

## Klinefelter Syndrome: The Learning Disability Connection An Overview

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Klinefelter syndrome is a chromosomal abnormality involving the sex chromosomes which affects males. The name came from a paper written in 1942 by Dr. Harry F. **Klinefelter**, and others, in which they described nine boys and men who had a variety of similar problems including breast development, lack of sperm production, and some hormonal abnormalities (Plumridge, Barkost, & **LaFranchi**, 1982; Klinefelter, 1984).

A study by Cohen and Durham (1985) suggested that many individuals with **Klinefelter** syndrome led normal or near-normal lives. But, as focused in this presentation, individuals with **Klinefelter** syndrome may experience, or have experienced, difficulties in school performance. Clinical findings (Nielsen & Sorensen, 1979) in boys with **Klinefelter** syndrome from Canada, Scotland, United States, Denmark, and Japan showed that 44% of the targeted boys had maladjustment for structured school situations compared to 24% of the control group. Later, follow-up of the same group by Stewart, Bailey, Netley, Rovet, Park, Gipps, and Curtis (1982) revealed that 64% of the boys with **Klinefelter** syndrome had disorders of educational achievement, while only 26% of the control group had educational achievement disorders. In one study of school-age boys with **Klinefelter** syndrome by **K. Sorensen**, A. M. Sorensen, and Nielson (1981), the results showed later speech development, frequent speech disorders, difficulty concentrating, poor attention, less interest in surroundings, lower verbal intelligence level, and lower self-esteem.

In Colorado, a follow-up study by Pennington, Bender, Puck, Salbenblatt, and Robinson (1982) was performed on boys identified by their sex **chromatin** pattern at two Denver hospitals during ten years of screening newborns. These boys were compared with chromosomally normal siblings. Of the fifteen boys with **Klinefelter** syndrome, eight had received speech therapy, four had a specific reading disorder, one had problems with handwriting, and four had problems with attention. The authors concluded that boys with sex chromosome abnormalities were at a potential genetic risk for developing learning disabilities or problems. In an Edinburgh follow-up study, a lower verbal intelligence score than performance intelligence score was found in boys with **Klinefelter** syndrome (Bancroft, Axworthy, & **Ratcliffe**, 1982).

The learning problems encountered by individuals with **Klinefelter** syndrome seem to focus on problems associated with auditory processing and language. In one study, weaknesses were found with the rate of processing auditory information, auditory memory; and expressive language in the areas of word finding, syntactic production, and narrative formulation (Graham, Bashir, Stark, **Silbert**, & **Walzer**, 1988). This was supported in a synthesis of studies by Rovet, Netley, **Keenan**, Bailey, and Stewart (1996). Out of twenty-six studies using subjects with sex-chromosome abnormalities, with **Klinefelter** syndrome as subjects in each study, the results indicated either delayed language problems, speech problems, and/ or difficulties with academics, especially reading. Rovet et. al (1996) presented findings from their twenty year study of boys with **Klinefelter** syndrome. They reported findings of verbal cognitive deficits and language-based academic problems in reading, spelling, and mathematics.

In conclusion, there is overwhelming evidence that individuals with **Klinefelter** syndrome are at an increased risk for learning problems, especially auditory processing and **language**-based learning disabilities or learning problems. If these disabilities, or problems, are not dealt with, there is an increased risk for lower academic achievement, reduced self-esteem, problems

## Klinefelter Syndrome: The Learning Disability Connection: An Overview (cont.)

with behavior, and early exit from school. But as Berch and Bender (1987) relate ... biology should not be considered destiny. Thus, learning problems could be reduced . . . if teachers and other professionals who work in the schools could be alerted and then strategies should be devised to work more successfully with individuals with Klinefelter syndrome (Todd-Goodson, 1992). Therefore, awareness and knowledge by parents and professionals are important so intervention and support can be implemented.

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## SOME BEHAVIORS ASSOCIATED WITH SPEECH, AUDITORY PROCESSING, AND/OR LANGUAGE PROBLEMS

- does not pay attention (listen) to instruction 50% or more of the time
- has difficulty following verbal direction, he often needs instructions repeated
- cannot attend to auditory stimuli for more than a few seconds
- forgets what is said in a few minutes
- has a short attention span
- easily distracted by background noise
- experiences problem discriminating between sounds
- does not comprehend as many words or verbal concepts as same age peers
- has difficulty following directions in a series
- speech developed late or unclearly
- is a poor communicator
- asks many extra informational questions
- interprets words too literally
- says "what" or "huh" often
- has problems with academics, particularly reading and written language
- makes consistent articulation errors
- exhibits dysfluencies (repetitions, prolongations, interruptions) in the flow or rhythm of speech
- has inadequate vocabulary
- has difficulty conveying messages or conversing with others
- has difficulty expressing personal needs
- has problems with social skills

## DEVELOPMENTAL MILESTONES FOR SPEECH AND LANGUAGE IN CHILDREN FROM ONE YEAR TO SIX YEARS

### Twelve Months to Twenty-four Months

- Understands “no”
- Combines two words such as, “Mama water.”
- Uses 10 to 20 words, including names
- Waves goodbye and plays pat-a-cake
- Gives a toy when asked
- Points to his or her toes, eyes, and nose
- Brings object from another room when asked

### Twenty-Four Months to Thirty-Six Months

- Identifies body parts
- Carries on a **“conversation”** with self and toys
- **Asks simple questions such as, “What’s this?”**
- **Uses two-word negative phrases such as, “No want.”**
- Forms **some plurals by adding “s”** to the ends of words
- Has a **450** word vocabulary
- Combining nouns and verbs such as, “Mommy go.”
- Understands simple time concepts like “tomorrow”
- Refers to self as “me” rather than by name
- Likes to hear same story repeated
- May say “no” when means “yes”
- Solves problems by talking instead of hitting or crying
- Answers “where” questions
- Names common pictures and things
- Uses short sentences **like “me want more”** or “me want cookie”
- Matches three or four colors, knows concepts **such as big and little**

### Thirty-Six Months to Forty-Eight Months

- **Can tell a simple story**
- Has a **sentence length of four-five** words
- Has a vocabulary of nearly **1000** words
- Names at least one color
- Understands words like “yesterday”, “lunch time”, “tonight”, “big-little”

### Forty-Eight Months to Sixty Months

- Has sentence length of four to five words
- Uses past tense correctly
- Has a vocabulary of nearly 1500 words
- Points to colors **red, blue, yellow, and green**
- Identifies triangles, circles, and squares
- Understands terms like “In the morning”, “next”, “noontime”
- Asks many questions, including “who?” and “why?” questions

### Sixty Months to Seventy-Two Months

- Has sentence length of five to six words
- Has a vocabulary of about **two thousand** words
- Knows basic concepts like “behind”, “near”, “top”, “same”, “different”
- Knows address
- **Identifies a penny, nickel, and dime**
- **Knows common opposites like “big/little”**
- **Counts ten objects**
- **Asks questions** for information
- Uses **all types of sentences** for example, **“Let’s go to the store after we eat.”**

Adapted from the *Speech & Language Milestone Chart*, published by the Learning Disabilities Association of America

## SUGGESTIONS FOR THE LEARNING DISABILITY COMPONENT TO KLINEFELTER SYNDROME Preschool and School-Age

This is a partial list of recommendations for professionals and parents to use with boys with Klinefelter syndrome who have learning problems or learning disabilities associated with auditory processing and/ or language. There are many sources, such as organizations, that can provide lists of books, other strategies, and materials to use in the classroom and in the home. It is important to remember that each boy with Klinefelter syndrome is an individual and as such, each will have different needs. If a strategy or material does not seem to work after a reasonable amount of time, try something else. **And** when a method or strategy is successful, make sure it is shared **with** the other people that are involved with that student.

### • **Strategies for classroom teachers**

- speak slower and use concrete, shorter sentences with simple syntax
- provide repetition as needed
- keep ambient noise reduced
- provide activities to work on auditory memory
- for reading comprehension, present advance organizers to help **organize**
- **structure** reading in small chunks and use a continuous checking system
- in mathematics, drill for mathematics fact and continue until mastery is achieved
- teach how to do mathematics word problems (i.e., teaching the 'language' of the **problems**)
- monitor the process used for determining an answer for mathematics (it is very difficult to "unlearn" an incorrect procedure)

### • **General suggestions for classroom teachers**

- **use** pictures and gestures when teaching
- include activities in the instructional day that teaches the student how to think and solve problems
- help the student focus his attention on the relevant features of a task
- individualize instruction, allowing the student to master basic academic skills at his own rate
- use concrete examples to demonstrate how to correctly perform the instructional task
- use direct instruction as needed
- if needed, allow and encourage the use of compensatory instruction (i.e., tape recorder, calculator, computer, dictionary)
- refer to a specialist (or **prereferral** team) if the student is unable to keep pace with the academic demands of the classroom, does not have the communication skills of his peers, or has inappropriate or immature social skills
- create a supportive environment where the students are encouraged to communicate with each other
  - arrange for activities where the student (and others) use oral language for different purposes (e.g., making a speech, leading a discussion) with different audiences (i.e., classmates, parents night)
- encourage the student to ask questions as needed
- work with the specialist to integrate appropriate language development activities in all academic instruction
- for older students, use multiple choice, rather than essay-style, when testing
- help the student move from one task to another
- use mnemonic devices to help recall

#### SUGGESTIONS FOR THE LEARNING DISABILITY COMPONENT TO KLINEFELTER SYNDROME (cont.)

- Focus for early speech and language **therapy** \*
  - stress vocabulary building
  - train sentence understanding
  - teach comprehension skills
  - give strategies for word finding

These should be used for older students as needed

- Parents' role
  - become knowledgeable about your child's learning/ language problems
  - encourage your child to tell stories and about activities about his day-help him clarify and organize what he says
  - become active participants in your child's educational program
  - consider tutoring your child on the skills being learned at school-work with the classroom teacher on the best ways to tutor
  - keep open the communication with the classroom teacher and the specialists involved with **your child**
  - educate those who work with your child about Klinefelter syndrome and the type of learning problems associated with it
  - communicate with your child that a learning disability does not mean he is "dumb", but that he learns in a different way and, perhaps, at a different pace
  - encourage activities that your child does well and/ or likes to do
  - increase knowledge about the laws related to students with special needs
  - be **supportive**, be **supportive**, be supportive

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## RESOURCES FOR LEARNING DISABILITIES

### Organizations

• Alliance for Technology Access  
2175 E. Francisco Blvd., Suite L  
San Rafael, CA 94901

(415) 455-457s

• American Speech-Language-Hearing Association (ASHA)  
10801 Rockville Pike  
Rockville, MD 20852

1-800-638-8255

e-mail: [webmaster@asha.org](mailto:webmaster@asha.org)

Web Address: <http://www2.asha.org/asha>

• Association on Higher Education and Disability (AHEAD)  
P.O. Box 21192  
Columbus, OH 43221

• Clearinghouse on Disability Information  
Office of Special Education and Rehabilitation Services  
U.S. Dept. of Education  
330 c St. SW  
Switzer Bldg., Rm. 3132  
Washington, DC 20202-2524

• Closing the Gap  
Technology in Special Education and Rehabilitation  
P.O. Box 68  
526 Henderson, MN 56044

(507) 248-3294

e-mail: [info@closingthegap.com](mailto:info@closingthegap.com)

Web Address: <http://www.closingthegap.com>

• Council for Exceptional Children (CEC)  
1920 Association Drive  
Reston, VA 22091-1589

(703) 620-3660

Web Address: <http://www.cec.sped.org>

• ERIC Clearinghouse on Adult, Career and Vocational Education  
Ohio State University  
1960 Kenny Rd.  
Columbus, OH 43210

• Learning Disabilities Association of America (LDA)  
4156 Library Road  
Pittsburgh, PA 15234

(412) 341-1515; (412) 341-8077  
Web Address: <http://www.ldanatl.org>

• Learning Disabilities Association of Canada (LDA)  
323 Chapel St., Ste 200  
Ottawa, Ontario  
Canada K1N 7Z2

• National Clearinghouse on Postsecondary Education for  
Individuals with Disabilities  
Heath Resource Center  
1 Dupont Cir. NW, Ste 800  
Washington, DC 20036-1107

• National Information Center for Children  
and Youth with Disabilities (NICHCY)  
P.O. Box 1492  
Washington, DC 20013

1-800-999-5599; (703) 893-6061

• Stuttering Foundation of America  
P. O. B o x 1 1 7 4 9  
Memphis, TN 38111-0749

### Books

*Many Ways to Learn: Young People's Guide to Learning Disabilities* (1996)  
by Judith Stem and Uzi Ben-Ami

\$12.95 plus \$4.50 for shipping

Order from:

Magination Press  
19 Union Square West  
New York, NY 10003

(212) 924-3344

## RESOURCES FOR KLINEFELTER SYNDROME

### Booklets

*Klinefelter Syndrome: The X-tra Special Boy (1982)*  
by Diane Plumridge, Christie Barkost, & Stephen LaFranchi

*For Boys Only: A Supplement (1982)*  
by Diane Plumridge, Christie Barkost, & Stephen LaFranchi

Order both from:  
Child Development and Rehabilitation  
Genetics and Birth Defects **Clinic**  
Oregon Health Sciences University  
P.O. Box 574  
Portland, OR 97307

(503) 494-8307

*Understanding Klinefelter Syndrome (1993)*  
by Robert Bock

National Institute of Child Health and Human Development  
9000 Rockville Pike  
Bethesda, MD 20892

(301) 496-5133

Web Address: <http://www.NIH.gov>

## GLOSSARY

### SELECTED TERMS RELATED TO LEARNING DISABILITIES

**Achievement Test (or Educational Test)**-A test that measures the extent to which an individual has acquired certain information or mastered certain skills.

**Aptitude Test**-A test designed to measure an individual's ability to learn.

**Articulation**-Refers to the production of speech sounds resulting from the movements of the lips, jaw, and tongue as they modify the flow of air.

**Attention Deficit Disorders (ADD)**-A term frequently used to describe the academic and behavioral problems of an individual who is having difficulty focusing and maintaining attention. Called **Attention Deficit Hyperactivity Disorders (ADHD)** when excess movement involved.

**Attention Span**-The length of time an individual can concentrate on a task without being distracted or losing interest.

**Auditory Closure**-Ability of an individual to complete a whole word, phrase, or sound based upon the presentation of only a part (e.g., hearing several musical notes and **being** able to recognize the song they represent).

**Auditory Discrimination**-Ability of an individual to detect differences in sounds: **may range from difficulty** hearing the difference between noises (i.e., gross) to difficulty hearing the difference between letter sounds (i.e., fine).

**Auditory Figure-Ground**-Ability of an individual to attend to one sound against a background of sound (e.g., hearing the teacher speak when the class is noisy).

**Auditory Memory/Auditory Attending**-Ability of an individual to retain and recall information that has been heard.

**Auditory Processing**-The rate an individual processes what they hear.

**Basic Skills**-Usually the academic subjects such as reading, writing, spelling, mathematics.

**Chronological age (CA)**-The amount of time, usually expressed in years and months, that has elapsed since an individual's birth

**Cognitive Ability-Intellectual ability: thinking** and reasoning skills.

**Criterion Referenced Test**-Designed to provide information on specific knowledge or skills possessed by an individual. Such tests usually cover relatively small units of content and are closely related to instruction. The scores have meaning to what the individual knows or can do, rather than comparing scores from an external group.

**Decoding**-1. Receptive habits in the language process that allow meaningful use of what is received either auditorily or visually. 2. Breaking down a complex structure into the simplest understandable units, or translating something that is not understood into something that is comprehended.

**Dyscalculia**-Difficulty in understanding or using mathematical symbols or functions.

Dysfluency-Also called stuttering; hesitations in or interferences with *smooth* speech.

Dysgraphia-Difficulty in producing legible handwriting with age-appropriate speed.

Dyslexia-An impairment in reading ability or a partial inability to read. Learning disability is a more generic term, and used more in an educational setting.

Dyspraxia-Difficulty in coordinating body movements such as in speaking.

Education for All Handicapped Children Act of **1975**- EHA or PL **94-142-A** federal law, described as a “Bill of Rights for the Handicapped”, that includes many provisions and special features designed to protect the rights of children with disabilities. Includes provisions for free appropriate public education, definitions of the various handicaps, priorities for special education services, protective safeguards, and procedures for developing mandatory individualized education programs.

Education Evaluation-One of the components necessary to determine whether an individual has a disability. The evaluation using consists of a battery of tests, classroom observation, and an analysis of class work.

Etiology-The cause or origin of a condition or disease.

Expressive Language-Communication through writing, speaking, and/ or gestures.

FAPE-Acronym for “free appropriate education.” One of the key stipulations of PL94142 and IDEA, which requires an educational program for **all** children without cost to parents. This stipulation does not require the best possible education, but when combined with the legal requirement for the Least restrictive environment, it implies that the individual is to receive the education and related services that **will** bring about an adequate program.

Idiopathic-Describes a condition of unknown causes.

Individuals with Disabilities Education Act (**IDEA**)-**When** PL94142, the Education *for All Handicapped Children Act*, **was** updated during the One Hundred and First Congress (**PL-101-476**), it was renamed the Individuals with Disabilities Education Act. The new act carried forth all the provisions of **PL94-142** but **also** included additional elements.

Inclusion-Connotes the expectation that for the majority of students with disabilities the least restrictive environment is in general education with support. Inclusion does not mean full time enrollment in general education but connotes that it is the preferred placement for all students and that the majority of the services will be delivered there.

Individualized Education Program (or Plan) (**IEP**)-A written education plan developed for each student identified as having a learning disability. School districts are required by law to develop these plans, in cooperation with parents. The IEP gives a statement of the student’s present levels of educational performance, annual goals, short-term objectives, specific *services needed* by the child, dates when these services will begin and be in effect, and related information.

**Individual Family Service Plan (IFSP)-A** feature of PL99457: an expanded **individualized** education program that is written for preschool children with disabilities and their **families**. The plan outlines the family's strengths and needs related to enhancing the **child's** development.

IQ-Intelligence quotient.

Learning Disabilities **(LD)-Disorders** that affect the **way an** individual learns. Individuals with learning disabilities **usually** have average or above average intelligence. Learning disabilities may cause **difficulties** in listening, thinking, **talking**, reading, writing, **spelling**, or mathematics. Excluded are learning difficulties caused by **visual**, hearing, motor problems, mental retardation, emotional disturbances, or environmental disadvantage.

Mainstreaming-The practice of placing students with disabilities into the regular classroom for at least part of the school day.

Norms-Statistics that provide a frame of reference by which meaning may be given to test scores. Norms are based upon **the actual** performance of individuals of various grades or ages in the standardization group, often from different areas of the United States, for the test. The most common types of norms are standard scores, percentile rank, or grade or age equivalent.

Phonology-The science or study of language structures and their relationship to the sound system of oral language.

Processing-The use of internal thinking **skills** such as generalizing, abstracting, classifying, and integrating to carry out thought.

Receptive Language-Language that is spoken or written by others and received by an individual.

Rehabilitation Act of 1973 **(PL93-112)-A** comprehensive piece of federal legislation that expanded **federally** funded rehabilitation services to individuals with severe disabilities. This law contains Section 504, which prohibits discrimination on the basis of disability in **all** federally assisted programs and mandates accessibility of these programs to individuals with disabilities.

Resource Room-An instructional setting where a student identified as have special needs goes for specified period of time on a regularly scheduled basis.

Resource **Room Teacher-A** specialist who works with students who have special needs.

Scatter-Variability in an **individual's** test scores.

School Psychologist- a professional who administers and interprets psychological and educational tests; assists with behavior management; provides counseling; consults with **parents**, staff, and community agencies about educational issues.

Sight Words-Words recognized on sight without aid of phonics or other word-attack skills.

**Speech Language Pathologist-A** person approved by the American Speech-Language-Hearing Association to work with children who have speech and language disorders. **Also** known as a speech clinician.

Standardized Test-A test that compares an individual's performance with the performance of a large group of similar individuals. IQ tests and most achievement tests are standardized.

Transition Services-A provision of **IDEA** that requires the **planning** and implementation of a coordinated set of activities for students with disabilities **that** promotes their successful movement from school to post school activities **including** post secondary education, vocational training, employment, adult education/services, and independent living community participation. The law basically requires that such a plan, which outlines the responsibilities of the school and other agencies, to accomplish the student's successful movement into the community, be in place for students with disabilities from age sixteen on.

Vocational Rehabilitation-service to provide diagnosis, guidance, training, physical restoration, and placement to individuals with disabilities for the purpose of preparing them for, and involving them in, employment that can help them to live with greater independence. The preferred term is now rehabilitative services.

Written Language-Encompasses all areas of writing (e.g., handwriting, capitalization, punctuation, spelling, ability to express thoughts in sentences).

#### References

*Glossary of learning disabilities terms.* [http://22.ldonline.org...aries/ld\\_glossary.html](http://22.ldonline.org...aries/ld_glossary.html)

Vergason, G.A. & Anderegg, M. L. (Eds.). (1997). *Dictionary of special education and rehabilitation* (4th ed). Denver, CO: Love Publishing Company.