

# TET 103: CHILD DEVELOPMENT (0–3 YEARS)

P. Kyalo Mulwa  
School of Education  
University of Nairobi  
Department of Educational Communication and Technology  
Email: [peter.kyalo@uonbi.ac.ke](mailto:peter.kyalo@uonbi.ac.ke)  
Mobile: +254 422 824/0771 897 750

---

---

---

---

---

---

---

---

## Lecture 5: Chromosomal and Genetic Abnormalities

### Objectives

- At the end of this lecture the learner should be able to:
  - a) Define Chromosomal abnormalities/disorders
  - b) Describe common chromosomal and genetic abnormalities/disorders
  - c) Explain the treatment of correction of the chromosomal and genetic abnormalities/disorders

05-Nov-18

TEC 103: Child development 0-3 by P. Kyalo Mulwa

2

---

---

---

---

---

---

---

---

### Introduction

- Chromosomal and genetic abnormalities are a major cause of serious developmental problems in children.
- Most chromosomal and genetic disorders are classified according to whether they are sex-linked or non-sex linked i.e. the disorders are either determined by defects in the sex-chromosomes or the autosomes

05-Nov-18

TEC 103: Child development 0-3 by P. Kyalo Mulwa

3

---

---

---

---

---

---

---

---

**SEX-LINKED ABNORMALITIES**

- Sex-linked abnormalities are a result of defects in the sex-chromosomes or defects in the genes contained in these chromosomes
- Defects in the sex-chromosomes involve:
  - The presence of extra chromosomes
  - The absence of a chromosome
  - Inactivity of a chromosome
  - Chromosomal breakage

---

---

---

---

---

---

---

---

**Presence of extra chromosome**

- Known as klinefelter's syndrome which occurs in every 1,000 live-born males
- Individuals with this condition have an extra X chromosome yielding an XXY arrangements
- This phenotype usually includes sterility, small external male sex organs, undescended testicles and breast enlargement
- About 25% of men with this syndrome are mentally retarded

---

---

---

---

---

---

---

---

**Presence of extra chromosome**

- This condition worsens as more X's are added to the genotype, and is reduced in its physical manifestations by hormone replacement therapy after usual age a of puberty
- This therapy, which involves testosterone (male sex hormone) injections must be continued for life or the male secondary sex-characteristics will not be maintained
- XYY pattern often called the Supermale syndrome appears in about 1 in 1000 male populations.

---

---

---

---

---

---

---

---

**Presence of extra chromosome**

- Men with this condition tend to be taller than average and have a greater incidence of acne and minor skeletal abnormalities
- In most studies done, the average XYY subjects were found to be of slightly lower intelligence scores than the XY control group.
- XXX triple X syndrome affects 1 in every 500 to 2500 female births
- Girls affected by this condition are no different in appearance or sexual development from normal age mates, except for a greater tendency toward tallness
- They however have a tendency of impaired verbal intelligence.

05-Nov-18 TEC 103: Child development 0-3 by P. Kyalo Mulwa 7

---

---

---

---

---

---

---

---

**Absence or Inactive Chromosome**

- Known as **Turner's syndrome** which occurs in 1 every 10,000 live born females
- In this condition one X chromosome is either absent or inactive resulting in an XO arrangement
- Individuals with this syndrome have an immature female appearance (because they do not develop secondary sex characteristics) and lack internal reproductive organs
- Ovaries do not develop prenatally and incomplete development of sex characteristics at puberty
- Other features include short stature webbed neck and sometimes mentally retarded

05-Nov-18 TEC 103: Child development 0-3 by P. Kyalo Mulwa 8

---

---

---

---

---

---

---

---

**Absence or Inactive Chromosome**

- This condition is treated through hormonal therapy in childhood to stimulate physical growth and at puberty to stimulate the development of the secondary sex characteristics special education to treat spatial ability problems.

**NB:** The individual however will remain sterile

05-Nov-18 TEC 103: Child development 0-3 by P. Kyalo Mulwa 9

---

---

---

---

---

---

---

---

**Chromosomal Breakage**

- The most serious form of chromosomal breakage occurs in an inherited syndrome called **fragile X syndrome**.
- This condition occurs in 1 in every 1,500 male birth and in 1 in every 2,000 female births
- The disorder gets its name from the fact that a small portion of the tips of the X chromosomes seems to be susceptible to breakage under certain conditions
- Children with this condition may have minor facial deformities, growth abnormalities, such as large head, large jaw and a long face

05-Nov-18

TEC 103: Child development 0-3 by P. Kyalo  
Mulwa

10

---

---

---

---

---

---

---

---

**Chromosomal Breakage**

- The unusual behavioral patterns include hand clapping, hand biting, hyperactivity, and poor eye contact
- This syndrome is also associated with mental retardation and various forms of learning disorders
- It is estimated that this syndrome is the second most common chromosomal disorder associated with mental retardation - second only to down syndrome
- About 12% of such children also have infantile autism.

05-Nov-18

TEC 103: Child development 0-3 by P. Kyalo  
Mulwa

11

---

---

---

---

---

---

---

---

- Most of the sex-linked disorders/abnormalities are inherited from the X chromosome (it is much larger than the Y chromosome)
- This is because females receive two XX chromosomes, they get two doses of X chromosome sex-linked genes, one from each of their parents
- Normal males receive only one X chromosome and therefore only one dose of X chromosome and therefore only one dose of X chromosome genes, which comes from the mother

05-Nov-18

TEC 103: Child development 0-3 by P. Kyalo  
Mulwa

12

---

---

---

---

---

---

---

---

- This asymmetry in genetic material leaves men susceptible to a number of genetic defects that ordinarily do not affect women
- For example, if a daughter has a harmful recessive gene on one X chromosome, she will usually have a dominant gene on the other X chromosome to override it. Thus the other recessive gene (X) is not expressed. A son has no complementary allele to dominate the effects of a harmful recessive gene on his X chromosome, so the harmful gene is expressed.

05-Nov-18 TEC 103: Child development 0-3 by P. Kyalo Mulwa 13

---

---

---

---

---

---

---

---

**Harmful Sex-linked Traits**

- Harmful sex-linked traits that primarily affect males include hemophilia, and color blindness.

**a) Hemophilia**

- A defect that delays the clotting of the blood
- Although this is a rare condition occurring 1 in every 4,000 to 7,000 male births, it has received a lot of publicity because of its association with AIDS
- Since hemophiliacs have episodes of bleeding that require transfusion, many hemophiliacs who received transfusions prior to the developments of procedures to safeguard the blood supply received AIDS.

05-Nov-18 TEC 103: Child development 0-3 by P. Kyalo Mulwa 14

---

---

---

---

---

---

---

---

**Harmful Sex-linked Traits**

**b) Colour blindness**

- This is another sex-linked inherited disorder is colour blindness
- A girl will be colour blind only if she receives the same gene from both parents – the father is colour blind and her mother must carry the gene for the defect
- A boy on the other hand will be colour blind if he inherits the recessive gene on the X chromosome from his mother
- He cannot inherit the trait from his mother.

05-Nov-18 TEC 103: Child development 0-3 by P. Kyalo Mulwa 15

---

---

---

---

---

---

---

---

**Harmful Sex-linked Traits**

- He cannot inherit the trait from his father because he inherits only the Y chromosome from his father, and none of the traits are expressed on it
- Besides the X-linked disorders many sex-differences reveal that the male is at more disadvantage than the female
- The rates of spontaneous abortion and infant and childhood deaths are greater for males
- Learning disabilities, behavior disorders, and mental retardation are also more common among boys
- It is possible that these sex differences can be traced to the genetic code.

05-Nov-18 TEC 103: Child development 0-3 by P. Kyalo Mulwa 16

---

---

---

---

---

---

---

---

**Harmful Sex-linked Traits**

- The female with two X chromosomes benefits from a greater variety of genes
- Nature however seems to have adjusted for the male's disadvantage - about 100 boys are born to 106 girls, and judging from miscarriages and abortion statistics more boys are therefore conceived.

05-Nov-18 TEC 103: Child development 0-3 by P. Kyalo Mulwa 17

---

---

---

---

---

---

---

---

**NON -SEX LINKED ABNORMALITIES**

05-Nov-18 TEC 103: Child development 0-3 by P. Kyalo Mulwa 18

---

---

---

---

---

---

---

---

**Assignment**

05-Nov-18 TEC 103: Child development 0-3 by P. Kyalo Mulwa 19

---

---

---

---

---

---

---

---

**....END...**

05-Nov-18 TEC 103: Child development 0-3 by P. Kyalo Mulwa 20

---

---

---

---

---

---

---

---