

1

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Dyslexia

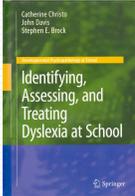
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2

Acknowledgement

Catherine Christo, PhD
California State University, Sacramento

John Davis, PhD
California State University, East Bay



3

Presentation Objectives

From this session it is hoped that participants will increase their ability to ...

1. recognize the defining features of dyslexia.
2. articulate the causes, prevalence, and associated features of dyslexia.
3. conduct screenings for, and identify the presence of, dyslexia.

NOTE: The presenter, Stephen E. Brock, may have a financial interest related to this presentation from sales of the book *Identifying, Assessing, and Treating Dyslexia at School*.

4

Workshop Outline

1. Preface
2. Causes
3. Prevalence and Associated Conditions
4. Case Finding and Screening
5. Diagnosis

5

Preface

- The core symptoms of dyslexia are
 - "... frequently overlooked and put down to mere stupidity, or some error of refraction, very much to the disadvantage of the individual, because the individual was often blamed, bullied, laughed at, for a defect which was not his fault but his misfortune."

E. Treacher Collins

Shaywitz (2003)

6

Preface

1. Learning to reading is
 - Associated with positive adult outcomes
2. Reading disabilities are
 - Associated with juvenile delinquency
 - The most common SLD referral
3. Early identification and treatment of reading disabilities is essential.
 - "Matthew effect"
 - Reduces at-risk readers from approximately 25 to 6%

Feorman (2003); Frieden (2004); Mellard & Woods (2007); O'Brien et al. (2007)

Preface

7

- Functional Consequences
 - Dyslexia "... can have functional consequences across the life span, including lower academic attainment, higher rates of high school dropout, lower rates of postsecondary education, high levels of psychological distress and poorer overall mental health, higher rates of unemployment and under-employment, and lower incomes. School dropout and co-occurring depressive symptoms increase the risk for poor mental health outcomes including suicidality, whereas high levels of social or emotional support predict better mental health outcomes."

DSM-5

American Psychiatric Association (2013, p. 73)

Preface

8

- Defining dyslexia
 - Types of dyslexia
 - Acquired
 - Most often surface or visual dyslexia
 - Typically seen in adults following TBI/stroke
 - Developmental
 - Most often phonological dyslexia
 - Some rare cases of surface dyslexia observed

Beaton (2004)

Preface

9

- Defining dyslexia
 - International Dyslexia Association
 - *Dyslexia is a specific learning disability that is **neurobiological** in origin. It is characterized by difficulties with accurate and/or fluent **word recognition** and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the **phonological** component of language that is often **unexpected** in relations to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in **reading comprehension** and reduced reading experience that can impact growth of vocabulary and background knowledge. [emphasis added]*

Lyon et al. (2003, p. 2)

Preface

10

- Defining dyslexia
 1. Etiology is a neurobiological phonological processing deficit
 2. Behavioral marker is difficulties with single word decoding
 3. Unexpected given other learning/cognitive skills and abilities, and the presences of quality instruction
 4. Can result in difficulty in constructing meaning from text and associated academic skill development

Christo, Davis, & Brock (2009)

Preface

11

- Defining dyslexia
 - More than just a lack of skill development
 1. Early differences in phonological processing
 2. Phonological processing predicts reading skill development
 3. Interventions that target phonological processing improve reading skill
 4. Neuroimaging suggests functional brain differences
 5. A heritable disorder connected to specific genetic differences
 - Affected by language skills (other than sound processing) and instruction, but such is not the primary cause of the disability
 - The environment affects the expression of EVERYTHING

Christo, Davis, & Brock (2009)

Preface

12

- Defining dyslexia
 - Phonological Processing
 - Manipulating the sounds of language
 - Rapid Naming
 - Fast, automatic retrieval processes
 - **Word Recognition Speed**
 - Orthographic Processing
 - Memory for (recognition of) the letters in words
 - Knowledge of multi-letter units or word forms
 - Reflected in writing remembering common letter patterns, recognizing correctly spelled words, reading phonetically irregular words, and reading speed

Preface

13

1. Special education involves categorical decisions
2. Reading skill is not categorical

3. Thus, not all students with “dyslexia” will be eligible for/require special education assistance
4. Special education is not THE answer to the challenge of dyslexia
 - It is AN answer for a select group of students with more severe manifestations of dyslexia

Shaywitz (2003)

Preface

14

- While our brains are wired for speech, direct instruction is needed to learn to read.
- Reading integrates multiple systems
 - Visual system
 - Phonology
 - Working memory
 - Language
 - Executive functioning (ADHD)
- Dyslexia is but one of several “internal” reasons for why a student might not be learning how to read.
 - In other words, not all students with reading difficulties (and identified as SLD) will be considered dyslexic

Preface

15

- Basic assumptions
 - Reading process has two major components
 - Decoding (word reading)** + comprehension (constructing meaning from text) = Reading
 - Dyslexia
 - Interferes with decoding

Christo (2015)

Preface

16

- Basic assumptions
 - Dyslexia does not reflect an overall defect in language
 - Although it can co-exist with such
 - It is a localized weakness with a specific part of the language system: the phonological module

Shaywitz (2003)

Preface

17

- Basic assumptions
 - What is a phoneme?
 - The smallest unit of speech that distinguishes one word from another
 - The fundamental element of the language system
 - The essential building block of all spoken and written words
 - Dyslexic children have difficulty developing awareness that words are comprised of phonemes
 - “children who are dyslexic perceive a word as an amorphous blur, without an appreciation of its underlying segmental nature.” (p. 44)

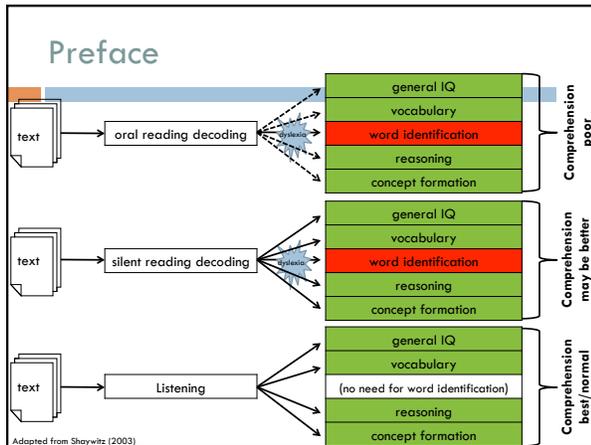
Shaywitz (2003)

Preface

18

- Basic assumptions
 - Development of the *Alphabetic Principle* (Reading Rockets)
 - General awareness that words have parts
 - Specific awareness that these parts are sounds
 - Linkage of these sound parts to the printed word
 - “Finally, he comes to understand that the printed word and the spoken word are related. He knows that the printed word has an underlying structure and that it is the same structure he hears in the spoken work. He understands that both spoken and written words can be pulled apart based on the same sounds, but in print the letters represent these sounds.” (p. 44)

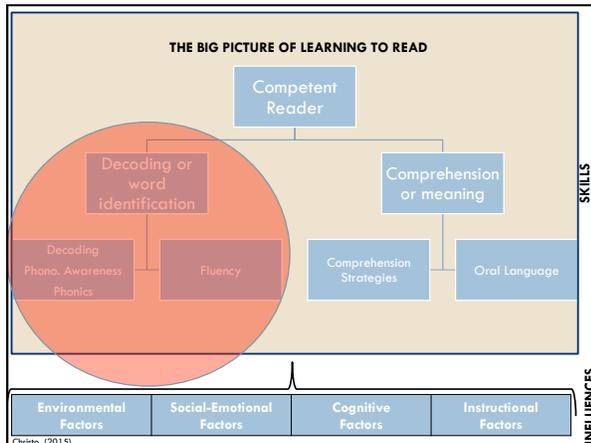
Shaywitz (2003)



Preface

- Basic assumptions
 - Multiple components of reading must be taught in a systematic, explicit manner that also immerses children in language and text

Christo (2015)



Preface

- Becoming automatic readers
 - Word based skills must be automatic
 - All words become sight words
 - **Can't "not read"**
 - **Frees working memory to construct meaning from text read**
 - Critical for higher order reading skill

Christo (2015)

Preface

- To summarize
 - Dyslexia involves trouble connecting the sounds that make up words with the letters that represent those sounds.

www.understood.org (https://www.youtube.com/watch?v=Qf6m1mRtCQ)

24 Workshop Outline

1. Preface
2. Causes
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5. Diagnosis

Causes

25

- Genetics
 - Heritability
 - $.55 \pm .22$
 - Chromosomes 6 and 15 strongest links to reading
 - 1, 2, and 18 also implicated
 - Chromosome 6
 - Increased risk for both dyslexia and ADHD

Pennington & Olson (2005); Christo, Davis, & Brock (2009); Willcutt et al. (2002)

Causes

26

- Environment
 1. Not completely heritable
 2. Supports the notion of gene x environment interactions
 3. A genetic predisposition to dyslexia can be exacerbated or mitigated by the environment
 4. While up to 20% of children are “at risk” for dyslexia, the “environment” (i.e., appropriate early intervention) reduces prevalence of dyslexia to 2-6%

Christo, Davis, & Brock (2009)

Causes

27

- Neurobiological Structures
 - Good readers use different parts of the brain than do dyslexic readers
 - The reading system relies on 3 inter-related brain structures
 1. Parieto-temporal (slow word analysis and important to the novice reader)
 2. Occipito-temporal (automatic recognition of word form, the express pathway to reading)
 3. Broca’s area/Interior frontal gyrus (articulation/word analysis, poor reader’s sub-vocalization may reflect use of this area)
 - Good readers activate the back of the brain
 - Highly skilled readers make use of the occipito-temporal region
 - Dyslexic readers over utilize the left frontal (Broca’s area) and right frontal regions

Christo, Davis, & Brock (2009); Shaywitz (2003)

Causes

28

- Neurobiological Structures
 - Good readers use different parts of the brain than do dyslexic readers
 - Under activation of the back for the brain is a neural signature of dyslexia
 - Brain activation profile can normalize after intervention
 - Younger brains are more malleable, but even adults can change their brains and become better readers

DYSLEXIA and the Brain

Christo, Davis, & Brock (2009); Shaywitz (2003)

Causes

29

- Psychological processes
 - Visual processing ?
 - Temporal processing
 - Phonological core deficits
 - Most researchers and practitioners consider a phonological deficit the core deficit of dyslexia
 - Perception, interpretation, recall and production of language at the level of the speech sound system
 - Includes pronouncing words, remembering names and lists, identifying words and syllables, giving rhymes, detecting syllable stress, segmenting and blending phonemes
 - Rapid naming deficit
 - Children who fail to name things they saw at the same speed as other children (letters or objects)
 - Because readers do not generally name the letters of a word in the process of reading, it is unlikely that the correlation of reading skill and naming speed reflects a simple association. Rather, naming speed is thought to provide a marker for underlying processes sensitive to precise and rapid timing requirements
 - The speed with which you name and the speed that you read is really important not just for the speed, but for the brain’s ability to do these processes fast enough to allocate time to construct meaning from text (i.e., reading comprehension)
 - Double deficit

Christo, Davis, & Brock (2009)

Causes

30

- Visual Processing?
 - American Academy of Pediatrics, American Academy of Ophthalmology, and American Association for Pediatric Ophthalmology and Strabismus (1998) stated that **eye defects, subtle or severe, do not cause reversal of letters, words, or numbers. Claims of improved reading and learning after visual training, neurologic organization training, or use of colored lenses are almost always based on poorly controlled studies that typically rely on anecdotal information.**
 - An AAP technical report reinforces a 2009 policy statement that said there is **no scientific evidence to indicate dyslexia or other learning disabilities are caused by vision problems. In addition, there is no benefit to using vision training or other related techniques to help children with these disabilities.**

Christo, Davis, & Brock (2009)

31 Workshop Outline

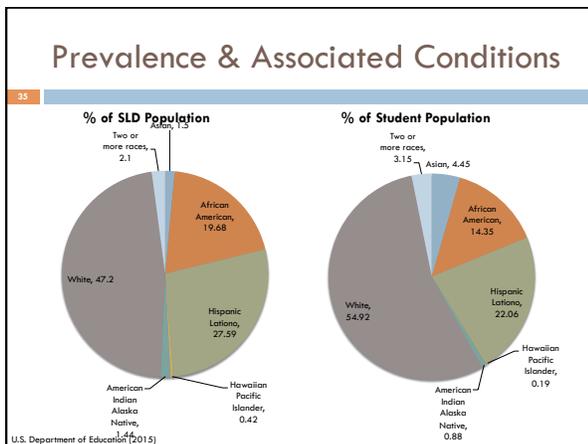
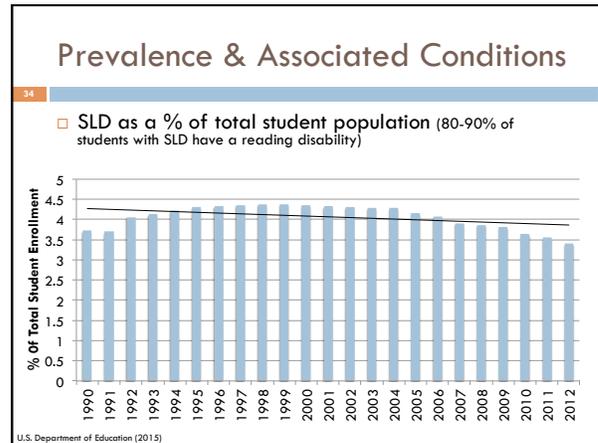
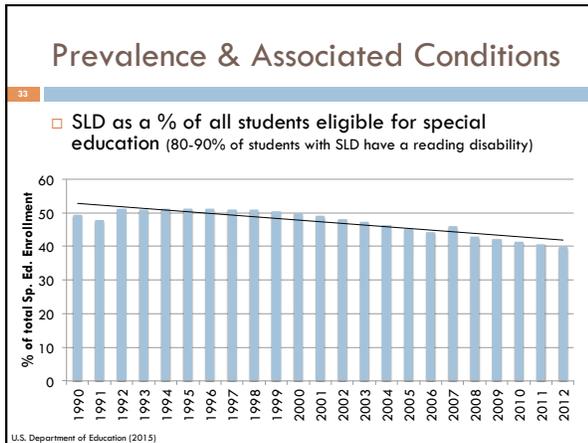
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Prevalence & Associated Conditions

32

- Reading difficulties vs true dyslexia
 1. Early reading interventions from kindergarten through second grade reduced the prevalence of reading disabilities to an extrapolated figure of about **2%** of the population.
 2. Current percentage of children with reading disabilities in special education estimated to be about **2.7%** of the school population.
 - 1.8 of the 66.8 million school children ages 6 to 21 years.

Torgesen et al. (2001); Torgesen et al. (1997); U.S. Department of Education (2015)



Prevalence & Associated Conditions

36

- Gender differences
 - Using school identification procedures
 - 1:4 (one girl for every four boys)
 - Using clinical identification procedures
 - More boys than girls, but the differences are not significant
- Why, when schools identify reading disabilities, are more boys identified than girls?
- Is there a problem with special education eligibility criteria, general education practices, or both?

Shaywitz (2003)

Prevalence & Associated Conditions

37

- ADHD
 - ▣ 36% of children with ADHD also have dyslexia
 - ▣ 18% of children with dyslexia also have ADHD
 - Even in the absence of a reading skill deficit, children with AD/HD (predominantly inattentive type) have difficulty with rapid number naming and reading comprehension
- Communication Disorders
- Developmental Coordination disorders
- Autism
- Other mental disorders

American Psychiatric Association (2013); Brock & Kremer (1996); Brock & Christo (2003); Christo, Davis, & Brock (2009)

Workshop Outline

38

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Case Finding and Screening

39

- Family history
 - ▣ Family history of dyslexia is a strong risk factor that should be considered in any screening of children for dyslexia risk
 - Having a parent with dyslexia is a significant risk factor
 - Over 50% of achievement test score variance due to heritable factors
 - 66% of 4 year olds identified as at risk for reading failure due to having a parent with dyslexia were significantly delayed in reading at 8 years of age

Christo, Davis, & Brock (2009).

Case Finding and Screening

40

- Language skill development
 - ▣ Important to understanding the meaning of language (i.e., semantics and syntax)
- Speech skills development
 - ▣ Important to phonological processing and development of the alphabetic principle

Christo, Davis, & Brock (2009).

Case Finding and Screening

41

- Language and speech skill development
 - ▣ Oral language
 - May have some relationship to later reading problems if the speech difficulties are not resolved during early reading instruction
 - Greater risk conveyed when speech difficulties are comorbid with more global language delays

Christo, Davis, & Brock (2009).

Case Finding and Screening

42

- Language and speech skill development
 - ▣ Vocabulary prior to 1st grade predicts reading development
 - Spoken vocabulary facilitates reading word recognition
 - May also create richer phonological representations
 - May be simply related to underlying (more fundamental) language facility important to development of reading skills (e.g., phonological processing)

Christo, Davis, & Brock (2009).

Case Finding and Screening

43

- Language and speech skill development
 - Phonological processing (rhyming detection/production, segmenting, phoneme recognition sound categorization)
 - Good early development of these skills positively predicts reading achievement
 - Poor early development of these skills, by themselves, is not as powerfully predictive of later reading achievement
 - Preschoolers who went on to later be identified as dyslexia also had family histories of dyslexia and tended to have more global language delays.
 - Preschoolers who went on to become average readers had a more mixed language profile (while low in phonological processing, had average or above performance on measures of syntax and semantics).

Christo, Davis, & Brock (2009).

Case Finding and Screening

44

- Language and speech skill development
 - Letter knowledge
 - One of the best preschool predictors of reading success.
 - May be facilitative of learning to read.
 - May also be a task that serves to represent the outward manifestation of
 - cognitive processes (verbal memory)
 - predispositions (interest in books)
 - environmental factors (access to print)
 important to reading.

Christo, Davis, & Brock (2009).

Case Finding and Screening

45

- Otitis media (OM)
 - Conflicting results in studies examining the relationship between OM and later academic outcomes
 - Roberts et al. (2002) did not find any long term detrimental effects of a Hx of OM on word recognition.
 - Winsel (2006) reports that children in grades 1 and 2 with a Hx of OM were deficient on phonological, semantic, and reading abilities.
 - The impact of OM most pronounced when occurring between 6- and 18-months.
 - The fluctuating hearing loss associated OM (and not OM per se) interferes with development of speech sound representations, making mapping of print to speech more challenging.

Christo, Davis, & Brock (2009); Roberts et al. (2002); Winsel (2006)

Case Finding and Screening

46

- Preschool screening
 - Family history
 - Letter naming
 - Sentence memory
- Specific measures
 - Phonological Abilities Test (Muter, Hulme, & Snowling, 1997)
 - Get Ready to Read (Reading Rockets)
 - <http://www.readingrockets.org/article/get-ready-read-screening-tool>

Christo et al. (2009)

Case Finding and Screening

47

- Kindergarten screening
 - Visual processing
 - Little evidence to support visual perceptual processing or visual memory problems as a marker for dyslexia
 - Phonological awareness
 - Strong predictor of reading performance

Christo, Davis, & Brock (2009)

Case Finding and Screening

48

- Kindergarten screening
 - Vocabulary
 - Powerful predictor of which children receiving classroom based interventions would respond adequately to reading intervention
 - Naming speed tasks
 - Correlate with reading difficulties (especially naming of letters and numbers).
 - Because knowing letter names is facilitative of reading development, letter naming speed may be more a marker of how well a child is acquiring foundational reading skills than of an underlying cognitive process.

Christo, Davis, & Brock (2009)

Case Finding and Screening

49

- Kindergarten screening
 - ▣ Screening measures
 - Ready to Learn (Fawcett, Nicolson, & Lee, 2004)
 - Test of **Phonological Awareness** (2nd ed.; PLUS; Torgesen & Bryant, 2004)
 - Test of Auditory Analysis Skills (Rosner, 1979)
 - Yopp-Singer Test of Phoneme Segmentation (Yopp-Singer; Yopp, 1995)
 - Test of **Early Reading Ability** (3rd ed.; Reid, Hresko, & Hammill, 2004)
 - Dynamic Indicators of Basic Early Literacy Skills (Good et al., 2003)

Christo, Davis, & Brock (2009)

Case Finding and Screening

50

- Kindergarten screening
 - ▣ Screening measures

Test	Age Range	Phonological Processing	Naming Speed	Knowledge of letters/print	Vocabulary	Other
Ready to Learn	4.5-6.5	YES	YES	YES	YES	Memory, Motor skills
TOPA-2+	5.0-8.0	YES				
Rosner TAAS	K to 3 rd	YES				
Yopp-Singer	K to 2 nd	YES				Comprehension
TERA-3	3.5-8.5	YES		YES		
DIBELS	K-3 rd	YES	YES	YES		

Christo, Davis, & Brock (2009)

Case Finding and Screening

51

- Kindergarten screening
 - ▣ Screening measures
 - Letter knowledge measured at the beginning of K the best predictor of mastering basic reading skills.
 - However... such screening will yield false positives at the beginning of K.
 - Screening in the middle of K will reduce false positives
 - "Children who enter school with good language skills (i.e., phonologic, semantic, and syntactic skills), knowledge about the alphabet, and no family history of dyslexia are likely going to be successful readers."
 - "...the child with global language deficits, lack of alphabetic knowledge, and a family history of dyslexia is at high risk for reading disabilities."

Christo, Davis, & Brock (2009, p. 57)

Workshop Outline

52

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5. Diagnosis
6. Assessment
7. Treatment

Diagnosis

53

- DSM-5
 - ▣ Specific Learning Disorder
 - A. Difficulties learning and using academic skills, as indicated by the presence of at least one of the following [6] symptoms that have persisted for at least 6 months, despite the provision of interventions that target those difficulties:
 1. Inaccurate or slow and effortful word reading (e.g., reads single words aloud incorrectly or slowly and hesitantly, frequently guesses words, has difficulty sounding out word.
 2. "understanding"
 3. "spelling"
 4. "written expression"
 5. "number sense"
 6. "mathematical reasoning"

American Psychiatric Association (2013, p. 66)

Diagnosis

54

- DSM-5
 - ▣ Specific Learning Disorder
 - B. The affected academic skills are substantially and quantifiably below ... chronological age, ... cause significant interference with academic ... performance ... as confirmed by individually administered standardized achievement measures and comprehensive clinical assessment.
 - C. The learning difficulties begin during school-age years ...
 - D. ... not better accounted for by intellectual disabilities, uncorrected vision or auditory acuity, other mental or neurological disorders, psychosocial adversity, lack of proficiency in the language of academic instruction, or in adequate educational instruction.

NOTE: The four diagnostic criteria are to be met based on a clinical synthesis of the individual's history (developmental, medical, family, educational), *school reports*, and *psychoeducational assessment*.

American Psychiatric Association (2013, p. 67; emphasis added)

Diagnosis

55

- DSM-5
 - ▣ Specific Learning Disorder
 - 315.00 (F81.0) With impairment in reading
 - Word reading accuracy
 - Reading rate or fluency
 - Reading comprehension
 - Note: Dyslexia is an alternative term used to refer to a pattern of learning difficulties characterized by problems with accurate or fluent word recognition, poor decoding, and poor spelling abilities. If dyslexia is used to specify this particular pattern of difficulties, it is important also to specify any additional difficulties that are present, such as difficulties with reading comprehension or math reasoning.

American Psychiatric Association (2013, p. 67)

Diagnosis

56

- DSM-5
 - ▣ Specific Learning Disorder
 - Severity specifier
 - Mild:** ... the individual may be able to compensate or function well when provided with appropriate accommodations or support services ...
 - Moderate:** ... unlikely to become proficient without some intervals of intensive and specialized teaching...
 - Severe:** ... unlikely to learn those skills without ongoing intensive individualized and specialized teaching for most of the school years. Even with an array of appropriate accommodations or services ... the individual may not be able to complete all activities efficiently.

Severe Moderate Mild Fluent Automatic Reading

Tier 3 Tier 2 Tier 1

American Psychiatric Association (2013, pp. 67-68)

Diagnosis

57

- DSM-5
 - ▣ Specific Learning Disorder
 - Comprehensive assessment is required. ... No single data source is sufficient for diagnosis. ... is a clinical diagnosis based on a synthesis of the individual's medical, developmental, educational, and family history; the history of the learning difficulty, including its previous and current manifestation; the impact of the difficulty on academic ... functioning; previous or current school reports; portfolios of work requiring academic skills; curriculum-based assessments; and previous or current scores from individual standardized tests of academic achievement. If an intellectual, sensory, neurological, or motor disorder is suspected, then the clinical assessment ... should also include methods appropriate for these disorders. Thus, comprehensive assessment *will involve professionals with expertise in specific learning disorder and psychological/cognitive assessment.*

American Psychiatric Association (2013, p. 70)

Diagnosis

58

- DSM-5
 - ▣ Specific Learning Disorder
 - Associated features supporting diagnosis
 - ...frequently but not invariably preceded, in preschool years, by delays in attention, language, or motor skills.
 - An uneven profile of abilities is common.
 - ... cognitive deficits associated with difficulties learning to read words are well documented ...
 - But cognitive testing, neuroimaging, or genetic testing are not useful for diagnosis at this time
 - ... increased risk for suicidal ideation and suicide attempts.

American Psychiatric Association (2013, p. 70)

Diagnosis

59

- DSM-5
 - ▣ Specific Learning Disorder
 - Risk and prognostic factors
 - **Environmental.** Prematurity or very low birthweight ... prenatal exposure to nicotine.
 - **Genetic.** Family history dyslexia and parental literacy skills predict literacy problems in offspring
 - **Course modifiers.** Comorbidity with ADHD is predictive of worse mental health outcome. Systematic, intensive, individualized instruction, using evidenced based interventions, may improve or ameliorate the learning difficulties in some individuals or promote the use of compensatory strategies in others, thereby mitigating the otherwise poor outcomes.

American Psychiatric Association (2013, p. 72)

Assessment

60

- Purposes of Assessment
 1. Non-categorical identification of dyslexia
 2. Categorical special education eligibility decision
 3. **Inform interventions**

Assessment

61

- Non-categorical identification of dyslexia
 - Developmental, family, and health history form

Christo, Davis, & Brock (2009)

Assessment

62

- Non-categorical identification of dyslexia
 - Little support for IQ as a predictor of progress in attainment of basic early literacy skills (e.g., phonemic awareness).
 - IQ does predict response to interventions
 - However, reading failure among persons with dyslexia is unexpected in relation to ability/intelligence

Christo, Davis, & Brock (2009)

Assessment

63

- Non-categorical identification of dyslexia
 - Weakness in reading skills
 - Reading fluency
 - GORT, GSRT
 - Oral language
 - KTEA, WJ
 - Word reading
 - TOWRE, KTEA, WJ
 - Spelling
 - KTEA, WJ

Christo, Davis, & Brock (2009)

Assessment

64

- Non-categorical identification of dyslexia
 - Weakness in reading related cognitive processes
 - Most commonly phonological processing
 - May also be
 - Naming speed,
 - Orthographic processing
 - Working memory

Christo (2015)

Assessment

65

- Non-categorical identification of dyslexia
 - Measures of Phonological Processing
 - CTOPP
 - Elision (7-24)
 - Blending Words (5-24)
 - Sound Matching (5-6)
 - Phoneme Isolation (7-24)
 - Blending Non-words (7-24)
 - Segmenting Non-words (7-24)
 - Segmenting Words (7-24)
 - NEPSY
 - Phonological Awareness
 - Nonword Repetition
 - W-J
 - Sound Blending (cog.)
 - Incomplete Words (cog.)
 - Sound Awareness (ach.)
 - PAL
 - Rhyming
 - Syllables
 - Phonemes
 - Rimes
 - KTEA
 - Phonological awareness: Rhyming, Sound Matching, Blending, Segmenting, Deleting Sounds

Christo (2015)

Assessment

66

- Non-categorical identification of dyslexia
 - Measures of Orthographic Awareness
 - PAL
 - Alphabet Writing
 - Receptive Coding
 - Expressive Coding

Also may consider Jordan Right-Left Reversal Test
Not many instruments available to look at this.

Christo (2015)

Assessment

67

Non-categorical identification of dyslexia

- Measures of Rapid Naming
 - CTOPP
 - Rapid Digit Naming
 - Rapid Letter Naming
 - Rapid Color Naming
 - Rapid Object Naming
 - NEPSY
 - Speeded Naming
 - WJ
 - Rapid Picture Naming
 - PAL
 - RAN Words
 - RAN Digits
 - RAN Words and Digits
 - KTEA
 - Naming Facility: Objects, Colors, Letters

Christo (2015)

Assessment

68

Non-categorical identification of dyslexia

- Measures of Working Memory
 - WJ Working Memory Composite
 - PAL – Verbal Working Memory
 - WRAML – Working Memory Cluster

Christo (2015)

Assessment

69

Non-categorical identification of dyslexia

- Measures of Long Term Storage and Retrieval
 - Association
 - WRAML – Sound Symbol
 - WJ – Visual Auditory Learning
 - KABC – Atlantis
 - Rapid Retrieval
 - WJ
 - Retrieval Fluency
 - Rapid Naming
 - PAL
 - Naming Speed tests
 - CTOPP
 - Rapid Naming tests

Christo (2015)

Assessment

70

Non-categorical identification of dyslexia

- Oral Language Skills
 - “The ultimate goal of reading instruction is to help children acquire the knowledge and skills necessary to comprehend printed material *at a level that is consistent with their general verbal ability or language comprehension skills*” (Torgesen, 2002)
 - Conversely lack of reading may impact development of verbal ability

Christo (2015)

Assessment

71

Non-categorical identification of dyslexia

- Oral Language Skills
 - Oral language clusters
 - WJ
 - KABC
 - Language specific tests
 - CELF
 - Test of Early Language Development
 - Oral and Written Language Scales
 - Vocabulary tests
 - PPVT
 - WISC: Vocabulary
 - DAS: Word Definition
 - KABC: Verbal Knowledge
 - WJ: Comprehension Knowledge

Christo (2015)

Assessment

72

Non-categorical identification of dyslexia

- Listening comprehension significantly higher than reading comprehension
 - Important criteria for dyslexia

Christo (2015)

Treatment

73

- Comprehensive School Wide Programs (primarily designed for disadvantaged learners)
 1. *Success for All*
 - *Reading Roots (K-1) and Reading Wings (2-5)*
 - Useful for at-risk students, but not for the more disabled learners
 2. *Direct Instructional System of Teaching Arithmetic and Reading (DISTAR)*
 - Not as thoroughly school wide as Success for All

Christo, Davis, & Brock (2009)

Treatment

74

- Reading Curricula
 1. Preventive/Beginning intervention
 - *Open Court Reading*
 - *A Legacy of Literacy*
 2. For struggling readers
 - *Wilson Program*
 - *Language!*
 3. Supplemental for specific needs
 - *Lindamood Phoneme Sequencing*
 - *Great Leaps for Reading*
 - *Visualizing/Verbalizing*

Christo, Davis, & Brock (2009)

Treatment

75

- Controversial Treatments
 - *Fast ForWord- Language* (Miller & Tallal, 1996)
 - *Earobics* (Cognitive Concepts, 2000)
 - *Tomatis* (1978)
 - *Irlen lenses* (Irlen, 1983)
 - optometric visual training (Rayner, 1983; Taylor, 1965)
 - *Davis Method* (Davis & Braun, 1997; 2003)
 - *Dore Program* (Dore & Rutherford, 2001)

Christo, Davis, & Brock (2009)

Treatment

76

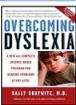
- In summary, effective interventions for kids with dyslexia;
 - Teach the relationship between sounds and letters in a very explicit and structured way
 - Help struggling readers recognize words they have seen before
 - Do not focus on things like balance or eye movement.

www.understood.org (https://www.youtube.com/watch?v=QrIf6m1mRcQ)

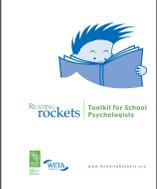
Resources

77

- Books




- Reading Rockets
 - www.nasponline.org/resources/reading/NASPtoolkit.pdf




Resources

78

- Parent Groups
 - www.decodingdyslexia.net
 - www.understood.org
 - www.1donline.org

79

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Dyslexia

