

## **SUMMARY of *Early Effects of the Tomatis Listening Method in Children with ADD***

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This is a summary of the research study investigating early effects of the Tomatis Method in children diagnosed with ADD. Improvements in processing speed, phonological awareness, reading efficiency, attention, behavior and brain physiology were hypothesized by the end of Phase 1 of the Tomatis Method intervention. The study documents the effects of Phase I of the Tomatis Listening Method of sound stimulation on children with ADD ages 7-13. Of the 25 participants, recruited from schools in the Greater Seattle area, 15 (8 boys and 7 girls) received the Tomatis treatment solely while 10 (9 boys and 1 girl) served as controls (non-Tomatis group) and were stabilized on ADD medication three months prior to and throughout the study. Therefore, the research compared Tomatis versus non-Tomatis intervention in children with ADD. Although the children in the non-Tomatis group were medicated for ADD, this research did not compare ADD medication treatment with Tomatis intervention. The Tomatis sound stimulation group received 15 consecutive Tomatis sound stimulation sessions of 2 hours each; participants received no additional vestibular or visual-motor exercises, such as swinging or balancing on a balance board, during the listening sessions or other therapies throughout the research. The measures used to capture changes have been standardized for this age range. Results revealed statistically significant improvements for the Tomatis when compared to the non-Tomatis group: children in the experimental group showed statistically significant improvement in processing speed, phonological awareness, phonemic decoding efficiency when reading, behavior, and auditory attention.

Information detailing the Tomatis Method, testing instruments and study results is included below.

**The Tomatis Listening Method:** Recent research has suggested that sound and music stimulation has positive effects on cognitive functions such as attention, memory, learning, and language development (Kraus & Banai, 2007; Patel, 2006; Wong et al., 2007). Dr. Alfred Tomatis (1972, 1974, 1980, 1989) developed the Tomatis Listening Method - the world's first and most widely used sound stimulation technique spanning over 250 centers around the world. Mozart, Gregorian Chant, Strauss waltzes, mother's or spoken voice, and children's songs, and one's own voice are sound sources for the sound stimulation. The Tomatis Method consists of three phases. The first phase is comprised of 30 hours of Tomatis sound stimulation (3weeks) given over 15 days (Monday-Friday) for 2-hour increments. Phases two and three are each eight days long (two hour sessions).

**Testing Instruments:** A battery of neuro-psychological tests and subtests were used to assess changes in children's performance before and after the first phase of the Tomatis Method. The same battery of tests was used during the two data collection sessions for the non-Tomatis group. Table 1 (below) shows all the instruments used in the two meetings of data collection or testing sessions for each participant.

Name of Instrument	Test/Subtests Used / Specifics
Coding	From WISC-IV (pencil and paper)
CTOPP	Elision, Blending Words (used a CD)
TOWRE	Complete test (form A or form B)
BASC-II (PRS)	Complete test (parent form)
IVA Plus	Complete test (computerized)
qEEG	At rest, eyes Open (computerized recording)

## **Results: Cognitive, Behavioral, and Attention Measures**

**Processing speed.** The increase in processing speed between pre- and post-testing in the Tomatis group averaged 66.6% of a standard deviation (2.3 standard score [SS] points) improvement after only three weeks of Tomatis Method treatment. The non-Tomatis group improvement was a negligible 0.1 SS points. These findings confirmed the hypothesis that the first phase of the Tomatis Method significantly improves visual perceptual and grapho-motor processing speed, which requires sustained attention and adaptation. These findings were statistically supported at a 99% confidence interval ( $p = 0.01$ ).

**Phonological processing.** The Tomatis group improved their performance in phonological awareness by an average of 8 SS points upon completion of the first phase of the Tomatis Method treatment. This increase in performance represents a gain of 53% of a standard deviation. The non-Tomatis group, on the other hand, showed a very slight improvement of only 1 SS point on average, or 6.6% of a standard deviation. These findings were statistically supported at a 98% confidence interval ( $p = 0.02$ ).

**Reading efficiency.** Children who received the Tomatis sound stimulation intervention improved their decoding speed while also maintaining or improving their decoding accuracy. The findings on the Phonemic Decoding efficiency subtest were statistically supported at a 96% confidence interval ( $p = 0.04$ ). Preliminary findings of the study on the Sight Word efficiency subtest showed a slight improvement in the Tomatis group when compared to the non-Tomatis group ( $p = 0.13$ ). Therefore, while the results of the phonemic decoding efficiency subtest are significant, and may be suggestive of gains in reading fluency with just the first phase of the Tomatis, continued Tomatis Method treatment may be required in order to see similar improvements in sight word efficiency.

**Behavioral observation.** The Tomatis group showed significant improvement in attention as observed by their parents (6 point improvement). While the average  $t$  score on the Attention Problems scale in the pretest fell in the “clinically at risk” range ( $t = 66$ ), the posttest score (average  $t = 60$ ) bordered on the “average” range, which requires a  $t$  score of 59. Similarly, the overall challenging behavior measured by the BSI improved significantly from the “clinically at risk” range ( $t = 61$ ) to well into the “average” range with an average  $t$  score of 55. The initial behavior scores on both scales for the non-Tomatis group improved by only 1  $t$  point: Attention Problems ( $t = 66$ ) and BSI ( $t = 68$ ). The average scores for the non-Tomatis group remained in the “clinically at risk” range. The predicted behavior improvement findings in the thesis are consistent with previous research supporting the effect of the Tomatis Method on this area of development (Gilmor, 1999). These findings were statistically supported for both subscales at a 98% confidence interval ( $p = 0.02$ ).

**Attention:** There was statistically significant improvement of the Auditory Attention Quotient (AAQ) for the Tomatis group in comparison to the non-Tomatis group ( $p = 0.2$ ). While there was a slight increase in performance for the Tomatis group in comparison to the non-Tomatis group, the difference between the two groups’ Visual Attention Quotient (VAQ) over time did not reach significance ( $p = 0.03$ ). When asked to engage both auditory and visual attention, the difference in performance between the Tomatis and the non-Tomatis group on the Full Scale Attention Quotient (FSAQ) (composed of the AAQ and VAQ) were marginally significant at a 92% confidence interval ( $p = 0.08$ ).

**Neurophysiological Measures (qEEG):** Statistically significant changes in the qEEG spectral maps were only observed in the Tomatis group when comparing pre- and post-treatment recordings. The theta/beta ratio at the midline (central and parietal) recording sites was larger after the first phase of the Tomatis treatment. This paradoxical preliminary outcome was contrary to expectations. However, the individual analysis of the pre- and post- qEEGs showed that the changes observed still fell within normal values, which may serve to explain the gains recorded in the cognitive, behavioral and attentional domains. A further evaluation and thorough description of each and all individual qEEG maps led to better characterization of each child in terms of their neurophysiological ADD profile. Research shows that there is more than one ADD neurophysiological profile in children and most fit into

four subgroups (Clarke et al., 2001a; Clarke et al., 2001b; Kropotov, 2009). In the Tomatis group, eight participants exhibited hyperarousal and were categorized in the third subgroup, four participants exhibited maturation lag and were categorized in the second subgroup, and two participants exhibited hypoarousal and were categorized in the first subgroup. One participant in the Tomatis group did not show electrophysiological evidence that allowed characterization as ADD (EEG descriptors evaluated classified the child as “normal”). These findings point to the relative significance of qEEG as a diagnostic or research tool when attempting to use it as a stand-alone, since the wide individual variation in electrophysiological descriptors for a supposedly common.

**Statistical Considerations:** Most of the above results remained statistically significant when adjusted to control for gender, age and gender-age interaction. A linear regression was used since the two groups were not age and gender matched or randomly selected and assigned. The outcomes for speed of processing ( $p = 0.04$ ), phonological processing ( $p = 0.02$ ), behavioral attention problems ( $p = 0.045$ ) and behavioral symptoms ( $p = 0.02$ ) remained statically significant at a 95% confidence interval or higher, while changes in auditory attention remained only marginally significant ( $p = 0.09$ ) at 91% confidence interval. These findings were triangulated in three main domains: processing speed, phonological awareness, and attention. Therefore, the results were not statistically adjusted for multiple comparisons.

The presented outcomes add to the body of evidence in support of the effects of the Tomatis Method. These highly significant, early changes suggest that the Tomatis Method can be a brief and efficacious intervention. Future investigations of brain physiology, however, are needed to characterize the seemingly paradoxical neurophysiological changes. The significant improvements noted in cognition, attention and behavior found in the results of the study strongly suggest that already the first phase of the Tomatis Method has positive effects in children with ADD and can be considered a scientifically proven tool alongside other established evidence-based treatments for children with ADD.

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