LEVERAGING VIRTUAL REALITY TO ADDRESS RACIAL BIAS

Concept Team:

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Birmingham bears witness to America's complex racial history. Despite gains, racial and ethnic biases continue to damage every aspect of our society. Biases are at the core of inequities in health, education, and economic opportunity; they are the foundation of fear, misunderstanding, and violence. Our challenge is to diminish and eradicate racial bias, and ultimately prevent it.

Our sustainable platform will combine cutting-edge virtual-reality technologies and modern scientific understanding to engage people with virtual experiences designed to modify bias and facilitate pro-social behavior guided by empathy and insight.

Ultimately, we expect our platform will be used in preventative and rehabilitative capacities across ages, backgrounds, and professions. **Our initial project aims to reduce bias and facilitate communication between physicians and patients in pain.** We will then expand to other relevant domains, including education and law enforcement.

Our project is uniquely interdisciplinary—it is a wholly novel approach that arises from the synthesis of multiple disciplines.

Our project calls for input from across the institution; it draws together Social Sciences, Engineering, Education, Medicine, and the Humanities and Arts. Further, participation and input from real members of the community—in particular the citizens of Birmingham—is at the core of the science and vision of our proposal.

INITIAL PROJECT: BIAS IN PAIN CARE

THE PROBLEM:

In the United States, Black Americans and other minority groups experience disproportionately more frequent, severe, and disabling chronic pain relative to White counterparts. Remediation of minority group disparities is a central objective of the National Pain Strategy. Disparities are particularly stark in the area of **pain care**. Across indices of care, **Black Americans are likely to be undertreated for their pain** relative to Whites.

Medical provider bias (explicit and implicit) and poor patient-provider communication are major contributors to racial disparities in pain care and outcomes. These interact to establish a treatment atmosphere characterized by **mutual mistrust** and sustained by **lack of mutual understanding**.

A SOLUTION:

In line with Intergroup Contact Theory, there is now persuasive evidence that **racial biases can be altered through social perspective-taking facilitated by contact with members of the "out" group**. Said another way, opportunity to meaningfully engage with Black patients can enhance and attenuate anxiety and perceived threat among treating physicians. Analogously, practiced contact with a White physician can reduce anxiety and threat perceived by a minority patient. Increased understanding of another's perspective disrupts the atmosphere of mistrust and facilitates positive communication and shared decision making.

Evidence in the Pain Setting: As part of a recent NIH-funded R01 investigation, project collaborator Dr. Adam Hirsh (IUPUI) demonstrated that empathically-coordinated contact with digitally-generated **minority patients** prospectively reduced bias within real-life prescription practices among medical trainees and clinicians who showed evidence of implicit bias and biased treatment practices during preliminary assessment.

Our first project will leverage advances in virtual technologies and the science of empathy and discrimination to develop and test a **virtual platform to address racial bias in pain care.** Critically, the anticipated platform will—for the first time—allow us to uniquely target experiential elements identified as central and indispensable to facilitating cross-racial exchange. These elements include **exposure, empathic understanding, perspective-taking, and self-insight.**

Exposure: Contact and meaningful exchange is the bedrock of this approach. Providers will be able to interact with avatars representing patients from a variety of minority backgrounds; patients will be able to interact with avatar providers. Interaction and dialogue will be facilitated by modern off-the-shelf immersive experience technologies, including head mounted displays and machine learning. Patient avatars will be represented by stereoscopic (three-dimensional video) recordings of **real individuals** from the community and programmed with their narrative. Assessment of cognitive behavioral patterns relevant to bias and unhelpful to communication will be incorporated into the platform and used to facilitate **self-insight** and individualized training experiences. Coordinated metrics—e.g., real-time measurement of physiological response—will dynamically steer immersive contact. **Critically, the virtual platform facilitates broad dissemination of accessible and scientifically rigorous experiential training that is not possible using existing traditional approaches.**

Empathic insight: Empathy is elicited through direct discovery and experience of another person's life: learning about their stories, their challenges, their world. Through carefully crafted virtual experiences, participants will not only gain an intellectual understanding of others' lives, but they can gain "direct" experience, having discovered their challenges and perspectives for themselves.

Perspective-taking: Perspective-taking interventions—wherein individuals are asked imagine experiences from the point of view of another—have emerged as powerful tools to build empathy and address bias. Virtual-reality-based tools can go much further than ordinary storytelling by enabling the participant to perceive from the other's perspective, not only learning about the nature of another person's experience, but in fact experiencing it themselves. Beyond merely imagining walking in another's shoes, they can directly "inhabit" another person's body and directly experience their particular physical and social challenges.

DEFINING THE SCOPE & A NEW SCIENCE:

Our approach targets individual-level change that must accompany necessary changes at the systems level. Unacknowledged biases and associated communication difficulties are culprits across domains of racial inequity—for instance, in the workplace and classroom. Using the theoretical tenets outlined above, we will expand and tailor the platform to address bias across a variety of domains.

Our novel approach will **inform the new science** of social injustice intervention, and **a core scientifically rigorous inquiry** will serve to advance and refine our approach. Our team has substantial experience in generating novel concepts—most recently in virtual intervention for pain-relief for spinal cord injury—that mutually advance both the science and technology of critical interventions.

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CONCEPT TEAM:

Corey Shum (Principal Contact), School of Engineering, University of Alabama at Birmingham (UAB), shum@uab.edu, 205-934-8505
Corey Shum directs the Immersive Experience Lab (IXL) at the University of Alabama at Birmingham (UAB), School of Engineering, Engineering and Innovative Technology Development group. He leads a cross-functional team of artists, developers, engineers, and programmers to develop application modules that employ immersive virtual reality (VR), augmented reality (AR), and mixed-reality (MR) artificial experience technologies. His current development projects involve neuropathic pain, the psychology of embodiment, vestibular rehabilitation, remote physical therapy, and live AR display of real-time medical imaging. Corey also directs development of novel and domain-specific devices for real-time human metric tracking and response, including body position, physiology, and attention.

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Dr. Trost's research addresses specific cognitive, affective, and behavioral dimensions of pain experience that may contribute to disability or facilitate positive adjustment following physical injury. Her recent work has focused on interventions targeting pain relief and rehabilitation in back pain and traumatic injury, with a focus on Virtual Reality (VR) intervention. Her work has received internal, national, and international research support. Dr. Trost is currently collaborating with Corey Shum and IXL on several funded projects, including development of an immersive virtual platform for treatment of neuropathic pain in spinal cord injury. Dr. Trost likewise has an established research program regarding interpersonal processes in the context of pain and illness -- specifically, how pain sufferers communicate their pain and how this is interpreted/responded to in their social environment.

Adam Hirsh, PhD, Department of Psychology, Indiana University – Purdue University Indianapolis (IUPUI), athirsh@iupui.edu, 317-274-6942
Adam Hirsh, PhD is Associate Professor in the Department of Psychology and Director of the Pain Research Laboratory at Indiana University – Purdue University Indianapolis (IUPUI). He received his PhD in Clinical & Health Psychology from the University of Florida and completed a postdoctoral fellowship in Rehabilitation Research at the University of Washington School of Medicine. His laboratory conducts research on the biopsychosocial aspects of pain and functioning in humans. Recent investigations have focused on pain judgments and treatment decision-making for low-income racial minorities, perceptions of injustice in children with chronic pain and their caregivers, and individual differences in pain expectations and coping. His work has been funded by several public and private agencies, including the National Institutes of Health, American Pain Society, and Walther Cancer Foundation.

ADDITIONAL COLLABORATORS:

Kristina Visscher, PhD, Associate Professor, Co-director, Civitan International Neuroimaging Laboratory, Department of Neurobiology, University of Alabama at Birmingham (UAB). Research specialization: Cognitive neuroscience.

Burel Goodin, PhD, Associate Professor, Department of Psychology, Medical/Clinical Psychology, University of Alabama at Birmingham (UAB). Research specialization: Race disparities in pain experience.