

What do you really know about colour blindness?

Colour vision deficiency (CVD) can have a substantial impact on children and young people's learning. This article discusses how CVD can affect people and the need for routine screening.

The Association of Teachers and Lecturers union recently surveyed their Members to find out how aware they are of colour blindness and its effect on ability to learn. The results were surprising because they revealed that only 15% of respondents said that they had one or more pupils in their setting requiring support because of colour blindness (Colour Blind Awareness, 2015).

This is at odds with the statistical occurrence of (inherited) colour blindness, which affects 1 in 12 boys and 1 in 200 girls or, put another way, at least one child in every UK (co-educational) class (of 30) (Table 1) (Colour Blind Awareness, 2015). Our studies show that approximately 80% of pupils with a colour vision deficiency (CVD) arrive in Year 7 undiagnosed despite some 70% having already had an NHS eye test.

Like dyslexia, before it was well known and well understood, colour blindness is a hidden disability and can lead to children becoming disillusioned with learning or feeling that they are stupid or less able than others. It can provide a faulty foundation for learning and even affect how well they do in their GCSE/A Level exams and their choice of career.

What is colour blindness?

Colour blindness is (usually) an inherited condition affecting people's ability to perceive colours. It is caused by 'faulty' gene-sequencing in the DNA of the X-chromosome.

'... colour blindness is a hidden disability and can lead to children becoming disillusioned with learning or feeling that they are stupid or less able than others.'

We have 3 types of cone cells in our retinas. Each type is responsible for detecting either red, green or blue light. In colour blindness the faulty sequencing means one type is unable to decipher light wavelengths correctly. Consequently the brain receives incorrect information and cannot properly interpret colour, so someone with CVD is not able to distinguish between colours normally.

There are rare forms of colour vision deficiency, such as blue blindness and monochromacy, but red and green colour deficiency is very common. Colour blindness can also be acquired as a side effect of some diseases (e.g. diabetes, sickle cell anaemia).

What do colour blind people see?

Sadly the school CVD screening programme was phased out before technology allowed us to 'see' the world through colour blind eyes. Now we can understand how difficult life can be for colour blind people in a world where even just using the internet relies upon the ability to distinguish between colours. Colour blind people can see clearly

and in focus. People with red and green deficiency commonly experience problems with reds, greens, browns and orange—all appearing as shades of 'muddy' green. Blue and yellow can be seen but can still be confused. Purple is frequently mistaken for blue because it contains an element of red, which is 'invisible'. Green deficient can mistake green for grey/red/blue, and pink and red deficient will also confuse reds with black.

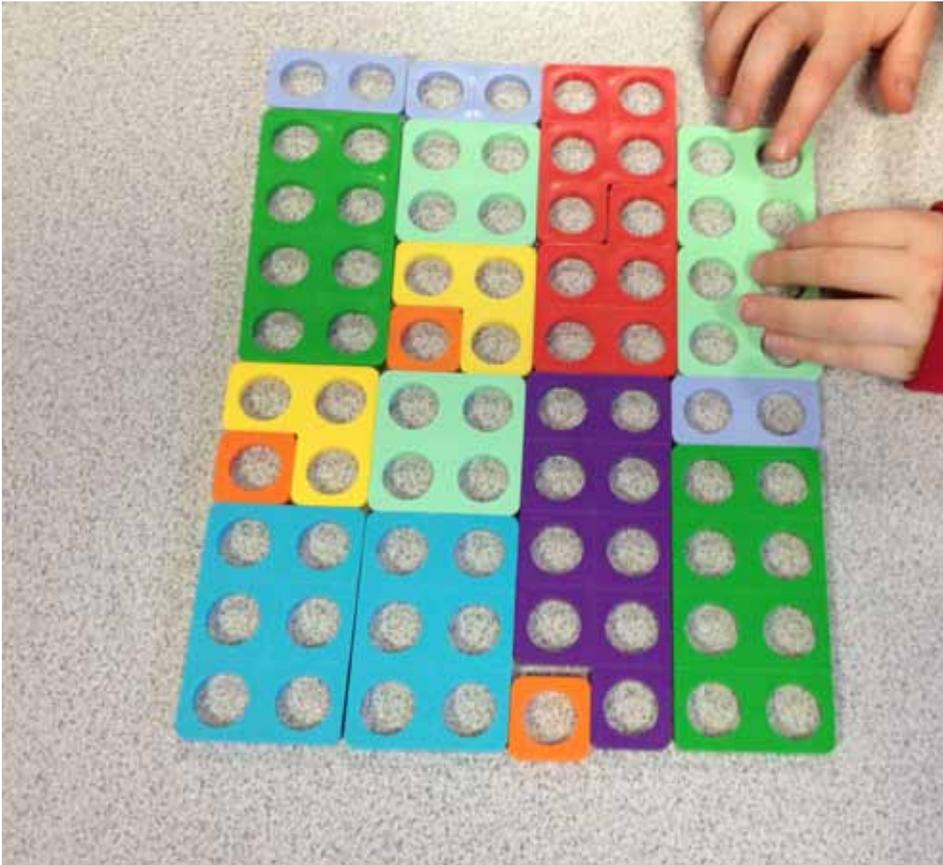
Why is this relevant to school nurses?

A fundamental aspect of the school nurse's role is to identify situations where factors relating to health or development may have an impact on the long-term outcomes for a child. In the past school nursing teams routinely screened pupils for CVD, usually with Ishihara Plates but colour vision screening is no longer mandated as part of the national *Healthy Child Programme* (2009). However, key components of the *Healthy Child Programme* (2009) such as vision screening, and growth and BMI checks are still carried out routinely for all children in reception and Year 6, which would seem ideal opportunities to reintroduce this significant early identification activity. Furthermore CVD screening is a very quick and simple test to perform with little cost or labour implications raising the question as to why

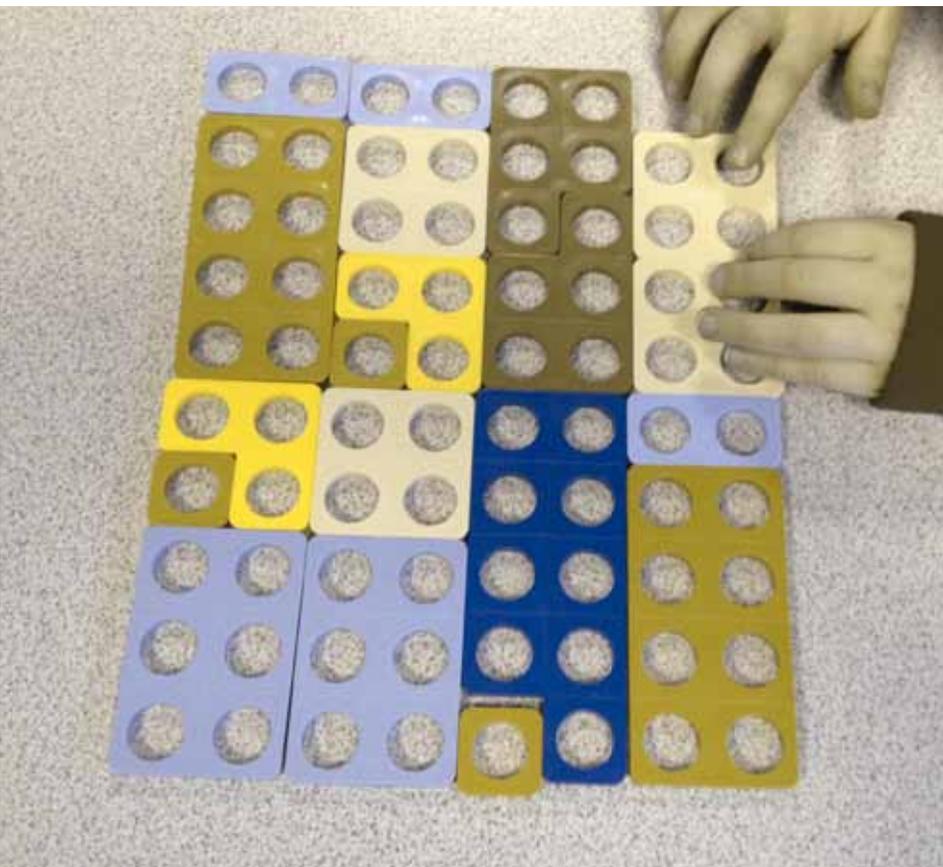
Table 1. Incidence

- CVD affects 1 in 12 boys and 1 in 200 girls
- Boys are up to 20 times more likely to have CVD than girls
- CVD affects approximately 3m people in the UK
- There are about 450 000 CVD pupils in UK schools

Kathryn Albany-Ward, Founder of Colour Blind Awareness
Michelle Sobande, school nurse, South Tees Hospitals NHS Foundation Trust; senior lecturer, Teesside University



Normal vision



Protanopia

this screening was ever abandoned from the routine screening programme in the first place.

All too often parents are not advised that their children are no longer screened for CVD so a child's CVD diagnosis can create anxiety and confusion. It should be reasonable for parents to assume that if they have taken their child for an NHS eye test the optician would automatically test for CVD, but this is not the case. Parents are unlikely to be aware that CVD testing is not a statutory part of the NHS eye test for children and it is up to the optician to decide whether or not they test for colour blindness. School staff may also often assume that these simple tests still happen as part of a child's routine screening, which can have a further impact on the confusion of the situation and can lead to some complacency around identifying the signs of CVD.

Why colour matters in school

In schools, colour is an important tool, but for colour blind students it can be a nightmare—undermining confidence, encouraging basic errors, making them slower to follow instructions, and causing frustration and even anger.

When children start school they are asked to describe the big brown dog, fill in colouring sheets and sing songs about the rainbow. If children do not understand some of what is being said, they cannot learn to full capacity.

As they progress, CVD pupils must interpret coloured maps and graphs. Colour is used to highlight information in Science, Art, Maths, Food Technology, IT, Economics, even in languages/History/English, and especially in sport.

While colour blind children can learn to identify colours through their hue and saturation they cannot see what others do. So CVD students are at a disadvantage when compared to their colour normal peers who instantly and automatically know the colour of objects and information.

While every teacher wants to be able to support colour blind students, they are thwarted because they will not have been trained in CVD; the Department for Education provides no information or advice; and perplexingly CVD is not generally considered a special educational need.

Teachers do not realise textbooks, worksheets and educational products are not designed for CVD students, so CVD children are unlikely to be supported in school. The ATL survey confirms this—over half (53.3%) of respondents said that they are somewhat aware of how colour blindness affects pupils' learning but that they do not have a pupil in their class/school/college with the condition. A quarter (26.3%) said that they were not aware of how colour blindness can affect pupils' learning.

Hence Colour Blind Awareness has set up a short survey for school nurses to collect information on the phasing out of screening and opinions about whether it should be re-introduced. We would be very grateful for further responses: <https://www.surveymonkey.com/s/3LSDVJT>

What else can school nurses do to help?

School Nurses have a key role in influencing local and national policy to raise awareness of these issues and to promote the benefits of CVD screening within the routine screening programme.

School nurses are also ideally placed to

coordinate support and act in advisory capacity for teachers and parents. They can advise:

- On classroom organisation—to ensure settings are colour blind friendly (e.g. labelled crayons/felt tips)
- To seat CVD pupils in good natural light
- Staff about resources
- Staff to look out for classic signs of colour blindness such as: inappropriate use of colour in worksheets/drawings/diagrams, unwillingness/inability to play games/sequencing, consistently holding back, slow/distracted/disruptive behaviour (because extra time is needed to process information), unexpected poor results in some tasks, holding back in sports (e.g. when team colours clash or balls/beanbags/line markings etc 'disappear'). **BJSN**

Colour Blind Awareness (2015) Association of Teachers and Lecturers (ATL) Conference 2015 debates need for educational staff to be trained to support colour blind pupils. www.colourblindawareness.org/wp-content/uploads/2015/02/ATL-2015-conference-Colour-Blindness.pdf (accessed 30 April 2015)

Department of Health, Department for Children, Schools and Families (2009) *Healthy Child Programme. From 5–19 years old*. The Stationery Office, London

Further information

Colour Blind Awareness

General information and advice for parents and teachers, articles and a special page for colour blind children can be accessed at: www.colourblindawareness.org

Colour Blind Awareness

YouTube Channel

Videos aimed at young colour blind children, parents and teachers plus infographics, TV news items and mini-documentaries can be accessed here: <https://www.youtube.com/channel/UCSaszC-5bbJr8CvE8N5NrEg>

Facebook: Colour Blind Awareness page and Colour Blind Chat Group
Twitter: @colourblindorg

Survey for school nurses: <https://www.surveymonkey.com/s/3LSDVJT>

NHS

<http://www.nhs.uk/conditions/Colour-vision-deficiency/>