

Not Just XX and XY

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Many people insist that one's sex is as simple as having XX (female) or XY (male) chromosomes. It's not that simple.

HOW WE LEARN

School introduces more and more complex concepts as the student matures. Take math for example. Math education starts at the counting level (whole positive numbers). "How many cows are in this picture?" Then you learn about zero, and later negative numbers, fractions, and decimals. Maybe in high school then college, you might learn about imaginary numbers, algebra, statistics, calculus, and even weirder forms of math.

Similarly in elementary school you might learn about basic body parts, then major organs and organ systems. In high school you might learn about how your body maintains itself through homeostasis.

In elementary school you might learn about inherited traits, but then in middle school you learn about genes, and high school get into DNA and RNA. At this level you learn men have XY chromosomes and women have XX chromosomes. **K-12 education must keep material at a basic level because there isn't time to cover each subject in more detail. That doesn't mean what you learn is wrong, it just isn't the whole story.**

Just because you are educated doesn't mean you are an expert on every subject. Even my brother fell victim to the K-12 concept of gender, and his perspective was published here. ¹ This is my rebuttal.

INTERSEX CONDITIONS

Another level of genetics beyond high school is understanding intersex conditions. Intersex conditions are not transgender identities. They are discussed here because **much legislation aimed at transgender people can hurt people with intersex conditions too.**

The majority of people have either XX or XY chromosomes, corresponding to women or men. At birth you look at their genitals and conclude they are a boy or a girl. Intersex conditions arise when a person's anatomy or chromosomes are not as simple as XX or XY, and/or their genitals are not clearly what we expect for a boy or girl, often referred to as having "ambiguous genitals." Intersex conditions are also called Disorders of Sex Development (DSD) or Differences in Sex Development (also DSD) or Variations in Sex Characteristics (VSC) or Diverse Sex Development (another DSD). ²

¹ <https://thefederalist.com/2017/09/11/dont-use-female-pronouns-transgender-brother/>

² <https://www.nhs.uk/conditions/differences-in-sex-development/>

Overall, **about 1.7% of babies have an intersex condition**. Some people can go their whole lives without knowing they have an intersex condition. Intersex conditions typically have chromosomal or hormonal causes.

Chromosomal variations go way beyond the XX and XY you learned in high school.³

- A chromosome can be missing, such as 45, XO (Turner syndrome)⁴ The 45 is the number of chromosomes the person has, which is typically 46 (23 from each parent).
- Extra chromosomes can happen, including 47, XXY (Klinefelter syndrome⁵)
- The 47, XYY syndrome produces taller males with developmental disabilities.⁶
- Similarly, 47, XXX or Triple X syndrome produces taller females with developmental disabilities.⁷

Intersex conditions can result from developmental hormones being released at the wrong time, or not enough, or the hormones not being used correctly by the body.

- Congenital adrenal hyperplasia (CAH) arises when XX baby's adrenal glands produce too many androgens like testosterone.⁸ A particularly dangerous form of CAH is called "salt wasting;" it can be quickly fatal if not detected shortly after birth.⁹ Newborns are routinely tested for CAH for this reason.
- An XX baby can have an enlarged clitoris if they produce too many androgens. This type of ambiguous genitals can produce confusion whether the baby is male or female.
- An XY baby can have atypical genitals if they don't produce enough androgens. This can result in their testes not descending into the scrotum, or a small penis, or a scrotum that looks more like labia.
- An XY baby can have the opening of the urethra not located at the tip of the penis, a condition called hypospadias.¹⁰ An estimated one person in 200 has this condition, making it a very common birth defect.
- An XY baby can have partial or complete inability to use androgens. They produce testosterone but can't use it. This is called Partial or Complete Androgen Insensitivity Syndrome (PAIS or CAIS).¹¹ A baby with CAIS will appear completely female and never realize they have the condition. The only outward sign is that they are completely infertile and never menstruate.

In rare cases, Mother Nature can do really amazing things. A chimera happens when two embryos (twins) fuse in the womb, producing one offspring that has two different sets of DNA. The embryos don't have to be the same sex, so the offspring can be half male and half female.

³ <https://www.ncbi.nlm.nih.gov/books/NBK115545/>

⁴ <https://www.mayoclinic.org/diseases-conditions/turner-syndrome/symptoms-causes/syc-20360782>

⁵ <https://www.nhs.uk/conditions/klinefelters-syndrome/>

⁶ <https://rarediseases.info.nih.gov/diseases/5674/47-xyy-syndrome>

⁷ <https://rarediseases.info.nih.gov/diseases/5672/47-xxx-syndrome>

⁸ <https://my.clevelandclinic.org/health/diseases/22470-atypical-genitalia-formerly-known-as-ambiguous-genitalia>

⁹ <https://www.endocrine.org/patient-engagement/endocrine-library/congenital-adrenal-hyperplasia>

¹⁰ <https://www.cdc.gov/ncbddd/birthdefects/hypospadias.html>

¹¹ <https://www.nhs.uk/conditions/androgen-insensitivity-syndrome/>

In people a chimera can have 46,XX/46,XY chromosomes, when an XX fetus and an XY fetus merge into one person who has both male and female chromosomes. This used to be called a hermaphrodite but is now called a chimera or mosaic.¹² There are subtle differences between the latter.

There are many more possibilities, ranging in frequency from one in 1000 babies to one in 200,000 or fewer. Mother Nature is very creative! While rare there are still hundreds of thousands of people with some of these conditions. **This is why legislation that assumes only XX or XY chromosomes denies the humanity of people with these and other intersex conditions.** We are talking about over 5.5 million Americans who don't exist according to some proposed laws.

One's sex is not as black and white as many people would like.

¹² <https://academic.oup.com/humrep/article/22/4/1037/696615>