Project Details	
Project Code	MRCNMH24Ca Lewis
Title	What goes up must come down? Using digital technology to understand the dynamic nature of mood in bipolar disorder
Research Theme	Neuroscience & Mental Health
Summary	People with bipolar disorder (BD) experience disabling episodes of high and low mood, but how mood fluctuates between them could help us better understand subtypes of BD and improve treatments. Using cutting-edge statistical methods and long-term digital mood tracking data from the largest cohort of people with BD in the world, you will derive novel measures of mood dynamics and link these with genetic factors and clinical features (e.g illness course, BD subtypes).
Description	Bipolar disorder (BD) is a mood disorder where people experience disabling episodes of both high and low mood. Originally, it was thought that people with BD experience discrete mood episodes surrounded by periods of wellness, but new evidence suggests this is an oversimplification. In fact, people with BD continue to experience abnormal mood regulation even during periods when they would be considered "well". Compared to healthy controls, people with BD experience heightened responses to emotional stimuli and more rapid changes in mood states. This project aims to answer the question: what can dynamic features of mood tell us about clinical outcomes and long-term prognosis of BD? Prior BD research suggests those with worse mood regulation have a more severe and impairing course of illness and may be more likely to have particular subtypes of BD. However, these studies often have small sample sizes because participants need to record their mood at frequent intervals over long periods of time. This prospective data collection is not traditionally done in psychiatry (which often relies on cross-sectional assessment) but may be more clinically useful. Technological advances now make it easier than ever to collect vast amounts of data in large samples. This presents new challenges and opportunities: how do we address the increased chance of missing data? How do we combine thousands of datapoints from multiple people when most statistical methods used in psychiatry allow ≤10 timepoints per person? How do we account for seasonal changes in mood? Dynamic features of mood can be defined in multiple ways (e.g. the intensity of peaks and troughs in mood over time, the amount of time taken to recover from mood disturbances), but which are most useful for aiding our understanding of BD? New statistical methods which draw on other fields such as engineering and economics can address these issues whilst also opening exciting new avenues for how we examine and conceptualise mood dynamics. This PhD project offers a unique opportunity to be at the frontiers of mood dynamics research. The student will learn cutting-edge statistical methods for analysing data from digital technology and apply them to data from the Bipolar Disorder Research Network (BDRN) – the largest individual cohort of people with BD in the world. Over 1200 BDRN participants have completed online weekly mood questionnaires for an average of 2 years, resulting in ≥100,000 datapoints. This dataset represents a powerful resource to examine mood dynamics in real-world settings and link this with the rich clinical, demographic and biological data in BDRN. Aims:

	A1) Derive traditional and novel measures of mood dynamics in people with BD. The student will draw on resources from several disciplines (psychology, engineering, economics), including cutting-edge statistical methods for analysing time series data (dynamic structural equation modelling). A2) Test which mood dynamics are most useful for predicting course of illness and clinical characteristics of BD. The student will test associations between mood dynamics measures identified in A1 with the rich clinical and demographic data available in BDRN (e.g. age of onset, BD subtype, number of mood episodes, personality traits, presence of other psychiatric co-morbidities). A3) Test the hypothesis that greater mood instability indicates a greater genetic susceptibility to BD. The student will test whether mood dynamics are predicted by genetic risk for BD and related disorders (e.g. major depressive disorder, schizophrenia). There will be several opportunities for the student to take ownership and steer the project. For A1 and A2, they will identify research gaps through a review of mood dynamics literature and by collaborating with people with lived experience of BD. In A3, they will be able to decide which polygenic risk scores to include in addition to those for BD (e.g. neuroticism).
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