

Specific Learning Disorders (DSM 5)

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□ Specific Learning Disorders

A. Difficulties in learning & using academic skills

- For at least **6 months**
- **Despite** interventions
- In at least **1** of the followings:
Reading, writing, mathematics



➤ Reading:

- Inaccurate word reading
- Slow, effortful, & *in*fluent word reading
- Difficulty in *understanding* & *comprehension* of what is read



➤ Writing:

- Inaccurate spelling
- Inaccurate grammar & punctuation
- Difficulties in clarity or organization of written expression



➤ Mathematic:

- Difficulties mastering **number sense**
- Inaccurate or influent **calculation**
- Difficulties in **memorization** of arithmetic facts
- Difficulties with mathematical **reasoning**



B. The affected academic skills are **below** those expected for the **chronological age**

- Significantly **interferes** with:
 - **Academic** performance
 - Or **occupational** performance
 - Or **activities** of daily living



- **Confirmed by :**

- Standardized **achievement** measures
- & comprehensive **clinical** assessment

- **For > 17 years:**

Documented **history** of impairing learning difficulties (instead of standardized assessment)



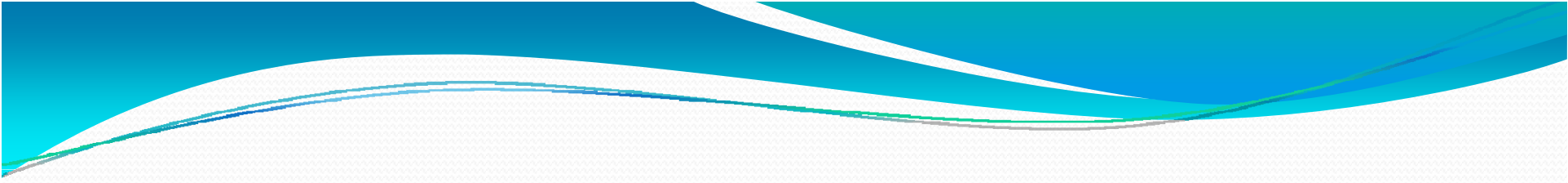
C. Begin during **school-age** years

- May not manifest until the **demands exceed the capacities**



D. Are not better accounted for by:

- Intellectual disabilities
- Uncorrected visual or auditory acuity
- Other mental or neurological disorders
- Psychosocial adversity
- Lack of proficiency in the language of academic instruction
- Inadequate educational instruction

- 
- With impairment in **reading**
 - With impairment in **written expression**
 - With impairment in **mathematics**



➤ Specify current severity:

Mild:

- Some difficulties learning skills
- May be able to **compensate** or **function** well with **accommodations** or **support** services



Moderate:

- Marked difficulties learning skills
- Unlikely to become proficient without some intervals of intensive & specialized teaching
- Some accommodations or supportive services at least part of the day may be needed to complete activities accurately & efficiently



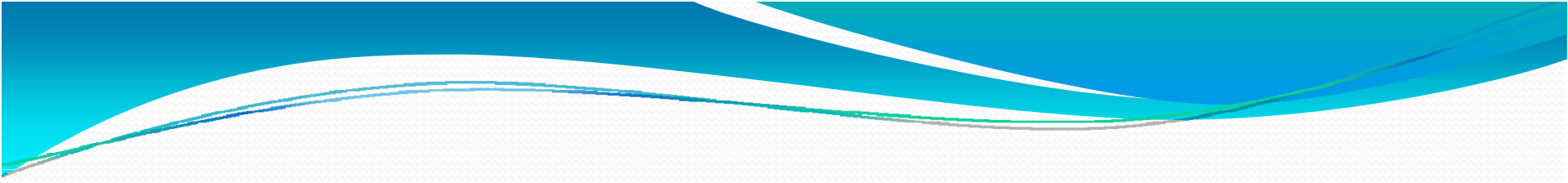
Severe:

- Severe difficulties learning skills
- Affecting several academic domains
- Unlikely to learn those skills without ongoing intensive individualized & specialized teaching
- May not be able to complete all activities efficiently
Even with an array of appropriate accommodations or services at home, at school, or in the workplace



□ Persistence is defined as:

- Restricted progress in learning for at least 6 months
- Despite extra help at home or school
- Not a marked decline from a former state
- Typically persists into adulthood

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- Affects learning in otherwise normal intellectual functioning (IQ>70)
 - Underachievement is unexpected
 - Even may occur in intellectually gifted individuals



□ In adults:

- Ongoing difficulties in **literacy** or **memory** skills
- Evidence from **school reports**, or **portfolios** of work
- Reassessment is **not** necessary



Why specific?



1. Not attributable to:

- Intellectual disability
- Global developmental delay
- Hearing or vision disorders
- Neurological disorders or neurodegenerative cognitive disorders
- Motor disorders
- Pediatric stroke
- Traumatic brain injury



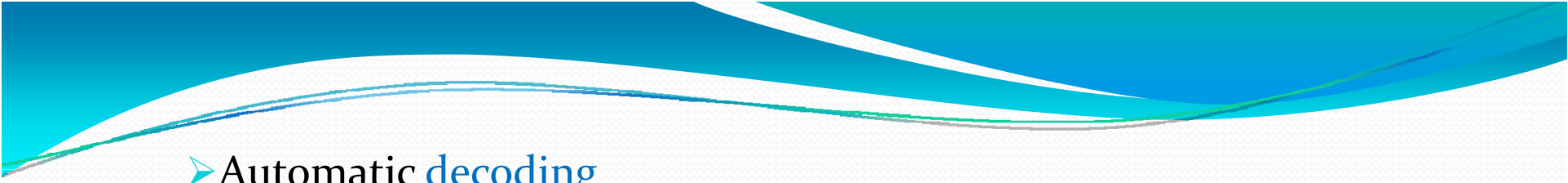
2. Can not be attributed to:


- Economic disadvantages
- Environmental disadvantages
- Chronic absenteeism
- Lack of education

3. May be restricted to one academic skill

Learning Disorder has Deficit in:

- Visual perception
- Spatial orientation
- Intersensory integration (letter-sound association)
- Left/right discrimination
- Phonological processing
- Orthographic skills
- Learning letter cues to code & decode words

- 
- Automatic decoding
 - Decoding in context
 - working memory
 - Revisualization
 - Visual motor integration
 - Organizing information
 - Grammar
 - Formulation



- Can not **match** visual written codes with auditory spoken codes (phoneme-grapheme matching)

- Can not **read**

- Can not **understand** written language


- ❖ **Experience written native language akin reading a foreign language**

- Does not **learn** to read

- Does not **understand** what he is reading

- Does not learn to **write**

- ❖ **Key source of learning disorder lies within language disorder**

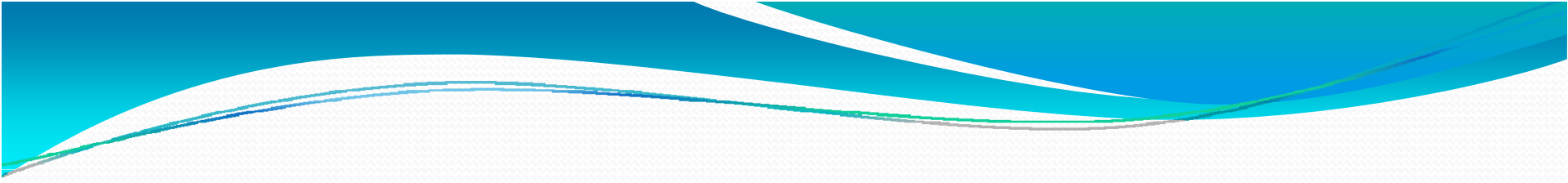
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- LD influence the brain's ability to efficiently **perceive** or **process** verbal & nonverbal **information**
 - **Difficult** to **keep up** with their peers in certain academic subjects whereas they may **excel** in **others**
 - Results in **underachievement**
 - The underachievement is **unexpected** based on the child's potential & the opportunity to have learned more
 - Affects **10%** of youth
 - Can include **more than 1 area** of deficit



- Current consensus is that:

Core deficits are related to difficulty recognizing & remembering the associations between letters & sounds:

- Can not identify the parts of words that denote specific sounds
- Cause trouble with word recognition & “sounding out” words
- Are slower than peers in naming letters & numbers
- Low speech sound awareness causes weak reading
- Low scores in short-term memory for speech sounds cause weak language

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- Persistent difficulties learning **keystone academic skills**
 - May **impede** learning in other academic subjects
 - The affected academic skill is well **below average** for age
 - Or average achievement is sustainable only by **extraordinary** high levels of **effort** or **support**
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- *Talking or walking emerge with **brain maturation***
 - *Academic skills have to be **taught & learned explicitly***



□ Reading Disorder

Difficulty in **single word** reading

Difficulty in **word recognition** by sight

Difficulty in **spelling**

Difficulty in **sounding out unfamiliar** words

Inaccurate reading




□ Reading Disorder (cont.)


- Slow reading
- Influent expressive reading
- Poor reading comprehension
- Makes substitutions, omissions, or distortions in reading
- Difficulty in both expressive & silent reading

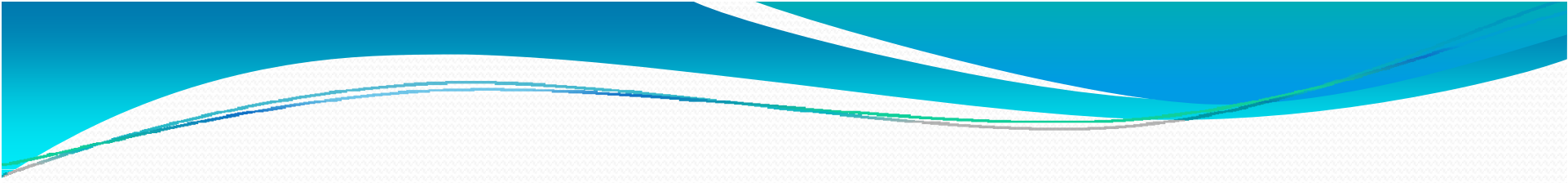


□ Reading Impairment:

- Up to **75%** of those with SLD
- Up to **60%** have **language** impairment
- Up to **60%** have **mathematic** impairment
- Those with **language** impairment:
Up to **85%** have **reading** impairment

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- ADHD, ODD, CD, depressive disorders, higher anxiety symptoms, poor peer relationship
 - Less skill in responding to subtle social cues
 - Up to 25% have ADHD
 - In those with ADHD: 15-30% have SLD
 - Children with both reading & mathematic impairment may perform more poorly in mathematics
(Although reading skills are no different from those with only reading disorder)

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- 35-40% of 1st degree relatives have RD
 - Phonological awareness is linked to chromosome 6 & 18
 - Single word identification is linked to chromosome 15 & 18
 - Impairment in reading & spelling are linked to chromosome 1, 2, 3, 6, 15, 18
 - Encoding process & working memory (*rather than attention or long-term memory*) are weak in reading impairment
 - Association between dyslexia & birth in May June, July
Prenatal exposure to a maternal infectious illness in the winter months

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- Intellectually average children with cerebral palsy & epilepsy
 - Postnatal brain lesions in **left occipital** lobe (causes right visual-field-blindness) &
 - Lesion in **splenium** of corpus callosum
 - Blocks transmission of **visual information** to language areas of left hemisphere
 - Long periods of **malnourishment** during early childhood
 - Children with RD (even without ADHD), may have deficits in **cognitive inhibition** & may act **impulsively**



□ Written Expression disorder

Poor handwriting

Errors in dictation

Errors in spelling

Poor grammar

Short sentences

Poor organization

Poor ideation

Impairment in Written Expression (cont.)

- The **most complex** skill
- Acquired to convey an **understanding** of language
- & to **express** thoughts & ideas
- Spelling errors are among the **most common** difficulties in writing disorder
- **5-15%** of school-age children
- Often occurs with **deficits** in **reading**
- May result from **combined effects** of language disorder & reading disorder



□ Impairment in Mathematics

- Have poor achievement in 4 groups of skills:
 - Linguistic skills
 - Perceptual-conceptual skills
 - Mathematical-computational skills
 - Attentional skills



1) Linguistic skills

- Understanding mathematical **terms**
- Understanding **word problems**
- Converting written problems into mathematical **symbols**



2) Perceptual-conceptual skills

- Ability to recognize & understand symbols
- Ability to order clusters of number
- Ability to use mathematical signs correctly



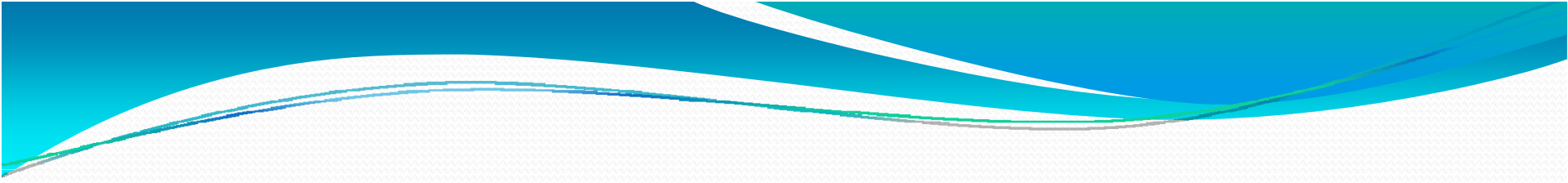
3) Mathematical-computational skills

- Basic addition, subtraction, multiplication, division
- Following sequencing of basic operation, line up numbers, follow the rules of the mathematical operation




4) Attentional skills

- Copying figures correctly
- Observing operational **symbols** correctly

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- Up to **6%** of school-age children have some difficulty with mathematics
 - More frequent in **girls**
 - **20%** of children with SLD have MD
 - Up to **60%** comorbid with reading disorder

Assessment of Specific Learning Disorders

- ✓ Phonation
- ✓ Spelling
- ✓ Drawing
- ✓ Recognizing the **figure** of letters & words
- ✓ Recognizing the **phonation** of letters & words
- ✓ Reading single words
- ✓ Reading words in **context**
- ✓ Reading **unfamiliar** words

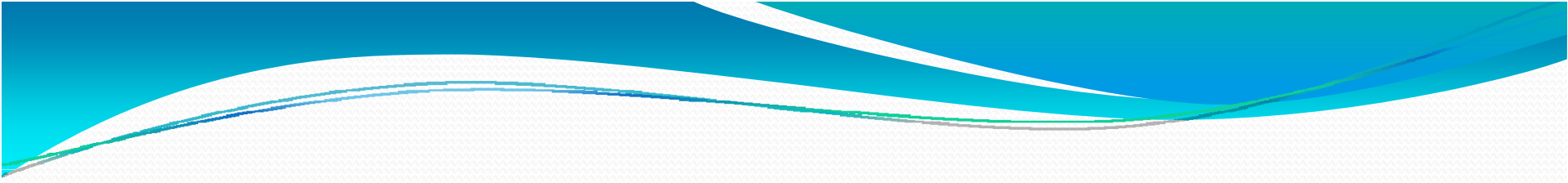
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- ✓ Forget old words as they learn new ones?
 - ✓ Easy learn & easy forget?
 - ✓ Chronology of symptoms
 - ✓ Developmental history
 - ✓ Language disorder, ADHD
 - ✓ Frequent school change
 - ✓ Excessive school absence
 - ✓ Impoverished school

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- No single **data source** is sufficient for a diagnosis of specific learning disorders

- **Uneven profile of abilities is common:**

e.g. above average abilities in drawing, design, music, visuospatial domains

but slow, effortful, & inaccurate reading, & poor reading comprehension, poor written expression


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- Exhibit **poor performance** on psychological & cognitive **tests**
 - **Unclear** whether these cognitive abnormalities are the **cause, correlate, or consequence** of the learning difficulties

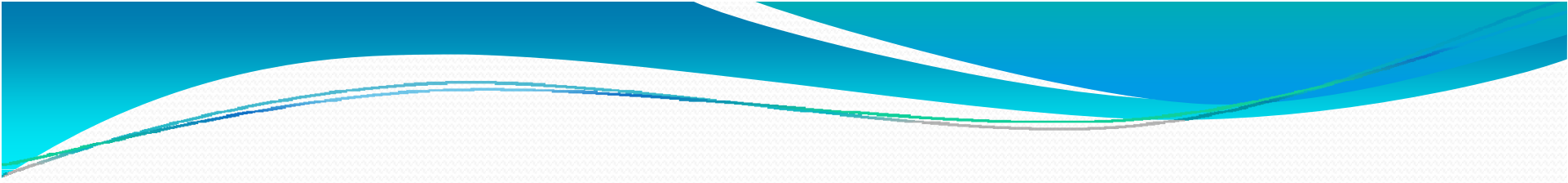
➤ **Not useful** for diagnosis at this time:

Cognitive testing

Neuroimaging

Genetic testing

- 
- Occurs across languages, races, cultures, & socioeconomic conditions
 - May vary in its manifestation according to the:
 - Nature of the spoken & written symbol systems
 - Cultural & educational practices
 - **English:**
Inaccurate & slow reading
 - **Spanish, German, non-alphabetic languages:**
Slow but accurate reading
(more direct mapping between sounds & letters)

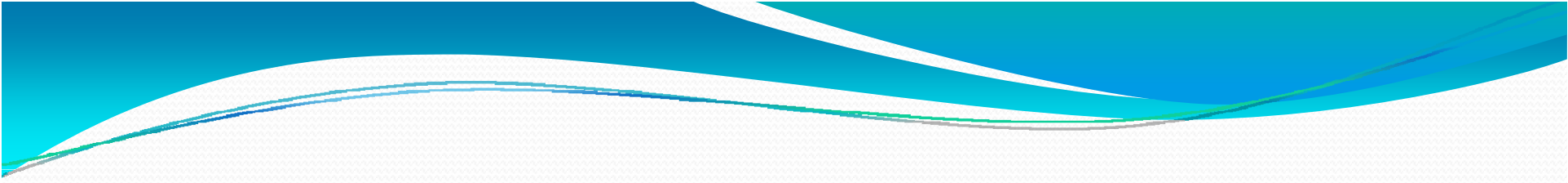


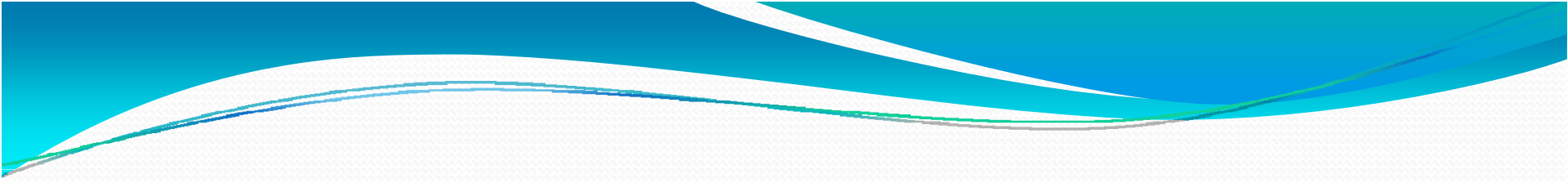
**Language of the assessor, the instrument, & the child
should be the same.**

**In bilingual children, both languages have to be
assessed.**

Epidemiology of LLD

- Are among **covert** disabilities
- It is wise to search & **be hypervigilant** for their cues
- Up to **20%** of children & adolescents have LLD
- **30%** of children & adolescents referred to mental health centers have LLD
- Are among the most **common developmental** disorders

- 
- 5-15% among school-age children
 - 4% in adults
 - More common in **boys** (boys/girls=2-3)
 - Lifelong
 - Variable course & clinical expression

- 
- The co-occurrence of **SLD & ADHD**:
more frequent than expected by chance
 - Commonly co-occurs with other **neurodevelopmental disorders**
(*ADHD, Communication disorders, DCD, ASD*)
 - Commonly co-occurs with other **mental disorders**

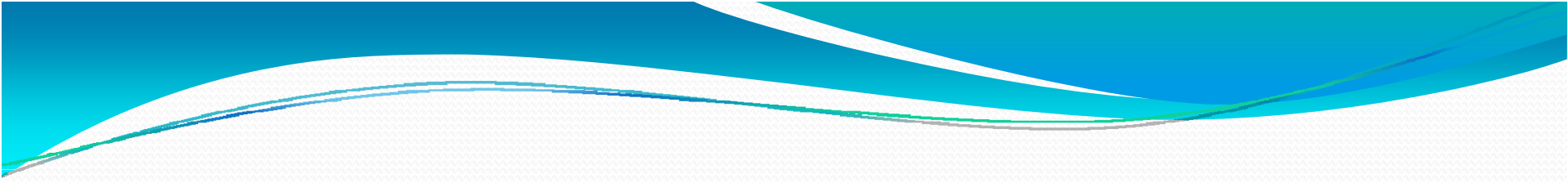
Adverse Effects of LLD

- Predispose later Axis I disorders
- Predicts continuation of Axis I disorder
- 50% comorbidity with Axis I disorders
- Initial presentation with emotional or behavioral problems is common

Adverse Effects

- Decrease in comprehension
- Decrease in attention & motivation
- Decrease in educational success
- Humiliation by classmates
- Decrease in self esteem

Parents & teachers are confused because these children are bright & successful in some areas but retarded & low achievers in some other areas specially academic ones!

- 
- School refusal
 - Somatic complaints
 - Compensatory **acting out** behaviors
 - **Oppositional** defiant behaviors
 - More than **30%** have **conduct** problems
 - Elementary school years are the most difficult
 - **40% drop out of school**



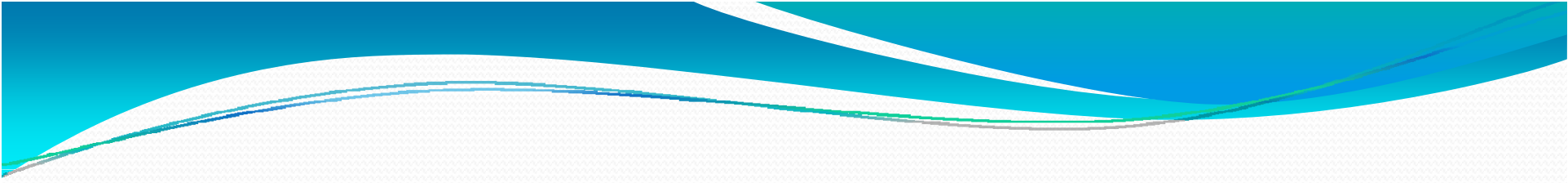
❖ Risk & prognostic factors:

- Prematurity
- VLBW
- Prenatal exposure to **nicotine**

Etiology of LLD

- LLD is **increasing** because **high risk lives** are **spared** by medical technology
- **80%** have at least one **prenatal, perinatal, or postnatal** complicating factor
- Genetic factors are important (**polygenic**)
- Higher **concordance** among MZ twins
- **Higher prevalence** in 1st degree relatives of LLD patients

Neurodevelopmental immaturity

- 
- A neurodevelopmental disorder
 - With a biological origin
 - Interaction of:
 - Genetic
 - Epigenetic
 - Environment



❖ Aggregate in families:

- 4-8 times higher in 1st degree relatives of those with RD
- 5-10 times higher in 1st degree relatives of those with MD
- Higher heritability for both reading ability & disability in both alphabetic & nonalphabetic languages
- High covariation between various learning difficulties
- Genes related to one presentation are highly correlated with genes related to another manifestation

Treatment

- Complex & **multimodal**
- Speech Language Therapy (**SLT**)
- Increasing **potentials** (Build on child's strengths)
- Decreasing **disabilities** (focus on deficient areas)
- Parents & teachers **education & support**
- Correcting **misconceptions** (not oppositional, lazy, stubborn, slow,...)
- **Special** classes & **special** teachers

Treatment (cont.)

- Computer programs helps a lot
- Social skills training groups
- Increasing self-esteem
- Dealing with forgetfulness (*notebook; 1-2 step, short, & clear commands,..*)
- No devaluation, **no** overprotection
- Treatment of concurrent disorders