

Introduction

Down's syndrome has become the colloquial term used to describe the chromosomal condition known medically as Trisomy 21 or T21 (Kumin, 2012; Burack et al., 2020). The name 'Down's syndrome' originates from a paper published by a British physician, Doctor John Langdon Down, who fully described the syndrome in 1866 (Down, 1867; Tong, 2021). Down's syndrome is identified by a complex set of pathologies, caused by the presence of all or part of a third copy of the human chromosome 21 (Medline Plus, 2020). This can occur when the 46 chromosomes present in every human cell are being divided in half during early foetal development (Stanford Children's Health, 2022). However, this chromosomal abnormality was not discovered until many years later. In 1959, French human geneticist Doctor Jerome Lejeune observed 47 chromosomes in the cells of individuals with Down's syndrome instead of the usual 46 (Neri and Opitz, 2009).

According to Mencap (2022) and Centres for Disease Control and Prevention (2021a) there are 3 types of Down's syndrome:

- Trisomy 21 – accounts for approximately 95% of children born with Down's syndrome. Every cell in the body has 3 separate copies of chromosome 21 instead of 2 (Evans-Martin, 2008).
- Translocation – accounting for a small percentage of around 3% of individuals diagnosed. This type of Down's syndrome is identified by the extra chromosome 21 attaching or 'trans-locating' to a different chromosome (Gumus, 2019).
- Mosaic – affecting about 2% of children born with Down's syndrome. Mosaic refers to the combination of cell copies, with a mixture of cells with both 3 copies of chromosome 21 and other cells with the typical 2 copies. As a result of the presence of cells with a typical number of chromosomes, children with Mosaic Down's syndrome may have fewer physical attributes that are typically associated with Down's syndrome (Moncada Arita et al., 2022).

small nose,
mouth, and ears

slightly bent
5th finger

Diagnosis

Approximately 1 in every 1000 babies is born with Down's syndrome, with around 750 babies being born each year mostly as a chance occurrence (Centres for Disease Control and Prevention, 2021b; Mencap, 2022). However, the chance of having a baby with Down's syndrome increases in line with maternal age (Stern, Biron, and Moses, 2016). A diagnosis of Down's syndrome will certainly have been established long before a child starts statutory education. Currently, as a result of advances in prenatal screening and detection,

Down's syndrome can be identified during pregnancy (Huang et al., 2020). In the United Kingdom an initial screening test to assess the chances of having a baby with Down's, Edwards' and Patau's syndromes is offered between weeks 10 and 14 of pregnancy. Further tests are offered to confirm if a baby has one of the conditions if the screening test reveals a potential for a higher likelihood (National Health Service, 2021).

Down's syndrome is one of the more common chromosomal disorders which can affect physical and physiological development along with impacting on typical academic progression and resulting in challenges for learning (Akhtar and Bokhari, 2021).

Understanding Down's Syndrome

Typically, Down's syndrome is identified by a characteristic facial appearance which can include a flattened face, small ears, almond shaped eyes with the outside corners of the eyes pointing upward and a tongue that tends to occasionally protrude from the mouth (National Library of Medicine, 2020). Additionally, many children with Down's syndrome have small hands and feet and a single crease across the palm of the hands referred to as Single Transverse Palmer Crease (STPC). This term replaces the outdated 'Simian Crease' (Nicklaus Children's Hospital, 2022). Many children with Down's syndrome are affected by a variety of birth defects and weak muscle tone during infancy. Additionally, approximately half of all affected children are born with a heart defect (Ramachandran et al., 2015; Visootsak et al., 2013). Furthermore, alongside these potential physical barriers, Down's syndrome is an intellectual disability, however, this can vary considerably between individuals ranging from mild to severe with all affected individuals experiencing some form of cognitive delay, delayed development or behavioural problems (Evans-Martin, 2008; Walsh et al., 2015). Commonly speech and language develop later than in typically developing children which can present difficulties when a child starts school (Kumin, 2012). Furthermore, the speech of individuals with Down's syndrome may be difficult to understand, again further perpetuating challenges in meeting the needs of children with Down's syndrome due to difficulties expressing themselves and being understood (Down Syndrome Education International, 2022). This can potentially lead into behavioural issues such as stubbornness or tantrums, difficulties focussing on a task and occasionally obsessive-compulsive behaviour (Beswick and Hardy, 2004). Moreover, a small percentage of children with Down's syndrome are also diagnosed with Autistic Spectrum Disorder (ASD) which can further negatively affect communication along with adversely impacting on social interaction (Pisula and Niedźwiecka, 2021).

short, stocky build

almond-shaped
eyes with skin
fold covering
inner corner

white spots
on colored
part of eyes

flat, round face

Conclusion

Down's syndrome is a chromosomal condition, occurring mostly coincidentally that affects approximately 750 new families each year. With adequate support, some patience and an improved understanding, a mainstream curriculum can facilitate learning, promote academic progression and encourage positive social and emotional development.

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Support Strategies

Despite the medical complications including possible heart conditions, language delay, fine motor difficulties, problems with hearing and visual impairments, the majority of children with Down's syndrome attend mainstream school. Accessing the mainstream curriculum has better outcomes for children with Down's syndrome, however, additional support is often required (Dolva et al., 2011). Inclusive education yields benefits for all students. Research suggests that children with Down's syndrome gain not only academic benefits from mainstream inclusive education but social and behavioural advantages from being educated with their typically developing peers (Bowles and Frizelle, 2016). Support strategies for children with Down's syndrome will vary between individuals. Generally, for those with visual impairments, using larger printed resources with good contrast will be beneficial. Using bold, clear colourful pictures can be more effective than pale or pastel colours. Even if a child with Down's syndrome wears their glasses, their visual acuity will still be below normal which will also affect a child's ability to write and see the pale blue lines on a white piece of paper (Stewart, Woodhouse and Trojanowska, 2005). It can be significantly more difficult for a child with Down's syndrome to process language. Using shorter sentences and allowing more processing time are crucial approaches to supporting their needs. Avoiding negative sentences and multiple instructions in one sentence along with being mindful of word order can be essential implementations allowing comprehension of intention (Kumin, 2012). Additionally, the use of visual supports such as now and next timetables and words with picture cues can further support understanding and encourage sight word recognition (Dolva et al., 2011).

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