Virtual Reality and Rehabilitation for Justice-Involved Populations

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Abstract

In this paper our goal is to examine the history of mass incarceration in the United States and explore Virtual Reality (VR)-based treatments that can address the high rates of drug abuse and mental health disorders within the justice-involved population. In pursuit of a solution to this health crisis, this paper will explore the state of mass incarceration in the U.S. and recent developments in scientific literature surrounding the therapy-based benefits of VR. VR-based exposure therapy, in particular, is proven to be effective in treating patients struggling with trauma and addiction. As alternatives to incarceration become more widely discussed by the general public and more seriously considered by policymakers, these advances in technology may bolster arguments for new, restorative forms of justice. Our goal in examining recent findings in VR in conjunction with the criminal justice system is to demonstrate how to incorporate VR-based therapy in existing rehabilitation programs. These findings also demonstrate how pertinent justice-involved people are to the topic of VR-based therapy due to the population's high rates of substance abuse disorders and mental illnesses—conditions that often occur at the same time. Finally, this paper will emphasize that VR therapy should only enhance treatment services rather than act as their replacement, and marginalized groups' privacy and consent must remain protected.

Introduction

The United States incarcerates more people than any other country in the world, in both absolute numbers and per capita. Incarceration rates in the U.S. have seen exponential growth over the past half-century, and the amount of incarcerated people has increased sevenfold since 1970. Today, there are about 2.3 million people in jail and prison in the U.S. (The

American Civil Liberties Union, 2018). Among those incarcerated in the U.S., a disproportionate number are Black and Hispanic. Black Americans make up 37 percent of America's incarcerated population (Wang, 2023), despite representing only 13.6 percent of U.S. residents (U.S. Census Bureau, 2023). Hispanic people make up about 19 percent of the incarcerated population (Sakala, 2014) despite making up 17 percent of the U.S. population (U.S. Census Bureau, 2023).

The incarcerated population in the U.S. also suffer from mental health and substance abuse disorders at high rates. Drug offenses alone account for two-thirds of the increase in the federal inmate population, and more than half of the increase in state prisoners between 1985 and 2000 (Alexander, 2010, p. 59). Despite the fact that the majority of the justice-involved population struggles with these health issues, support and treatment for this health crisis is insufficient. While there are rehabilitative programs in place for incarcerated people, they are in great need of support.

This paper explores methods to improve the rehabilitation programs currently in place for the justice-involved population, with a focus on the benefits of Virtual Reality (VR)-based treatment. Studies show that VR-based treatments can improve treatments for some of the country's most common disorders, including PTSD, anxiety, and substance abuse. I argue that VR-based treatments can bolster traditional forms of rehabilitation for incarcerated people, a population that struggles with PTSD, anxiety, and substance abuse at disproportionate rates.

History of mass incarceration

In order to formulate ideas on providing incarcerated and justice-involved people with therapy, it is essential to understand the principles the prison system survives on and how we, as a country, reached this point in the first place. In *The New Jim Crow*, Michelle Alexander identifies three moments in U.S. history where white elites successfully established a racial caste system. The first was slavery in the early colonial period of America. Following slavery, the second racial caste system came in the form of Jim Crow laws, segregating whites and Blacks and ensuring that Black people remained in servitude to white Americans in need of labor. The final form of the racial caste system is mass incarceration, onset by the War on Drugs of the 1980s.

The U.S. prison system today

Today, the U.S. has imprisoned individuals struggling with substance abuse disorder and mental illness at disproportionate rates. Prisons and jails are overburdened and overcrowded and cannot provide the incarcerated with proper health care, mental health care in particular, while in custody (Dolan, 2018). These institutions' inability to provide treatment only worsens the problem and preserves the cycle of recidivism. The U.S. prison system profits off of a vulnerable population that suffers from mental illness and drug addiction at high rates, with no access to adequate therapy and treatment services. Without support, they may return to the illegal activities that led to their arrest upon release (Sawyer & Wagner, 2018). Our attention needs to divert from a broken system that only contributes to and profits off of the problem, and focus more on bolstering current alternatives to incarceration.

The current state of the prison system in this country is abysmal and represents a racial caste system that has been iterated throughout U.S. history. Civil rights lawyer and activist Michelle Alexander discusses this concept in-depth in her book *The New Jim Crow*, and asserts that the segregation laws of the late 19th and early 20th centuries—referred to as "Jim Crow" laws—were not fully abolished. Instead, the laws were modified by white elites to fit the needs and demands of the current political climate, and the War on Drugs was deliberately put forth in race-neutral terms. Race-neutral language served as a guise to conceal the reality that a new system of racial subordination had been established through mass incarceration (Alexander, 2010.

Incarceration rates broken down by race

Black Americans and Hispanic people are incarcerated at grossly disproportionate rates, and Black Americans make up 37 percent of America's incarcerated population (Wang, 2023), despite representing only 13.6 percent of U.S. residents (U.S. Census Bureau, 2023). Hispanic people make up about 19 percent of the incarcerated population (Sakala, 2014), despite making up 17 percent of the U.S. population (U.S. Census Bureau, 2023). Alexander argues that The War on Drugs in particular is linked to these unprecedented statistics and has been the biggest contributor to the systematic mass incarceration of people of color in the U.S. (Alexander, 2010).

Drug convictions in the U.S.

Convictions for drug offenses are the leading cause of the explosion in incarceration rates in the U.S. Drug arrests have tripled since 1980 and, as a result, more than 31 million people have been arrested for drug offenses since the drug war began. Drug offenses alone account for two-thirds of the increase in the federal inmate population and more than half of the increase in state prisoners between 1985 and 2000 (Alexander, 2010, p. 59). Racial disparities in incarceration rates are harrowingly evident in the demographic breakdown of drug convictions. Nearly 40 percent of those incarcerated in state or federal prison for drug law violations are Black. On top of that, 37 percent of people incarcerated in federal prisons for drug offenses are Latino. In 2013, Latinos comprised 47 percent of all cases in federal courts for drug offenses (Drug Policy Alliance, 2015, p. 1).

Mandatory minimum penalties for drug convictions have also contributed greatly to the surge in the country's prison population. In the fiscal year of 2020, two-thirds of drug offenders were convicted of an offense carrying a mandatory minimum penalty, and the average sentence was almost 11 years (U.S. Sentencing Commission, 2020). Just under a decade before, in 2011, the Department of Justice reported that Black people account for almost half of all prisoners incarcerated with a sentence of more than one year for a drug-related offense (Rosenberg, 2017).

The reality of drug conviction rates

The high rates of imprisonment amongst Black and Latino people do not necessarily mean there are higher rates of drug-related criminality amongst these populations. High rates of imprisonment in these communities can be attributed to behavioral health disorders, law enforcement decisions whether or not to arrest someone, people's ability to obtain pretrial release, and judicial decisions about the severity of defendants' sanctions. Additionally, unequal rates of jail admissions and stays (i.e. disproportionate arrest rates) may be related more to differences in enforcement and court responses than to populations' criminal behavior (Wertheimer, 2023). Furthermore, despite the majority of illegal drug users and dealers nationwide being white, 75 percent of people imprisoned for drug offenses have been Black or Latinx (Alexander, 2010, p. 96).

Drug addiction is so pervasive in crime that even offenders who were not convicted for drug offenses are linked to drug influence and abuse. A 2010 study by Columbia's National Center on Addiction and Substance Abuse found that 77 percent of prisoners who committed property crimes, 65 percent of prisoners who committed violent crimes, and 67.6 percent of

those who committed other crimes either committed their crime to get money to buy drugs, were under the influence of drugs at the time of the crime, had a history of regular drug use, or had a drug use disorder (The National Center on Addiction and Substance Abuse at Columbia University, 2010). Statistics like these are resounding evidence that mass incarceration is both a race issue and a health issue, and a focus on offenders struggling with addiction and mental health, in particular, is a necessary first step towards reducing the U.S. prison population.

VR-based therapy

Alternatives to incarceration offered through rehabilitation are obvious starting points, and policymakers aim to invest their support in rehabilitation programs that offer data-based evidence of their effectiveness. Studies on VR have produced data-based evidence of VR's effectiveness in treating patients struggling with substance abuse, anxiety, and Post-Traumatic Stress Disorder (PTSD). In the following sections, this paper will detail these studies on VR-based therapy and the benefits it can offer patients.

Origins of VR

Over the past couple of decades, domains of technology have evolved to create unprecedented change in social media, education, and even therapy. Artificial intelligence and VR in particular have posed a variety of new ways to provide treatment for the country's most vulnerable populations. "Virtual reality," a term coined in 1989 by computer scientist Jaron Lanier, can be defined as "a form of human-computer interaction that provides the user a heightened level of immersion in the computer-generated environment" (Rizzo, et al., 1977). Unlike viewing film on a screen or a video on a computer monitor, VR users encounter sensory information often delivered through a head-mounted display, specialized interface devices, and sophisticated graphics. Through these sensory stimuli, the user derives a sense of presence within the virtual environment.

Throughout history, VR systems have undergone a variety of changes in their methods of application. The 1950s and 1960s saw inventions like the simulation device, interactive multimedia theater, and head-mounted display, all of which shared the basic structures and processes underlying VR technology. In the 1970s, Myron Krueger put forth advanced interactive audience experiences, jumpstarting immersion in computer-generated worlds within which people and virtual characters can

interact. By the mid-1990s, the study and application of VR to treat psychological disorders began to advance.

Developments in VR technology

The surge in scientific investigations of VR therapy we saw in the mid-1990s followed the rise of Cognitive Behavioral Therapy (CBT), with origins that can be traced back to the 1950s. At the time, early researchers such as B. F. Skinner and Joseph Wolpe pioneered the behavioral therapy movement. As behavioral therapy practices evolved over time to include cognitive psychotherapy practices, the two forms of therapy were eventually grouped together under the umbrella term "Cognitive Behavioral Therapy (Kaczkurkin et al., 2015)." Previously existing approaches to CBT emphasized exposure to feared stimuli, and were primarily conducted in vivo or imaginal exposure. VR was thought to have the potential to be a more powerful method of therapy because it provided environments more realistic than imagination, and was more accessible than in vivo exposure. In cases where imaginal exposure cannot be easily applied to patients receiving CBT, VR can be used as an alternative treatment, or a supportive psychotherapeutic technique (Giotakos et al., 2016).

Emory University led the first study to look at the effectiveness of VR therapy for acrophobia—the fear of heights—in 1995. This was led by clinical psychologist Barbara Rothbaum and Georgia Institute of Technology computer scientist Larry Hodges (Rothbaum et al., 1995a). Similar studies followed in the next couple of years to examine VR exposure therapy for phobias including the fear of flying and spider phobia (Carlin, et al., 1997; Rothbaum, et al., 1996). Since these earlier studies, within just a couple of decades, VR's development and application within behavioral health has extended to an even wider range of anxiety disorders. VR has also diversified to include other areas in clinical mental and behavioral health.

The technological advances that took place over time in VR caused a proliferation of clinical research within the field. These changes included a decrease in cost (in earlier studies the setup could cost over $250,000), and an overall improvement in the underlying technology. Developments were made in "audiovisual displays, computational speed, 3D graphics rendering, intelligence agents, tracking devices, user interface, voice recognition capabilities, and software." Collaborative efforts were made to improve VR simulations by developing shareable tools, modular architecture, and interface standards. Scientists constructed virtual

applications from skyscrapers and spiders to fantasy worlds and virtual airplanes.

These developments in VR served to expand the landscape of psychological research and behavioral health applications in the modern world. Psychological treatments were no longer limited to the traditional doctor-patient relationship. Treatment could now take place through interactive and immersive environments. The leaps and bounds in VR therapy discoveries over the years allows for the integration of VR therapy in crucial mental health practices today.

Benefits of VR-based therapy

VR is a highly valuable component to mental health practices today because it offers a virtual immersion beyond the limits of the clinical environment. VR therapy creates a multisensory experience with imagery, sound, touch, and smell that allows the patient a sense of "presence" while interacting with the virtual world (Dinh, et al., 1999). The clinician also has the ability to control the duration, sensory cues, and sequencing of the virtual environment to match the exposure to the patient's treatment goals. Real life exposures, on the other hand, are far more unpredictable and are limited by the natural order of an event. In VR therapy, the clinical experience can be enhanced at levels that match the patient's needs.

When it comes to exposure therapy, VR exposure therapy (VRET) allows patients to immerse themselves in environments that, through in vivo exposure, would be costly, time consuming, dangerous, and/or impractical. VR relieves clinicians of any reliance on the patient's willingness and ability to engage in a memory through imaginal exposure. The patient may also be coached during or immediately after the exposure through VR. This can increase engagement, habituation, and appropriate coping (e.g., Culbertson et al., 2012). In real-life exposures, concerns regarding confidentiality or stigma may arise for patients and prevent in-the-moment coaching from happening. People who find it more difficult to engage in exposure-based treatments, or are reluctant to engage in therapy tend to be more willing to engage in VR therapy (Rizzo et al., 2015b; Wilson, et al., 2008).

VRET is particularly useful in activating and modifying fears in CBT for phobias. VRET is extremely extensible and can include a wide range of stimuli that are significant to a patient's traumatic memory. VR makes typically unfeasible stimuli like the sound of a helicopter for war veterans feasible. VRET has been used to treat PTSD in veterans of the Vietnam

War, survivors of 9/11 (Difede & Hoffman, 2002), and a motor vehicle crash (Beck, et al., 2007).

Social skills training in the absence of VR has long been an intervention for people with severe mental illness thought to improve social discomfort, negative symptoms, and independent living skills. However, these interventions present barriers to people's participation. In a clinical setting, this is due to an anxiety or embarrassment-induced reluctance to engage in a group with other patients. In a nonclinical setting that is more naturalistic, engaging in skills practice can be even more intimidating. Using VR, a naturalistic setting can be mimicked and skills practice with virtual avatars can take place. This diminishes perceived risk to the patient, and the unpredictability and inconvenience that comes with a naturalistic setting.

Evidence of the benefits of incorporating VR into mental health treatments has proliferated over the past 20 years. Studies show that VRET can improve treatments for some of the country's most common disorders, including PTSD, anxiety, and substance abuse.

VRET for PTSD

VR technology for the treatment of PTSD progressed markedly in the wake of the Afghanistan and Iraq wars in particular. The VR treatment method was first studied in the late 1990s with a virtual Vietnam war scenario for male Vietnam veterans (Rothbaum, et al., 2001). Although imaginal exposure therapy is an established and effective method of addressing PTSD symptoms, a subset of patients do not ultimately respond to this intervention. The exposure allows for the processing of traumatic memories to occur (Foa, et al., 1989), however, forms of imaginal exposure can be limited by the insufficient level of immersion and presence in the recounted memory.

VRET for PTSD provides patients with stimuli that have significance in their traumatic memory, which boosts the level of exposure and emotional processing that can occur. In a 1999 study, Drs. Barbara Rothbaum and Larry Hodges led the first VRET-based treatment of a Vietnam war veteran with PTSD. The study was a series of sessions, where the first session served as the control and the patient was immersed in a neutral environment. In the second and third sessions, the patient was exposed to two virtual environments (VEs): the first, a virtual jungle clearing and the second, a virtual helicopter ride. Each VE included audio effects that the patient likely associated with the war and the virtual surroundings, including the sounds of gunfire, bomb explosions, radio

chatter, and men yelling “Move out! Move out!” In the jungle VE, the patient saw visual effects like muzzle flashes from the jungle, helicopters flying overhead, landing and taking off, and fog. In the helicopter VE, the patient could see the interior of a Huey helicopter with the backs of the pilot's and copilot's heads, instruments, controls, and the view out of the helicopter side door.

In sessions four and five, the patient was exposed to the same jungle and helicopter VEs, plus their triggered memories. The patient was asked to describe what memories each VE triggered and to repeat them several times to allow habituation. In sessions six through 14, the patient was exposed to the VEs and imaginal exposure to his most traumatic memories.

VR serves as a secondary component to the imaginal exposure method in this experiment. The study followed standard practices for imaginal exposure for PTSD, and the patient was asked to recount their traumatic memories in the present tense repeatedly until their anxiety decreased. While the patient repeated these memories, they were asked to keep their eyes open while the therapist matched the patient’s description in VR as closely as possible.

The doctors who ran this experiment found that the patient experienced a significant decrease in PTSD symptoms following VRET. The clinician-rated PTSD decreased by 34 percent, and self-rated PTSD decreased by 45 percent. These benefits of the treatment were maintained at a six month follow-up (Rothbaum et al., 1999). Although the results of this study were the first step in uncovering the range of benefits VRET can provide patients with PTSD, it also unveiled some of VRET’s limitations.

This study was the first stage of the proliferation of studies on VRET for traumatized individuals. Considering that Rothbaum and Hodges’s study results center on just one patient, they say more research into VRET’s benefits and limitations was crucial in determining its value. Rothbaum and Hodges also acknowledge the limitations of VRET and note that VRET is proposed to act as a component of a comprehensive treatment program, rather than a replacement (Rothbaum et al., 1999). Patients like the veteran in Rothbaum and Hodges’s study require a comprehensive program for treatment (Foy et al., 1998), rather than just a PTSD focused treatment.

Today, VRET is considered an emerging treatment for people with PTSD, especially considering the limited access the U.S. population has to psychotherapies. A more recent study conducted in 2022 explored the effects of VRET on armed forces veterans with PTSD. Results showed

that VRET can be particularly useful in treating PTSD resistant to traditional exposure. It is continuously advised that VRET programs should be combined with traditional therapy, and must feel as realistic as possible to stimulate the imagination. The promising findings in VRET studies so far suggest that VRET could become a cost-efficient and effective means of providing treatment for patients with PTSD (Vianez, 2022).

VRET for anxiety

Anxiety disorders are the most common in the U.S. and affect 19.1 percent of the population age 18 and older every year (Anxiety and Depression Association of America, 2022). Studies show that VR is an effective and affordable method of treating anxiety disorders and other disorders that are closely related to anxiety (Donnelly et al., 2021). Anxiety disorders can be broken down in these categories: Generalized Anxiety Disorder (GAD), Social Anxiety Disorder, and phobias. Disorders that are closely related to anxiety include Obsessive Compulsive Disorder (OCD) and PTSD, which some may experience at the same time (Anxiety and Depression Association of America, 2022). CBT is a widely used method to treat anxiety, and appears to be efficacious and effective in the treatment of anxiety disorders (Foa et al, 2015). Exposure-based CBT in particular is known as the gold standard for treating patients with anxiety disorders, and its efficacy has been well-established by extensive research (Loenen et al, 2022).

Over the years, a number of studies have been conducted to explore how VR can be integrated into exposure-based CBT to treat anxiety. Research in recent years on the efficacy of VRE-CBT on anxiety disorders have shown good treatment results. In 2022, five meta-analyses were carried out to study the efficacy of VRE-CBT versus control conditions. The meta-analyses consistently show a clear superiority of VRE-CBT versus non-active control groups. They show similar or larger effects of VRE-CBT versus CBT conditions incorporating in vivo exposure (Loenen et al, 2022).

VR has also been demonstrated to be effective in treating generalized social anxiety disorder (Anderson et al., 2013; Roy et al., 2003) and studies suggest it could be useful in treating subclinical presentations like test anxiety (Alsina-Jurnet, et al., 2007). Preliminary findings also suggest that VR could be helpful in potentiating the effects of exposure and response prevention treatment for OCD (Belloch et al., 2014).

VRET for substance abuse

Findings on using VR in an exposure model have expanded from anxiety disorder treatment to the field of substance use and other addictive disorders. Cue exposure therapy (Heather & Bradley, 1990) posits cravings are conditioned responses. These responses arise from associating an environmental cue with a drug. The individual can reduce cravings through repeated contact with the environmental cue in the absence of the substance–the same extinction learning model used in exposure therapy for anxiety. The effect of exposure can be bolstered with VR with more sense of immersion and presence, and VR-based cue exposure therapy has been demonstrated with nicotine (Choi et al., 2011) and gambling (C.-B. Park et al., 2015). Most VR therapy to date takes place in an outpatient setting. This may be attributed to the fact that anxiety disorders and specific phobias rarely warrant an inpatient or residential treatment setting.

VRET in action

Studies proving the efficacy of VRET to treat anxiety and the advances VR-based therapies have already made are only further evidence that an expansion in its implementation is necessary. Recovery facilities in the U.S. have already caught on to VRET's potential to revitalize current rehabilitation methods and are beginning to implement them in their treatment programs.

JourneyPure at The River is a drug and alcohol treatment facility in Nashville, Tennessee that has already introduced VR-based addiction treatment to its set of recovery programs. JourneyPure concedes that VR treatment in Nashville is a form of care that is not fully developed, however, the facility notes a wide range of benefits it has already seen upon adopting the treatment. Due to the large degree of control the therapist has over the virtual environment, JourneyPure's clients are guided through traumatic memories and distressing emotions safely. Therapists can also encourage their clients to have fun by immersing them in a lighter environment when necessary, allowing clients to split their attention between navigating calming scenes and working through painful past experiences. JourneyPure also cites that their clients are overall more actively engaged in their recovery, and by detaching themselves from their surroundings, they can focus solely on working through their session.

VRET in summary

Over the past thirty years, studies using VR have effectively demonstrated its ability to treat anxiety, PTSD, and substance abuse through highly immersive exposure therapy. The virtual component makes VRET more effective than current forms of in vivo and imaginal exposure therapy due to the technology's ability to use a wide range of stimuli that are largely inaccessible in real-life settings. VRET is also more individualized and affords patients safety from judgment or risks to their privacy, thereby driving higher levels of engagement than traditional exposure therapy. Clinicians still maintain their ability to coach patients during or immediately after their session and can step in if a patient's session becomes overwhelming. VR is also considered a cost-effective system for therapy or educational training and as VR technology continues its rapid advancement, VR systems will only become more and more affordable. The following sections will consider VR's success in treating disorders commonly linked to the prison population, and how VR therapy might enhance existing rehabilitation programs for incarcerated people.

VRET for drug and mental rehabilitation

As scientists continue to explore VR's role in new therapy techniques, it is evident that VRET offers a unique method of bolstering traditional mental health treatments. While VR's beneficial role in therapy is being studied and discussed more widely, not much light has been shed on how these services can be useful in the context of rehabilitating one of our nation's most vulnerable populations: incarcerated people. Mass incarceration has had a devastating effect on minority populations in the United States, and they are struggling with addiction or mental health disorders at unprecedented rates.

Studies show that VR therapy is effective in treating patients struggling with trauma and addiction, disorders that can directly contribute to instances of criminal activity and prison recidivism. VR therapy also sees greater engagement than other exposure therapies, as the patient has more privacy and the clinician can coach the patient during or immediately after exposure. Considering the data-based evidence of the benefits VR has to offer, VR-integrated rehabilitation could take on a whole new legitimacy in the eyes of policymakers and provide support to the flailing set of resources for justice-involved populations. In order to decrease the staggering prison population, this country must first strengthen drug and mental rehabilitation programs with an investment in VR, especially for programs offered as an alternative to conviction.

The history of incarceration detailed in this paper demonstrates the sordid course U.S. policy has taken and how that has led to the incredibly high rates of drug and mental health-related afflictions seen in the jail and prison population. The prison system is incapable of addressing its health crisis and, in turn, only perpetuates recidivism. VR therapy has demonstrated the ability to supplement rehabilitation services, and justice policy offers a route to leverage VR and strengthen the appeal of rehabilitative alternatives to incarceration in the eyes of policymakers. VR has the capacity to provide data-based evidence of VR therapy's effectiveness and is also proven to be more cost-effective than traditional forms of care. Both of these factors would give arguments for VR's incorporation into rehabilitation programs an advantage and provide proposals for policy change more legitimacy in the eyes of state courts. The following sections will discuss recent shifts in justice policy in relation to rehabilitation services for justice-involved people and the ways that VR treatment can serve as a tool to strengthen policy proposals for rehabilitation programs.

Implications of VR on justice policy

In addition to overburdened courts, shifts in policy and court-based responses can also be attributed to advances in the science of drug use intervention and recovery, and an increase in research on the effectiveness and cost-efficiency of alternatives to incarceration. Policy response strategies like "justice reinvestment" favor data-driven applications of resources to approach solutions, rather than the tough-on-crime policies that defined the criminal justice system for decades. This focus on reinvestment is appealing to communities and taxpayers as well, as it generates the greatest return on overall community improvement in terms of cost savings, public safety and stability, and long-term health for justice-involved populations. Justice policy is also taking a public health approach to rehabilitation by identifying both mental health and addiction treatment as medical necessities, and recognizing that relapse is often implicated in the process of rehabilitation.

Considering these progressions in justice policy and strategies, VR therapy's implementation into existing forms of rehabilitation would be highly appealing to policymakers in favor of data-driven approaches. VR is also appealing to communities and taxpayers as it is a highly cost-efficient and engaging form of therapy and thus serves as a long-term reinvestment into patients' health.

Risks of using tech to solve social issues

Studies of VRET's benefits and facilities like JourneyPure are all promising, and highlight VRET's unique ways of enhancing traditional forms of treatment. It is tempting to assume that JourneyPure's success can be replicated in rehabilitation programs across the country, however, integrated technology into vulnerable populations can cause serious harm if handled incorrectly. Experts in science, medicine, and technology warn against the dangers of leveraging technology to address social issues, especially social issues that involve marginalized groups. The following sections will discuss such risks and how they may materialize in VR-based therapy for justice-involved groups.

Considering the extensive history of drug and mental health-related afflictions in the justice-involved population and the wide range of therapy-based benefits VR offers, it is easy to point to VR services as a catch-all solution to this health crisis. However, Princeton Professor Ruha Benjamin details in her 2019 book *Race After Technology* the grave dangers of tech products that seem to offer "fixes" for social issues and human biases. Benjamin echoes Michelle Alexander's coined term "The New Jim Crow" with "The New Jim Code," a term that Benjamin defines as "the employment of new technologies that reflect and reproduce existing inequities but that are promoted and perceived as more objective and progressive than the discriminatory systems of a previous era" (Benjamin, 2019, p. 5-6). "The New Jim Code" reveals how technology both perpetuates and obfuscates racialized state violence in America and intentionally riffs off "The New Jim Crow," Alexander's term for one of the many vessels through which racialized state violence takes place: mass incarceration.

Technological benevolence and threats to equity

One dimension of the New Jim Code that Benjamin calls "technological benevolence" points to the dangers of tech products that, at face value, offer fixes to social issues but in reality only exacerbate social and racial inequity (Benjamin, 2019, p. 140). Marked by buzzwords like "health," "safety," and "diversity," new technology marketed as benevolent fixes to injustice in recent years has gone unexposed to human differences, such as race and gender, causing biased and discriminatory outcomes.

A direct connection between technology-based mass incarceration reform and technical fixes can be made with the growing use of electronic monitoring (EM) technologies for incarcerated people. Intended to resolve

the devastating state of overcrowding in U.S. jails and prisons, EM technologies propose "mass monitorization" instead of mass incarceration (Benjamin, 2019, p. 138). Ankle bracelets are being rolled out on a much larger scale, operating on a deeply racially-biased algorithmic formula used to determine who should be assigned e-monitoring. Innovative forms of injustice like EM are promoted as an alternative to incarceration that is cost-effective, increases public safety, and allows those awaiting trial or serving parole to integrate into work and family life. EM and other highly dangerous technical alternatives to incarceration endorse mass surveillance and do not fully reject the punitive ideals the U.S. criminal justice system was founded upon.

Data collection also poses risks to equity and when technology systems operate on data collection, even those explicitly aimed at addressing bias, they can still reinforce the New Jim Code's discriminatory nature. HireVue, a new artificial intelligence (AI) program for vetting job applicants, aims to "reduce unconscious bias and promote diversity" in the workplace with an AI-powered program that collects and analyzes thousands of data points from recorded interviews of prospective employees. Data points include a variety of verbal and nonverbal cues like facial expression, posture, and vocal tone. Jobseekers' scores are also compared to current top-performing employees' scores, which allows the program to decide whom to flag as a desirable candidate for hire, and whom to reject (Benjamin, 2019, p. 141).

Companies like HireVue are attractive due to their ability to cut down the sheer amount of time and money typically poured into recruitment, however, they have been proven to discriminate against applicants due to their highly imbalanced biases. Such imbalances arise due to designers' lack of an understanding that "colorblind" designs do not safeguard against discriminatory design. Amazon was forced to scrap its AI recruitment tool in 2018 after discovering it discriminated against women. The system was built using primarily the resumes of men over a ten-year period and downgraded applications that included women's colleges or terms like "women's chess club." Even after making the system gender-neutral, Amazon could not continue to safeguard against every potential bias the system could devise with neutrality (Benjamin, 2019, p. 144). While human decision-makers might be biased in the job recruitment process, AI recruitment tools do not possess the same diversity of biases, and replacing thousands of human perspectives with just a few algorithms is dangerous. Neutrality cannot account for the flexibility and range of human judgment.

Risks to privacy in VR therapy

The negative consequences and biased decision-making Benjamin outlines in her discussion of AI recruitment program data collection draws similarities to the novel issues VR data collection creates for user privacy. Concerns raised in March 2021 by the Information Technology and Innovation Foundation (ITIF) surround the serious risks that may arise from the extensive biometric data that Augmented and Virtual Reality (AR/VR) devices collect from their users. Data collection is necessary to AR/VR devices' ability to function as it allows for the proper identification of individuals and inference of additional information, both of which create a better immersive experience overall. Despite data collection being necessary, the scope, scale, and sensitivity of the information that is collected exacerbate users' privacy risks (Dick, 2021).

The highly immersive experience VR offers operates through a collection of sensors and displays that work together to form an illusory display of virtual worlds. To build these worlds, the technology requires basic information as a starting point, using gaze-tracking and brain-computer interface (BCI) technologies to interpret neural signals. On top of the information VR technologies collect, which might contain a variety of personal, identifying, or otherwise sensitive information, VR devices might utilize this combination of information to reveal or infer further details about individual users. Information on the health data of a patient using VR for therapy in particular is even more likely to be sensitive than, say, a user on a VR gaming or fitness platform (Dick, 2021).

User data collection is also disproportionately harmful to particularly vulnerable users, like children, older adults, and marginalized and other vulnerable populations. The risk of harm from personal information is exacerbated for vulnerable populations, and they may face discrimination or autonomy violations as a result. At the same time, these populations are more likely insufficiently equipped to manage their privacy risks, or give fully informed consent to their data collection. Should sensitive information be shared with service providers or employers, individuals participating in VR therapy are made more susceptible to discrimination in health care or employment (Dick, 2021). Risks of facing discrimination or physical harm may arise in cases where participants' age, sex, race, sexual orientation, or health conditions generate observed biometric data that VR devices use to infer this information, all without participants' consent (Dick, 2021).

Legislative calls for privacy protection

To safeguard against encroachments on VR users' sensitive data the ITIF proposes that, rather than the patchwork of state and national policies that currently regulate AR/VR, policymakers introduce comprehensive national privacy legislation and regulate based on actual harms tied to user data. Existing laws on data privacy typically relate to digital technologies and connected devices. When it comes to immersive experiences however, regulations on privacy are not as easily transferred and lack innovative mechanisms to protect user consent, transparency, and choice within immersive contexts (Dick, 2021).

Alongside regulations' ambiguity, existing definitions of personal and biometric data do not account for biometric information collection and processing outside of identification purposes. Imprecise definitions of the limitations of data collection expose users to unauthorized access to, or malicious use of, data that falls outside of existing definitions, such as utilizing psychographic data to infer sensitive personal information. In addition to tightened, more precise regulations, the ITIF also calls for stronger notice, transparency, and consent practices which can ensure users make better-informed decisions about the data they choose to share, including sensitive biometric and biometrically derived information (Dick, 2021). Inaction on these crucial changes to current AR/VR regulations could give way to the same harms Benjamin outlines in "Race After Technology." Allowing technologies to make data-based inferences on highly vulnerable groups like the justice-involved population, which is predominantly Black, would have disastrous effects and only further subject them to systems of oppression and surveillance.

Implementing tech with caution

Benjamin's "Race After Technology" and the ITIF's study on VR both raise valid points on the risks of using technology to solve a social issue, and must be considered in any future attempts to incorporate VR into treatment services. The New Jim Code's power lies in its covert allowance of racist habits and logics to influence tech design, where the humans who create the algorithms are rendered invisible. Resistance to the New Jim Code necessitates prioritizing equity over efficiency and social good over market imperatives. Slower, more socially conscious innovation in tech design prevents the prioritization of the (often white) individuals funding the product's design which, in turn, prioritizes their interests and biases.

Graphic designer Natasha Jen asks that design practitioners stray away from buzzwords and instead engage in more self-criticism and seek to base their ideas on evidence.

Efforts to prevent encroaching upon users' sensitive data and sensationalizing VR therapy as a whole must be a priority, especially for justice-involved groups. The ITIF notes that marginalized groups are already more prone to exploitation through data collection, which means the majority of justice-involved populations who participate in therapy would do so at high risk. Greater transparency, definition specificity, and limitations on data collection are all necessary components to establishing equitable, safe policy surrounding the implementation of VR therapy in rehabilitation programs.

Conclusion

As the U.S. continues to incarcerate Black and brown bodies at unprecedentedly high rates, the social and political issues caused by the prison industrial complex continue to be exacerbated. Considering that 49 percent of people in state prisons struggle with substance abuse and at least 20 percent struggle with mental illness, recent developments in VR provide an opportunity to support rehabilitation efforts. VRET can bolster current treatment methods for drug abuse and mental disorders at a cost-effective rate. As this paper has demonstrated, an investment in VR is an investment in rehabilitation, which will reduce recidivism rates and better prepare justice-involved groups for the challenges they may face upon re-entering society. VRET in particular is proven to be effective in treating patients struggling with trauma and addiction, disorders that the prison population struggles with at disproportionate rates. In comparison to imaginal and in vivo exposure therapy, virtual exposure is far more extensible and boosts the level of exposure and emotional processing each patient experiences. In this process of integrating VRET into rehabilitative services, it is essential to navigate implementing technology within a changing social system with extreme caution. Technology is not the single answer to social and racial inequity, and the safety of any vulnerable populations implicated must be a top priority. Scientists and policymakers should consider VRET a technological supplement to existing forms of therapy and aim to merely enhance a social system that is already being innovated upon.

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