AOTA Evidence Briefs
Autism Spectrum Disorder

*A product of the American Occupational Therapy Association's Evidence-Based Literature Review Project

Auditory Integration Training and Other Sound Therapies for Autism Spectrum Disorders

Sinha, Y., Silove, N., Wheeler, D., & Williams, K. (2005). Auditory integration training and other sound therapies for autism spectrum disorders. Cochrane Developmental, Psychosocial and Learning Problems Group, Cochrane Database of Systematic Reviews, 1.

Level I
Systematic review

Why research this topic?

Children with **autism** (see *Glossary*) often exhibit abnormal responses, such as hypersensitivity, to sounds. Auditory Integration Training (AIT) was developed to decrease hearing sensitivity and improve auditory integration. By improving auditory integration, researchers and clinicians believe that behavior and learning problems associated with autism may improve. AIT uses modulated music that has been filtered to dampen specific frequencies. In one course of intervention, children listen to the electronically modulated music through headphones for specific time periods for 10 days. The effectiveness of AIT has been investigated in a number of studies. This review synthesized the random controlled trials for AIT in individuals with autistic spectrum disorders.

What did the researchers do?

This **Cochrane Library** (see *Glossary*) Level I systematic review used relevant comprehensive research databases and a broad topic search strategy to find randomized controlled trials on AIT with persons with autism. Sinha, Silove, Wheeler, and Williams (2005) identified six studies for inclusion in this review. This number was too small for **meta-analysis** (see *Glossary*); therefore the authors summarized the findings without combining the **effect sizes** (see *Glossary*).

The researchers assessed the quality of the studies by analyzing the sampling methods and the study designs. They combined and evaluated the findings to develop overall conclusions and implications for practice.

What did they find?

The six studies in this review included individuals (adults and children) with autism and also included individuals who were cognitively impaired. In all trials, the participants received AIT for 10 consecutive days with two 30 minute sessions per day. The control condition listened to unmodulated music. All trials used at least one standardized measure of behavior and most (five) used the Aberrant Behavior Checklist. Two studies did not find consistent improvement in behavior. Three trials found small improvements in behavior when groups were compared. Measures of cognitive ability and hearing sensitivity did not differ when control and AIT groups were compared.

What do the results mean?

Occupational therapy practitioners may refer families to AIT to supplement their intervention program. They are positioned to provide information to families about AIT research evidence. Sinha et al. noted that the largest clinical trial did not report a difference between AIT and the **control group** (see *Glossary*). In trials where behavioral changes were reported, the validity of the findings was questioned. Use of older children and adults in the sample may have masked changes in cognition and language that typically occur at younger ages.

The authors concluded that AIT has not been supported by empirical findings. They recommend further research and improved research designs that include long term follow up. However, other studies (e.g., Rimland & Edelson, 1995; Edelson et al., 1999) had different findings and careful review of individual studies seems warranted prior to drawing conclusions about AIT effectiveness. Occupational therapy practitioners should consider the child's characteristics, the family's resources, the feasibility of consistent application, and the cost and benefits of AIT prior to recommending it.

What are strengths and limitations of this study?

Following the guidelines established by the Cochrane Library, this systematic review includes only randomized controlled trials; therefore, only six of about two dozen studies of AIT were included. Although these studies may have highest rigor in research design, they have flaws in sampling and selection of measures that limit their validity.

Glossary

Autism—Autism Spectrum Disorder—Pervasive Developmental Disorders (PDD) is the diagnosis used in the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.), text revision (DSM-IV-TR; American Psychiatric Association [APA], 2000), and in the International Classification of Diseases (ICD-10; World Health Organization, 1993) to describe children with a cluster of symptoms that vary widely in type and severity. The symptoms are grouped into three broad categories: (a) qualitative impairment in social interaction; (b) communication disorders; and (c) stereotyped, repetitive patterns of behaviors or a restricted range of interests. Depending on the level and distribution of impairment across these categories, a child can be diagnosed with Autistic Disorder, Asperger syndrome, or Pervasive Developmental Disorder—

Not Otherwise Specified (PDD—NOS). All three of these diagnoses are usually included under the umbrella term *autism spectrum disorders* (ASDs).

The Individuals with Disabilities Education Improvement Act of 2004 (IDEA, Pub. L. 108–446) also includes autism as a disability category under which children might be eligible for special education and related services. The IDEA regulations define *autism* as "a developmental disability significantly affecting verbal and nonverbal communication and social interaction generally evident before age 3 that adversely affects a child's educational performance. Other characteristics often associated with autism are engagement in repetitive activities and stereotyped movements, resistance to environmental change or change in daily routines, and unusual responses to sensory experiences" (34 C.F.R., §300.7[c][1][i]).

Cochrane Library—The Cochrane Library is a collection of databases that contain high-quality, independent evidence to inform healthcare decision-making. Cochrane reviews represent the highest level of evidence on which to base clinical treatment decisions. The Cochrane Collaboration produces core content for The Cochrane Library, including the Cochrane Database of Systematic Reviews and can be found at http://www.cochrane.org/index.htm

Control group—A group that received special attention similar to that which the treatment group received, but did not receive the treatment.

Effect size (Cohen's *r*)—An effect size is a measure of clinical significance. It provides information about the magnitude of effect of the treatment. Although related to significance, it is not as influenced by the size of the sample. Therefore, it is possible to have an outcome on which the treatment had a large effect (e.g., the treatment group improved a lot more than the control group) and still have a nonsignificant result. If the results have a large effect but no significance, then this effect may be sample specific and not generalizable outside the study. There are many types of effect sizes. What is reported here is Cohen's *r*, which can be interpreted in a manner similar to a Pearson's correlation coefficient:

Effect size *r*	**Size of the effect**
<0.99	Negligible
0.10–0.29	Small
0.30–0.49	Medium
>0.50	Large

Meta-analysis—A specific subset of systematic review that statistically combines data from many studies to find a common effect. The meta-analysis' power comes from the ability to statistically digest many studies and emerge with a final assessment of their common effect.

References

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., Text revision.). Washington, DC: Author.

Cohen, J. (1977). Statistical Power Analysis for Behavioral Sciences. New York: Academic Press.

Edelson, S. M., Arin, D., Bauman, M., Lucas, S. E., Rudy, J. H., Sholar, M., Rimland, B. (1999). Auditory integration training: A double-blind study of behavioral and electrophysiological effects in people with autism. *Focus on Autism and Other Developmental Disabilities, 14*(2), 73–81.

Individuals with Disabilities Education Improvement Act (IDEA) of 2004. Public Law 108–446, 20 U.S.C. § 1413.

Rimland, B., & Edelson, S. M. (1995). Brief report: A pilot study of auditory integration training in autism. *Journal of Autism and Developmental Disabilities, 25*, 61–70.

World Health Organization. (1993). *International classification of diseases: Diagnostic criteria for research* (10th ed.). Geneva, Switzerland: World Health Organization.

This work is based on the evidence-based literature review completed by Jane Case-Smith, EdD, OTR/L, FAOTA

For more information about the Evidence-Based Literature Review Project, contact the Practice Department at the American Occupational Therapy Association, 301-652-6611, x 2040.

AOTA® Copyright 2007 American Occupational Therapy Association, Inc. All rights reserved. This material may be reproduced and distributed without prior written consent