Cambridge-Fudan Symposium: Talk Titles & Abstracts



Professor Tamsin Ford
University of Cambridge

Professor Tamsin Ford: Are the kids ok? Lessons from epidemiology about mental health in children and young people

Even prior to the Covid 19 Pandemic, official government statistics suggested that the UK's children were getting physically healthier, but their mental health was deteriorating. Similar concerns arose in many countries around the world, which were then probably exacerbated by the Pandemic and resulting social restrictions. Despite sustained investment with mental health support teams within schools, the level of demand on mental health services is outstripping the capacity of services to respond. There are concerns over the level of access, and how well services meet needs. We should remember that most children and young people are doing well, whilst working hard to reduce the impact of societal, school and family factors that might undermine their mental health. What is good for the vulnerable is likely to benefit all.



Professor Peter Fonagy
University College London

Professor Peter Fonagy: The development of resilience and mental ill health: Does parenting play a role?

Resilience—the capacity to sustain or restore adaptive functioning in the face of adversity—arises from a dynamic interplay of biological, psychological, and social processes. Parenting, as the primary context for early social learning, exerts a central influence on this developmental pathway. Evidence from longitudinal, epidemiological, and neurobiological research indicates that parental behaviour and the quality of the parent–child relationship can buffer against or exacerbate vulnerability to mental ill health. Sensitive, contingent caregiving fosters secure attachment and supports the development of self-regulation, mentalizing capacity, and epistemic trust—the openness to accept and integrate relevant social information—each essential for adaptive coping. In contrast, parenting characterised by neglect, inconsistency, hostility, or unresolved trauma can dysregulate stress-response systems, impair mentalizing, and undermine epistemic trust, constraining the child's ability to benefit from supportive social contexts across the lifespan.

Yet, the effects of parenting are neither deterministic nor uniform. Genetic and temperamental factors moderate susceptibility; parental adversity translates into child vulnerability only under specific conditions; and later relational experiences can attenuate or exacerbate early risks. Parenting effects are often indirect, operating through cascading mechanisms that shape representations of self and others, calibrate stress physiology, and influence trajectories of social participation and help-seeking.

Understanding these contextual contingencies is essential for translating developmental science into prevention. Achieving this will require novel approaches to data integration that can capture and model the complex, interacting influences on resilience and psychopathology—an area where advances in AI hold considerable promise. Without such integrative methods, prevention in child psychiatry will remain aspirational rather than achievable.



Professor Kathryn Abel
University of Manchester



Dr Matthias Pierce
University of Manchester



Dr Mary-Ellen Lynall
University of Cambridge

Professor Kathryn Abel and Dr Matthias Pierce: Critical examination of the fetal origins hypothesis of neuropsychiatric disorder

There is considerable interest in the role of intrauterine exposures on offspring neurodevelopmental risk. Particularly those where public health measures could significantly modify risks of poor outcomes e.g. maternal smoking cessation in pregnancy. However, drawing causal inferences in epidemiological studies is problematic primarily because of biases due to unobserved and poorly measured confounders. There are also potential biases because of the long duration between exposures and outcomes, and in accurately measuring the exposure. First, we consider some of the most prominent ideas related to the fetal origins hypothesis of neuropsychiatric disorder incl. poor fetal growth, intrauterine maternal infection, antenatal severe psychological stress and famine. We shall discuss various approaches that might improve the strength of causal inference in studies of intrauterine exposure and later neuropsychiatric outcomes and briefly consider gene-environment interactions.

Dr Mary-Ellen Lynall: What can genetics and immunology teach us about mental health?

There is growing evidence that shared immune mechanisms contribute to multiple psychiatric disorders, particularly in a subset of patients. I will outline our work using functional genomics and immunophenotyping to identify immune cell subsets implicated in both cross-disorder and disorder-specific genetic risk, suggesting a causal role for adaptive immunity across psychiatry conditions. I will highlight the potential for infection- and stress-induced immune dysregulation to modulate disorder onset via immune-brain crosstalk. I will discuss the implications for understanding common pathways across diagnoses, and how we will extend this work to understand how genetic, immune and environmental factors interact across the lifespan to lead to symptoms.



Professor Gunter Schumann
Fudan University

Professor Gunter Schumann: Understanding the brain in a changing environment: strategies, methods and results

In this presentation I discuss the Horizon Europe project 'environMENTAL', which is aimed at investigating how some of the greatest global environmental challenges, climate change, urbanisation and regional socioeconomic conditions affect brain health during the lifespan, and develop interventions aimed at prevention and early intervention ([http://www.environmental-project.org).]www.environmental-project.org). Leveraging federated cohort data of over 1 million European citizens and patients enriched with deep phenotyping data form large scale behavioural neuroimaging cohorts, we are identifying identify brain mechanisms related to environmental adversity underlying symptoms of depression, anxiety, stress and substance abuse.

I will first describe how environMENTAL builds upon our research on quantitative neurobiological phenotypes of psychiatric illness in the IMAGEN ([http://www.imagen-project.org)]www.imagen-project.org) and other cohorts where we discovered brain mechanisms underlying behaviour and psychopathology, established models for prediction, and stratification of mental illness, and developed novel methods for neuroimaging analyses, including 3T/7T predictions and a digital twin brain model.

environMENTAL extends this work by integrating environmental factors, enabling us, for example, to model how complex, real-life exposure to living in the city relates to brain and mental health, and how it is moderated by genetic factors. Going forward, we shall link population and patient data via geo-location to environmental data derived from remote sensing satellite measures, climate models as well as digital health applications, to develop a neurocognitive model of multimodal environmental influences defined by transdiagnostic symptom groups of mental illness, their brain correlates and their underlying molecular mechanisms. Based on the mechanistic knowledge generated, the project will identify compounds targeting causal mechanisms of disease and develop in close collaborations with stakeholders virtual reality interventions that target symptom clusters defined by shared brain mechanisms.



Professor Jianfeng Feng
Fudan University



Professor Duncan Astle
University of Cambridge

Professor Jianfeng Feng: Lifespan neurodevelopment at individual level

The children's component of the Chinese Brain Project is briefly introduced, with the aim of fostering further collaborations. We then highlight our long-term effort on developing an encyclopedia of brain and behavior. Ongoing work spans multiple domains, including sleep duration, substance use, depression, alcohol consumption, screen time, reading, family environment, and social networks.

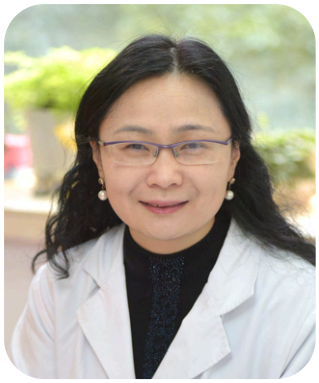
Several large-scale cohorts—such as ABCD, IMAGEN, and the UK Biobank—have provided an unprecedented opportunity to investigate diverse behavioral traits and disease mechanisms. Taking the UK Biobank, the most data-rich resource, as an example, we illustrate both expected outcomes and methodological advances that can be extended to other cohorts. In parallel, leveraging IMAGEN, we examine lifespan neurodevelopment at the individual level.

Finally, by integrating these multi-scale, spatiotemporal datasets, we aim to construct a more comprehensive and rigorous picture of brain development, ultimately contributing to healthier neurodevelopmental trajectories for children.

Professor Duncan Astle: Development, Disorders and Data Science

Human brain development takes a long time and results in highly variable outcomes, including neurodevelopmental and child psychiatric conditions. This variability in brain development is important for understanding differences in cognition, mental health and learning. But measuring and mapping that variability is extremely challenging.

This talk showcases the application of different computational frameworks that address three crucial developmental challenges. Firstly, how do we capture the incredible cognitive heterogeneity that exists across childhood and adolescence, and do these differences map to established diagnostic categories? Secondly, can we build developmental models that formalise simple biological principles in order to capture complex developmental phenomena? Thirdly, can we use these models to bridge scales and species to establish fundamental and causal mechanisms that shape development?



Professor Fei Li
Xinhua Hospital (Shanghai Jiao Tong University)



Dr Anna Moore
University of Cambridge

Professor Fei Li: Advances in Intervention and Treatment for Autism Spectrum Disorder

Autism spectrum disorder (ASD) ranks among the leading causes of non-fatal health burden in individuals under 20 years of age. However, evidence-based therapeutic interventions remain limited. Here, we present findings from two parallel series of clinical investigations examining pharmacological and neuromodulatory approaches.

In our pharmacological investigation, we evaluated bumetanide, a well-characterized loop diuretic with potential modulatory effects on insular GABA concentrations and social communication. Following pilot studies, we conducted a randomized, double-blind, placebo-controlled trial and showed that administration of bumetanide (0.5mg twice daily) over a three-month period yielded significant improvements in social functioning among children with ASD, with a favorable safety profile. Notably, we identified a panel of pretreatment cytokine biomarkers, including MIG, IFN-α2, and IFN-γ, that exhibited predictive validity for treatment response (approximately 30% response rate). We are currently conducting a validation study recruiting high-response subjects to establish the clinical utility of this predictive algorithm for precision medicine applications.

In parallel, we investigated repetitive transcranial magnetic stimulation (rTMS), an FDA-approved noninvasive neuromodulation technique with established efficacy in major depressive disorder. Traditional rTMS protocols present significant implementation challenges in the ASD population, particularly among young children and those with intellectual disabilities, due to requirements for prolonged stationary positioning during neuronavigation and stimulation procedures. To address these limitations, we developed an innovative 5-day protocol targeting the left motor cortex that eliminates the need for neuronavigation and incorporates abbreviated stimulation sessions within 3 minutes. Following initial safety and feasibility studies, we conducted a randomized, sham-controlled, partially double-blind, multicenter trial. Results demonstrated significant improvements in social functioning following the 5-day intervention protocol in 1-month follow-up visit, with no clinically significant adverse events. These findings support the viability and scalability of modified rTMS protocol as a therapeutic intervention for ASD.

Dr Anna Moore: Towards the early identification of children's mental health problems

If we are to tackle the global mental health crisis, we must focus on where the biggest impact can be made—early intervention and prevention. But how can we redesign an overstretched, under-resourced system to make this possible? In this talk, I connect insights from basic science on early risk factors for poor mental health with advances in health informatics, implementation science, and human-centred design. I make the case that responsibly developed AI diagnostic tools—embedded within systems built for early identification—could be the transformative force we need to change the trajectory of mental health worldwide.