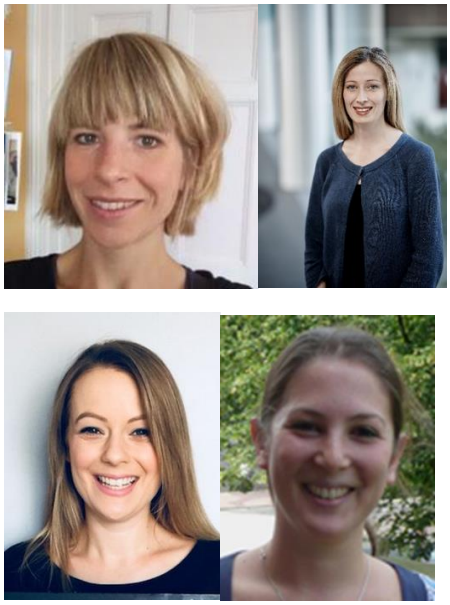
The Cerebra Centre for Neurodevelopmental Disorders

CEREBRA
Working wonders for children with brain conditions

Children and young people with rare genetic syndromes and intellectual disability

A Cerebra funded research programme

Our work on the emotion, cognition and behaviour of children and young people with rare genetic syndromes has been at the heart of Cerebra funded research for many years. The programme is led by Dr. Jo Moss (Lecturer in Developmental Psychology at the University of Surrey), Dr. Hayley Crawford (Assistant Professor at Warwick University Medical School), Dr. Jane Waite (Lecturer in Psychology at Aston University) and Dr. Alice Welham (Clinical Lecturer at the University of Leicester).



From top left clockwise: Alice Welham, Jane Waite, Jo Moss and Hayley Crawford

We are often contacted by parents, professionals or small charities that support families of children with syndromes to see if we had information on the behaviour and development that is associated with a rare syndrome. When this happened we would scour the literature and give what information we could and when we found there was not enough accurate and useful information then we would set up a project to answer the questions asked of us.

Kleefstra syndrome has been one focus of our work

This information is invaluable to parents and clinicians. Parents have a better understanding of their child's behaviour, they are often relieved to know that some behavioural characteristics are very common in a syndrome and they are more able to prioritise the challenges they face. In the last six years we have conducted the first in depth studies of behaviour in Kleefstra, Phelan-McDermid, Pitt-Hopkins, Potocki-Lupski, Pallister-Killian, 19p13.2 deletion, Rubinstein-Taybi and Lowe syndromes with Dr. Alice Welham focusing on very rare syndromes. We have also collaborated on the first descriptions of behaviour in an unusual genetic cause of Cornelia de Lange syndrome, (SM1CA mutation).

Alongside these first descriptions we have continued to investigate specific areas of concern to parents. Cerebra PhD student Effie Pearson has shown that the expressive communication problem in Angelman syndrome is mainly due to an isolated speech production deficit. This means it is likely that the children can acquire expressive communication using a different method much more quickly than is usually the case. This information is being cascaded through speech and language networks. Cerebra PhD student Laura Groves showed that between the ages of 12 and 18 years change in cognition and behaviour became evident in Cornelia de Lange syndrome. This enables specific proactive plans to be put in place to minimise the anxiety that can appear during this time. This finding led to a specific

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recommendation in International Treatment and Management Guidelines for Cornelia de Lange syndrome published in Nature Reviews Genetics.

Ed provides a saliva sample so the research team can identify genetic differences

For other syndromes we have refined or extended existing knowledge. Dr. Mary Heald identified the sensory problems that people with Angelman and Cornelia de Lange syndrome experience. From the work of PhD student Stacey Bissell, we have characterised the early problems in children with Tuberous Sclerosis Complex. We have also identified specific cognitive deficits that exist over and above intellectual disability and so cause particular problems in day to day life for people with some syndromes. In Cornelia de Lange syndrome, for example, flexible planning becomes more difficult in teenage years and Dr. Lucy Wilde's research showed that poor emotional control and impulsivity are prominent in Smith-Magenis syndrome. Remarkably, Dr. Jane Waite's work showed that verbal and visual memory appear to develop at different rates in Rubinstein-Taybi syndrome.

Visual and verbal memory develop at different rates in Rubinstein-Taybi syndrome

In each case clinicians, parents and researchers have more insight into how people experience their world and why apparently straightforward tasks might be more difficult for some people than others. These lessons can be applied to all people with complex needs.

The Cerebra Network for Neurodevelopmental Disorders will continue to conduct research in this area and make information, advice and guidance available to the families of children with rare genetic disorders.

Examples of publications

Waite, J., Beck, S., and Oliver, C. (2016). Dissociation of developmental trajectories for verbal and visuo-spatial working memory in Rubinstein-Taybi syndrome. *Journal of Autism and Developmental Disorders*, **46,** 2064-2071

Moss, J., Fitzpatrick, D., Welham, A, Penhallow, J. and Oliver, C. (2017). Genotype-phenotype correlations in Cornelia de Lange syndrome: Behavioral characteristics and changes with age. *American Journal of Medical Genetics (Part A).* **173A**, 1566-1574.

Nelson, L., Crawford, H., Reid, D., Moss, J. and Oliver, C. (2017). An experimental study of executive function and social impairment in Cornelia de Lange syndrome. *Journal of Neurodevelopmental Disorders*, 9:33.