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ORIGINAL ARTICLE



Feasibility, Appropriateness, and Willingness to Use Virtual Reality as an Adjunct to Counseling among Addictions Counselors

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ABSTRACT

Introduction: Research suggests that virtual reality (VR) experiences can be helpful as adjunctive tools in psychotherapy for some mental health conditions. VR is a computer-generated experience that produces a feeling of being immersed in a different environment. VR experiences could be useful in the treatment of substance use disorders, and several are currently being tested. However, few psychotherapists report using VR experiences in their practices, even when doing so is well-supported. Understanding key barriers and concerns about using VR among drug/alcohol counselors is important to ultimately encouraging adoption. **Methods:** Licensed counselors ($N=101$) who provide treatment to clients with substance use disorders were recruited via email Listservs, professional organizations, and social media. Participants viewed a 15-minute educational video about VR and then completed a survey of their views about using it with their clients. **Results:** Most clinicians (82%) believed they would be likely to use a VR experience in drug/alcohol counseling, and 81% believed it would be appropriate for most of their clients. A minority (19%) noted important concerns, including that their clients may be skeptical of it (15%), cost (14%), and space (10%). Those who had cost and space concerns were less likely to report high use intentions ($OR=0.29$ and $OR=0.31$, both $p < .05$, respectively). **Conclusions:** Findings suggest that addictions counselors are eager to use VR, but key barriers should be addressed. VR developers should incorporate features to encourage trust among users, design experiences for small spaces, and explore ways of supporting the purchase of VR systems for counselors.

KEYWORDS

Virtual reality; mHealth; substance use disorder; clinician; counselor

Introduction

Recent research suggests that virtual reality (VR) experiences can help those struggling with a variety of mental health conditions when used as an adjunctive tool in psychotherapy (Parsons & Rizzo, 2008; Riva et al., 2002, 2008; Rothbaum et al., 2010). VR refers to a computer-generated experience that gives users the feeling of being immersed in a new environment by mimicking how humans naturally orient, sense, and explore their environments (e.g., by providing stereoscopic vision, head movement/tracking, stereo sound) (Penn & Hout, 2018). In this way, VR provides a surrounding and vivid illusion of reality (Slater & Wilbur, 1997). Likely the most well-developed application of VR in psychotherapy involves using it to provide exposure to threatening stimuli in the treatment of specific phobias and other anxiety disorders (Kothgassner et al., 2019; Parsons & Rizzo, 2008; Powers & Emmelkamp, 2008). Traditionally, counselors have provided exposures by guiding patients through a variety of *in vivo* situations that resemble or approximate their fears. Using VR to conduct these exposures has a variety of key advantages, including depicting stimuli/situations that would otherwise be impractical, costly, or dangerous, increasing both therapist and patient control over those situations, and the ability to standardize techniques and content. Some

evidence suggests that patients may also prefer VR over *in vivo* exposures and may be less likely to drop out of VR-assisted treatment (Garcia-Palacios et al., 2001, 2007). Meta-analyses have also shown that VR-assisted therapies for anxiety disorders are at least as effective as traditional treatments (Kothgassner et al., 2019; Powers & Emmelkamp, 2008). These promising findings have spurred the development of similar VR-assisted therapies for other mental health conditions, including eating disorders, obesity, and others (Riva et al., 2002, 2008).

Research on adjunctive VR experiences for addictions is less developed, but programs in this area built to date rely on similar techniques and show some promise (Bordnick et al., 2012; Choi & Lee, 2015; Girard et al., 2009). It is well-established that, among those with substance use disorder (SUD) who are trying to change, exposure to cues and situations typically associated with use pose especially high risk for relapse (Fatseas et al., 2015; Stevenson et al., 2017). This cue- or situationally-based risk could be due to a variety of processes, such as social pressure (Drummond et al., 1995), cue reactivity (Carter & Tiffany, 1999), or low self-efficacy about controlling use (DiClemente, 1986). For this reason, counseling techniques that involve helping patients learn skills to manage cravings, assertively refuse using, and otherwise practice controlling drinking when in

high-risk situations are a core part of many approaches to treatment and intervention (Kadden, 1994; Marlatt, 1990; Witkiewitz et al., 2005). The few VR experiences developed explicitly to help individuals control their use to date have generally involved some degree of exposure, similar to those used in anxiety. Choi and Lee (2015), for example, created a VR experience that attempted to use conditioning to reduce craving for alcohol by presenting personal alcohol-related cues (e.g., a preferred drink), followed by aversive alcohol-related situations (e.g., being diagnosed with liver cancer, being dizzy/sick on the subway). Their research has shown that small groups of both heavy drinkers and those with alcohol dependence report lower levels of subjective craving after engaging with the experience (Choi & Lee, 2015; Lee et al., 2009). Girard and colleagues (2009) created an experience in which users are tasked with finding virtual cigarettes and crushing them as they explored a fantasy virtual environment. Participants with nicotine dependence who used this experience over four weekly sessions showed higher rates of abstinence than those receiving only psychosocial support. Bordnick and colleagues (2012) also created a VR experience that provides coping skills training for those with nicotine dependence by immersing users in situations that are high-risk for smoking (e.g., a party) and having a therapist help them identify specific triggers and discuss potential coping strategies. After 10 weeks, they found that both smoking rates and craving were lower among those who used both nicotine replacement therapy (NRT) and the VR experience for an hour a week, versus those who used NRT alone. As some of these experiences suggest, VR programs can go beyond simply giving users a realistic sense of presence in high-risk situations, and may also be an ideal tool to deliver other evidence-based techniques that can help users change their substance use by, for example, increasing the personal relevance of these techniques, their generalizability beyond treatment, or their overall impact on users. As Choi and colleagues' (2015) work suggests, one example could involve using VR to provide users with potent, personal feedback about the health consequences of their substance use, due to VR's capacity to instill users with a unique sense of embodiment, or an implicit sense that a virtual body depicted in VR is the user's actual body (Matamala-Gomez et al., 2019). Together, this body of research suggests that teams may soon develop VR experiences that prove to be beneficial in helping treat substance use disorders.

Although patients struggling with a variety of mental health conditions have shown high interest in using VR in psychotherapy (Botella et al., 2015; Garcia-Palacios et al., 2007; Nameth et al., 2021), even if such programs are effective, counselor-guided VR experiences will not benefit patients unless they are first adopted by counselors. Limited past research suggests that, despite the availability of effective VR programs for treating anxiety disorders, only 3% of practicing psychotherapists have reported using VR in their practices (Lindner et al., 2019; Segal et al., 2011). Studying perceptions of VR-assisted counseling among clinicians is essential to designing strategies for encouraging use that address important concerns and barriers and

effectively promote adoption. Few such studies have been conducted among clinicians providing mental health counseling to date. Kramer et al. (2010) conducted focus groups with clinicians treating posttraumatic stress disorder (PTSD) and found that among their top concerns were receiving appropriate training, securing the needed equipment, software, and support, and the potential that focusing on the VR experience may weaken from the therapeutic alliance. Segal et al. (2011) surveyed psychotherapists in general and similarly found that cost, technical difficulties, and training were among the top reservations about using VR. Rimer and colleagues (2021) echoed these results in a study of general clinicians, but added that enabling clinicians to experience VR themselves improved their overall attitudes toward it. Finally, findings from Lindner et al. (2019) contrast with these results, showing that their top concerns were whether VR was realistic enough to generalize to the real world and the quality of the software in general. It is also important to note that, across all of these studies, clinicians also highlighted unique strengths of using VR in psychotherapy, and most saw these strengths as either balancing or outweighing its drawbacks. To date, we are not aware of any studies exploring the perceptions of clinicians who provide drug/alcohol counseling, specifically. Exploring how the views of these clinicians may be similar/unique to others is important, given that drug/alcohol counselors often have a wider variety of training levels and experience than other areas of mental health, and practice in more varied settings (e.g., forensic, dedicated drug treatment centers).

Beyond these practical concerns, how a product is marketed to clinicians also plays an important role in their adoption of innovations (Lublóy, 2014; Manchanda & Honka, 2005). For better or worse, mental health clinicians often learn about treatment innovations through traditional dissemination channels, like professional conferences and scholarly journal articles (Gallo & Barlow, 2012), suggesting that the research outcomes of a given innovation are one important factor in clinicians' decision to explore new tools. When designing new digital health products (especially those that are primarily intended for clinicians' use), developers also need to plan studies to evaluate the efficacy of their products that are strong enough not only to satisfy regulators, but also effectively persuade clinicians that the product is helpful. Clinicians also have varying ideas about what constitutes "success" in treating SUD (Fleury et al., 2016; Kelly & Bergman, 2021; Witkiewitz et al., 2020), so understanding which research outcomes could persuade most clinicians to adopt VR in their practices would be valuable and would assist developers in planning research pipelines that incorporate the most compelling outcomes.

Given these needs, we surveyed the views of practicing drug/alcohol counselors about using VR as a tool in the counseling they provide. Similar to past studies, we anticipated that counselors would generally have positive views about VR, and that their willingness to use an effective VR experience if it were available would vary by age and their experience using other technologies in treatment. We also expected that their top reservations about it would be cost, training, and support, and that these factors would be associated with their

willingness to use VR. Finally, we anticipated that clinicians would be most likely to consider using a VR experience if research had shown that users had abstained from drug/alcohol use for significantly longer than those who had not.

Methods

Participants

Participants ($N=112$) were recruited from emails, listserv postings, and advertisements in newsletters maintained through professional and scientific organizations of drug/alcohol counselors, as well as social media posts and advertisements from February to July 2021. We selected this sample size because it would allow us to test whether specific demographic factors and barriers had medium-to-large associations ($f=0.25$) with VR use intentions in a multiple regression framework with at least 12 predictors, with power ≥ 0.8 and $\alpha=0.05$. Eligible participants were: (1) at least 18 years old, (2) able to read fluently in English, (3) licensed to provide counseling in the United States, (4) provided alcohol/drug counseling for at least 15% of their typical work week, and (5) had no experience using VR in their professional roles. Participants residing anywhere in the United States were eligible to participate.

Procedures

Participants were first screened for eligibility online. If eligible and interested, they were asked to provide informed consent and contact information before being re-directed to the main survey. Prior to responding to questions about VR, participants were first asked to watch a 15-minute video that provided basic information about VR. This video used the Oculus Quest 2[®] VR system to explain what VR does, how it works, how to set it up, how much it costs, and how it has been used in medical and mental health settings. One key reason we chose the Quest 2 for this introduction is that it is one of the only fully self-contained VR hardware systems that does not require other hardware (outside of the head-mounted display itself), active tethering to a computer, or use in a static play area, making it among the most portable and easy-to-use systems currently available. The video explained these features, as well as the process for setting up a “play area,” its recommended size, the Quest 2’s approach for preventing injury to users when they approach the edge of the play area, and other practical aspects of use. After 15 minutes had passed, the ‘next’ button displayed, and participants were able to move on. Participants were then asked to complete a 5-question quiz about the video’s content to ensure their understanding. Questions were presented in random order for each participant. Those who scored < 5 questions correct on this quiz the first time were given feedback and directed to try again. Participants who did not answer 5 questions correct on the second try were withdrawn from the study. After completing the quiz, participants were able to move on to answer questions about their views of using VR in drug/alcohol counseling. Participants who completed the full survey were provided with a \$20 gift card via

email. All procedures were reviewed and approved by the Brown University Institutional Review Board.

Measures

Description of hypothetical VR experience

Since few VR experiences have been marketed to help users with addictions in the US so far, participants were first asked to read a brief list of bullet-points describing the characteristics of a hypothetical VR experience that could be available in the future to guide their answers to the questions that followed. This list of characteristics mirrored many of the characteristics of well-designed, popular programs created for anxiety disorders (Meyerbröcker & Emmelkamp, 2010), and included that (1) the experience would be intended for use under the active guidance of the therapist (i.e., the client wears a headset while the therapist views what they are seeing on another screen and offers guidance periodically), (2) the therapist could control many of the parameters of the experience (e.g., the pace and “intensity” of high-risk situations), (3) it would take about 5 minutes to get clients set up in the VR system and oriented to the experience, (4) therapists could be trained to use the experience in as little as 30 minutes.

Feasibility, appropriateness, intentions to use

Single items assessing each of these constructs were drawn from past formative studies and recommendations (Birkhead et al., 2019). Intentions to use were assessed by asking “how likely do you think you would be to use a VR experience like this as a tool in your counseling practice?” rated on a 1 (*not at all*) to 5 (*very*) scale. Participants were also asked to estimate the percentage of clients they would offer such an experience to, if they were able to, as well as what percentage they thought might accept and use it. This item is another way to assess acceptability among counselors, given evidence that providers are more likely to adopt innovations that they believe would benefit their patients (Lee et al., 2003). Feasibility was assessed by asking “how feasible do you think it would be for you to use a VR experience like this in your counseling sessions, if you were able to?” rated on the same 5-point scale. Appropriateness was assessed by asking “how appropriate do you think a VR experience like this would be for them?” rated on the same 5-point scale.

Concerns about VR

Participants’ concerns about using VR in their drug/alcohol counseling were assessed by first asking “how would you rate your concerns about using VR in the drug/alcohol counseling that you do?” with response options *none at all* (1), *not any that would keep me from using it* (2), *yes, but mostly minor concerns* (3), and *yes, some that could keep me from using it* (4). Participants were then asked to pick from a list of possible concerns they may have about using VR from a list, group them into severe concerns and moderate concerns, and then rank them within each group, with their most important concerns first.

Hypothetical research outcomes

Next, we asked participants to rate the likelihood that they would use a VR experience with their clients if research had been published showing positive effects on various outcomes. On a scale of 1 (*not at all likely*) to 5 (*very likely*), participants rated the likelihood that they would use a VR experience with their clients if research had shown those who used it experienced five different outcomes versus those who did not: That it (1) reduced users' drug/alcohol use by a statistically significant amount, (2) reduced users' drug/alcohol use by at least 25%, (3) increased the length of time users successfully abstained from drug/alcohol use by a statistically significant amount, (4) decreased the number of drug/alcohol-related problems users experienced by a statistically significant amount, and (5) increased users' motivation to reduce their drug/alcohol use.

Data analysis plan

Only participants who provided complete data for the above survey items were included in these analyses ($N=101$). We first computed descriptive statistics for all demographic and professional characteristics. Next, we calculated basic summary statistics (overall M s and SD s) for items assessing use intentions, feasibility, and acceptability. To test whether intentions to use VR varied across various demographic or professional characteristics, we estimated an ordered logistic regression model, with participants' intentions ratings as an outcome, and each demographic/professional characteristic as predictors. We selected this approach after observing high negative skew in the outcome variable, with only a few/no responses in the lower categories. Next, we computed the percentage of participants who chose each concern and, among those who selected it, the average rank they assigned it among other concerns. To test whether those who selected specific concerns reported lower intentions to use, we estimated another ordered logistic regression model, again with use intentions as an outcome and factor variables indicating whether participants selected a given concern as predictors. Finally, we calculated summary statistics for participants' ratings of each hypothetical research outcome.

Results

Participant demographic characteristics are presented in Table 1, and participant professional characteristics are shown in Table 2. Eight participants (7%) did not complete the full survey, and three (3%) did not correctly answer the quiz assessing the content covered in the information video, resulting in a final analyzed sample of 101 participants.

Overall, participants reported that they would be likely to use a VR experience in drug/alcohol counseling with their clients ($M=4.23$, $SD=0.80$, Range = 2–5). Only 3% reported that they were “unlikely” to use VR. Participants also rated VR as appropriate for their drug/alcohol clients ($M=4.12$, $SD=0.70$, Range = 3–5), with 81% of participants rating it as “appropriate” or “very appropriate.” Participants provided lower average ratings of feasibility ($M=3.8$, $SD=1.04$, Range

Table 1. Demographic characteristics of participants ($N=101$).

| Characteristic | Mean (SD) or N (%) |
|---------------------------------------|---------------------|
| Age (Range: 25–76) | 45.5 (12.1) |
| Female gender ¹ | 79 (78.2) |
| Female assigned at birth ¹ | 79 (78.2) |
| Race | |
| White | 86 (85.2) |
| Black or African American | 10 (9.9) |
| Asian | 2 (2.0) |
| American Indian/Alaska Native | 0 (0.0) |
| Multiracial | 3 (3.0) |
| Ethnicity (Hispanic or Latino) | 2 (2.0) |
| Region of residence | |
| Northeast | 51 (50.5) |
| South | 36 (35.6) |
| Midwest | 6 (5.9) |
| West | 7 (6.9) |
| Education | |
| Some college | 1 (0.99) |
| Bachelor's degree | 22 (21.8) |
| Some grad school | 4 (4.0) |
| Master's degree | 62 (61.4) |
| Some doctoral work | 3 (3.0) |
| Doctorate degree (PhD, PsyD, DNP) | 8 (8.0) |
| Medical doctorate (MD, DO) | 1 (1.0) |
| Income (annual) | \$71,238 (\$23,615) |
| Employed full-time | 93 (92.1) |

Note.

¹All other participants reported male gender or sex assigned at birth, although other options were available for each characteristic.

= 1–5), with 16% reporting that VR was either “somewhat” or “very” unfeasible to use in drug/alcohol counseling. On average, participants reported that, if such a tool were available, they would offer it to 61.7% of their patients ($SD=27.8$), and that they believed an average of 62.4% of the patients they offered it to would actually try it. In the ordered logistic regression model, clinicians' intentions to use VR did not vary across any included demographic characteristic, except that participants with backgrounds in social work reported significantly lower likelihood of use, relative to participants with other training disciplines (see Table 3 for results).

Concerns and perceived barriers

The percentage of participants who selected various concerns and the average rank of selected concerns by severity level are presented in Table 4. Among concerns participants rated as most severe (i.e., those they believe may prevent them from actually using VR), the top three selected most often were that: (1) their clients wouldn't trust it, (2) cost, and (3) clients wouldn't like it. However, it is important to note that only 14% of participants selected the top concern, suggesting only a small portion of clinicians had severe concerns overall. The top three most highly ranked concerns (i.e., consistently ranked highest among those chosen) were: (1) time, (2) keeping the equipment clean, and (3) having sufficient space or room. Among the top three concerns participants rated as moderate (i.e., those they were concerned about, but that may not prevent them from using VR) were that: (1) it seemed like it could be awkward to use in-session, (2) clients may not like it or would refuse use, and (3) cost. The most highly rated, moderate concerns among those chosen were: (1) cost, (2) clients' potential refusal, and (3) not wanting to interrupt the “flow” of sessions. In an ordered logistic

Table 2. Professional characteristics of participants (N = 101).

| Characteristic | Mean (SD) or N (%) | Characteristic | Mean (SD) or N (%) |
|--|---------------------|--|--------------------|
| Education | | Primary work setting | |
| Some college | 1 (0.99) | Community hospital | 3 (3.0) |
| Bachelor's degree | 22 (21.8) | Academic hospital | 6 (5.9) |
| Some grad school | 4 (4.0) | VA/Military hospital | 4 (4.0) |
| Master's degree | 62 (61.4) | Outpatient mental health center | 14 (13.9) |
| Some doctoral work | 3 (3.0) | Inpatient mental health center | 3 (3.0) |
| Doctorate degree (PhD, PsyD, DNP) | 8 (8.0) | Outpatient addiction treatment center | 18 (17.8) |
| Medical doctorate (MD, DO) | 1 (1.0) | Inpatient addiction treatment center | 4 (4.0) |
| Income (annual) | \$71,238 (\$23,615) | Prison or detention center | 16 (15.8) |
| Employed full-time | 93 (92.1) | Community medical clinic/health center | 6 (5.9) |
| Professional discipline | | Private medical clinic/health center | 1 (1.0) |
| Psychologist | 6 (5.9) | Government/social service center | 2 (2.0) |
| Social worker | 25 (24.8) | K-12 school | 2 (2.0) |
| Substance abuse counselor | 48 (47.5) | Private practice | 19 (18.8) |
| Health educator | 2 (2.0) | Other | 3 (3.0) |
| Mental health counselor | 17 (16.8) | Primary counseling approach | |
| School counselor | 1 (1.0) | 12-step facilitation | 3 (3.0) |
| Physician (other than psychiatry) | 1 (1.0) | Cognitive-behavioral therapy | 14 (13.9) |
| Other | 1 (1.0) | Motivational interviewing | 48 (47.5) |
| Years of training in addictions counseling | 3.8 (2.0) | Acceptance and commitment therapy | 6 (5.9) |
| Years experience in addictions counseling | 10.9 (6.4) | Mindfulness-based relapse prevention | 3 (3.0) |
| Avg. # sessions w/ each addictions client | 14 (8.5) | Dialectical behavior therapy | 2 (2.0) |
| | | Narrative therapy | 3 (3.0) |
| | | Harm reduction | 2 (2.0) |
| | | Eclectic | 7 (6.9) |
| | | Other | 13 (12.9) |

Table 3. Ordered logistic regression of clinicians' ratings of their likelihood of using a VR experience in counseling with patients struggling with SUD by demographic/professional characteristics.

| Variable | OR | SE | p | 95% CI |
|---|-------------|-------------|-------------|------------------|
| Age | 1.04 | 0.03 | .115 | 0.99-1.11 |
| Years of training | 0.98 | 0.14 | .910 | 0.75-1.29 |
| Years of drug/alcohol counseling experience | 0.93 | 0.05 | .208 | 0.84-1.03 |
| Average # sessions w/ each client | 1.04 | 0.03 | .158 | 0.98-1.12 |
| Importance of evidence-based practice | 1.05 | 0.38 | .898 | 0.51-2.15 |
| Training discipline ¹ | | | | |
| Social work | 0.18 | 0.12 | .010 | 0.05-0.67 |
| Substance abuse counseling | 0.52 | 0.37 | .355 | 0.13-2.08 |
| Practice settings ¹ | | | | |
| Outpatient | 1.04 | 0.70 | .957 | 0.28-3.90 |
| Inpatient | 0.36 | 0.36 | .301 | 0.52-2.49 |
| Forensic | 0.52 | 0.44 | .442 | 0.10-2.76 |
| Private practice | 0.72 | 0.54 | .661 | 0.17-3.11 |

Note. Bolded values are $p < .05$.

¹All variables dummy-coded, comparing identified group versus all others.

regression model, those who selected two concerns were more likely to report lower ratings of intentions to use VR: (1) those who reported not having sufficient room/space, and (2) those who were concerned about the cost (see Table 5).

Hypothetical research outcomes

Participants rated the likelihood that they would use a VR experience in their drug/alcohol counseling highest if research on it showed that those who used the VR experience reduced their drug/alcohol use by a statistically significant amount, compared to those who had not ($M = 4.48$, $SD = 0.71$). The second-highest was research showing that those who used VR reported higher levels of motivation to change their drug/alcohol use ($M = 4.47$, $SD = 0.65$), followed by research showing that those who used VR abstained from drug/alcohol use significantly longer than those who did

Table 4. Counselors' concerns about using VR with patients in addictions counseling.

| Concern | Severe concerns | | Moderate concerns | |
|---|-----------------|-----------------------------|-------------------|-----------|
| | % Picked | Avg. rank ¹ (SD) | % Picked | Avg. rank |
| <i>Severe concerns</i> | | | | |
| I wouldn't have time | 4.0 | 1.3 (0.5) | 4.0 | 3.3 (1.5) |
| My clients wouldn't like it/would refuse | 11.9 | 1.8 (1.0) | 14.9 | 1.7 (0.7) |
| My clients wouldn't trust it | 13.9 | 1.9 (1.2) | 7.9 | 2.4 (1.1) |
| It seems like it would be awkward | 3.0 | 1.7 (0.6) | 18.8 | 1.9 (1.5) |
| Don't want to interrupt the normal "flow" of sessions | 5.9 | 2.0 (1.1) | 9.9 | 1.5 (1.6) |
| It could damage my rapport with clients | 7.9 | 2.4 (1.2) | 5.9 | 2.2 (1.5) |
| Don't think I could use it correctly | 9.9 | 2.0 (0.9) | 5.0 | 2.4 (1.1) |
| Don't think it would work for clients w/ disabilities | 10.9 | 2.3 (1.0) | 5.0 | 2.4 (1.5) |
| Don't have the space or room | 10.9 | 1.5 (1.2) | 9.9 | 2.0 (1.6) |
| Worried about clients' safety | 7.9 | 2.5 (1.1) | 10.9 | 1.8 (1.0) |
| Don't think it would help them | 1.0 | 5.0 (0.1) | 5.0 | 2.4 (0.5) |
| Costs too much | 12.9 | 1.7 (0.6) | 13.9 | 1.5 (0.8) |
| Couldn't keep the equipment clean | 3.0 | 1.3 (0.6) | 9.9 | 3.2 (2.2) |

Note.

¹With 1 (most important) and up to 13 (least important).

not ($M = 4.41$, $SD = 0.72$). It is important to note that 26-32% of participants rated their likelihood of using VR higher across all of these hypothetical research outcomes, when compared to their initial ratings, suggesting that conducting/reporting on research that focuses on any of these variables could be important to increasing adoption among a significant number of clinicians.

Discussion

In this study, we presented basic information about modern VR systems and how they are being used in mental health treatment to a sample of counselors who work with SUD clients and asked them about their views of potentially using

Table 5. Ordered logistic regression of clinicians' ratings of their likelihood of using a VR experience in counseling with patients struggling with SUD by whether they selected specific concerns.

| Variable | OR | SE | p | 95% CI |
|---|-------------|-------------|-------------|------------------|
| Wouldn't have time | 0.84 | 0.74 | .848 | 0.15-4.72 |
| Clients wouldn't like/would refuse | 1.29 | 0.70 | .645 | 0.44-3.74 |
| Clients wouldn't trust it/me | 0.37 | 0.25 | .142 | 0.10-1.40 |
| Using it could be awkward | 0.34 | 0.20 | .070 | 0.11-1.10 |
| Wouldn't want to interrupt "flow" of sessions | 0.82 | 0.55 | .769 | 0.22-3.08 |
| Could damage rapport with clients | 1.75 | 1.53 | .520 | 0.32-9.71 |
| Couldn't use it correctly | 1.92 | 1.59 | .429 | 0.38-9.70 |
| Wouldn't work w/ clients w/ disabilities | 0.43 | 0.29 | .209 | 0.12-1.60 |
| Don't have the space/room | 0.31 | 0.18 | .045 | 0.10-0.97 |
| Worried about clients' safety | 0.53 | 0.36 | .348 | 0.14-1.98 |
| Don't think it would help | 0.65 | 0.67 | .679 | 0.09-4.91 |
| Costs too much | 0.29 | 0.16 | .026 | 0.10-0.86 |
| Couldn't keep equipment clean | 0.50 | 0.34 | .305 | 0.13-1.88 |

Note. Bolded values are $p < .05$.

it in the drug/alcohol counseling they do, if a helpful VR experience were available. Consistent with past research with therapists and counselors working in other areas of mental health (Kramer et al., 2010; Schwartzman et al., 2012), results showed that the vast majority of drug/alcohol counselors would use VR experiences with their patients and believed such an experience would be appropriate for them. However, lower ratings of feasibility relative to studies in other areas of mental health (Rimer et al., 2021) suggest that drug/alcohol counselors may have unique practical concerns that could limit their use of VR as a counseling tool. Findings also showed that, if an effective adjunctive VR experience were available for those struggling with SUD, counselors believed that they would offer it to a majority, but not all, of their patients, possibly reflecting the reasonable view that VR may not be for everyone. Results also indicated that counselors believed that a majority of the patients they offered such a VR experience to, but not all, would use it. This potentially reflects a similarly practical view that not all SUD patients would feel comfortable or trust such an experience. Together, these findings suggest that, while there is enthusiasm about using VR as a tool in addictions counseling, future efforts to encourage use of these experiences should address counselors' practical concerns and provide them with information/training about which patients would benefit most from using it, as well as how to introduce patients to VR.

Findings about the specific concerns of counselors showed that the most commonly-selected severe concern was that clients may not trust the experience or would not like it/would refuse to use it. This concern may be unique to counselors who provide drug/alcohol treatment specifically, since previous research shows that those who use drugs often have lower levels of trust in others versus those who do not (Terracciano et al., 2008), and the immersive nature of VR often means that users are often isolated from other things happening in the room during use. The mix of these two factors may result in users with SUD feeling vulnerable or at least uncomfortable while using VR. Further, past studies of other anxiety and other mental health conditions has not identified patient refusal as a serious concern among counselors (Rimer et al., 2021; Segal et al., 2011), and

patients with anxiety disorders may prefer VR to *in vivo* treatment techniques (Garcia-Palacios et al., 2007). As such, to successfully reach and help users with SUD, those developing VR experiences for these patients should consider steps that could help encourage trust among users, such as incorporating specific features (e.g., allowing users of head-mounted display [HMD] systems to switch between the digital content and a camera view of the room by pressing a button, or using cave VR systems rather than HMDs to avoid blocking users' view of the room during use) or training counselors to introduce the experience to their clients in specific ways that encourage trust.

Consistent with other recent studies of therapists treating other mental health conditions (Schwartzman et al., 2012; Segal et al., 2011), cost was another concern that addictions counselors identified among their most severe reservations. Further, ordered logistic regression models showed that counselors who selected cost as a key concern were about 3.5 times less likely to report being interested in using VR than those who did not. Cost was only one of two concerns associated with a lower likelihood of VR use, suggesting that it may be among the most important barriers that could impact counselors' adoption of VR. It is also notable is that this was a common concern for a minority of clinicians despite using the Oculus Quest 2* as a key example of a modern VR system in the informational video, which retails for a dramatically lower price (\$299-399 US) than other all-in-one head-mounted display systems introduced over the last decade (which often costed over \$10,000 US). This suggests that those developing VR products should also consider ways of assisting counselors in pursuing support for purchasing VR systems, and would ideally plan their product's research pipeline to include conducting studies that could ultimately support coverage for VR-assisted counseling from payors.

Among other top "severe" concerns selected by counselors included reservations about whether they would have space or room to use VR with their clients in the settings they work in, and whether VR would be a good fit for their clients with disabilities. However, ordered regression models showed that only those who were concerned about not having space to use VR reported significantly less likely to use VR, while being concerned about VR's appropriateness for clients with disabilities were not. This pattern of results suggests that, while VR's accessibility for clients was a concern, barriers involving physical space may be more likely to limit VR's uptake among clinicians. It is important to note that counselors raised these concerns even though the informational video (a) explicitly noted that many modern HMD systems like the Quest 2 can be used in a user-defined play area of most any shape or size and as small as 6 ft. 5 in. by 6 ft. by 5 in. (which is smaller than most standard medical exam rooms) or in a stationary sitting position, and (b) showed examples of VR's various clinical applications that specifically emphasized its use for patients rehabilitating from medical events/accidents, since VR is quickly becoming a core tool for helping patients regain mobility, for example (Glegg et al., 2013, 2017; Glegg & Levac, 2018). Our results suggest that VR developers may need to design VR

experiences for SUD for use in even smaller spaces than the Quest 2's recommended minimum play area, or allow users to interact with the experience from the stationary sitting position. These findings also suggest that developers should consider the needs of users with disabilities when designing their experience, and speak to its accessibility in training materials developed for drug/alcohol counselors.

We also asked counselors about how likely they thought they would be to use a VR experience if research focused on its effectiveness in addressing various drug/alcohol outcomes were available. Participants provided the highest average ratings of their likelihood of using VR if research were available showing that clients using VR reduced their drug/alcohol use by a statistically significant amount, followed by research showing that using VR can increase clients' motivation to reduce their drug/alcohol use, and research showing longer rates of abstinence among VR users. Although the magnitude of differences in average likelihood ratings were very small across the three highest-rated outcomes (0.01-0.07, or 0.2-1.4% of the scale) and all other outcomes assessed (0.1-0.19, or 2-3.8% of the scale), 91-100% of counselors who initially reported being unlikely to use VR or neutral reported being likely or very likely to use VR if research assessing any of the outcomes assessed were available. These findings suggest that conducting and disseminating research testing the efficacy of digital health platforms like VR in changing virtually any relevant drug/alcohol outcome (e.g., substance use, abstinence, problems, motivation to change) could persuade a significant number of counselors to adopt it in their practices. Finally, findings from ordered logistic regression models suggested that social workers were less likely to report high intentions to use VR. Few studies have explored use of technologies like VR across different mental health disciplines, but it is possible social workers may be more skeptical of technology use in their practices and prefer to rely on verbal counseling. However, this explanation is speculative and further research is needed to test this hypothesis and confirm these findings.

Although this study is unique and has a number of important strengths, several limitations are also important to note. First, counselors were not sampled randomly, and were informed that the study was about the use of technology in addictions treatment before consenting to the study. As such, participants may have been more enthusiastic about technologies like VR than the average addictions counselor. It is also not clear how representative this sample was of the broader population of licensed counselors who treat addictions in the US. Relatedly, participants also overwhelmingly identified as female gender and White. Ratings may have been less supportive among a more diverse sample, or among a sample with different characteristics. Next, the overall sample size was modest and may not have been able to detect significant associations between some predictors with small-to-medium associations with use intentions. Finally, while no participants in this sample had used VR in counseling before, many could have been exposed to VR for entertainment purposes. However, we did not assess this factor, which could have been important in predicting willingness to use VR in treatment.

In summary, we found that the vast majority of clinicians believe they would be likely to use a VR experience in the counseling they do with drug/alcohol patients, and believe it would be appropriate for most of their patients. However, a minority also noted important concerns, such as the potential that their clients would be skeptical of it, cost, and having sufficient space, suggesting that the developers of these experiences should incorporate features to encourage trust among users, design experiences for small spaces, and explore ways of supporting the purchase of VR systems for counselors. Findings also highlighted the importance of conducting and disseminating research showing the benefits of VR for substance use outcomes to encouraging adoption among clinicians.

Author contributions

TBW and NNE conceptualized the project, chose methodology, and created the study surveys. TBW administered the project, secured resources/funding for it, collected the data, and wrote the original draft of the manuscript. NNE reviewed & edited drafts of the manuscript.

Disclosure of interest

The authors report no conflict of interest.

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