Project Details	
Project Code	MRC23PHSBa Walton
Title	The natural environment and depression: triangulating the role of stress biomarkers across geographically diverse regions
Research Theme	Population Health Sciences
Summary	Urbanicity is an important risk factor of mental illness. Furthermore, this link may be mediated by biological markers of stress including inflammation and epigenetic processes. However, the relationship between physical features of the living environment, biomarkers of stress and mental health in more geographically diverse regions (e.g. Australia, South America, Europe) remains unknown – a key limitation, which this project will address.
Description	Significance: By 2050, 68% of the world's population are predicted to be living in urban areas. There is strong evidence that aspects of living environments can impact mental health. However, there is a large gap in acknowledging geographical variations when using measures of green space to infer urbanicity or natural environments, which is critical for increasing the inclusivity of this research and its applicability to population health globally. Challenge: The literature investigating the relationship between physical features of the environment (e.g., green and blue space) and mental health is currently limited to studies focussed on 1) European and Western samples (Astell-Burt, Mitchell & Hartig, 2014; Beyer at al., 2014; Van den Berg et al., 2016); 2) urban/sub-urban green space (Nutsford, Pearson & Kingham, 2013; Xu et al., 2019); and 3) environments with climates where open space is habited by vegetation. Exposure to green spaces has also been linked to anti-inflammatory and epigenetic pathways through which exposure to natural environments may decrease stress. However, again this was done exclusively in urban (Xu et al., 2019) and European samples (Jeong et al., 2022), and has not been assessed in populations living in more geographically diverse regions or using more diverse measures of the natural environment. Originality: These limitations create serious challenges when applying this research to low- or middle-income countries, severely limiting the inclusivity of our current understanding of how green and blue spaces can protect mental health. The aim of this project is to develop better and more inclusive measures of the natural environment and investigate their role in mental illness, using existing data (total n=46,000) of adults living in remote areas of Australia, in the agricultural county of Molina in Chile and in Italy. The three objectives of this project are to: 1) develop a measure of the natural environment based on more diverse data (e.g., topography, distance to closest blue space, vegetation cover index, population density, species diversity index, open space, sand/soil surface), which is more inclusive of geographical variation in different countries and regions. 2) investigate how predictive this improved measure is of mental health outcomes, including depression, in a series of geographically diverse samples. 3) investigate the role of biological mediators (e.g., inflammation, epigenetics) and behavioural mediators (e.g., physical activity) that might mediate the relationship between the natural environment and depression in these geographically and socio-demographically diverse samples. Student ownership: The student will be able to: 1) Decide

	on the concrete health outcome (e.g. depression, anxiety, internalizing disorders), informed by their first PREP placement; 2) Choose the most appropriate statistical and conceptual approaches (e.g., explanatory versus predictive modelling, biomarkers versus causal mechanisms) informed by their second PREP placement; 3) Identify the most appropriate datasets, in addition or in place of the suggested data informed by their third PREP placement. Feasibility: This project is based on large-scale, secondary data, that has already been collected. This makes this project highly feasible and cost-effective, but with high scientific returns. Added-value features: This project is highly cross-disciplinary, cutting across environmental psychology, epigenetic psychology and health geography. The high-impact output of this project is further secured through the collaboration across the University of Exeter, University of Bath and University of Bristol. Knowledge transfer: This project will provide important insights into the relationship between the physical environment and mental health globally. The student will work with the Research and Innovation Services at the University of Bath to evidence the impact of this project.
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