

# Unpacking Auditory Processing Disorders—a link with dyslexia?

UNPACKING AUDITORY  
PROCESSING DISORDERS  
A link with dyslexia?

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PRESENTATION TO DECODING  
DYSLEXIA

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TOPICS DISCUSSED

- Definition and Prevalence of Dyslexia and Auditory Processing Disorders
- How many children have both APD and Dyslexia?
- Who can diagnose APD? What tests are used?
- Treatment options for APD
- Resources/Recommended Books Websites

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# Unpacking Auditory Processing Disorders—a link with dyslexia?

## WHAT IS DYSLEXIA?

- A language-based learning disability neurological in origin
- Affecting 15-20% of population
- Difficulties with connections between letters and sounds
- Weakness in distinguishing sounds of language
- Possible problems in vocabulary development, reading comprehension, spelling and written expression
- Not explained by lower intelligence, learning opportunity, motivation or visual acuity

from International Dyslexia Association (2000) and (Eggermont 2015)

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## WHAT ARE AUDITORY PROCESSING DISORDERS?

- Inability to understand spoken language in a meaningful way in absence of hearing loss
- Deficits in information processing of audible signals not attributed to impaired peripheral hearing sensitivity or intellectual impairment

American Speech-Language Hearing Association (2014)

- May lead to or be associated with difficulties in higher-order language, learning, cognitive and communication functions.

Chermak and Musiek (2014)

- Not explained by lower intelligence, learning opportunity, motivation or visual acuity

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## WHAT IS AUDITORY PROCESSING?

- Efficiency and effectiveness by which central nervous system uses auditory information

Geffner (2018)

- Difficulty using auditory information to communicate and to learn

Jerger and Musiek (2000)

- 3 to 5 percent incidence in population—and more common than incidence of hearing loss

Chermak and Musiek (1998)

- "What the brain does with what the ears hear." "What we do with what we hear."

Dr. Jack Katz, developer of an auditory processing testing model

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# Unpacking Auditory Processing Disorders—a link with dyslexia?

## AUDITORY PROCESSING

- How central nervous system uses auditory information
- Auditory deficit not result of other higher-order cognitive, language or related disorder
- Problem with decoding of language
- Difficulty with distinguishing, discriminating, recognizing or comprehending sounds heard
- Often not a stand-alone category for receipt of special education services

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## AUDITORY PROCESSING DISORDERS

- "Sounds get into the auditory system, but the brain is unable to interpret efficiently or at all, the meaning of sounds—in an extreme case, meaningful sounds can not be differentiated from non-meaningful sounds." (Flexer, 1994)

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## (CENTRAL) AUDITORY PROCESSING

- Auditory system mechanisms and processes for:
  - Awareness that a sound occurred
  - Finding where the sound came from (localization)
  - Paying attention to the sound
  - Separating the sound from background noise
  - Deciding if the sound is speech or not
  - Figuring out which speech sound was made
  - Understanding tonal and stress patterns
  - Understanding each part of the word

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# Unpacking Auditory Processing Disorders—a link with dyslexia?

## (CENTRAL) AUDITORY PROCESSING

- More auditory system mechanisms and processes for:
- Creating words out of sounds
- Creating sentences out of the words
- Remembering all of the sounds and words
- Understanding the context
- Understanding the situation
- Putting it all together to figure out what was said

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## SYMPTOMS OF AUDITORY PROCESSING DIFFICULTIES

- Misunderstand sounds or words heard
- Difficulty with spelling
- Difficulty remembering names and places
- Frequently says "what" or asks to have things repeated
- Difficulty following oral directions
- Easily distracted by noises
- Omits sounds when repeating words

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## MORE SYMPTOMS OF AUDITORY PROCESSING DIFFICULTIES

- Confuses sequence of activities in a task
- Difficulty differentiating one sound from another
- Slow response to questions
- Inappropriate response to questions
- Difficulty grasping meaning from material presented orally

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# Unpacking Auditory Processing Disorders—a link with dyslexia?

## SIMILARITIES AND DIFFERENCES BETWEEN DYSLEXIA AND APD

### Dyslexia

- Struggles with reading, spelling, leaving out letters, perhaps reversing letters, or confusing order of letters in a word
- Hard to isolate sounds in words, match sounds to letters or blend sounds into words
- Trouble with rhyming and language learning

### APD

- May struggle with reading, spelling
- Hard to isolate sounds in words, match sounds to letters or blend sounds into words
- May retreat when struggles getting a joke, following game rules, keeping up with conversation
- Trouble with rhyming and language learning

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## SIMILARITIES AND DIFFERENCES BETWEEN DYSLEXIA AND APD

### Dyslexia

- May have easier time understanding stories heard vs. stories s/he reads
- Reading challenges can affect self-esteem and self-confidence
- Finding right word to say may lead to long processing time to respond

### APD

- May have easier time understanding stories s/he reads vs. stories heard
- Listening challenges can affect self-esteem and self-confidence
- Challenge with understanding may lead to long processing time to respond

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## SIMILARITIES AND DIFFERENCES BETWEEN DYSLEXIA AND APD

### Dyslexia

- Treatment:
- Explicit structured reading instruction focusing on identifying sounds in words and understanding how those sounds are represented by letters

### APD

- Treatment:
- Speech therapy and auditory training to improve perception of individual sounds in words to develop reading and active listening skills

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# Unpacking Auditory Processing Disorders—a link with dyslexia?

## PHONEMIC AND PHONOLOGICAL AWARENESS: HOW SOUNDS FUNCTION IN WORDS

**Phoneme**—smallest unit of sound in a language. Most words have several phonemes/ speech sounds blended together.

"Feel" = 3 phonemes: /f/ /ee/ /l/. Each sound affects meaning. Remove /f/, replace with /h/ = different word. Change /ee/ for /aw/ and meaning changes.

**Phonological awareness** = ability to recognize many ways sounds function in words

**Phonemic awareness** = understanding most **minute** sound units in words.

Both require:

- Ability to hear, recognize and manipulate individual speech sounds in a language
- Critical skill for word attack, sound-symbol correspondence, decoding
- Involves auditory processing and memory for auditory information
- Impaired **phonemic awareness** contributes to reading and writing challenges, such as b/d, p/q, m/w

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## PHONOLOGICAL AWARENESS ABILITIES

- Recognize that words are made up of a variety of sound units.
- Know that words can be segmented into larger sound "chunks"
- Chunk words into syllables
- Understand that sounds and print letters are connected—1st step towards reading
- Recognize individual sounds (phonemes)—vowels and consonants
- Recognize words that rhyme.
- Blend sounds into a whole word.
- See smaller words in larger words ("an" in "stand")
- Recognize stress patterns in words

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## SIMILARITIES AND DIFFERENCES BETWEEN APD/ADHD ACCORDING TO RANKINGS OF PEDIATRICIANS AND AUDIOLOGISTS

### ADHD

- Inattentive
- Distracted
- Hyperactive
- Fidgety/restless
- Hasty/impulsive
- Interrupts/intrudes

### APD

- Difficulty hearing in background noise
- Difficulty following oral directions
- Poor listening skills
- Academic difficulties
- Poor auditory association skills
- Distracted
- Inattentive

(Chermak, Musiek, Hall 1999)

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# Unpacking Auditory Processing Disorders—a link with dyslexia?

“... Attention relies on sensory networks developed in other brain regions.... This is where attention... and auditory processing problems overlap. Attention involves learning to sort through all the sensory data around you and pick out what’s relevant. But you can’t recognize something as relevant until it’s part of your knowledge base.... Hard to pay attention to speech when trouble distinguishing its sounds from one another, or from other sounds in the environment.

... Children with auditory processing disorders may exhibit symptoms similar to those of attention deficit disorders-- easily distracted, not engaging in class, or not following directions.”  
(Burns, 2015)

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“The diagnosis and etiology of APD are similar to Specific Language Impairment and dyslexia, and APD often co-occurs with impairments of language, literacy, and attention. Developmental and behavioral genetic research suggests that one should expect APD to co-occur frequently with other symptoms.”

(Eggermont 2015)

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According to the National Institutes of Health, in children referred for learning difficulties, around **43% have Auditory Processing Disorder (APD)**. In addition, **25% of all children tested for learning disabilities were found to have coexisting APD and dyslexia**. Research indicates that 50% to 70% of children with dyslexia have an underlying disorder within the auditory system that has disrupted the normal acquisition of language.

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# Unpacking Auditory Processing Disorders—a link with dyslexia?

## HOW DO WE TEST FOR APD?

### Hearing - Audiologist

Audiological testing: pure tones, air and bone conduction  
Speech reception thresholds  
Speech discrimination  
Tympanometry  
Acoustic reflex testing  
Otoacoustic emissions

### Auditory Processing - Audiologist

Phonological/phonemic awareness  
Articulation  
Gap detection  
Dichotic words/digits  
Speech-in-noise-auditory figure-ground  
Temporal memory: Pitch patterns and duration  
Sound localization

### Comprehension - SLP

Receptive/Expressive Language  
Vocabulary  
Attention  
Memory  
Processing speed  
Spelling  
Reading  
Narratives

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## TEAM MEMBERS ASSISTING WITH DIAGNOSTIC INPUT

- Patient
- Parents
- Teachers
- Pediatrician
- Psychologist
- Speech-language pathologist
- Neurologist/functional neurologist
- Developmental vision specialist
- Occupational therapist

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## APD TREATMENT

Bottom up and Top down approaches

Sensory-perceptual based and  
Perceptual-cognitively-based

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# Unpacking Auditory Processing Disorders—a link with dyslexia?

## SENSORY-PERCEPTUAL APPROACHES

- Therapeutic listening programs: The Listening Program, iLS, Safe and Sound Protocol for auditory hypersensitivity
- HeartMath
- Play Attention
- NeuroNet
- Fit Lights
- Interactive Metronome
- Feather Squadron

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## PERCEPTUAL-COGNITIVE PROGRAMS

- **Hear Builder Series:** "Target skills for success in school, Rely on evidence-and research-based learning, Support state and Common Core State Standards, Have multi-level activities with specific objectives, Print comprehensive reports, Use at school and home on computers and tablets"
- Online and CD's,
  - Auditory Memory
  - Sequencing
  - Following Directions
  - Phonological Awareness

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## PERCEPTUAL-COGNITIVE PROGRAMS

### FASTFORWARD: "PREPARE THE BRAIN, PRACTICE THE SKILLS, REINFORCE WITH ORAL READING" ONLINE PROGRAM

Memory: working and short term  
Attention: sustained and focused  
Processing and Sequencing: sounds, letters, words, sentences  
Reasoning, critical thinking and problem solving

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# Unpacking Auditory Processing Disorders—a link with dyslexia?

## PERCEPTUAL-COGNITIVE PROGRAMS

- **CAPDOTS:** "on-line auditory training system for the treatment of Central Auditory Processing Disorders"
- For "treatment of binaural integration deficits characterized by difficulties with dichotic listening (integrative type) and atypical interaural symmetry. These individuals may also be identified as those with auditory divided attention deficits."

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## PERCEPTUAL-COGNITIVE PROGRAMS

- Brainware Learning

**Brainware Safari:** "Online program which works on 41 cognitive skills in the areas of attention, memory, visual processing, auditory processing, sensory integration and reasoning/logic"

**SkateKids and Ramps To Reading** "online digital game-based supplemental reading programs built to stimulate the cognitive processes necessary for learning to read while students build critical literacy skills, with a unique focus on reading comprehension."

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## BOOKS FOR PARENTS ABOUT AUDITORY PROCESSING DISORDERS

- Bellis, T., *When the Brain Can't Hear: Unraveling the Mystery of Auditory Processing Disorder*. New York: Atria Books, 2003.
- Edell, H., Lucker, J., and Alderman, L. *Don't You Get It? Living with Auditory Learning Disabilities*, New York, Shadow Publishing, 2008.
- Foli, K. and Hollowell, E. *Like Sound Through Water: A Mother's Journey Through Auditory Processing Disorder*. New York: Atria Books, 2002.
- Heymann, L., *The Sound of Hope: Recognizing, Coping With and Treating Your Child's Auditory Processing Disorder*. New York: Ballantine Books, 2010.
- Mountjoy, A. and Davies, K. *Can I tell you about Auditory Processing Disorder?: A guide for friends, family and professionals*. May 2018

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