Project Details	
Project Code	MRC21PHBa Shah
Title	Understanding Mental Health in Neurodevelopmental Conditions: A Hidden Talents Approach
Research Theme	Population Health
Summary	People with neurodevelopmental conditions (NDCs) often score lower on cognitive tests, which is related to poor mental health. However, they may have enhanced mental abilities ('hidden talents') due to their symptoms and related adversities. Drawing on the lived experience of people with NDCs and population-based genetic, cognitive, and neuroimaging data, the project will investigate the role of hidden talents in understanding and enhancing mental health in NDCs.
Description	—Background Neurodevelopmental conditions (NDCs), such as Autism and ADHD, affect around 10% of the population, and are associated with numerous mental health difficulties. Autism alone is more costly than cancer, stroke, and heart disease, combined (Buescher et al., JAMA), yet there is little research spending on NDCs relative to other conditions (60p per autistic adult vs £295 per cancer patient). Such underfunding, including PhD training, has left two particular gaps in understanding NDCs, which will be addressed in this project. First, research on NDCs is overly focussed on single conditions even though neurodevelopmental traits are overlapping and continuously distributed in the population (Thapar et al., Lancet Psychiatry). This is compounded by a lack of cross-disciplinary research across population-health and cognitive sciences. Addressing these issues, our access to a population-based NIMH dataset—rich in genetic and neurocognitive data—will provide *special resources* for an *original, significant, and feasible* project. Second, it is assumed that NDC related symptoms and adversities (e.g., bullying) are predictive of poor cognition and mental health. However, previous research has neglected how adaptive developmental processes sometimes enhance cognition and thereby reduce mental illness in NDCs. This has recently been formalised as the 'hidden talents' approach (Frankenhuis et al., 2020, TiCS). Therefore, drawing on population-based data and the cognitively grounded hidden talents approach, this *cross-disciplinary project* will identify hidden talents in NDCs and thereby inform understanding of and interventions for improving mental health in NDCs. —Aims, Method, & Timeline Month 1-3—Preparatory Work—Supervised by Shah: *This project has ethical approval, increasing its feasibility*. After data management training, the student will establish links with external partners for Study 1 and dissemination activities, e.g., National Autistic Society; Letter of Support available). Month 3-15—Study 1—Livingston & Russell: Online qualitative study on the lived experience of adolescents and adults with NDCs (N~500), focussing on their talents and coping strategies (cf. Livingston et al., Lancet Psychiatry). Data will be analysed using *novel text-mining algorithms* to derive themes and findings will also inform variable selection and modelling in Studies 2-4. This *cutting-edge approach to Patient and Public Involvement (PPI)* will be conducted with *Bath's Institute for Mathematical Innovation and existing links with charity partners and clinicians (Devon Autism/ADHD Service)*. Month 12-38—Studies 2-4—Walton, Langley, & Shah: Three studies drawing on genetic,

	neuroimaging, and cognitive data in the Adolescent Brain Cognitive Development cohort; abcdstudy.org. This is the largest population-based study of neurocognition and health in the US (N~12K), with several measures of overlapping NDCs and mental health. Analyses will focus on uncovering hidden talents, i.e., neural and cognitive markers positively associated with NDCs and related adversities. We will then test if these hidden talents moderate the association between NDCs, related adversities, and later mental health outcomes, using genetically sensitive longitudinal analyses. Month 38-42—Open Science & Outputs—This stage will be dedicated to authoring and revising academic articles to form a PhD incorporating publications. Analyses, anonymised datasets, and code will be preregistered and uploaded on the *Open Science Framework*. The student will also present results to clinician and charity partners, thereby informing clinical practice and national policy, i.e., *knowledge transfer and impact generation*. Overall, the student will complete an ambitious interdisciplinary project with high quality training, with major impact in the field of NDCs and mental health.
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