NIHR | Maudsley Biomedical Research Centre

Neuroimaging Theme
Maudsley Biomedical Research Centre

**The South London and Maudsley NHS Foundation Trust and the
Institute of Psychiatry, King's College London**

'New Questions of Old Data' Funding Call Description

Date of issue: 30th July 2021

**Deadline for submission of application: 30th September 2021
Decisions expected to be announced by 15th October 2021**

About the NIHR Maudsley BRC:

The National Institute for Health Research (NIHR) Maudsley Biomedical Research Centre (BRC) is a partnership between South London and Maudsley NHS Foundation Trust, the UK's largest mental health trust, and the Institute of Psychiatry, Psychology & Neuroscience at King's College London, Europe's leading academic centre for mental health research.

The NIHR Maudsley BRC focuses on researching novel tests, treatments and technologies to understand and treat mental disorders. Our aim is to accelerate the translation of the latest scientific discoveries into first-in-man clinical trials and other well-designed studies. The findings from these studies can then be developed and implemented to produce new tests and treatments for people with mental and neurological disorders.

Our research priorities are focused around:
- novel treatments
- precision medicine
- translational informatics
- and mental-physical health

For more information please see: https://www.maudsleybrc.nihr.ac.uk/about-us

About the Neuroimaging Theme:
The Neuroimaging Theme is one of 21 themes supported by the NIHR Maudsley BRC and sits within the Precision Psychiatry Cluster (see Appendix A for organisation chart). The theme supports work across other clusters as well as commissioning neuroimaging method specific research. Between March 2018 to November 2022 the Neuroimaging Theme aims to:
- Develop assays which improve early diagnosis, predict treatment response and inform clinical management

- Make neuroimaging a core clinical procedure in precision psychiatry in the next 5 years.
- Expand our current suite of analytical tools

About this call:

Aims
The aim of this call "Asking new questions of old data" is to promote or create open/shared analysis frameworks within the IoPPN where "old" neuroimaging data and novel methodologies can be integrated together for the development of translational biomarkers for precision medicine.

Background
Over the last ten years or so, we have seen ever-increasing advances in neuroimaging in terms of sequence improvement and harmonisation among centres. We have seen the concurrent effort in acquiring and sharing public repositories of large population-based cohorts capturing a wide range of clinical populations, which have gradually promoted the importance of open science. This context is fertile ground for the complementary development and optimisation of cutting-edge analytic and statistical tools. It allows us to tackle methodological challenges using data that are already available and, at the same time, answer questions exploiting ground-breaking approaches. Furthermore, big data has the invaluable advantage of fostering the exploration of individual differences within and across clinical cohorts to develop novel biomarkers for precision medicine.

One example of an emerging methodology that holds great potential to address this challenge and allow neuroimaging to make a step towards precision medicine is **normative modelling**, an approach that provides statistical inferences at the level of the individual with respect to a normative pattern. Similar to the growth charts used in paediatric medicine to map height and weight as a function of age, normative modelling generalises this notion by replacing these variables with clinically relevant variables and applying automated statistical techniques to map centiles of variation across the cohort. This strategy offers a way to quantify and characterize the degree of deviation of different individuals from an expected pattern and from one another. Importantly, overlapping abnormalities across patients and consistent patterns of deviation are not necessary conditions for the development of these models.

Translational or Impact Pathway
A fundamental pillar of this funding call is the use of existing data for the development of novel methodologies or the exploration of individual differences within and across clinical cohorts using existing advanced modelling approaches. The IoPPN neuroimaging bank stores an incredibly extensive amount of data of healthy controls and patients spanning different psychiatric conditions. Given the current difficulties associated with MRI scanning and subjects' recruitment, data sharing to address questions not yet considered/fully answered is a prerequisite for this project area.

We would welcome applications focusing on either the development of new multimodal tools integrating different kinds of data (genomic, molecular, structural, functional, etc), or the application of existing advanced analytical modelling methods to study underrepresented cohorts of patients or healthy controls.

For example, from a report produced listing the number of neuroimaging studies conducted at the CNS per patient group in the year 2019, the top four populations were:

a) Healthy controls (the majority of which were adults)
b) Patients with psychosis or schizophrenia (In particular patient groups at risk of psychosis, or patients with schizophrenia)
c) Patients with neurodevelopmental disorders (in particular children or adults with ASD or ADHD
d) Patients with affective disorders (in particular patients with Bi-polar disorder or depressive disorders)

Therefore, a particular focus on the following under-represented patient populations is highly encouraged. Cohorts for example that include:

• Neurodegenerative disorders
• Behavioural disorders
• Neurological disorders
• Eating disorders
• Substance abuse

Call duration: 12.5 months
• Successful applications will be notified 15th October 2021.
• Funding will be made available until 30th October 2022.

Eligibility: The call is open to all King's staff and students and King's Health Partner employees.

Budget:

This funding call will be in launched in parallel with its sister call 'Reaching out'. Between the two calls, the total budget for this call is approximately £100,000. There is no cap on the number of projects we can award, however for guidance, based on previous, similar funding calls it is expected that projects focused on supporting new types of data analysis may cost between £2,000 - £5,000. Costs may be greater if a small number of pilot scans is included in the application.

[If relevant, to calculate the cost of acquiring new neuroimaging data, please use the latest Centre for Neuroimaging Sciences Scanning Costing Tool provided as part of the call documentation].

What the funding covers:

• Staff training and support costs
• PPI workshop/ collaborative workshop activities
• Specialist analysis software purchase
• Data access fees (if required)

- MRI scanning hours (for example, if a particular novel analysis method needs to be piloted) & participant travel and expenses (where relevant)
- Open access publishing costs

This call cannot provide staffing costs.

Study pre-requisites

All research teams who are successful in being awarded funding will be required to take part in the design and delivery of one or two (maximum) workshops (half day each) aimed at sharing methodological and clinical knowledge related to field of neuroimaging analysis. These workshops we hope will contribute towards the promotion and development of our neuroimaging analysis community within the IoPPN.

Study outcomes

Expected outcomes of this call are that funded studies will support future work that could lead to one or both of the following:

- direct patient benefit (for example, improved clinical guidance or care resulting in earlier diagnosis; improved treatment choice; reduced misdiagnosis; improved quality of life; reduced referrals to hospitals or cost savings and / or
- specific outcomes such as securing follow up funding, enhanced capability of neuroimaging in a clinical setting, initiation of new collaborations, new product or service approval or accreditation, raised awareness among patients and the public.

Reports sharing outcomes from these studies in both academic and PPI friendly formats will be requested at the end each project and may be translated into a NIHR Maudsley BRC case study to be showcased on appropriate digital platforms.

Equality, Diversity & Inclusion Statement

The Neuroimaging Theme aims to promote equality, diversity, and inclusion in all its activities. One way of doing this is to prompt and support its research teams to take more time and effort in reflecting how they may contribute to these aims themselves through the design, implementation and evaluation of their own research studies. For this call, we would like applicants to consider race equality as intrinsic to their study design and will be asked to provide a brief race equality impact statement (Smith et al., 2020) within their funding application form.

Examples of ways to promote equality, diversity and inclusion more generally into the research process that applicants may also like to consider are as follows:

1.   Complete an equality analysis review of the new work planned (for more information see: https://www.kcl.ac.uk/hr/diversity/guidance-and-resources/equality-analysis).

2.   Acknowledge any limitations regarding recruitment bias of existing data sets used and recommend ways to reduce this happening in new data collection projects to encourage a truer representation of the local community in their participant sample.

References:

Smith, S., Gilbert, S., Ariyo, K., Arundell, L.-L., Bhui, K., Das-Munshi, J., Hatch, S., &

Lamb, N. (2020). Multidisciplinary research priorities for the COVID-19

pandemic. *The Lancet Psychiatry*, *7*(7), e40. https://doi.org/10.1016/S2215-

0366(20)30250-9

Appendix A: NIHR Maudsley BRC Organisation Chart

BRC STRUCTURE
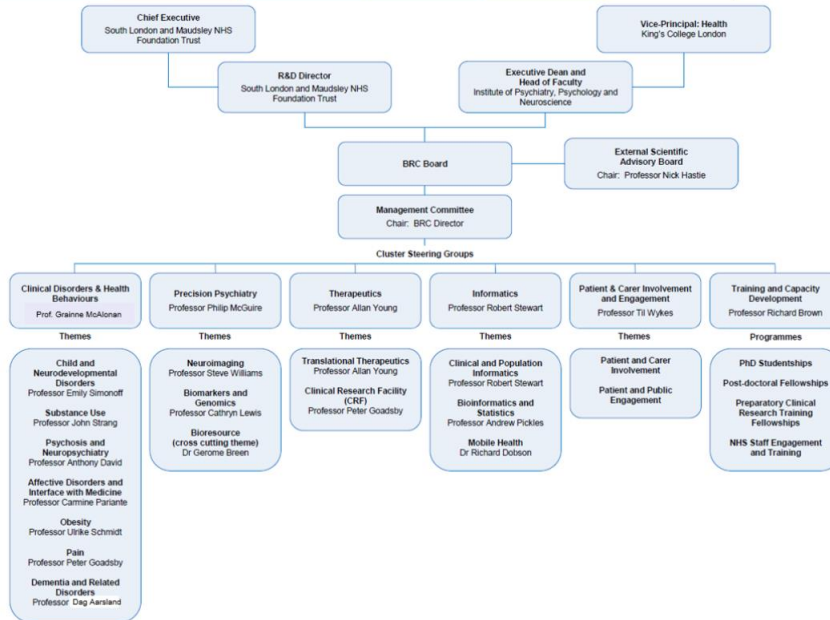
Maudsley Biomedical Research Centre (BRC)

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