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Improving Employment and Reducing Recidivism among Prison Offenders via Virtual Reality Job-Interview Training

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Abstract

Persistent unemployment is a critical criminogenic factor linked to higher recidivism rates. In an effort to build career pathways for returning citizens in the trades, the Michigan Department of Corrections designed and operated a first-of-its kind immersive skilled trades training program called the "Vocational Villages" prior to parole within select state prison facilities. These Villages leverage technologies such as virtual reality and robotics to optimize the opportunity to provide the equivalent of master-level trades credentials in 14 different trades. To further enhance employment outcomes for returning citizens who complete the Vocational Villages, we developed and tested the integration of a virtual reality job interview training (VR-JIT; a simulated remote meeting platform) module into the Village curriculum. Building upon prior National Institute of Mental Health-funded randomized controlled trials (RCTs) that demonstrated VR-JIT's efficacy in improving interview skills and increasing job offer rates in community samples, we initiated a first-of-its-kind RCT within two Vocational Village sites. The primary goal of this study was to evaluate the effectiveness of VR-JIT, delivered alongside services-as-usual (SAU), versus SAU alone in promoting employment and reducing recidivism among incarcerated adult males preparing for community re-entry.

The study had three primary aims: (1) to assess whether the addition of VR-JIT to SAU enhanced employment outcomes and reduced recidivism; (2) to investigate the mechanisms influencing employment and recidivism outcomes; and (3) to conduct a multilevel, mixed-method process evaluation to examine the adoptability, acceptability, scalability, feasibility, and implementation costs of VR-JIT within the prison settings. Findings from this study are critical for understanding both the external validity and scalability of VR-JIT as a correctional employment intervention.

The study determined that VR-JIT was effective at improving interview skills, reducing interview anxiety and increasing competitive employment outcomes, while also being viable for broad implementation. Notably, the addition of VR-JIT increased employment by nearly 10% and reduced time-to-employment by nearly 3 weeks. The Vocational Villages alone had a recidivism rate of 0.0% while the VR-JIT group had a recidivism rate of 3.1%. This difference was not significant.

This study suggests that a pragmatic *VR-JIT* implementation was associated with improved employment outcomes among returning citizens engaged in prison-based employment services. Thus, implementing *VR-JIT* within vocational services could bridge a critical gap in employment readiness, thereby helping returning citizens to overcome barriers to employment. Future research is needed to expand *VR-JIT*'s external validity in other correctional settings and identify evidence-based strategies to optimize delivery of *VR-JIT* within prison-based employment readiness programs.

Summary of the Project

Major Goals and Objectives

The major goal of this study is to conduct a confirmatory effectiveness randomized controlled trial (RCT) and an implementation evaluation of Virtual Reality Job Interview Training (VR-JIT) by comparing employment and recidivism outcomes of returning citizens receiving services as usual (SAU) plus VR-JIT (SAU+VR-JIT) with the outcomes of returning citizens receiving only services as usual (SAU-only).

The Hybrid Type 1 effectiveness-implementation design has three objectives: 1) evaluate whether SAU+VR-JIT, compared with SAU-only, enhances employment outcomes and reduces recidivism among this population (i.e., effectiveness); 2) evaluate the mechanisms of employment outcomes and explore the mechanisms of recidivism; and 3) conduct a multilevel, mixed-method initial process evaluation of VR-JIT implementation.

Research Questions

The research questions for this confirmatory effectiveness RCT are:

Objective 1: a) will individuals who receive SAU+VR-JIT have higher employment rates, greater improvement in job-interview skills, and reduced recidivism by six-month follow-ups compared to individuals who received only SAU?; b) will SAU+VR-JIT be more cost-effective than SAU-only?; c) will the use of the computerized VR-JIT tool free up SAU staff time for non-interview-practice-related vocational training, relative to SAU only?

We hypothesized that: 1) SAU+VR-JIT trainees, compared with SAU-only trainees, will have higher employment rates (H1a), greater improvement in job-interview skills (H1b), and reduced recidivism by six-month follow-up (H1c); 2) SAU+VR-JIT will be more cost-effective than SAU-only (H2); and 3) SAU + VR-JIT staff time will spend less time on job interview training that SAU only staff (H3).

Objective 2: a) will interview-skill improvement and measured role-play interview performance mediate the effect of interview training on employment outcomes?; b) do employment outcomes mediate the relationship between interviewing skills and recidivism at six-month follow-up?

We hypothesize that interview-skill improvement and measured role-play interview performance will mediate the effect of interview training on employment outcomes (H4).

Objective 3: a) is VR-JIT acceptable, feasible, scalable; b) what are VR-JIT implementation barriers and facilitators; and c) is VR-JIT affordable?

We hypothesize that VR-JIT will be acceptable, feasible, and scalable (H5). There are no hypotheses for the implementation barriers and facilitators. We hypothesize that preparing to implement VR-JIT will be affordable.

Expected Applicability of the Research

Study Rationale

Recidivism and reincarceration remain among the most pressing public-safety concerns facing communities across the United States. Annually, more than 600,000 returning citizens are released from state and federal prisons (Carson & Golinelli, 2012). Yet, the challenge of successful reentry is underscored by troubling statistics: according to the Bureau of Justice Statistics, 44% of released individuals are rearrested within their first year, 68% within three years, 79% within six years, and 83% within nine years of release (Alper & Durose, 2018). These figures highlight significant gaps in both rehabilitation and post-release support and reinforce the need for more effective interventions designed to interrupt this cycle.

Among the various protective factors that reduce the risk of recidivism, employment stands as one of the most powerful. Unemployment is a leading driver of reincarceration (Nally et al., 2014), with research showing that unemployed returning citizens are approximately twice as likely to reoffend compared to those who secure employment post-release (Indianapolis-Marion County Commission, 2013). Other criminogenic risks—including criminal history, antisocial behavior, poverty, age, and unstable housing—also play contributory roles (Visher et al., 2017; Piquero et al., 2013; Clark, 2016). Importantly, those who do recidivate but are employed typically remain in the community twice as long as their unemployed counterparts (Tripoldi et al., 2010). Employment not only reduces engagement in predatory crime and substance use—both established risk factors for reoffense (Laub & Sampson, 2003)—but also enables individuals to secure housing, pay bills, and forge supportive community networks (Petersilia, 2005; Visher & Courtney, 2006). Further, employment decreases the economic incentives for further criminal activity (National Research Council, 2008). Despite these known benefits, only about a quarter of returning citizens obtain employment within the first 12 months after release (Petersilia, 2001; Bushway et al., 2007), making strategies to promote early job placement an urgent public-safety imperative.

The critical need for vocational services to support employment among returning citizens has received growing national attention. Yet, only half of all state prisons offer vocational programs to facilitate reentry (Harlow, 2003). In recognition of these gaps, initiatives such as the U.S. Department of Justice's "National Reentry Week" in 2017 coordinated over 550 reentry-training events, including job-interview practice and job fairs, to support returning citizens' transition (U.S. DOJ National Reentry Week: After Action Report). Systematic reviews of vocational programs have demonstrated that targeted interventions—such as the Center for Employment Opportunities in New York City—can reduce recidivism, though the aggregate evidence is mixed and ongoing evaluation using rigorous RCT methodologies is needed (Newton et al., 2018).

Service gaps

One critical service deficit, particularly acute within prisons, is access to evidence-based job-interview training. Drawing from the theory of planned behavior (Ajzen, 1991), research has shown that active job-search behaviors (e.g., job interviewing) are among the most proximal

predictors of employment (Corbiere et al., 2011). The job interview remains a critical hurdle, as hiring managers routinely rely on interviews to gauge both work skills and social acumen (Huffcut, 2011; Hurtz & Donovan, 2000; Hunter & Hunter, 1984). For returning citizens, being able to candidly and effectively address their justice-involved history during interviews is essential for job attainment.

However, the job-interview training most commonly found within existing vocational rehabilitation services is rarely rooted in evidence-based practices. Supported employment—the gold standard in vocational rehabilitation programming (Bond et al., 2008)—typically relies on brief, counselor-led mock interviews. Unfortunately, there is no evidence-based training to prepare employment counselors on asking open-ended questions, delivering nuanced feedback, or authentically replicating a hiring managers personality or demeanor (Substance Abuse and Mental Health Services Administration, 2009). Clients are generally provided only one or two brief mock-interview opportunities prior to real job interviews, which are insufficient due to the complex, interpersonal, and highly social nature of job interviewing (e.g., Smith et al., 2022; Smith et al., 2025). This gap in evidence-based, repetitive, and high-fidelity job-interview training is particularly consequential for justice-involved individuals, who not only encounter barriers in skill development but also face real stigma and structural obstacles in the labor market. At the time this study was funded, there were no published RCTs evaluating job-interview interventions within prison-based employment programming—which was the focus of the present trial.

Virtual Reality Job Interview Training

Over the last decade, Virtual Reality Job Interview Training (VR-JIT)—a virtual job interview simulator with in-built, automated feedback—has become the most rigorously evaluated intervention for job-interview skills among clinical populations such as individuals with schizophrenia and autism (Figure 1). SIMmersion, LLC (www.simmersion.com), developed VR-JIT to support job interview training for adults with disabilities and other needs. The user experience of VR-JIT involves an interactive simulation consisting of video, speech recognition, and non-branching logic components that work in tandem to challenge trainees to navigate complex social cues and respond appropriately to realistic interpersonal exchanges with a virtual hiring manager. Throughout VR-JIT, trainees first enhance their knowledge on the basics of interviewing, including how to discuss their conviction history, through electronic learning (e-learning) content. Second, trainees are also exposed to a virtual hiring manager that interacts with trainees' responses in real-time as they navigate VR-JIT. The virtual hiring manager was developed using footage from an actor such that the facial expressions, intonation, and social cues of the character are as realistic as possible. A microphone can be utilized by trainees to allow them to "speak" directly with the virtual hiring manager, as opposed to communicating through keystrokes; a feature that enhances the overall interactive environment of VR-JIT and specifically provides experience for trainees with navigating complex social cues. Trainees are expected to build competency in and increase retention of interviewing skills through repetition.

VR-JIT relies on behavioral learning principals (e.g., repetitive practice) to provide an infrastructure for trainees to improve their interview skills (Cooper, 1982; Cooper et al., 2007) as well as the principles for designing effective simulations (Issenberg, 2006), which supports trainees to repeatedly practice their skills. VR-JIT prepares returning citizens around this topic by

providing opportunities through VR-JIT to practice different approaches to disclosing conviction histories in a judgement-free environment.

Prior to completing virtual interviews, trainees review the e-learning content where they learn eight different job interview skills (e.g., conveying that you are a hard worker, sounding easy to work with, sharing things in a positive way, sounding professional, sounding honest, showing interest in the position) along with other interviewing tips. After reviewing the e-learning content, trainees will begin simulating job interviews with a virtual hiring manager named "Molly Porter." She works for a fictional company named *Wondersmart*. The interview takes place in Molly's office, where the trainee joins her for an interview. After asking each question during the interview, Molly pauses so participants can speak their responses via microphone, facilitated through the interface. Molly is designed to "respond" to trainee's behavior according to three distinct difficulty levels: easy (friendly), medium (direct), and hard (stern). Throughout a single interview, Molly's behavior and personality are also attuned to a trainee's prior responses; she changes her future questions and social cues in response to, for example, inappropriate responses from a trainee. VR-JIT dictates Molly's conditional probabilities for each possible reply as determined by three factors: 1) difficulty level, 2) the conversation history, and 3) Molly's interactive relationship with the trainee. Molly has demonstrated high consistency in both responses and emotional states within each given difficulty level, despite the fact that her questions change from interview to interview. Within the VR-JIT interface, trainees can see options for responding to Molly's questions; they can also access a complete transcript of the interview along with feedback on their statements.

Trainees receive real-time feedback from an on-screen coach named *SIMantha* who displays nonverbal cues (e.g., thumbs up and a smile) about the trainee's responses. Also, trainees can click "help" buttons that clarify interview questions or response options. For example, the coach shows the trainee a "thumbs down" for a problematic response. If the trainee is unclear why their response was a problem, the help button provides a detailed explanation about why the statement was problematic (e.g., "This statement focuses on a negative character trait; try focusing on your strengths").

At the beginning of the VR-JIT experience, trainees apply for one of eight available positions at *Wondersmart*. After selecting a position (e.g., stock clerk, customer service representative), trainees complete a job application within VR-JIT, including questions about work-related history and skills; this application is consistent with those found online by national retail stores. This component of the simulation provides valuable practice with completing realistic internet-based applications used by many employers. The job application data provided by trainees in VR-JIT is utilized by Molly to generate relevant questions for the job interview. For example, the job application within VR-JIT allows trainees to indicate that they have a prior conviction and when they do so, VR-JIT generates a range of responses for trainees to choose from that assists them in disclosing this conviction to Molly during the interview, when prompted.

Both during and after the job interview, trainees can review transcripts of the interaction by replaying the entire conversation or individual exchanges with Molly, including a replay of the trainee's voice as captured by speech recognition. Hearing as opposed to simply reading the transcript allows trainees to reflect on tone and other variations in voice they may have missed or misjudged. Trainees can also click on interactive sections in the written transcript to receive

specific feedback on how their responses impacted their interview and overall score, and how Molly 'perceived' their responses in the simulation; including how their responses shaped her choice of subsequent questions. For example, Molly may ask about the nature of one's conviction and a participant may respond with "It was for assault, but it was just a misunderstanding." Then their feedback might read "This makes it sound like you do not think you should have been in trouble and like you have not learned from your past. Molly will worry that you may make the same mistakes again because you do not seem to be sorry." Lastly, the feedback in the transcript is color-coded where green segments of text reflect appropriate or useful responses, red text indicates inappropriate or unconstructive responses, and black coded text denotes neutral responses.

After completing each simulated interview with Molly, trainees receive a score and summary feedback on how to improve in the eight domains of interview skills (i.e., hard worker, sounding easy to work with, sharing things in a positive way, sounding professional, sounding honest, showing interest in the position, negotiation, and overall rapport). The total scores are based on an algorithm that tracks trainees' performance throughout the interview; they range from 0 to 100 and if they score 90 or above, trainees are notified "You got the job!" Notably, the feedback provided as a part of the summary that accompanies the score assists trainees in decoding the subtleties of interview-based interactions.

Current VR-JIT Evidence and Translation to Study Objectives

Five RCTs substantiated VR-JIT's efficacy at improving interview skills and obtaining job offers (Smith et al., 2016; M.J. Smith et al., 2015; Smith, Ginger, Wright, Wright, Taylor, et al., 2014; Smith, Ginger, Wright, Wright, Boteler Humm, et al., 2014), and two Hybrid Type 1 (HT1) RCTs extended these findings to community-based contexts, assessing both effectiveness and initial implementation (Blajeski et al., 2024; Sherwood et al., 2023; Smith, Sherwood, et al., 2021; Smith et al., 2022) in mental health services and pre-employment services programs. Additional research in schools (Smith, Sherwood et al., 2022; Smith, Smith, et al., 2021), as well as financial and dosing studies (Danielson et al., 2024; Smith, Graham et al., 2020; Smith et al., 2024), confirm that VR-JIT 1) improves job-interview performance, 2) reduces anxiety, 3) increases access to competitive employment, 4) is feasible to implement, and 5) is budget-friendly in non-justice-involved populations.

Building on these foundations, VR-JIT was piloted in corrections, with prison staff delivering the intervention within two prison-based, trades-focused, pre-release employment readiness programs. In this small trial (n=44), returning citizens who participated in VR-JIT showed greater gains in job-interview skills and anxiety reduction, as well as higher rates of competitive employment at six months post-release compared to services-as-usual (82% vs. 69%; Smith et al., 2022). A subsequent, larger confirmatory HT1 RCT (n=101) implemented by prison staff sought to replicate these findings (Objective 1), while also evaluating the mechanism by which VR-JIT facilitated access to employment (Objective 2).

Despite promising outcomes, implementing VR-JIT in correctional settings presents distinct challenges—many shared with broader community efforts—including logistical constraints (scheduling, technology, staff training) and correctional-specific barriers such as security protocols and supervision requirements (Blajeski et al., 2024; Sherwood et al., 2023).

Recognizing these complexities and newly validated benefits for returning citizens, the current study also conducted the first multi-level, mixed-methods evaluation of early-stage implementation outcomes for VR-JIT within prisons (Objective 3).

Specifically, study objective 3 examined barriers and facilitators at multiple levels, drawing on interviews and surveys with both staff and RCT participants in two prison settings. Given the novelty of VR-JIT implementation in corrections, our focus centered on salient early-stage outcomes: acceptability, feasibility, and, specifically for technology-based interventions, usability. The Consolidated Framework for Implementation Research (CFIR; Damschroder et al., 2022) provided a rigorous evidence-based approach for assessing these dimensions, leveraging its interdisciplinary foundation and prior utility in analogous community mental health context (Blajeski et al., 2024). Our qualitative methods assessed factors influencing implementation (staff training acceptability, resource availability, implementation feasibility, perceived appropriateness, attitudes, and facility infrastructure), while quantitative surveys captured the perceptions of returning citizens and instructors regarding quality, satisfaction, usability, and barriers.

Based on prior research, we hypothesized that Vocational Village administrators and career-readiness counselors would find VR-JIT feasible and appropriate, with the orientation and overall implementation acceptable and sustainable. Likewise, we anticipated high acceptability and usability ratings from returning citizens. Employing CFIR, we further expected to identify unique barriers and facilitators specific to prison-based implementation.

This focus is especially timely, as each year more than 500,000 individuals are released from state or federal correctional facilities (USDOJ, 2021), yet a majority struggle to reestablish themselves, with recidivism rates remaining high (Alper & Durose, 2018). Employment is a well-documented stabilizing factor (Berg & Huebner, 2011), improving housing security, financial stability, and social integration (Gibson & Krohn, 2012; Petersilia, 2005; Ramakers et al., 2017). While vocational programs offer promise, fewer than half of states provide sufficient services (Newton et al., 2018; Stephan, 2008), and a lack of evidence-based job-interview training represents a major gap (Wells, 2014; Flake, 2015; Pham et al., 2017; Ricciardelli & Mooney, 2018).

Given the interest from state corrections departments and the need for scalable, evidence-based interventions, this study also examined the costs of preparing prison-based employment readiness programs to deliver VR-JIT. Implementation preparation—spanning the decision to adopt an intervention to its first delivery (Moulin et al., 2019)—is distinct from maintenance costs and is critical as approximately half of implementation efforts fail during this initial stage (Saldana et al., 2012), rendering incurred costs "sunk." Accordingly, we conducted a budget impact and sensitivity analysis to estimate resource requirements for the preparation phase across other prison programs.

In sum, this study's findings will aid correctional administrators and policymakers in making informed decisions about evidence-based educational tools to enhance employment outcomes for returning citizens, ultimately supporting safer, more successful community reentry and reducing recidivism.

Study Design (Objective 1)

We conducted a pragmatic, parallel, randomized controlled trial using a Hybrid Type 1 effectiveness–implementation design (Curran et al., 2022) to evaluate whether adding *VR-JIT* to the Vocational Villages model improved post-release employment outcomes and recidivism, compared with Vocational Villages as usual. The study used a 2:1 randomization ratio of VV+*VR-JIT* to VV. The study protocol was approved by the University of Michigan's Institutional Review Board, and all procedures were reviewed, approved, and monitored by a data and safety monitoring board. As a pragmatic RCT, this study had broad participant eligibility within the Vocational Villages, had flexible intervention protocols (i.e., job coaches could adjust intervention completion expectations based on participant needs), emphasized employment as a real-world outcome, occurred within a naturalistic setting, and emphasized a concurrent implementation evaluation (Zwarenstein et al., 2008). The trial was registered with clinicaltrials.gov (NCT03937128) and all elements of the Consolidated Standards of Reporting Trials (CONSORT) statement (see http://www.consort-statement.org) have been included in the manuscript.

Participants were not blinded to group assignment, but the group in which a participant was assigned was unknown to those assessing outcomes. Blinding is essential to mitigate biases and helps prevent results being skewed due to both conscious and unconscious influences. We then conducted six-month and 12-month follow-ups with the participants to evaluate their employment outcomes. Services as usual (SAU) job-training at the Vocational Villages include full days of training and classroom instruction intended to mimic a typical workday outside prison walls and to provide returning citizens marketable skills.

Study Design (Objective 2)

Based on Corbiere et al.'s (Corbiere et al., 2011) Model of Employment, we will evaluate if improved interviewing skills mediates the relationship between VR-JIT (number of completed virtual interviews) and employment outcomes (i.e., obtaining employment). We will test first for a significant SAU+VR-JIT impact on interview skills compared with SAU-only, then check for treatment by mediator interaction (Kraemer & Gibbons, 2009), then evaluate the product of the two coefficients (MacKinnon et al., 2007) with bootstrapped confidence intervals (Preacher & Hayes, 2004).

Study Design (Objective 3a-3b)

This implementation study (Curran et al., 2022) was designed to describe the initial implementation process outcomes and identify initial barriers and facilitators of *VR-JIT* uptake. The study used a convergent mixed methods design (i.e., simultaneous collection of both qualitative and quantitative data followed by the integration of data during interpretation (Creswell & Plano Clark, 2023). The design was ideal for addressing our questions as most implementation outcomes were evaluated both quantitatively and qualitatively at the same time after implementation, with both methods given equal importance. The study protocol was approved by University of Michigan Institutional Review Boards, and all procedures were reviewed, approved, and monitored by a data and safety monitoring board. All participants provided written informed consent.

Study Design (Objective 3c)

We determined the labor (and associated costs) and non-labor costs of preparing the two prison sites to implement VR-JIT within their prerelease employment readiness programs (i.e., the Vocational Villages within the Michigan Department of Corrections). These costs include planning meetings, training, and collaborations with the research team and prison staff. We conducted a budget impact analysis (BIA) in which we surveyed the hours spent by research team members and prison staff on the activities required to prepare the two Vocational Village sites to implement VR-JIT (Sullivan et al., 2014). We used salaries and fringe benefits to calculate the cost of these activities and estimated costs to replicate the implementation preparation activities. This BIA analysis was completed from the perspective of the prison budget holders and only includes the costs necessary for prisons to engage in the activities needed to prepare their staff and setting to implement VR-JIT within their ongoing employment readiness program. The study protocol was approved by University of Michigan Institutional Review Boards, and all procedures were reviewed, approved, and monitored by a data and safety monitoring board. All participants provided written informed consent.

We used the comprehensive EPIS (Exploration, Preparation, Implementation, and Sustainment) framework to guide the process to implement evidence-based practice in public health, social, health, and mental health services (Moullin et al., 2019). During the exploration phase, our research team partnered with the State of Michigan's Department of Corrections (MDOC) to consider programming needs (e.g., enhancing employment programming) and evaluating whether VR-JIT could help support those needs (Smith, Mitchell et al., 2020). During the preparation phase, we identified potential determinants of implementation (i.e., barriers and facilitators), and developed a detailed implementation plan to evaluate the effectiveness of VR-JIT. The current study is set during this implementation preparation period and our analysis focused on the resources and activities necessary for VR-JIT delivery as outlined in the EPIS framework. The implementation phase (i.e., delivery of VR-JIT and provision of implementation support) and sustainment phase (i.e., identification and facilitation of ongoing VR-JIT implementation supports) are beyond the scope of this study. For our computational framework, we used a cost-calculator approach that focuses on the collection of labor hours engaged in implementation preparation activities and the related salaries of personnel engaged in the activities (Sullivan et al., 2014).

Collaborating Organizations

Beginning in September 2017, the Principal Investigator (Dr. Matthew Smith) networked with an MDOC intern who facilitated a demonstration with a group of returning citizens participating in a post-release job readiness program. Based on the success of this demonstration, Dr. Smith was connected with Mr. Kyle Kaminski, Director, Offender Success Programs at the MDOC in December 2017. Over the next 15 months, Dr. Smith, Mr. Kaminski, and other MDOC representatives conducted several meetings to plan out a collaborative effort to evaluate VR-JIT within two MDOC prisons, the Parnall Correctional Facility and the Richard A. Handlon Correctional Facility. During this period, Dr. Smith was awarded two research grants to first pilot VR-JIT (funded by the University of Michigan) and then conduct a Hybrid Type 1 effectiveness-implementation randomized controlled trial of VR-JIT within the MDOC Vocational Villages.

The MDOC Vocational Villages are prison-based, specialized residential programs where returning citizens live, work, and study together in preparation for their release. Admission to the Vocational Villages requires returning citizens to meet stringent behavioral and academic standards, such as maintaining at least six months free of Class I misconduct (e.g., assault) and completion of all core and academic programming. The Vocational Village curriculum is centered around 13 vocational trade training programs (e.g., welding, masonry, tree trimming). Participants select a primary trade where they earn recognized trade credentials through a combination of coursework and hands-on training, which are designed to be transferable to the workforce. In addition, participants completed a 15-hour workshop to enhance their job search skills such as completing job applications, cover letters, resume writing, and job interview techniques (Washington 2018). Participants self-reported they completed role-play mock job interviews with employment readiness instructors (M = 0.82, SD = 1.68; range 0 to 12) or their peers in the Vocational Villages (M = 0.88, SD = 2.12; range 0 to 11) based on their need and an assessment of their skill. Participants completed M=3.14 (SD=5.0) hours of classroom instruction on job interview skills led by employment readiness instructors. Additional Vocational Village details are here: https://www.michigan.gov/corrections/0,4551,7-119-33218_75514---,00.html.

Changes in Approach from Original Design and Reason for Change

Objective 1 was originally designed to include 18- to 24-year-olds actively enrolled in one of the two Vocational Villages. However, due to the launch of the RCT taking place right before the COVID-19 pandemic, NIJ approved of the removal of the upper age limit in order to help with our enrollment numbers. Participants ranged in age from 21 to 61 years old. Beginning in May 2021, NIJ also approved that returning citizens with low risk of violent crime reoffense also became eligible for the study due to COVID-19-related recruitment shortfalls. The COVID-19 pandemic required us to further change our study design by pivoting from in-person study visits to a fully remote protocol (via phone or video conferencing) when the Vocational Villages shut down and movement within the prisons stopped. The change in protocol included a new virtual recruitment session where prison staff played a pre-recorded video from our team; collecting a verbal, rather than written, consent; entering all collected data directly into Research Electronic Data Capture (REDCap; (Harris et al. 2009; Lawrence et al. 2020)) with participants not recording any of their data responses on paper copies; and electronically videorecording some assessments instead of using a video camera in-person. The participants who did not complete their study visits at the prisons due to the COVID-19 pandemic were invited to complete them post-release via phone or video conferencing. When the Vocational Villages opened back up in 2022, we resumed in-person study visits with participants at the Richard A. Handlon Correctional Facility but continued to use the remote protocol for the remainder of the RCT at the request of the Parnall Correctional Facility. All of the changes we made were a direct result of a worldwide pandemic which was further compounded by working within the confines of correctional facilities following their own internal COVID-19 protocols.

Objective specific changes from the COVID-19 pandemic included prioritizing Objective 1a (RCT) over objectives 1b (VR-JIT cost effectiveness), and 1c (staff efficiency). Due to staffing shortages during the pandemic, the prison site partners did not have sufficient staff to engage in the study and power the cost-effectiveness and staff efficiency analyses. This data was still collected from available staff. However, the resources required to facilitate this data processing and analyses were diverted to the necessary work required to complete objective 1a and all of

objective 3. Additional changes were the need to prioritize completing objective 1a and concurrently complete objective 3 before addressing objective 2 (mediation analyses). Notably, the pandemic caused our study sample to be 101 out of 150 participants, thus we became underpowered for the mediation analyses. We intend to conduct this analysis outside of federal funding and publish results at a later date.

Objective 1 Study Participants

The study team recruited study participants from the Parnall Correctional Facility and the Richard A. Handlon Correctional Facility. All participants were enrolled in the Vocational Villages and were pre-screened by prison staff. Once identified, participants attended a recruitment presentation led by the research team. Participant inclusion criteria were: 1) enrolled in the Michigan Department of Corrections (MDOC) Vocational Villages; 2) within three months of their earliest release date, and 3) at moderate-to-high risk for violent crime reoffense (via the Correctional Offender Management Profiling for Alternative Sanctions (COMPAS (Brennan et al. 2009). Study exclusion criteria were: 1) the presence of an uncorrected hearing or visual problem that interfered with using VR-JIT; and 2) a medical illness that compromised cognition (e.g., moderate-to-severe traumatic brain injury). The University of Michigan's Institutional Review Board approved the study protocol, and all participants provided informed consent.

Objective 2 Study Participants

Not yet determined.

Objective 3a-3b Study Participants

Participants for Objective 3a-3b included MDOC staff (instructors [*n*=6], and Vocational Village principals [*n*=2]), and returning citizens (*n*=56).

Objective 3c Study Participants

Participants for Objective 3c included members of the implementation support team, which consisted of the external scientific partner (*n=6*) and prison staff (*n=9*). The external scientific partner included the Principal Investigator, 3 research coordinators, 1 graduate student, and 1 information technology specialist. Prison staff included 2 administrative principals/leaders and 1 assistant principal (herein referred to as leaders), 2 teachers, and 3 information technology specialists from their respective prison.

Study Procedures

Stakeholder Involvement (All Objectives)

Aligned with principles of community-engaged research (Newman et al., 2011), we convened a stakeholder advisory board (SAB) that included criminal justice scientists, a state-level corrections assistant education manager, and a reentry coordinator for a local county sheriff's office with lived experience as a returning citizen. The SAB co-designed the study and addressed real-time challenges and adjustments to study design and implementation.

Objective 1 Randomization

The database manager used a random number generator to determine random assignments with a randomization scheme of 75 participants per prison. Eight blocks of nine (and one block of three) participants (*n*=6 VV+*VR-JIT* to *n*=3 VV only) were generated at a 2:1 ratio. This block size of nine was chosen because the prison computer labs housed 6 computers that could be used for *VR-JIT*. As noted in our CONSORT (Figure 2), 101 participants met inclusion criteria, provided informed consent, and completed pre-test study measures. After all pre-tests were completed for a block of participants, the study database manager or project coordinator randomly selected a participants' personal identification number (PIN) and then entered it into the randomization sequencer, which identified the random assignment. The project coordinator communicated the random assignment for each PIN to the Vocational Village primary contact who individually informed the study participants. This method was preferred by the prison so the participants would know their assignment ahead of beginning the intervention visits. The prison sites were located up to 2 hours from the research team so traveling to the site to inform participants of their assignment was a strain on resources. Notably, the target sample of 150 participants was not reached due to a COVID-19 pandemic-related enrollment shortfall.

Objective 1 Blinding

Study data collection teams, the biostatistician, and trained role-play video coders were blinded to group assignment. Participants and *VR-JIT* implementers (i.e., prison staff) were not blinded to group assignment due to the pragmatic implementation approach.

Objective 1 VR-JIT Implementation Procedures

Following the training orientation, Vocational Village instructors facilitated computer lab sessions where residents completed virtual interviews over 2-3 weeks. During this time, Vocational Village administrators were involved in five ways: 1) contributed to and approved the final implementation design, 2) had final say on which instructors would participate, 3) supervised to make sure implementation was running smoothly, 4) facilitated call-out (i.e., calling out residents from current programming to attend *VR-JIT* visits), and 5) prescreened those who met eligibility criteria. The completion of at least 15 virtual interviews was recommended based on our understanding of how to maximize the effectiveness of *VR-JIT* when the study launched in 2020 (Smith, Mitchell et al., 2020). To promote hierarchical learning, residents were asked to progress through *VR-JIT*'s three difficulty levels (i.e., easy, medium, hard). If residents achieved a score of 90 or higher (out of 100) in the first three 'easy' interviews, they advanced to 'medium'; if not, they had two more attempts to achieve 90 or higher. Residents automatically advanced to 'medium' after five completed 'easy' interviews, regardless of score. Next, residents continued with three to five interviews on 'medium' using the same progression to determine when they were ready for 'hard.' Residents were then asked to perform 'hard' interviews for the remainder of their training. *VR-JIT* implementers were instructed to help residents review their virtual interview transcript and performance assessment. Notably, *VR-JIT* implementers reported that 6.8% of residents needed 'no' guidance, 60.1% needed 'a little' guidance, 30.8% needed 'some' guidance, and 2.3% needed 'a lot' of guidance.

Objective 1 Data Collection Methods

In preparation for data collection, the research team reviewed study assessments, practiced assessment delivery, and performed at least two mock study visits (per visit type). A master's level project manager (trained by the Principal Investigator) evaluated staff performance and provided feedback. To ensure fidelity to research visit procedures, research staff used a checklist during study visits.

During pre-test visit 1, participants (i.e., returning citizens) completed self-report surveys about their background, employment, and criminal justice (i.e., times arrested, duration in jail or prison) histories. During pre-test visit 2, participants completed a video-recorded mock job interview with the research team and then a series of self-report measures to assess their job interview skills, anxiety, and motivation. Participants were then randomly assigned to VV+*VR-JIT* or VV only. Participants completed the same self-reports and mock interview during post-test. Additionally, VV+*VR-JIT* completed surveys on *VR-JIT* acceptability and usability. Due to the COVID-19 pandemic, 52.5% of participants (*n*=53) completed both pre-test and post-test in-person, 36.6% of participants (*n*=37) completed both pre-test and post-test remotely, 2.0% of participants (*n*=2) completed pre-test in-person and post-test remotely, 3.0% of participants (*n*=3) completed pre-test in-person and did not complete post-test, and 5.9% (*n*=6) completed pre-test remotely and did not complete post-test.

All study visits within the prison were conducted in a semi-private room with a closed door (that had a window), ensuring minimal security standards with prison staff in an adjacent room. After the pre-test visits, the research team used a public MDOC database (https://mdocweb.state.mi.us/otis2/otis2.aspx) to gather each participant's criminal justice history, including MDOC number, earliest release date, and offense type (e.g., violent or non-violent). A six-month post-release follow-up phone interview was conducted with participants to obtain their employment outcomes. Participants received postcard reminders at three- and five- months post-release ahead of their follow-up date. If participants did not respond to phone and email contact within 4 weeks, the study team ceased contact efforts. The study team also collected post-release employment records from MDOC. Upon release, participants were given a copy of their consent form and a flyer with their *VR-JIT* login information. They were reminded that the research team would be reaching out six months after returning to their communities to conduct the six-month follow-up phone visit.

Objective 3a-3b Data Collection Methods

Objective 3c Data Collection Methods

Hours spent engaging in the various implementation preparation activities to prepare the prisons to implement VR-JIT were collected at the end of this phase. These data were collected using self-report surveys from prison and research staff using a timeline follow back procedure to complete hours for each month during the implementation preparation phase. All surveys were collected using electronic surveys via REDCap, a secure online data collection manager (Harris et al., 2009). Implementation preparation activity categories were created a priori by sharing categories used in a recently completed study (Smith, Graham et al., 2020). All participants reviewed the existing categories (from the prior study) and recommended adaptations to tailor the categories to be more representative of a correctional setting.

Annual salaries and fringe benefits were provided by the Michigan Department of Corrections administrative team. Annual salaries for the research team were self-reported in 2019. Using the reported salary information, we then estimated fringe benefits to determine the cost of each labor hour and updated these to 2021 salary estimates so estimates were more comparable with current costs. Salaries included 2021 university and prison fringe benefits, which were estimated by the research team based on publicly available university data and fringe benefits directly from prison staff. Non-labor costs for hardware and software were paid for and estimated by the research team.

Objective 1 Study Measures and Outcomes

There were no changes to study measures after the trial was commenced.

Background Characteristics

Demographic, employment, and criminal justice histories. Participants filled out a brief survey detailing their demographics (e.g., age, race, education) and employment histories (e.g., prior job experience (0=no 1=yes). Additionally, they completed a questionnaire regarding their criminal justice involvement, including the number of times in jail or prison, the lifetime number of years in jail or prison, and whether their primary offense was violent (0=no, 1=yes).

Mental health. Participants reported any prior DSM-V diagnoses (e.g., depression, bipolar disorder), and their current psychological distress was evaluated using the 10-item version of the Symptom Checklist (SCL-10; Rosen et al., 2000), adapted from the Symptom Checklist-90 (Derogatis & Savitz, 1999). The SCL-10 provides a total score based on 10 items rated on a 5-point scale, indicating the frequency of various distress experiences (e.g., feeling afraid, difficulty making decisions) over the past 30 days, ranging from 0 ("not at all or 0 days") to 4 ("extremely or 20+ days"). The SCL-10 had acceptable internal consistency ($\alpha = .79$).

VR-JIT Process Measures. VR-JIT engagement variables were automated by the SIMmersion *VR-JIT* system. *VR-JIT* recorded the total number of completed virtual interviews, the total number of minutes speaking with the virtual interviewer, and the total number of minutes interfacing with the elearning. Virtual interview performance scores were automated from 0 to 100 for each interview via the *VR-JIT* performance algorithm.

Primary Outcomes

Employment. Competitive employment is defined as being situated in an integrated community setting, paying at least minimum wage, and not designated specifically for individuals with disabilities or other needs (Workforce Innovation Opportunity Act, 2014). The MDOC Employment and Opportunities Unit provided research staff with competitive employment outcome data. Employment was verified using pay stubs provided to a parole agent who entered the paystub data into a database. The research team also collected employment outcome data from returning citizens. Obtaining a job was cross-referenced between MDOC and self-report data. Whether or not competitive jobs were obtained within the six-month follow-up period was coded as 1 for 'yes' and 0 for 'no.'

Recidivism. We defined recidivism as the rearrest of a participant after their release. To collect rearrest data, research staff used the MDOC Offender Tracking Information System (OTIS; https://mdocweb.state.mi.us/otis2/otis2.aspx). Here, they obtained the current status of each participant: paroled, returned to prison on parole violation, parole absconder, etc. In some cases, if a participant was paroled out of state, staff referred to that state's internal tracking system. In order to minimize potential delays in processing arrest records, we procured the data approximately three months after the six-month follow-up date.

Secondary Outcomes

Job Interview Skills (Performance-Based). We evaluated interview skills at pre- and post-test visits by video-recording a single mock interview role-play. We utilized a version of the Mock Interview Rating Scale (MIRS) that we adapted for justice-involved populations (J-MIRS) by adding an item for participants to discuss their prior conviction. The J-MIRS offers eight job scenarios for participants to choose from for their mock interviews with the research team. Participants were given five minutes to review the scenario before research staff posed 14 standard interview questions, along with four to eight interview questions randomly selected from a pool of 70. In prior research, the J-MIRS had acceptable internal consistency (α=.74), good test-retest reliability (r=0.82, p<.001) and was sensitive to change over time in the feasibility study (Smith et al., 2023).

Before conducting the J-MIRS, raters (who were unaware of participants' group assignments) viewed a video and rated a single item on 'likeliness to be hired,' using a scale from 1 (unlikely) to 5 (very likely), to provide an overall rating of job interview performance. Subsequently, the raters re-watched the video and evaluated nine specific job interview skills based on established literature (Huffcutt, 2011) using a five-point Likert-type scale with defined anchors (1 = poor to 5 = excellent). These skills included the following: 1) comfort level, 2) discuss prior conviction (see supplemental Figure 1 for a description of this single additional item and its scoring anchors), 3) hard worker, 4) working with others, 5) positive communication, 6) sounding honest, 7) interested in the job, 8) professionalism in speech, and 9) overall rapport. Each skill was rated based on qualitative anchors (e.g., a comfort level rating of 1 indicating high anxiety and loss of focus). A cumulative score was calculated by summing the scores of the nine skills. In the present study, the J-MIRS had strong internal consistency at pre-test (α=.83, N=101) and post-test (α=.82, N=88).

The four raters were master's degree students with previous experience in conducting real-world job interviews. They trained using 10 role-play videos to familiarize themselves with the rating anchors before independently rating study videos. Raters compared their ratings with the gold standard videos, and their assessments were reviewed and discussed with the study team role-play trainer. Additionally, raters collectively reviewed videos in monthly reliability sessions with the trainer to address rating discrepancies (ratings differing by more than one point) and establish a consensus score. For reliability, three raters assessed the same videos in 15% of the sample, yielding a one-way random effects ICC of .92 across all nine items at pre-test and an ICC of .95 across all nine items by four raters at post-test.

Job Interview Skills (Self-Report). Following the mock job interviews, participants rated their perceived proficiency or comfort level across nine job interview skills. This assessment utilized a total score based on a seven-point Likert scale (e.g., 1 'extremely skilled' to 7 'extremely unskilled'). Internal consistency was strong at pre-test (α=.92) and post-test (α=.90) in this study and in prior research using this measure (Smith et al., 2023).

Job Interview Training Motivation. Participants reported their motivation to practice job interview skills, measured using a total score from the interest/enjoyment subscale of the Intrinsic Motivation Inventory (IMI; McAuley et al., 1989). Seven items were rated with a Likert scale (e.g., 1 'not at all true' to 7 'very true'). Sample items included the following: "I enjoyed preparing to find a job very much," "Preparing to find a job was fun to do," and "I would describe practicing job interview role-plays as very interesting." Internal consistency was good at pre-test (α=.85) and at post-test (α=.88) in this study and in prior research (Smith et al., 2023).

Job Interview Anxiety. Participants reported their job interview anxiety via an adaptation of the Personal Report of Public Speaking Apprehension (PRSPA; McCroskey 1970). We used "job interviewing" in place of "public speaking" for all 34 items. The Likert scale was from 1= "*strongly disagree*" to 5 = "*strongly agree*." The PRSPA uses a validated two-step process to generate the total score that we replicated in this study = ((72 – (total of step 2 items) + (total of step 1 items)). Internal consistency was excellent at pre-test (step 1 items, α=0.95 and step 2 items, α=.90) and post-test (step 1 items, α= 96 and step 2 items, α=.91) in this study and in prior research (Smith et al., 2023).

Objective 3a-3b Study Measures

Vocational Village Administrator and Instructor-Level Quantitative Measures

VR-JIT Orientation Acceptability, Appropriateness, and Expected Feasibility (Pre-Implementation). Immediately following *VR-JIT* training orientation, five instructors completed the *VR-JIT* training orientation evaluation with three scales. The first scale consisted of seven items that assessed orientation acceptability (e.g., *"How acceptable were the training materials?"*). Item responses were on a 5-point Likert scale (e.g., 1=*Not at all satisfied* to 5=*Very satisfied*; or 1=*Not at all acceptable* to 5=*Very acceptable*). Internal consistency was high (**α**=0.97). The second scale consisted of five items that assessed *VR-JIT* appropriateness (e.g., *"How well do you think VR-JIT fits with residents' goals for job training?"*). Item responses were on a 5-point Likert scale (e.g., 1=*Not at all well* to 5=*Very well;* 1=*Not at all effective* to 5=*Very effective*). Internal consistency was high (**α**=0.95). The third scale consisted of nine items that assessed the expected implementation feasibility of *VR-JIT* (e.g., *"How prepared do you feel you are to train residents on VR-JIT?"*). Item responses were on a 5-point Likert scale (e.g., 1=*Not at all prepared* to 5=*Very prepared*; or 1=*Not at all confident* to 5=*Very confident*). Internal consistency was good (**α**=0.94). The above scales were used in prior *VR-JIT* implementation evaluations (Blajeski et al., 2024; Sherwood et al., 2023; Smith, Sherwood et al., 2022; Smith, Smith, et al., 2021).

VR-JIT Acceptability and Sustainability (Post-Implementation). One Vocational Village principal and five instructors completed an assessment of *VR-JIT* acceptability and sustainability

at post-implementation. The acceptability scale consisted of nine items (e.g., *"How effective does VR-JIT seem to be in helping residents improve their interviewing skills?"*). Item responses were on a 5-point Likert scale (e.g., 1=*Not at all* to 5=*Very much*). Internal consistency was good (α=0.87). Three single item measures of *VR-JIT* acceptability were included (*How effective does VR-JIT seem to be in helping residents improve their interview skills; How engaged have your residents been in the VR-JIT curriculum?; How well does VR-JIT fit with the overall goals and requirements of the Vocational Villages?*) using a 5-point Likert scale (1=*Not at all* to 5=*Very*). *VR-JIT* sustainability was measured with three items (e.g., *"How motivated are you to continue to deliver VR-JIT?"*, *"How disruptive will it be to your daily work routine to continue to use VR-JIT?", and "How equipped is your program to support the continued delivery of VR-JIT?"*). Item responses were on a 5-point Likert scale (e.g., 1=*Not at all* to 5=*Very*). The above measures were used in prior *VR-JIT* implementation research (Blajeski et al., 2024; Sherwood et al., 2023; Smith, Sherwood et al., 2022; Smith, Smith, et al., 2021).

Vocational Village Administrator and Instructor-Level Qualitative Measures

Semi-Structured Interview. Following *VR-JIT* delivery, two Vocational Village principals, one Vocational Village instructor (who served in an administrative capacity), and five instructors completed an interview discussing potential barriers to and facilitators of *VR-JIT* implementation. Consistent with our quantitative measures, the semi-structured interview questions focused on barriers and facilitators that are salient to achieving "early" implementation outcomes as defined by Proctor et al. (e.g., adoption, feasibility, acceptability, etc.) and suggestions for adaptations to the implementation process that would be beneficial to future efforts (Proctor et al., 2011). The questions were informed by the quantitative measure items, which is consistent with a convergent mixed methods design. The semi-structured interview consisted of 15 open-ended questions (*"What did you struggle with the most getting VR-JIT up and running in your classroom?"* and *"How can we make VR-JIT better for instructors and residents to use?"*).

Returning Citizen-Level Quantitative and Qualitative Measures

VR-JIT Acceptability and Usability. Returning citizen acceptability of *VR-JIT* was measured quantitatively using an adapted version of the Treatment Acceptability Rating Form (Reimers & Wacker, 1988). The acceptability scale consisted of five items (e.g., *"Virtual interviewing was easy to do", "Virtual interviewing was enjoyable"*) rated on a 7-point Likert scale (e.g., 1=*extremely unenjoyable* to 7=*extremely enjoyable;* α=0.72. We measured resident-level *VR-JIT* usability quantitatively using an adapted version of the System Usability Scale (Brooke, 1986) consisting of four items (e.g., *"My instructor did a good job helping me learn how to use the virtual interviewing tool"*; *"I was able to use the virtual interview tool on my own"*). Item responses were on a 4-point Likert scale (e.g., 1=*Not at all true* to 4=*Very much*; α=0.68). Qualitatively, we assessed resident-level acceptability via two open-ended questions (e.g., *"What was your favorite thing about the VR-JIT?"*, *"What was your least favorite thing about VR-JIT?"*).

Objective 3c. Study Measures

To calculate implementation preparation costs, we collected two measures: participant salary (Table 1) and participant time spent on specific implementation preparation activities

(enumerated in Table 2). Participants reported the amount of time spent on each activity via a monthly self-report. Prior to data collection, the list of activities was adapted from prior research evaluating implementation preparation activities of VR-JIT at a community mental health agency (Smith, Graham et al., 2020). Prison staff reviewed the existing activities and identified which activities were relevant and added new activities specific to the prison setting. Then the research team finalized the activity list. One example of a listed activity was prison staff needed to complete an orientation on how to use VR-JIT, how to instruct participants to use VR-JIT, and a review of best practices. Another example is that prison information technology (IT) staff needed to prepare computing devices so that they could safely be used within the prison.

Objective 1. Data Analyses

We analyzed the study data using an intention-to-treat approach. Independent sample *t* tests and Chi-square analyses evaluated whether there were between-group differences at baseline related to background characteristics. We used descriptive statistics to evaluate *VR-JIT* engagement (i.e., total completed virtual interviews, total minutes engaged with virtual interviews, total minutes engaged with e-learning). *VR-JIT* performance was measured as the mean (SD) of the virtual interview scores.

First, we conducted unadjusted Chi-square and t-test analyses to evaluate the two employment outcomes (i.e., obtaining employment and time-to-employment) and recidivism. Subsequently, we conducted fully specified multivariable logistic regression and Cox proportional hazards models to evaluate whether VV+*VR-JIT* resulted in a greater likelihood of employment and shorter time to employment during the six-month follow-up period. The proportional hazards assumption was evaluated by using a group-by-time interaction term and visual inspection of log minus log function plotted against time. The intention-to-treat analyses of the primary outcomes were conducted while adjusting for covariates known to influence employment among returning citizens. Of note, the very low recidivism rates did not produce the statistical power required to conduct a logistic regression.

Specifically, the covariates included the following variables given their known associations with employment: educational attainment (coded as 0=high school graduate/GED equivalent or less than high school graduate and 1=post-secondary education [any type]) (Lockwood et al. 2016), racial minorities (recoded as 0=White and 1=Black, Indigenous, and other Persons of Color [BIPOC]) (Decker et al. 2015; Holzer et al. 2006), presence of a disability or psychiatric disorder (coded as 0=no, 1=yes) (United States Bureau of Labor Statistics, 2024; McAlpine & Alang, 2021), prior job interview role-play training (Speas, 1979), number of times in jail or prison (Leasure & Kaminski, 2020), and psychological distress (Turney et al., 2013). We also included site (to account for site-level variations in service-as-usual) and year of release as covariates—the latter to account for fluctuations in local economies in years surrounding the Covid-19 pandemic (Cook et al., 2006). In addition, we included the receipt of a job offer by baseline as a fixed-effect covariate as this could have biased participant engagement in VV alone or VV+*VR-JIT* with unintentional effects on study outcomes.

Mixed-effects linear regression models with random intercepts and an AR[1] autocorrelation structure (Feingold, 2013) were used to test the secondary hypotheses that VV+*VR-JIT* would lead to greater improvements in interview skills, interview anxiety, and

interview motivation over time by modeling the effects of the group-by-time interaction. The intention-to-treat analyses of secondary outcomes were conducted adjusting for the same covariates as in the primary outcome analyses. Primary and secondary effectiveness outcomes were evaluated using one-tailed tests given the previously demonstrated effectiveness of *VR-JIT* at improving these outcomes in prior RCTs (e.g., Smith et al., 2015; 2021; 2022; 2023).

Missing Data and Outliers

Data were reviewed and a single value was missing at the item level for one participant at pre-test and one participant at post-test for self-reported job interview skills. There were missing values from 10 participants (9.9%) for their assessments of job interview preparation (i.e., role-plays completed with staff and peers, hours of job interview didactics) within services as usual, with one participant reporting an outlier of 50 hours of job interview didactics. We imputed the missing data using a multiple imputation approach. Nine participants did not complete post-test due to unanticipated early release (n=3), the Covid-19 pandemic lockdown (n=5), or declining to participate (n=1). By using the interquartile range method (Ghasemi & Zahediasl, 2012), outliers were observed for the job interview role-play data (n=1; and n=1 participant's data excluded due to poor actor fidelity during role-play), interview anxiety data (n=2), and motivation data (n=2). Winsorized weighted outlier replacement resulted in similar results to those of analyses with trimmed outliers; thus, we opted for the latter approach, and the data for those particular variables were excluded from the analysis.

Objective 3a-3b Data Analyses

The qualitative and quantitative data were analyzed separately using an embedded approach for the purpose of expansion. For the quantitative data, descriptive and summary statistics (i.e., mean, standard deviation, range) were calculated across all measures: i.e., pre-implementation *VR-JIT* acceptability (administrators, instructors); acceptability of *VR-JIT* delivery training and orientation (administrators, instructors); *VR-JIT* appropriateness and expected delivery feasibility (administrators, instructors); post-implementation *VR-JIT* feasibility and sustainability (administrators, instructors), acceptability (administrators, instructors, residents), and usability (residents only). A paired-sample t-test was calculated between the pre- and post-implementation delivery measures (administrators, instructors). All statistical analyses were conducted in *R* (R Core Team, 2021).

Qualitative, semi-structured interview data from administrators and instructors were transcribed in preparation for data analysis. We analyzed data iteratively using Framework Analysis (Srivastava & Thomas, 2009; Warner et al., 2018) via the updated CFIR (Damschroder et al., 2022) to code barriers and facilitators to implementing *VR-JIT*. All transcripts were coded using Nvivo version 14 (Lumivero, 2023). To facilitate comparison, a matrix of themes was developed: participant type (x-axis) vs. barriers and facilitators (y-axis). Matrices identify y-axis themes common to all groups and features specific to particular subgroups, should they be present in the data (Gale et al., 2013). Thematic analysis was conducted with the responses to the two open-ended survey questions from the residents (Nowell et al., 2017).

The qualitative coding team consisted of four individuals with variable expertise in implementation science, *VR-JIT* program delivery, working in correctional facility settings, and qualitative research. Coding training occurred in May 2024 and was provided by author JLM, who has extensive qualitative research experience and conducting framework analysis using CFIR. Each transcript was coded by the full team and consensus was achieved for each code. If the team could not agree on a code, the senior implementation scientist was consulted to adjudicate. Counts of the number of determinants identified by domain and their valence (i.e., barrier, facilitator, both, neither) as well as the coverage across all possible constructs were calculated.

Objective 3c. Data Analyses

For our analysis, we used a cost calculator approach and utilized Microsoft Excel calculation commands to sum the total hours and compute the cost per activity (Sullivan et al., 2014). We calculated labor costs using each participant's per-hour salary rate and the time spent on each implementation preparation activity. We estimated labor costs by multiplying the time spent on each activity by the per-hour salary of each participant (e.g., prison information IT specialist). Once calculated, the activities and their labor costs were sorted by activity type: meetings and correspondence, VR-JIT technology setup, materials to deliver VR-JIT, and orientation and training.

To calculate replication costs, the external scientific partner (i.e., the Michigan University research team) generated replication estimates based on their experience preparing the prison sites for VR-JIT implementation and previous implementation preparation expertise. Notably, time spent on activities focused on preparing the aforementioned RCT was excluded as these costs were unrelated to the VR-JIT implementation preparation activities.

Uncertainty analysis. To provide prison administrators (or budget holders) more confidence in the estimated costs, the external scientific partner also generated reasonable effort ranges to replicate each implementation preparation activity. To generate replication efforts, the Principal Investigator and research coordinator met and discussed how much effort would be required to replicate the implementation preparation activities in new settings, given that efforts from the existing study may optimize the efficiency of future implementation efforts. These values were then used to conduct a sensitivity analysis and expected cost range for each activity (Sullivan et al., 2014).

Objective 1a. Results

Participant Characteristics and VR-JIT Engagement

Table 3 displays the background characteristics for the sample who were randomized to VV+*VR-JIT* (*n*=66) or VV only (*n*=35). Enrollment occurred from September 2019 through September 2023, with six-month follow-ups completed by July 2024. Due to the Covid-19 pandemic, remote participant recruitment and data collection occurred at one prison from July 2021 through September 2023; and from March 2020 to May 2022 at the other site, after which in-person recruitment and data collection resumed until September 2023. Table 4 displays their participation in VV services as usual and the descriptive statistics of participant engagement with *VR-JIT*.

Primary Outcomes

We observed that 82.3% of the VV+*VR-JIT* group obtained employment prior to completing six-month follow-up, while 73.5% of the VV group obtained employment (χ^2 [1]=1.0, p=.15). Table 5 displays the fully specified multivariable logistic regression (χ^2 [11]=23.24, p=.016; Nagelkerke R^2=.34; Harrell's concordance statistic (C-statistic) = .82) revealing that VV+*VR-JIT* had better odds of obtaining a competitive job within six months compared to the VV group (OR=3.76, p=.032), after covarying for education, racial/ethnic minority status, the presence of a disability/mental health diagnosis, release year, study site, number of times in jail or prison, psychological distress, and pre-test interview skill.

We observed that VV + *VR-JIT* (M=72.7 SD=66.4) required 14 fewer days until obtaining employment (or censored timepoint of 182 days post-release) as compared to the VV only group (M=86.0 SD=72.8) (t [94]=1.0, p=.17). Table 6 displays the fully specified multivariable Cox proportional hazards model that adjusted for the same variables as the above logistic regression, indicating that the VV+*VR-JIT* group had a better hazards ratio of obtaining employment (Figure 3) as compared with the VV group (HR=1.62; p=.037). The recidivism (re-arrest) rate by six-month follow-up did not statistically significantly differ between groups as 0.0% (n=0) of the VV only group recidivated compared to 3.1% of the VV + *VR-JIT* (n=2) group (χ^2 [1]=1.09, p=.30).

Secondary Outcomes

Longitudinal intention-to-treat analyses of secondary outcomes are shown in Table 7, including estimated marginal means for each group at pre- and posttest, results of the mixed-effects regression models (that included the same covariates from the primary analyses—education, racial/ethnic minority status, disability or mental health diagnosis, year released, site, pre-release job offer, number of times in jail or prison, baseline job interview skills, number of job interview role plays during services-as-usual, baseline distress), and longitudinal effect sizes (d) (Feingold, 2013). Two models revealed significant group-by-time interactions that confirmed hypothesized greater improvements in job interview skills (estimate±SE=2.62±0.71, p<0.001, d=0.60) and job interview motivation (estimate±SE=1.53±0.83, p=0.035, d=0.23). The job interview anxiety model (estimate±SE=-3.97±2.39, p=0.050, d =-0.19) revealed a trend decline in the VV+*VR-JIT* group, compared with the VV group, while the self-reported job interview skills model did not reveal a significant group-by-time interaction. Supplemental Table 1 displays the as-treated results, where the only difference in the pattern of results is that there is a significant group-by-time interaction when analyzing job interview anxiety (estimate±SE= -4.75±2.46, p=0.028, d=-0.22) with VV+*VR-JIT* significantly reducing their interview anxiety as compared to the VV group.

Objectives 3a-3b Results

Vocational Village Administrators and Instructors

Administrator and Instructor Survey Results. During the implementation preparation phase, administrators and instructors rated their orientation on how to deliver VR-JIT was highly acceptable (M=31.2, SD=3.56), that VR-JIT was highly appropriate for their services (M=21.4, SD=3.36), and feasible to deliver (M=36.2, SD=3.77). Notably, their post-implementation ratings

(with different measures) indicated the VR-JIT intervention itself was highly acceptability (M=27.3, SD=2.33), highly appropriate (e.g., fit with resident's goals, M=4.67, SD=0.52), feasible (e.g., wasn't disruptive to services-as-usual, M=1.17, SD=0.41), and sustainable (M=11.8, SD=1.92; e.g., costs, time burden, availability of supervision and implementation support). These quantitative results indicate that instructors anticipated that VR-JIT would be acceptable, appropriate, and feasible, while the same implementers validated these views of VR-JIT at post-implementation.

Administrator and Instructor CFIR Results. Overall, 172 CFIR codes were used. These included 98 facilitators, 49 barriers, and 25 coded as neither or undetermined valence. The most frequently coded CFIR domain was Innovation (*n*=61), followed by Inner setting (*n*=53), Individuals (*n*=43), Process (*n*=27), and Outer Setting (*n*=6).

Innovation Domain. Six out of the eight constructs within the Innovation domain were coded (75% coverage). Residents mostly reported facilitators (*n*=43, 71%), including factors related to the design of *VR-JIT*, such as being able to repeat the interviews as many times as they liked; that they progressively became harder as they advanced; and that the facial expressions, tone, and reactions were realistic. One administrator reported, "[residents] were always intrigued and impressed with the program because they felt it was high-tech."

Administrators and instructors also mentioned *VR-JIT*'s ease of use, as well as positive outcomes perceived from residents using it. Both administrators and instructors indicated that it improved residents' confidence with interviewing, "I think the biggest thing that I saw to be the most beneficial was the confidence it built… It's a great tool, and to that degree, anytime we can put an effective tool in somebody's hands, it has the potential to change outcomes, and that's what this tool should be used for." Other noted facilitators included the tools' adaptability and individualization for each resident. "[*VR-JIT*] allowed the [instructor] to individually approach what would have been a large group task or a one-on-one task to be done at everybody's own pace. So, my [instructor] thoroughly enjoyed having the flexibility to walk around the room and give extra support where needed."

Administrators and instructors indicated that *VR-JIT* provided relative advantage to the typical way of teaching job interviewing skills in the Vocational Villages, which is conducting individual mock interviews to build skills and confidence. "Um, but, here, for example in general population, I am working with maybe two hundred people, our other career readiness instructor here at the facility has the other fourteen hundred…. It's absolutely impossible for him to sit down with each and every person and work on the skill and confidence." No staff discussed the costs associated with *VR-JIT* or the innovation source as determining factors for implementation.
Interviewees also highlighted areas of potential improvement for *VR-JIT*. These included design features such as allowing residents to provide novel answers as opposed to selecting from a list of pre-made answers. Another suggestion included expanding the tool to allow individuals of a variety of different trades to be asked targeted, experienced-based questions related to a given field. Another suggested adaptation to *VR-JIT* related to tailoring it for use among residents to help them prepare for difficult subject matter:

> As you deliver to offenders, knowing that this is a population that potentially could be served. Um, so, like, you pick a disability and, you know, where you can disclose a disability and have Molly [the virtual hiring manager] talk about it. It'd be nice if there was some place where you could indicate things that may come up that are touchy in interview.

Another instructor indicated that additional evaluative support for [residents] would be beneficial, such as helping with score interpretation and coaching them through which response led to their score on a particular question.

Inner Setting. Eight of the eleven Inner Setting constructs were coded (73% coverage). Facilitators included having available resources such as staff, equipment, time, and space, which promoted implementation of *VR-JIT*. Others indicated that relational connections and communication within Vocational Village staff teams were crucial for successful implementation within the correctional facility, "It's just like anything else in the correctional facility. You gotta let everybody know what's happening from the beginning so everyone's on the same page." Administrators and instructors indicated that *VR-JIT* was compatible with the structure of the Vocational Village, and that making *VR-JIT* a priority promoted its use.

Compared to facilitators, there were relatively more reported Inner Setting barriers (n=31, 58%). Many *VR-JIT* implementers reported barriers related to structural characteristics associated with implementing *VR-JIT* within the Vocational Villages that operate within a correctional facility. Things such as schedule interruptions related to custody, lock downs, and mobilizations (i.e., the process of assembling and deploying staff and resources in response to an emergency or crisis situation) were reported. "If there was any problem with the program at all, it was scheduling and working within the confines of the [correctional] facility in case we had a mobilization." Moreover, limitations to the number of residents allowed in one area as well as finding available physical space were reported, and that because residents often used *VR-JIT* in large classroom settings, that fewer residents used the microphone feature to verbally speak the answers to interviewer questions rather than selecting the option silently. Other barriers included limited resources such as not enough staffing and having laptops that did not work properly or had uncharged batteries. Instructors also faced barriers getting needed materials such as computer mice and technological equipment through security measures, which at times reportedly delayed or inhibited implementation. One administrator or instructor noted that lack of communication with the Warden and their staff made it challenging at times, and that more involvement and connections would have made implementation smoother. There were no coded segments related to mission alignment, incentive systems, or culture.

Outer Setting. The Outer Setting accounted for the fewest mentioned determinants. Only the critical incidents construct was coded (14% coverage); all six mentioned determinants were barriers related to interferences from Covid-19. As one administrator or instructor noted, "I didn't have a problem seeing the program run… It was just that we had so many things going on, and covid was an interference, and then staff gone due to illness or one thing or another."

Individuals. The Individuals domain included constructs related to capability, opportunity, and motivation of correctional facility staff and leadership (i.e., Wardens), the administrative leads of the Vocational Villages, instructors, and residents. Most of the Individual-level determinants

were coded as facilitators (*n*=29, 67%). Facilitators in this domain included favorable attitudes toward *VR-JIT* among MDOC staff and administrators. "I really like the tool. I think it is very beneficial, and I think it could help a lot of people." Also, staff felt that they had the capability of teaching and using *VR-JIT* with the residents as well as the opportunity to test its use to make sure they felt comfortable with it. Instructors noted that support and buy-in from leadership facilitated *VR-JIT's* use, "You know this is what is cool about MDOC leadership, they're forward in trying to think ahead and this was just going to be a neat tool that we could use to give those that have been justice-impacted or either returning citizens an opportunity to just get better at something." Administrators and instructors reported that residents could use tool on their own and that some residents acted as peer support and would help others who got stuck. Finally, staff noted that residents enjoyed using *VR-JIT*, and that they rarely needed encouragement to continue using it, "So, um, those were some of the, you know, things that they said about it. But, to have consistently positive things from a group such as these, is, um, doesn't happen often."

Individual-level barriers included capability issues among some residents who had not used a computer in quite some time and had difficulty with the technology of *VR-JIT* being implemented virtually. Additionally, given that computer mouses were often not allowed in the facility, that having to use the laptop trackpad was difficult for some residents. Opportunity barriers were reported, given that the residents had busy schedules or that behavioral issues led to disciplinary actions that at times caused attendance issues.

Process. The process domain captures methods used throughout the implementation process that either facilitate or hinder the use of *VR-JIT*. Most (*n*=17, 63%) were facilitators. Administrators and instructors indicated that the training and follow-up technical support they received from the research team for *VR-JIT* was thorough, and it promoted its use, "I think that was very beneficial being able to contact you if I had questions about [*VR-JIT*]." Others indicated that an additional half-day workshop that allowed staff to go over the program and try out all the equipment would be helpful.

Several instructors discussed adaptations or tailoring strategies for implementing *VR-JIT*. Instructors also indicated that they adapted their implementation of *VR-JIT* by staggering the number of residents using the program to two at a time to encourage use of the microphone speech feature. Another indicated that adjusting their schedule so that *VR-JIT* was the first thing the residents did before any other class was an effective way to incorporate it into routine practice. Another instructor suggested incentivizing use of *VR-JIT* among their residents or using other dissemination strategies such as handouts or demonstrations to increase a pull among residents and increasing engagement.

One administrator or instructor indicated that they used teaming strategies to reflect and evaluate on *VR-JIT* implementation. Another indicated that implementing *VR-JIT* in prison settings requires ongoing communication across different levels of the correctional facility to ensure a smooth implementation process.

Process challenges that came up included laptop batteries dying and needing to be charged early in the morning by staff and security settings on laptops making initiating *VR-JIT* burdensome.

Returning Citizens Survey Results. A total of 56 returning citizens completed the survey at the post-study assessment. Residents rated that *VR-JIT*, on average, was highly usable (*mean*=3.83, *SD*=.29, *max*=4.0) and highly acceptable (*mean*=6.32, *SD*=.65, *max*=7.0).

Returning Citizens Open-Ended Survey Questions. In response to the question, "what did you like most about *VR-JIT*", several residents reported that SIMantha (the virtual coach who provides immediate non-verbal feedback after answering a question) was their favorite part. They indicated that they liked how she had realistic expressions and provided immediate feedback. One resident noted, "…the way that whenever you would choose the choices and questions, [SIMantha] would tell you the negative and positives about why it was a good or bad answer. I really liked that about [*VR-JIT*]". Others indicated that they learned several new skills using *VR-JIT*:

> I still remember my first mock interview that I did. I never knew how to ask questions to the interviewer. That was the part that really helped me in the end. Don't do one-word answers, that still sticks with me… Even though I signed off, there's still certain things that stick with me, like asking questions other than how much money am I going to make, and not to give one-word answers.

Multiple residents also described how *VR-JIT* helped them overcome nervousness and build their confidence in job interviewing:

> [*VR-JIT*] helped me know what an employer was looking for, know what kind of questions to look forward to. I got more out of it. It's something that really prepared me for a job interview. I still get a little bit nervous but at the end of the day I know what an employer will ask me. I know the responses they're looking for.

Another resident noted, "I liked that it actually helped me. I had no experience prior to this, and I felt like I got some bounce in my step now. Thank you."

In response to the question, "what did you like least about *VR-JIT*", many residents indicated that the questions and available answers were repetitive and that the tool felt redundant and tedious over time. Others indicated some technical components went awry, such as accidentally clicking the wrong answer and not being able to go back; that the microphone didn't always pick up what they wanted to say; and that there was a lag between when the interviewer asked a question and when the response options were available.

Objective 3c. Results

Table 1 presents the input parameters for labor and non-labor costs. Total non-labor costs summed to $23,210. The total labor cost of implementation preparation for VR-JIT in two prisons was $17,694, based upon 284 total labor hours (Table 2). The estimated labor cost per prison was $8,847. When labor and non-labor costs were summed together, implementation preparation costs were $20,452 per prison. Over half (56.7%) were from non-labor costs $11,605. In Table 2, over half of labor hours (55.2%) were from meetings and correspondence for delivery planning, physical infrastructure to support VRJIT delivery, and preparations to purchase computers. The remaining labor hours were distributed across VR-JIT technology setup (20.5%), orientation and training (18.3%), and materials used to deliver VR-JIT (16.7%).

Table 2 displays all the implementation preparation activities grouped by category and includes the number of unique individuals in each activity, the total hours, the total labor costs, and the proportions of hours and costs accrued by the external scientific partner. The total hours recorded in Table 2 represents the total time spent on each activity and varied by staff member. For example, there were 26 total labor hours for the activity "Review VR-JIT Training Materials among the Michigan Department of Corrections (MDOC) staff"; however, this does not mean that the 5 staff members captured in this activity each spent 5.2 hours on this activity.

Table 9 displays the replication estimates and effort range for each implementation preparation activity. Overall, the estimated total labor replication cost for this study was $7,182 or $3,592 per prison (61% lower than the cost in the 2 prisons described above). We estimated the total cost of replicating the VR-JIT implementation preparation labor costs would range from $5,753 to $8,611, which is $2,877 to $4,306 per prison. Replication efforts are the amount of effort expected by future prison staff (outside of the context of a research study) to prepare a prison to implement VR-JIT (e.g., setting up physical infrastructure to use VR-JIT, updating computers to safely deliver VR-JIT). These cost estimates are based on replication efforts ranging from 5% to 100%, depending upon the task. For example, future correspondence regarding on-site technology setup support will likely consist of a lower effort in the future because the activities required for this task were unknown at the start of the study, and we have since developed a process that can be generalized (with minimal adaptation) to other prison settings. Additionally, the completion of VR-JIT orientation training among prison staff is expected to remain a high effort task because the training is standardized, and existing feedback did not suggest making adaptations to this process to shorten it. Notably, seven implementation preparation activities received an estimate of 0% because each activity was not an expected cost (i.e., no staff labor hours required) to implement VR-JIT in future prison settings. These costs were only attributed to preparing for the very first VR-JIT implementation in prisons. Figure 4 displays the estimated cost ranges per implementation preparation activity. These activities are ranked from highest to lowest range. For most activities, the cost range was within ±$100 of the base value. Most other activities ranged between ±$100 and ±$200. The activity with the widest range (meetings and correspondence among MDOC staff and MDOC IT) was estimated to cost between ±$314. The activities with the largest estimated ranges involved MDOC staff, including meetings and correspondence among MDOC staff and MDOC IT for VR-JIT setup (±$314), meetings and correspondence among the MDOC staff about the physical infrastructure to support VR-JIT delivery (±$202), reviewing VR-JIT training materials among the MDOC staff (±$171), and meetings and correspondence among the MDOC staff about delivery planning (±$170).

Discussion

Securing employment is a critical milestone for individuals reentering society following incarceration, as it significantly reduces the risk of recidivism and supports successful reintegration. However, a major obstacle for many returning citizens is the job interview process. Despite the proven overall effectiveness of Michigan Department of Correction's Vocational Villages—innovative prison-based trades-focused employment program (Smith et al., 2023; Washington, 2018)—the specific impact of standard job interview training within these settings had not been rigorously assessed, and the broader field of vocational rehabilitation has lacked evidence-based approaches to systematic job interview preparation.

In response to this gap, Virtual Reality Job Interview Training (VR-JIT) was developed as a scalable, technology-based solution by SIMmersion with the Principal Investigator (Matthew Smith), allowing returning citizens to practice interviews—including disclosure of prior convictions—and receive immediate, tailored feedback in a supportive, virtual environment (e.g., Bell & Weinstein, 2011; Smith et al., 2014). Our study evaluated VR-JIT's effectiveness and implementation alongside traditional services within the Vocational Villages. Despite recruitment challenges and a reduced sample size due to the COVID-19 pandemic, our results provide compelling evidence for VR-JIT's added benefit.

Specifically, the combination of Vocational Villages services plus VR-JIT (VV+VR-JIT) led to higher rates of competitive and integrated employment within six months post-release (80.6%) compared to the Villages' usual services alone (67.6%), closely mirroring results from previous pilot studies at these sites (Smith et al., 2023). Statistically, the odds of employment were significantly higher for the VV+VR-JIT group (OR = 3.23, p = .03), accounting for demographic, clinical, and justice-involved backgrounds and contextual factors such as baseline interview skills and prior job offers. Notably, VR-JIT participants also found jobs more quickly; the hazard ratio indicated a reduction in time-to-employment by approximately 23 days (HR = 1.79, p = .021). This effect remained even after adjusting for the robust context and support provided through the Vocational Villages themselves.

Not only did VR-JIT impact employment rates and speed, but it also boosted participants' job interview skills, motivation, and self-confidence, while reducing interview-related anxiety—an essential outcome given the well-documented stress associated with discussing prior convictions (Ricciardelli & Mooney, 2018). These benefits are consistent with VR-JIT's effectiveness in other populations, such as adults with serious mental illness (Smith et al., 2022). Furthermore, the qualitative implementation evaluation feedback underscored the value of VR-JIT, with users and staff praising features like realistic simulations, immediate feedback, progressive difficulty, and flexibility for repeated practice.

The study did, however, highlight several limitations. First, generalizability may be limited, as the Vocational Villages have unique selection criteria and support structures; most participants had served lengthy sentences and completed rigorous academic and behavior requirements. The control group—Villages services without VR-JIT—already performed at a high level, with employment rates in line with the Villages' internal data and exceeding national averages for similar programs (Cook et al., 2015). Second, traditional interview training was already integrated into Vocational Villages programming, limiting our ability to completely isolate VR-JIT's added impact. Third, a relatively low post-release survey response rate required reliance on administrative employment records for outcome analysis. Fourth, COVID-19 disruptions led to staffing shortages, implementation halts, retraining, and fewer participants than intended. Lastly, technological barriers—such as limited equipment, facility interruptions, and digital literacy challenges among participants—sometimes hindered full engagement with VR-JIT.

Despite these challenges, several factors facilitated successful implementation of VR-JIT. The platform's engaging, realistic, and adaptable simulations, as well as ongoing training and support for staff, promoted acceptance and use among both staff and returning citizens. Leadership buy-in and positive attitudes further bolstered implementation, echoing themes found in VR-JIT research across other populations (Blajeski et al., 2023; Sherwood et al., 2023). Still, barriers such

as technology access, staff capacity, and scheduling disruptions remain persistent concerns, both in correctional and community-based service settings.

Budget impact analysis suggests that VR-JIT can be a cost-effective addition to existing vocational services, with implementation preparation estimated at approximately $3,592 per prison for labor ($2,877–$4,306 range) to serve 100 returning citizens—about $359 per participant (Danielson et al., 2023), which is comparable to or lower than other educational and vocational interventions in corrections (Davis et al., 2013). Costs may decrease with experience, scale, or adoption of asynchronous/self-guided training, and may vary based on site-specific factors.

Implications for Practice and Future Research

These findings support the integration of VR-JIT as an effective, scalable enhancement to established employment readiness programs for returning citizens. Correctional administrators considering VR-JIT or similar innovations should prioritize comprehensive staff training, address technology access, and minimize schedule disruptions. Adapting content to further address issues unique to people with convictions (e.g., disclosing felonies) may also enhance relevance and impact. Policymakers and correctional leaders are encouraged to leverage the synergy of VR-JIT and in-person vocational services to boost employment outcomes and, ultimately, reduce recidivism.

Future research should test VR-JIT's implementation and effectiveness across a greater variety of correctional and community settings, including populations with shorter sentences and different backgrounds. Studies might also explore innovative, peer-led implementation models, drawing on evidence from peer-support approaches in mental health services (Üstel et al., 2021). Additionally, future work should extend cost analyses beyond preparation to full program sustainment, evaluate long-term employment and recidivism outcomes, and assess cost-effectiveness relative to alternative models.

Overall, this research demonstrates that VR-JIT is a promising tool for improving the employment prospects of returning citizens, especially when thoughtfully integrated into existing vocational rehabilitation frameworks. Addressing persistent barriers and capitalizing on identified facilitators can enhance its adoption and effectiveness, supporting the broader goal of successful reentry and societal reintegration.

Table 1.

Budget Impact Analysis Input Parameters

Variables	Input parameter	Median	Reference
Average salaries			
External scientific partner (*n*=5)[1]	$ 106,599[1]	$ 58,880	Actual salaries[2]
MDOC Leaders (*n*=3)	$ 160,650	$ 160,650	
MDOC Teachers (*n*=3)	$ 123,930	$ 123,930	
MDOC IT (*n*=3)	$ 142,290	$ 125,460	
Hardware			
Computers (*n*=14)	$1,000		
Headphones (*n*=14)	$15		
Software			
Software license (*n*=100)	$90[3]		

[1]This input parameter includes annual salary information from 5 members from the scientific partner. One team member, a doctoral student, was paid $16 an hour and did not have an annual salary measure.

[2]Salaries include fringe benefits and are based on 2021 salary estimates.

[3]Software costs reflect the publicly available cost listed on www.simmersion.com. The website notes group discounts are available.

Table 2.
Implementation Preparation Activity Labor Hours and Costs

	Total Number of Unique Staff	Total Hours	Proportion of Total Hours (%)	Proportion of Hours Accrued by the External Scientific Partner (%)	Total Labor Costs	Proportion of Costs Accrued by the External Scientific Partner (%)
Meetings and Correspondence						
Delivery Planning						
Meetings and correspondence among the implementation preparation support team members[1]	10	32.25	11.3	34.8	$ 2,011	34.3
Meetings and correspondence among the MDOC staff[2]	5	25	8.8	0	$ 1,701	0
Meetings and correspondence among the external scientific partner[3]	4	16.5	5.8	100	$ 665	100
Meetings and correspondence among MDOC staff and software team[4]	0	0	0	0	$ -	0
Physical infrastructure to support VR-JIT delivery						
Meetings and correspondence among the implementation preparation support team members[1]	4	22	7.7	68.1	$ 1,275	67.3
Meetings and correspondence among the MDOC staff[2]	6	18.3	6.4	0	$ 1,344	0
Meetings and correspondence among the external scientific partner[3]	5	14.75	5.2	100	$ 904	100
Preparing to purchase						
Meetings and correspondence among the implementation preparation support team[1] and software team[4]	6	16.75	5.9	85.0	$ 1,264	45.0
Meetings and correspondence among the MDOC staff[2]	0	0	0	0	$ -	0

Meetings and correspondence among the external scientific partner[3]	2	8.5	2.9	100	$ 727	100
Meetings and correspondence among the external scientific partner[3] and software team[4]	2	2.5	0.8	100	$ 224	100
VR-JIT Technology Setup: Time spent in meetings, corresponding, preparing computers, providing support						
Delivery planning						
Correspondence and on-site support among implementation preparation support team[1]	5	12.45	4.3	100	$ 1,098	100
Meetings among implementation preparation support team[1] and software team[4]	4	8	2.8	100	$ 580	100
Meetings and correspondence among MDOC staff[2] and MDOC IT staff	3	37.75	13.3	0	$2,523	0
Materials to deliver VR-JIT						
Delivery planning						
Review VR-JIT Training Materials among the MDOC staff[2]	5	26	9.1	0	$ 1,708	0
Developing, tailoring, reviewing, or printing materials (by external scientific partner[3]) to train MDOC staff[2] to deliver VR-JIT	4	21.5	7.5	100	$ 770	100
Orientation/training						
Delivery planning						
Training and monitoring of MDOC staff[2] to deliver VR-JIT by the implementation	4	7	2.4	100	$ 260	100

preparation support team members						
Complete VR-JIT orientation training among the MDOC staff[2]	4	4	1.4	0	$ 256	0
Prison orientation and prison security among the external scientific partner[3]	5	10.33	3.6	100	$ 380	100
Total	15	283.58	---	53.1	$17,690[5]	47.0
Labor costs per prison					$ 8,847	

Note. MDOC = Michigan Department of Corrections, UM = University of Michigan, IT = Information Technology, VR-JIT = Virtual Reality Job Interview Training.

[1] Implementation preparation support team includes the UM and the MDOC teams.

[2] MDOC staff include the MDOC leaders and teachers.

[3] External scientific partner is the UM team (Principal Investigator, graduate student, research coordinators, IT staff).

[4]Software team is SIMmersion and the MDOC IT staff.

[5]This number is 17,694 in our publication due to the representation of various cents on the dollar for other amounts in the column.

Table 3.
Background Characteristics of Study Sample

	VV Group (n = 35)	VV+ *VR-JIT* Group (n = 66)	Test Statistic (t or χ^2)	p
Mean Age (*SD*)	38.5 (8.9)	36.7 (9.7)	-0.9	.37
Race [a]				
White (%)	48.6	45.5		
Black/African American (%)	40.0	37.9		
Latinx (%)	4.5	5.7	8.2	.23
More than one race (%)	0.0	9.1		
Asian (%)	2.9	0.0		
American Indian/Alaskan Native (%)	2.9	0.0		
Other (%)	0.0	3.0		
Education				
Completed some high school (%)	5.7	1.5		
High school grad/GED equivalent (%)	42.9	57.6	4.0	.41
Some college (%)	20.0	18.2		
Technical school graduate (%)	20.0	18.2		
Associates degree (%)	11.4	4.5		
Prior employment (%)	94.3	87.9	1.1	.31
Mental health disorders or disabilities[b]				
No disorders or disabilities (%yes)	57.1	71.2	2.0	.15
Learning disability (% yes)	2.9	9.1	1.4	.24
Depressive disorder (% yes)	20.0	18.2	0.1	.82
Anxiety disorder (% yes)	25.7	22.7	0.1	.74
Posttraumatic stress disorder (% yes)	11.4	12.1	<0.1	.92
Bipolar disorder (% yes)	8.6	7.6	<0.1	.86
Schizophrenia (% yes)	2.1	1.5	0.2	.65
Psychological distress (*M*, *SD*)	2.2 (2.5)	2.3 (3.5)	0.1	.90
Criminal justice history				
Total arrest count (*M*, *SD*)	5.0 (4.1)	7.0 (5.4)	1.9	.06
Total years in prison or jail (*M*, *SD*)	12.2 (8.8)	9.4 (6.7)	1.8	.08
Primary offense was violent (%)	37.5	39.3	<0.1	.91
Risk for non-violent re-offense				
Low (%)	94.0	95.1	2.0	.36
Medium (%)	3.0	4.9		
High (%)	3.0	0.0		
Risk for violent re-offense				
Low (%)	31.6	17.1	1.8	.40
Medium (%)	47.4	63.4		
High (%)	21.1	19.5		

[a] Values will not sum to 100% due to multiple races or ethnicities selected.
[b] Values will not sum to 100% due to presence of multiple disabilities or disorders.

Table 4.
Vocational Village Services as Usual and VR-JIT Process Outcomes

	VV Group (n = 35)	VV+ *VR-JIT* Group (n = 66)	Test Statistic (t or χ^2)	p
Trade				
Automotive technology (%)	31.4	10.6	6.8	.009
Carpentry (%)	11.4	25.8	2.9	.09
CNC Machining (%)	20.0	22.7	0.1	.75
CDL/Forklift (%)	8.6	15.2	0.9	.35
Welding (%)	8.6	12.1	0.3	.59
Masonry/Concrete (%)	11.4	4.5	1.7	.20
Robotics/CNC (%)	8.6	7.6	<0.1	.86
Electrical (%)	2.9	6.1	0.5	.48
Food technology (%)	2.9	4.5	0.2	.68
Tree trimming (%)	0.0	3.0	1.1	.30
Plumbing (%)	0.0	1.5	0.5	.46
Completed at least 1 job interview role-play (staff or peer led) (%)	35.5	45.5	0.8	.38
# of job interview role plays with staff/peers (M(SD))	1.7 (3.4)	1.7 (3.1)	-0.1	.93
Hours of classroom job interview didactics (M(SD))	3.0 (4.9)	3.2 (5.1)	.21	.83

VR-JIT Engagement (n=58)	Minimum	Maximum	Mean	SD
Total number of completed virtual interviews	7	20	11.4	2.6
Completed 'easy' interviews[b]	3	5	3.4	0.6
Completed 'medium' interviews[b]	2	7	3.3	0.9
Completed 'hard' interviews[b]	0	12	4.6	2.3
Average Score (across all completed interviews)[c]	75.1	97.6	90.8	5.2
Total minutes engaged in e-learning	1.7	51.9	16.6	11.9
Total minutes engaged in virtual interviews	90.8	407.15	173.83	56.5

[a]Values will not sum to 100% due to participants working in multiple trades
[b]data not recorded for two participants
[c]data not recorded for four participants

Table 5.
Logistic regression results for obtaining new employment by 6-month follow-up, fully specified model (N=96[a])

Domain	Predictor variables	*OR*	95% CI[b]		*p*[b]
Study group	VV + VR-JIT (reference: VV)	3.76	1.17	--	0.032
Demographics	BIPOC (reference: White)	2.80	.63	12.37	0.176
	Any post-secondary education (reference: high school education or less)	4.03	.99	16.40	0.052
Clinical characteristics	Mental health or disability diagnosis (reference: none)	.22	.04	1.18	0.077
	Psychological distress	.90	.73	1.11	0.318
Justice history	Total times in prison or jail	.80	.66	0.96	0.015
Historical context	Release year (linear)	1.00	.52	1.89	0.990
Vocational village context	Medium security (reference: minimum security)	4.55	.97	21.24	0.054
	# of staff or peer job interview role plays completed	1.43	.97	2.09	0.068
	Baseline job interview skills	1.22	1.04	1.43	0.015
	Pre-release job offer (reference: no offer)	8.02	1.54	41.84	0.014

Model χ^2 (11) = 23.24, p =0.016; Nagelkerke R^2 = 0.34; Harrell's concordance statistic (C-statistic) = .82

OR = odds ratio; CI = confidence interval; BOPIC = Black, Indigenous, and other People of Color

[a]employment outcomes were missing for 5 participants (one still incarcerated, four released outside of Michigan and lost to follow-up.

[b]CI for directional intervention hypothesis only uses a lower limit confidence interval.

[c]One-sided *p*-value for directional intervention hypothesis, two-sided *p*-value for covariates/factors.

Table 6.
Cox proportional hazards model results for obtaining new employment by 6-month follow-up, fully specified model (N=96[a])

Domain	Predictor variables	*HR*	95% CI[b]		*P*[c]
Study group	VV + VR-JIT (vs. VV)	1.79	--	3.13	.021
Demographics	BIPOC	1.36	.81	2.28	.241
	Education	.74	.56	.97	.032
Clinical	Any disability/mental health diagnosis	.74	.41	1.34	.321
	Psychological distress	1.01	.93	1.08	.971
Justice history	Total arrest count	.94	.89	1.01	.066
Historical context	Release year (linear)	1.21	.96	1.53	.107
Vocational village context	Site	1.86	1.02	3.39	.044
	# of staff/peer job interview role plays	1.09	1.01	1.17	.028
	Baseline job interview skills	1.06	1.01	1.12	.035
	Pre-release job offer	1.96	1.09	3.52	.024

Model χ^2 (11) = 15.12, p =.172
[a]employment outcomes were missing for 5 participants (1 still incarcerated, 4 released outside of Michigan and lost to follow-up.
[b]CI for directional intervention hypothesis only uses a lower limit confidence interval.
[c]1-sided *p*-value for directional intervention hypothesis, 2-sided *p*-value for covariates/factors.

Table 7.
Mixed-effects linear regression models for secondary outcomes, fully specified models (N=92)

Outcome variable		Mean ±SD		Mixed-effects regression analysis			Longitudinal effect size
		Intervention	Control	Model Parameter	Estimate ±SE	p[b]	d
Job interview skills role-play performance[c]	Pre	27.67±0.59	28.80±0.80	Group	-3.75±1.42	0.009	
	Post	29.16±0.61	27.66±0.82	Time	-1.13±0.57	0.048	
				Group*time	2.62±0.71	<.001	.60
Job interview motivation	Pre	39.60±0.84	39.46±1.14	Group	-1.39±1.86	0.456	
	Post	41.00±0.85	39.33±1.16	Time	-0.13±0.67	0.846	
				Group*time	1.53±0.83	0.035	.23
Job interview anxiety	Pre	88.58±2.46	84.11±3.44	Group	8.44±5.47	0.125	
	Post	81.96±2.48	81.46±3.48	Time	-2.65±1.93	0.175	
				Group*time	-3.97±2.39	0.050	-.19
Job interview skills self-repor	Pre	45.70±0.93	46.62±1.30	Group	-1.55±2.47	0.531	
	Post	47.69±0.95	47.96±1.33	Time	1.34±1.07	0.212	
				Group*time	0.64±1.33	0.316	.10

Note. SD = standard deviation; SE = standard error; Group = VV + VR-JIT vs VV; Time = pre-test to post-test.
[a] n=9 participants did not complete post-test assessments.
[b]One-sided p-value for directional intervention by time hypotheses, two-sided p-value for main effects.
[c]Job interview skills sample had missing post-test data from four additional participants.
Note: model included the fully-specified covariates in the domains of demographics, clinical characteristics, justice history, historical context, and Vocational Village context.
d effect size = pooled standard deviation at follow-up/parameter estimate*(n timepoints-1)

Table 8.
Quantitative results of implementation process evaluation

Implementation Preparation MDOC Staff Surveys (n=5)	Mean	SD	Range (Min, Max)
VR-JIT Orientation Acceptability	31.2	3.56	28 to 35 (7, 35)
VR-JIT Appropriateness	21.4	3.36	18 to 25 (5, 25)
VR-JIT Expected Implementation Feasibility	36.2	3.77	32 to 40 (9, 45)
Post-Implementation MDOC Staff Surveys (n=6)			
VR-JIT Acceptability	22.8	2.04	21 to 25 (5, 25)
VR-JIT Appropriateness			
VR-JIT fit with resident's goals for job training?	4.67	0.52	4 to 5 (1, 5)
VR-JIT fit with goals and requirements of Vocational Villages?	4.67	0.52	4 to 5 (1, 5)
VR-JIT Feasibility			
VR-JIT disruptive to class routine	1.17	0.41	1 to 2 (1, 5)
VR-JIT implementation documentation has been challenging	1.83	0.75	1 to 3 (1, 5)
VR-JIT Sustainability (n=5)	11.8	1.92	10 to 15 (3, 15)
Post-Implementation Resident Surveys (n=56)			
VR-JIT Acceptability	31.59	3.23	7 to 35 (23, 35)
VR-JIT Usability	19.23	1.50	5 to 20 (11, 20)

Table 9.
Implementation preparation assumption estimates

Implementation Preparation Labor Costs	Estimate (%)	Effort Estimate Range (%)
Meetings and Correspondence		
Delivery Planning		
Meetings/correspondence among implementation support team[1]	25	20-30
Meetings/correspondence among MDOC staff[2]	40	30-50
Meetings/correspondence among external scientific partners[3]	15	10-20
Meetings/correspondence among MDOC staff and software development team[4] (SIMmersion)	0	0
Physical infrastructure to support VR-JIT delivery		
Meetings/correspondence among implementation support team	10	5-15
Meetings/correspondence among MDOC staff	70	55-85
Meetings/correspondence among external scientific partners	10	5-15
Preparing to purchase		
Meetings/correspondence among implementation support team and software development team (SIMmersion)	35	25-45
Meetings/correspondence among MDOC staff	0	0
Meetings/correspondence among external scientific partners	0	0
Meetings/correspondence among external scientific partners and software development team (SIMmersion)	0	0
VR-JIT Technology Setup: Time spent in meetings, corresponding, preparing computers, providing support		
Delivery planning		
Correspondence/on-site support for implementation support team	10	5-15
Meetings among implementation support team and software development team (SIMmersion)	50	40-60
Meetings/correspondence among MDOC staff and MDOC IT	85	70-100
Materials to deliver VR-JIT		
Delivery planning		
Review VR-JIT Training Materials among MDOC staff	90	80-100

Developing, tailoring, reviewing, or printing materials to train MDOC staff to deliver VR-JIT among external scientific partner	15	10-20
Orientation/training		
Delivery planning		
Training/monitoring of MDOC staff to deliver VR-JIT among the implementation support team members	90	80-100
Complete VR-JIT orientation training among the MDOC staff	90	80-100
Prison orientation and prison security for external scientific partner	0	0
Non-Labor Costs		
Computers	Required	-
Headphones	Required	-
Software license	Required	-

Note. MDOC = Michigan Department of Corrections, UM= University of Michigan, IT = Information Technology, VR-JIT = Virtual Reality Job Interview Training.

[1] Implementation support team includes the UM and the MDOC teams.

[2] MDOC staff include the MDOC leaders and teachers.

[3] External scientific partner is the UM team (Principal Investigator, graduate student, research coordinators, IT staff).

[4]Software team is SIMmersion and the MDOC IT staff

Figure 1. Interface for Virtual Reality Job Interview Training

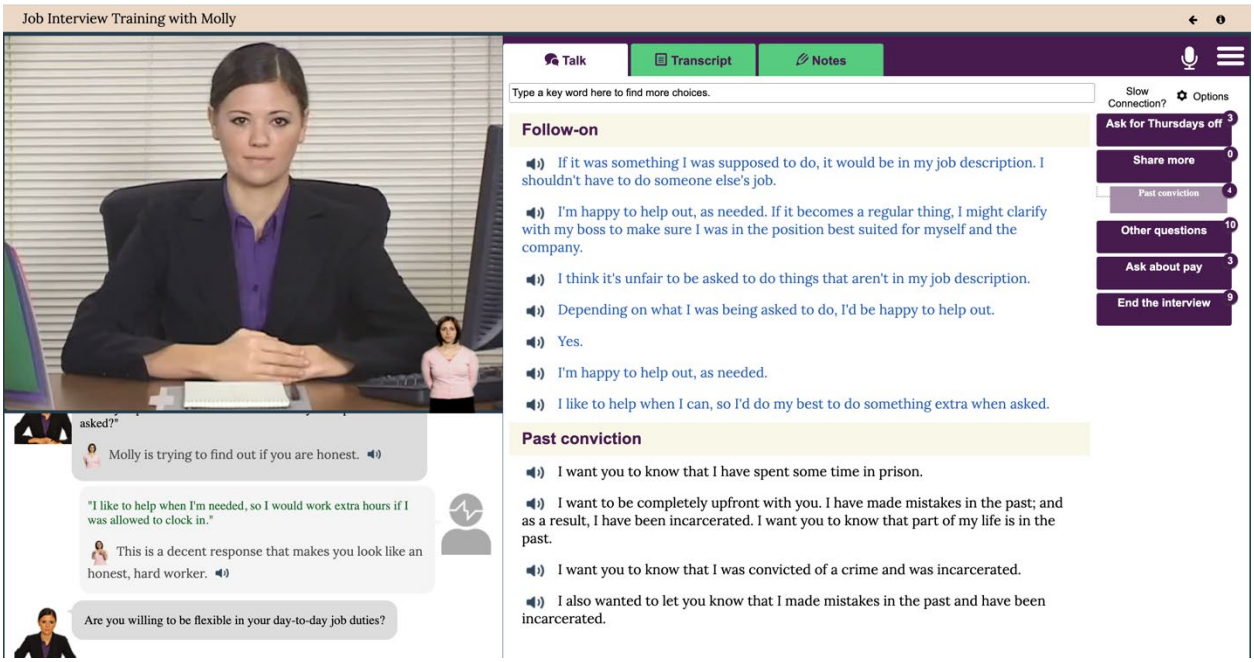
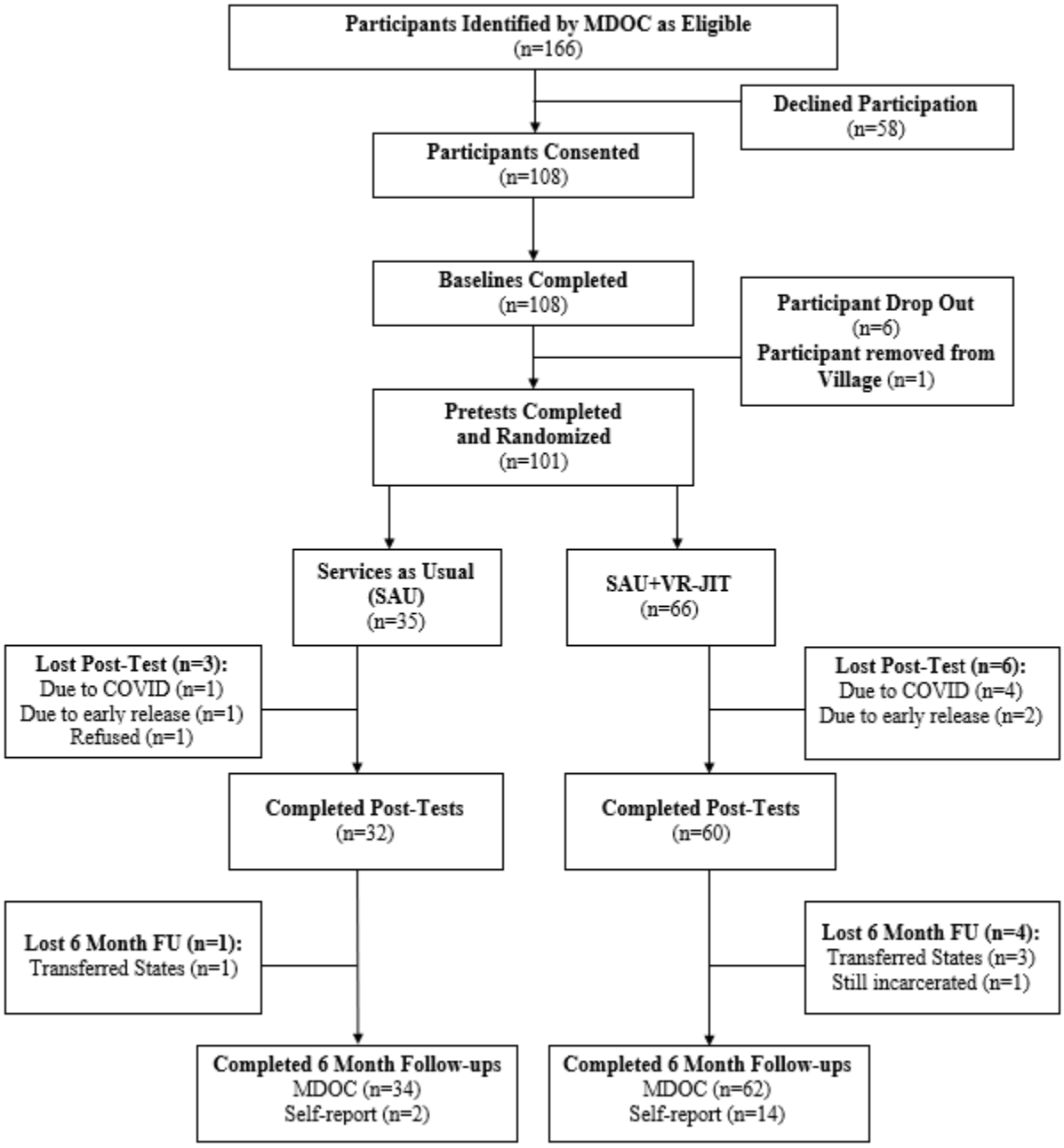
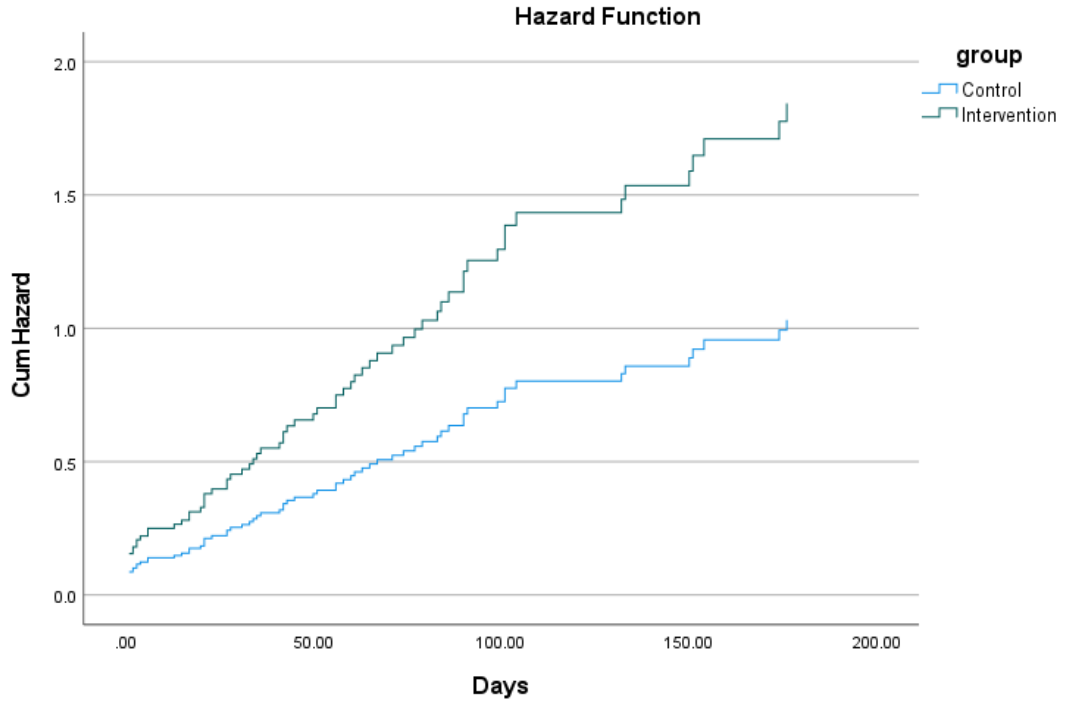


Figure 2. Consort Diagram



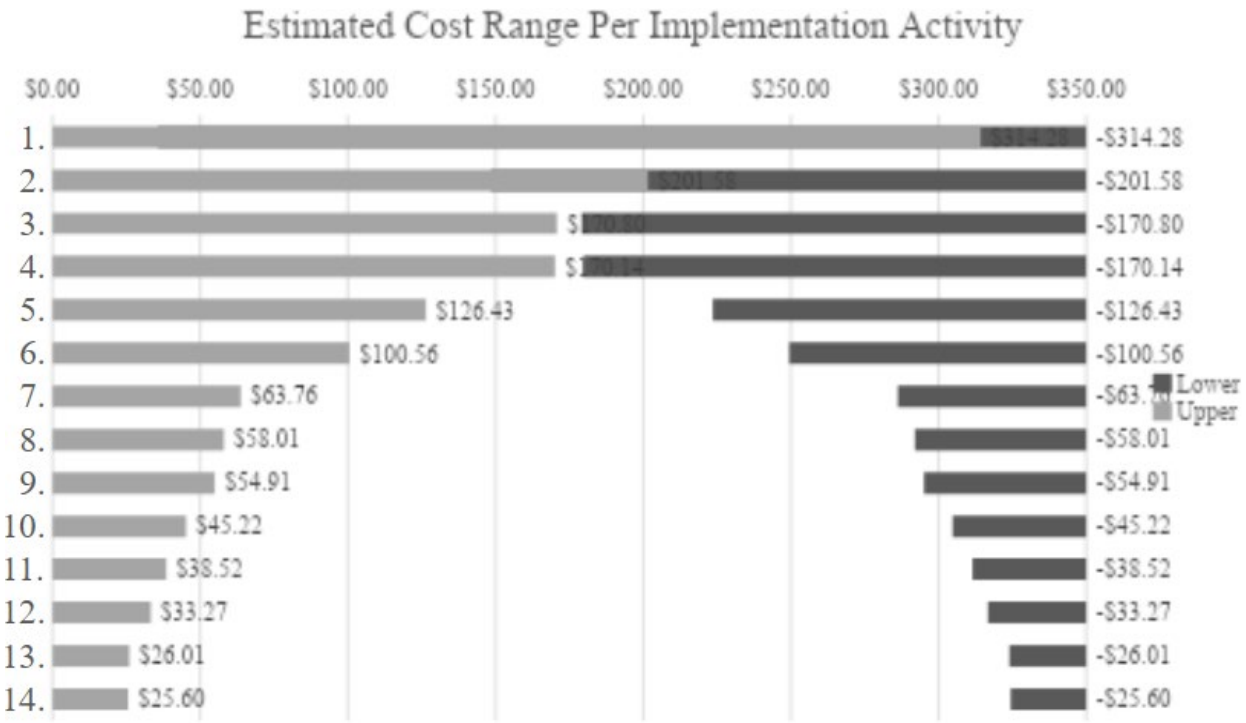
Note. Ns reported at 6 month follow-up may be larger than Ns reported at post-test as some participants were released prior to completion of post-test but either completed their follow-up data at the 6 month time point or their follow-up data was reported by their parole officer and entered into the MDOC database which was provided to the University of Michigan research team.

Figure 3. *Cumulative Hazard of Employment Across Time*[a] *By Intent-to-Treat Study Condition (N=96)*



[a]Days from release to employment. Data were right-censored after 6 months (182 days).

Figure 4.



Cost Range Order	Activity
1	Meetings and correspondence among MDOC staff and MDOC IT
2	Meetings and correspondence among the MDOC staff
3	Review VR-JIT Training Materials among the MDOC staff
4	Meetings and correspondence among the MDOC staff
5	Meetings and correspondence among the implementation support team and software development team (SIMmerson)
6	Meetings and correspondence among the implementation support team members for delivery planning
7	Meetings and correspondence among the implementation support team members for physical infrastructure to support VR-JIT delivery
8	Meetings among implementation support team and software development team (SIMmersion)
9	Correspondence and on-site support among implementation support team
10	Meetings and correspondence among the external scientific partner
11	Developing, tailoring, reviewing, or printing materials to train MDOC staff to deliver VR-JIT among the external scientific partner
12	Meetings and correspondence among the external scientific partner
13	Training and monitoring of MDOC staff to deliver VR-JIT among the implementation support team members
14	Complete VR-JIT orientation training among the MDOC staff

Supplemental Table 1.

Mixed-Effects Linear Regression Models (N=86[a]), as-treated models based on fully specified model.

Outcome variable		Mean ±SE		Mixed-effects regression analysis			Longitudinal effect size
		Intervention	Control	Model Parameter	Estimate ±SE	p^b	*d*
Job Interview Skills	Pre	27.57±0.64	28.72±0.83	Group	-3.51±1.46	.017	
	Post	28.81±0.66	27.58±0.84	Time	-1.13±0.55	.043	
				Group*time	2.37±0.71	<.001	.54
Job Interview Motivation	Pre	39.53±0.88	39.62±1.15	Group	-1.95±1.86	.296	
	Post	41.27±0.89	39.50±1.16	Time	-0.13±0.63	.840	
				Group*time	1.86±0.80	.012	.28
Job Interview Anxiety	Pre	88.86±2.61	83.60±3.45	Group	9.97±5.62	.078	
	Post	81.47±2.64	81.01±3.49	Time	-2.63±1.95	.181	
				Group*time	-4.75±2.46	.028	-.22
SR Job Interview Skills	Pre	45.14±1.00	46.68±1.32	Group	-3.13±2.48	.208	
	Post	47.94±1.02	48.16±1.34	Time	1.34±1.03	.194	
				Group*time	1.45±1.30	.133	.22

Note. SD = standard deviation; SE = standard error; Group = VV + *VR-JIT* vs VV; Time = pre-test to post-test; model included the fully specified covariates in the domains of demographics, clinical characteristics, justice history, historical context, and Vocational Village context; *d* effect size=pooled standard deviation at follow-up/parameter estimate*(n timepoints-1).

[a]n=6 participants randomized to *VR-JIT* did not use *VR-JIT* due to the COVID-19 pandemic; n=9 participants did not complete post-test assessments; [b]1-sided p-value for directional intervention by time hypotheses, 2-sided p-value for main effects; [c]Job interview skills sample had missing post-test data from 4 participants.

Supplemental Figure 1. Justice Involved Mock Interview Rating Scale (J-MIRS) Item: Discu
Prior Conviction

This category is the primary index of the participant's ability to effectively discuss prior conviction during a job interview. Consider whether the participant engages in a well-timed discussion that clearly addresses their previous convictions and *stipulations*. Higher scores w reflect confidence, self-reflection, and being straightforward. Participants will lose points for ineffectively articulating justice experience and inability to take responsibility for their involvement.

Note: Participants will NOT LOSE POINTS if they fail to discuss prior convictions but will b coded as missing. ****

Item 2 – Communication Skills (discuss prior conviction) –

Excellent	Average	Poor
• Takes ownership of record • Confident, straightforward • Frame going to prison as an opportunity to change • Provides examples on how they've changed	• Lacks confidence • Talks around issue without being direct • Example(s) of change lacks detail • Poor timing to disclose (interrupts interviewer)	• Refuses to discuss criminal history • Displaces blame • Overly detailed about offense or time in prison
Comments:		

5	4	3	2	1

Artifacts

Peer Reviewed Publications (Reverse Chronological Order)

1. Danielson E, Smith, M. J., Ross, B., Parham, B., Johnson, J. E., Cuddeback, G. S., Smith, J. D., McGregor, D., Suganuma, A., & Jordan N. (2023). Implementation preparation costs of virtual reality job interview training in prisons: A budget impact analysis. *Journal of Offender Rehabilitation, 62*(2), 81-97. https://doi.org/10.1080/10509674.2022.2160040

2. Smith, M. J., Parham, B., Mitchell, J., Blajeski, S., Harrington, M., Ross, B., Brydon, D. M., Johnson, J. E., Cuddeback, G. S., Smith, J. D., Bell, M. D., McGeorge, R., Kaminski, K., Suganuma, A., & Kubiak, S. (2023). Virtual reality job interview training for adults receiving prison-based employment services: A randomized controlled feasibility and initial effectiveness trial. *Criminal Justice and Behavior*, *50*(2), 272-293. https://doi.org/10.1177/00938548221081447

3. Smith, M. J., Mitchell, J. A., Blajeski, S., Parham, B., Harrington, M., Ross, B., Sinco, B., Brydon, D. M, Johnson, J. E., Cuddeback, G. S., Smith, J. D., Jordan, N., Bell, M. D., McGeorge, R., Kaminski, K., Suganuma, A., & Kubiak, S. P. (2020). Enhancing vocational training in corrections: A type 1 hybrid randomized controlled trial protocol for evaluating virtual reality job interview training among returning citizens preparing for community re-entry. *Contemporary Clinical Trials Communications*, *19,* 100604. https://doi.org/10.1016/j.conctc.2020.100604

4. Smith, M. J., Harrington, M., Ross, B., Quinn, C. R., Perez Musan, L., Brydon, D. M., Johnson, J. E., Cuddeback, G. S., Smith, J. D., Merle, J., Burke-Miller, J. K., Jordan, N. Bell, M. D., Friedman, B., Kryscio, P., Suganuma, A. (2025). A pragmatic randomized controlled trial of virtual reality job interview training in prison employment services. *Journal of Experimental Criminology*. https://doi.org/10.1007/s11292-025-09684-7

Scientific Manuscripts in Peer Review or in Preparation

5. Merle, J., Smith, M. J., Harrington, M., Ross, B., McClellan-Presgrove, J., Perez Musan, L., Quinn, C. R., Brydon, D. M., Johnson, J. E., Cuddeback, G. S., Bell, M. D., Friedman, B., Kryscio, P., Suganuma, A., & Smith, J. D. (in preparation). A mixed-method implementation process evaluation of *Virtual Reality Job Interview Training* for returning citizens engaged in a prison-based, trades-focused, employment readiness program.

Conference Symposia, Paper, Workshops and Roundtable (Reverse Chronological Order)

1. Smith, M. J., Harrington, M., Ross, B., Mitchell, J., Funcke, L., Brydon, D. M., Cuddeback, G. S., Bell, M. D., Kaminski, K., Kryscio, P., Seal, D., Friedman, B., Suganuma, A., & Smith, J. D. (2024, November). Evaluating the Effectiveness of Virtual Reality Job Interview Training in A Prison-Based Employment Readiness Program. In M. J. Smith (Chair), Leveraging Technology

to Enhance Employment Outcomes upon Re-Entry [Symposium]. American Society of Criminology, San Francisco, CA.

2. Smith, J. D., Merle, J., Harrington, M., Ross, B., McClellan-Presgrove, J., Funcke, L., Brydon, D. M., Johnson, J. E., Cuddeback, G. S., Bell, M. D., Kaminski, K., Kryscio, P., Seal, D., Friedman, B., Suganuma, A., & Smith, M. J. (2024, November). Using Implementation Science to Evaluate the Delivery of Virtual Reality Job Interview Training in A Prison-Based Employment Readiness Program. In M. J. Smith (Chair), Leveraging Technology to Enhance Employment Outcomes upon Re-Entry [Symposium]. American Society of Criminology, San Francisco, CA.

3. Danielson, E., Smith, M. J., Ross, B., Parham, B., Johnson, J. E., Cuddeback, G. S., Smith, J. D., McGregor, D., Suganuma, A., & Jordan N. (2024, November). Implementation preparation costs of virtual reality job interview training in prisons: A budget impact analysis. In M. J. Smith (Chair), Leveraging Technology to Enhance Employment Outcomes upon Re-Entry [Symposium]. American Society of Criminology, San Francisco, CA.

4. Smith, M. J., Harrington, M., Ross, B., Mitchell, J., Funcke, L., Brydon, D. M., Cuddeback, G. S., Bell, M. D., Kaminski, K., Kryscio, P., Seal, D., Friedman, B., Suganuma, A., & Smith, J. D. (2024, October). Leveling Up Employment Outcomes for Returning Citizens: Results of an RCT evaluating Virtual Reality Job Interview Training Delivered in a Pre-Release Trades Program. National Reentry Workforce Collaborative Annual Conference, Denver, CO.

5. Smith, M. J., Parham, B., Mitchell, J., Blajeski, S., Harrington, M., Ross, B.*, Brydon, D. M., Johnson, J. E., Cuddeback, G., Smith, J. D., Jordan, N., Bell, M. D., McGeorge, R., Kaminski, K., Suganuma, A, & Kubiak, S. P. (2021, August). Virtual reality job interview training for adults receiving prison-based employment services: A randomized controlled feasibility and initial effectiveness trial. Corrections Educational Association.

6. Smith, M. J. (2019, July). Virtual reality job interview training: supporting decarceration and reentry initiatives. Annual Meeting for the Correctional Education Association, Detroit, MI, United States.

Poster Presentations (Reverse Chronological Order)

1. Parham, B., Smith, M. J., Mitchell, J., Blajeski, S., Harrington, M., Ross, B., Brydon, D. M., Johnson, J. E., Cuddeback, G., Smith, J. D., Jordan, N., Bell, M. D., McGeorge, R., Kaminski, K., Suganuma, A., & Kubiak, S. P. (2021, January) Virtual reality job interview training reduces job interview anxiety in returning citizens: preliminary findings from a prison-based randomized Matthew J. Smith, Ph.D., MSW, MPE, LCSW 22 controlled trial [Poster presentation; virtual]. 26th Annual Society for Social Work and Research conference, Virtual Meeting.

Implementation Manual

1. Harrington, M., Sharma, A., Ross, B., & **Smith, M. J.** (2024, July). Virtual Reality Job Interview Training: An Intervention Manual for Correctional Settings. Level Up: Employment Skills Simulation Lab.

Data Sets Generated

Throughout our study we generated the following databases:

1. NIJ RCT Database (Quantitative/SPSS) - home to all of the study's RCT data.
2. RCT Participant Acceptability/Usability Quantitative Database (Quantitative/SPSS) - created in order to run analyses on participant acceptability and usability quantitative data.
3. RCT Participant Acceptability/Usability Database - created in order to run analyses on participant qualitative data.
4. Implementation Evaluation Database (Qualitative) - created in order to run analyses on prison staff implementation quantitative data.
5. Implementation Evaluation Database (Qualitative) - created in order to run qualitative analyses on prison staff implementation evaluation data.

Community Dissemination Activities via Presentation, Correspondence, etc.

1. 2024 Executive Summary: Leveling Up Vocational Villages with Virtual Reality Job Interview Training. (https://www.canva.com/design/DAGipX7mLaw/k2lPEN-npp7fnfIGJ4oBlw/view?utm_content=DAGipX7mLaw&utm_campaign=designshare&utm_medium=link2&utm_source=uniquelinks&utlId=h92379c616e)
2. Texas A & M University, Department of Psychiatry Grand Rounds, April 2025
3. Strategies to Overcome Obstacles and Avoid Recidivism Assist, March 2025
4. Federal Reserve Bank of Saint Louis, March 2025

5. Juvenile and Youth Services, Detroit, MI, March 2025
6. Growth Works, Western Wayne CMO, February 2025
7. Black Family Development, Inc., Detroit, MI, February 2025
8. Vera Institute, January 2025
9. Life-Line, Denver, CO, April 2024
10. MichiganWORKS!, Detroit, MI, April 2024
11. Center for Employment Opportunities, Detroit, MI, February 2024
12. MADE Institute, Flint, MI, October 2024
13. A Brighter Way, Ann Arbor, MI, April 2023
14. North Dakota Department of Corrections; May 2021
15. Harrington, M., Sharma, A., Ross, B., & Smith, M. J. (Forthcoming). Virtual Reality Job Interview Training: An Intervention Manual for Correctional Settings. Level Up: Employment Skills Simulation Lab.

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