



**EFFECTS OF MUSIC THERAPY ON VERBAL MEMORY SKILLS AND PHONOLOGICAL AWARENESS IN GREEK CHILDREN WITH DYSLEXIA**

**Dimitra Katsarou<sup>1</sup> and Zoi Lentziou<sup>2</sup>**

<sup>1</sup>Neurolinguistics, Hellenic Open University

<sup>2</sup>Music therapist, University of Derby

**ARTICLE INFO**

**Article History:**

Received 9<sup>th</sup> September, 2017

Received in revised form 25<sup>th</sup>

October, 2017

Accepted 23<sup>rd</sup> November, 2017

Published online 28<sup>th</sup> December, 2017

**Key words:**

Neurolinguistics, dyslexia, verbal memory skills, phonological awareness, music therapy

**ABSTRACT**

Dyslexic children often have significant deficits in verbal memory skills and exhibit lower skill levels in verbal memory tasks. Music therapy is considered as an educational strategy that seems to improve linguistic skills of people with educational needs. Based on this we conducted an intervention so as to find out if music therapy can be beneficial in verbal memory skills of children with dyslexia. For this research we chose the quantitative research method, using the standardized test RAVLT (Rey Auditory Verbal Learning Test) and the ATHENA Test. The sample of the research consisted of 26 children, from which 13 took part in music therapy programs in a speech therapy centre, whereas 13 consisted the control group. All the children were 5-12 years old. The results of the present showed that children who have attended the music therapy group had better performance in verbal learning in all words that have been set by the researcher. According to the results music therapy can enhance their short verbal memory skills.

*Copyright©2017 Dimitra Katsarou and Zoi Lentziou. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.*

**INTRODUCTION**

Dyslexia is a form of learning disabilities (Handler & Fierson, 2011) that significantly affect the academic and educational performance or daily activities of people with normal intelligence quotient (IQ), which require reading, writing or mathematical skills (Siegel, 2006).

Brady (1986) suggests that deficits in short-term memory results in language impairments, such as in the spoken language, based on the fact that language deficits go beyond the simple word encoding and have an effect on word processing. Gathercole *et al.* (2008) also suggest that verbal short-term memory is associated with children's ability to learn new words and to acquire vocabulary. Dyslexia is related to deficits in the phonological processing, as well as in verbal working memory (Beneventi, Tonnessen & Ersland, 2009; Kramer, Knee & Delis, 2000). However, it is not so clear if the phonological deficit derives from the impairment in the verbal working memory, or there is a distinct deficit in the verbal working memory (Beneventi, Tonnessen & Ersland, 2009). The fact that researchers have not succeeded in finding this association yet may be attributed to the fact that typical verbal short-term memory tasks may be usually used in order to measure two types of ability: the items that should be remembered (item memory) and the order in which they are presented (order memory) (Xiaoli, Yifu & Jarrold, 2016).

There is a debate in the international bibliography concerning whether children with dyslexia have difficulties in recognizing items/acquisition of information, or recalling verbal information that have been stored (Kramer, Knee & Delis, 2000).

According to the American Music Therapy Association (n.d.) "music therapy is the clinical and evidence-based use of music interventions to accomplish individualized goals within a therapeutic relationship by a credentialed professional who has completed an approved music therapy program". In special education, music can be used in a therapeutic context, aiming at developing certain skills and / or be used as a means of personal and emotional expression (Katsarou, 2017; Rickson & McFerran, 2007). According to Pellitteri (2000), music therapy can be effective as a way of facilitating the development of certain areas of functioning in children with special needs, as well as a way of achieving integration of special needs children in the classroom (Skeja, 2014). Makris and Makri (2009) argue that the objectives of music therapy may be the following: improvement of phonological skills, use of community's music resources, solving of unpleasant situations. Each of these objectives may be subdivided to smaller and short-term objectives. According to Meadows (1997), music therapy in preschool education is important as means of involving the child with the learning environment, developing the child's sense of self and, finally, establishing personal relationships and developing social skills. The study of Montello and Coons (1998) found that music therapy can be

\*Corresponding author: **Dimitra Katsarou**  
Neurolinguistics, Hellenic Open University

effective in children with learning, emotional and behaviour disorders. More specifically, it was found that through music, children with the above mentioned problems could transform their anger, aggressiveness and frustration into creativity. In addition, it is supported that music therapy can help children with learning disabilities to practice and discriminate between sounds, to develop their language skills, to develop an understanding of patterns of language, to teach language information, and to improve speech skills (Roden, Kreutz & Bongard, 2012). Lamprianidou (2006) argues that the method of acoustic-psycho-phonology method of music therapy can help in the diagnosis and treatment of learning disabilities, such as dyslexia, difficulty in the expression of written and speaking, as well as pathology of phonation, speech and language expression. Kartasidou (2006) claims that the identification of the role of music in special education should be made in two levels: one referring to the enhancement of non-musical skills and one referring to the enhancement of musical skills. Moreover, Kartasidou (2006) supports that rhythm teaching in children with learning disabilities is very important concerning two different elements, namely perception and performance. Coroiu (2015) also suggests that music therapy plays a significant role in the development of learning practices, as well as in the self-regulation of an individual's emotions, which of particular importance in the case of children with special educational needs.

The present research aims at examining the effectiveness of music therapy in improving linguistic skills and phonological awareness, as proved by the above studies, but by focusing on its effect on verbal memory skills of children with dyslexia, since there is lack of bibliographic data concerning the effect of music healing in verbal memory of dyslexic children, especially in the case of Greece. The study examined the following research question: Are there any significant differences in verbal memory skills, between children with dyslexia who have received a music therapy intervention and children with dyslexia who have not?

## METHOD

This study used a positivist – quantitative methodological approach, seeking to collect quantifiable data with the use of specific tools - questionnaires. The present research seeks to examine the effect of two independent variables, music healing and gender, on a dependent variable, verbal memory, as well as on the general phonological awareness of the children.

### Tools

For the purpose of this research, the following questionnaires were employed: a) RAVLT (Rey Auditory Verbal Learning Test; Schmidt, 1996); b) The phonological awareness component of the ATHENA test.

The test RAVLT (Rey Auditory Verbal Learning Test) is a commonly used tool for neuropsychological assessment for verbal learning. RAVLT test consists of a 15-item word list. These words are presented five times (five trials) in exactly the same order, with an assessment of recall after each presentation, and a recognition memory condition. At first, the teacher reads the 15 words one time and then the teacher starts to read the words in pairs of three words. In the end, the teachers asks the children and this process should be repeated five times. It should be mentioned that the words are not related to each other (e.g. drums, colour, farmer, house, nose),

but they have limited semantic or functional associations. The words used in this research are the following (in order of appearance): drums, curtains, bell, coffee, school, parents, moon, garden, hat, farmer, nose, turkey, colour, house, and river. The score is the total number of words that were recalled by the children correctly in each trial (Trial I through Trial V).

The ATHENA test consists of various diagnostic tests to assess cognitive, perceptual, motor and psycholinguistic processes related to the difficulties faced by the children to meet the learning requirements of the school. The chosen scale was the one referring to phonological awareness (Paraskevopoulos & Paraskevopoulou, 2011).

### Sample

The sample of the research consisted of 26 children, from which 13 took part in music therapy programs in a speech therapy centre, whereas 13 consisted the control group. All the children were 5-12 years old ( $M^1=7.5$ ,  $Std=1.92$ ). The majority of the children were boys ( $n=20$ , 76.9%) while on each group participated 10 boys and 3 girls.

As mentioned above, 13 children took part in the intervention program. In this program, the research undertook various activities such as: Memory-melody, Memory-theory of music, Vocabulary learning, Phonemic awareness, Use of musical instruments, Vision and acoustic memory. Each activity took place for 2 hours per week, for a total amount of two months.

## RESULTS

### Athena test

The descriptive statistics and significance of independent sample t-test for the total scores for each dimension of ATHENA scores per group p indicate that the differences that exist in the performance of the two groups in the tasks of ATHENA test, referring to phonological awareness, are not statistically significant ( $p>0.05$ ).

A Manova test was performed, in order to examine whether the performance of the students is significantly dependent on the group in which they belong. The results indicate performance of students in phonological awareness tests used for the Athena Test was not statistically dependent on whether they belong in the experimental or in the control group ( $F=0.715$ ,  $p=0.554>0.05$ ).

### RAVLT test

The descriptive statistics and the second examines whether there is a differentiation between the two groups regarding the total scores for Trial I - Trial V. The children belonging to the experimental group, namely those who participate in a music therapy program, performed better in Trial II ( $M = 9.85$ ,  $SD = 1.994$ ) compared to the control group ( $M = 8.85$ ,  $SD = 1.908$ ), in Trial III ( $M = 10.69$ ,  $D = 1.702$  compared to  $M = 8.46$ ,  $SD = 2.145$ ), in Trial IV ( $M = 11.46$ ,  $D = 2.222$  compared to  $M = 8.08$ ,  $SD = 2.253$ ), and in Trial V ( $M = 12.38$ ,  $D = 1.710$  compared to  $M = 7.00$ ,  $SD = 2.082$ ). Only in Trial I children belonging in the control group had better performance ( $M = 9.15$ ,  $SD = 2.154$ ) in comparison to children from the experimental group ( $M = 9.08$ ,  $SD = 2.290$ ).

---

<sup>1</sup> M=Mean, Std, Standard Deviation

The independent samples t-test indicate that there is a statistical significant difference in Trial III,  $t(24) = 2,937$ ,  $p = 0.007$ , in Trial IV,  $t(24) = 3,857$ ,  $p = 0.001$ , and finally in Trial V,  $t(24) = 7,207$ ,  $p = 0.000$ . On the contrary, there is no statistically significant difference in Trial I,  $t(24) = -,088$ ,  $p = 0.930$  and in Trial II,  $t(24) = 1,307$ ,  $p = 0.204$ . As we saw earlier in the above table, in Trial III – Trial V, children belonging in the experimental group had better performance compared to children belonging in the control group.

## DISCUSSION

From the RAVLT test it was indicated that only in Trial I children belonging in the control group had better performance, in comparison to children from the experimental group. However, this difference is not statistically significant. On the contrary, children belonging to the experimental group outperformed children belonging in the control group in Trial II - Trial V. The statistical analysis indicated that the differences in the performance of the two groups in Trial III - Trial V are statistically significant.

The above results imply that children who have attended the music therapy group had better performance in verbal learning in all words that have been set by the researcher. This means that music therapy can enhance their short verbal memory skills and thus the first research hypothesis was partially confirmed, based on the outcomes from the RAVLT test. Therefore, these outcomes partially coincide with the findings of previous studies (Chan, Ho & Cheung, 1998; Emmerson, 2013; Franklin *et al.*, 2008; Ho, Cheung & Chan, 2003; Lamprianidou, 2006; Overy, 2000; Pellitteri, 2000; Rickson & McFerran, 2007; Sausser & Waller, 2006; Moreno *et al.*, 2011), according to which interventions of music therapy can help in improving short verbal skills in children with dyslexia. Further, this indicates that there is an association between language and music skills, as several researchers (Chan, Ho & Cheung, 1998; Franklin *et al.*, 2008; Huss *et al.*, 2011; Jentschke, Koelsch, Sallata & Firederici, 2008; Katsarou, 2017) have proposed.

As proven, it cannot be doubted that the music therapy intervention had a positive effect in the short verbal memory skills of children with dyslexia. This result coincides with the results from previous (Chan, Ho & Cheung, 1998; Emmerson, 2013; Franklin *et al.*, 2008; Ho, Cheung & Chan, 2003; Lamprianidou, 2006; Overy, 2000; Pellitteri, 2000; Rickson & McFerran, 2007; Sausser & Waller, 2006; Moreno *et al.*, 2011) according to which music therapy can help children with dyslexia. Perhaps this supports the assumption of other researchers (Chan, Ho & Cheung, 1998; Franklin *et al.*, 2008) that music skills and verbal memory skills are associated.

## Acknowledgements

This survey was conducted in Plasis World a center for the diagnosis and treatment of developmental and learning disorders in Thessaloniki where speech therapy, ergotherapy, psychotherapy and special education are offered.

## References

American Music Therapy Association (n.d.). Music Therapy as a treatment modality for Autism Spectrum Disorders. Retrieved from: [http://www.musictherapy.org/assets/1/7/MT\\_Autism\\_2012.pdf](http://www.musictherapy.org/assets/1/7/MT_Autism_2012.pdf)

- Beneventi, H., Tønnessen, F.E., & Erslund, L. (2009). Dyslexic children show short-term memory deficits in phonological storage and serial rehearsal: an fMRI study. *The International Journal of Neuroscience*, 119(11), 2017-2043.
- Brady, S. (1986). Short-term memory, phonological processing and reading ability. *Annals of Dyslexia*, 36, 138-153.
- Chan, A. S., Ho, Y. C., & Cheung, M. C. (1998). Music training improves verbal memory. *Nature*, 396(6707), 128-128.
- Coroiu, P.M. (2015). The Role of Art and Music Therapy Techniques in the Educational System of Children with Special Problems. *Procedia - Social and Behavioral Sciences*, 187, 277-282.
- Emmerson, J. (2013). The effects of music training in dyslexia. *Education Matters*, 1 (2), 52-64.
- Franklin, M. S., Moore, K. S., Yip, C. Y., Jonides, J., Rattray, K., & Moher, J. (2008). The effects of musical training on verbal memory. *Psychology of Music*, 36(3), 353-365.
- Gathercole, S.E., Briscoe, J., Thorn, A., Tiffany, C., & ALSPAC Study Team (2008). Deficits in verbal long-term memory and learning in children with poor phonological short-term memory skills. *The Quarterly Journal of Experimental Psychology*, 61(3), 474-490.
- Handler, S.M., & Fierston, W.M. (2011). Joint Technical Report—Learning Disabilities, Dyslexia, and Vision. *American Academy of Pediatrics*, doi:10.1542/peds.2010-3670.
- Ho, Y. C., Cheung, M. C., & Chan, A. S. (2003). Music training improves verbal but not visual memory: cross-sectional and longitudinal explorations in children. *Neuropsychology*, 17(3), 439.
- Huss, M., Verney, J. P., Fosker, T., Mead, N., & Goswami, U. (2011). Music, rhythm, rise time perception and developmental dyslexia: perception of musical meter predicts reading and phonology. *Cortex*, 47(6), 674-689.
- Jentschke, S., Koelsch, S., Sallat, S., & Firederici, A. (2008). Children with specific language impairment also show impairment of music-syntactic processing. *Journal of Cognitive Neuroscience*, 20, 1940-1951.
- Kartasidou, L. (2006). Music in special education. In: Kartasidou, L., & Lelouda, S. (Eds.), *Music pedagogy. Music education in special education. Music therapy* (pp. 46-60). Athens: University of Macedonia.
- Katsarou, D. (2017). Does music therapy improve linguistic skills of children with dyslexia? A Greek Study. *International Journal of Current Advanced Research*, 6(10), 7012-7016.
- Kramer, J. H., Knee, K., & Delis, D. C. (2000). Verbal memory impairments in dyslexia. *Archives of Clinical Neuropsychology*, 15(1), 83-93.
- Lambrianidou, C. (2006). The acoustic-psycho-phonology and its implementation in music education and communication. In: Kartasidou, L., & Lelouda, S. (Eds.), *Music pedagogy. Music education in special education. Music therapy* (pp. 14-24). Athens: University of Macedonia.
- Makris, I., & Makri, D. (2009). *Introduction to music therapy*. Athens: Grigoris.

- Meadows, T. (1997). Music therapy for children with severe and profound multiple disabilities: A review of literature. *Australian Journal of Music Therapy*, 8, 3.
- Montello, L., & Coons, E.E. (1998). Effects of active versus passive group music therapy on preadolescents with emotional, learning, and behavioral disorders. *Journal of Music Therapy*, 35, 49-67
- Moreno, S., Bialystok, E., Barac, R., Schellenberg, E. G., Cepeda, N. J., & Chau, T. (2011). Short-term music training enhances verbal intelligence and executive function. *Psychological science*, 22(11), 1425-1433.
- Overy, K. (2000). Dyslexia, temporal processing and music: The potential of music as an early learning aid for dyslexic children. *Psychology of Music*, 28(2), 218-229.
- Paraskevopoulos, I.N. & Paraskevopoulou, P. (2011). Athena Test. *Educational Issues*, 11, 5-39.
- Pellitteri, J. (2000). THE CONSULTANT'S CORNER:" Music Therapy in the Special Education Setting". *Journal of educational and psychological consultation*, 11(3-4), 379-391.
- Rickson, D. J., & McFerran, K. (2007). Music Therapy in Special Education: Where Are We Now?. *Kairaranga*, 8(1), 40-47.
- Roden, I., Kreutz, G., & Bongard, S. (2012). Effects of a school-based instrumental music program on verbal and visual memory in primary school children: a longitudinal study. *Frontiers in psychology*, 3.
- Sausser, S., & Waller, R. J. (2006). A model for music therapy with students with emotional and behavioral disorders. *The Arts in Psychotherapy*, 33(1), 1-10.
- Siegel, L.S. (2006). Perspectives on dyslexia. *Paediatrics & Child Health*, 11(9), 581-587.
- Skeja, E. (2014). The Impact of Cognitive Intervention Program and Music Therapy in Learning Disabilities. *Procedia - Social and Behavioral Sciences*, 159, 605-609.
- Xiaoli, W., Yifu, X., & Jarrold, C. (2016). Using a Process Dissociation Approach to Assess Verbal Short-Term Memory for Item and Order Information in a Sample of Individuals with a Self-Reported Diagnosis of Dyslexia. *Frontiers in Psychology*, 7, 1-10.

**How to cite this article:**

Dimitra Katsarou and Zoi Lentziou (2017) 'Effects of Music Therapy on Verbal Memory Skills and Phonological Awareness in Greek Children With Dyslexia ', *International Journal of Current Advanced Research*, 06(12), pp. 7950-7953.  
DOI: <http://dx.doi.org/10.24327/ijcar.2017.7953.1259>

\*\*\*\*\*