



# Neurodevelopmental Disorders Annual Seminar 2018

21<sup>st</sup> June 2018  
Coventry University

Dear Colleagues,

Welcome to Coventry University for the Neurodevelopmental Disorders Annual Seminar 2018 (NDAS18). This year's seminar has been organised as a collaboration between Hayley Crawford (Coventry University), Jane Waite (Aston University), Caroline Richards and Lucy Wilde (University of Birmingham).

The seminar series started in 2012-2013 as a collaboration between Jo Van Herwegen, Emily Farran, and Deborah Riby and provided a platform for early career as well as established researchers to discuss the application of recently developed tools and innovative research methods to the study of neurodevelopmental disorders. Due to the success of these initial seminars, and the enthusiasm of the delegates, they formed a larger committee and launched the Neurodevelopmental Disorders Annual Seminar.

NDAS18 could not have come together without the help and contribution of many people. We thank them all. First, we would like to thank the keynote speakers, Jacqui Rodgers and Hana D'Souza, who have given up their time and travelled to be here with us. We also thank all of you who are presenting an oral presentation or a poster. We would also like to thank the rest of the NDAS committee: Jo Van Herwegen, Emily Farran, Deborah Riby, Gaia Scerif and Chris Oliver. Particular thanks go to Catherine Lavery, Pria Sandhu, Ed Ingram, and Laura Whelan who did a large amount of work behind the scenes.

We hope that you will enjoy the day and, for those of you who are attending tomorrow's workshop, we hope that you find that equally stimulating. We look forward to seeing you next year at NDAS19!

**Dates for your diary:**

**Next year's NDAS19 will be organised by University of Surrey and held on the 4th and 5th July 2019. Further details to follow!**

### **Student Bursaries**

As part of the Neurodevelopmental Disorder Annual Seminar series, we award student bursaries to contribute to the costs of conference registration and travel.

This year, we awarded three student bursaries of £50.00 each. Congratulations to this year's awardees:

Emine Gurbuz  
Emily Grew  
Elena Piccardi

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# Oral Presentation Schedule

TIME	SESSION A (CC1.3)	SESSION B (CC1.4)
8.45	<i>Registration opens</i>	
9.15	Welcome: Hayley Crawford (CC1.3)	
	<i>Theme: SOCIAL COGNITION</i> <i>Chair: Hayley Crawford</i>	<i>Theme: LANGUAGE AND COGNITIVE DEVELOPMENT</i> <i>Chair: Chris Oliver</i>
9.30	Exploring theory-of-mind in children, adolescents and adults with Autism Spectrum Conditions in a large European cohort Hannah Hayward	The role of attention in reading and maths achievement in children with and without an Autism Spectrum Disorder Emily Grew
9.50	False belief performance and its cognitive correlates in typically developing and autistic participants Ann Dowker	A longitudinal investigation of ASD and ADHD symptomatology and pragmatic language difficulties in young boys with fragile X syndrome Elise Ng-Cordell
10.10	Visual motion prediction and verbal false memory in autistic children Catherine Manning	Motor competence as a predictor of Large-scale spatial cognition in Attention Deficit Hyperactivity Disorder, Williams syndrome and typical development Emily Farran
10.30	Social camouflaging by autistic men and women Laura Hull	Communication abilities of children with Sotos syndrome: A cross-syndrome comparison with Williams syndrome Chloe Lane
10.50	<i>Coffee Break (20 mins)</i>	
	SESSION A (CC1.3)	SESSION B (CC1.4)
	<i>Theme: DEVELOPMENTAL TRAJECTORIES</i> <i>Chair: Jane Waite</i>	<i>Theme: ATTENTION AND EYE-TRACKING</i> <i>Chair: Lucy Wilde</i>
11.10	Comparing the developmental trajectory of early social cognition skills between children with Cornelia de Lange, fragile X and Rubinstein-Taybi syndromes Katherine Ellis	Characterisation of associations between social and non-social attention and later ASD symptoms in infants with tuberous sclerosis complex: an eye tracking study Charlotte Tye
11.30	Cognitive functioning and neurodevelopmental disorders across development in 22q11.2 Deletion syndrome Sinéad Morrison	The effects of social distraction on atypical attention and memory: An eye-tracking study Jacalyn Guy
11.50	Behaviours in younger and older children with tuberous sclerosis complex compared to typically developing control groups Stacey Bissell	Syndromic Autism: Progressing Beyond the Current Understanding Jennifer Glennon
12.10	<b>KEYNOTE: Hana D'Souza (CC1.3)</b>	
13.10	<i>Lunch (45 mins)</i>	

TIME	SESSION A (CC1.3)	SESSION B (CC1.4)
	<i>Theme: BIOMARKERS</i> <i>Chair: Chris Oliver</i>	<i>Theme: MENTAL HEALTH AND SLEEP</i> <i>Chair: Caroline Richards</i>
13.55	Intra- individual trial- to trial neural variability in Autism Spectrum Conditions (ASC) and Attention Deficit Hyperactivity Disorder (ADHD): A biomarker of ASC with high specificity Aikaterini Giannadou	Components underlying anxiety in williams syndrome Deborah Riby
14.15	Neurocognitive and parent-reported markers of tactile sensory processing in infants at familial risk for ASD or ADHD and age-matched control infants Elena Piccardi	University students with autism: The social and academic challenges of university life Emine Gurbuz
14.35	Alterations in electrophysiological indices of perceptual processing are associated with co-occurring emotional and behavioural problems in adolescents with ASD Virginia Carter Leno	Sleep problems and the relationship with psychiatric and neurodevelopmental difficulties in young people with 22q11.2 deletion syndrome (22q11.2DS) Hayley Moulding
14.55		Settling and waking behaviours in children with Smith-Magenis and Angelman syndromes Georgie Agar
15.15	<i>Coffee Break (15 mins)</i>	
15.30	<b>KEYNOTE: Jacqui Rodgers (CC1.3)</b>	
16.30	Closing Discussion: Chris Oliver	
17.00	<i>Wine reception and posters</i>	
18.00	<i>End of NDAS18</i>	

# Biographies for Keynote Speakers



**Hana D'Souza,**  
University of London

With her sights set on becoming a clinical child psychologist, Hana completed a Master's degree with a focus on Clinical Psychology at Masaryk University, Czech Republic. However, during her studies she spent a year at the University of Toronto, where she fell in love with developmental research. Hana went on to obtain an MSc in Psychological Research at the University of Oxford. She then completed a PhD at Goldsmiths, University of London, with Prof. Andrew Bremner and Prof. Annette Karmiloff-Smith, and is now a postdoctoral researcher at the Centre for Brain and Cognitive Development, Birkbeck, University of London.

Hana is interested in the development of attention and motor abilities, and how these interact over developmental time and constrain other domains in typically and atypically developing children. Her research focuses on infants and toddlers with neurodevelopmental disorders of known genetic origin, such as Down syndrome, fragile X syndrome, and Williams syndrome.

As part of the London Down Syndrome (LonDownS) Consortium, Hana is currently investigating individual differences and interactions between various domains and levels of description across development in infants and toddlers with Down syndrome. The LonDownS Consortium is a multidisciplinary team of human geneticists, cellular biologists, psychiatrists, psychologists, neuroscientists, and mouse geneticists, whose aim is to understand the link between Down syndrome and Alzheimer's disease, and to identify protective and risk factors that could inform interventions.



## **Jacqui Rodgers, Newcastle University**

Jacqui Rodgers is a senior lecturer and autism researcher in the Institute of Neuroscience, Newcastle University. She leads a programme of work which aims to advance the conceptualisation, assessment and treatment of mental health conditions in children and adults with neurodevelopmental disorders. She has a particular interest in anxiety in autism and with colleagues at Newcastle has developed the first ever anxiety questionnaire specifically designed for use with children with ASD, and is currently working on a version for adults. She is also involved in the development and evaluation of a range of anxiety intervention programmes for autistic children and adults. She is co-chair of both the anxiety and suicide special interest groups at the annual meeting of the International Society for Autism Research and has recently guest edited a special issue of the Journal of Autism and Developmental Disorders on anxiety in ASD.

# Abstracts for Keynote Speakers

## **Embracing complexity to understand development: The case of Down syndrome**

Hana D'Souza

Centre for Brain & Cognitive Development, Birkbeck, University of London

Development is a complex process, involving interactions between various domains across levels of description. A number of large consortia have been established in order to understand both typical and atypical development. The London Down Syndrome (LonDownS) Consortium is a multidisciplinary team of human geneticists, cellular biologists, psychiatrists, psychologists, neuroscientists, and mouse geneticists, whose aim is to understand the link between Down syndrome and Alzheimer's disease, and to identify protective and risk factors that could inform interventions. I will present data from this large scale study of Down syndrome with an emphasis on individual differences in infants and toddlers. I will then discuss how running a large battery of tasks does not necessarily mean embracing complexity. Many of our traditional developmental paradigms aim to isolate domains. The domains measured from various tasks are then correlated in order to understand how they are connected. Yet, everyday experiences *emerge* through complex interactions of various domains – such as motor ability, attention allocation, and the actions of other social agents. Thus, in order to understand typical and atypical development, it is crucial to embrace complexity by putting these interactions at the very core of our research. Findings from studies using this approach have been challenging fundamental assumptions about typical development. I will introduce some of my plans to apply this approach to understanding atypical development and explain why I believe it has the potential to reconceptualise our understanding of neurodevelopmental disorders.



# **Anxiety and Autism Spectrum Disorder**

Jacqui Rodgers

Institute of Neuroscience , Newcastle University

Anxiety is a significant problem for many autistic people. There is growing evidence that some aspects of anxiety may present differently in ASD and that ASD related features of anxiety should therefore be considered during assessment and treatment. Furthermore, when anxiety is present it is often complex. Autistic people frequently present with multiple anxiety disorders concurrently, making it difficult to develop tailored packages based on specific anxiety sub-types. Effective interventions that target trans-diagnostic anxiety related mechanisms may be a parsimonious solution offering efficient and inclusive targets for treatment.

This presentation will consider the identification, assessment and treatment of anxiety in ASD. It will go on to explore the role that a specific trans-diagnostic mechanism: Intolerance of Uncertainty (IU), may have in anxiety in ASD. During the talk we will explore potential relationships between anxiety, IU and some of the core features of ASD and consider a treatment model for anxiety, which takes these interactions into account. Building on this work evidence will be presented from two recent intervention programmes targeting IU in ASD. The first is a novel parent group intervention targeting IU in autistic children and the second is a single case experimental design study with autistic adults who participated in an individualised treatment programme targeting IU.

# Abstracts for Oral Presentations

## **Settling and waking behaviours in children with Smith-Magenis and Angelman syndromes**

Georgie Agar<sup>a</sup>, Chris Oliver<sup>a</sup>, Jayne Trickett<sup>b</sup>, Caroline Richards<sup>a</sup>

University of Birmingham<sup>a</sup>, University of Leicester<sup>b</sup>

**Background:** Problems with sleep onset and night waking are more common in Smith-Magenis (SMS) and Angelman syndromes (AS) compared to both typically developing and heterogenous intellectual disability peers. The heightened prevalence in these syndromes suggests additional internal and environmental causative and/or maintaining factors which warrant further investigation.

**Methods:** Videosomnography and actigraphy data were collected for 12 participants with AS ( $M$  chronological age = 8.01) and 11 with SMS ( $M$  chronological age = 8.80). Children with SMS showed greater adaptive functioning ( $M=65.90$ ,  $SD=11.44$ ) than children with AS ( $M=47.16$ ,  $SD=7.94$ ). The groups were well matched on number of nights of footage ( $t(21) = 1.575$ ,  $p=.130$ ), and mean sleep duration across these nights ( $t(21) = 2.073$ ,  $p=.051$ ). Settling (30 minutes prior to sleep onset) and night waking were coded for twenty-one behaviours using a live coding scheme, relating to pain, challenging behaviour and interactions with caregivers. In total, 173 clips were coded (5,190 minutes).

**Results:** Inter-rater reliability for the behavioural codes was good (mean  $\kappa = 0.74$ ; range 0.54-1.00). Significant differences in behaviours shown during settling and waking between groups and between individuals were obtained. Lag sequential analyses demonstrated that children and parents used a hierarchy of behaviours when attempting to re-settle to sleep after waking.

**Conclusions:** The results highlight indicators of pain and environmental factors which may differentially maintain sleep problems in children with AS and SMS. The implications of these findings for the underlying aetiology of sleep problems in AS and SMS and the potential for intervention approaches will be discussed.

# **Behaviours in younger and older children with tuberous sclerosis complex compared to typically developing control groups**

Stacey Bissell, Lucy Wilde, Chris Oliver

University of Birmingham

**Introduction:** Tuberous sclerosis complex (TSC) is a genetic disorder associated with benign tumour growth, epilepsy, and intellectual disability. A number of behaviours are also associated with this disorder, including: self-injury, aggression, impulsivity and repetitive behaviours. The aim of this study was to explore the behaviour profiles of younger (aged 1-4 years) and older children with TSC (aged 5-11 years), and to determine whether these behavioural profiles were developmentally appropriate when matched according to gender and chronological age to their typically developing (TD) peers.

**Method:** Caregivers of younger ( $n = 21$ ;  $M$  age = 2.81,  $SD = 1.05$ ) and older children with TSC ( $n = 21$ ;  $M$  age = 9.22,  $SD = 1.06$ ), and caregivers of TD children, completed questionnaire measures of adaptive functioning and behaviours (e.g., challenging behaviour, impulsivity, overactivity, repetitive behaviours).

**Results:** Younger children with TSC had significantly higher rates of overactivity and stereotyped behaviour, and lower rates of insistence on sameness than older children with TSC. Compared to the younger TD group, self-injury severity was significantly higher, whereas rates of overactivity did not differ. Relative to their TD peers, both younger and older children with TSC showed higher rates of impulsivity and stereotyped behaviour, and lower mood.

**Discussion:** It is important to take into account chronological age when investigating behaviours in TSC, to determine those that are characteristic of the disorder (e.g., impulsivity), and those that may be developmentally appropriate (e.g., overactivity).

# **False Belief performance and its cognitive correlates in typically developing and autistic participants**

Ann Dowker, Lucy Elliott

Oxford University, St Hilda's College, Oxford

Children with autism have been consistently found to be delayed in false belief tasks compared to typically developing children. There are debates as to whether this involves a specific false belief deficit in autism, or whether false belief is secondary to other cognitive abilities such as language and executive function. Emotion understanding is also delayed in autistic children, but even less is known about the specificity of this deficit. The present study included 23 seven-to -19-year-olds with autism; and 31 typically developing four-to six-year-olds. All carried out Jarrold et al's (2000) set of false belief tasks; a researcher-devised test of emotion understanding; Diamond et al's (2002) Day/Night test of Executive Function (inhibition); and the British Picture Vocabulary Test. The typically developing group obtained significantly higher scores than the autistic group on most tests; but after controlling for Age and Vocabulary raw score, only the difference in False Belief remained significant. Within the autistic group, False Belief correlated significantly with Emotional Understanding, Executive Function and Vocabulary. Emotion Understanding correlated with Vocabulary but not with any other scores. Within the typically developing group, there were no significant correlations between the cognitive tasks. Thus, False Belief seemed to be related to other cognitive abilities in the autistic but not the typically developing group. This suggests that, contrary to some theories, False Belief may in fact be a more independent function in typically developing children than those with autism.

# Comparing the developmental trajectory of early social cognition skills between children with Cornelia de Lange, fragile X and Rubinstein-Taybi syndromes

Katherine Ellis<sup>a</sup>, Chrisi Stefanidou<sup>b</sup>, Laurie Powis<sup>c</sup>, Ian Apperly<sup>c</sup>, Jo Moss<sup>c</sup>,  
Chris Oliver<sup>c</sup>

Aston University<sup>a</sup>, Anglia Ruskin University<sup>b</sup>, University of Birmingham<sup>c</sup>

**Aims:** Individuals with Cornelia de Lange (CdLS), Fragile X (FXS) and Rubinstein-Taybi syndromes (RTS) show distinct socio-behavioural phenotypes. Those with disorders characterised by atypical social profiles (e.g. Autism Spectrum Disorder) evidence divergent developmental trajectories of social cognitive skills, which may underpin their social development. This study compared the developmental sequence of early social cognitive skills that may underpin socio-behavioural phenotypes in children with CdLS, FXS and RTS.

**Method:** Twenty-two children with CdLS (Mage=77.98 months, SD=39.46), nineteen with FXS (Mage=71.70, SD=30.40) and eighteen with RTS (Mage=110.61, SD=45.95) participated in the 'Early Social Cognition Scale' (Powis, 2014), to assess abilities that require early understanding of others' intentions.

**Results:** Development of early social cognition skills was overall delayed in children with CdLS, FXS and RTS relative to their non-verbal mental age. Scalogram analyses revealed that none of these syndromes passed tasks in the same order observed in typical development. Pairwise comparisons between tasks of increasing difficulty within each syndrome group revealed spared and impaired abilities across these groups. Prior corrections for multiple comparisons, children with CdLS ( $p=.04$ ), FXS ( $p<.01$ ) and RTS ( $p=.04$ ) found tasks that required understanding simple intentions in others significantly easier than tasks requiring responding to and using joint attention. Following corrections, this difference remained only in children with FXS ( $p<.01$ ).

**Conclusion:** Results suggest there may be an underlying mechanism other than general cognitive ability disrupting social cognitive development in children with CdLS, FXS and RTS. The observed pattern of strengths and weaknesses highlights factors that may lead to disrupted social cognition in these syndromes.

# **Motor competence as a predictor of Large-scale spatial cognition in Attention Deficit Hyperactivity Disorder, Williams syndrome and typical development**

Emily Farran<sup>a</sup>, Aislinn Bowler<sup>a</sup>, Hana D'Souza<sup>b</sup>, Leighanne Mayall<sup>a</sup>, Annette Karmiloff-Smith<sup>b</sup>, Elizabeth Hill<sup>c</sup>

Department of Psychology and Human Development, UCL Institute of Education, University College London<sup>a</sup>, Centre for Brain and Cognitive Development, Department of Psychological Sciences, Birkbeck, University of London<sup>b</sup>, Department of Psychology, Goldsmiths, University of London, London<sup>c</sup>

Attention Deficit Hyperactivity Disorder (ADHD) is the most prevalent neurodevelopmental disorder during childhood. Despite evidence of a co-occurring motor impairment in this group, little is known about the motor system in ADHD. Using a cross-syndrome comparison with Williams syndrome (WS), who also show impaired attention and motor skills, we addressed the developmental consequences of impaired motor skills by establishing the relationship between the motor system and navigation (assessed using virtual reality) in ADHD. Based on evidence from typically developing (TD) infants, that crawling and walking ability predict spatial performance, we predicted that impaired motor ability would be a limiting factor to the development of spatial cognition. Participants with ADHD (N=43), WS (N=200) and TD (N=71) children took part. The ADHD group was split into and ADHD high motor (ADHD-H: N =24) and an ADHD low motor (ADHD-L: N=19) group, based on the zones of the Bruininks-Oseretsky Test of Motor ability 2 (BOT2). Surprisingly, navigation performance in the ADHD-L group did not differ from that of the ADHD-H group or the TD group. In contrast, the WS group demonstrated deficits in motor ability and in navigation. Motor ability was correlated with navigation (after controlling for age) in the TD group only. This suggests that impaired motor ability in ADHD does not limit the development of large-scale spatial ability. Equally, it appears that the deficits in motor ability and in spatial cognition in WS represent independent impairments.

**Intra- individual trial- to trial neural variability in Autism Spectrum Conditions (ASC) and Attention Deficit Hyperactivity Disorder (ADHD): A biomarker of ASC with high specificity**

Aikaterini Giannadou, Elizabeth Milne, Megan Freeth

University of Sheffield

Intra- individual trial- to trial neural variability is suggested as a potential measurable indicator of the presence of ASC. High functioning individuals with ASC show greater neural variability compared to individuals without ASC. A similar pattern has been observed in ADHD, a disorder that shares genetic risk factors with ASC. The aim of the present study was to test the specificity of the biomarker and explore overlapping or shared neural mechanisms in ASC and ADHD. EEG was used to measure neural variability, in the form of inter-trial phase coherence (ITPC), in an ASC (N=28), ADHD (N=32) and a neurotypical (N=34) sample. There was a significant difference between groups as determined by a one-way ANOVA ( $F(2,91)=4.475, p=0.014$ ). Post-hoc tests revealed that ITPC values were significantly lower in the ASD group than the ADHD ( $p=0.022$ ) and the neurotypical group ( $p=0.034$ ), suggesting that increased neural variability is specific to the ASC group. The information obtained will advance our understanding of the etiology of ASC and the identification of such biomarkers will contribute towards the development of tools to diagnose ASC at an early stage.

## **Syndromic Autism: Progressing beyond the current understanding**

Jennifer M. Glennon, Hana D'Souza, Luke Mason, Annette Karmiloff-Smith,  
Michael S. C. Thomas

Centre for Brain and Cognitive Development, Department of Psychological  
Sciences, Birkbeck College

Down syndrome (DS) and fragile X syndrome (FXS) are associated with elevated risk of autism relative to the general population. Yet despite reaching clinical thresholds, there are suggestions that these 'syndromic' forms of autism are symptomatically distinct when compared to the idiopathic or 'non-syndromic' autism phenotype. The current study employs a variety of well-established eye tracking paradigms to investigate the visuo-attentional correlates of autistic trait variation in children with DS and FXS aged between 6 and 10 years. These groups are matched on chronological age and intellectual ability with children with idiopathic autism and neurotypical controls. Visual orienting difficulties ('sticky attention') and enhanced visual search performance (considered to reflect a local/featural processes bias) have been documented in children with idiopathic autism. We want to know if autistic trait variation in children with DS and FXS is similarly underpinned by visual orienting and visual search abilities. We use cross-sectional developmental trajectory analyses to generate visuo-attentional profile comparisons. This study provides insight into the complex heterogeneity associated with syndromic autism presentations and autism per se, with clinical implications for the utility of autism intervention programmes in DS and FXS populations.



# **The role of attention in reading and maths achievement in children with and without an Autism Spectrum Disorder**

Emily Grew, Deborah Riby, Mary Hanle

Durham University

Attention abilities provide the gateway for learning in all domains, including reading and maths. Although not a core feature of Autism Spectrum Disorder (ASD), attention atypicalities have been well-documented (Ames & Fletcher-Watson, 2010). However, little research has investigated the role of attentional atypicalities in academic achievement in ASD. Twenty-seven children with ASD aged between 6 and 16 years ( $M = 10.75$ ) and 61 typically developing children aged between 6 and 11 years ( $M = 8.94$ ) completed standardised assessments of FSIQ, selective, sustained, and divided attention, and reading and maths achievement. Correlational analyses showed that attention abilities were related to reading and maths achievement, but differently for children with and without autism. A hierarchical cluster analysis of achievement profiles for all children revealed sub-groups of different profiles of achievement relating to divided attention. For example, 79% of children in the group with poor attention and poor achievement were children with autism. Inspection of the profile of this group indicated that although FSIQ was in the average range ( $M = 86$ ) as was reading achievement ( $M = 81$ ), these children appeared to have a relative weakness with maths achievement ( $M = 73$ ). Children with average or above-average attention and achievement showed no such weakness. Overall, the findings suggest that the ability to divide attention between two tasks (in this case, auditory and visual) may be more important than sustained or selective attention skills for academic achievement, and that divided attention may be particularly important for children with autism in relation to maths achievement.

# **University students with autism: The social and academic challenges of university life**

Emine Gurbuz, Deborah Riby, Mary Hanley

Durham University

The number of university students with an Autism Spectrum Disorder (ASD) is significantly increasing (e.g. MacLeod & Green, 2009; White et al., 2011). The current study investigated the social and academic experiences of students with an ASD compared to university students without an ASD. An online questionnaire was completed by 26 ASD students and 158 non-ASD students, all of whom were currently enrolled at a UK university. The questionnaire contained both Likert scale items and open-ended questions to combine the use of quantitative and qualitative data and insights. ASD students reported significant challenges and a higher level of mental health difficulties than non-ASD students. For example, over 50% of ASD students reported mental health difficulties compared to 17% of the non-ASD students. Significant challenges focused on the social components of university life, including social skills, support, and the awareness of ASD by others. Relative strengths were reported regarding academic skills, but these occurred alongside the social challenges. There were more thoughts of withdrawal by ASD students, highlighting the need for support mechanisms, especially focusing on the social aspects of being at university and having an ASD. These data are important for the design of student support services that meet the needs of university students with an ASD.

# **The effects of social distraction on atypical attention and memory: An eye-tracking study**

Jacalyn Guy<sup>a</sup>, Elise Ng-Cordell<sup>a</sup>, Brianna Doherty<sup>b</sup>, Mihaela Duta<sup>a</sup>, Gaia Scerif<sup>a</sup>

University of Oxford<sup>a</sup>, University of California, San Francisco<sup>b</sup>

The behavioural phenotypes in autism spectrum disorder (ASD) and fragile X syndrome (FXS) are characterised by attention and socio-communicative difficulties and anxiety. While there is an emerging body of research on the relationship between social attention and anxiety in both of these conditions, the effects of social attention and distraction on learning and memory remain unclear. Furthermore, little is known about how these relationships differ among boys and girls. Recent research suggests that typically-developing (TD) children are distracted by social information, which affects their memory. In this current, ongoing study, we extend this work to samples of boys and girls with ASD and FXS.

The aims of the study are to (1) examine how children with ASD and FXS attend to, learn, and remember information in conditions of social and non-social distraction, using behavioural and eye-tracking measures, and (2) explore how individual differences along dimensions that distinguish individuals with ASD and FXS (e.g. inattention, anxiety, and social functioning) influence attention and memory.

We are comparing performance on a visual search and memory task in children with typical development, ASD, and FXS. To date, preliminary findings suggest age- and group-specific patterns of attention and memory. We further hypothesize that differences in attention and memory will be driven by group-level differences in social distraction, and individual-level differences in social anxiety and functioning. This novel project will provide useful insights for understanding and supporting learning and social behaviour in young people with ASD and FXS.

# **Social camouflaging by autistic men and women**

Laura Hull, William Mandy, Meng-Chuan Lai, Simon Baron-Cohen, Carrie Allison, Paula Smith, Konstantinos Petrides

University College London

**Introduction:** Social camouflaging behaviours (strategies used to compensate for or mask autistic characteristics during social interactions) are widespread amongst autistic individuals. There are currently no self-report measures of camouflaging. Previous research has suggested autistic females camouflage to a greater extent than males, but no research has yet measured camouflaging in non-autistic males and females.

**Aims:** To develop and validate a self-report measure of autistic camouflaging (CAT-Q), based on autistic adults' experiences. To compare levels of camouflaging in autistic and non-autistic male and female adults.

**Methods:** Autistic adults' descriptions of camouflaging behaviours were combined with researchers' and clinicians' suggestions to produce items for the CAT-Q, which was administered online to adults with ( $n = 283$ ) and without a diagnosis of autism ( $n = 414$ ). Psychometric assessment was used to refine and test the final 25-item questionnaire. Mean differences on total camouflaging score were compared across gender and diagnostic group, controlling for autistic traits.

**Results:** The CAT-Q is a reliable and valid self-report measure of social camouflaging in autism. An interaction between gender and diagnostic group was found. Autistic females camouflage to a greater extent than autistic males ( $\eta^2 = .078$ ). There is no significant difference in camouflaging levels between non-autistic females and males.

**Discussion:** Gender differences in social camouflaging exist only in autistic adults, suggesting a differential presentation of autism amongst females. Camouflaging is a common behaviour and should be taken into account during autism assessments, to ensure autistic individuals can maximise the benefits and address any harmful consequences of camouflaging.

# Exploring theory-of-mind in children, adolescents and adults with Autism Spectrum Conditions in a large European cohort

Hannah Hayward , Karen Ashwood, Francesca Happe, Jumana Ahmad, Rosemary Holt, Daisy Crawley, Antonia San Jose Caceres, Simon Baron-Cohen, Meng-Chuan Lai, Declan Murphy, Eva Loth and the EU-AIMS LEAP Group

Institute of Psychology, Psychiatry and Neuroscience, King's College London

**Background:** ‘Theory of Mind’ (ToM) hypothesis is a prominent account of social-communicative impairments in ASC; the ability to ascribe mental states to others/self to predict behaviours (Baron-Cohen, et al., 2000). Studies report many adolescents/adults with ASC pass ‘first-order’ tasks, yet struggle in social situations (Klin, 2000). This has led to the distinction between ‘first order’ ToM abilities (e.g. ‘false belief’ measured in a continuous manner by the “Sandbox” task (Begeer et al., 2012)), and perhaps more pervasive impairments in spontaneous usage (Klin, 2000; Volkmar et al., 2004). One paradigm that taps spontaneous attribution of mental status is the ‘animated shapes’ task that elicits a (verbal)ToM response more akin to the “social demands” inherent in real-life.

**Objectives:** To investigate false belief and spontaneous ToM usage in a mixed sex cohort of males and females with ASD across different ages and IQ. Associations between ToM and social-communicative abilities will also be examined

**Methods:** Participants with ASCs (N=363) and age-matched typically developing (TD) participants (N=262) recruited as part of EU-AIMS Longitudinal European Autism Project (LEAP). A battery of cognitive tasks included the Frith-Happe Triangles animations ‘Animated Shapes’ task (Abell et al 2000; Castelli et al., 2002) and the continuous false belief ‘Sandbox’ task to assess theory of mind. The ‘Triangles’ task were audio-recorded/transcribed/analysed for “accuracy” (I.e. correct inference of underlying scenarios) and “psychological state descriptions” (i.e. use of mental state terms) using a scoring system developed by the authors, based

on Castelli (2000). 100% of the narratives were scored by two raters at each LEAP site, inter-rater reliability was above 91% across.

IQ assessed using the WASI, autism symptomatology using the (parent-report) Social Responsiveness Scale (SRS-2), adaptive functioning using the Vineland (VABS-III).

2 (group) x 2 (sex) x 3 (age group: child, adolescent, adult) between-subject ANOVAs were used.

**Results:** Both tasks revealed moderate correlations in both groups (ASC:  $r = .25, p = .01$ ; TD:  $r = .14, p = .05$ ). The “Sandbox” task found a significant effect of group ( $F(1,516) = 8.403, p < .05, d = 0.24$ ) with the ASC group performing significantly worse (i.e. greater egocentric bias) than TDs. No group differences found on the ‘Triangles’ task. Significant effect of sex ( $F(1,609) = 6.938, p < .05, d = 0.28$ ) (females < males) and age ( $F(3,609) = 33.349, p < .001$ ) (children < adolescents < adults) found, effects do not hold with diagnosis. The ‘triangles’ task was moderately correlated with ASD symptomatology in both groups (TD;  $r = -.31, p < .01$ , ASC;  $r = -.21, p < .01$ ). ‘Sandbox’ task correlated with ASC symptomatology in the ASC group only ( $r = -.16, p < .01$ ). In the ASC group, the ‘triangles’ task was correlated with adaptive behaviour ( $r = -.14, p = .05$ ) in males, and adolescents (social domain,  $r = -.23, p = .05$ ). TD group; the ‘triangles’ task correlated with Communication ( $r = -.20, p = .05$ ). The continuous FB task correlated with adaptive behaviour in the ASC group, (daily living ( $r = .22, p = .01$ ); communication ( $r = .15, p = .05$ ); social ( $r = .30, p = .01$ )) in males. In the TD males, it correlated with all domains of adaptive behaviour.

**Conclusion:** We report group differences in prompted ToM usage, though find no group deficits in spontaneous ToM usage in individuals with ASC.

# **Communication abilities of children with Sotos syndrome: A cross-syndrome comparison with Williams**

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Sotos syndrome and Williams syndrome are distinct congenital syndromes associated with intellectual disability, as well as a profile of relative strength in verbal ability, compared with nonverbal reasoning ability. Previous research indicates that Sotos syndrome is associated with expressive and receptive language difficulties but communication abilities, such as language structure and pragmatic language have not been explored. Williams syndrome is typically associated with relative pragmatic language deficits. The aim of this study was to investigate the communication abilities of children with Sotos syndrome and specifically, to determine whether Sotos syndrome and Williams syndrome are associated with similar communicative profiles or whether these are syndrome-specific. Communication abilities were assessed using the Children's Communication Checklist, second edition (CCC-2). This 70-item questionnaire assesses language structure skills and pragmatic language skills, as well as social abilities and restricted interests. The CCC-2 was completed by the parent/caregiver of children with Sotos syndrome ( $n = 29$ ) and children with Williams syndrome ( $n = 34$ ). Both groups had similar overall communicative ability, as assessed by General Communication Composite (GCC) scores (Sotos syndrome,  $M = 26.03$ ,  $SD = 13.93$ ; Williams syndrome,  $M = 26.82$ ,  $SD = 10.60$ ). Analysis of the language structure profiles and pragmatic language profiles revealed that children with Sotos syndrome and children with Williams syndrome have similar language structure profiles but differences in pragmatic language profiles. This is the first cross-syndrome comparison of Sotos syndrome and Williams syndrome. Overall, the findings indicate that, despite similar overall communicative ability, these syndromes are associated with distinct pragmatic language profiles.

# **Alterations in electrophysiological indices of perceptual processing are associated with co-occurring emotional and behavioural problems in adolescents with ASD**

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Many young people with autism spectrum disorder (ASD) experience emotional and behavioural problems. However, the causes of these co-occurring difficulties are not well understood. Perceptual processing atypicalities are also often reported in individuals with ASD, but how these relate to co-occurring emotional and behavioural problems remains unclear. Event-related potentials (ERPs) were recorded in response to both standard and deviant stimuli in an auditory oddball paradigm in adolescents (mean age 13.56 years, range = 11.40-15.70) with ASD (n=43) with a wide range of IQ (mean IQ 84.14, range 27-129). Response to deviant as compared to standard stimuli (as indexed by the mismatch negativity; MMN) and response to repeated presentations of standard stimuli (habituation) were measured. Multivariate regression tested the association between indices of perceptual processing and emotional and behavioural problems. Greater perceptual sensitivity, as indexed by increased MMN amplitude, was associated with higher levels of behaviour problems. MMN amplitude also showed a trend positive correlation with sensory hypersensitivity. Greater habituation at the N2 component was associated with higher levels of emotional problems. Upon more detailed analyses, this appeared to be driven by a selectively greater ERP response to the first (but not the second or third) standard stimuli that followed deviant stimuli. All results remained in covariation analyses adjusting for age, sex and IQ, although the association between MMN amplitude and behaviour problems became non-significant when adjusting for ASD severity. Findings suggest that alterations in perceptual processing may be important for understanding emotional and behavioural problems in people with ASD.



# **Visual motion prediction and verbal false memory in autistic children**

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Recent theories propose that atypical predictive processing has a causal role in many aspects of the autism phenotype, from sensory processing to social symptoms, and that difficulties in making predictions may be related to reduced contextual processing. Despite the potential of these new theoretical accounts, there is relatively little empirical evidence for impaired prediction abilities in autism. In this pre-registered study, 30 autistic children aged 6–14 years and 30 typically developing children matched in age and non-verbal IQ completed visual extrapolation and false memory tasks to assess predictive abilities and contextual processing, respectively. In the visual extrapolation tasks, children were asked to predict when an occluded car would reach the end of a road and when an occluded set of lights would fill up a grid. Autistic children made predictions that were just as precise as those made by typically developing children, across a range of occlusion durations, with Bayesian analyses showing support for the null hypothesis. In the false memory task, autistic and typically developing children did not differ significantly in their discrimination between items presented in a list and semantically related, non-presented items, although the data were insensitive, suggesting the need for larger samples. Our findings provide an important test of rapidly developing theories and suggest that autism is not characterised by pervasive impairments in prediction. Further studies will be required to assess the relationship between predictive processing and context use in autism, and to establish the conditions under which predictive processing may be impaired.

## **Cognitive functioning and neurodevelopmental disorders across development in 22q11.2 Deletion Syndrome**

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Young people with the chromosomal disorder 22q11.2 Deletion Syndrome (22q11.2DS) often have difficulties with cognitive functioning and high rates of neurodevelopmental disorders such as Autism Spectrum Disorders (ASD) and Attention Deficit Hyperactivity Disorder (ADHD). Better understanding of the relationship between cognition and behaviour across development in a group with a well characterised genomic lesion can provide insights into underlying mechanisms of neurodevelopmental disorders.

63 children and 62 adolescents with 22q11.2DS completed assessments to establish ASD and ADHD symptomatology as well as assessments of cognitive functioning which have been linked to these neurodevelopmental disorders; sustained attention, processing speed and working memory. 59 of their unaffected siblings (23 children and 36 adolescents) also participated and their cognitive functioning performance was taken into account as a typically developing control group in the analysis.

Adolescents with 22q11.2DS displayed less deficits in working memory than children compared to control siblings ( $p=0.039$ ). There were interactions between presence of ASD symptomatology and developmental stage on cognitive deficits in all domains with adolescents with ASD symptomatology performing worse than children with ASD symptomatology (sustained attention,  $p=0.016$ ; processing speed,  $p=0.022$ ; and working memory,  $p=0.006$ ). ADHD symptomatology was associated with greater sustained attention deficits ( $p=0.224$ ). These findings suggest that relationships between different neurodevelopmental disorders and cognitive deficits may vary across developmental stages.

# **Sleep problems and the relationship with psychiatric and neurodevelopmental difficulties in young people with 22q11.2 deletion syndrome (22q11.2DS)**

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Cardiff University

**Background:** Severe sleep problems are common in young people with neurodevelopmental disorders. Little is known about the prevalence and nature of sleep problems in 22q11.2 deletion syndrome (22q11.2DS). This study aimed to identify the prevalence and nature of sleep problems in young people with 22q11.2DS compared to their unaffected siblings, and associations with neurodevelopmental difficulties (psychiatric, neurocognitive and development coordination domains).

**Method:** 133 young people with 22q11.2DS (mean age 10.1 years, s.d.= 2.45) and 61 unaffected sibling controls (mean age 11.0 years, s.d.= 2.24) were assessed for sleep problems, ADHD and anxiety symptoms using the Child and Adolescent Psychiatric Assessment (CAPA). The Social Communication Questionnaire was used to assess Autism spectrum disorder (ASD) symptoms. Neurocognitive measures were measured using the Cambridge Automated Neurocognitive Test Battery, the Wechsler Abbreviated Scale of Intelligence and set-shifting ability by the Wisconsin Card Sorting Task (WCST). The Developmental Coordination Disorder Questionnaire identified motor symptoms.

**Results:** Young people with 22q11.2DS showed elevated rates of sleep problems compared to controls (59% vs. 21%,  $p < 0.0001$ ). Two sleep patterns were identified: restless sleep/tiredness was associated with higher ADHD (OR=1.15,  $p = 0.001$ ) and anxiety (OR=1.09,  $p = 0.008$ ) symptoms and worse set-shifting ability. Greater impairment in development coordination was found to be associated with insomnia (OR=1.04,  $p = 0.023$ ).

**Conclusions:** There is a lack of research into sleep problems in 22q11.2DS and clinicians may not be aware of the elevated frequency. The two sleep patterns had distinct associations with psychiatric symptoms, cognitive performance and development motor coordination highlighting the need for further investigation.

# **A longitudinal investigation of ASD and ADHD symptomatology and pragmatic language difficulties in young boys with fragile X syndrome**

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Difficulties in pragmatics are strongly associated with social difficulties across neurodevelopmental disorders, including fragile X syndrome (FXS), autism spectrum disorder (ASD), and attention deficit / hyperactivity disorder (ADHD). FXS is associated with elevated levels of ASD and ADHD symptomatology, and a considerable proportion of individuals with FXS meet diagnostic criteria for ASD and/or ADHD. However, there is great variability in ASD and ADHD symptomatology in individuals with FXS, and these may be best understood in continuous rather than categorical terms. Furthermore, it is unclear how variability in these behaviours affects outcomes in language and communication longitudinally. Previous research suggests that, above and beyond having a diagnosis of FXS, more severe ASD symptoms lead to additional impairments in pragmatic language. Less is known about how ADHD symptomatology might influence language development in this population, and no studies have investigated these three aspects of the FXS phenotype together. The current study aimed to investigate the relationship between ASD and ADHD symptomatology and pragmatics longitudinally in FXS. We hypothesized that in boys with FXS, ASD and ADHD symptomatology would be inversely related to pragmatic language competency, and would predict more severe difficulties in pragmatics over time. Thirty-six boys with FXS participated at three time-points, 12-months apart. Results showed that 1) ASD symptomatology is positively related to impairments in both structural and pragmatic language abilities, and 2) ADHD symptomatology is positively related to pragmatic language alone. These findings point to implications for early interventions targeting attention, social cognition and language impairments.

# Neurocognitive and parent-reported markers of tactile sensory processing in infants at familial risk for ASD or ADHD and age-matched control infants

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**Background:** Atypicalities in tactile processing are observed in individuals diagnosed with ASD and ADHD but have rarely been investigated in infant sibling designs. Both hypersensitivity and hyposensitivity to tactile stimulation are cited as evidence of unusual sensory profiles in these populations. Investigating similarities and differences in early markers of tactile processing may help in unraveling common/distinct developmental pathways.

**Methods:** A paired-stimulus paradigm was used to administer pairs of vibrotactile stimuli to 10-month-olds at familial risk for ASD (HR-ASD, N=47), ADHD (HR-ADHD, N=22) and low-risk controls (LR-CT, N=18). 38 pairs were administered with 700ms ISI within the pair and 8s ISI between the pairs. Continuous EEG was recorded and 6-10Hz oscillations time-locked to stimulus onset extracted. Correlations between 6-10Hz oscillations and the parent-reported Infant-Toddler Sensory Profile tactile domain and quadrants' scores were investigated.

**Results:** Analysis of 6-10Hz desynchronization to tactile stimulation revealed that sensory gating occurred in low-risk controls. Sensory gating was significantly reduced in HR-ASD and HR-ADHD infants. Further, tactile hypersensitivity in HR-ASD and tactile hyposensitivity in HR-ADHD infants were observed. Significant correlations between EEG and parent-reported measures emerged in the whole sample and in HR-ASD infants: hypersensitivity to stimulation and reduced sensory gating (S1-S2) correlated with reduced sensation seeking.

**Discussion:** While atypical sensory gating might represent a common pathway to later behavioral atypicality, distinct neural responses to tactile stimulation occur in HR-ASD and HR-ADHD infants. Further, HR-ASD infants manifest compensatory behaviors suiting their neural processing style. Coupling neurocognitive and parent-reported markers might improve power in the identification of common/distinct pathways to symptoms development.

## **Components underlying anxiety in Williams syndrome**

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Anxiety is the most significant mental health concern associated with the neurodevelopmental disorder of Williams Syndrome (WS). This presentation will include data from studies within a large programme of research that looks at the potential mechanisms that underlie heightened anxiety in this group, with the aim of informing intervention development and theory. The focus will be on the potential roles of social abilities, cognitive / executive functions, and an intolerance of uncertainty, in the development of anxiety for individuals with WS. For example, within this presentation, parental reports allow us to explore the potential associations between anxiety, social functioning and executive functions (N=26), as well as the potential role of intolerance of uncertainty in the maintenance of anxiety (N=59), and developmental changes in anxiety presentation over 4-years (N=17) for individuals with WS. A range of correlation, regression, and mediation analyses were used to understand the potential mechanisms underlying heightened anxiety. In summary, the results indicated that facets of the WS cognitive and behaviour profiles were directly linked to heightened anxiety as reported by parents. Difficulties with aspects of cognitive regulation (such as shifting attention) were also related to anxiety presentation. Furthermore, it may be that all of these components are linked through an intolerance of uncertainty, and linked to the autism literature may be particularly important concerning this issue. Further research understanding the mechanisms underlying anxiety in WS is important in order to develop evidence-based interventions.

# **Characterisation of associations between social and non-social attention and later ASD symptoms in infants with tuberous sclerosis complex: an eye tracking study**

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Tuberous sclerosis complex (TSC) is a single-gene disorder associated with variable developmental outcomes, with up to 60% of individuals receiving a diagnosis of autism spectrum disorder (ASD). The specific mechanisms through which individuals will go on to develop ASD are yet to be clearly defined. An increasing proportion of TSC cases are identified prenatally, providing a unique opportunity to study risk pathways to ASD. The Early Development in Tuberous Sclerosis (EDiTS) Study is a prospective longitudinal study of infants with TSC (n=25) and age-matched typically developing infants (n=25) from birth to 24 months of age. We used portable eye-tracking technology in the home to measure social and non-social attention using a range of tasks. At 5 months, infants with TSC showed increased peak looking time to faces compared to typical infants, associated with younger age at seizure onset, but not with ASD symptom scores at 14 months. Conversely, infants with TSC showed longer disengagement times on the gap/overlap task from 10 months of age compared to typical infants, which was associated with increased ASD symptoms at 14 months. These preliminary findings indicate atypical social attention from 5 months combined with reduced flexibility in control of non-social attention from 10 months in infants with TSC, suggesting early developmental changes that mimic ASD risk markers in familial cases. Identification of sensitive and objective biomarkers of risk for ASD in TSC will aid in directing more specific interventions and in testing the efficacy of novel early intervention targets.

# Abstracts for Poster Presentations

## **Habituation in children with individual differences in social abilities**

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**Objectives:** Habituation to a repeating stimulus is an important index of information sampling and attentional flexibility that is atypical in Autism Spectrum Disorder (ASD). ASD is a condition that impacts development of social skills. To determine whether effects of habituation also relate to general differences in social skills, this study investigated whether children with poorer than average social skills show reduced habituation to a repeating stimulus compared to children with average social skills. Further, we measured habituation to different types of stimuli, social and non-social, to assess the stimulus-dependence of these effects.

**Methods:** 64 children aged 4 -12 years completed an eye-tracking task measuring attention to a repeating and a novel stimulus. Social skills were measured using a parent-report measure sensitive to risk of ASD.

**Results:** Preliminary analyses reveal different patterns of information sampling based on gender: Females demonstrated significantly more looking than males in the social condition only and, only in females, lower social ability was associated with significantly less attention to the screen. Preliminary analyses did not reveal any differences in habituation to the repeating stimulus based on stimulus type, gender, verbal or social ability.

**Conclusions:** Results indicate differences in information sampling based on gender, wherein social stimuli appear to be more salient for females than males. Further, social ability impacts information sampling differently in females than in males. Further analyses are underway. Data from clinical samples will also be presented.



# **Is there a common brain basis for deficits of visual attention, motion sensitivity and visuo-motor cognition in children following perinatal brain injury, very preterm birth, and Developmental Co-ordination Disorder?**

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We have previously described a cluster of deficits across many genetic and acquired neurodevelopmental disorders (e.g. Williams Syndrome, Autism) related to visual dorsal stream networks (Atkinson, JOV 2017: 'dorsal stream vulnerability'). This cluster includes deficits in motion sensitivity, visuo-motor integration, action planning, visual attention, and spatial cognition. Here we present new data from ongoing studies comparing these deficits in two cohorts of children following perinatal brain injury (PBI) and/or very preterm birth (N=181), and two cohorts with Developmental Coordination Disorder (DCD) ( N=65).

ECAB (Early Child Attention Battery) was used to measure components of visual attention (selective; sustained; attentional control), the child-friendly 'Ball in the Grass' test to compare global motion and static form sensitivity, and the Movement-ABC for visuomotor assessment.

We find (a) attention deficits in most PBI and preterm-born children, greatest in sustained attention; (b) motion coherence deficits are common in both DCD and PBI, although in DCD these are age-dependent; (c) ~1/3 of PBI children show both motion and form sensitivity deficits; (d) individual differences in motion sensitivity correlate with ECAB in PBI, and both form and motion with visuomotor skills in DCD; (e) PBI children's motion and attention deficits were greater than expected from general cognitive ability.

We relate these results to our findings that motion coherence sensitivity in typical development correlates with differential brain growth in specific parietal areas, with visuo-motor ability and numerical cognition (Braddick et al, J Cog Neuro 2016), and to broader views of dorsal stream function and Duncan's multiple-demand network.

## **Social cognitive profiles in children and adolescents with ASD**

Elisa Back, Annette Williams, Marjan Darabi-Hammond, Jessica Ganter,  
Jessica Dalebout-Campbell, Hannah Cotmore

Kingston University London

Autism Spectrum Disorder (ASD) is characterised by social communication difficulties, however there are mixed findings with respect to recognising, understanding and expressing emotions and mental states. The aim of this study was to investigate the profile of abilities in individuals with ASD in areas of everyday social functioning. Twenty children and adolescents with ASD were matched to 20 typically developing (TD) children and adolescents (aged 7-15) on chronological age and IQ. A battery of tasks were administered that included traditional Theory of Mind tasks (first and second order false belief reasoning), affective Theory of Mind tasks which involved inferring mental states from briefly presented facial expressions and an empathic responsiveness task which concerned responding to real-life displays of emotions. Findings suggested that the ASD group performed less well than the TD group only on the second order false belief task and inferring mental states to briefly presented facial expressions but they showed similar levels of performance on the first-order false belief task and the empathic responsiveness task. Findings will be discussed in relation to the underlying mechanisms required for social cognitive and social affective processing in ASD and the implications for using more real-life paradigms.

# **A preliminary study into managers' knowledge and awareness of ASD in the workplace**

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**Background and aims:** Adults with ASD face a number of challenges in the workplace and employment rates remain unnecessarily low (Shattuck et al, 2012). In principle, adjustments could be made to resolve these challenges, but employers may not be aware of the specific difficulties experienced or be knowledgeable about suitable strategies. To date, no research has focused on exploring the knowledge and awareness of ASD in managers.

**Method:** This study gathered online survey responses 31 general managers from a wide range of different industries, about their knowledge and awareness of ASD in the workplace, particularly focussing on communication factors following previous research identifying this as a key barrier (Müller et al, 2003; Hesmondhalgh, 2010) and on awareness of support strategies.

**Results:** Overall knowledge of ASD was moderately low, with managers knowing the least about strategies for support. Respondents were aware of some social communication difficulties in ASD and managers with experience of ASD (within or outside of the workplace) were more likely to identify 'social awkwardness' as a communication obstacle. More than half of the respondents did not identify less visible language-based challenges such as understanding complex instructions.

**Implications:** Less obvious communication obstacles in ASD may not be widely known by employers and this may lead to overly negative judgements about work performance. Furthermore, despite having some knowledge of ASD, there is a gap in managers' awareness of effective workplace strategies. The current study highlights the need for further research in partnership with the autistic community to develop manager training.

# **Using CRISPR-Cas9 gene editing to explore the molecular consequences of disrupting genes in the 3p26 deletion region associated with Autism**

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Autism Spectrum Disorders (ASD) are a group of heterogeneous neurodevelopmental disorders characterised by behavioural abnormalities within the domains of social interaction, language communication, and restricted stereotypic behaviours. According to the Simons Foundation Autism Research Initiative, 881 genes in humans are implicated in ASD. Moreover, the list of candidate genes for ASDs is still growing. To understand the mechanism of how these genes are involved in ASDs can allow insight into how these neurodevelopmental disorders progress. Contactin 4 (CNTN4), an Ig cell adhesion molecule (IgCAM), is a gene involved in neuronal migration and outgrowth. Disruption of CNTN4 has been observed in patients with ASD and 3p26 deletion syndrome. Recent studies show behavioural changes relating to cognitive performance and sensory behaviour in Cntn4 knockout mice. CNTN4 has also been found to be a binding partner with amyloid precursor protein (APP). Together they may promote target-specific neuronal outgrowth, which is important in functional development of behavioural pathways. We hypothesised APP and CNTN4 interaction contribute to brain morphology and function. To determine if brain and neurite morphology are affected by these two genes, a CRISPR-Cas9 vector was made to knockdown APP and CNTN4 in vitro. This plasmid will be transfected into a neuronal cell line to detect the correlation between CNTN4 and APP. This will allow us to explore the molecular function of these two genes and how they contribute to neuronal morphology.

# **Mental imagery in typical development and ADHD**

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As we communicate, navigate and problem-solve our way through life, we are constantly generating and manipulating mental representations. Mental imagery, or “seeing with the mind’s eye”, is an integral part of a child’s ability to make sense of their world; whether it be anticipating whether a book will fit on a shelf or multiplying numbers together. Mental imagery is a high-level cognitive process involving sustained attention and has also been shown to be positively associated with working memory capacity. Children with attention-deficit/hyperactivity disorder (ADHD) are characterised as possessing executive function deficits (including working memory), which are associated with poor academic achievement in this group. Research is yet to investigate mental imagery in ADHD, and the little research with typically developing (TD) children has yielded inconsistent results. Therefore, my primary aim is to characterise mental imagery in ADHD, and I will first investigate TD trajectories to provide clarity to previous findings. I will measure the development of four components of mental imagery (generation, maintenance, scanning and rotation) in TD children aged 4-10 years, and also determine the relationship between each component, with working memory (WM) and sustained attention. It is predicted that abilities in each component will increase linearly with increasing age, and that scanning and rotation will develop extensively between age 4 and 6 years. Moreover, children with better imagery abilities are expected to be more proficient in WM. It is expected this work will further elucidate the relationship between mental imagery, WM and attention in typical and atypical development.

# Association between social abilities and attentional mechanisms in typically developing children

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**Background:** Low-level mechanisms of attentional orienting towards social stimuli, e.g., faces, are likely to be at the basis of high-level difficulties in social relationships (Keehn et al., 2013). In typically developing children, we expected to observe faster orienting of attention towards social stimuli and when attention was facilitated by the offset of a central fixation stimulus. Further, we hypothesised that voluntary orienting of attention towards social stimuli would have been atypical in children with lower social abilities.

**Methods:** Fifty-six typically developing children between 4 and 12 years of age completed an eye-tracking gap-overlap task, while their parents filled the Social Aptitude Scale (SAS; Liddle, Batty & Goodman, 2009).

**Results:** Children oriented their attention faster, when the peripheral stimulus was a face ( $F= 23.309$ ;  $p<0.001$ ) and when its onset happened immediately after the offset of a central one, compared to when attention needed to be voluntarily disengaged from the centre ( $F= 158.617$ ;  $p<0.001$ ), Further, children with lower social skills did not show this last effect, for social stimuli presented on left visual field ( $p>0.05$ ).

**Conclusions:** We replicated previous results about the “gap-effect” and observed the salience effect of social stimuli, which were more attractive and effective in eliciting orienting of attention in typically developing children. Further, our results may suggest the presence of atypical activation of the right brain systems regulating mechanisms of attentional alerting and orienting to social stimuli, since both these reflexive and voluntary mechanisms were atypical among children with lower social skills.

# **The role of motor coordination in the relationship between executive function and language abilities**

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**Background and aim:** Results across studies investigating the links between executive function (EF) and language have been inconclusive both in terms of the direction and the nature of this relationship. Since motor coordination is related to both language and EF, and considering the overlaps between Developmental Coordination Disorder (DCD), language and EF difficulties, the aim of the current study was to explore the contribution of motor coordination to the relationship between EF and language.

**Method:** Measures of expressive and receptive language, and of verbal and nonverbal EF were administered to 7-11 year-old typically developing children (n=71), children with DCD (n=23) and children with poor motor coordination but no DCD diagnosis (n=57). A moderation model was tested using Group as the moderating variable, and next using motor coordination as a continuous moderating variable.

**Results:** The relationship between EF and language did not differ between groups. However, motor coordination moderated the effect of EF on language. EF skills positively predicted language abilities at low and moderate levels of motor coordination, but not at high levels of motor coordination. The interaction between motor coordination and language did not predict EF outcomes.

**Conclusions:** When motor coordination is below average, EF seems to play an important role in determining language outcomes. This includes children with moderate levels of motor skills, rather than being restricted to children with a motor impairment. Thus, poor to moderate motor coordination skills could represent a risk factor for language ability, with EF acting as a potential protective factor.

# **Flexible scheduling to prevent the development of disabling resistance to change**

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Resistance to change (RstCh) contributes to one of the core diagnostic domains of autism spectrum disorder (ASD), and is prevalent in other neurodevelopmental disorders (NDDs), including Prader-Willi (PWS) and fragile-X syndromes (FXS). Challenging behaviours following changes to expectations can make RstCh highly disabling. While there is a strong focus on early intervention within ASD, limited systematic data examines the effectiveness of existing approaches in preventing the development of severe RstCh. The current project aims to develop an intervention (“flexible scheduling”) targeting parents of children at risk of developing RstCh, which is designed to systematically increase flexibility in children’s routines. Evidence suggests that attention-switching is linked to RstCh, with more rigidity around when this cognitive skill develops, associated with more RstCh when older. The flexible scheduling developed here will allow future work to test the hypothesis that exposing children at risk of RstCh to more flexible routines will encourage the development of the cognitive skills necessary to manage change. Using a participatory design approach, a Professional Advisory Network (PAN) of 12 experts familiar with ASD, PWS and/or FXS, was consulted via 6 focus groups comprising 1-4 participants each, on the development of initial specifications for the intervention and on the design of a semi-structured interview schedule for consulting on the flexible scheduling approach with parents and teachers. Professional perspectives included paediatricians, behaviour therapists, clinical psychologists, and speech and language therapists. Outcomes of the PAN consultation will be discussed in terms of the trajectory and design of the proposed flexible scheduling approach.



## **Time perception and Autistic Spectrum Condition**

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During the past two decades there has been a growing perception in researchers, clinicians, parents and caregivers that there exist atypical time perception abilities in Autism Spectrum Conditions (ASC). The perception of duration is a relevant ability because, among other reasons, it is involved in building a social concept of temporal orientation, and therefore, in predicting events and coordinating actions with others. However, the evidence is patchy and far from conclusive, and there is still no clarity on how an impairment in time perception would be related to the other social and non-social atypicalities that characterise this neurodiversity. This talk will cover the three-stage plan that was followed in order to gain more clarity about this topic: (a) From a systematic review (under review) it will be argued that evidence is not yet consistent enough to declare a time perception impairment in ASC, although there are trends regarding a possible different developmental trajectory, and the involvement of other cognitive processes in results a time perception impairment. (b) Preliminary results from an online approach in general population suggest there is no relationship between the ability to estimate durations and autistic traits. (c) Preliminary data from a lab-based approach covering time sensitivity, interval timing and time-based prospective memory will also be presented. Finally, reflections on the theoretical and methodological challenges in researching time perception in ASC, and the impact of this line of research in applied settings will be discussed.

## **Components of psychopathology in autism and Williams syndrome**

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Williams Syndrome (WS) and Autism Spectrum Disorder (ASD) are neurodevelopmental disorders associated with a range of psychopathology; including the presence of significant mental health challenges (e.g. heightened anxiety, depression), social atypicalities in daily functioning, and behavioural issues (e.g. including externalising behaviours). The rationale for this study was to understand whether the relationship between these aspects of psychopathology was syndrome-specific, and consider what this might mean for theory and intervention design. This online questionnaire study used a range of standardised measures, and collated information from 53 parents of individuals with WS and 44 parents of individuals with an ASD (all children aged 4-17years ;  $M=10.44$ ;  $SD=3.86$ ). Parents of children with ASD reported significantly higher levels of anxiety, depression, socio-communication deficits, and externalising behaviours in their children than those with WS. However, there were heightened atypicalities in both groups (compared to typical norms). Examining the associations between aspects of emotion difficulties, socio-communication atypicalities, and behaviour in these groups, will allow for greater understanding of behavioural difficulties and the development of targeted interventions. Mediation analyses indicated that there were syndrome-specific relationships between components of psychopathology. For example, the results indicated that the presence of heightened depression, anxiety and externalising behaviours might be more closely associated with each other in ASD, than they are in WS (where these seem more independent of each other). The results are discussed in terms of the mediation analysis, the relationship between components of psychopathology, and broader implications for syndrome-specific theories and intervention.

# **The role of family dynamics and relationships in the psychological wellbeing and adjustment of children with Williams syndrome, their parents and siblings**

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Family dynamics and relationships are important for child outcomes, but little research has examined this in families with a child with Williams Syndrome (WS). This questionnaire study drew on family systems theory to explore associations between the WS behavioural phenotype, and behavioural adjustment, well-being, dynamics and relationships in families. To date, 40 parents (from 28 families) and 19 neurotypical siblings (8-17 years; 5M, 14F) to a child with WS (4-17 years; 19M, 9F) have participated in this ongoing study. Parents and siblings completed individual questionnaire packs measuring: parental wellbeing and family functioning; quality of the sibling relationship; social behaviour, anxiety, behavioural and emotional adjustment of the child with WS and the neurotypical sibling. A positive association was found between parent reports of behavioural adjustment of the children with WS and their siblings ( $r = 0.63$ ). Sibling self-report anxiety levels were higher than the normative population ( $t(18) = 4.99, p < .001$ ), but behavioural difficulties were not. The siblings' perceptions of family support were negatively associated with their behavioural difficulties ( $r = -0.53$ ). Characteristics of family functioning were also associated with parental wellbeing: family satisfaction, overall life satisfaction and aspects of the quality of the sibling relationship were negatively associated with parents' symptoms of anxiety and depression. The current findings emphasise the need to take a family systems perspective in understanding the developmental outcomes of children with WS and their neurotypical siblings, and the psychological wellbeing of parents. The importance of social support for positive outcomes is also highlighted.

## **Learning in a probabilistic environment in the EU-AIMS LEAP Cohort: How do individuals with autism spectrum disorder perform and how does this relate to restricted, repetitive behaviours and associated-ADHD symptomatology?**

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**Background:** Cognitive flexibility denotes the ability to shift thoughts and actions in response to changes in the environment. Impairments in cognitive flexibility have been proposed to underlie restricted, repetitive behaviours (RRBs) in ASD and to explain behavioural deficits seen in often co-occurring ADHD. Error scores on probabilistic reversal learning (PRL) tasks examining choice behaviour have been used to index cognitive inflexibility. Bayesian computational models move beyond composite scores and reveal latent cognitive processes about how individuals learn over time and the strategies used, which may provide greater insight into the nature of cognitive flexibility.

**Methods:** Here we investigated task performance and learning strategies on a PRL task in a large sample of 567 children, adolescents and adults as part of the EU-AIMS LEAP cohort, in relation to age, RRBs and associated-ADHD symptomatology.

**Results:** Results showed a group effect in adolescents only, whereby ASD adolescents made significantly more perseverative errors than typically developing (TD) adolescents. Model comparisons revealed the best

estimate for children in both groups and ASD adolescents was the Fictitious-Update model; for TD adolescents the Reward-Punishment model outperformed the others; while for adults in both groups the Experience-Weighted Attraction was superior. ADHD symptomatology was significantly related to lose-shift behaviour in ASD adults.

**Conclusion:** Findings suggest that different strategies are employed by different age groups when learning in a probabilistic environment. These strategies transition during adolescence, with potentially different developmental trajectories for ASD and TD individuals. Furthermore, these findings suggest a link between learning flexible choice behaviour and ADHD symptomatology in ASD adults.

# **Abstract concept learning in children with Autism Spectrum Disorder and reduced language**

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Memory impairments in Autism Spectrum Disorder (ASD) have been demonstrated in free recall of semantically related items (Tager-Flusberg, 1991), and recognition of combinations of features (Bowler, Gardiner & Gaigg, 2008). Bowler & Gaigg (2008) demonstrated difficulties in employing hierarchical semantic relations between words to aid recall in individuals with ASD, suggesting a difficulty with relational binding - the ability to encode relationships between items and events, to allow for adaptive use of this information (Eichenbaum, 2000).

The current study examined this ability in children with ASD and reduced language, utilising a non-verbal paradigm. Addyman & Mareschal (2010) used a task in which looking times were measured, to highlight the level of awareness of hierarchical relational properties of visual stimuli. This paradigm was replicated to investigate the extent to which difficulty with relational binding is characteristic of ASD, regardless of linguistic ability. The hypothesis was that individuals with ASD and reduced language would be impaired in their awareness of the relational properties of stimuli. Thirty children with ASD and reduced language, and twenty-one typically developing children were matched on non-verbal IQ. Participants were familiarised to pairs of items which all bore the same relation to each other (e.g. AA, BB, etc), and were then presented with a test phase in which this relation either changed or stayed the same. The proportion of time spent looking at the items compared to the background was measured. No group differences were found, suggesting intact non-verbal relational binding in children with ASD and reduced language.

**Keywords:** memory; autism

# **Relationships between sensory atypicalities, repetitive behaviours, anxiety and intolerance of uncertainty in autism spectrum disorder and williams syndrome**

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**Background:** Autism Spectrum Disorder (ASD) and Williams syndrome (WS) share psychopathology relating to sensory processing and repetitive behaviours. The relationships between the sensory features and repetitive behaviours in both disorders and the mechanisms underlying these relationships are not well explored. The aim of this study was to examine the relationships between sensory processing, repetitive behaviours, anxiety and intolerance of uncertainty in autistic children and those with WS to better understand the complexity of the disorders.

**Methods:** Parents of 19 autistic children and 16 WS children, aged between 4 and 9 years, were asked to complete questionnaires assessing children's sensory experiences, anxiety symptoms, the severity and frequency of repetitive behaviours that the children were engaging in and the level of intolerance of uncertainty.

**Results:** Serial mediation analysis was performed. Direct significant relationships between sensory features and repetitive behaviours were found only in the ASD group. Sensory processing difficulties and repetitive behaviours were mediated via intolerance of uncertainty in WS.

**Discussion:** The findings support the value of considering the complexity of the mechanisms underlying the relationship between sensory processing and repetitive behaviours across neurodevelopmental disorders. Understanding these relationships will shed light on some of the most challenging and intractable characteristics of both conditions and inform suitable intervention programmes to improve quality of life for individuals living with either ASD or WS.

# **The prevalence of anxiety disorders in Cornelia de Lange and fragile X syndrome**

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Social difficulties are commonly described in Cornelia de Lange (CdLS) and fragile X syndrome (FXS) and are typically characterised by social withdrawal, reduced eye contact, and some selective mutism. These difficulties are often described as being anxiety-like; however few studies have evaluated behaviours against clinical criteria. Those that have report high rates of anxiety disorders but highlight that the use of clinical guidelines to characterise behaviour can be problematic in these populations (Cordeiro et al., 2011; Crawford, Waite & Oliver, 2017). This study aimed to assess the prevalence and nature of anxiety disorders in CdLS and FXS. Caregivers of individuals with CdLS (n=38, age range=3–53years) and FXS (n=25, age range=6–48years) completed the Kiddie Schedule of Affective Disorders (Endicott & Spitzer, 1978), a clinical interview based on DSM-5 criteria from which anxiety disorders were rated as of interest, of concern, or threshold. The majority of participants were rated as of interest for at least one anxiety disorder; however, despite anxiety-like behaviours being frequently described, few individuals met full clinical criteria to score as threshold. One reason was caregivers' reports that whilst anxiety behaviours were high, these were often inconsistent or mediated by other factors. In addition, interpreting behaviour to assess consistency with DSM-5 criteria was difficult due to individuals' level of cognitive ability and expressive language. The profiles of anxiety-like behaviour shown by individuals with CdLS and FXS and the limitations of using clinical guidelines to define these have important implications for clinical practice.



# **The recognition of microexpressions: a comparison between children with ASD and typically developing children**

Rashma Hirani, Elisa Back

Kingston University London

**Background:** Understanding facial expressions is important for successful social interaction. Therefore, studying the development of this process is key to understanding why these skills vary amongst individuals. This study explored whether children with ASD and typically developing children (TD) can identify mental states presented as microexpressions with varying timeframes. Microexpressions are defined as facial expressions that occur briefly for a fraction of a second. Presenting microexpressions of mental states is a novel addition to research and investigating the detection of microexpressions in children has not yet been explored.

**Method:** Data from a short computer task was collected from 30 TD children and 30 children with ASD (aged 6-16) matched on their chronological age and IQ. Eight mental states were presented as microexpressions using 5 varying timeframes: 120ms, 160ms, 200ms, 240ms, 280ms. Participants identified these mental states from four options. The Wechsler Abbreviated Scale of Intelligence IQ test was used to match participants.

**Results:** Correct responses were analysed to find that at 120ms & 160ms: participants performed below chance levels. The type of mental state presented had an effect on whether it was recognized or not. Accuracy rates for children with ASD were found to be lower than the TD group.

**Discussion:** Although, children with ASD showed impairment there was a trend towards an increase in accuracy when the time frame was longer. Further investigation into the recognition of microexpressions of mental states, will help to explore the most effective interventions in the teaching of emotion recognition to individuals with ASD.

# **Real time language production and Theory of Mind assessment in Autism Spectrum Disorder**

Hayley Hunt, Elisa Back, Jo Van Herwegen

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Understanding and labelling emotions and mental states has often been associated with impacting understanding of social situations for people with Autism Spectrum Disorders (ASD), arguably due to difficulties in Theory of Mind (ToM) understanding. However, many studies that examine ToM abilities use tasks that have a complex language content, or use non-verbal tasks that lack ecological validity. Language difficulties have been frequently reported in ASD. Therefore, the current study used more ecologically valid methods to investigate spontaneous judgements and accurate mental state labelling, challenging participants to simultaneously interpret, code, and communicate mental states in complex scenes from the silent movie *The Artist*.

35 participants with ASD, diagnosis reconfirmed using ADOS 2, were matched to 34 typically developing (TD) peers, mean Chronological Age (CA) ASD 13.7, TD 13.0 age range between 7 and 18 years, also groups were matched using WASI FSIQ. Participants watched three scenes and were asked "Please watch the scene and say what you think is happening, paying particular attention to how the characters are thinking and feeling." Participants were watching and talking concurrently. Mean Length of Utterance (MLU) and language samples were coded using SALT.

Preliminary findings indicate participants with ASD's MLU is reduced, as is the use and accuracy of mental state terms. Analysis considers the impact of the reduction in flexible and diverse language on ToM understanding.

# **What are the experiences of adults with Intellectual Disability (ID) and dysphagia? An exploratory study**

Rachael Kasch

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There is no known literature published regarding the experiences of adults with ID living with dysphagia. This research uses 1:1 semi-structured interviews to uncover the neglected experiences of adults with ID living with dysphagia. Listening to and understanding individual experiences will provide valuable new knowledge that draws on real world experience. Participants can provide new insights about the physical, social and emotional experiences of living with dysphagia. On the basis of these findings, SLT recommendations will be produced to improve future care.

There are approximately 1.5 million people in the UK with ID (Emerson et al. 2011). Epidemiological studies indicate a 7-8% population increase by 2020 (Emerson and Hatton 2008). Dysphagia is recognised as one of the five key areas of risk for people with ID (National Patient Safety Agency 2004) and can lead to impaired quality of life, malnutrition, dehydration, aspiration, choking and death (The Royal College of Speech and Language Therapists 2009).

Historically, people with ID have been left out of research (Mactavish, Mahon and Marie 2000). People with ID tended to be the subject of research rather than participants (Gates and Waight 2007). More recently, there is an expanding body of literature examining inclusive methodologies and advocating meaningful involvement of adults with ID in research (Jephson 2015, Kidney & McDonald 2014, Cook and Inglis 2012). However, despite the recent drive to include adults with ID in research, little attention has been paid to the perspectives of adults with ID and dysphagia. The noticeable gap in the literature regarding the experiences of adults with ID and dysphagia can and will be addressed by this research.

# **Multivariate analyses of face processing in Williams Syndrome**

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Facial identity processing is usually considered a selective strength in individuals with Williams syndrome (WS). Despite this general characterization, the neural markers of face processing ability in WS remain relatively poorly understood. There are few existing studies exploring this important ability in WS, and those that do exist focus on the response of a single ERP component, the face selective N170. Here we seek to broaden the characterization of the neural underpinnings of face processing ability in WS by using state-of-the-art analysis, multivariate pattern analysis (MVPA), of neural responses. Using MVPA alongside the high temporal resolution of EEG permits analysis of the dynamically evolving profile of face processing in WS. Here, 11 individuals with WS completed a single EEG recording session viewing faces of upright and inverted faces and buildings while completing an unrelated simple task. Comparing individuals with WS with typically developed, age-matched adult participants suggested a delayed processing of upright faces relative to buildings and inverted faces in WS. Differentiation of neural responses of upright faces comparatively to inverted faces was also more sustained in WS individuals suggesting that face processing is completed in a faster manner in TD individuals. Through this novel application of MVPA we argue for a larger difference in the neural processing of faces than what was previously understood.

## Enhancing the validity of a Quality of Life measure for autistic people

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**Background:** Quality of life (QoL) is an important outcome to measure in research and services. The World Health Organisation questionnaire (WHOQoL-BREF) has been used in several studies with autistic adults. To date it has not been validated) specifically with this population.

**Objectives:** To explore the need for additional items to address important QoL issues for autistic adults. To explore the validity of the WHOQoL-BREF (26 items), and additional items with a sample of autistic adults.

**Methods:** Four focus groups of autistic adults were held to discuss the WHOQoL-BREF. Eleven items were developed from themes derived from transcripts. Fifteen cognitive interviews and a two-round Delphi survey (N=374) were conducted to refine the items and establish their importance and clarity. Nine items (ASQoL) were retained for further testing.

309 participants (mean age=43.0 years, SD=13.8) took part in a validation study recruited via the Adult Autism Spectrum Cohort-UK.

**Results:** Exploratory Factor Analysis of the ASQoL supported a one factor solution (loadings >0.46), explaining 66.6% of the variance. A predicted global item (about autistic identity) did not load onto the factor.

Results of the validation study of confirmed the criterion, convergent and divergent validity of the WHOQoL-BREF with this population, and evidenced promising measurement properties of the ASQoL and the WHO Disabilities module.

**Conclusion:** The proposed ASQoL items make a unique contribution to representing, measuring and understanding the QoL needs of autistic adults. The findings on validity of the WHOQoL-BREF supports its use with autistic adults and strengthens conclusions from previous research.

# **The H.E.R.O within: Psychological Capital as a moderator of perceived stress in parents of children with Prader-Willi syndrome displaying challenging behaviour**

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The expression of challenging behaviour is characteristic of the neurogenetic disorder Prader-Willi syndrome (PWS). Consequently, parents of children with PWS often experience significant levels of stress, which can have negative implications for both parenting behaviour and subsequent child behaviour. Critically, few interventions exist to reduce such stress. The relationship between challenging behaviour and parental stress is suggested to be moderated by psychological resources. A construct referred to as Psychological Capital (PsyCap) delineates a number of personal positive psychological resources one can draw upon to cope with stress: Hope, Efficacy, Resilience and Optimism. Amelioration of these state-like psychological resources may be a pathway to stress reduction in parents of children with PWS. The current study assesses the moderating influence of PsyCap in the relationship between challenging behaviour and perceived stress. Fifty parents of individuals with PWS completed the Perceived Stress Scale, the Psychological Capital Questionnaire, and the Temper Outburst Questionnaire regarding their child's behaviour, during the baseline of a cognitive training intervention evaluation study for individuals with PWS. It is hypothesised that a positive relationship between increased challenging behaviour in children and perceived parental stress will be moderated by parental PsyCap, such that the relationship will get weaker as PsyCap increases. If the hypothesised results are ascertained, a parent focused element could be added to future cognitive training interventions which would aim to develop and enhance PsyCap in parents of children with PWS and thus act as positive psychological resource to help cope with the stress created by challenging behaviour.

## **CNTN4 (Contactin4), a candidate gene for autism spectrum disorders, affects hippocampal synaptic plasticity and behaviour**

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Autism spectrum disorders (ASD) are neurodevelopmental disorders that are clinically detected by impairments in social interaction and restricted, repetitive behaviour. Learning and memory behaviour is one of the endophenotypes that can be studied to simplify the huge variety in ASD. Contactin4 (CNTN4), an Ig cell adhesion molecule (IgCAM) gene, is associated with ASD. We target the functional analysis of CNTN4 and how it affects hippocampal brain functions. The goal of this study is to understand how CNTN4 loss-of-function impacts brain development and behaviour. To this end we used a *Cntn4*-knockout (KO) mouse model and determined hippocampal neuronal morphology, subjected mice to fear conditioning and hippocampal long-term potentiation.

For that purpose, we tested if *Cntn4* gene expression affects CA1 synaptic transmission and the ability to induce LTP in hippocampal slices. Stimulation in CA1 stratum radiatum significantly decreased synaptic potentiation in *Cntn4* KO mice. Neuroanatomical analyses showed abnormal dendritic arborisation and spines of hippocampal CA1 neurons. Short- and long-term recognition memory, spatial memory and fear conditioning responses were also assessed. These behavioural studies showed increased contextual fear conditioning in heterozygous and homozygous KO mice, quantified by a gene-dose dependent increase in freezing response. In comparison to wild-type mice, *Cntn4*-deficient animals froze significantly less and groomed more, indicative of increased stress responsiveness under the test conditions. Our electrophysiological and neuro-anatomical behavioural results in *Cntn4* KO mice suggest that CNTN4 has important functions for fear memory through the neuronal morphological and synaptic plasticity changes in hippocampus CA1.

## **Delineating the communication profile of Angelman syndrome**

Effie Pearson, Mary Heald, Lucy Wilde, Chris Oliver

University of Birmingham

Angelman syndrome (AS) is a rare genetic syndrome caused by a deletion or alteration of UBE3A. AS is associated with a homogenous absence of speech which is significantly disproportionate to individuals' cognitive and receptive levels. This disparity suggests that the absence of speech may be linked to the genetic basis of AS. However, there is a lack of literature comparing other forms of communication, such as gestures, to receptive abilities and comparing this profile to TD children. If other forms of communication are shown to be relatively preserved, then this would indicate that only speech is affected in AS and strengthen the argument of the genetic implication.

Caregivers of children with AS completed the MacArthur-Bates Communicative Development Inventory and the Vineland Adaptive Behavior Scales. Participants were grouped according to genetic subtype (deletion and non-deletion) and further matched on receptive language scores to a normed database of typically-developing children.

Results showed that the non-deletion group had significantly higher receptive language and gesture use than the deletion group, but there was no difference for expressive language. When compared to the typically-developing group, AS scored significantly lower for expressive language and gesture use.

The absence of language in AS does not seem to be wholly accounted for by developmental delay due to within-syndrome variability for other forms of communication. However, when compared to typically-developing children, gestures do not appear preserved in Angelman syndrome which is illustrative of a wider communication impairment in AS. Further detailed research into gesture use in AS is required.



## **Interpersonal challenges and suicidality: understanding suicide risk in autistic people**

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Coventry University<sup>a</sup>, University of Nottingham<sup>b</sup>, Newcastle University<sup>c</sup>

Autistic adults are eight times more likely to die by suicide than the general population but there are no validated measures to understand risk. A pilot cross-sectional online survey (n=163, aged 18-30) explored how self-reported autistic traits interacted with thwarted belonging (social isolation) and perceived burdensomeness (social worthlessness) to predict suicidality as described by the Interpersonal Theory of Suicide (ITS) (Pelton and Cassidy 2017). Thwarted belonging and burdensomeness significantly mediated the relationship between autistic traits and suicidality suggesting the ITS provides a useful framework for understanding suicide risk. This poster presents these results alongside protocol for future phases. Phase 2 will employ cognitive interview methodology to evaluate the applicability of the self-report Interpersonal Needs Questionnaire (assesses burdensomeness and thwarted belonging) to predict suicidal thoughts and produce a tailored measure for autistic people. Phase 3 will propose a model to understand the transition from suicidal thoughts to attempt drawing on understanding of emotional expression, sensory processing and self-harm. Later phases will explore measurement properties of adapted instruments in autistic adults and assess predictive capacity of the model. Study design is guided by a group of autistic adults with experience of mental health difficulties and online participation following good practice from the Participatory Autism Research Collective (2017). Outputs will include the first empirically tested set of measures to understand suicide risk in autistic adults, service provider training resources and will inform research into conditions with over-lapping symptoms.

# **Which modality specific cognitive abilities predict arithmetical competence in typical development, Turner Syndrome and developmental dyscalculia?**

Rosemary C. Penford, Jenny Gibson

University of Cambridge

**Objectives:** This study aims to increase knowledge of the cognitive abilities which predict mathematical competence by investigating the impact of modality on the associations between both executive functioning and number acuity, and arithmetic competence, and whether the modality specific cognitive constructs found to be predictive in typical development are replicated in populations with known visuospatial deficits.

**Design:** Utilising a cross-sectional experimental design, within a cross-syndrome neuroconstructivist approach, and developmental trajectories methodology, this study involves 190 children drawn from three groups; typical development (130 children) and two neurodevelopmental disorders; developmental dyscalculia (30 children) and Turner Syndrome (30 children).

**Methods:** Children in each population are aged between 4- and 18-years. Each completes two sessions (each approximately 40 minutes) consisting of arithmetic competence and verbal and non-verbal measures of general cognitive abilities, inhibition, cognitive flexibility, working memory, and non-symbolic magnitude comparison. Additionally, socioeconomic status information is sought from parents via a questionnaire. Data will be analysed via a series of regressions (including hierarchical and mixed-design), construction and comparison of construct specific developmental trajectories, an adapted analysis of covariance, a repeated-measures analysis of variance, and if appropriate, a path analysis.

**Results:** As this study is ongoing, exploratory results will be presented. Data for the typically developing population will be analysed via hierarchical regression and possibly a path analysis to identify the constructs which are predictive of arithmetic competence. If sufficient data has been collected congruent analyses will be conducted for the developmental dyscalculia and Turner Syndrome populations.

# **Investigating the relationship between social-autistic traits, social anxiety and social insight using a novel experimental task**

Hannah Pickard, Francesca Happé

King's College London

**Background** Social Anxiety (SA) is elevated in Autism Spectrum Disorder (ASD), a neurodevelopmental condition characterised by social and communication (SC) difficulties. Despite the high prevalence of SA in ASD, research exploring the cognitive mechanisms underpinning SA is limited. Recent research has proposed that individuals with ASD who show an enhanced awareness of their own SC difficulties, termed social insight, may be at an increased risk of developing SA. To date, no research has explored the relationship between social insight and SA at either a clinical or subclinical level. This is primarily due to the lack of robust experimental measures of social insight. In the present study, we have developed a novel dynamic video-based experimental task to measure social insight. Using this task, we aim to explore the relationship between social insight, SA and social-autistic traits.

**Methods** We used a mixed experimental design using both cognitive tasks (IQ, social insight) and questionnaires (SA, autistic traits, depression, anxiety). A sample of 57 typically developing adults completed both accuracy and metacognitive measures.

**Results** Our preliminary analysis shows that autistic traits and SA symptoms are not related to social cue recognition. Negative bias in social cue recognition is related to higher SA symptoms. We will present findings related to social insight.

**Conclusions** The present research may have important implications for understanding the cognitive mechanisms associated with SA and inform the adaptation of interventions used to treat SA symptoms in individuals with ASD, who often experience increased insight into their own SC difficulties.

# **The depression related cognitive profile of young people with ASD**

Sinéad Rhodes, Tracy Stewart, Daniel Hannam, Jessica Oldridge, Emma Yong

University of Edinburgh

Depression is highly prevalent in young people with autism spectrum disorder (ASD). Despite this high prevalence, knowledge of the cognitive factors associated with depression, namely overgeneral memory (OGM), and the factors that maintain OGM such as executive control and rumination, is limited. The lack of research examining OGM in ASD is surprising given extensive research showing depression is associated with a difficulty in the retrieval of specific memory details. We examined the depression-related cognitive profile of 11 young people (aged 18-27 years) diagnosed with ASD and compared with an age and sex matched control group. All completed the Minimal Instruction Autobiographical Memory Test, the Ruminative Response Scale and the Internal Shift Task, an executive control task that includes an emotion condition. Although the participants with ASD showed high depression symptoms as predicted, they were more specific in their performance on the OGM task than the control group in contrast to the over-general profile observed in young people with depression without ASD. Participants with ASD engaged in higher levels of brooding rumination and reflective pondering and had longer response times on the emotion condition of the executive control task similar to the profile of individuals with depression. Our study shows that while young people with ASD show a similar cognitive profile to individuals with depression, they show the opposite pattern in their overgeneral memory profile. The specific nature of memory recall in young people with ASD likely reflects the local processing inclination typically observed in ASD.

## **Mapping longitudinal change and exploring effects of educational settings in boys with fragile X syndrome**

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There is considerable variability in cognitive and behavioural outcomes among individuals with fragile X syndrome (FXS), suggesting that some variability is accounted for by environmental influences. Previous research has found that characteristics of the home environment have an important influence on multiple domains, including adaptive functioning, cognitive ability, and behavioural difficulties. However, this research focused primarily on home settings, and little is known about the effects of educational setting (i.e. mainstream (MS) or special educational needs (SEN) school placement) on similar outcomes.

In the current study, we explored whether educational settings were associated with 1) different strengths and difficulties in terms of cognitive ability, attention and behaviours, and 2) different rates of longitudinal change in any of these areas in boys with FXS. 52 boys with FXS took part in a longitudinal study, and were assessed at three different time points, one year apart. Children completed a set of cognitive and attention tasks, and their parents completed a series of questionnaires measuring problem behaviours, autistic symptomatology, and ADHD symptoms.

Preliminary analyses suggest that behavioural and cognitive profiles vary across educational settings. Children in SEN settings had lower cognitive ability, higher levels of autistic symptomatology, more behavioural difficulties, and greater attention deficits than children in MS settings across all time points. However, rates of longitudinal change varied across educational settings, with children in SEN settings showing greater improvement in some aspects of cognition and behaviour. These differences highlight the importance of studying the effects of educational setting on changes in cognition and behaviour.

# **Beliefs and experiences of practitioners using multi-sensory environments with autistic children**

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Multi-Sensory Environments (MSEs) are present in most special needs schools across the UK, and are widely used with autistic pupils. MSEs contain equipment that changes the sensory environment for educational or therapeutic benefit. Despite their wide use, the efficacy of MSEs has been under-researched and produced mixed findings. We investigated the beliefs of practitioners who regularly use MSEs with autistic pupils using a sequential mixed-methods design. First, ten practitioners (9 female, aged 24-62 years) were interviewed. Using an inductive thematic analysis, six themes were identified: (1) MSEs promote positive outcomes; (2) MSEs have distinct properties that facilitate benefits; (3) MSE use should be child-centred; (4) An active practitioner is necessary for benefits; (5) MSEs can be used for learning; and (6) Challenges of MSE use. The most prevalent codes from these themes were then converted into a 28-item online survey, to which respondents rated agreement on a five-point Likert scale. Responses from 102 practitioners (93 female, aged 21-68 years, from 56 organisations) indicated they believe that MSE use with autistic children gives enjoyment (98%), reduces anxiety (92%), and allows for teaching possibilities not available in a classroom (94%). However, 52% stated that the MSE does not always bring benefits. All respondents agreed that how the MSE should be used should be determined by the pupil's needs. Further investigation is needed to establish the circumstances in which MSE use brings benefit to autistic children. Consequently, a follow-up study directly observing the behaviour of autistic children in a purpose-built MSE is in progress.

# Notes