

**The Virtual Drug Dealer: A Longitudinal Qualitative Study of Patients' Experiences
with VR-CBT for Substance Use Disorder**

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Abstract

Background: Substance Use Disorders (SUDs) are severe health conditions affecting millions globally, leading to harmful neurocognitive, physical and social consequences. Despite the theoretical effectiveness of treatments like Cognitive Behavioural Therapy (CBT), challenges with cue exposure and skills training remain present, resulting in high relapse rates. Emerging evidence suggests that Virtual Reality (VR) could enhance SUD treatment by addressing these limitations.

Objective: This study explores patient experiences with VR-CBT for SUD treatment, focusing on its impact on treatment outcomes, patient reactions, and areas for improvement.

Results: Findings suggest that, according to patients, VR enhances the effectiveness of CBT by creating realistic, immersive environments for both cue exposure and skills training. Patients reported that VR-CBT effectively triggers cravings and allows for the practice of coping strategies, surpassing traditional CBT methods in engagement and effectiveness. However, patients identified areas for improvement, including the need for greater personalisation of VR scenarios to expand the immersion further.

Discussion: Integrating VR into CBT for SUDs shows promise in addressing key limitations of traditional CBT, particularly in exposure therapy and skills training. However, further refinement is needed to personalise the patient experience to individual needs.

Introduction

The Widespread Impact of Substance Use Disorders

Substance use disorders (SUDs) are severe conditions that affect many people (Swimmer & Sandelich, 2024). In recent years, SUDs have been increasingly prevalent. According to the National Survey on Drug Use and Health (NSDUH), 17.3% of people in the United States had a SUD in 2022, up from 14.5% in 2020 (NSDUH, 2022). The unsafe use of substances like tobacco and alcohol can cause severe neurocognitive impairments, mental and physical health risks, and disrupt education or work performance (Fadus et al., 2019; Taubin et al., 2023). As a result, SUDs in the United States often lead to diseases, unemployment, accidents and crimes, costing approximately \$500 billion annually (Garofoli, 2020). Therefore, it is crucial to provide appropriate and effective treatment to reduce the impact of SUDs and mitigate their widespread consequences.

Current Treatment Approaches and Challenges in Addressing SUDs

According to Pasareanu et al. (2015), proper treatment is capable of stabilising patients and reducing harm, resulting in an increased quality of life. This is accomplished utilising a variety of treatment methods, all hoping to reduce substance use and relapse risk (Caroll & Kiluk, 2017; Fadus et al., 2019). Common treatment methods include family-based therapy, cognitive behaviour therapy (CBT), contingency management and motivational interviewing (Fadus et al., 2019). Arguably, the most widely recognised form of treatment is CBT; a psychotherapeutic approach that focuses on the thought processes that cause the dysfunctional behaviour (An et al., 2017). CBT focuses on changing the thought patterns that cause the addictive behaviour, involving skills training to prevent relapse (An et al., 2017; Caroll & Kiluk, 2017; Fadus et al., 2019). These include social skills, craving management and distraction techniques, which make up the basis of the treatment (McHugh et al., 2010).

Although CBT has achieved considerable acclaim in controlled studies, its effectiveness in real-world clinical settings often falls short (McHugh et al., 2010). This results in clinical outcomes falling short of expectations (Olatunji & Hollon, 2010). Notably, the risk of relapse following CBT treatment remains a significant concern. Over 60% of patients relapse within the first year after completing therapy (Thaysen-Petersen et al., 2023). The less than optimal results raise questions about the practical application of CBT for substance abuse, despite its proven effectiveness in theory. The main goal of CBT for SUD – teaching patients skills to reduce substance use and maintain abstinence (McHugh et al., 2010; Nurlita et al., 2023) – appears difficult to achieve within a standard CBT session. This is mainly due to limitations in two key areas: exposure and skills training (Bouchard et al., 2017; Thaysen-Petersen et al., 2023).

The first reason for the suboptimal results of CBT for substance abuse in real-world settings is the limitations of cue exposure. Cue exposure involves presenting trigger-inducing stimuli (e.g., sight or smell of alcohol) to elicit cravings without requiring substance use (Byrne et al., 2019; Kiyak et al., 2023). Through exposure, patients learn to apply coping skills in real high-risk situations to reduce the risk of relapse (Rosenthal et al., 2022; Thaysen-Petersen et al., 2023). Unfortunately, using cue exposure for drug abuse in CBT is often challenging due to its limited availability in practice (Rosenthal et al., 2022; Thaysen-Petersen et al., 2023). The need to expose patients to real-life situations involving illegal substances, people (e.g., dealers), or environments is often impractical and unachievable. These limitations restrict CBT to mostly verbal or inadequate exposure sessions, which may not effectively address the context of SUDs. Consequently, this results in poor treatment outcomes and high relapse rates (Bouchard et al., 2017; Thaysen-Petersen et al., 2023).

The second reason are the limitations in skills and coping strategies training. Skills training is a core component of CBT, helping patients develop new skills to change their

thought processes and maintain the desired behaviour. Combining cue exposure with skills training allows patients to practice skills for managing relationship difficulties, building social support, and improving communication (McHugh et al., 2010). Additionally, patients practice coping strategies to, for example, refuse offers of alcohol or drugs in high-risk situations (Boness et al., 2024; McHugh et al., 2010). However, skills training in realistic situations during CBT remains challenging. Firstly, CBT may overlook personal circumstances that are important for developing the skills needed to prevent relapse (Hofmann et al., 2012; Marlatt & Donovan, 2005). Secondly, it is often not practical for SUD patients to practice skills and coping strategies in real-world situations. This restriction, similar to exposure therapy, results in insufficient skills training and difficulties applying techniques outside of therapy sessions (Miller & Rollnick, 2013).

Therefore, more opportunities for exposure and skill development may be necessary to fully realise the benefits of CBT in the therapy room. Current evidence suggests that Virtual Reality (VR) has the potential to provide these opportunities in CBT for treating SUD (Thaysen-Petersen et al., 2023).

Leveraging Virtual Reality to Improve SUD Treatment

VR creates computer-generated simulations focused on *presence* or *immersion* – a psychological state where virtual objects are perceived as real through auditory, visual and interactive stimuli (Thaysen-Petersen et al., 2023). This immersion helps patients respond to virtual scenarios as they would in real life, making VR a promising tool for improving SUD treatment (Lebiecka et al., 2021; Taubin et al., 2023; Worley, 2019). VR can address the key limitations of CBT by replicating real-life situations for more effective cue exposure, triggering craving responses without requiring unsafe environments (Amista, 2018; Kiyak et al., 2023; Taubin et al., 2023). Additionally, VR offers greater personalisation, allowing patients to practice skills like refusing substances in realistic yet safe settings (Amista et al.,

2018; Bouchard et al., 2017; Jeppesen et al., 2022). This strengthens coping strategies and reduces relapse risk (Bouchard et al., 2017; Rosenthal et al., 2022; Thaysen-Petersen et al., 2023).

Evidently, integrating VR into CBT (VR-CBT) offers a promising solution to the limitations in exposure and skills training in current treatment methods – key elements for successful CBT in SUD (Rosenthal et al., 2022).

Exploring Patient Experience and Usability in VR-CBT for SUD Treatment

Whilst VR-CBT shows great promise, its adoption for treating SUDs is still in early stages. This is partly due to not much research being conducted on the patient perspective and experience with VR-CBT. Optimising VR through improving user experience (UX) and usability in practice is crucial for several reasons. For example, the Technology & Acceptance Model (TAM), a theoretical model, explains that the perceived ease of use and usefulness indicates the user engagement with the technology (Marangunić & Granić, 2015). Empirical evidence shows this, indicating that positive VR experiences, such as increased motivation and satisfaction during skills training, enhance engagement and improve treatment outcomes (Freeman et al., 2017). Therefore, understanding and improving the user experience through patient feedback is crucial for optimising exposure and skills training in VR-CBT treatment for SUDs, as it helps refine VR applications to ensure they are engaging and effective for patients (Bouchard et al., 2017; Freeman et al., 2017).

This research serves as a pilot study to explore the patient experience of VR-CBT for SUD patients, identifying key elements that improve their treatment experience through the integration of two VR sessions. The study uses a qualitative, longitudinal design, conducting semi-structured interviews with patients at three different time periods. A longitudinal study design with three interviews provides valuable insights into patient experiences and changes over time, improving understanding of treatment effectiveness and usability (Smith et al.,

2009). To explore this, the following research question was formulated: “*How do Patients Experience the Integration of VR into CBT sessions for Substance Use Disorder?*”.

Additional sub-questions are as follows:

1. How do patients experience the effect of VR on their treatment for SUD?
2. What physical and psychological reactions do patients experience during VR-CBT sessions for SUD?
3. What are points of improvement for VR-CBT according to patients?

Methods

Setting and Protocol

This study was conducted in the Addiction Psychiatry department Zwolle and Deventer of the Dimence Groep. The Addiction Psychiatry department in Zwolle and Deventer is an outpatient clinic for adults with substance abuse or dual diagnosis problems. The clinic offers diagnostic evaluations and treatment for psychiatric and substance use disorders. Their CBT-centered treatment addresses SUDs in adults, including drugs, alcohol, and tobacco. For this study, Dimence Groep created a pilot study where two VR-sessions were integrated into the existing CBT treatment program for patients with SUDs. The primary purpose of the VR-sessions was to practice coping skills through exposure to triggering scenarios. Understanding tension, cravings, and other physical sensations can create effective opportunities for patients to practice their skills and coping strategies.

The VR-CBT sessions used CleVR, an evidence-based software for designing and developing virtual environments (CleVR, n.a.). CleVR develops dynamic and interactive virtual environments that respond to patient behaviour. In these environments, patients can role-play various situations safely in the therapy room. The patient’s behaviour determines the events that occur within the virtual world. For example, correct behaviour triggers different responses than incorrect behaviour, ensuring that nothing is scripted. Each VR

experience is therefore unique. Additionally, therapists continuously monitor sessions and respond in real-time, providing constant support and guidance to the patient (CleVR, n.a.).

The images below illustrate these virtual environments.

Figure 1

A CleVR environment depicting a household confrontation.



Figure 2

A CleVR environment set on a public street with multiple character interaction.



Figure 3

Image showing a VR-CBT session in practice.



The VR-CBT treatment at Dimence Groep involved two VR-sessions one week apart. Some sessions were spaced up to two weeks apart, depending on patient availability. Each session lasted 60 minutes, allowing patients a maximum of 20 continuous minutes with the VR headset, followed by a five minute break. After the break, patients could wear the VR headset for another 20 minutes, allowing them to practice two role-play scenarios per session. Before starting the first session, the therapist briefly introduced the VR equipment to the patient. Patients then wore the headset and spent around five minutes in an empty virtual environment to get acquainted with the controls. Written consent and safety agreements, such as stopping if feeling dizzy, were established before beginning the session. In each of the two VR-sessions, patients could choose two out of four available role-play scenarios, called templates. Each template represents a high-risk situation for substance abuse in a virtual environment. The four available templates were set in a supermarket, shopping district, park and a home. Once the template started, tension was gradually built by having the

participant engage and interact with the environment displaying a triggering scenario.

Furthermore, the therapist was able to further customise the templates during the sessions.

The therapist asked the patient about factors that increased or decreased risk, such as crowd density, sounds, spoken phrases, substances, and character appearances. If the patient felt overwhelmed, the therapist could adjust these elements in real-time to temporarily reduce tension. Therapists were personally trained by researcher V. Veldkamp on using CleVR and provided with a manual detailing the startup process for the VR equipment. For a full and detailed description of the protocol, please refer to Appendix C. The study was approved by the BMS Ethics Committee of the University of Twente (221426).

Participants

The study targeted male and female patients receiving CBT treatment for SUDs at the Addiction Psychiatry department of Dimence Groep Zwolle and Deventer. A total of 10 participants were recruited using convenience sampling, with the following inclusion criteria: patients had to be 18 years or older, voluntary participating, currently undergoing active treatment for SUDs at the Addiction Psychiatry of Dimence Groep Zwolle and Deventer, at risk for comorbid addiction issues, and declared mentally and physically able to participate by a healthcare professional.

Exclusion criteria included patients with epilepsy, severe motion sickness, and behavioural addictions – compulsive behaviours that provide short-term rewards but lead to negative consequences similar to SUDs – like gaming. Participants could withdraw from the study at any time during treatment. Demographic information was not included in the study, as the focus was on the overall patient experience with VR-CBT rather than individual differences. That is beyond the scope of this study.

Materials and Procedure

A researcher conducted a semi-structured interviews with the patient. Interviews lasted 30 minutes on average. Two topic lists were created to guide the interviews: . Topic list 1 was used for the first two interviews and covered four topics: experience, physical tension, emotional tension, and craving effects, with questions like *“What did you notice regarding physical tension?”* and *“What have you learned today?”* (see Appendix A). Topic List 2, used for the third interview, included additional questions that focused on patient perceptions of the time gap. (see Appendix B). For example, *“What is your experience after two weeks with the various scenarios and situations (templates)? Have there been certain scenarios where your experience was different? If so, what was the reason for this?”*. Additionally, probes based on information of the previous two interviews with participants were used to identify and explain any perception changes. Concrete examples of these probes are not included in topic list 2 but are present in the interview transcripts. For instance, the interviewer references a previous statement made by a participant by asking, *“Yes, that was also the moment, according to me, when you said the irritation increased?”* in the third interview. Interviews were conducted in person and recorded with an audio recorder. Alternatively, some were held online via video call. Interviews were transcribed and then imported into Atlas.ti for analysis.

Analysis

A thematic analysis was used to code the interviews. Thematic analysis is a data analysis method used to identify and examine commonalities within data. Identifying these commonalities involves systematically organising and interpreting interview data, referred to as coding, to find and categorise recurring codes (Braun & Clarke, 2012). These codes are often simplified into categories to facilitate drawing conclusions from the data. The coding process was inductive and iterative, involving repeated reviews of transcriptions to identify and recategorise new codes throughout the analysis phase for optimal results. At the start of

the coding process, transcripts from three participants were coded to create a preliminary set of codes. These codes were then reviewed and adjusted with guidance from lead researcher V. Veldkamp of Dimence Groep. The codes were then used to analyse the remaining transcriptions. Through this process, codes were added, removed or combined in collaboration with V. Veldkamp, resulting in a set of finalised codes that were organised into categories.

Results

Data analysis identified three categories:

1. Experience
2. Physical and psychological reactions
3. Points of improvement

Each category aligns with a specific sub-research question (e.g. Category 1 corresponds to sub-research question 1) and is presented in separate tables. These tables list main codes, sub-codes (in italics), definitions, and code frequencies, ranked by total frequency across interview rounds. After each table, a brief explanation with examples and patient quotes is provided. Table 1 below shows the codes and frequencies for Category 1.

Table 1

Main and sub-codes, definitions, and frequencies of codes focusing on the patient experience labelled as Category 1.

Category 1: Experience						
Main and sub-codes	Definition	<i>N</i> _{patients} (Max. 10)	<i>N</i> _{interview1} (%)	<i>N</i> _{interview2} (%)	<i>N</i> _{interview3} (%)	<i>N</i> _{total} (100%)
Helpful thoughts	Patient recognises useful new perspectives during or after VR sessions.	10	63 (38.2%)	63 (38.2%)	39 (23.6%)	165
<i>A) Exploration of growth</i>	<i>Patient gains a positive outlook on recovery during VR sessions.</i>	8	50 (41.3%)	43 (35.5%)	28 (23.2%)	121
<i>B) Resources</i>	<i>Patient is aware of coping strategies through VR sessions.</i>	7	14 (31.8%)	20 (45.5%)	10 (22.7%)	44
Pitfalls	Patient learns about their substance use vulnerabilities through VR.	10	71 (45.8%)	70 (45.2%)	14 (9.0%)	155
Effective	Patient finds VR helpful for understanding and managing substance use.	10	38 (27.7%)	56 (40.9%)	43 (31.4%)	137
Self-efficacy	A patient feels confident in their ability to reject using a substance in VR sessions.	10	44 (43.6%)	25 (24.8%)	32 (31.6%)	101

Behaviour change present	Patient uses ways to reduce substance use during or after VR sessions.	9	27 (31.8%)	30 (35.3%)	28 (32.9%)	85
Not effective	Patient feels VR sessions are not helpful because they do not provide new insights or support.	4	6 (21.4%)	10 (35.7%)	12 (42.9%)	28
Unhelpful thoughts	Negative self-thoughts that hinders a patient's progress during VR.	7	13 (50.0%)	11 (42.3%)	2 (7.7%)	26
Motivation	Patient feels more motivated to stick with treatment during or after VR sessions.	6	6 (26.1%)	6 (26.1%)	11 (47.8%)	23
Behaviour change absent	Patient does not change their substance use despite VR sessions.	5	2 (20%)	6 (60%)	2 (20%)	10

Note: Code frequencies for each interview round are provided as percentages to offer a clearer comparison across the three rounds. Npatients displays how many times a specific code was mentioned by the ten patients. Ninterviews displays how many times that specific code was mentioned in interviews 1, 2 or 3. Ntotal displays the total frequency of a code.

Category 1: Experience

Category 1 covers patients who obtained new insights about substance use during the VR sessions. As seen in Table 1, patients frequently reflected on their thoughts and behaviours in the VR sessions. These *helpful thoughts* came from experiencing and practicing refusal skills in plausible VR situations that a patient might encounter in real life. Through role-play, patients learned and reflected on how they think, feel and react in these situations, which they found insightful. This *exploration* helped them understand themselves better. Patient 2 explained:

“I was a bit surprised by how much you can learn about yourself in situations you might encounter, where you wouldn't think about it beforehand, and then realize, OK, yes, this could come up again.” [Patient 2]

Additionally, patients reported that role-playing these situations in VR helped them recognise their vulnerabilities. For example, some patients shared how it was tough to say no when VR characters pressured them to smoke or drink, a common *pitfall*. Others, like patient 2, noted that the clear blue sky in the VR environment was their vulnerability, as they associate sunny days with drinking beer.

Furthermore, 7 patients reported the opportunity to learn available *resources*, like practicing the skill to say no or walk away from the situation. Patient 7 illustrated this:

“[...], especially dealing with learning to say no. I think I mentioned that last time too, that learning to say no, that's necessary. When you have to be clear, react quickly, and actually be able to practice that, you know.” [Patient 7]

Because of this, 9 patients found the VR sessions *effective* for practicing skills and coping strategies in plausible realistic situations. Patients 3 and 4 note that the realistic VR scenarios are more effective at triggering cravings than just talking with a therapist. They continue by adding that in VR, the patient gets to practice managing those cravings and try

different approaches to reject a joint, which teaches them the optimal way to handle similar situations in real life. In fact, 5 patients already accomplished this in the second VR session. These patients felt more prepared in their second session and showed increased confidence in their ability to reject offers in VR, a display of *self-efficacy*. After being asked about their confidence in resisting cravings for alcohol in the VR environment, Patient 6 explained:

“Yes, well, that is quite high, because now that you're asking me if I felt like I had to use alcohol again, I actually didn't feel that at all. So my confidence in it has really increased, a lot.” [Patient 6]

9 patients reported that the VR sessions had a positive influence on *behaviour change*, particularly in strengthening skills and strategies when declining a joint or a beer in a VR scenario. Whilst this occurred in the VR sessions, patients reported feeling confident that they could replicate the same behaviour in real life situations as well. After a successful VR interaction, Patient 3 shared:

“I felt strong. Because I said, I had other options, you know. I said, “Yeah, we can also grab that watermelon back there.” Or I said, “Do you see those soda bottles or a piece of cheese? We can do that instead.” [Patient 3]

Additionally, patients shared increased **motivation** to continue treatment with VR after successfully applying skills in the VR sessions to avoid smoking or drinking. Patient 4 expressed eagerness to further explore and refine these skills:

“[...], especially with the name therapist, I'm open to it, so yeah, if you guys want to further explore it, I would like to explore that, yes. Yeah, I think that's really cool. Yeah, you think that's cool too.” [Patient 4]

However, patients did *not* experience these changes in behaviour. Patients 4, 7 and 8 struggled to resist strong urges in VR, failing to decline offers from characters. These patients shared more **unhelpful thoughts** and seemed close-minded, refusing to think deeper about

interactions in VR. Notably, some patients may have done this unconsciously, unintentionally blocking the reflective process in the VR sessions. Patient 8 shared the following in the VR shopping street template:

“I just started ignoring people, actually, most of them. Yeah, just kind of scanning, but basically in an 'ignore mode'.” [Patient 8]

Lastly, four patients noted some instances where VR was *not effective*, due to them not feeling immersed enough in the VR environments. Patient 10 – who had a background in game development – makes most mentions of this code. Patient 10 found the VR software outdated and clunky, which made the environment feel unrealistic and less effective for them.

Table 2 below shows the codes and frequencies for Category 2.

Table 2

Main and sub-codes, definitions, and frequencies of codes related to patients' physical and psychological reactions during VR sessions, labelled as Category 2.

Category 2: Physical and Psychological Reactions						
Main and sub-codes	Definition	<i>N</i> _{patients} (Max. 10)	<i>N</i> _{interview1} (%)	<i>N</i> _{interview2} (%)	<i>N</i> _{interview3} (%)	<i>N</i> _{total} (100%)
Emotional tension	Patient has good or bad emotional reactions to situations in VR.	10	144 (45.3%)	102 (32.1%)	72 (22.6%)	318
<i>A) Positive emotions</i>	<i>Patient feels good after successfully practicing skills in VR.</i>	9	32 (64.0%)	8 (16.0%)	10 (20.0%)	50
<i>B) Negative emotions</i>	<i>Patient feels overwhelmed and reacts negatively in VR.</i>	10	112 (41.8%)	95 (35.4%)	61 (22.8%)	268
Trigger present	Stimuli in VR that prompts a strong urge in patients to use a substance.	10	108 (50.2%)	71 (33.0%)	36 (16.8%)	215
Bodily tension present	Patient has physical reactions to substance triggers in VR.	9	63 (42.3%)	48 (32.2%)	38 (25.5%)	149
Craving present	Patient feels a strong urge to use a substance in VR sessions.	8	36 (40.4%)	37 (41.6%)	16 (18.0%)	89
Craving absent	Patient does not feel any urge to use a substance in VR sessions.	9	30 (48.4%)	21 (33.9%)	11 (17.7%)	62

						19
Trigger absent	No stimuli present in VR that prompts a strong urge to use a substance.	10	21 (67.7%)	6 (19.4%)	4 (12.9%)	31
Bodily tension absent	Patient has no physical reactions in VR.	8	17 (56.7%)	7 (23.3%)	6 (20.0%)	30

Note: Code frequencies for each interview round are provided as percentages to offer a clearer comparison across the three rounds. Npatients displays how many times a specific code was mentioned by the ten patients. Ninterviews displays how many times that specific code was mentioned in interviews 1, 2 or 3. Ntotal displays the total frequency of a code.

Category 2: Physical and Psychological Reactions

The second category includes patients who had reactions to particular triggers or interactions in the VR sessions, often associated with the substance addiction. A common reaction shared by almost all patients was tension. Patients experienced tension either physically or emotionally, usually triggered by scenarios in VR, like a party with many drinks or a simple bar drink request from a character in the environment. For example, Patient 1 encountered alcohol in a VR scenario and felt a strong urge to drink. Trying to resist by saying no or distracting themselves caused physical, or *bodily tension*. Patients often experienced bodily tension as muscle tightness, stiffness, or pressure in the chest or neck. Others, like Patient 6, described it as a physiological reaction:

“[...] I think I indeed had the most tension during the supermarket session. There you just notice a kind of tension and a slightly elevated heart rate.” [Patient 6]

Moreover, tension was not consistent throughout a session, as patient 4 explained:

“Well, the tension... When you use VR, the tension increases. Because you know it, the tension gets higher, and your desire increases.” [Patient 4]

Likewise, *emotional tension* included patients feeling a range of emotions – both positive and negative – when exposed to triggers in VR. Negative emotions, in particular, tended to increase tension. Patients mostly reported anger, like feeling frustrated, irritated, or annoyed towards characters and their dialogue due to constant peer pressure to drink or smoke. For example, Patient 3 experienced this firsthand:

“Yeah, well, I did get a bit irritated, yeah. I got irritated because they kept going.”

[Patient 3]

Similar to bodily tension, patients felt emotional tension peak during confrontations with triggers, and it gradually decreased by the end of the VR session.

Nine patients reported experiencing positive emotions, like pride or satisfaction. Patients shared these feelings when successfully applying a skill or coping strategy in a VR scenario, like confidently declining a joint from an overly aggressive character in VR. Positive emotions were not accompanied by tension but rather contributed to a sense of accomplishment. For example, Patient 1 noted:

“No, I’m actually proud of myself for staying calm and not letting myself be influenced by others.” [Patient 1]

Being triggered was different for each patient and their respective addiction and environment. Notably, patients more often mentioned settings or social interactions in VR that closely resembled real-life events as stronger triggers, rather than static objects like a bottle of wine on a table. The context and its resemblance to the real-world were more impactful triggers than individual items. For example, Patient 2 was triggered by a clear sky in the VR environment, which made him crave a beer, whilst Patient 7 was triggered by hearing the word “gambling” in a conversation with a character in VR, which made him want to gamble.

A trigger in a VR session was often dictated by a sudden urge to use the substance, a **craving**. Patients 2 and 3 reported that seeing other VR characters drink and offer them a drink triggered a strong lust in their brain, which was hard to ignore, especially since they could see and interact with the bottle or glass. Similar to tension, cravings were reported in waves of intensity. For example, Patient 9 described how their craving changed during the session when asked by the interviewer:

“Yeah, because before we started there was absolutely nothing. And during, well, when I saw it [the substance] lying there, and then it just subsided again.” [Patient 9]

However, unlike tension, patients reported cravings to persist longer throughout the VR sessions, continuing even after the sessions had ended. Patients 2, 4 and 7 shared still experiencing cravings to drink or smoke after the VR sessions. Patient 7 explained:

“No, the craving actually lingered a bit longer. The craving doesn't disappear even when you take off the headset, it just stays there.” [Patient 7]

Table 3 below shows the codes and frequencies for Category 3.

Table 3

Main and sub-codes, definitions, and frequencies of codes showing suggestions for improvement from patients labelled as Category 3.

Category 3: Points of Improvement						
Main and sub-codes	Definition	<i>N</i> _{patients} (Max. 10)	<i>N</i> _{interview1} (%)	<i>N</i> _{interview2} (%)	<i>N</i> _{interview3} (%)	<i>N</i> _{total} (100%)
Software	Patient feedback on how the VR software works and ideas for improvement.	10	147 (29.5%)	150 (30.1%)	202 (40.4%)	499
<i>A) Personalisation</i>	<i>Patient wants VR sessions to better suit their individual needs.</i>	10	29 (20.4%)	61 (43.0%)	52 (36.6%)	142
<i>B) Immersiveness</i>	<i>How deeply the patient felt immersed in the VR environment's realism.</i>	10	82 (35.7%)	77 (33.5%)	71 (30.8%)	230
<i>C) Role-play</i>	<i>Patient feedback on the VR role-play setup of the templates.</i>	10	48 (37.8%)	44 (34.7%)	35 (27.5%)	127
Protocol enhancement and safety measures	Patient suggests ways to improve the implementation of VR-CBT in practice.	6	8 (18.6%)	24 (55.8%)	11 (25.6%)	43
Hardware	Patient feedback on the VR equipment and devices used.	6	22 (61.1%)	8 (22.2%)	6 (16.7%)	36

Category 3: Points of Improvement

The third category covers patient feedback on the VR sessions, focusing on hardware, software, and suggestions for improving VR-CBT for SUD. Most of the feedback from patients was about the VR *software*, which shaped their overall experience in the sessions. Patient feedback on the software can be grouped into three areas: personalisation, immersiveness, and role-play. Firstly, all patients wanted more *personalisation* in the VR sessions to make the experience more relatable. Patient 1 suggested adjusting the templates to better reflect a patient's situation, such as creating an environment or script already familiar to the patient. This would trigger stronger cravings, and offer better opportunities for skills training. All patients describe how the current templates are too generic, and are not designed specifically for each patient. Patients share how this created a disconnection from them and the situation they were in the VR. For example, Patient 6 found a particular scenario quite unrealistic, as it was not familiar to them:

“Well, no, not recognizable for me. That I'm sitting in a park and a dealer comes up to me. Well, that's not recognizable for me.” [Patient 6]

Additionally, the personalisation of the VR sessions should also address the specifics of each patient's addiction. Patient 2, a weed addict, noted that the lack of the smell of weed in the VR sessions was significant for them, as it triggers their response. Patient 2 explained:

“I think the smell, if I were to smell weed. That, um, that I would be a bit more, um, now I can separate it very well, like this is VR. But if you smell it... that would evoke different associations.” [Patient 2]

Secondly, all patients reflected on the *immersiveness* of the VR sessions. Most patients found the VR world to be realistic, which in turn made them feel immersed in the scenario they were role-playing. Patient 6 described this:

“It's really an eye-opener because you're essentially in a real world, even though it's virtual. But it feels very real.” [Patient 6]

Notably, the realism and immersion did not depend on graphical fidelity. In fact, Patients 1, 3, and 8 found the VR characters to be stiff and have very static movements, which made the environment feel unrealistic. Instead, patients felt immersed in VR through the *role-play* scenarios. All patients described how the location, characters, and dialogue resembled real-life events, making them feel real despite knowing it was a virtual world. Patient 1 shared their experience on this:

“And definitely the situation, the place where you are, that makes a big difference. It just makes it much more realistic.” [Participant 1]

Furthermore, Patients 3, 4, 6, and 8 suggested adding introductory sessions to help patients get familiar with VR controls, managing expectations, and address concerns. These suggestions would be a ***protocol enhancement and safety measures***. Patients 6 and 8 also recommended extra sessions to personalise the experience based on the patient needs:

“But perhaps you could inventory beforehand. Where are the problems actually? Who has which problems? Then you can better tailor the VR sessions, I think.”
[Participant 6]

Lastly, six patients gave feedback on the VR ***hardware***. Patients 5, 6, and 10 reported headphone static, motion sickness, and equipment discomfort, which disrupted their concentration during sessions. Patient 10 was particularly vocal about this:

“Another thing that's really an issue: that laptop makes a lot of noise. For how it looks, it shouldn't be like that. It really shouldn't, to be honest. But you can hear it through the microphone.” [Patient 10]

No major differences were found between the interview rounds, except in Category 2, where mentions of physical reactions were notably lower in the third interview. This decline was

expected, as Category 2 captures immediate observations from the VR sessions, whereas Categories 1 and 3 address longer-term effects.

Discussion

This study explored the experiences of SUD patients with VR-CBT sessions in treatment. To answer this question, the study aimed to answer three sub-research questions. Firstly it explored the patient perspective on how VR-CBT sessions impact their treatment outcome. Secondly, it explored what patients perceive as physical responses in VR-CBT sessions. Thirdly, it explored points of improvement for VR-CBT from the perspective of the patients. Overall, patients had a highly positive experience and view of VR-CBT, expressing enthusiasm for its inclusion in SUD treatment as it was easy to operate and helped them gain insights into their thoughts and behaviour.

Main Findings

Firstly, most patients found the VR-CBT sessions beneficial for their SUD treatment. Category 1 shows that patients found it beneficial for reflecting on their thoughts and behaviours in made-up, yet realistic situations related to their substance addiction. Patients reflected on handling offers to drink or smoke, recognising their vulnerabilities, learning coping strategies for cravings, and utilising skills to manage peer pressure. Patients shared that these insights were possible through the role-playing aspect in the VR sessions. As the findings show, patients found the role-playing scenarios in VR sessions to be the most realistic, closely resembling real-life events. This provided effective cue exposure, which allowed patients to realistically role-play and practice skills as if the situations were real. This shows that VR is a practical way to improve exposure and skills training, crucial for successful CBT in SUD treatment (Rosenthal et al., 2022). VR helps patients become more self-aware, gaining insights and effectively develop skills, as research suggests (An et al., 2017; Carroll & Kiluk, 2017; Fadus et al., 2019).

Additionally, most patients preferred the VR sessions over their usual treatment, which involved conversing about substance-use behaviours with a therapist. According to the findings, patients shared how the latter was not good at triggering cravings, tension or self-insight. On the other hand, the VR sessions were capable of eliciting these responses in patients. Thaysen-Petersen et al. (2023) stated that CBT limited to verbal sessions is often inadequate for addressing the core behaviours of SUDs, leading to ineffective treatment. This seemingly aligns with patient feedback in this study, which found VR sessions more engaging and effective than traditional CBT treatment because the immersive nature of VR better replicates real-life situations and triggers, leading to stronger psychological and physical responses.

Secondly, the findings suggest that VR exposure in CBT can effectively simulate real-life situations for SUD patients by triggering physical and psychological reactions such as cravings, muscle tightness, and increased heart rate. The ability to effectively simulate these reactions is a key element in SUD treatment (Bordnick et al., 2008). Most patients reported feeling tense and experiencing cravings when confronted with familiar cues, like seeing alcohol or facing peer pressure to drink. Familiar environmental cues, which maintain addictive behaviour (Stacy & Wiers, 2010), led to stronger reactions, whilst unrealistic scenarios, like Patient 6 finding it unrealistic for a dealer to approach them in a park reduced cue exposure's effectiveness. Although tension faded once triggers were removed, cravings often persisted after sessions. These responses align with research showing that familiar substance-use cues elicit real psychological and physical reactions (Bordnick et al., 2008; Rosenthal et al. (2022), supporting VR's role in simulating cue exposure for SUD treatment.

Thirdly, patients provided valuable feedback on VR-CBT for SUD treatment, focusing on software design improvements. Patients emphasised the need for more personalisation in VR sessions, as scenarios that closely mirrored real-life were most

engaging. However, some scenarios felt too general, leading to disengagement. For example, Patient 2, with a weed addiction, found a supermarket scenario unrealistic, as it did not reflect their experiences (finding a joint at the check-out counter was not familiar). McHugh et al. (2010) and Langener et al. (2021) highlight that a major benefit of VR is its ability to be personalised for each patient. In this study, patients feel that this personalisation could be even deeper, with experiences tailored to their specific addiction and personal history.

most patients found the VR environment unrealistic due to outdated graphics and static character movement. Despite this, patients shared feeling immersed in the VR sessions, largely because the scenarios felt recognisable and believable. This aligns with a study conducted by Slater & Wilbur (1997), which found that high-quality graphics alone do not determine immersion. Instead, a sense of presence and immersion is more influenced by interaction quality, narrative engagement and the realism of the experience. The findings describe that patients managing the sudden tension or cravings in a familiar, specific scenario created immersion in the VR sessions. Therefore, VR-CBT should be personalised to maximise this immersive experience for patients. Future research could explore how VR-CBT works for patients from diverse backgrounds to determine if it is personalisable for everyone. Patient 10 with a software development background, found the VR sessions ineffective, suggesting that some cases might need to be reconsidered for VR treatment.

Strengths & Limitations

An important limitation of this study is the semi-structured nature of the interviews. Whilst this approach allowed participants to share their experiences broadly, it led to inconsistencies, particularly in interview length. Variability was observed in this area, with interviews ranging anywhere from 15 to 40 minutes, depending on the participant. This variability may have biased the findings, as some insights may have been more heavily influenced by a few participants rather than being equally supported across all participants.

Another limitation of this study was the fact that patients only experienced two VR sessions. Given more time and more VR sessions, patients may have gotten more accustomed to the technology, and have provided more conclusive long-term results of VR-CBT. Future research should focus on the long-term status and benefits of VR-CBT.

A key strength of this study is its qualitative, longitudinal design, which allowed for in-depth exploration of patient experiences across the three interviews. Although not the primary focus of the study, it provided a brief insight into how patients' perceptions with and on VR-CBT evolve, enabling the identification of long-term benefits and points of improvement. Future research should involve a longitudinal study covering the entire treatment cycle of a patient to capture these variations more effectively.

Conclusion

This study demonstrates from the perspective of SUD patients, VR-CBT is a valuable and practical treatment method, offering significant benefits in skill development and self-insight through immersive and realistic exposure scenarios, achieving the two important factors of CBT treatment: cue exposure and skills training. Patients found that VR-CBT effectively triggers cravings in most patients, providing ample opportunities to practice skills and coping strategies for managing these cravings and associated tension. However, personalisation of VR scenarios still remains crucial to maximise therapeutic outcomes, and an important point of improvement for patients. Despite some limitations in graphical realism, the immersion provided by well-designed scenarios was deemed effective by patients. Future research should investigate the adaptability of VR-CBT for diverse SUD patient backgrounds.

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Appendix A

Topic list 1 en interviewvragen voor patiënten na VR-interventie 1 en 2

De topic-list is gemaakt op basis van literatuur onderzoek uit het werkboek ‘Cognitieve gedragstherapie bij middelengebruik en gokken’ of een soortgelijk protocol en betreft in ieder geval de volgende onderwerpen: ervaring, lichamelijke spanning, emotionele lading, trek en effect.

Instructies voorafgaand aan het interview:

-De voice-recorder ligt op de secretariaat (Zwolle, te vinden in gang 2 B (tweede verdieping, gang B) in de postvakken kast. Hij ligt in het postvakje > VR-onderzoek.) (Deventer, te vinden bij 00.34, trap naar beneden en postvakken. Ligt in postvak > Vivian Veldkamp)

-Zwolle: De VR ruimte is in 1B04.

-Deventer: De VR ruimte wisselt per behandelaar, zie hierboven per behandelaar waar je moet zijn.

-Je wacht in de wachtruimte (Zwolle: van vleugel 1B ongeveer, Deventer wachtruimte begaande grond) 15 min. Van tevoren en de behandelaar haalt je uit de wachtkamer. Je doet het interview in de VR-kamer en vraagt van tevoren of de toestemmingsverklaring is ondertekent. De ondertekende toestemmingsverklaring mag je eveneens in het postvakje leggen waar ook de voice-recorder ligt. Na afronding sluit je de kamer af (vraag daarvoor een collega) en breng je de voice-recorder weer naar het secretariaat in de kast. Haal de opname **niet** van de voice-recorder af.

-De voice-recorder: de handleiding zit in de doos. Aan de zijkant zit de aan en uitknop. De rode knop is om op te nemen. De stop knopt (vierkantje) om te stoppen. Ik haal zelf de bestanden eraf, dat hoeft je niet te doen.

-Je begint elke de opname met: *Mijn naam is (naam interviewer) vandaag is het (datum en jaar) om (tijdstip). Ik zit hier met patiënt (nummer dat correspondeert met planning, dus VV-..) en dit is interview nummer 1/2/3. Dan volgt onderstaande instructie:*

Welkom (naam patiënt), vandaag ga ik een aantal vragen aan u stellen naar aanleiding van de VR-sessie die u vandaag gehad heeft. Als het goed is heeft u hier eerder toestemming voor gegeven en heeft u een telefonische uitleg en folder meegekregen over het doel van het onderzoek. Daarnaast zou ik u willen vragen of u het goed vindt dat ik een geluidsopname/video opname maak van het interview van vandaag. Het interview zal ongeveer tussen de 15 en maximaal 45 minuten duren en bestaat uit ongeveer 16 vragen. Uw gegevens zullen anoniem verwerkt worden en u kunt zich te allen tijden terugtrekken uit dit onderzoek. Is dat helder? Heeft u voor nu nog andere vragen aan mij of aan uw behandelaar? Oké, dan gaan we verder.

Allereerst wil ik u vragen: Wat vond u van de VR-sessie? (vraag 1).

Ga door naar de volgende vragen.

ONDERWERPEN	SUBONDERWERPEN	VRAGEN
1. ERVARING	Ervaring algemeen	Vertel eens, wat vond u van de VR-sessie?
	Ervaring per template	Wat is uw ervaring met de verschillende scenario's en situaties (templates)?

2. LICHAMELIJKE SPANNING	Spanning algemeen	Wat merkte u als het gaat om lichamelijke spanning?
	Hartslag, zweten, spieren	Wat voelde u tijdens de sessie? (Denk aan hartslag, zweten, aanspannen van spieren)?
	Locatie in het lichaam	Waar voelde u dat?
	Signalering van deze spanning	En wanneer voelde u dat ?
	Toename of afname van spanning	En was deze spanning het hoogste?
3. EMOTIONELE LADING	Emoties algemeen	Welke emoties riep de situatie bij u op?
	Boos, bang, bedroef, blij	Welke basisemoties waren dit? Denk aan boos, bedroefd, blij of bang?

	Signalering van emoties	En wanneer voelde u dat?
	Toename of afname van emoties	En wanneer voelde u dat het meeste?
4. TREK	Trek algemeen	Wat merkte u op als het gaat om trek?
	Toe of afname van trek	Was er een toename in trek? Of was er een afname?
	Verleiding	Hoe groot was voor u de verleiding?
	Vertrouwen	En hoeveel vertrouwen heeft u dat u niet gaat gebruiken in deze situatie?
5. EFFECT	Leren	Wat heeft u geleerd van vandaag?
	Volgende keer	Wat neemt u mee naar de volgende keer?

Geef de volgende instructie:

'Dit waren alle vragen, bedankt voor het beantwoorden. U heeft hard gewerkt.

*Wanneer dit uw eerste VR-interventie is, heeft u nog een tweede afspraak staan op **-datum-** Ook na deze VR-interventie zal er een interview bij u afgenomen worden door een andere behandelaar.*

*Wanneer dit uw tweede VR-interventie is, zou ik graag met u een telefonische afspraak willen maken voor het laatste interview. **-Bespreek een datum voor over twee weken-**.*

Bedank de patiënt, rond het gesprek af. De ondertekende toestemmingsverklaring mag je eveneens in het postvakje leggen waar ook de voice-recorder ligt. Na afronding sluit je de kamer af (vraag daarvoor een collega) en breng je de voice-recorder weer naar het secretariaat in de kast.

Appendix B

Topiclist 2 en interviewvragen patiënten na afronding VR-interventie

De topic-list is gemaakt op basis van literatuur onderzoek uit het werkboek ‘Cognitieve gedragstherapie bij middelengebruik en gokken’ of een soortgelijk protocol en betreft in ieder geval de volgende onderwerpen: ervaring, lichamelijke spanning, emotionele lading, trek en effect en bijdrage of tips.

Instructies voorafgaand aan het interview:

-Het derde gesprek kan eveneens via telefoon of beeldbellen. Zorg dat je dit goed bespreek met de patiënt en maak een opname. De opname moet op een beveiligd apparaat gedaan worden en opnames moeten na overdragen aan de onderzoeker, verwijderd worden van elk apparaat. Indien je wel op locatie bent, kun je de voice-recorder gebruiken,.

-De voice-recorder: de handleiding zit in de doos. Aan de zijkant zit de aan en uitknop. De rode knop is om op te nemen. De stop knoep (vierkantje) om te stoppen. Ik haal zelf de bestanden eraf, dat hoeft je niet te doen.

-Je begint elke de opname met: *Mijn naam is (naam interviewer) vandaag is het (datum en jaar) om (tijdstip). Ik zit hier met patiënt (nummer dat correspondeert met planning, dus VV-..)* en dit is interview nummer 3. Dan volgt onderstaande instructie:

Welkom (naam patiënt), vandaag ga ik een aantal vragen aan u stellen naar aanleiding van de VR-sessies die u twee weken en drie weken geleden gehad heeft. Als het goed is heeft u hier eerder toestemming voor gegeven en heeft u een telefonische uitleg en folder meegekregen over het doel van het onderzoek. Daarnaast zou ik u willen vragen of u het goed vindt dat ik een geluidsoptname/video opname maak van het interview van vandaag. Het interview zal ongeveer tussen de 15 en maximaal 45 minuten duren en bestaat uit ongeveer 20 vragen. Uw gegevens zullen anoniem verwerkt worden en u kunt zich te allen tijden terugtrekken uit dit onderzoek. Is dat helder? Heeft u voor nu nog andere vragen aan mij of aan uw behandelaar? Oké, dan gaan we verder.

Allereerst wil ik u vragen: Hoe heeft u over het algemeen de beide VR-sessies ervaren?

Ga door naar de volgende vragen.

ONDERWERPEN	SUBONDERWERPEN	VRAGEN
1. ERVARING	Ervaring algemeen	Hoe heeft u over het algemeen de VR-sessies ervaren?
	Ervaring per sessie	Wat is uw ervaring na twee sessies? Zit daar een verschil in tussen de sessies?
	Ervaring na twee weken	Wat is uw ervaring nu er twee weken voorbij zijn? Zit daar een verschil in tussen de weken?

	Ervaring per template	Wat is uw ervaring na twee weken met de verschillende scenario's en situaties (templates)? Zijn er bepaalde scenario's geweest waarin uw ervaring anders was? En zo ja, waar kwam dit dan door?
2. LICHAMELIJKE SPANNING	Spanning algemeen	Wat merkte u als het gaat om lichamelijke spanning?
	Hartslag, zweten, spieren	Wat voelde u tijdens de sessies? (Denk aan hartslag, zweten, aanspannen van spieren)?
	Locatie in het lichaam	Waar voelde u dat?
	Signalering van deze spanning	En wanneer voelde u dat ?
	Toename of afname van spanning	En was deze spanning het hoogste?
3. EMOTIONELE LADING	Emoties algemeen	Welke emoties riepen de situatie bij u op?

	Boos, bang, bedroef, blij	Welke basisemoties waren dit? Denk aan boos, bedroefd, blij of bang?
	Signalering van emoties	En wanneer voelde u dat?
	Toename of afname van emoties	En wanneer voelde u dat het meeste?
4. TREK	Trek algemeen	Wat merkte u op als het gaat om trek?
	Toe of afname van trek	Was er een toename in trek? Of was er een afname?
	Verleiding	Hoe groot was voor u de verleiding?
	Vertrouwen	En hoeveel vertrouwen heeft u dat u niet gaat gebruiken in deze situatie?
5. EFFECT	Leren	Wat heeft u geleerd na twee weken na de sessie?

	Volgende keer	Wat neemt u mee naar uw behandeling?
6. BIJDRAGE	Ervaring	Denkt u dat VR een positieve bijdrage heeft geleverd aan uw CGT-behandeling? En zo ja welke dan?
7. TIPS		Heeft u nog tips aan ons ten aanzien van de VR-sessies?

Geef de volgende instructie:

'Dit waren alle vragen, bedankt voor het beantwoorden van alle vragen. De interviews zijn nu klaar. U heeft hard gewerkt. Bedankt voor uw deelname aan dit onderzoek.'

Bedank de patiënt, rond het gesprek af. De ondertekende toestemmingsverklaring mag je eveneens in het postvakje leggen waar ook de voice-recorder ligt. Na afronding sluit je de kamer af (vraag daarvoor een collega) en breng je de voice-recorder weer naar het secretariaat in de kast.

Appendix C

Bijlage 3: Gebruikersbeschrijving en uitgebreide procedure.

Gebruikersbeschrijving:

VR maakt als onderdeel uit van de standaardzorg van de Dimence Groep. De Dimence Groep heeft de volgende uitleg als het gaat om VR:

Met een cliënt tot de kern komen van zijn hulpvraag, exposure therapie of vaardigheden oefenen; Virtual Reality (VR) kan hier een hulpmiddel voor zijn. VR is een behandelvorm waarbij de cliënt d.m.v. een VR bril in een virtuele wereld stapt. Deze wereld kan worden aangepast aan de hulpvraag van de cliënt. VR is toepasbaar in een blended vorm, waarbij therapie wordt afgewisseld met VR-sessies. Hierbij wordt gebruik gemaakt van vastgestelde behandelmethoden, gestoeld op de CGT technieken. Bij Dimence en Transfore is deze relatief nieuwe behandelvorm mogelijk en wordt dit toegepast door behandelaren die hier in getraind zijn

De reden waarom we met Virtual Reality willen gaan werken is dat er veelbelovende onderzoeksresultaten zijn en zowel behandelaren als cliënten die met VR hebben gewerkt tevreden zijn. Over het algemeen kan gesteld worden dat VR helpt om tot de kern van een hulpvraag te komen doordat je specifieke situaties gecontroleerd in een behandelkamer kan oefenen en ter plekke kan reflecteren. Verder is gebleken dat cliënten deze nieuwe vorm van behandeling omarmen en dat zij meer gemotiveerd lijken te zijn om echt zelf aan te slag te gaan. Uit onderzoek lijkt ook te komen dat het meer beklijft en dat er minder recidive plaatsvindt. VR lijkt, voor sommige toepassingen, echt een betere behandeluitkomst te genereren; redenen om hier met elkaar verder in te ontwikkelen en te leren toepassen. Hierin werken we samen nauw samen met ander GGZ instellingen, universiteiten en leverancier van VR (CleVR B.V.). CleVR B.V. is een externe organisatie die is ingehuurd om personeel te trainen en levert de software (Social Worlds) en bijhorende apparatuur. De VR-CGT van CleVR heeft een CE Certificering als medisch hulpmiddel en wordt inmiddels gezien als standaard evidence- based behandeling binnen de Dimence Groep.

Wanneer de cliënt de VR bril opzet, stapt hij/zij in een beveiligde behandelomgeving; een virtuele wereld. Deze kan volledig worden aangepast op zijn/haar behandeling. Dit doe je als behandelaar door continu, al doende, met je cliënt te overleggen. Je cliënt kan bijvoorbeeld een situatie oefenen in een supermarkt, bus, café of winkelstraat. Samen bepaal je hoe deze virtuele omgeving eruit ziet, hoe druk het is en hoe de personages reageren. Als behandelaar zit je aan de ‘knoppen’ en kun je direct allerlei variaties activeren. Zo kan een cliënt, gecontroleerd, situaties oefenen en zie jij als behandelaar hoe de cliënt reageert en kan je hierover in gesprek.

Er zijn diverse protocollen ontwikkeld voor de behandelaar en de patiënt, te denken aan een protocol voor het inzetten van VR-CGT gericht op angst. Hierbij hoort een handleiding, een handboek voor de behandelaar en een werkboek voor de patiënt. Daarnaast kan er gebruik gemaakt worden van de interventies

De interventies die beschikbaar* zijn:

- Rondlopen
Rondlopen in een situatie, in principe geen interactie mogelijk.

- Rollenspel
Diverse situaties waarin de interactie ingezet kan worden met de behandelaar. Dit kunnen één of meerdere rollen zijn.
- Perspectief wissel
Diverse situaties waarin er interactie ingezet kan worden met de behandelaar. De rollen kunnen omgedraaid worden en er kan een observant toegevoegd worden.
- Emotie herkenning

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Het rondlopen en herkennen van emoties. • Catwalk

Karakter komen op de patiënt af en een bepaalde emotie.

De volgende situaties zitten op dit moment beschikbaar in Social Worlds:

- Het café (nacht)
- De winkelstraat
- Het park
- Een huissituatie (woonkamer, slaapkamer, tuin)
- De supermarkt
- Een balie/instelling/kantoor situatie
- Gevangenis
- Bus (stilstaand/rijdend)

Elke situatie heeft meerdere omgevingen.
De triggers en helpers die o.a. beschikbaar* zijn

- Geluid
 - Sirene
 - Rinkelendgeld
 - Blaffendehond
 - Huilendebaby
 - Pratendemensen ○ Lachendemensen
- Tekst
 - TekstaanpassenopTV/banner/balken
 - Muziek
 - Gesproken zinnen in de omgeving
 - Boze/blijezinnen
 - Profielgroep
 - Aantal karakters die rondlopen
 - Karakter aankijken/wegkijken/stiekem kijken
 - Afstand langslopen

*: CleVR B.V. is continu in ontwikkeling en er zijn regelmatig nieuwe updates. Dit maakt dat deze lijst niet uitputtend is. Er worden op dit moment verslaving gerelateerde interventies,

situaties en triggers/helpers ontwikkeld die tijdens dit onderzoek tevens gebruikt zullen worden.

Uitgebreidere toelichting over de procedure en werving

Er zullen in deze studie, vier VR-templates gebruikt worden. Een template is een blauwdruk van een risicovolle situatie voor problematisch middelengebruik in de virtuele omgeving. Deze VR-templates worden gemaakt in de VR-omgeving van genaamd 'Social Worlds' gemaakt door CleVR B.V. naar aanleiding van de focusgroepen uit de studie 'Triggers en Tech'. CleVR B.V. is op dit moment scripts aan het ontwikkelen die specifiek gaan over problematisch middelengebruik voor de behandeling van verslavingsproblematiek. Een script is een stappenplan voor de behandelaar, waarin aangegeven wordt wat hij/zij moet doen binnen de VR-omgeving bijvoorbeeld in een rollenspel. Daarnaast zijn er handleidingen beschikbaar vanuit CleVR B.V. en zal er nog een stappenplan voor behandelaren specifiek voor dit onderzoek ontwikkeld worden. Het is op dit moment niet bekend of CleVR B.V. deze scripts die zij ontwikkelen ook voorlegt worden aan de behandelaren, zodoende doet de

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onderzoeker dit wel. De scripts worden voorgelegd aan de behandelaren om te toetsen of de scripts aan zullen sluiten bij de patiënten. Samen met de betrokken behandelaren zal de onderzoeker een keuze maken in de scripts en op basis daarvan vier templates bouwen, indien deze nog niet gebouwd zijn door CleVR B.V. Als deze al wel gebouwd zijn door CleVR B.V. dan zullen vanuit daar vier templates gebruikt worden. De templates staan al dan klaar in het programma 'Social Worlds' en zijn voor iedere behandelaar te gebruiken. En op basis van het script doorloopt iedere behandelaar de procedure op dezelfde wijze.

Voordat een behandelaar start met een template, zal de behandelaar een korte introductie geven aan de patiënt om te wennen aan het gebruik van VR-bril. De behandelaar doet dit door de patiënt ongeveer vijf minuten rond te laten lopen in de VR-omgeving. Hierbij legt de behandelaar uit wat de principes zijn van VR, waar hij/zij op moet letten en legt veiligheidsafspraken voor. Deze regels en afspraken staan allemaal benoemd in het stappenplan: 'VR stappenplan Triggers & Helpers' of via de algemene instructies voor het apparaat. Er komt nog een stappenplan voor de behandelaar bij dit onderzoek.

Wanneer de template gestart is, kan de template in de sessie nog verder gepersonaliseerd worden. De behandelaar stelt de patiënt een aantal vragen die gaan over risico verhogende of verlagende factoren:

- De profielgroep. Dit betreft het uiterlijk van een x aantal karakter in de virtuele omgeving. Voorbeeld: Wanneer iemand meer spanning krijgt als mensen een hoodie dragen, dan kunnen deze als profielgroep ingesteld worden en gedurende de sessie toegevoegd of verwijderd worden.
- Hoeveel mensen in de situatie. Er zijn minimaal drie tot maximaal 40 karakters (inclusief de karakters in de betreffende situatie) beschikbaar die gedurende de sessie aangepast kunnen worden. Voorbeeld: Wanneer iemand meer spanning ervaart als het een drukke omgeving betreft dan kan de situatie ter plekke drukke gemaakt worden.
- Geluiden. Dit gaat over zowel helpende als niet helpende geluiden. Voorbeeld: Wanneer iemand meer gespannen wordt, omdat hij een sirene op de achtergrond hoort, kan dit toegevoegd worden.

- Gesproken zinnen. Dit kunnen standaard zinnen zijn of wanneer de patiënt specifieke zinnen heeft, kan de behandelaar deze ook nog ter plekke toevoegen. Voorbeeld: Wanneer iemand het lastig vindt om nee te zeggen wanneer hem een joint aangeboden wordt, kan deze zin toegevoegd worden.
- Middelen. Er zijn diverse middelen beschikbaar zoals alcohol, weed, pillen.

De VR-sessies worden aangeboden in een lopende evidence-based CGT-behandeling. Dimence, team Verslavingspsychiatrie maakt over het algemeen gebruik van het CGT-protocol gericht op middelengebruik ontwikkeld door Resultaten Scoren of een afgeleide versie hiervan (Merckx, 2014; Schippers et al., 2014). Dit protocol ziet er globaal als volgt uit:

- Sessie 1: Voorbereiden op verandering
- Sessie 2: Doelen en zelfcontrole maatregelen
- Sessie 3: Zelfcontrolemaatregelen en functie-analyse
- Sessie 4: Functie-analyse en noodmaatregelen
- Sessie 5: Noodmaatregelen en omgaan met trek
- Sessie 6: Omgaan met trek en veranderen van gedachten
- Sessie 7: Veranderen van gedachten en weigeren van aangeboden middelen
- Sessie 8: Weigeren van aangeboden middelen

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- Sessie 9: Tussenevaluatie en vaststellen keuzethema's
- Keuzebijeenkomst: Sociale vaardigheden: een praatje maken
- Keuzebijeenkomst: Sociale vaardigheden: omgaan met kritiek
- Keuzebijeenkomst: Sociale vaardigheden: geven van kritiek
- Keuzebijeenkomst: Omgaan met sombere stemming
- Keuzebijeenkomst: Omgaan met spanning
- Keuzebijeenkomst: Effectief problemen oplossen
- Keuzebijeenkomst: Omgaan met terugval

Bij sessie 3 en 4 wordt er gewerkt aan de functieanalyse en bij sessie 5 en 6 aan het onderzoeken van gedachten. Idealiter worden de VR-sessies gepland in een lopende behandeling tussen deze sessies in het protocol. Er zullen twee VR-sessies ingepland worden bij de VR-behandelaar. Tussen de eerste en de tweede VR-sessie zitten minimaal vijf tot maximaal twintig werkdagen. In de eerste VR-sessie volgt allereerst een korte introductie en kennismaking met het VR-apparaat. In de twee VR-sessies moeten minimaal twee en maximaal vier templates doorlopen worden. De sessies duren gemiddeld 60 minuten. Na elke VR-sessie volgt er een interview met de patiënt en de behandelaar. Het interview wordt afgenomen door de onderzoeker of een bij het onderzoek betrokken persoon. Dit kan via beeldbellen of op locatie. De interviews duren tussen de vijftien en 45 minuten. In veertien dagen na de tweede VR-sessie volgt er een nog een laatste interview met de behandelaar en de patiënt. De interviews worden met schriftelijke toestemming van de respondenten opgenomen op audio.

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