



RESEARCH BRIEF SERIES WEATHER READY

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This research brief is part of a call designed to help advance knowledge regarding how diverse community members perceive and prepare for inland flooding, understand observations and forecasts, receive alerts and warnings, make protective action decisions, and respond to and recover from the impacts of inland flood events.

DO VIRTUAL REALITY HAZARD SIMULATIONS INCREASE PEOPLE'S WILLINGNESS TO CONTRIBUTE TO HAZARD MITIGATION? RESULTS FROM AN EXPERIMENT

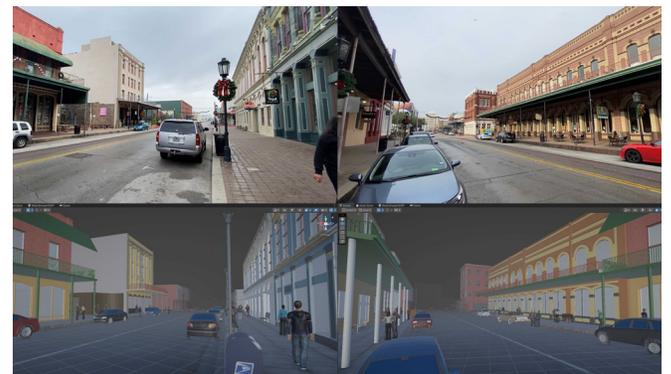
SUMMARY

There is a pressing need for cities to build resilience against climate change, which is driving hazard threats like rising sea levels and more frequent and intense extreme weather events. However, public risk perceptions of climate change remain relatively low, which can hinder the proactive measures needed to prepare for future impacts.

In climate change education, the use of virtual reality (VR) technology can make abstract concepts like extreme weather impacts more tangible, potentially raising awareness and motivating climate action. By designing and implementing immersive VR simulations of hazard events in Galveston, Texas—a city that is highly vulnerable to hurricanes and rising sea levels intensified by climate change—this experiment explored how simulated experiences of flooding events effected public perceptions and behaviors related to climate change.

Participants were exposed to educational content on flooding (control) and virtual depictions of storm surge, rising waters, and heavy rainfall (treatment), then asked to participate in a public goods game to evaluate their willingness to make a financial contribution to climate resilience efforts.

Our findings provide insights on how experiential tools like VR might be integrated into educational interventions and public engagement around climate change adaptation.



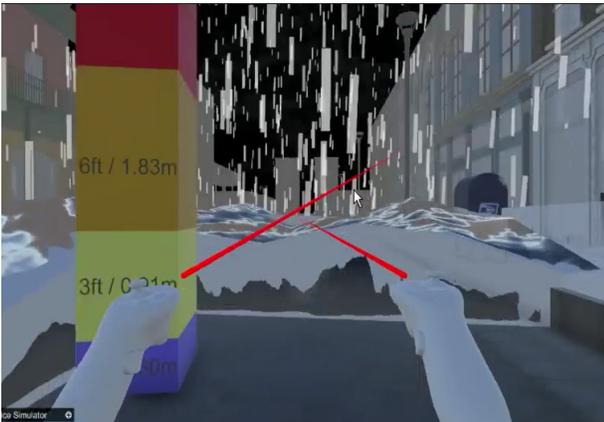
Real-world street views (top row) and VR-rendered scenes (bottom row) of Galveston, Texas. Photo credit: Haoming Qin, January 2024.

KEY FINDINGS

- Participants who were exposed to detailed educational content—like charts depicting storm tide level, flood zone maps, and historical photographs of past flooding events—contributed more consistently to climate resilience than those exposed to immersive VR flood simulations alone.
- Higher levels of education were positively associated with increased contributions to climate resilience, with participants who have a bachelor's or postgraduate degree being significantly more likely to contribute.
- Older participants (aged 45-64) showed less willingness to contribute to climate resilience.

RESEARCH IMPLICATIONS

- While immersive virtual reality experiences can have a role in climate change education and engagement, clear and structured educational information may be more effective in fostering proactive mitigation behaviors.
- Climate education initiatives should not exclusively focus on those who are already predisposed to engage. Instead, policymakers should develop more inclusive educational strategies that target a wider range of demographics, to foster a broader engagement with climate issues.
- Communication strategies around climate adaptation and resilience might be more effective when tailored around factors like age and education level. Factors like gender, household size, and perception of climate change importance should also be considered.
- Environmental organizations and government educational campaigns should focus on well-designed infographics, informative videos, and structured messages to raise awareness and encourage climate-friendly behaviors among the public.
- Future research should continue exploring the complex interactions between demographic factors, VR experiences, and climate perceptions to develop targeted and effective communication strategies.



Screenshot of a scene from the VR flood scenario simulation.
Photo credit: Haoming Qin, May 2024.



Participant using VR headset to experience flood simulation in the VizLab at the University of Texas at San Antonio.
Photo credit: Haoming Qin, May 2024.

AUDIENCE

This research is relevant to policymakers, environmental organizations, and educators looking to develop educational and experiential interventions to raise awareness around climate change threats and encourage climate-friendly behaviors among the public.

Full report: Zhai, W., Giacomoni, M., Qin, H., & Huang, H. (2025). *Do Virtual Reality Hazard Simulations Increase People's Willingness to Contribute to Hazard Mitigation? Results From An Experiment*. (Natural Hazards Center Weather Ready Research Report Series, Report 18). Natural Hazards Center, University of Colorado Boulder. hazards.colorado.edu/weather-ready-research/do-virtual-reality-hazard-simulations-increase-peoples-willingness-to-contribute-to-hazard-mitigation



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