MIDI 2025 Conference

Virtual, Augmented and eXtended Reality in Chronic Pain and Anxiety Management

Abstract

Virtual, Augmented and eXtended Reality (VR/AR/XR) are emerging as non-pharmacological options for chronic pain and anxiety. Synthesizing post-2020 trials and prototypes, we find immersive environments delivers clinically meaningful short-term analgesia across syndromes (e.g., fibromyalgia, chronic low back pain), with durability contingent on repeated/maintenance use. For anxiety, virtual immersive exposure therapy yields outcomes comparable to in-vivo exposure for specific phobias, while smartphone-based augmented reality exposure is non-inferior for arachnophobia. Beyond exposure, relaxation and biofeedback programs (HR/HRV, EDA, EEG, fNIRS, eye-tracking) reduce generalized and situational anxiety and enable *closed-loop* adaptation of virtual environments. Early neuroadaptive systems can trigger just-in-time supports or combined modalities (e.g., VR+TENS) when pain/arousal peaks are detected. To translate promise into durable impact, the field needs standardized dosing, multicenter long-term RCTs, rigorous adverse-event reporting (including cybersickness), and interoperable, privacy-preserving data pipelines.

Overall, Mixed Reality Continuum is a practical adjunct today and a platform for AI-personalized, sensor-driven care.