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# Training Drivers' Risk Anticipation Behavior Through Virtual Reality: Psychological Mechanisms and Road Safety Implications

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## ABSTRACT

Road traffic accidents remain a major public health concern, with human error accounting for the majority of crashes (World Health Organization, 2018). One of the most effective protective mechanisms identified in traffic psychology is drivers' ability to anticipate potential hazards before they materialize (Horswill & McKenna, 2004). Traditional driver training often emphasizes technical skills, yet risk anticipation is a cognitive process requiring targeted interventions. Recent advances in virtual reality (VR) technology provide an innovative platform for simulating high-risk traffic scenarios in a safe and controlled environment.

The aim of this study is to explore how VR-based training programs can enhance drivers' anticipatory behavior, thereby improving hazard perception and reducing accident risk. VR environments allow repeated exposure to hazardous situations without real-world consequences, supporting experiential learning and strengthening cognitive preparedness (Fisher et al., 2011). Moreover, VR systems can adapt to individual skill levels, providing personalized feedback that promotes self-regulation and risk awareness.

Evidence from prior studies suggests that immersive simulations significantly improve hazard perception compared to conventional classroom or video-based training (Underwood, Crundall, & Chapman, 2011). By integrating psychological theories of attention and situational awareness with VR technology, this research seeks to establish a framework for risk anticipation training tailored to drivers in Romania and beyond. The findings are expected to inform both educational practices and public policy, emphasizing the role of emerging technologies in road safety.

**Keywords:** virtual reality, risk anticipation, hazard perception, driver training, traffic psychology