Improving VR-CBT for individuals with substance use disorder and a mild intellectual disability: an interview study

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Abstract

People with a mild intellectual disability (MID) experience significant problems in life related to their disability, including a disproportionate risk of developing a substance use disorder (SUD). One of the most common (and effective) forms of treatments for SUD is cognitive behavioral therapy (CBT). Yet, people with MID seem to benefit less from this approach, as this type of treatment requires people to have a certain level of cognitive functioning, which people with MID often struggle to achieve. Integration of VR into CBT for people with MID could make CBT treatment more effective. However, limited research and interventions are available which incorporate VR into CBT for this target group (VR-CBT). Furthermore, client perspectives are often not included when developing new SUD interventions, leading to practical problems, including interventions not being feasible for clients. This study aims to bridge this gap, by including lived-experience experts, who will rate the suitability of VR-CBT for people with a mild intellectual disability, and provide recommendations.

To meet this study goal, five lived-experience experts who had experience with people with MID, were interviewed. In these semi-structured interviews, the experts were asked to provide considerations related to people with MID, and provide opinions on VR and CleVR. Finally, the lived-experience experts provided opinions of concrete VR-CBT exercises and rated the suitability of these exercises for people with a mild intellectual disability.

With the results of the interviews, five guidelines were formulated, which could be used to serve as a starting point for tailored VR-CBT treatment for people with MID and SUD. These guidelines include designing a visual guide for understandability, including people with MID in further stages of development, removal of a specific aspect on the flashcards, development of an VR-CBT coping styles protocol, and VR's potential for inclusion in different stages of CBT. The overall results of the study indicate how VR is a suitable addition to CBT for individuals with a mild intellectual disability.

Introduction

Substance Use Disorders (SUD) are universally acknowledged to be widespread across populations, and have severe consequences (Murray et al., 2019; Vasilenko et al., 2017). This also applies to the Netherlands, where 7.1% of the population qualified for SUD in 2022 (Ten Have et al., 2023), using the classification of SUD according to *the Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; DSM-5; American Psychiatric Association, 2013). In this characterization, substance disorders are defined as a collection of 11 symptoms, of either cognitive (e.g. experienced lack of control over consumption), behavioral (i.e. spending a considerate amount of time related to the acquisition, usage and recovery of the substance) or physiological (e.g. experience of withdrawal) nature, which indicate that an individual keeps on using a substance, such as alcohol, cocaine or cannabis, despite its negative implications (APA, 2013). Consequences of SUD can range from personal problems, such as comorbid medical conditions and unstable family ties, to societal issues, like increased illegal activity and a stronger reliance on the social welfare system (Daley, 2013). Given these severe outcomes and its common occurrence, SUD has been a topic that has faced a significant amount of attention in research (Tran et al., 2019).

A group that was found to have an increased likelihood of developing and maintaining SUD, and are thus seen as a risk group for SUD, are people with a Mild Intellectual Disability (MID) (Burgard et al., 2000; McGillicuddy, 2006; Van Duijvenbode & Van der Nagel, 2019). According to the DSM-5, (mild) intellectual disability is a condition characterized by deficits in cognitive abilities (e.g. problem-solving, planning and abstract thinking), and problems in adaptive functioning (e.g. social skills, personal hygiene-related issues), resulting in an individual having difficulties fulfilling the responsibilities of day-to-day life (APA, 2013). The reason why people with MID are more likely to have a substance use disorder, is that they have a higher tendency to possess common risk factors that are related to SUD (Van der Nagel et al., 2014). Risk factors related to their reduced cognitive abilities for example, are that people with MID experience a heightened influence of peer pressure, increased inhibition problems, and insufficient coping abilities (Van Duijvenbode & Van Der Nagel, 2019). Furthermore, it is found in practice that people with MID tend to make wrongful assumptions about what is considered normal substance consumption. These individuals tend to overgeneralize and overestimate overall substance usage, such as the belief that every person in the Netherlands uses drugs. Another example of this is the belief that if a peer consumes a lot of beer during a night out, they will do the same ever day (Van Der Nagel et al., 2012; Van Der Nagel et al., 2014). This leads to a person with MID normalizing their own substance use, and potentially overusing it. This increases the chance of problematic substance use, and thus the risk of developing a substance use disorder.

As a result of these numerous risk factors, the prevalence and impact of SUD on MID individuals are also relatively high. An increasing number of studies have suggested that people with MID are overrepresented in mental healthcare institutions, and (forensic) addiction treatment facilities (Bhandari et al., 2014; Luteijn et al., 2017). For instance, a study by Luteijn et al. (2017), done in a

Dutch forensic treatment center for addiction, found that 39% of the people in their sample had intellectual disabilities, compared to an estimation of around 6.4% in the regular Dutch population (Woltiez et al., 2019). Additionally, multiple studies have shown that the impact of substance abuse for these people is more severe, compared to individuals without MID (e.g. Slayter, 2008). Resulting from the interaction between their substance abuse and factors of their intellectual disability, people with MID are, for example, more likely to exhibit behaviors related to criminality and violence, and be more vulnerable for (sexual) exploitation (Slayter, 2008). Furthermore, societal exclusion, and financial problems are also part of the problems that individuals with SUD and MID disproportionately suffer from (Slayter & Steenrod, 2009). Designing adequate treatment is therefore of pivotal importance to counteract these consequences.

A traditional way in which substance abuse is treated is by using cognitive behavioral therapy (CBT). Cognitive behavioral therapies are among the most well-supported approaches for treating SUD (US Department of Health and Human Services, 2016). This form of treatment entails an approach that tries to identify an individual's problematic ideas, beliefs, and behavior (Beck, 1995), and replace them with more constructive cognitions, feelings, and behavioral patterns. More specifically for the Netherlands, a specific treatment approach following the CBT principles as described in the *Handboek cognitieve gedragstherapie bij middelengebruik en gokken,* includes components such as “registration and monitoring of usage”, “Drawing up a change goal and increase motivation to maintain this goal”, “learning of skills to cope with substances or gambling”, “changing of cognitions” and “improving general and specific problem-solving skills” (Schippers et al., 2014, pp.23-52). Ultimately, this treatment helps the client to deal with commonly occurring problems related to SUD, and generalize the learned skills to personal risk situations, so that these situations are recognized and (preferably) avoided. Eventually, the goal is that the individual manages to either reduce or completely quit their substance usage (Schippers et al., 2014). What can be deduced from this, is that traditional treatments rely heavily on the cognitive and adaptive abilities of a person.

Unfortunately, the reliance on these skills is also part of the reason why traditional CBT treatment is less effective for individuals with MID. In the Netherlands however, adapted CBT protocols are available, so that it is more suited to the abilities of people with MID. This form of CBT (CBT+) includes aspects of regular CBT for SUD, such as the self restraint (coping) skills known as ‘the 6D’s’: Distance (taking distance from a risky situations), Distraction (removing attention from substance), Declare! (declaring help), Different thinking and Different acting (finding alternatives), and Doing great! (give compliments for good behavior) (Van der Nagel & Kiewik, 2016). But it is also adapted to be more in line with the cognitive levels of people with MID. Examples of those adaptations include overall usage of simpler language in texts, increased repetition of exercises, more visual elements, and exercises that are more practical (Van der Nagel & Kiewik, 2016). Nonetheless, some of the difficulties that people with MID experience in traditional CBT treatment, are also not completely solved in this CBT+ treatment. For example, due to the cognitive and adaptive deficits that

most intellectually disabled people experience (e.g. problems with verbalizing thoughts, limited abstract reasoning abilities), people with MID often struggle to identify and express personal risk situations, and are also often unable to generalize the skills and insights learned in the neutral treatment room to real-life situations (Van der Nagel et al., 2014). This difficulty with generalization is not accounted for in current CBT+ treatment (Van der Nagel & Kiewik., 2016). Furthermore, it is assumed that for people with MID, environmental aspects play a big role in triggering SUD-related behaviors and cognitions, making it difficult to discuss, re-enact, and evaluate these thoughts and actions in a neutral treatment room, the way it is currently realized in CBT+ treatment (Kip & Van Der Nagel., 2021). Thus, while the tailored approach of CBT+ is more in line with the needs of people with an intellectual disability, adaptations are needed to this approach to increase chances of generalization and account for the important environmental aspect of SUD for this target group.

An addition that could alleviate this issue, is Virtual Reality (VR). Several (pilot) studies have reviewed VR as an addition to general SUD treatment, and have shown promising results (Segawa et al., 2020). A study that considered VR in combination with cue-exposure therapy (VR-CET), for example, found that exposing an individual to a substance in the safe environment of a treatment room, combined with the realistic context that VR provides, could reduce cravings for said substance and reduce chances of relapse (Tsamitros et al., 2021). However, another study looking at VR-CET found that this form of therapy by itself is ineffective in the long-term (Pericot-Valverde et al., 2019). A reason for this could be that VR-CET (or CET in general) addresses cravings but does not provide the tools on how to cope with these cravings, therefore reducing its effectiveness (Byrne et al, 2019). Combining VR-CET with CBT and Coping Skills Training could therefore be a promising solution, to retain the benefit of safe exposure to cravings as highlighted in VR-CET, while integrating the CBT coping styles to manage these urges over a longer course of time (Amista et al., 2017).

VR-CBT aims to integrate these approaches, as it focuses on cognitive restructuring and teaching coping strategies to help minimize strong psychological reactions (such as cravings) that occur in relation to substance use disorders (Langener et al., 2021a). Bordnick et al. (2012), highlighted the usefulness of this approach for people with a nicotine dependence. They found that VR-CBT reduced post-treatment craving levels and overall cigarette usage, as it allowed individuals to be exposed to customized triggering scenarios, and practice coping manners while in a safe and regulated setting (Bordnick et al., 2012). This safe VR setting is especially important, as it allows clients to evoke thoughts, feelings, and behaviors related to their addiction, but without the potential adverse effects that evoking these cognitions in the real world can have (Mazza et al., 2021). Furthermore, for people with MID specifically, Langener et al. (2021a) showed that exposing an individual to personal risk scenarios could trigger higher cravings for these individuals, compared to neutral settings. This therefore highlights how VR-CBT can contribute to eliciting SUD-related cognitions. This could be beneficial to overcome the issue that people with MID face in CBT+, where they are unable to reproduce SUD-related cognitions and subsequent behaviors due to the lack of

SUD-related triggers in the treatment room. Finally, a study that employed daily life skill training in a VR-setting, found that VR allowed for real-life skills transference and generalization for people with MID (Michalski et al., 2023). While this study was not performed in the context of SUD treatment, this does highlight that skills training in VR, similar to the coping skills aspect of VR-CBT for SUD, can aid in alleviating the issue with generalization from the treatment room to real life, which is also often encountered in CBT+ treatment for SUD.

While the aforementioned factors highlight how VR-CBT could be an effective improvement to SUD treatment for people with MID, only limited information is available on how exactly this approach should be integrated into the existent CBT+ treatment for people with MID, with few detailed protocols available or other methods that specify how to integrate this approach (Langener et al., 2021b). This study aims to help bridge this gap, by formulating specific guidelines for VR-CBT exercises, in order to be useful and suitable for people with a mild intellectual disability receiving treatment for SUD.

More specifically, this study will employ semi-structured interviews to interview lived-experience experts. Lived-experience experts are people who have suffered from SUD, and currently use their expertise as former clients to help people that are currently in recovery from SUD. In this study, the experts will provide feedback on the CleVR VR software, and on VR-CBT using predesigned VR-CBT exercises that can be conducted in this VR environment. The semi-structured format of this study allows for flexible questioning to gain in-depth insights into the opinions of the lived-experience experts, while maintaining a set structure to allow for comparison across interviews. The input of lived-experience experts is valuable, to ensure that clients are represented in designing the exercises. This way, insights can be gained into the needs of clients with MID undergoing SUD treatment, related to how a client needs to be addressed for example, or the extent to which exercises need to trigger, so that they are challenging and helpful.

The research question, and its sub questions are therefore formulated as follows:

How do lived-experience expert rate the suitability of VR-CBT for people with MID and SUD and how can VR-CBT exercises be designed to fit treatment for people with MID?

a) *What are factors related to the intellectual disability of people with MID, that need to be considered when treating people with MID and SUD?*
b) *What are the lived-experience experts' opinions on integrating VR, and specifically CleVR, into CBT treatment?*
c) *What are the lived-experience experts' impressions of the VR-CBT exercises?*

Method

Participants

This semi-structured interview study required the participants to have specific knowledge about intellectually disabled people who are undergoing SUD treatment. Consequently, purposive sampling was used to find participants, as this level of specific knowledge cannot be expected of participants when they are selected from a random population. People with MID undergoing SUD treatment were not included in this phase of the intervention development, since little was known about the trigger-inducing effect of the exercises for example, and participation in this study could therefore produce harmful effects for these individuals. Lived-experience experts were therefore chosen as the target group, as they were deemed most-representative as former clients. Participants were included if they have lived experience with SUD, and now play a role in healthcare to help people with SUD. Some of the clients that are helped by the lived-experience experts have MID due the high prevalence of MID within the SUD population.

Participants were invited to participate in the interview utilizing e-mails, and 50% of the experts to whom was reached out, consented to participation. Due to practical reasons, such as overall availability and specificity of the target population, a limited number of participants were interviewed. This means that in total, five lived-experience experts, whom were all Dutch, participated. Four participants identified as male (*M*age= 51.25, *SD*age= 4.06, age range = 45-58), and one as female (*M*age= 63, *SD*age = n/a). Four of the participants worked as lived-experience experts in addiction care for Intact, a branch of Tactus, and one participant as a senior supervisor at a care organization for people with intellectual disabilities. They had been working at their respective professions for an average of 7.3 years (SD = 4.01), ranging from 3.5-15 years. 3 participants had experience with VR in relation to their professions, of which 2 were familiar with the CleVR software. None of the participants had an active role in CBT treatment. All had worked with people with MID and SUD before.

The interviews were conducted in Dutch, between 23 and 29 April 2024. Two of the interviews were conducted as duo interviews, to cater to personal preferences of the participants. Participation in the interviews was voluntary. On April 3, approval was granted for this study by The Ethical Committee of the BMS faculty at the University of Twente (number 240437).

Materials

CleVR software

CleVR is the VR framework used in this study, which was altered to fit into CBT to treat people with SUD, and can therefore be used as a form of VR-CBT (*CleVR Producten,* n.d*).*
In the second part of the interview, participants were shown a video displaying the possibilities of CleVR, retrieved from Youtube (CleVR Virtual Reality, 2022). The video takes the perspective of a person wearing the glasses, meaning that participants were able to see what a client would experience,

if they were to undergo treatment in this software. The video showcases examples of some of the CleVR scenarios in which VR-CBT can be carried out. Participants for example saw a scenario of a person walking through a supermarket, being in a doctor's office, a park, and a person addressing the client while on the streets (Figure 1).

Figure 1

Impression of the CleVR video shown to the interviewees

Note. From Promo (EN) CleVR SW4 - Dynamic Interactive VR software for Mental Health, Training and Education, by CleVR Virtual Reality, 2022 (https://www.youtube.com/watch?v=4X5XeTD0kWM).

Besides picking a scenario in line with the needs of the client (e.g. practicing in a supermarket for people who abuse alcohol), participants were informed that the scenarios could be altered in collaboration with the therapist to fit the needs of the client more, that the therapist was able to see what the client saw through a separate screen, and that they could talk to the client. Furthermore, participants were also informed about other possibilities of the CleVR software, which enable personalization and manipulation of the scenario's, including the addition of characters resembling a person the client knows, adjustment of the number of characters, inclusion of police officers or dealers, and controlling the facial expressions of characters. Finally, the interviewees were informed that the therapist can play a virtual character with whom the client can role-play, and that the therapist can manipulate the voice and behavior of this virtual character. (*CleVR Producten,* n.d*)*.

VR-CBT Flashcards

This study investigated VR-CBT, using the VR-CBT flashcards designed by the TRIGGERS & TECH project. The flashcards were tailored to clients with MID, and intended to serve as guidelines for therapists. The participants saw the flashcards in the third part of the interview, and were informed that these flashcards were developed to be conducted in CleVR. Furthermore, they were notified that the exercises on the flashcards were based on the six D's (Dutch: six A's) coping skills of CBT (Van Der Nagel & Kiewik, 2016). These respective coping skills on the flashcards included "Distance", "Declare", "Different Thinking", "Doing Great", "Distraction", and "Different Acting" (see Appendix I for all used flashcards). Each flashcard contained the goal, description, the exercise's degree of

difficulty, and the triggers and helpers of the exercise. Additionally, the flashcard contained the steps of the exercises. These steps were divided into three segments, namely instructions on what to do before the client puts on the VR-headset, what can be done while in the VR environment, and instructions on how the reflect on the exercise. Table 1 gives and overview of all the flashcards that were used in this study, and Figure 2 shows an example of exercise 1, *Different Thinking.*

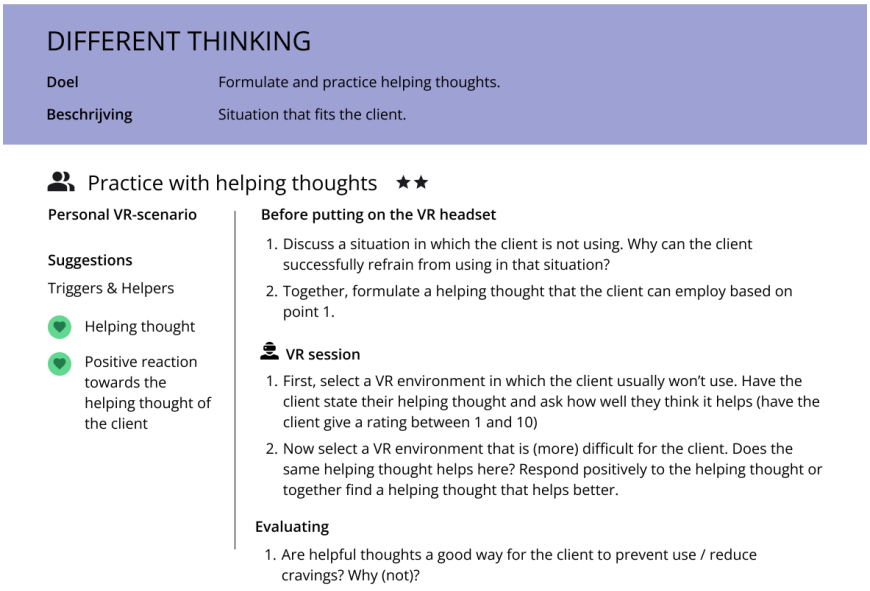
Table 1

Overview of VR-CBT flashcards and its descriptions

Exercise	Description
1, *Different Thinking*	The client learns to formulate and practice helping thoughts, in a situation that fits the client.
2, *Different Acting*	The client practices other behavior, at the bar by ordering a drink.
3, *Distance*	The client learns to take distance from riskful use situations, at the liquor department of a supermarket.
4, *Different Thinking*	The client learns to discover dangerous thoughts and replace them with helpful thoughts, at the pub or at home with friends.
5, *Declare*	The client learns to say no, and learns to indicate what they do and do not like, in a situation that fits the client.
6, *Distance*	The clients learns to take distance from riskful use situations, at the supermarket near the beverage department.
7, *Doing Great*	The client learns how to receive compliments, in the living room with a friend.

Figure 2

Example of flashcard 1, Different Thinking which was shown to the interviewees



Note. Developed by the Triggers & Tech project team.

Procedure

The appointments for the interviews were scheduled via mail and were conducted in real-life. The interviews at a location preferred by the participant, such as the participant's workplace. Two of the interviews were conducted as duo interviews, to cater to personal preferences of the participants.

To begin the interview, participants were provided with a short introduction regarding the purpose of this study and were informed about the handling of the data and the rights of the participants. Then the recording, using a Zoom H4N Pro Voice/Sound recorder, was started and the interviewees were asked to give verbal informed consent. A semi-structured interview scheme was created for these interviews (Appendix III). This scheme was developed to harness in-depth knowledge and insights from lived-experience experts into the suitability of CBT-VR exercises for MID individuals with SUD, and was translated to Dutch to cater to the native language of the interviewees. The content of the interview scheme was based on previous literature discussed in the introduction, the content of the flashcards, and the authors experience with CleVR. Furthermore, this interview scheme was designed in collaboration with two other researchers working on a similar project. The interview consisted of three parts, and was structured from general topics to more specific questions about the CBT-VR exercises.

In the first part, participants were asked about their profession, their role in addiction healthcare, and the extent to which they were familiar with the topics central to this study, such as VR and CBT but also experience with MID. If the participants were unfamiliar with a certain topic, then a small explanation would be provided. Examples of questions that were asked in this section include *"Could you tell me something about yourself and your current profession?"* and *"To what extent do you play a role in CBT treatment?"*.

For the second part, participants were given an explanation about the possibilities of the CleVR software, and were shown the aforementioned video about CleVR. Then, they were asked to reflect on the software and its possibilities for SUD treatment, based on what they saw in this video, with an exemplary question of this segment being: *"What are your first impressions after seeing this video?"*.

The third part of the interview revolved around the CBT-VR flashcards. The interviewer decided per interview which flashcards would be used, and explained how the flashcards were based on the 6 D's. Furthermore, participants were informed that the flashcard is only viewed by the therapist in the treatment context, and that they are meant to be personalized to a client's needs. Participants were then shown this flashcard and asked to give their opinions and potential improvements regarding the CBT-VR exercises, with questions such as *"What do you think of the VR aspect of this exercise?"* and *"How would you change this exercise to make it suitable for people with MID receiving treatment for SUD?"*. These questions were then repeated in a new round where another flashcard was presented to the participants. Participants were shown a maximum of three

flashcards, leading to a total of 7 out of the 11 flashcards being presented, with the remaining flashcards not being presented due to time constraints. Participant one reviewed flashcard 1 and 2, participants two and three saw flashcards 3 and 4, and participants four and five were presented with flashcard 5, 6 and 7. Then, the interviewees were asked some closing questions, for instance *"Do you have any additional recommendations based on the flashcards you just saw?"*.

The interview was concluded after the participants were asked if they had some final questions or remarks. The interviewees were also provided with contact information from the researcher, in case any further questions, recommendations or remarks after the interview arose. The average duration of the interviews was 53 minutes.

Data Analysis

The recorded interviews were transcribed verbatim and uploaded to Word, after which the transcript was adapted by hand. All personal information, like dates, locations, and names, was anonymized using square brackets: the name of interviewee 4 was for example changed to 'Participant 4.' Then, the anonymized interviews were transferred to Atlas.ti software, a research tool that is used often for qualitative research, after which the transcripts were analysed.

For the analysis of the data, a combination of a deductive and inductive approach was used by the researcher to establish the codes. In the first round, the initial codes were harnessed in an inductive way, so that the reported experiences could be interpreted as truthful to their original intentions as possible. After the first set of codes was generated, a second researcher working on a similar project was asked to review the codes, to increase reliability. After this, a second round of coding was carried out. The codes were then deductively divided into general themes that align with the topics of the interview scheme, such as '*Features of MID individuals related to SUD and its treatment'* or '*Impressions VR-CBT exercises*.' The codes were then per theme divided into categories such as '*Therapy-related characteristics CleVR'* and were, when applicable, coded into positive and negative codes. The codes were continuously reviewed and revised if necessary, making it an iterative process. The final codes were then allocated to a total of 5 themes, with the complete distribution of the codes being further elaborated in the results section, and the codebook in Appendix II.

Results

The results from the interviews will be analyzed using the following 5 themes: 1. *Features of MID individuals related to SUD and its treatment*, 2. *General impressions of VR,* 3. *Opinions on CleVR,* 4. *Impressions VR-CBT exercises and* 5. *VR-CBT recommendations.*

Theme 1. Features of MID individuals related to SUD and its treatment

The first theme (Table 2) that was identified revolves around remarks participants made about features of MID individuals, which are related to SUD and its treatment. The theme firstly considers challenges in daily life and treatment, and secondly identified additional needs that people with MID have, which need to be fulfilled to make treatment (more) effective for this target group.

Table 2

Features of MID individuals related to SUD and its treatment

Categories	Code	*N(a)*[1]
Challenges in daily life and treatment		26
	Housing issues	3 (2)
	Stronger need to belong	3 (2)
	Understanding difficulties	8 (3)
	Application difficulties in real-life	5 (2)
	Shorter attention span	5 (2)
	Less patience	1 (1)
	More quickly overwhelmed	1 (1)
Needs in treatment		12
	Increased need for repetition	5 (4)
	Increased need for simple language	2 (1)
	Clear focus of task	1 (1)
	Require personalized approach	4 (3)

[1] *N* refers to the total frequency of the code, and (*a)* the number of participants mentioning this code.

Challenges in daily life and treatment

Regarding daily life issues, participants mentioned that addiction seems to be more difficult for people with MID, as they also face an increased number of complex problems related to their disabilities, like **issues** with **housing**. Additionally, participants mentioned that people with MID are more likely to fall into addiction, as they have a **stronger need to belong**, compared to people who do not have an intellectual disability. Participant 5 stated for example: *"Those kinds of people, who already feel a bit left behind, also want to belong and I think that's a really big thing. They want to fit in, they want to join in with the crowd, so they quickly fall into an addiction and they don't even know what it is. Yes, then it's already too late."*

Concerning the challenges that people with MID face in addiction treatment, more so than people without a mild intellectual disability, several codes were found. The code that was most mentioned was that intellectually disabled people have **problems with understanding** of things that are said, and also have **application difficulties in real life.** Meaning they try to apply the skills and knowledge they learned in treatment to real life, but are often unable to do. Participant 1 said: *"And*

they know how to tell it all very easily or beautifully. Exactly what has been learned, they can teach themselves things very well. [..] I know some who I speak to regularly. And if I then ask yes, why did it go wrong? Well, then a very standard thing is told straight from the book. Yes, I've bitten off more than I can chew. And then I say, what are you going to do now? Yes, then I'm going to take it easier now […] and then you realize [that they do not know how]." Other challenges that arose, are that individuals with MID have a **shorter attention span**, typically have **less patience** and are **more quickly overwhelmed**.

Needs in treatment

Participants also identified some additional needs that people with MID have in treatment. Participants mentioned how people with MID have an **increased need for repetition**, an **increased need for simple language**, and require **a clear focus of the task** at hand for treatment to be successful. For the latter, one participant mentioned how you should provide people with MID with a limited amount of options, and only focus on these, for example. Finally, participants mentioned that people with MID **require a personalized approach**, as there is a large variety between one person with MID and another**.**

Theme 2. General impressions of VR

The following theme that was identified considers general opinions participants have about VR as a means for treatment (Table 3). The first category related to this theme discusses general attitudes participants had towards VR, and the second category regards potential client traits users have, which can be related to the usage of Virtual Reality in treatment.

Table 3

General impressions of VR

Category	**Code**	***N(a)*[1]**
Attitude towards usage VR		
		17
	Positive attitude	8 (5)
	Seen as promising technology	4 (2)
	Need for something new	5 (3)
Client traits needed for VR		13
	Motivation for treatment	10 (4)
	Openness to experience VR	3 (1)

[1] *N* refers to the total frequency of the code, and (*a)* the number of participants mentioning this code.

Attitude towards usage VR

Participants overall had a **positive attitude** about the usage of VR in treatment, as participant 3 mentioned: "*I think VR can be very helpful, not just here, but in all kinds of situations."* It was indicated that adding VR in the case of treatment is 'an actual addition', and a 'new development' to current CBT treatment, therefore the code of **seen as promising technology** was identified. Furthermore, they, for example, mentioned that in addiction treatment it was worth a try to use VR, as addiction treatment in general has the **need for something new**, as a lot of people seem to relapse. Participant 5 mentioned*: "I think something should be added anyway. With how things are going now. With the years. You constantly hear that things are going wrong, and from so many people I hear: 'I am here for the 8th time. I am here for the 10th time.' People are never almost never in [an addiction clinic] for the first time, often they have been there 4 or 5 times, so I'm always thinking about it. […] what can we do so that the success rate is higher?"*

Client traits needed for VR

Participants also mentioned some client traits that could affect whether VR could be useful for addiction treatment or not. The code that was mentioned most was that clients must have the **motivation for treatment**, in general. Participant 4 stated how *"You see some people sitting in a clinic and I think, well? I don't know what you're doing here? A little vacation, a little fun. [..]someone who is really seriously looking for something, like I have to change now, because otherwise? Then I guess it is…"* Finally, besides having the general motivation for treatment, participants noted how you need to have **the openness to experience VR**, as not everyone is always willing to try out every new way of treatment, as one participant noted: *"Yes, I wanted to know everything and I just didn't want to use anymore. Anything I could use or deploy for that. Yes, I insisted on that, but yes, then you have to have a certain mindset."*

Theme 3. Impressions of CleVR

This theme looks at the opinions the participants have about aspects of CleVR. The codes are divided into three categories, as highlighted in Table 4.

Table 4

Opinions on CleVR

Category	**Code**	***N(a)*[1]**
Appearance CleVR		12
Positive		3
	Immersive experience	3 (1)
Negative		9
	Unrealism graphics and behavior	9 (3)

Therapy-related characteristics CleVR			53
	Positive		42
		Practice behavior	3 (2)
		Insight into reactions to difficult situation	7 (4)
		Safe setting	4 (4)
		Realistic scenarios	9 (4)
		Good transition from inpatient setting to real world	14 (2)
		Voice-morphing	3 (2)
		Realistic role play with therapist	2 (1)
	Negative		11
		Unrealistic scenario	3 (1)
		Inability to engage	5 (1)
		Potential arousal negative feelings	3 (2)
Suggestions CleVR			4
		Improve graphics	3 (2)
		Use as transitionary device	1 (1)

[1] *N* refers to the total frequency of the code, and (*a)* the number of participants.

Appearance CleVR

The first category considers the opinions on the appearance of CleVR, the code that was mentioned most here was the **unrealism of the graphics and behavior.** Participant 2 mentioned that the graphics of the people, dogs, and the glass “make me laugh”, and Participant 1 said the people look very fake, especially compared to for example current video games. However, participant 1 has experienced CleVR before, and for them it was a very **immersive experience**, highlighted in the following quote: *“But after wearing the glasses. Yes, you are also so immersed in the story, so to speak, and then it becomes a lot less noticeable. Yes, at least that's according to my experience.”*

Therapy-related characteristics CleVR

The second category mentions which aspects of CleVR were found to be useful or not useful for addiction treatment. Overall participants thought CleVR could be a very nice addition for

treatment. The code that was mentioned most often, was that participants said that for an inpatient setting, CleVR could be useful as a **transition from the treatment in the clinic to the real world**. Participant 4 and 5: *"It is a training for the outside world, of what you can encounter, because in the clinic it [recovering from SUD] all seems so easy […] and your addiction brain knows that too."* Participants also acknowledged some **realistic scenarios**, such as the supermarket and bar, which were seen as difficult environments for many who struggle with a substance use disorder. Participants also liked that the software allowed **insight into the reactions to a situation** that a client finds difficult. Participant 3 expressed the following in this context: *"then this will really help, I think. Especially because you can practice situations. And what happens if you say no to that person for once? Yes, does he get angry, or this or that and how do you deal with it? Seeing it once and experiencing it might be very helpful."* The final positive aspects of CleVR that were mentioned, is that the software allows the client to **practice behavior** while in a **safe setting**, that **voice-morphing** can be enabled, so that the persons with who clients can engage in the software do not have the connection with the therapist, and the ability of the software to enable **realistic role-play with the therapist**. Participant 4: *"But he [the client] already sees a figure, I'll call it a figure, opposite him with a beer glass in his hand, then the therapist can play the one with the beer glass? [...] Well, see that's what I mean! Yes Yes."*

As for negative usefulness aspects of CleVR, some codes were also identified. One participant mentioned they would be **unable to engage** in this software, due to its lack of realism. The following quote by Participant 2 supports this: *"Yes, I would not take it seriously then."* and "*Yes, the thing is that as soon as I have the idea that I am not being taken seriously or that I am perceiving it as unserious. Yes, I am going to try everything, to I think make me agree [with my own actions], yes, yes."* Participants also mentioned that using this software has the potential to **arouse negative feelings** and act as a trigger for strong cravings. Finally, participant 5 felt the bus was **an unrealistic scenario**, as they did not understand how this scenario could be related to addiction and its treatment.

Suggestions CleVR

The final category revolves around the suggestions that participants mentioned to make CleVR more suited for addiction treatment. Participants suggested that **improvement of the graphics** could be useful, to eliminate the aforementioned issues related to realism. Furthermore, a participant also mentioned that CleVR could rather be used as **transitionary device** between a treatment room and a hyperrealistic VR software, to slowly increase the level of difficulty.

Theme 4. Impressions VR-CBT exercises

This theme considers the opinions participants had about the VR-CBT exercises. The theme is divided into multiple categories. In the first category the value of VR per CBT exercise is discussed, the second category considers the structure of the exercises, the third category considers the triggering

effect of the exercises, and the final category looks at specific remarks participants made about the suitability for people with MID.

Additional value of VR for CBT coping exercises

This category considers the extent to which participants reported the additional value of enacting the CBT exercises in VR. The codes in Table 5 are divided into positive and negative aspects, and it's mentioned for which exercises the codes applied

Table 5

(Additional) Value of VR for the CBT coping exercises

Category		Code	N(a)[1]	Exercise
Value of VR for CBT coping exercises			20	
	Positive		16	
		Hopeful VR enhances engagement exercise	2 (1)	General
		Minimize gap clinic to real-life	6 (2)	General
		Good way to practice	8 (3)	2, 3, 4
	Negative			
		VR unnecessary addition	4 (2)	4

[1] *N* refers to the total frequency of the code, and (*a)* the number of participants.

Overall, participants thought that adopting VR into the specific CBT exercises, was a useful addition. More specifically, a participant was **hopeful that VR could enhance engagement**, participant 1: "*Yes, for example in a game or something, everyone can get carried away like that? Well, I hope that's the case here [in VR-CBT] too, that people get carried away in the [VR] situation."* Furthermore, for inpatient treatment, it was mentioned how VR can **minimize the gap from the clinic to real-life**. Clients often do not realize that the actual difficult part of treatment begins once the client has left the clinic, as you are then back in the environment where you are faced with your addiction. Participant 4 elaborated: "*Yes and that is always said [to them]. But it is not felt, so to speak. And with this [doing the exercises in VR], there's probably more of that, in any case."* And for exercise 5, *Declare*, the participant said: *"And then it is a good thing to employ that [saying no aspect of exercise 5, Declare] in VR, in the clinic. […] this is something that you definitely have to learn, as that is what many encounter when they are back outside".* Finally, it was mentioned how VR was deemed useful as a **good way to practice** the coping skills of the VR-CBT exercises. For exercise 3, participants liked that the flashcards could safely be practiced in a supermarket environment, and another participant said the following for exercise 2, *Different Acting*: "*Yes, this [VR] is great to practice, right? Yes, this*

is good. I think so. [...] Yes, especially with people who force things on you or dealers who do that of course. But friends too, friends who do use. [...]And yes, you can really practice those kinds of things there [exercise 2, Different Acting]." – Participant 1.

As for an exercise where interviewees thought VR would **be an unnecessary addition**, participants stated that it was the case for exercise 4, *Thinking Differently*. Participants reported how the clients are constantly confronted with dangerous thoughts illustrated in the exercise, and therefore do not require VR-simulation. Participant 3: "*Well when I read this. I think people constantly face this, so you don't really need the glasses for that. I think they continuously make a decision every second between whether I am going to use or whether I am not going to use."* The VR-CBT exercise was therefore seen as more useful when it is enacted as a traditional CBT exercise, and thus without VR.

Structure of VR-CBT exercises

In this category, the usefulness and clarity of the exercises, according to participants, is evaluated using structural aspects of the exercises (Table 6).

Table 6

Structure VR-CBT exercises

Category	Code	N(*a*)[1]	Ratio[2]	Exercise
Structure VR-CBT exercises				
	Representation of goal	10	100%	
	Positive	8(4)	80%	1,2,3,4,5,6,7
	Negative	2(2)	20%	4
	Understandability exercise	16	100%	
	Positive	10(5)	62.5%	1,2,3,4,5,6,7
	Negative	6(2)	37.5%	3,4,6,7
	Additional value degree of difficulty	16	100%	
	Positive	3(2)	18.75%	7
	Negative	13(4)	81,25%	General
	Representation CBT	4		
	Positive	3(2)	75%	3
	Negative	1(1)	25%	3

[1] *N* refers to the total frequency of the code, and (*a)* the number of participants. [2] Ratio refers to the relative distribution of the codes in percentages.

Firstly, regarding the level of **representation of the goal** of the VR-CBT exercise, participants mostly indicated a clear goal and an accurate representation in most exercises. With participant 1 stating the following for exercise 1, *Different thinking*: *"This [goal], yes I find it really clear"*. However, an exception for this is exercise 4, where it was said that the intention was clear, but it was deemed uncertain if the exercise would produce its intended outcome if the exercise remained in its current VR-CBT form.

Furthermore, regarding **the level of understandability of the exercises**, mixed codes arose. Three participants showed a clear understanding of the flashcards they saw. Additionally, a participant reported how exercise 4 would be understandable for the therapist. However, this participant personally firstly required a more extensive explanation than what was provided on the flashcards, as for them otherwise the exercise was unclear. This was due to exercise 3 missing a simple explanation element, and exercise 4 containing a large amount of text. Similarly, a participant had difficulty with understanding some of the individual steps. Participant 5: "*'Discuss that you are going to practice taking compliments' What do you mean by that?"*

As for **additional value of the 'degree of difficulty'** aspect of the flashcards, which is an addition on the flashcard that aims to represent the difficulty of the exercise on a scale from 1-3 stars, the code distribution supports how participants mostly indicated that it had no additional value. Exercise 7, *Applause*, was the only specific exercise where the degree of difficulty was deemed an appropriate fit. Participants thought this exercise to be useful, but confrontational, and was according to them therefore correctly rated as 1 out of 3 stars. Besides this exercise, participants reported the degree of difficulty to be an overall unhelpful addition to the exercises. One participant mentioned how exposure to addiction is difficult, no matter the circumstances and can therefore not be rated on a scale. Additionally, it was said that what is difficult for someone, is client specific. Participant 4 highlights this: *"Yes, I find it difficult. Of course you personally know what is 3 or 1 or 2 [stars] for those people? Because that can be very different per person. Because for some people the supermarket is really difficult. [...] for the others, he can walk into a café, drink a cup of coffee on the terrace while everyone around him is sitting around drinking beer and he doesn't find that that difficult, so I would find it difficult to say."* Finally, it was noted that the degree of difficulty is also dependent on the VR-scenario that is used for an exercise: *"Well, because it also depends on what video is shown of course. […] Look, if a person with the 'learning to say no' exercise (exercise 5) enters a house and there are drugs on the table and multiple users are using a bong or smoking a joint, then, yes, the difficulty will go up. In comparison with when someone enters a house and there is just someone sitting there."*- Participant 4.

Regarding some of the CBT aspects of the exercises, participants **recognized CBT aspects** in exercise 3, *Distance*. Additionally, for that same exercise, a participant mentioned how the flashcard resembled aspects of therapy they had had in an inpatient clinic, such as planning out potential situations and ways in which you can cope with them. However, they felt that the exercise lacked a

clear explanation aspect that is normally provided in therapy. Participant 2: *"Yes, you have the conversations, and you look at the situations and they explain it step by step and that (explanation) is what is a bit missing here."*

Triggering effect of exercises

This category considers the triggering effect of exercises. The outcomes are presented in Table 7. The majority of the VR-CBT exercises had an appropriate trigger.

Table 7

Triggering effect exercises

Category	Code	N(a)[1]	Exercise
Triggering effect of exercises		15	
Positive		12	
	Appropriate trigger	6(4)	2, 3, 5, 6
	Recovery from SUD triggering in itself	2(1)	general
	Exercises should trigger	4(1)	general
Negative		3	
	Too triggering in its current form	3(2)	4

[1] *N* refers to the total frequency of the code, and (*a)* the number of participants.

More specifically, one participant mentioned how **recovery from SUD is** difficult and **triggering in itself**, and thus an exercise could not be too hard. Furthermore, a participant mentioned how the exercises **should trigger** as it is needed for effective treatment: Participant 1: *You actually hope it in a way, right? that you trigger something in someone that is really difficult for him to deal with. I mean, I think it is then. Yes, I think that is educational."* […] *I think it's actually good. Even if someone is going to experience enormous cravings or is it going to be very difficult for someone to do this? Yes, this is the place to practice."* In contrast with these exercises, for flashcard 4 the exercise was considered **too triggering in its current form**. As doing the exercise in VR was deemed too confrontational, and seeing triggering words related to substances like 'a line' were difficult for the interviewee to face. One participant said *"I have been clean for a long time now, but even I would greatly struggle with this."*

Suitability for MID

This category considers specific remarks that participants reported about the suitability of the flashcards for people with MID. In this category, some positive and negative aspects were identified (Table 8).

Table 8

Suitability exercises for people with MID

Category	Code	N(a)[1]	Exercise
Suitability VR-CBT for people with MID		31	
Positive		18	
	Repetition across multiple sessions VR-CBT	2(2)	General
	VR helps with application difficulties in daily life	1(1)	General
	Trains challenging skills for people with MID	9(2)	5,7
	Challenging but helpful step	2(1)	1
	Personalised sentences	2(2)	6
	Collaboration with therapist	2(1)	1
Negative		15	
	Too much information for client	1(1)	4
	Unsuitable language	10(3)	2, 7
	Facial expressions needed for difficult exercise	2 (1)	4
	Potential to take VR too literally	1 (1)	general
	Cannot know how a person with MID thinks	1 (1)	7

[1] *N* refers to the total frequency of the code, and (*a)* the number of participants.

Overall, possibilities of the exercises that particularly suited individuals with MID, include the option to repeat the exercises. Since people with MID often need more time for a taught skill to be understood and mastered, and for the severity of the reaction to a risk situation to decrease, the **repetition across multiple sessions** of the VR-CBT exercises was deemed especially well-suited. Furthermore, when participants were asked if VR was more useful for people with MID than for people without MID, it was mentioned that the VR-aspect was deemed especially suitable as **VR helps with application difficulties in daily life** which people with MID often struggle with, one participant responded: *"I think so, because I notice after the clinic that they do take it in. They nod and say yes, and I can do it all. But then they can't. Yes, I do notice that"*. Additionally, the types of exercises also suited people with MID, as they **train challenging skills for people with MID**. Exercise 5, Declare,

practices ‘saying no’ to peers, which is something people with intellectual disabilities find very difficult, Participant 4 and 5 elaborate it as follows: *“Right, it's even more important for them. I think they actually have trouble saying no. [...] Well, again. Then you come back with that part of belonging. Yes, you know, because what if they think something of me again or… […] Yes, they really want to be part of it. They just barely know the word 'no'. They will say yes to almost anything.”* Additionally, exercise 7, Applause, was seen as useful for increasing feelings of self-worth, and accepting compliments are mentioned as being difficult for this target group. As for some specific steps that were liked by the interviewees, in exercise 1, Different Thinking, participant 1 felt that the step *“Let the client state their helping thought”* could be **a challenging but helpful step**, as it could stimulate the client to not fall back into a standard (negative) thought pattern that was used to excuse their substance abuse. Furthermore, in exercise 6, Distance, participants liked the “Make small talk with the client, using the phrase you agreed upon beforehand” step, so that clients could first practice taking distance using **personalized sentences** that are realistic for the client to encounter. Finally, a participant felt that exercise 1 could not be too difficult for people with MID, as it is done in **collaboration with the therapist.**

Reasons why exercises were deemed less suited for people with MID, were mostly specific to certain exercises. Exercise 4, Different Thinking, had **too much information for the client** on the flashcard, reducing the clarity. Exercise 2 and 7 contained, according to participants, **unsuitable language** which could be wrongly interpreted. Participant 1 reported: *Yes, non-alcoholic, yes, that, then I immediately think of alcohol-free [beer etc.], so to speak. And I don't think that's a solution either. I wouldn't promote that either [..] No exactly, because that really gives the same association. Your brain doesn't know if there is alcohol in it. Same action, same taste, same look.”*. The participant therefore suggested to replace the wording to ‘a coke’ or ‘a water’ for example. As for exercise 7, Participants mentioned how the second part of the sentence *"Wow, it is so nice and tidy here! At home I never have it this neat!"* can produce a counterproductive outcome, as the client can also interpret it in a way in which they do not have to clean their house anymore, rather than as a compliment regarding their cleanliness, participants therefore suggested to remove this second part. Furthermore, for exercise 4, *Different Thinking*, where clients are expected to identify personal dangerous thoughts and replace them with helpful ones, a participant mentioned how this **difficult exercise requires facial expressions to be seen**. The therapist needs to be able to see the body language and facial expressions of a client in order to see how the client reacts to the exercise, and see if the exercise is not too triggering for them. With VR glasses on, however, a large part of the face would be covered, making it more difficult to see how the client is experiencing the exercise.. Furthermore, a participant felt it was difficult to speak for a person with MID regarding exercise 7, as you **cannot know how a person with MID thinks**. Finally, another thing that needs to be considered is that the client could potentially **take VR too literally**: *“That's right, but if you put people with MID in a café, say, with those [VR] glasses,*

then you don't want them to think, oh, I'm out. I can easily get back into the café, so to speak. That's not done. Don't go to the café at all for the first year. Not that they easily think, oh, I have to use this and this when I go to the café."

Theme 5. VR-CBT Recommendations

The final theme that was identified highlights the suggestions participants made about VR-CBT, related to the flashcards. The theme is divided into 7 categories, all outcomes can be seen in table 9.

Table 9

VR-CBT recommendations

Category	Code	N(a)[1]	Exercise
Preconditions for appropriate triggering effect		11	
	Evaluate craving feeling at end	3 (1)	2
	Use VR-CBT later in treatment process	6(2)	3
	Build up difficulty of VR environment	1(1)	5
	Consult between therapist and client	1(1)	3
Add aspects		4	
	Extend evaluation aspect	1(1)	1
	Provide clear and simple introduction	3(2)	3
Building up difficulty		4	
	Incorporate element of surprise	2(2)	2,6
	Include social circle for persuasion	2(1)	2
Adaptations for multiple types of addiction		10	
	Adjust role of virtual characters	3(3)	2, 6
	Realistic substance use related phrases	7(3)	2, 5, 6
Additional CBT exercise		6	
	Practice with boredom and loneliness	4(2)	General
	Simulate dystopian/utopian scenario	2(1)	General
Suitability MID		11	
	Therapist could provide examples helping thought	1(1)	1
	Add visual guide for client	4(2)	4
	Consult people with MID	6(3)	General
Other		3	

Want to experience exercises in CleVR	3(2)	General	

[1]*N* refers to the total frequency of the code, and (*a)* the number of participants.

Preconditions for appropriate triggering effect

Participants mentioned improvements of the exercises to ensure an appropriate trigger, so that they are not too confrontational, or entice the client to use after the exercise. Participants recommended to **evaluate the cravings at the end** of an exercise. Participant 1, for example, highlighted to following for exercise 2: *It is important that when you take off the glasses that you do not immediately send someone home, because then someone immediately goes to the supermarket or the dealer. So that cannot be the intention. But afterwards, if you discuss it properly. And what just happened. And that it is possible to feel that way, right? That craving and that it is in a safe environment. Yes, and yes, if you keep talking about it for a while so that someone goes home safely, then I don't think there is much danger.* Furthermore, participants suggested to **use the VR-CBT exercises later in the treatment process**, this way it allows clients the time in treatment to establish a good basis for themselves before they truly practice the difficult exercise. Participant 3: "*Yes, but I wouldn't do that [exercise 3] already in the first process, I would do that at the end of the process. [...] First the basics, and 'What can I do if...?' So that he [the client] can fall back on that. If you do that immediately, I think you will have a craving moment."*. Another suggestion that was provided to ensure that an exercise is not too triggering, is to **build up** the **difficulty of the VR environment**. A participant recommended to first let a client practice walking along a situation they find difficult (e.g first walk along bar if they have problems with alcohol) before practicing in a situation that is truly difficult for them. Finally, **consultation between the therapist and client**, to estimate if a client is willing to undertake practicing the exercises in VR, was also mentioned as a manner to ensure an appropriate trigger.

Suggestions to add aspects

Participants also recommended to add certain aspects to exercises. Participant 1 suggested to **extend the evaluation aspect** of the exercises. For exercise 1, for example, this can be done by not only addressing the helping thought aspect of the exercise in the evaluation, but also reflecting on when it went wrong. Additionally, participants recommended that the therapist should provide **a clear and simple introduction** prior to subjection to a VR-CBT exercise, to increase clarity and ensure that the client understand the exercise. Participant 2 explained it the following way, in relation to exercise 3: *What I would like is yes, it should be very clear to me, [...] Yes indeed, if you put this [exercise 3] to me, yes, with just an example of cognitive behavioral therapy. Yes, you ask me that, it won't ring a bell, but [...] As soon as you say yes, as soon as you explain it to me. Then, I can understand everything and then I know exactly how or what, but at that moment I am not triggered. Because of words like that and that entrance, I miss it here [in exercise 3]."*

Suggestions for building up the difficulty

For variations that can increase the difficulty of the VR-CBT exercises participants had some further suggestions. Participants recommended to **incorporate an element of surprise** to the exercises. A participant said the following for exercise 6, where clients can practice with saying no to a virtual character who uses a pre-established phrase to entice the client to use: *Yes, you can extend it further, because... Look, if they already know that sentence that they agreed with that person, they keep it in their heads. And then it will probably be easier, but if you say a b sentence at the end, see how he [the client] reacts, because he actually already knows in his head what is coming. What sentence have you agreed on and to take things a step further, you can always say something extra and see how they respond?.* Furthermore, a participant recommended to **include the social circle for persuasion** in exercises related to alcohol abuse. For exercise 2, for example, the participant thought it could be interesting to have a friend persuade the client to use alcohol, as that is a common occurrence.

Suggestions for adaptations for multiple types of addiction

Participants also provided suggestions, so that the VR-CBT exercises can fit multiple forms of addictions: one participant said:*"Yes, this is specifically about alcohol, but yeah, you also have people who smoke marijuana or do coke or whatever. So yes, you could also do it with other substances, right?"* This could be enabled by **adjusting the role of the virtual characters**, so that they are more well-suited to the client's personal risk situations. For exercise 6 for example, where the goal of the exercise is to take distance from an acquaintance with whom a client has used substances. This could be enabled by replacing the bartender illustrated in the exercise with a dealer, making the exercise more suitable for a person struggling with a cocaine addiction for example. Furthermore, the interviewees provided suggestions for **realistic substance use related phrases**, which can be used to make the interactions in VR-CBT similar to interactions encountered in real-life by MID individuals. Participants mentioned how dealer VR characters could say *'I have really good stuff right now'* or *'Here, it is free for you!'*. And for an exercise where friends persuade someone to drink alcohol: *"Don't be so unsociable (Dutch: ongezellig), join us for once!"*

Suggestions additional VR-CBT exercises

Furthermore, participants provided suggestions for additional exercises that can be developed. Participants suggested to develop an exercise for an inpatient setting where you can **practice with boredom and loneliness**. As these feelings, especially at home after one has been in a clinic with a lot of people, is seen as an extremely difficult situation that inclines people to use. Participants therefore thought it would be interesting to simulate a scenario where a client is alone at home, to practice how a client can cope with this. Furthermore, a participant felt it could be useful **to simulate a dystopian and utopian scenario**, which could be experienced by the client to see what life could look like if they do, or do not, continue the substance abuse. This scenario could be used as a manner to increase a client's motivation for treatment. Participant 5 provided an example for a person with an alcohol addiction: *"That you, you can say it like this. You choose yes or no, you want or you don't want alcohol anymore. You want to stay that way, so you show that world. And also the success world huh.*

White-picket fence life, you name it, that they find a good job, car, and so on. As a manner of speaking, then [...] Or, you relapse. Some dirty little man under a bridge. Who lives outside on the street, with a few of those trays of alcohol, huh? Difference of future and past. […] It seems to me, as a very good thing, you know? [...] The difference with what I go through in the addiction and how it can be. And you know, the contrast is big and that hits very hard."

Suggestions to increase suitability for people with MID

Additionally, besides aforementioned recommendations, participants also provided specific suggestions to increase suitability of the exercises to people with MID. For exercises where clients are expected to use (personal) helping thoughts, it was suggested that the **therapist could provide examples of helping thoughts**, if a client was unable to think of one themselves. Furthermore, participants recommended to **consult people with MID**, or specifically people with MID who have been in recovery from SUD for a longer period of time. This was recommended so that for every scenario that is expected to be used for addiction treatment, more insights into aspects such as the degree of understandability for this population can be gathered. Finally, it was recommended to **design a visual guide for the client** with either pictograms or a comic strip, this way, the exercises are easier to comprehend, and the triggering effect of SUD related words like 'a line' are also reduced.

Other suggestions

Finally, participants mentioned they would **like to experience the VR-CBT exercises in CleVR**, to give more well-informed feedback: *"You know I think it is difficult, look if I were to really see it and experience the simulation myself […] Then I would find it easier to provide feedback."* – Participant 4.

Discussion

The main goal of this study was to consider how well-suited VR-CBT is for people with a mild intellectual disability battling SUD, and how VR-CBT could be designed to align with this target group, based on the opinions of lived-experience experts, which was assessed using three sub questions. Furthermore, the findings from each sub-question are combined and, together with input from previous research, used to develop guidelines. These guidelines can be applied to increase the suitability of VR-CBT for people with SUD and MID.

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Factors related to intellectual disability requiring consideration in SUD treatment

The first sub question looks at factors related to the intellectual disability of people with MID, requiring consideration in SUD and its treatment. The experts mainly indicated how people with MID have trouble understanding what is being said in treatment, along with the fact that people with MID have difficulty applying skills learned in treatment to real life, with the latter aligning with Van Der Nagel et al. (2014) who stated that people with MID have difficulty generalizing skills from the treatment room to their personal lives. Furthermore, they have a shorter attention span compared to most people without MID, as supported by research from Jacob et al., (2021) for example. The lived-

experience experts also indicated needs that people with MID have in treatment, the experts mainly mentioned aspects which are required for people with MID to increase understandability. People with MID need more repetition for example, but also more simple and straightforward language, and benefit most from treatment when they are provided with one option to focus on, this is in line with research from Luteijn et al. (2020) who suggested adaptations that therapist could enforce, to be more suited for people with MID. These improvements included adaptations to the communication style, such as easier language, but also recommendations for an increased number of sessions (Luteijn et al., 2020). Finally, personalized adjustments in treatment are also needed, as there are many differences between one person with MID and the other. Aligning with Van Duijvenbode & Van der Nagel (2019), who state that approaches tailored to people with MID are needed to meet the needs of this target group. Considering these challenges and needs is important for tailoring VR-CBT treatment to people with MID.

Considerations for using CleVR and VR in treatment

The second sub question examines the suitability of VR and CleVR, as a means to improve SUD treatment. The lived-experience experts were mainly positive about usage of this technology. One concern that was mentioned however, is that clients would potentially be unable to engage in CleVR due to its limited realism, and therefore if CleVR and VR should be offered as an addition to SUD treatment. While the findings from this study also highlight some potential problems that can occur when CleVR is used, CleVR can still be a valuable tool to use for VR-CBT in SUD.

Problems with realism were mostly experienced by participants with no previous experience with CleVR, while high realism was not deemed necessary by the experienced experts, allowing the latter to provide more well-informed opinions on this VR framework. Furthermore, previous research by Van Gisbergen et al. (2019) supports the positive experience of the experts with CleVR experience. This research namely found that the level of realism makes no difference on the overall feeling of presence, engagement or in general adverse effects. It was postulated that the numerous different elements already create the necessary level of experience and realism for someone who is engaging in the software (Van Gisbergen et al., 2019). Considering that CleVR has many different elements which allow for interactivity, the visual realism of the software should therefore not be an issue.

Furthermore, the experts also highlighted an array of benefits of VR for CBT treatment and MID individuals. Current SUD treatment requires new impulses to increase effectiveness for a larger group of clients, and VR could be one of these technologies. Additionally, elements of the CleVR software such as the ability to practice in a realistic scenario while in a safe setting, were also seen as beneficial. Finally, experts also expected that VR can help bridge the gap between a clinic and day to day life, addressing the key issue of generalization which people with MID face in CBT treatment (Van der Nagel et al., 2014). In relation this, the experts expected that the realistic VR-scenarios can contribute to reducing these problems with applicability, which is also in line with research by

Michalski et al. (2023) stating that VR can increase generalization to real-life for people with MID. It can therefore be said that VR poses significant benefits and should thus be offered as an addition to CBT for people with MID and SUD.

VR-CBT exercise suitability

The final sub-question addresses the suitability of VR-CBT exercises for people with MID based on the insights of lived-experience experts, who also provided recommendations to improve these flashcards. The main findings are that the experts were positive about the usage of these VR-CBT exercises. This was because the exercises allowed clients with MID to practice essential and challenging skills that are important to successfully battle SUD, such as withstanding peer pressure, which people with MID find difficult (Van Duijvenbode & Van Der Nagel., 2019). Furthermore, VR-CBT allows for repetition, an important need for an individual with MID following the findings of this study and, for example, Van Der Nagel & Kiewik (2016), and VR-CBT enables the client to do the exercises together with the therapist, who can use specific sentences provided from the flashcards which reflect personal real-life situations. Furthermore, it was said how the exercises would be understandable for the therapist, and that the exercises typically had an appropriate trigger. However, areas of improvement were also mentioned. Experts namely had problems with understanding some of the exercises, and felt some exercises contained language that can be wrongly interpreted by people with MID. Furthermore, the experts set certain preconditions that are important to be met, to have the right level of triggers, and expressed concerns regarding the inclusion of a ‘degree of difficulty’ aspect of the specific flashcards that were used in this study.

The lived-experience experts were thus overall positive about VR-CBT, although areas of improvement were also indicated. The experts provided suggestions to address the aforementioned concerns, which are used along with the other findings from this study and other research to formulate guidelines for increasing the suitability of VR-CBT for people with MID.

Guidelines

Consult people with MID to integrate straightforward language into VR-CBT

The lived-experience experts indicated that people with MID have a need for simple and straightforward language, this is needed to avoid miscommunications and increase understanding when enacting the VR-CBT exercises. Specific exemplary phrases that are provided to be used by the therapist during a VR-CBT exercise, should therefore be revised when they can be interpreted in numerous manners, to avoid potential counterproductive outcomes. This aligns with recommendations provided by Boardman et al. (2014) and Luteijn et al. (2020) stating that therapists should use easy language when communicating with people with MID. To increase suitability for people with MID in this context, the participants in this study recommended to revise the problematic phrases they

personally identified, but also do this revision process in consultation with people with MID. This would be helpful, so that therapists already have an overview of what type of language and examples can be used, to effectively communicate with people with MID.

Develop a visual version flashcard for client

The findings from this study indicate how much of the improvements for people with MID are related to the understandability of the flashcards, both in terms of language and in the limited explanation. It could be that these issues mainly arose because these VR-CBT flashcards are developed as a tool for therapists, and thus required background knowledge. However, due to the prevalence of findings related to problems with understandability, it should still be considered. Experts indicated how developing a visual guide for a client, with either pictograms or designed as a comic strip could help increase clarity. Furthermore, if some short blurbs of text in simple language are added that are further explained by the therapist, the recommendation of adding a clear introduction to VR-CBT is also met. Not only would this meet the needs of people with MID, supported by research from Berger et al. (2019) which highlighted how visual exercises can help increase understanding of tasks for this target group. It would also be in line with general goals of CBT+, which aim to make exercises more well-suited for people with an intellectual disability, by using visualization aspects (Van Der Nagel & Kiewik, 2016).

Remove degree of difficulty aspect from VR-CBT flashcards

Participants highlighted how the degree of difficulty aspect on the specific flashcards did not serve an added value for VR-CBT. The findings show how difficulty cannot be rated on a scale, is dependent on VR, and differs per client. Furthermore, it does not align with other findings in this study which indicate that the need for a personal approach is required for people with MID, and the overall personalization goal of this type of VR-CBT, which makes this form well-suited for people with MID who require a tailored approach (Van Der Nagel., 2014). Indicating how difficult a VR-CBT coping style exercise is as a general guideline, is therefore not in line with these goals of personalization. This degree of difficulty aspect should therefore be removed from the exercises, to ensure that the goal of a tailored approach for people with MID in CBT treatment is followed as intended.

Develop fixed VR-CBT protocol to enable an adequate trigger

The experts indicated how VR-CBT can be useful as an addition to CBT, and provided recommendations that can be integrated and developed into a fixed protocol, as to ensure that VR-CBT would produce an accurate triggering effect for the client. Firstly, recommendations were provided for factors that can be considered prior to the VR-CBT process. A therapist could consult with a client if they are willing to practice a specific exercise in VR and establish that the client has a baseline on how to deal with cravings, before being exposed to these potential cravings in VR. Furthermore, for the

steps in VR, if clients find exposure in VR to a personal high-risk situation too difficult at first, clients could first engage in a scenario deemed a lower risk for the client, before practicing the coping skill in the confrontational situation. Finally, the evaluation after VR should discuss the cravings that potentially occurred, so that a client does not leave the therapy room while still experiencing strong cravings. These recommendations from the experts are similar to suggestions provided by therapists in research by Skeva et al. (2021). In this study, therapists highlighted that they expect for VR-CBT to be most useful for SUD, preparation with the client and tailored evaluation after the exposure in VR could help mitigate the effect of the provoked triggers, as well as the suggestion VR should only be used when clients feel they have the ability to confront their cravings in a VR environment (Skeva et al., 2021). Integrating these factors into a fixed VR-CBT protocol could increase suitability of VR-CBT, as it aids in the client achieving and addressing cravings in a safe way. This would align with one of the core components of VR-CBT, which revolves around cognitive restructuring and finding manners to cope with these cravings (Langener et al., 2021a).

Improve motivation for CBT treatment using a new CleVR VR scenario

A final interesting finding was that participants suggested to develop a new CleVR scenario which could simulate the positive aspects of change, and the negative aspects of SUD, to increase motivation in pursuing treatment. While VR-CBT approaches mainly aim to practice the coping skills aspect of CBT (e.g. Bordnick et al., 2012), developing a scenario visualizing these positive and negative aspects could align with one of the components of traditional CBT, which revolves around increasing the motivation to adhere to a certain change goal in treatment (Schippers et al., 2014). Furthermore, since protocols of CBT in SUD, as described in Merkx et al. (2015), place significant emphasis on both the positive outcomes of change and the negative effects of pursuing the substance abuse, similar to how participants intended a scenario to be developed for SUD in the CleVR software, it could be promising to further investigate VR as a means to increase motivation for CBT. Additionally, using VR as a means to for motivation would also align with the needs of people with MID, as VR helps with visualization, which increases understanding, supported by Berger et al. (2019) and thus potential understanding of the effects that change in SUD can bring.

Limitations and strengths

Limitations

A first limitation of this study was that the lived-experience experts were not directly involved in CBT treatment. This made it difficult to address aspects specific to CBT in this study. However, since this study mostly looked at suitability for clients, and not necessarily at how well CBT aspects are represented in these exercises, the main goal of this study could still be achieved despite this limitation. Furthermore, the interviewer had limited experience with interviewing and qualitative research prior to this study. This might have impacted the quality of the results, due to potential errors

in the questioning for example. Additionally, it emerged during the interviews that one participant was not a lived-experience expert, despite the request for lived-experience experts as participants at the external treatment center for people with SUD who provided the participants. Nonetheless this participant was still included in this study, as they still provided valuable information, and they did have plenty of experience with people with MID and SUD.

Furthermore, this study had a limited sample size of 5 participants. Prior research by Hennink & Kaiser (2022) has shown that a sample of 9 participants is needed to achieve full data saturation in interviews. Since this criterion is not met with the current study's sample, it might have impacted the reliability. Finally, participants were only shown a short video of CleVR in this study and were therefore not able to gain the full experience of CleVR. Participants who did not have experience with CleVR prior to this study, indicated how they had some difficulties with judging the VR-CBT exercises, due to this limitation. The opinions on VR-CBT and CleVR might have differed if these participants had had the chance of experiencing this CleVR software, similar to how two of the participants had had this opportunity before.

Strengths of the study

Despite these limitations, this study still provided valuable insights. Firstly, this study contributed to the field of MID, SUD treatment and VR which in combination has faced limited research thus far. Research in this field is welcomed due to the high prevalence of people with MID struggling with a substance use disorder, with this study therefore contributing to this. Furthermore, this study used detailed and practical exercises of how VR-CBT can be realized, enabling the lived-experience experts to provide concrete feedback of factors that need to be considered to increase suitability for clients, before this manner of treatment can be integrated into current addiction care practices.

Additionally, this interview study provided unique and valuable input from people who know what it is like to experience SUD, and the treatment thereof. This client perspective is often overlooked in the development of interventions for SUD, resulting in interventions not being suited for the people for whom these interventions are developed. This study contributed to this gap, as the input of the lived-experience experts gives valuable insights into factors related to SUD requiring consideration for VR-CBT, that are best understood with personal experience related to the combination of substance abuse, experience with treatment and working with people with MID. Examples of these factors include how a person with MID should be addressed in treatment to ensure proper understanding, and what preconditions of VR-CBT need to be set so that it is not overly triggering or difficult for a person undergoing SUD treatment. But also includes illustrations of specific wording that can be used by the therapist in the VR-CBT scenarios, so that it closely mimics real-life interactions related to substance abuse. Finally, since the lived-experience experts also provided feedback that can be used to improve details related to the specific VR-CBT flashcards, this

study also aided in improving the concrete VR-CBT exercises developed by the Triggers and Tech project.

Future research

The numerous recommendations indicate that VR-CBT requires additional improvements to become well-suited for people with a mild intellectual disability. Future research could integrate the recommendations provided in this study -such as the inclusion of a visual version of flashcards for client- into the practice of VR-CBT. Then, the VR-CBT exercises could be evaluated through usability testing. This can be done as a collaboration between firstly therapists and secondly people with MID who have had problems with SUD in the past, who will try out the exercises in the CleVR environment. This way VR-CBT can be enacted the way it is expected to be used in addiction care, while testing the recommendations and improvements that arose from this study. Furthermore, it can be assessed if the issues of understandability that arose for the lived-experience experts in this study, are diminished when a therapist describes the exercises to the clients in a step-by-step manner.

Additionally, future research could investigate if CleVR can also contribute to another important element of CBT, which revolves around enhancing the motivation to reach a treatment goal. Future studies could deploy scenarios of CleVR to see if these realistic scenarios increase the willingness to engage in treatment for people with MID. However, this should first be investigated without the usage of direct application, but rather be discussed in consultation with people with MID, to enable that employing VR in this section of treatment is in line with the needs of people with MID, and is not too difficult for example.

Conclusion

The goal of this study was to investigate the suitability of VR-CBT for people with a mild intellectual disability and investigate how VR-CBT and its respective exercises can be designed to fit treatment for these individuals. The findings of this study indicate that lived-experience experts considered VR-CBT to be both beneficial and well-suited for the treatment of SUD for people with MID. However, improvements were also mentioned. Hence, guidelines based on the recommendations from the experts are formulated that can be followed to adopt VR-CBT into clinical practice. Firstly integration of visual guides into VR-CBT could enhance better understanding for people with MID. Secondly, including people with MID could help improve clarity of language in interactions. Thirdly, removal of a degree of difficulty aspect of the exercises could aid in meeting the individual approach that is required for people with MID. Furthermore, integration of a fixed VR-CBT protocol could aid in ensuring an appropriate triggering effect, and finally, VR-CBT could not only be promising for practicing coping styles for people with MID, but also for potentially increasing motivation for CBT treatment. Integration of these guidelines can be used for future research, and serve as a starting point for tailored CBT treatment for people with MID and SUD.

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Appendix

Appendix I

Exercise 1, Different Thinking

DIFFERENT THINKING

Doel Formulate and practice helping thoughts.

Beschrijving Situation that fits the client.

Practice with helping thoughts ★★

Personal VR-scenario

Suggestions

Triggers & Helpers

- Helping thought
- Positive reaction towards the helping thought of the client

Before putting on the VR headset

1. Discuss a situation in which the client is not using. Why can the client successfully refrain from using in that situation?
2. Together, formulate a helping thought that the client can employ based on point 1.

VR session

1. First, select a VR environment in which the client usually won't use. Have the client state their helping thought and ask how well they think it helps (have the client give a rating between 1 and 10)
2. Now select a VR environment that is (more) difficult for the client. Does the same helping thought helps here? Respond positively to the helping thought or together find a helping thought that helps better.

Evaluating

1. Are helpful thoughts a good way for the client to prevent use / reduce cravings? Why (not)?

Exercise 2, Different Acting

DIFFERENT ACTING

Goal Practicing other behaviours.

Description At the pub, at the bar to order a drink.

Ordering a non-alcoholic drink ★★

Template 5A

Triggers & Helpers

- Other people drinking alcohol
- Bottles of liquor on tables or behind the bar

Before putting on the VR headset

1. Discuss that you are going to practice acting differently in situations where you might normally use.

VR session

1. The client is standing at the bar. Ask (in your role as bartender) what the client wants to drink.
2. Have the client practice ordering a non-alcoholic drink.
3. Make it increasingly difficult for the client by having the bartender give his own opinion:
   "You look like you've had a hard day, you probably like a shot of alcohol"
   "A Coke? Are you sure?"

Evaluating

1. Evaluate how "acting differently" went. What was easy/difficult? What was the reason for that?

Exercise 3, Distance

DISTANCE

Goal Learning to take distance in riskful use situations.

Description Client is at the supermarket near the liquor department.

Passing by ★

Template 1A

Triggers & Helpers

- Bottles of liquor
- Staring people / people who turn around to look at you

Before putting on the VR headset

1. Discuss the purpose of this exercise: learning to take distance in riskful use situations.
2. Tell the client that he's about to walk around in a virtual supermarket. Show the VR controllers and explain how they work.

VR session

1. Instruct the client to walk towards the liquor department. Start with another department when this is still too stressful.
2. Ask about their experience: is it stressful, why? Let them rate their level of stress on a scale from 1 to 10.
3. Instruct the client to move on (= taking distance)
   Is this difficult to do? Why (not)?

Evaluating

1. How did it go? Was it difficult to take distance?

Exercise 4, Different Thinking

DIFFERENT THINKING

Goal Discover dangerous thoughts and replace them with helpful ones.

Description At the pub or at home with friends.

Dangerous thoughts

Template 4A : alcohol
Template 4B : drugs

Triggers & Helpers

- Liquor / drugs
- Talking about substance use
- Dangerous thoughts
- Helping thoughts
- Positive affirmation on the helping thought

Before putting on the VR headset

1. Discuss the two types of dangerous thoughts (overestimating the benefits of use and justifying use). Also, does the client know an example of each?
2. Choose the VR template that best fits the client's addiction.

VR sessie

1. Talk (through the virtual characters) about substance use with the client using dangerous thoughts (e.g., "Drinking/using makes me feel better," "One glass/ line can't hurt anyway")
2. Does the client agree with the dangerous thoughts? Discuss why the dangerous thoughts are not true.
3. Discuss helping thoughts that can replace the dangerous one. Practice the situation again and let the client say a helping thought. Link it to a concrete action (one of the other D's) when this is needed for the client.

Evaluating

1. Could the helping thought also help in everyday life?
   If not, how can you modify the thought so that it does work?

Exercise 5, Declare

DECLARE

Doel Learning to say no, learning to indicate what you do/don't like.

Beschrijving Situation that fits the client.

Learning to say no ★★★

Personal VR-scenario

Suggestions

Triggers & Helpers

- Crowds
- Aggressive virtual character

Before putting on the VR headset

1. Discuss a situation in which the client finds it difficult to say no (this can either be related to their addiction or in general).
2. Select a VR environment appropriate to the situation and choose virtual characters with the client. Discuss what the characters should say and how the client would like to respond.

VR session

1. Practice saying "No" in the difficult situation. Give the client tips on how to say no as clearly as possible (confident posture, speaking forcefully, sticking to your point of view)
2. Discuss how saying "No" went and what could be improved. Then practice the same situation again and give compliments.

Evaluating

1. Did the re-enacted situation resemble the client's difficult situation enough? How could it be made even more real?
2. What has the client learned? What can be applied in daily life?

Exercise 6, Distance

DISTANCE

Goal Learning to take distance in riskful use situations.

Description Client is at the supermarket near the beverage department.

Taking distance from an acquintance ★★

Template 1B

Triggers & Helpers

- Bottles of liquor
- Expectations of the acquintance

Before putting on the VR headset

1. Select a virtual character together with the client who resembles someone with whom the client uses / used substances.
2. Discuss what the character should say to entice the client to substance use (e.g. "Your favorite beer is on sale, you can't pass that up, can you?!")
3. Discuss how the client can respond and how they can distance themselves from the situation (e.g., "I forgot an appointment, I need to go")

VR session

1. Make small talk with the client, using the phrase you agreed upon beforehand to entice the client to use.
2. Watch how the client responds. Do they succeed in distancing themselves? If necessary, give pointers (in your own voice) if the client is not succeeding.

Evaluating

1. How did it go? Was it difficult to take distance? What does it take to be able to do this in real life as well?

Exercise 7, Doing Great

DOING GREAT

Goal Learn how to receive compliments

Description In the living room with a friend

Receive a compliment ★

Template 6A

Triggers & Helpers

- Sincerity

Before putting on the VR headset

1. Discuss that you are going to practice taking compliments.
2. Tell that in VR you are playing a friend who is visiting. If necessary, modify the virtual character together so that it resembles an acquaintance of the client.

VR session

1. Give a sincere compliment to the client. Say e.g. "Wow, it is so nice and tidy here! At home I never have it this neat!"
2. Observe how the client responds to the compliment. If necessary, give directions on how they can receive it.

Evaluating

1. How did it feel to receive a compliment? What does it take to actually believe the compliment?

Appendix II

Codebook

Categories	Definition
Challenges in daily life and treatment	Difficulties that people with MID and SUD face in day-to-day life and in treatment.
Needs in treatment	Needs of people with MID that require consideration in treatment.

Category	Definition
Attitude towards usage VR	The extent to which participants believe VR in general could be useful for addiction treatment.
Client traits needed for VR	Factors related to traits of the client, that could affect the willingness to use VR.

Category	Definition
Appearance CleVR	Opinions on the looks of CleVR.
Therapy-related characteristics CleVR	Aspects of CleVR deemed (un)useful for MID and addiction treatment.
Suggestions CleVR	Mentioned improvements that aim to make CleVR more suitable for CBT treatment

Category	Definition
Value of VR for CBT coping exercises	Opinions on the usefulness of VR as integration into CBT coping exercises
Structure VR-CBT exercises	Opinions on the usefulness and clarity of VR-CBT exercise aspects
Triggering effect of exercises	Extent to which the VR-CBT exercises evoke triggers
Suitability VR-CBT for people with MID	Specific elements of the VR-CBT exercises that do (not) meet the needs of people with MID

Category	Definition
Preconditions for appropriate triggering effect	Recommendations to ensure an appropriate triggering effect

Add aspects	Recommendations of elements that increase understandability and reflection
Building up difficulty	Recommendations that can be used to vary in the level of difficulty
Adaptations for multiple types of addiction	Recommendations that can be integrated to VR-CBT to improve applicability of exercises to multiple forms of addictions
Additional CBT exercises	Suggestions for forms of VR-CBT exercises that can be developed to be integrated into various stages of CBT
Suitability MID	Specific suggestions which increase suitability of VR-CBT for people with MID
Other	Recommendations which allow for more well-informed feedback

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Appendix III

Interview guide

Interview guide

Hello (...) I'm Fleur Stevens and I'm a 3rd year psychology student working on her bachelor thesis. This interview is intended to help answer the research question of my thesis and is part of the Triggers and Tech project, which aims to adapt the Cognitive Behavioral Therapy (CBT) treatment with Virtual Reality so that it is even more suitable for people with mild intellectual disabilities. The subject of this interview and my thesis is to learn more about the suitability of CBT-VR exercises for the treatment of addiction in persons with mild intellectual disabilities, according to experts by experience. First, we'll talk about VR, CBT, addiction, and mild intellectual disabilities in general. Next, I'll show you a video of CleVR, a VR system developed for CBT exercises, which I'll also ask some questions about. Next, I'll show you examples of CBT-VR exercises and I ask questions about, for example, the purpose of the exercises. Finally, I will ask questions about the extent to which you find the CBT-VR exercises suitable for people with mild intellectual disabilities (also ask if it is okay to continue using LVB) with an addiction.

The interview lasts about 30 minutes and is voluntary, which means you can quit at any time without consequences. The interview is anonymous and the recordings and the elaboration of the interview will be deleted one year after the interview. Do you have any questions so far?Thank you again for your participation. If you have any questions, you can ask them at any time.

Before we proceed, I need your verbal consent for the recording and voluntary participation in this interview. Therefore, do you consent to participate in this interview and are you aware that you can stop at any time?

General questions

1. Can you tell us a bit about yourself, and about what being an expert by experience entails?

a. Which organization do you work for, and how long have you been working as an expert by experience?

b. How old are you?

2. Do you have experience in working with people with mild intellectual disabilities?

3. Do you have a role in guiding people with addiction (and MID) who are undergoing treatment?

a. For example, are you familiar with their treatment plan?

4. What do you think should be taken into account when treating clients with an addiction and a mild intellectual disability, compared to clients who only have an addiction?

5. Do you have any experience with VR?

a. If so, what kind of application was this? And what could you do in this virtual environment?

b. Was this VR application related to your work as an expert by experience?

6. Are you familiar with the CBT treatment?

a. If so, do you also play a role in the CBT treatment yourself (e.g. you assist therapists)

CBT is a widely used therapy in addiction care, the goal is to replace negative thoughts and behavior patterns with positive things. It is an active way of treatment: not only during treatment appointments, but also in your daily life you actively get to work. You do homework assignments and exercises to gain more insight into your use. Through the treatment you learn different behavior. You also learn to think differently at times when you actually want to use.

7. What do you already know about the addition of VR (exercises) to CBT for treating addiction?

8. How do you think VR exercises can be applied to CBT treatments for LVB?

(For example, what do people with LVB often have difficulty with during treatment for addiction? Could this problem be solved with VR?)

Questions about CleVR

9. Are you familiar with CleVR? (if not, go to 10)

a. What do you think of this software? And have you tried it out?

10. What are your first impressions after watching this video?

11. Do you think these environments will be easily recognizable for people with a mild intellectual disability?

a. Do you find the environments realistic, for example?

12. (Only if they are supervising clients) What would your client need to be able to use VR as an addition to CBT?

13. (Only if they are familiar with CBT content) Which elements of VR that you just saw do you think could replace existing elements in CBT?

Now that we have talked about the use of VR and have shown you the CleVR video, I will show you two exercise cards. These flashcards are examples of VR exercises according to the six A's (in Dutch: take distance, indicate, seek distraction, think differently, do differently, applause). This is how we want to implement the CBT principles in VR exercises. These flashcards serve as ideas for exercises

that the therapists themselves can personalize based on the needs of their clients. These flashcards can also be selected based on the session of the treatment the client is in. The client does not see these flashcards, but they do serve as a starting point for the therapist. After I have shown you the flashcards, I will highlight two of them and ask you a few more questions about them.

Questions about flashcards (show flashcard, ask questions 14-21 then another flashcard, then continue to question 20)

14. What do you think of this exercise?

a. What do you think of the VR aspect?

b. Do you feel that the VR aspect adds something?

c. Do you find the assignment and the goal of the assignment clear?

15. Do you think that this exercise is easy to understand for people with a mild intellectual disability?

a. Why/why not?

16. Do you think the described situation is recognizable for someone with a disability who is being treated for an SUD?

a. Do you think there is something missing from this exercise?

b. Do you think something could possibly be left out of this flashcard?

17. Do you think the goal of this exercise is clear for a client with a disability?

a. Why/not?

18. How do you think this exercise can be improved, so that the goal of the exercise is clearer?

19. Do you think this exercise/flashcard can be triggering for a client?

a. Why/not?

b. Do you think it is within the boundaries of the treatment to allow the client to do this exercise?

c. Would it still be beneficial to do this exercise?

20. To what extent do you think this CBT-VR exercise can be useful for people with an intellectual disability who are being treated for SUD?

21. How would you change this exercise to make it more suitable for people with MID receiving treatment for SUD?

a. Thinking back to your own experiences with treatment, or exercises you are currently doing with a client, can you think of anything?

Both flashcards

22. Thinking back to the exercises (and environment) I have shown you, do you feel that these exercises and environment could be appropriate to use as an addition to CBT?

a. Why/why not?

b. Do you feel that something is missing?

c. Do you feel that something needs to be left out?

23. Do you think that VR-CBT is a good addition to CBT in general?

24. Do you think that the VR exercises can be used as a starting point to personalize VR scenarios for specific clients?

25. Do you have any additional recommendations based on the flashcards you just saw?

26. Do you have any other questions or remarks about the topics we discussed in this interview, or the interview in general?

Thank you for participating in this interview. If you have any questions at a later time, you can contact me via the email address we used to schedule the appointment. (f.a.m.stevens@student.utwente.nl). Would you like to receive a copy of the final version of my thesis? If you would like more information about the general triggers and tech project, that is also possible, in that case I can have my supervisor send you more information.