IoPPN Research
Festival 2021

Across the lifespan

14.00 – 17.30 Tuesday 27 April 2021

#IoPPNfestival

We are pleased to welcome you to the 2021 IoPPN Research Festival, our annual showcase of exciting and innovative research from across the entirety of the Institute of Psychiatry, Psychology & Neuroscience (IoPPN).

In contrast to previous years, the 2021 festival is taking place online. What has not changed, however, is the valuable work and research being carried out by staff and researchers at all levels of their careers at the IoPPN.

This year we are pleased to welcome our two keynote speakers: Professor Grainne McAlonan and Professor Terrie Moffitt.

One of the highlights of the Research Festival has always been the chance to see the work going on in other departments and schools and make connections. And while we won't be able to mingle and network with speakers and attendees over a coffee break or reception, we hope you will still continue to take this event as an occasion to inspire collaboration.

We would like to thank Annicka Ancliff, Josephine Mumford, Jonathan O'Muircheartaigh, Marija-Magdalena Petrinovic, Hannah Warren, Trevor Brooks, Amelia Remmington and Robin Maginn; and all members of the RIC, and Press & Communications Department, who offered their guidance and support in the organisation of this year's festival.

We hope you will all enjoy the afternoon.

Professor Ian Everall
Executive Dean of the Institute of Psychiatry, Psychology & Neuroscience

Professor Mitul Mehta
Chair of the Research & Innovation Committee

Dr Paolo Deluca
RIC Lead for IoPPN Research Festival

About this year's festival

This year's bridging theme for the IoPPN Research Festival is 'Across the Lifespan'.

It is an opportunity to showcase the innovative and ground-breaking research across the life course, including pregnancy, through neonatal, adolescence and adulthood, to old age and intergenerational research. It speaks to important issues, such as diversity and inclusion, human-centred design, and ensuring services, support and treatment are accessible to everyone throughout their lives.

In suggesting such a wide-ranging theme, we also seek to acknowledge the incidence, prevalence and changing nature of mental health and mental disorders across people's life. Although roughly half of all lifetime mental disorders and conditions are experienced first in the mid-teens (and three quarters by the mid-20s) different disorders have different ages at which symptoms tend to occur, get worse or get better. Some develop slowly over time, such as some drug use disorders, while others can be episodic in nature, such as schizophrenia and depression. Others may develop very quickly following a major trigger event. A severely traumatic event may trigger anxiety, depression or post-traumatic stress reactions in people who would otherwise not experience a mental health problem. And severe mental disorders are responsible for premature death.

Thus, understanding the origins, onset, course, and prevalence across the lifespan is an essential step in preventing, treating and assisting in recovery and supporting people to live well.

Spotlight on: 3-Minute Thesis

The 3 Minute Thesis (3MT) celebrates the diverse research conducted by PhD students globally, and was established with a view to developing students' research communication skills. The challenge of explaining your thesis in just three minutes, and in a way that is accessible to a non-specialist audience, is a worthwhile training opportunity which helps to fine-tune your presentation skills in a friendly and supportive atmosphere.

The IoPPN held their final heats for the 3MT earlier this year, and we are pleased to have our two finalists present in this year's IoPPN Research Festival.

🌐 **threeminutethesis.uq.edu.au/about**

Early career research awards
2020–21

Autumn round

Early Career Research Awards
Institute of Psychiatry, Psychology & Neuroscience

Dr Andrea du Preez
Department of Basic & Clinical Neuroscience

Dr Maria Elisa Serrano Navacerrada
Department of Neuroimaging

Early Career Research Award
NIHR Maudsley Biomedical Research Centre

Dr Grace Lavelle
Department of Psychological Medicine

Dr Lucy Vanes
Department of Perinatal Imaging & Health
Faculty of Life Sciences & Medicine

Event programme

14.00	**Welcome** Professor Ian Everall, Professor Mitul Mehta and Dr Paolo Deluca	
14.20	**Keynote** Professor Grainne McAlonan	Autism across all ages: what does a vulnerable brain look like? Can we shift biology?
14.40	Joyce Peters	Why diversity and inclusion is a topic for everyone
14.45	Dr Tom McAdams	Intergenerational genetic research: how it has – and will – shed light on the causes of psychopathology
14:50	Dr Lisa Nolan	The impact of sex as a biological variable on the maintenance of auditory function across the lifespan
14:55	Professor John Marsden	Cocaine addiction: mental imagery and craving control
15.00	Dr Tatiana Salisbury	Improving mental health: when expertise is not enough
15.05	Dr Matthew Grubb	Getting nosey about brain repair
15.10	Dr Ralica Dimitrova	Characterising heterogeneity in the developing neonatal brain
15.15	**3-Minute Thesis finalist** Curie Kim	The positive impact of intermittent fasting on memory and the brain
15.20	Dr Katherine Young	Anxiety and depression during the COVID-19 pandemic
15.25	Chris Albertyn	Dementia research in a digital age – the role of artificial intelligence
15.30	Dr Rina Dutta	Data science to understand suicidality and self-harm in the digital age
15:35	**Coffee break** (15 minutes)	

15.50	**Keynote** Professor Terrie Moffitt	Surprises about psychopathology revealed by following 1000 people for four decades
16.10	Dr Rosalyn Moran	Pushing beliefs, neuromodulators and computational psychiatry
16.15	Dr Gemma Modinos	Neurobiology of psychosis risk: from mechanistic to big data approaches
16.20	Professor Gerome Breen	Anorexia nervosa is both a psychiatric and metabolic disorder
16.25	Dr Maria Elisa Serrano Navacerrada	Imaging brain synaptic density across the lifespan: from normal to pathological
16.30	Dr Virginia Carter Leno	Associations between theory of mind and conduct problems in autistic and non-autistic youth
16.35	Dr Sam Cooke	Distinguishing the novel from the familiar: cortical plasticity across the lifespan
16.40	**3-Minute Thesis finalist** Lucy Chester	Cannabis and psychosis
16.45	Dr June Brown	Offering accessible early interventions for depression and anxiety across the lifespan
16.50	Dr Lauren Carson	The eLIXIR Partnership
16.55	Dr Petra Proitsi	Deciphering the role of blood metabolites in midlife cognitive function and Alzheimer's disease
17:00	**Closing remarks** Professor Matthew Hotopf	

Professor Grainne McAlonan keynote speaker

Professor of Translational Neuroscience
Department of Forensic and Neurodevelopmental Sciences

Autism across all ages: what does a vulnerable brain look like? Can we shift biology?

Synopsis

Autism Spectrum Disorder (ASD) is clinically diverse, and its etiological mechanisms are poorly understood. To inform prognosis and generate intervention opportunities we need a better understanding of causal pathways; and subsequently, a means to examine target engagement. There is fresh hope however, based on evidence that multiple risk factors for ASD and related neurodevelopmental conditions converge to disrupt the balance between excitatory glutamate (E) and inhibitory GABA (I). This will likely alter the activity and structure of brain circuits which underpin (especially social) cognition and behaviour. Professor McAlonon's research is directly testing this hypothesis by using MRI to examine spontaneous functional activity and microstructure in the brain of neonates with and without vulnerabilities for neurodevelopmental disorders. Her research has also begun to investigate whether E/I differences persist into adulthood in ASD, and if they are 'responsive' to pharmacological modulation. In her keynote talk, Professor McAlonan will share some of her early progress in these areas.

Biography

Professor Grainne McAlonan studied Medicine at University of Cambridge and Imperial College London and completed a PhD in Behavioural Neuroscience at University of Cambridge. After clinical and research posts in the UK, she worked for over a decade in the University of Hong Kong before returning to the IoPPN. She uses MRI as a translational tool to link brain and behaviour in people with neurodevelopmental conditions such as Autism Spectrum Disorder (ASD), and to 'back' (and 'forward') translate to laboratory models. Her current research is informed by her work in the National ADHD and Autism Service for Adults at the South London and Maudsley NHS Foundation Trust (SLaM). She is Clinical Disorders Cluster Lead for the NIHR Maudsley Biomedical Research Centre. Grainne is a group leader within the MRC Centre for Neurodevelopmental Disorders at IoPPN and is a lead investigator within the EU-AIMS-2-TRIALS consortium – a European network hosting the world's largest grant for autism research. She is responsible for fetal/neonatal/infant brain imaging studies of children vulnerable to neurodevelopmental conditions and for pharmacology studies in adults with ASD.

Joyce Peters

Faculty Marketing Manager
Institute of Psychiatry, Psychology & Neuroscience

Why diversity and inclusion is a topic for everyone

Synopsis

Our underpinning assumptions about life determine everything we do including our work and how we relate to others. But do we test our assumptions? Do we challenge ourselves? Diversity and inclusion should be a topic that everyone can engage in but if we don't know how or where to start, that is okay, we have tools and resources to help you get started. In the session Joyce Peters will focus in particular on race equality at the IoPPN and why it matters for everyone.

Biography

Joyce Peters is the Faculty Marketing Manager for the IoPPN and has been in the faculty for just under four years. She is also the Race Equality co-champion and outgoing Race Equality Network Chair. In her capacity as Faculty Marketing Manager, Joyce works across student recruitment activities for undergraduate and post graduate students.

She has been an active member and co-chair of IoPPN's Race Equality Network since 2016 working on a range of initiatives to celebrate culture and encourage discussion of race and race equality across IoPPN. As Race Equality D&I co-champion, Joyce leads on initiatives to drive change in the IoPPN culture to be more diverse and inclusive and enable people of all races and ethnicities to reach their potential.

Dr Tom McAdams

Wellcome Trust Senior Research Fellow/Honorary Senior Lecturer
Social, Genetic & Developmental Psychiatry Centre

Intergenerational genetic research: how it has – and will – shed light on the causes of psychopathology

Synopsis

Mental health problems run in families, with the children of parents with mental health problems at increased risk of developing problems of their own. However, the mechanisms underlying such associations are not always clear as both genetic and environmental routes of transmission are feasible. Dr Tom McAdams will discuss how intergenerational databases such as the Norwegian Mother, Father and Child Study (MoBa) can be combined with registry data and used to distinguish genetic from environmental modes of transmission. He will then discuss some of his recent research examining associations between parent mental health and child outcomes beginning in pregnancy and going through development. He will also introduce the Children-of-TEDS (CoTEDS) project, which is recruiting children born to participants in the ongoing Twins Early Development Study (TEDS). He will finish on some of his plans for future research in MoBa, CoTEDS and other intergenerational datasets.

Biography

Dr Tom McAdams is an Honorary Senior Lecturer based in the Social, Genetic & Developmental Psychiatry Centre. His research is focussed largely on developing and applying behavioural genetic methods to understand the mechanisms underlying the intergenerational transmission of psychopathology. Tom holds a Wellcome Trust Senior Research Fellowship focussed on exploring how to use intergenerational genetically informative datasets to this end. He works on various datasets including the Norwegian Mother, Father and Child Cohort Study (MoBa), and Scandinavian registry data. He is PI of the Children-of-TEDS (CoTEDS) Project.

Dr Lisa Nolan

Kings Prize Research Fellow
Wolfson CARD

The impact of sex as a biological variable on the maintenance of auditory function across the lifespan

Synopsis

Age-related hearing loss (ARHL) is a complex neurodegenerative disease that is associated with an increased risk of cognitive decline, dementia and depression. Everyone is at risk of losing their hearing as they age. However, hearing loss does not occur at the same rate or extent for everyone. Dr Nolan's research is focused on understanding how sex as a biological variable modulates the ability to retain hearing as people age. She is particularly interested in understanding how sex-hormones could interact with genetic risk loci for ARHL. Two key themes of her current research are: (1) The role of the Estrogen-related receptor gamma gene in the cochlea, and (2) Understanding estrogen-signalling in the cochlea. By identifying the genes and the molecular pathways that underlie sex-specific differences in the maintenance of hearing with advancing age, it is hoped that development of precision medicine for age-related hearing loss will be accelerated.

Biography

Dr Lisa Nolan completed her PhD at UCL on the molecular genetics of age-related hearing loss within the department of Immunology and Molecular Pathology, before moving to the UCL Ear Institute to follow up a genome wide association study into adult hearing using audiometric data from the 1958 British Birth Cohort. A key outcome was the discovery that genetic variation in the estrogen-related receptor gamma (ESRRG) gene is associated with an increased risk of ARHL in women of post-menopausal age. Lisa's long-standing interests lie in how biological sex can modulate susceptibility to common neurodegenerative diseases and in January 2019, funded by a King's College London Prize Fellowship, she moved to the Wolfson Centre for Age-Related Diseases to establish her own laboratory. Her research now focuses on understanding the molecular basis of sex-differences in the maintenance of hearing with advancing age.

Professor John Marsden

Professor of Addiction Psychology
Addictions Department

Cocaine addiction:
mental imagery and craving control

Synopsis

Stimulant use disorder is prevalent and hard to treat. At present, clinicians have no licensed medications to offer patients. Cocaine use disorder develops rapidly through adaptive learning processes and is experienced as intrusive and persistent craving triggered by exposure to conditioned stimuli. Typically, craving is experienced as a vivid and mental image which is then combined with beliefs and a powerful motivation to obtain the drug. Distressing craving can persist long into abstinence and predicts relapse. Drawing on a series of research studies funded by the Biomedical Research Council (BRC), Professor Marsden will summarize efforts to help patients to better recognise and cope with craving experiences. He will outline plans to integrate this promising work with experimental pharmacotherapies. Professor Marsden's talk will draw on BRC supported experimental studies to develop interventions for patients with cocaine use disorder.

Biography

John Marsden is Professor of Addiction Psychology at the Addictions Department, School of Academic Psychiatry. He is a British Association for Behavioural and Cognitive Psychotherapies practitioner in cognitive behavioural psychotherapies and a clinical research psychologist with a focus on experimental therapeutics for opioid, stimulant, and alcohol use disorders. He is the clinical research lead for a multi-centre trial of extended-release buprenorphine maintenance therapy for opioid use disorder.

Dr Tatiana Salisbury

Senior Lecturer in Global Mental Health
Health Service & Population Research

Improving mental health: when expertise is not enough

Synopsis

Dr Salisbury will discuss the incorporation of human-centred design approaches within global mental health. She will summarise her work to develop an intervention to improve adolescent perinatal mental health outcomes in sub-Saharan Africa.

Biography

Dr Tatiana Taylor Salisbury is a Senior Lecturer in Global Mental Health, and UKRI Future Leaders Fellow. She uses human-centred design to help health and community service providers in low resource settings actively engage communities in the development of scalable and sustainable solutions to positively transform their health, wealth and relationships. Her work includes research into the atiology of – and stigma associated with – mental health problems among children and adolescents living with HIV in Uganda, and comparison of health system characteristics and quality of residential rehabilitation care across Europe. Tatiana is Joint Director of the World Health Organization Collaborating Centre for Research and Training in Mental Health at the IoPPN.

Dr Matthew Grubb

Reader in Neuroscience
Centre for Developmental Neurobiology

# Getting nosey about brain repair

Synopsis

The adult brain is generally terrible at repairing itself. One exception to this rule is the projection from the nose to the olfactory bulb – the olfactory nerve – whose component cells are continually produced throughout life. This ongoing generation of new inputs to the brain means that the olfactory nerve can also naturally regenerate after injury. By exploiting this natural regenerative ability, it's possible to ask how target circuits can influence nerve function while repair is happening. In this way, the hope is to identify novel mechanisms that might be targeted to improve the success of nerve regrowth in this projection, and in other areas of the damaged central nervous system.

Biography

Dr Matthew Grubb received his PhD from the University of Oxford, before taking up post-doctoral positions at the Institut Pasteur in Paris and the Centre for Developmental Neurobiology at King's College London. Having obtained a Career Development Fellowship from the Wellcome Trust, Matt established his research group at the Centre for Developmental Neurobiology in 2010. Since then his laboratory has investigated mechanisms of activity-plasticity in the mammalian brain, focusing on the olfactory system, on adult neurogenesis, and on cell-intrinsic alterations in response to perturbations in sensory experience. Current projects involve multi-omics 'patch-seq' approaches to plasticity in single neurons, and investigating the physiological correlates of naturally-occurring nerve regeneration.

Dr Ralica Dimitrova

Research Associate
Centre for the Developing Brain
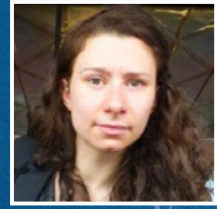
Characterising heterogeneity in the developing neonatal brain

Synopsis

Preterm birth represents a leading cause of infant mortality and morbidity and is a well-recognised risk factor to lifelong neurodevelopmental difficulties. Group-wise analyses of magnetic resonance imaging have identified differences between preterm and term-born infants, but still do not reliably predict neurocognitive prognosis for individual infants. This might be due to the unrecognized heterogeneity of cerebral injury observed in the preterm population. In this talk, Dr Dimitrova will discuss how the application of advanced modelling techniques has helped us overcome this challenge. By modelling early brain development, we can capture both the high variability of early life and provide inference at the level of the individual infant. This will provide future means to develop better imaging strategies to understand mechanisms of injury and determine more accurate individualised clinical and cognitive prognoses.

Biography

Dr Ralica Dimitrova received her PhD in Neuroimaging from the Department of Forensic & Neurodevelopmental Sciences, IoPPN and currently holds a position as a Research Fellow at the Centre for the Developing Brain, School of Biomedical Engineering & Imaging Sciences. During her doctoral and postdoctoral training Ralica has focused on studying the developing human brain. By combining quantitative magnetic resonance imaging and computational statistics, her work aims to map the typical trajectory of neonatal brain development and characterise how genetic vulnerability and early life exposure to environmental risks predispose individuals to atypical brain and cognitive development.

MRC Doctoral Training Partnership PhD Student
Department of Basic and Clinical Neuroscience

The positive impact of intermittent fasting on memory and the brain

Synopsis

It was originally thought that brain cells were unable to regenerate. However, we now know that there is a part of your brain, called the hippocampus, that continues generating new brain cells throughout life in a process called adult hippocampal neurogenesis. Neurogenesis is thought to be play a role in memory. In particular, a type of memory which allows you to tell the difference between two very similar events. This memory starts to get worse from our mid-20s with a sharp decline from around 60 years old. As we get older, neurogenesis also slows down and we produce less brain cells. This might be part of the reason why our memory gets worse with age. Intermittent fasting, a diet where you go through periods of fasting and normal eating, may have a positive impact, particularly on neurogenesis. In her talk, Curie Kim will talk about these findings, including how it could improve memory possibly by boosting neurogenesis.

Biography

Curie Kim is a final year PhD student in the Adult Neurogenesis & Mental Health lab headed by Dr Sandrine Thuret and Diet & Cardiometabolic Health research group headed by Dr Wendy Hall. Curie obtained a BSc degree in Healthcare Science at the University of Nottingham followed by a MSc in Neuroscience at King's College London with a specialisation in Neural Stem Cells and Nervous System Repair. She then continued her work as a research assistant in adult hippocampal neurogenesis in the Thuret lab investigating the impact of a mastication intervention on hippocampus-dependent cognition. For her PhD Curie is investigating the impact of intermittent fasting and mastication on ageing-associated cognitive decline and neural stem cell ageing in the context of adult hippocampal neurogenesis.

Dr Katherine Young

NIHR Maudsley Biomedical Research Centre Lecturer
Social, Genetic & Developmental Psychiatry Centre

Anxiety and depression during the COVID-19 pandemic

Synopsis

Adolescence is an especially vulnerable period of life with elevated risk for new onset of psychiatric conditions. The COVID-19 pandemic has introduced novel stress at a global population level, with young people facing particular stressors in regard to uncertainty around education and employment, loss of contact with peers, and likely long-term economic challenges. In her talk, Dr Katherine Young will outline her ongoing COVID-19 research which aims to examine risk and resilience to worsening stress-related mental health among young people.

Biography

Dr Katherine Young is an NIHR Maudsley Biomedical Research Centre Lecturer and MQ Fellow. Her background is in neuroscience, experimental and clinical psychology. Her translational research focuses on using neuroscientific techniques (eg neuroimaging, psychophysiology, cognitive testing) to better understand the development and maintenance of anxiety and depression, as well as to improve our mechanistic understanding of psychological treatments for these mental health problems. Her work focuses on depression (particularly symptoms of 'anhedonia') in adolescents. Since the beginning of the COVID-19 pandemic, she has been running a large online research study examining mental health among young people and adults across the UK. Katherine is investigating how different patterns of thoughts and behaviours relate to changes in symptoms of depression and anxiety, and how these interact with perceived stress levels among young people.

Chris Albertyn

Research Portfolio Lead
Department of Old Age Psychiatry

Dementia research in a digital age – the role of artificial intelligence

Synopsis

Artificial Intelligence (AI) methods are becoming increasingly ubiquitous in healthcare and clinical research; offering a succinct opportunity to maximise the value of data to promote health and well-being. In the context of dementia, AI methods offer the chance for accelerated and more accurate diagnosis, optimisation of patient pathways, and tailored personalised treatment programs. However, despite the significant promise these methods represent, it is essential to delineate the truths from the myths, the benefits versus the risks. In his talk, Chris Albertyn will elucidate how the Department of Old Age Psychiatry, in collaboration with external and cross-faculty partners, is building a critical mass of rich longitudinal data, and applying innovative data science methods to extract impactful results. He posits that a lifespan perspective is a prerequisite for any ageing and dementia researcher – but what's less discussed, is that we must also consider the current lifespan of AI itself.

Biography

Chris Albertyn is an early career researcher who joined King's College London in 2015. Since then, he has worked in a variety of roles in dementia research, primarily as study and clinical trial coordinators. His top five research passions are: Healthy Ageing & Dementia; Artificial Intelligence & Data Science; Clinical trials (particularly innovation in methodology and practice); Psychopharmacology; and Open Science, reproducibility and implementation science to maximise translational impact. He received his training in applied AI from the University of Oxford in 2019, and is passionate about exploring its potential in ageing and dementia research.

Dr Rina Dutta

Senior Clinical Lecturer
Department of Psychological Medicine

Data science to understand suicidality and self-harm in the digital age

Synopsis

Dr Dutta and her team have been harnessing the power of unstructured text in health records to understand suicidality and self-harm in more depth using Natural Language Processing (NLP). Her team study transdiagnostic clinical hypotheses relevant to different groups of patients across the lifespan, including young people, and pregnant and postnatal women. At its core, clinical NLP is multi-disciplinary. Dr Dutta will explain how clinical, linguistic, engineering and statistical approaches are used by her team to capitalise on the richness of real-world clinical data. Dr Dutta will also explain her rapidly emerging tranche of research concerning the experience of self-harm behaviour, using social media and smartphone data and an innovative follow-up study. The use of different linguistic syntax can give us an insight into mental health which could ultimately help us deliver new interventions, using social media and targeting the timing of this according to smartphone use.

Biography

Dr Rina Dutta is a Senior Clinical Lecturer and Clinician Scientist Fellow of the Health Foundation in partnership with the Academy of Medical Sciences. Her primary research programme is e-HOST-IT (Electronic health records to predict HOspitalised Suicide attempts: Targeting Information Technology solutions). She has secured over £2.2 million in the last five years for research in suicidality, self-harm, mortality, the linkage of datasets and clinical informatics research, using both electronic health records and social media data. Rina was formerly an MRC doctoral research training fellow. She received the BMA Margaret Temple Award (2007, 2011 and 2014) and was named Royal Society of Medicine Young Research Trainee of the Year (2011). Since 2009 she has worked as a Consultant Psychiatrist for the National Affective Disorders Service at the Maudsley Hospital, providing a specialist clinic for health care professionals with affective disorders.

Professor Terrie E Moffit keynote speaker

Professor of Social Development
Social, Genetic & Developmental Psychiatry Centre

Surprises about psychopathology revealed by following 1000 people for four decades

Synopsis

Repeated mental-health assessments in a birth cohort followed to age 45 reveal that mental disorder eventually affects virtually everyone. The predominant pattern among clinically significant cases is adolescent onset followed by a succession of different diagnoses emerging over decades. Findings challenge the field's over-reliance on researching and treating specific mental disorders diagnosed in cross-sectional snapshots.

Biography

Professor Terrie E Moffitt's expertise is in the areas of lifelong ageing, mental health, longitudinal research methods, developmental theory, neuropsychology, and gene-environment interplay. She is the associate director of the Dunedin Longitudinal Study, which follows a 1972 birth cohort in New Zealand. She also founded the Environmental Risk Longitudinal Twin Study (E-Risk), which follows a 1994 birth cohort in the UK. Terrie is a licensed clinical psychologist, with specialization in neuropsychological assessment. Her service includes as a trustee of the Nuffield Foundation (UK), chair of the Board on Behavioral, Cognitive and Sensory Sciences at the National Academies of Sciences, member of the National Advisory Council on Ageing (US-NIH), and chair of the jury for the Klaus J Jacobs Prize (Switzerland). She is an elected fellow of the US National Academy of Medicine, British Academy, UK Academy of Medical Sciences, Academia Europa, Association of Psychological Science, and the American Society of Criminology.

Dr Rosalyn Moran

Reader of Theoretical Neurobiology
Department of Neuroimaging

Pushing beliefs, neuromodulators and computational psychiatry

Synopsis

The neuromodulatory systems play a critical role in mediating cortical circuitry; supporting attention, learning, inference, memory and decision-making. In this talk Dr Moran will present theoretical models of neuromodulatory function as well as novel data from and models of, human brains that provide new insights on the role of classical neuromodulators including noradrenaline and serotonin and explore contemporary issues in neuromodulation related to the microbiome. Here Dr Moran will describe how state-action prediction errors (developed under the theory of Active Inference) can recapitulate classic tonic-phasic shifts in LC firing activity during conditioning and foraging tasks. In the second part of her talk, she will describe new data from the human striatum where fast scan cyclic voltammetry was used to measure serotonin levels during a betting game. Finally she will examine interoceptive pathways involved in anxiety and pain responses and describe how the gut microbiome is correlated with putative prediction pathways, promoting stabilisation of bottom-up 'gut feelings'.

Biography

Dr Moran obtained her PhD in Engineering from University College Dublin. She trained in neuroscience at University College London under Professor Karl Friston. She has held faculty positions at Virginia Tech and the University of Bristol. She is currently deputy head of the Department of Neuroimaging at the IoPPN. She served as an editor for Neuroimage and Neuroimage Clinical. The research in Dr Moran's lab aims to join together brain connectivity analysis with the putative algorithmic role of why regions in the brain are connected and what information these connections relay. This work lies at the intersection of Artificial Intelligence (deep networks), Bayesian Inference (variational principles) and Experimental Neurobiology (cognitive tasks in the scanner, with eye tracking and/or M/EEG). Of particular interest to these questions are the role of families of neurotransmitters in algorithmic deployment – e.g. the role of noradrenaline in prediction errors and model-based decision making. Dr Moran uses the Free Energy principle as a principle to develop new methods in Artificial Intelligence and in disease modelling. Diseases of interest include age-related neurodegenerative disease and schizophrenia.

Dr Gemma Modinos

Reader in Neuroscience & Mental Health and a Sir Henry Dale Fellow
Department of Psychosis Studies

Neurobiology of psychosis risk: from mechanistic to big data approaches

Synopsis

Dr Modinos' lab uses translational brain imaging techniques in humans and animal models to investigate the neural mechanisms involved in emotion and their role in the development of psychotic symptoms and disorders. The lab also applies psychopharmacological approaches to probe how to intervene on those neural mechanisms early to prevent or delay the development of psychosis. Besides such mechanistic studies, as Chair of the ENGIMA Schizotypy consortium, Dr Modinos works on large scale meta-analyses of neuroimaging data aiming to delineate the neural signature of subclinical psychotic-like experiences in healthy individuals. This talk will provide a bitesize overview of three main research themes within Dr Modinos' lab: (1) Neural basis of emotion along a psychosis continuum; (2) Translational neuroimaging in psychosis research; and (3) A big data approach to subclinical psychotic experiences through the ENIGMA Schizotypy consortium.

Biography

Dr Gemma Modinos is a Reader in Neuroscience & Mental Health, and a Sir Henry Dale Fellow (Wellcome Trust and Royal Society) at the IoPPN, and Visiting Scholar at the Department of Neuroscience of the University of Pittsburgh (USA). She studied a BSc in Psychology at the Autonomous University of Barcelona, followed by an MSc in Applied Neurosciences at the University of Barcelona (Spain). She then moved to the Netherlands to complete a PhD in Neuroscience (Cum Laude, highest distinction) at the University of Groningen. As a post-doc, Gemma moved to the UK to continue her academic career in the Department of Psychosis Studies at the IoPPN, and established her lab in 2017. She is Chair of the Young Academy of Europe, a pan-European network of excellent young scientists to provide scientific advice to the European Commission from a younger generation's perspective – a vital input to shape EU-wide policy for the benefit of future European scholars and scientists. Gemma is also Junior Executive Board Member of the Schizophrenia International Research Society (SIRS), and was the first female winner of the SIRS Rising Star award (2019).

Professor Gerome Breen

Professor of Psychiatric Genetics
Social, Genetic & Developmental Psychiatry Centre

Anorexia nervosa is both a psychiatric and metabolic disorder

Synopsis

Eating disorders are common, deadly but much understudied. The contribution of genetics to these disorders is substantial (50-60 per cent) but this is not widely known. Professor Breen co-leads the international Psychiatric Genomics Consortium Eating Disorders group. The group's work on the genetics of anorexia nervosa has found multiple interesting genes and shown that anorexia shares genetic effects with other psychiatric disorders. However, they have also found that anorexia shares genetics for low BMI, low body fat, better insulin function and increased levels of 'good' cholesterol. To drive forward research into the psychiatric, metabolic and environmental causes of eating disorders, Professor Breen's team launched the Eating Disorders Genetic Initiative on Feb 26th 2020. They aim to recruit 10,000 people with the goal of creating the world's largest re-contactable group of people with experience of an eating disorder and detailed clinical and genetic information.

Biography

Gerome Breen is Professor of Psychiatric Genetics at the SGDP and Primary Investigator on the Genetic Links to Anxiety and Depression (GLAD) and Eating Disorder Genetics Initiative (EDGI) projects at the NIHR Maudsley Biomedical Research Centre. He is a psychiatric geneticist with particular interests in psychosis and affective and eating disorders. One of the most important goals for his research is to discover the biological basis of common psychiatric disorders, which will allow better drug discovery and biomarker studies in mental health. Gerome's involvement with international genetic consortia has produced ground-breaking findings – notably the role of metabolic genetics in anorexia nervosa. He leads an arm of a national biobanking project called the NIHR BioResource for Mental Health, which aims to recruit 100,000 people with lived experience of a mental health disorder.

Dr Maria Elisa Serrano Navacerrada

Research Associate
Department of Neuroimaging

Imaging brain synaptic density across the lifespan: from normal to pathological

Synopsis

The synaptic vesicle glycoprotein 2A (SV2A) is a protein involved in synaptic transmission, and thus essential for proper function of the nervous system. Moreover, SV2A can be imaged in the live animal and human brain and has been hailed as a potential new marker of synaptic density. During her previous research into the roles of this protein, Dr Serrano observed that the expression of SV2A increases with ageing in rodent models. This increase is intriguing and could be linked to establishment, or strengthening, of new brain connections throughout life. Furthermore, alterations in SV2A expression are associated with multiple neurological and psychiatric diseases. For example, a decrease in SV2A brain levels in a rat model of epilepsy was observed, and a link between SV2A expression and anxiety in another mouse model. This protein, therefore, represents an interesting – but not yet fully characterised – target for quantifying synaptic density in the healthy and pathological brain.

Biography

Dr Maria Elisa Serrano Navacerrada is a Research Associate in the Neuroimaging department at IoPPN, working with Professor Federico Turkheimer and Dr Diana Cash. The focus of her research is understanding the underlying processes related to different neurological diseases and syndromes. She employs different in vivo and in vitro neuroimaging techniques such as Magnetic Resonance, Positron Emission Tomography and immunohistochemistry. During her studies Maria Elisa covered a broad spectrum of clinical and preclinical research, undertaking a BSc in psychology and two MSc's in cognitive psychology and in clinical neuroscience at the Complutense University of Madrid (Spain). During her PhD in biomedical and pharmaceutical sciences at the University of Liege (Belgium), she studied the role of the Synaptic Vesicle 2A protein (SV2A) in the normal and the pathological brain, analysing for the first time in vivo changes in synaptic density in an epilepsy model.

Dr Virginia Carter Leno

Sir Henry Wellcome Postdoctoral Fellow
Department of Biostatistics and Health Informatics

Associations between theory of mind and conduct problems in autistic and non-autistic youth

Synopsis

Many autistic young people exhibit co-occurring behaviour difficulties, characterized by conduct problems and oppositional and aggressive behaviour. The prevalence rates of these difficulties are far higher than those reported from non-autistic populations. These behaviours have a negative impact upon a young person's life, impacting educational achievement and community participation. They are also associated with caregiver stress and increased risk of hospitalisation/admission to residential care. However, the causes of these co-occurring behavioural difficulties, and specifically why they are more prevalent in autistic populations, is not well understood. Impairments in theory of mind (ToM) are often reported in autistic individuals and have been linked to conduct problems in non-autistic individuals. Whether an association between ToM ability and conduct problems exists in autistic populations, whether this association is similar between individuals who are autistic vs. non- autistic remains relatively unknown. This talk will present analyses testing the association between ToM ability and conduct problems in autistic and non-autistic youth.

Biography

Dr Virginia Carter Leno is a Sir Henry Wellcome Postdoctoral Fellow in the Department of Biostatistics and Health Informatics. Her PhD research focused on testing the neural and cognitive correlates of mental health problems in autistic adolescents, with the aim to delineate potential risk and resilience factors for psychopathology in autistic populations. Her postdoctoral work will continue this line of research, but focus on earlier neurocognitive antecedents, primarily in infancy, of both mental health and core autistic symptoms, and utilise longitudinal cohorts to answer questions of directionality. This work will involve using longitudinal statistical techniques to model trajectories of brain development, cognitive functioning and symptoms over time. One specific area of interest is testing whether established risk factors for mental health problems in non-autistic populations function in the same way in autistic individuals. This work will provide more accurate aetiological models, and therefore allow for the development of better-targeted interventions.

Dr Sam Cooke

Senior Lecturer in Neural Plasticity
Department of Basic & Clinical Neuroscience

Distinguishing the novel from the familiar: cortical plasticity across the lifespan
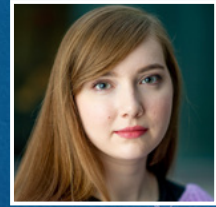
Synopsis

The theme of lifespan is highly relevant to Dr Cooke's research interests of learning and memory. Many of our memories last across our long lifespan, but we still do not understand how this is possible in such a dynamic system as our brain. The degree to which we learn also changes dramatically across our lifespan from early critical periods of plasticity that shape our brain forever, through to drastically diminished plasticity that is apparent in the natural process of ageing. Deficits of learning and memory are major symptoms of brain disorders that manifest at either end of the lifespan, from neurodevelopmental disorders, which are apparent in children, through to dementia, which devastates learning and memory in many elderly people. Dr Cooke will briefly describe the various approaches being taken to understand how the brain learns, how memories are retrieved, and how this may contribute to addressing disorders of learning and memory.

Biography

Dr Sam Cooke's research interests have always been learning and memory. He received a PhD from University College London, where he worked with Professor Chris Yeo to understand how plasticity in the cerebellum supports motor learning. Next, he investigated hippocampal mechanisms of synaptic plasticity required for episodic learning and memory, working with Doctor Tim Bliss at the National Institute for Medical Research. He then joined the laboratory of Professor Mark Bear at the Massachusetts Institute of Technology (MIT), where he developed new assays to interrogate thalamo-cortical processes of habituation and novelty detection. Sam joined IoPPN three years ago with the goal of translating the basic understanding of learning and memory we have gained in animal models into deeper understanding of human learning and memory dysfunction at either end of the lifespan.

Lucy Chester: 3-Minute Thesis finalist

NIHR Maudsley BRC PhD student
Department of Psychosis Studies

Cannabis and psychosis

Synopsis

Psychosis is the most debilitating of all mental illnesses, breaking a patient's very understanding of reality itself. Around 1 in 100 people will develop a psychotic disorder in their lifetimes, of whom around 1/3 will have an inadequate response to medication. Research is focusing on detecting risk factors that could lead to disease prevention.

The link between cannabis and psychosis is hotly debated. While we know that patients with psychosis are more likely to be cannabis users than the general population, we still have yet to prove that cannabis is a causative agent for the disorder.

Since 2010, the European Gene-Environment Interaction study (EU-GEI) identified over 350 individuals worldwide at risk of developing psychosis and followed their progress. In her talk, Lucy Chester will discuss early results and attempts to untangle the many factors that may tie a cannabis habit to a psychotic break.

Biography

Lucy Chester is in the third year of her PhD under the supervision of Professor Philip McGuire, Professor Sagnik Bhattacharyya and Dr Matthew Kempton. Her aim is to investigate the relationships between delta-9-tetrahydrocannabinol, cannabidiol and psychotic disorders.

This year, she is a finalist in the King's 3-Minute Thesis competition.

Lucy originally completed an MPharm degree at University College London and went on the qualify as a pharmacist. She works as a community pharmacist part-time around her PhD.

Dr June Brown

Reader in Clinical Psychology
Department of Psychology

Offering accessible early interventions for depression and anxiety across the lifespan

Synopsis

Only 30 per cent of those with mental health problems will access services. This has been due to the small size of the services and the general public being reluctant to seek help. Dr Brown has tried to address the problem by developing larger scale psychological workshops which have been marketed in a more friendly way. The original model was of larger-scale (up to 30 people) self-referral day-long psychoeducational stress workshops run in leisure centres. These have been developed to include different groups varying in age, from older adolescents to adults with different problems (depression, insomnia and anger). Settings include schools, community centres and workplaces. Uptake has been good, reaching minority ethnic groups groups and those who have not consulted their GPs. Present developments include day-long workshops for post-natal depression in Canada and sub-threshold depression in Manchester. The current multi-centre trial on psychoeducational stress workshops for 16-18 year olds in schools will also be described.

Biography

Dr June Brown, PhD, AsFBPS, C.Psychol, is Reader in Clinical Psychology at IoPPN and Consultant Psychologist at South London and Maudsley NHS Foundation Trust. She has published over 60 peer reviewed papers and book chapters. Through working as a psychology manager in Birmingham and in London, she became very aware of the low capacity of psychology services to meet the needs of people with mental health problems. A key focus of June's research has therefore been to develop brief accessible and larger-scale psychological treatments for depression and anxiety and offer early interventions and reach more 'hard to reach' groups. These interventions have now been adapted for use with different problems, and in different settings. She is a member of the UK NICE Guidelines Committee for Depression and helping develop recommendations for the use of evidence-based treatments in the UK.

Dr Lauren Carson

Postdoctoral Research Project Manager
Department of Psychological Medicine

The eLIXIR Partnership

Synopsis

Investment in health in the earliest stages of life is increasingly recognised as a means to improve the life course of health; beginning in utero, through to infancy, childhood and into adulthood. The Early Life Cross Linkage in Research (eLIXIR) Partnership was developed in 2018, generating a repository of real-time, pseudonymised, structured data derived from electronic health record systems combining both physical and mental health data from maternal and neonatal services across King's Health Partners. In her presentation, Dr Carson will describe the development of the eLIXIR Partnership, the planned expansion of this database through linkage to other local and national datasets, and some initial findings from the data.

Biography

Dr Lauren Carson received her BSc (Physiology) from King's College London. She completed her MSc in Reproductive & Developmental Biology and PhD in Clinical Medicine Research (Psychiatry) at Imperial College London. Lauren is currently a Postdoctoral Research Associate across both King's College London and the University of Birmingham. At King's she works as a Researcher for the Applied Research Collaborative (ARC) South London and as the Project Manager for the eLIXIR Programme enabling the data linkage of clinical care records for use in research. Additionally, Lauren has a keen interest in perinatal mental health, especially the impact of infertility and fertility treatment on the mental health of both the mother and child.

Dr Petra Proitsi

Alzheimer's Research UK Senior Research Fellow
Department of Basic and Clinical Neuroscience

Deciphering the role of blood metabolites in midlife cognitive function and Alzheimer's disease

Synopsis

Increasing life expectancy has produced a dramatic rise in age-associated diseases, including dementia. With the estimated worldwide number of dementia sufferers rising to up to 115.4 million in 2050, there is an urgent need to better understand the mechanisms underlying disease processes and develop appropriate risk reduction strategies. Blood metabolites are small molecules that closely represent the physiological status of an organism, reflecting what has been encoded by the genome and modified by systemic and environmental exposures. They are therefore valuable markers of biological processes in dementia. Epidemiological studies highlight associations between metabolites and particularly lipids, and Alzheimer's Disease (AD), the most common form of dementia. However, as pathologies underpinning AD are thought to develop at least a decade prior to symptom onset, confounding and reverse causation preclude drawing conclusions about causality. To disentangle the causal pathways, we use large epidemiological datasets with a wealth of life-course information (and other layers of biological information) and employ statistical methods that will help prioritise potential therapeutic targets.

Biography

Dr Petra Proitsi is an Alzheimer's Research UK Senior Research Fellow in the Department of Basic and Clinical Neuroscience. Petra trained in Biological Sciences (BSc) and Human Molecular Genetics (MSc) and did her PhD at the IoPPN investigating the genetics of behavioural symptoms in Alzheimer's Disease (AD). During her first post-doctoral fellowship Petra pursued her passion for statistical analyses by completing an MSc in Medical Statistics at the LSHTM. She was then awarded a research fellowship and spent two years at the University of Hong Kong followed by a Springboard Fellowship at the MRC Unit of Lifelong Health and Ageing at UCL, before returning to the IoPPN. Petra has recently set up a small but ambitious team focusing on identifying modifiable risk factors causally associated with AD, with a special interest in blood metabolites.

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**Institute of Psychiatry,
Psychology & Neuroscience**
King's College London
16 De Crespigny Park
London SE5 8AF

✉ ioppn-pr@kcl.ac.uk
🌐 kcl.ac.uk/ioppn
f /ioppn
📷 @kingsioppn
🐦 @kingsioppn