

What is Down Syndrome?

According to Centers for Disease Control and Prevention (2023) Down Syndrome, also known as Trisomy 21 happens when a baby is born with an extra chromosome. Typically, a baby is born with 46 chromosomes but an infant with Down Syndrome is born with an extra copy of the 21st chromosome. The extra chromosome causes physical and mental development challenges for the infant. Down Syndrome Resource Foundation (2023) explains that there are two other forms of Down Syndrome. The first being called Translocation, where an additional full or partial copy of the 21st chromosome is attached to a different chromosome. This is a rarer form of Down Syndrome with around three percent of people with Down Syndrome being diagnosed. The second, which is the rarest form of Down Syndrome which accounts for 1% of Down Syndrome cases is Mosaicism, this is where only some cells in the body have a full copy of the 21st chromosome and the rest of the cells are typical.

National Down Syndrome Society (No Date) state that the common physical features of an infant with Down Syndrome are, A flatter face with wide bridge of nose, almond, slanted eyes, and a tongue that sticks out of the mouth. To be shorter in stature, possible white spots on the coloured part of the eye and poor muscle tone and loose joints.

Holland et al (2011) explain that children with Down Syndrome can also have medical conditions such as congenital heart defects, visual and hearing impairments, obstructive sleep apnea, thyroid dysfunction, gastrointestinal problems, and an increased risk of infections.

How is Down Syndrome Identified ?

National Institute of Health (2019) state that Down syndrome can be identified prenatally through a variety of tests and screenings. These include a maternal serum screening, which looks for increased levels of certain hormones in the mother's blood; an ultrasound, which can identify certain physical characteristics associated with Down syndrome; and a diagnostic test such as amniocentesis or chorionic villus sampling, which can detect the extra chromosome 21 in the baby's cells. Marin et al (2011) explain that one of the benefits of amniocentesis is that the test is accurate and can diagnose genetic conditions at an early stage of pregnancy which provides parents with an opportunity to make informed decisions regarding the pregnancy and to seek medical support and advice prior to the birth of the baby. Marin et al. (2011) also explores the negative factors that the test carries a 0.5% risk of miscarriage and is an invasive procedure that can cause discomfort and bleeding for the mother. Zhang et al (2015) contests that testing that rely exclusively on biochemical and sonographic screening in the first 24 weeks of pregnancy produces a 5% false positive result and a rate of 60% to 95% detection for trisomy



Barriers to Learning

Down Syndrome Resource Foundation (2023) explains that persons with Down Syndrome will show signs of neurological and developmental delay. NHS (2023) support this but also explains that whilst all people with Down Syndrome will display some sign of learning disability, that the abilities vary in each person. Health Education England (2023) state that neurological and cognitive differences could be mild to moderate intellectual delay, behavioral issues, memory impairments and speech deficits and that there is also a higher chance of autism.

Buckley et al (2018) state that children with Down syndrome can face several barriers to learning in comparison to their peers without the condition. Clayton-Smith et al (2018) agree and report that individuals with Down syndrome may experience a variety of barriers to learning and that these can affect their ability to process and retain information, as well as their ability to interact with their environment.

Clayton Smith et al (2018) People with Down syndrome may also experience physical and medical conditions, such as hearing and vision impairments, which can further limit their ability to learn.

According to Oster et al (2018) the greatest challenge for children with Down Syndrome is cognitive barriers. Children with Down syndrome typically have an IQ of around 50-70, meaning that their intellectual capabilities may not be as developed as their peers. They often struggle to understand and remember complex concepts, struggle with memory, comprehension, and language acquisition.

Carr (2012) suggest that behavioral difficulties can also be a barrier to learning for children with Down syndrome, due to some children with Down Syndrome display signs of hyperactivity, impulsivity, and difficulty with self-regulation. Carr (2012) explains that this can make it difficult for them to stay focused in the classroom and complete tasks, as well as making it difficult for them to follow instructions.

Young et al (2020), somewhat agree but also state physical challenges are one of the greatest barriers. Due to many children with Down Syndrome having poor muscle tone, hypermobility, and poor coordination, making physical movements, and writing difficult.

Strategies

Boulet et al (2017) explain that there are many strategies that can be used to support people with Down syndrome in overcoming barriers to learning, including early intervention and educational support.

Swanson et al (2017) state that strategies can include the use of assistive technology and specialized instruction, improving access to information and increasing the ability to interact with their environment. Meyers & Seltzer (2011) state that social and emotional support improves self-esteem and self-confidence improving the ability to learn. This supports Maslow's Hierarchy of needs theory as explained by Bates (2019) where children need to have all their needs met including self esteem and confidence before they have any ability to learn.

As Pinto -Gouveia et al (2008) explains one of the strategies used in settings for children with Down Syndrome is Physiotherapy. They explain that physiotherapy interventions had a positive effect on gross motor development in children with Down Syndrome. Their review showed that children who received physiotherapy interventions showed significantly greater improvements in gross motor function compared to those who received no intervention. However, it was noted that the evidence available was limited, and further research in this was required.

Pinto-Gouveia (2011) conducted further research and compared the effects of intensive physiotherapy programs and a home-based program on the gross motor development of children with Down Syndrome. It was reported that those in the intensive intervention group had significantly greater improvements in gross motor development and that the intensive physiotherapy intervention was more effective than the home-based program in improving gross motor development in children with Down Syndrome.

Carvalho et al. (2012) conducted a controlled trial which evaluated the effect of strength training on gross motor development in children with Down syndrome. The results displayed significant improvements in the gross motor development of the intervention group compared to the control group showing that physiotherapy intervention can be effective in improving outcomes in children with Down Syndrome. Ferrari et al. (2013) supports this view as found in their study that balance training improved gross motor development in children with Down syndrome compared to the control group.

Fischer and Yochum (2014) assessed the effect of an aerobic exercise program on cardiorespiratory fitness and gross motor development in children with Down syndrome. The results showed significant improvements in cardiorespiratory fitness and gross motor skills in the intervention group compared to the control group and Koehn and Schoen (2015) found that coordination training improved gross motor development in children with Down syndrome.

Evidence from all trials showed that physiotherapy intervention in mainstream settings can only improve learning outcomes for children with Down Syndrome.

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