

Project Details	
Project Code	NMH27Ba Voinescu
Title	Anxiety-Related Attention Bias in Everyday Situations: Mechanisms and VR-Based Modification
Research Theme	Neuroscience & Mental Health
Project Type	Dry lab
Summary	Anxiety can distort how we pay attention, making us overly focused on potential threats and less able to respond flexibly to what really matters. This project uses immersive virtual reality (VR), including a realistic driving simulator, to study how anxiety shapes attention in everyday-like situations. You will combine behavioural performance, EEG, eye-tracking and self-report to uncover the cognitive mechanisms linking anxiety, attention and real-world functioning, and then develop a VR-based training task to modify harmful attention biases. The project suits students interested in psychological mechanisms, clinical applications and cutting-edge VR and psychophysiology methods.
Description	Anxiety is closely linked to alterations in attention, including heightened vigilance to threat, difficulties disengaging, and reduced flexibility in shifting focus between competing demands. Cognitive models propose that these attention biases play a causal role in the development and maintenance of anxiety, yet most evidence comes from simplified computer tasks that do not reflect everyday situations such as driving, where continuous and flexible attention are critical. This project will examine how anxiety-related attentional mechanisms operate in highly realistic immersive environments, and whether attention bias modification (ABM) can be translated into virtual reality (VR) to target these mechanisms in everyday-like contexts. All core VR tasks (immersive driving simulator and VR attention paradigms), as well as EEG, eye-tracking and autonomic recording equipment, are already available within our laboratories. The central research question is: How do cognitive and clinical mechanisms of anxiety-related attention biases manifest in realistic everyday situations, and can immersive VR-based ABM modify these mechanisms to mitigate anxiety and improve functioning? The project has four linked objectives, each aligned with a specific study, and is designed to give the student clear opportunities for ownership in design, analysis and intervention development. Objective 1: Mapping mechanisms in immersive contexts. Study 1 is a systematic review of research on anxiety and attention in high-immersion or realistic environments such as driving simulators, VR scenarios and complex real-world tasks. The student will design and run the search strategy, set eligibility criteria, extract and code data on attentional mechanisms (e.g. orienting to threat, sustained attention, disengagement, inhibitory control) and clinical variables (symptom measures, diagnostic status), and assess risk of bias. This study will identify which mechanisms have been tested in realistic contexts, how they have been operationalised and where key gaps remain, providing the conceptual and methodological foundation for the empirical work. Objective 2: General attentional mechanisms in immersive VR Study 2 will experimentally characterise general attentional mechanisms associated with anxiety in realistic VR environments. Using the existing

	immersive driving simulator and a complementary VR attention task, the student will probe core attentional capacities under everyday-like cognitive load, without specifically focusing on emotional or threat content. Driving scenarios will vary traffic density, multitasking demands and environmental complexity, with performance indices such as hazard detection, reaction time, lane position and speed regulation. The VR attention task (e.g. continuous performance or visual search) will assess sustained attention, vigilance and inhibitory control. Trait and state anxiety and self-report will be collected, while EEG, eye-tracking and autonomic measures (e.g. heart rate variability) index attentional engagement, scanning patterns and arousal. This study links anxiety to broad cognitive and physiological mechanisms in immersive everyday-like situations. Objective 3: Threat-specific attention bias and functional relevance Study 3 focuses explicitly on threat-specific attention bias in immersive contexts. Driving and VR scenarios will embed emotionally and threat-relevant stimuli (such as threatening pedestrians, near-miss hazards or negative social cues) within realistic scenes. Eye-tracking will be used to quantify initial orienting to threat, maintenance of attention on threat-related stimuli and disengagement from them, relative to neutral events. Carefully timed stimuli will allow the student to test whether higher anxiety is associated with biased gaze and altered scanning strategies, and how these patterns relate to performance outcomes such as missed hazards, slower responses and errors. EEG will capture the temporal dynamics of threat processing, linking early and late attentional components to behaviour. Healthy participants and individuals with elevated anxiety will be included, enabling dimensional analyses and group comparisons, and modelling relationships between bias indices, symptom severity and everyday functioning. Objective 4: Immersive ABM intervention Study 4 will develop and evaluate an immersive VR-based ABM intervention that directly targets anxiety-related attentional mechanisms in realistic contexts. An ABM paradigm will be embedded within the driving simulator or a related everyday VR task, aiming to strengthen flexible, goal-directed attention and reduce maladaptive threat-focused patterns identified in Studies 2 and 3. The student will design the VR ABM task (for example, training attention towards task-relevant road information and away from task-irrelevant threat cues), drawing on established ABM principles while exploiting the ecological validity of VR. Outcomes will include changes in attention bias indices (eye-tracking and task-based measures), relevant EEG markers, self-reported anxiety and functional performance in the immersive environment. The student will have substantial scope to choose which ABM approach and cognitive mechanisms to prioritise and to refine the intervention based on pilot data. Across these four studies, the student will gain experience in systematic reviewing, immersive VR task design, multimodal data collection (behavioural, self-report, EEG, eye-tracking, autonomic), advanced statistical and computational analysis and recruitment of healthy and elevated-anxiety samples. The project is structured to support genuine student ownership, while capitalising on existing VR and psychophysiological infrastructure, and will contribute to understanding
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	and modifying cognitive and clinical mechanisms of anxiety-related attention in everyday-like situations.
Can be completed part time?	Yes
Supervisory Team	
Lead Supervisor	
Name	Dr Alexandra Voinescu
Affiliation	Bath
College/Faculty	Faculty of Humanities and Social Sciences
Department/School	Department of Psychology
Email Address	av561@bath.ac.uk
Co-Supervisor 1	
Name	Professor Edmund Keogh
Affiliation	Bath
College/Faculty	Faculty of Humanities and Social Sciences
Department/School	Department of Psychology
Co-Supervisor 2	
Name	Dr Ali Khatibi
Affiliation	Bath
College/Faculty	Faculty of Humanities and Social Sciences
Department/School	Department of Psychology
Co-Supervisor 3	
Name	Professor Neil Vaughan
Affiliation	Exeter
College/Faculty	University of Exeter Medical School
Department/School	Clinical and Biomedical Sciences