children from both groups according to Wechsler Adult Intelligence Scale (WAIS). This test allows one to analyze the intellectual development of a particular individual. The test includes two main blocks - verbal and non-verbal. In this case, the tasks in the test were ranked in order of complication. According to this methodology, an IQ index above 130 is considered very high and is inherent in 2.2% of the population. An indicator of 69 points and below indicates an ID (also in 2.2% of the population). In the first group, the average IQ was 66 ± 3 (ID), in the second, 101 ± 4 (the average rate, 50% of the population).

Intervention and ethical issues

IQ tests were conducted under identical conditions for students from both groups, at the same time (before lunch, until emotional overload occurs).

A verbal agreement was concluded with each of the students on consent to participate in the research. Furthermore, the parents of these children were notified, with whom written agreements were signed. The agreements guaranteed anonymity and confidentiality of information. In the present study, all standards of morality and ethics generally accepted in world practice were observed. The study was approved at a meeting of the Ethics

Committee of [BLINDED] University. The study included all children whose parents gave written consent. Moreover, children with approximately the same average academic performance (satisfactory, good) were selected. The study did not include children whose parents did not consent to participate in the research, as well as children with health problems (chronic diseases of the cardiovascular system, mental disorders).

Classical music was chosen as musical accompaniment. Before determining the correspondence of one or another piece of music to a particular emotion, this piece was analyzed by music experts from the Chinese Conservatory. Accordingly, 'A Little Night Serenade' (all parts of the song) by W. Mozart corresponded to the emotion of joy, 'Adagio' (all parts of the song) by T. Albinoni (characterized by a slow pace) - the emotion of sadness and grief. The final part ("3rd Movement (Presto agitato)") of the Sonata No. 14 by L. Beethoven corresponded to the emotion of anger and 'Morning Mood' (all parts of the song) by E. Grieg - tranquility. A tape recorder was used to convey musical content. All students were shown identical recordings of the listed works. The standard length of each audio track was up to 5 minutes. When conducting the study, the following combination algorithm was used - three people in the case of group 1 and three in the case of group 2.

During the listening process, each of the participants was asked to draw a drawing in any form. Students listened to the songs in the same order through headphones at the same time. The drawing activity took place individually (the children sat one by one at the desks), the participants of the experiment did not see each other's drawings. The assumption was that a drawing created while listening to a piece of music can provide all the information about experienced emotions as an element of the psyche. Drawing can also help establish the emotional experience of children. It was also taken into account that the use of certain colors in the drawing is a reflection of the emotional richness of those images that appear when listening to music. Also, comments on the drawn pictures are a reliable indicator of awareness and understanding

by children of those emotional states that they experienced while listening to music. In order to quantify the accuracy of the expressed emotions, a verbal description was used to identify which emotion corresponds to a played track, the maximum possible number of points was five. The marker of the qualitative analysis was the identity of the content and color chart of the drawn picture, verbally named emotions, the associative array and the emotional background of the work. The drawings were processed using content analysis. Since music affects different levels of a child's psyche, it makes sense to determine the influence of music on the activity and behavior of children. This is necessary for children in group 2, as they tend to have spontaneous and often affective reactions that are difficult to control. This is also necessary in order to establish how long children can withstand emotional and intellectual stress, as well as to prevent over-excitement. B. Bourdon's corrective test was also carried out to find out the general performance and concentration of children when listening to music at different tempos, namely allegro and adagio.

Statistical analysis

In order to process the data, the Statistica 7.0 program (StatSoft Inc., USA) was used. The arithmetic mean was calculated, as well as the value of the standard deviation for each of the signs (points in the tables). Differences were considered statistically significant at $p \leq 0.05$. Differing levels of confidence are given in the body of the article. To identify significant differences between the groups, Student's t-test was used. For each group of children, their number is given in %, corresponding to the perception of a particular emotion.

Results

There were both common and different characteristics of the emotional perception of a music track being played in both groups. In particular, among the common features, there is a similar emotional perception of tracks by children from both groups. That is, children from both groups are able to emotionally and figuratively reflect the emotions they are experiencing. Neither of the groups had difficulties in displaying their emotions in the form of a picture. The comments given by children to the drawings allow one to assert that in both groups there is a conscious and adequate perception of the emotion transmitted by the music. Most of the children correctly identified the emotional load of music. At the same time, it is worth noting that there were varying degrees of confidence in their answers, as well as varying degrees of accuracy.

Children from both groups gave the most accurate answers on the emotions of joy and anger perceived when listening to music. The minimum accuracy of answers was observed in both groups when listening to a piece of music corresponding to sadness. There was also a low accuracy in the perception of emotional semitones by children from both groups (Table 1).

Children from group 1 showed significantly lower results compared to children from group 2 (Table 1). The most noticeable difference between the groups was obtained for two opposite reactions - anger and calmness.

Table 1 - Indicators of the accuracy (in points) of children's perception of emotions transmitted by music based on the analysis of drawings

Emotion	Group 1, points	Group 2, points
Emotion of sadness	1.94 ± 0.47	2.93 ± 0.66*
Emotion of anger	2.68 ± 0.5	3.75 ± 0.94**
Emotion of joy	2.79 ± 0.71	3.89 ± 0.73*
Emotion of calmness	2.71 ± 0.67	3.47 ± 0.77**

Note. * - differences are significant at $p \leq 0.05$, ** - at $p \leq 0.001$.

In particular, the children in the first group often mixed emotions such as sadness and calmness. Their characteristics were reduced either to a single definition of emotion (sadness), or to the description of actions accompanying sadness (something bad happened, or someone is crying).

Content analysis of children's drawings showed similar emotions when listening to W. Mozart ('joy'). Children typically depicted bright, sunny landscapes in sunlight, as well as rainbows. This category includes 83% of children from group 1 and 62% of children from group 2 (the difference between the groups is significant, $p \leq 0.01$). Another group of drawings included images of holidays and celebrations with people dressed smartly - 52% of children from group 1 and 65% from group 2 ($p \leq 0.05$). The next group of drawings includes scenes from everyday life that carry a positive meaning for children - recorded in 57% of children from group 1 and 54% in children from group 2 ($p \geq 0.05$). The comments of children from both groups to the created drawings confirmed the emotions they received. The most frequent element of the drawings was people, whom children portrayed in full growth. This indicates their readiness to communicate with the outside world.

Yet, children from group 2 are characterized by great ease in depicting abstract images when listening to the music of Mozart - this was recorded in 40% of children from group 2 versus 14% of children from group 1 ($p \leq 0.001$). A feature of children from group 1 is the almost complete absence of abstract thinking and the dominance of concrete thinking based on their personal experience, as well as on associations with concrete actions or with concrete objects. Among the dominant colors, no clear differences were found between the groups - mainly yellow, orange, and red colors, which corresponded to joyful emotions. At the same time, the red color reflected the energy that was present in Mozart's music.

When listening to Albinoni's music (corresponding to sadness), children most often depicted autumn landscapes, and there was no significant difference between the groups (69% from group 1,

73% from group 2, $p \geq 0.05$). The drawings included the elements typical for autumn and sadness, such as rain, clouds, cloudy weather, and clouds covered the entire space of the sky. As well as, in children from group 1, the drawings were more dramatic. Most likely, this may be due to the fact that they are insufficiently able to distinguish the difference between emotions. Children from group 2 depicted other elements corresponding to sadness, such as sunset, mountains, and lakes in the mountains, compared with group 1 (group 1 - 28%, group 2 - 54%, $p \leq 0.01$). Gray, black and brown prevailed among the range of colors used. These colors are especially prevalent among the drawings of children from group 1. These colors are associated with chaos, destruction and death, with the concentration of children on aggressiveness, antisocial, inappropriate behavior, the desire for conflict and paying the greatest attention to internal problems, that is, oneself. When listening to the track, an expansion of the emotion of sadness was observed, when, along with it, there was also fear, anxiety, as well as a feeling of emotional and mental discomfort. Unlike children from group 1, children from group 2, in addition to the colors traditional for the 'golden autumn', used violet, burgundy, and lilac colors in their drawings. In this group, the emotion of sadness was more homogeneous and was not supported by fear and other emotions.

When analyzing the drawings drawn while listening to Beethoven's Sonata No. 14, it was found that aggressive images, such as scenes of battles, blood, weapons, and destruction, as well as the figures of killed people, prevailed, with no significant difference between children from both groups (43% in group 1 and 49% in group 2, $p \geq 0.05$). At the same time, there were more negative images in the drawings of children from group 1. For children from group 2, the drawings were more heroic in nature and corresponded to such aspects of the war as a feat, self-sacrifice, fairy tale heroes (10% of children from group 1 and 45% from group 2, $p \leq 0.001$). Among the landscapes depicted by children from group 1, elements corresponding to catastrophes and natural disasters prevailed - forest fires, volcanoes, tornadoes, and hurricanes (18%

- group 2, 37% - group 2, $p \leq 0.01$). Thus, in children from group 1, the drawings were more negative. The analysis of the drawings showed that, in general, children perceived Beethoven's music as active and dynamic. Among the colors in children from group 1, black prevailed, to a lesser extent - yellow, while in group 2 - gray and brown. Perhaps the emotion of anger gives children in Group 1 some pleasure, as it condones affective behavior.

E. Grieg's music, corresponding to peace, was adequately perceived by children from both groups. The drawings corresponded to the emotion of peace, therefore, landscapes prevailed among the images, bringing peace and tranquility (56% in group 1 and 71% in group 2, $p \leq 0.05$). In particular, these were forest glades, the sea, birds in the sky. For children from group 1, the presence of an island in the sea was characteristic, which symbolizes a sense of peace and security. For children from group 2, the drawings were more complex - there were calm waves, sunsets, sunrises, and dolphins at the sea. It is interesting to note that in children from group 1, mythical characters such as fairies, dragons, and wizards were significantly more often present in the drawings (42% of children from group 1, 29% of children from group 2, $p \leq 0.05$). Among the colors, shades of blue (turquoise, dark blue), as well as pink and green prevailed. For children from group 1, more frequent use of purple and yellow colors was characteristic.

There were no significant differences in the performance of children depending on the level of intelligence and music at different tempos. At the same time, productivity was higher with musical accompaniment (Table 2). Yet, in children from group 1, productivity was lower, both with and without music ($p \leq 0.01$). An increase in productivity indicators in the first group was revealed at an adagio tempo of 3.3 a.u. versus 2.6 a.u. at an allegro tempo ($p \leq 0.05$). In the second group, these indicators did not differ significantly - 4.2 a.u. with adagio versus 4.3 a.u. with allegro ($p \geq 0.05$).

Table 2 - Results of the Bourdon analysis of children from two groups with adagio and allegro, as well as without musical accompaniment.

Indicator	Group 1, number of times	Group 2, number of times
Number of errors without musical accompaniment	18.22 ± 4.13	7.22 ± 3.95**
Number of errors with allegro	18.55 ± 4.67	11.59 ± 3.89**
Number of errors with adagio	12.65 ± 2.77	5.69 ± 3.35**

Note. ** - the difference between the two groups is significant at $p \leq 0.001$.

The number of errors was significantly different and was maximum for fast music, and minimum for slow music (Table 2). In group 1, the number of errors was maximum with fast music and minimum with slow music ($p \leq 0.01$). At the same time, the differences between the number of mistakes with and without fast music in group 1 are insignificant ($p \geq 0.05$). In group 2, the number of errors was also increased with fast music compared to slow music and without music ($p \leq 0.01$).

Discussion

The following patterns were established. The musical effect has the same effect on children from both groups. Children from both groups are characterized by the commonality of the images used, which are a reflection of the different emotional load of the music. Such images include landscapes, disasters, characters from myths, abstract images. In addition, the common for children from both groups turned out to be color associations characteristic of musical classical works of different emotional content. Other than, commonality was revealed in the differentiation of the emotional series with varying degrees of accuracy: joy, anger, calmness, sadness. A similarity was found between the indicators of attention and performance when listening to the music of different tempos - slow, corresponding to adagio, and fast, corresponding to allegro.

The revealed general patterns give reason to believe that children from both groups have common tendencies, such as the ability to accurately determine the dominant emotion in a particular piece of music. Yet, there are differences between these groups of children - children from group 1 (mild ID) less accurately differentiate the perception and the figurative content of the music. The evidence for this is the decreased recognition rates for sadness, joy, anger, and calmness. Children from group 1 are also characterized by less sensitivity to a particular piece of music. An expression of this is the greater uniformity in the choice of colors by children from the first group compared to the second. Similar results were obtained by other researchers for children with ID and other developmental disabilities (LEE and LIN, 2013; MOORE and ELLIOTT, 2019; SCHNEIDER and LEMAN, 2017).

This article did not note significant changes in the intellectual development of children with mild ID due to long-term listening to music compared to the beginning of the experiment. These results are confirmed by existing data (FAUTLEY, 2017; HEIDERSCHEIT and MADSON, 2015). However, the therapeutic effect of music is evident because it creates a suitable emotional background for an individual to interact with others. This creates an opportunity for more complete interaction with society for children with special needs, including those with a mild ID. In this regard, the emotional experiences of children are considered as an internal resource that must be constantly supported by appropriate specialists.

Of no small importance is the regulation of the general level of activity of children, which can be maintained at an acceptable level by music (WERNER and JOHANSSON, 2016). At the same time, activity remains and becomes more purposeful, elements of chaos and disinhibition in behavior decrease. It is also worth noting that for children from group 1, changes in activity persist at different tempos of music.

The obtained results are of practical importance since there is a possibility of correcting children's emotional background. The ability of children with mild ID to perceive and express their

emotions in connection with musical accompaniment indicates that emotions can compensate for insufficiently developed cognitive skills. This indicates the increasing importance of music therapy since it becomes possible to correct the emotional aspect of behavior. In the process of music therapy, there is a decrease in the role of special education teachers, as well as narrowly focused psychologists since the musical accompaniment softens the symptoms of deviant behavioral acts. Thus, the competent use of musical methods of therapy can significantly increase the results of corrective therapy when working with children with symptoms of ID.

Conclusions

There are two groups of signs characteristic of children with a mild ID and children with a normal level of development: common for both groups and specific for each of the groups. Children with a mild ID are capable of perception, differentiation, and graphic expression while listening to music of different tempos, although to a lesser extent compared to group 2. The common feature for children of both groups is the ability to graphically depict their emotions that arise when listening to music. The found differences between the two groups are that children with a normal level of mental development are able to more accurately identify their emotions when listening to music. Children with a mild ID are less likely to identify such emotions as anger and calmness than children with a normal level. Changes in children's behavior depending on the tempo of the music were recorded. The maximum productivity in both groups was observed with adagio music.

References

- BANDO, Hiroshi; YOSHIOKA, Akiyo; NISHIKIORI, Yu. Various Care Option of Integrative Medicine from the Viewpoint of Patient-Oriented Medicine. **Integrative Journal of Conference Proceedings**, vol. 2, no. 1, p. 000529, 2020.
- BANDO, Hiroshi; YOSHIOKA, Akiyo; NISHIKIORI, Yu; HIRAI, Yasutake; KUSAKA, Yoshihiro; YUU, Michihiro. Effective Music Therapy Session for Vocalization and Movement of Extremities. **Current Research in Complementary & Alternative Medicine**, vol. 1, 120006733771, 2019.
- CASSIDY, Jane W. The Effect of Decibel Level of Music Stimuli and Gender on Head Circumference and Physiological Responses of Premature Infants in the NICU. **Journal of Music Therapy**, vol. 46, no. 3, p. 180–190, 2009.
- DARROW, Alice-Ann. Early Childhood Special Music Education. **General Music Today**, vol. 24, no. 2, p. 28–30, 2011.
- DONALD, Donald E.; PINSON, Joseph. **Music Therapy in Principle and Practice**. Springfield: Charles C Thomas Publisher, 2012.
- DVIR, Tamar; LOTAN, Nava; VIDERMAN; Roni, ELEFANT; Cochavit. The Body Communicates: Movement Synchrony during Music Therapy with Children Diagnosed with ASD. **The Arts in Psychotherapy**, vol. 69, 101658, 2020.
- FAUTLEY, Martin. Notation and Music Education. **British Journal of Music Education**, vol. 34, no. 2, p. 123–126, 2017.
- GUTIÉRREZ, Enrique Octavio Flores; CAMARENA, Víctor Andrés Terán. Music Therapy in Generalized Anxiety Disorder. **The Arts in Psychotherapy**, vol. 44, p. 19–24, 2015.
- HEIDERSCHEIT, Annie; MADSON, Amy. Use of the Iso Principle as a Central Method in Mood Management: A Music Psychotherapy Clinical Case Study. **Music Therapy Perspectives**, vol. 33, p. 45–52, 2015.
- HIRAI, Yasutake; BANDO, Hiroshi; YOSHIOKA, Akiyo; NISHIKIORI, Yu. Music and Man in Art: The Future of Media and Technology. **Global Journal of Arts and Social Sciences**, vol. 2, no. 1, p. 116, 2020.

HUTCHINSON, Jasmin C.; KARAGEORGHIS, Costas I.; JONES, Leighton. See Hear: Psychological Effects of Music and Music-Video during Treadmill Running. **Annals of Behavioral Medicine**, vol. 49, no. 2, p. 199–211, 2015.

ISTVANDITY, Lauren. Combining Music and Reminiscence Therapy Interventions for Wellbeing in Elderly Populations: A Systematic Review. **Complementary Therapies in Clinical Practice**, vol. 28, p. 18–25, 2017.

KAIKKONEN, Markku; KIVIJARVI, Sanna. Interaction Creates Learning: Engaging Learners with Special Educational Needs through Orff-Schulwerk. **Approaches: Music Therapy & Special Music Education**, vol. 5, no. 2, p. 132–137, 2013.

KIVIJARVI, Sanna. Project Disabled People as Musicians: A Systemic Approach. **Procedia-Social and Behavioral Sciences**, vol. 45, p. 416–427, 2012.

LAES, Tuulikki; WESTERLUND, Heidi. Performing Disability in Music Teacher Education: Moving beyond Inclusion through Expanded Professionalism. **International Journal of Music Education**, vol. 36, no. 1, p. 34–36, 2018.

LEE, Liza; LIN, Hsiao-Fang. Music Educational Therapy and the Figurenotes Music Pedagogical Approach for Young Children with Special Needs. **Universal Journal of Educational Research**, vol. 8, no. 6, p. 2483–2492, 2020.

LEE, Liza; LIN, Shu-Chuan. Evaluating the Use of Music with Teaching Aids in a Multisensory Environment on Developing Children with Disabilities Positive Emotions and Communication Skills. In: PORTELA, José; VALE, Isabel; HUCKABY, Francyne; BIEGER, George (Eds.), **The Proceeding of the 23rd Annual Conference Of The European Teacher Education Network (ETEN)**. Portugal, Coimbra: Instituto Politécnico de Viana do Castelo, 2013. p. 143–162.

LEE, Liza; LIN, Shu-Chuan. Investigating the Impact of Music Activities Incorporating Sound Beam Technology on Children with Multiple Disabilities. In: **22st European Teacher Education Network (ETEN) Conference**. Portugal, Coimbra: Instituto Politécnico de Viana do Castelo, 2012. p. 124-132

LEVITIN, Daniel J.; GRAHN, Jessica A.; LONDON, Justin. The Psychology of Music: Rhythm and Movement. **Annual Review of Psychology**, vol. 69, p. 51–75, 2018.

MCCORD, K. A.; LEE, L. C. Using Music Technology with Young Children with Autism: Two Case Studies. In: **18th ISME Commission Seminar on Music in Special Education, Music Therapy, and Music Medicine**. Thessaloniki, Greece, 2012.

MOORE, Carolyn; ELLIOTT, Devan. Introduction to Music Therapy Practice. **Journal of Music Therapy**, vol. 56, no. 1, p. 117–121, 2019.

MYSKJA, Audun; LINDBAEK, Morten. Examples the Use of Music in Clinical Medicine. **Tidsskr Nor Laegeforen**, vol. 120, no. 10, p. 1186–1190, 2000.

NISHIKIORI, Yu; BANDO, Hiroshi; YOSHIOKA, Akiyo; FUJITA, Mitsuko; KUSAKA, Yoshihiro; YUU, Michihiro; TAKEHISA, Yozo. Trials of additional effective movements for music therapy session for the elderly. **Current Research in Complementary & Alternative Medicine**, vol. 4, p. 138, 2020.

OSTENSJO, Sigrid; CARLBERG, Eva Brogren; VOLLESTAD, Nina K. Everyday Functioning in Young Children with Cerebral Palsy: Functional Skills, Caregiver Assistance, and Modifications of the Environment. **Developmental Medicine and Child Neurology**, vol. 45, no. 9, p. 603–612, 2003.

RAGLIO, Alfredo; ATTARDO, Lapo; GONTERO, Giulia; ROLLINO, Silvia; GROPPPO, Elisabetta; GRANIERI, Enrico. Effects of Music and Music Therapy on Mood in Neurological Patients. **World Journal of Psychiatry**, vol. 5, no. 1, p. 68–78, 2015.

RUOKONEN, Inkeri; POLLARI, Sanna; KAIKKONEN, Markku; RUISMAKI, Heikki. The Resonaari Special Music Centre as the Developer of Special Music Education between 1995-2010. **Procedia -Social and Behavioral Sciences**, vol. 45, p. 401–406, 2012.

SCHNEIDER, Albrecht; LEMAN, Marc. Sound, pitches and tuning of a historic carillon. In: SCHNEIDER, Albrecht (Ed.), **Studies in Musical Acoustics and Psychoacoustics**. **Current Research in Systematic Musicology**. Cham: Springer, 2017. p. 247–298.

TAN, Siu-Lan; PFORDRESHER, Peter; HARRÉ, Rom. **Psychology of Music: From Sound to Significance Second Edition (2nd ed.)**. Routledge, 2017.

THOMPSON, William Forde. **Music, thought, and feeling: Understanding the psychology of music (2nd ed.)**. Oxford University Press, 2015.

VIKMAN, K. **Dimensions of the Figure Notes-Method in the First Years of Piano-Playing: Action Research with Different Target Groups. Research Reports, 2001, 177**. Department of Education. University of Helsinki, 2001.

WARTH, Marco KOEHLER, Friederike; WEBER, Martin; BARDENHEUER, Hubert J.; DITZEN, Beate; KESSELER, Jens. 'Song of Life (SOL)' Study Protocol: A Multicenter, Randomized Trial on the Emotional, Spiritual, and Psychobiological Effects of Music Therapy in Palliative Care. **BMC Palliative Care**, vol. 18, p. 14, 2019.

WERNER, Ann; JOHANSSON, Sofia. Experts, Dads and Technology Gendered Talk about Online Music. **International Journal of Cultural Studies**, vol. 19, p. 177–192, 2016.

WFMT. **2011 Study Abroad Program**, 2011. Available at <<https://www.wfmt.info/wfmt-new-home/about-wfmt/.2011>>. Accessed on June 12, 2021.

YOSHIOKA, Akiyo, NISHIKIORI, Yu; BANDO, Hiroshi. Music Therapy Session with Various Elements for Clinical Effects and Comfortable Mood. **Biomedical Science Journal**, vol. 1, BSJ-20-10, 2020.

YOSHIOKA, Akiyo, NISHIKIORI, Yu; NAKANISHI, Akinori. Recent Status of Hydrotherapy and Balneotherapy with Clinical Beneficial Effects. **International Journal of Complementary & Alternative Medicine**, vol. 12, p. 217–219, 2019.

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Research ethics committee approval

The study was approved at a meeting of the Ethics Committee of Peking University. The study included all children whose parents gave written consent. The study did not include children whose parents did not consent to participate in the research, as well as children with health problems (chronic diseases of the cardiovascular system, mental disorders).

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