Project Details	
Project Code	MRCPHS26Br Howe
Title	Investigating the relationship between neurodevelopmental and anxiety disorders across development.
Research Theme	PHS
Project Type	Dry lab
Summary	Mental health difficulties, such as anxiety, are common in young people with neurodevelopmental disorders, including Attention-Deficit Hyperactive Disorder (ADHD) and autism spectrum disorder. However, the nature of the relationship between neurodevelopmental traits and anxiety symptoms across development is not fully understood. Using existing longitudinal data on mental health and neurodevelopmental traits, this project aims to further understand: i) how neurodevelopmental traits and anxiety symptoms co-develop from childhood to young adulthood, ii) to what extent anxiety symptoms influence outcomes in young people with neurodevelopmental disorders, and iii) whether neurodevelopmental traits have a causal effect on anxiety symptoms, and vice versa.
Description	Neurodevelopmental disorders, including ADHD, ASD and learning disorders, affect around 15-20% of children and are associated with poor mental health outcomes, such as elevated rates of anxiety and depression. However, the nature of the relationship between neurodevelopmental traits and anxiety symptoms across development is not fully understood, and therefore this project aims to address this gap. We will study neurodevelopmental traits and anxiety symptoms both as diagnostic categories (i.e. as clinically defined neurodevelopmental/anxiety disorders), as well as dimensional traits (i.e. for example hyperactivity/inattentive/social communication symptoms or anxiety symptoms). This PhD project will use longitudinal data on mental health and neurodevelopmental traits from existing birth cohorts to address the following research questions: i) How do neurodevelopmental traits and anxiety symptoms co-develop from childhood to young adulthood? Using longitudinal data from the Avon Longitudinal Study of Parents and Children (ALSPAC), latent class growth analysis will be used to, first, model trajectories of anxiety and neurodevelopmental traits from childhood to young adulthood, then model joint trajectories to examine how these traits influence each other across development. If various trajectories of symptom development are found within the cohort, we will then examine biological (i.e. genetic) and environmental predictors, and outcomes associated with trajectory groups. We will also aim to replicate this analysis in the Norwegian Mother, Father and Child Cohort Study (MoBa). ii) To what extent do anxiety symptoms influence outcomes in individuals with neurodevelopmental disorders. Next this project will explore whether anxiety symptoms/disorders influence outcomes associated with neurodevelopmental disorders. There are a variety of potential outcomes to explore, including social, functional and educational outcomes associated with neurodevelopmental traits. We will investigate various possible

	mechanisms by which anxiety could influence these outcomes. For example, one hypothesis that we could test is whether anxiety mediates the relationship between autistic symptoms and social and educational outcomes. Again, this will primarily use data from ALSPAC, however, we also aim to replicate results across cohorts, such as the Millenium Cohort Study, and MoBa, where possible. iii) Whether neurodevelopmental traits have a causal effect on anxiety symptoms, and vice versa. Finally, we will use bidirectional two-sample Mendelian Randomisation (MR) to test whether neurodevelopmental traits/disorders have a causal effect on anxiety symptoms/disorders, and whether anxiety symptoms/disorders have a causal effect on neurodevelopmental traits/disorders. This method uses genetic variants, identified from genome-wide association studies (GWAS), as instrumental variables for an exposure to test for a causal relationship between exposure and outcome. We will use the largest most recently published GWAS studies to select genetic variants as instrumental variables for MR analysis. The student will use the most up-to-date MR methods (many of which have been developed in the department at University of Bristol) to test all assumptions of MR and to perform relevant sensitivity analyses. There is scope for the student to take ownership and steer the project towards their own interests. For example, it would be possible to have a greater focus on a specific neurodevelopmental disorder, as well as focusing on specific outcomes of interest.
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