Integration of VR Exercises Within CBT for People With Substance Use Disorder and Intellectual Disability: Experts' Opinions

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Abstract

People with Intellectual Disability (ID) are more vulnerable to Substance Use Disorder (SUD), however their treatment is less effective. This study is investigating the integration of Cognitive Behavioural Therapy (CBT) into Virtual Reality (VR) exercises and whether CBT principles are accurately represented. 4 experts took part in this qualitative study who were either psychologists, psychotherapists or researchers, and they were experts in the topic of CBT, ID, and SUD. The experts were shown flashcards representing the proposed CBT-VR exercises, to determine if they align with the 6 D's used in CBT: Distance, Declare, Distraction, Different thinking, Different acting, and Doing great. The results showed that all participants agreed that the proposed CBT-VR exercises represent the CBT principles well enough, and suggested some improvements. These improvements include the applicability of the flashcard, integration of negative and positive reactions, accompanying flashcards designed for clients, suitable manual and CBT representation. This study indicates that VR can be an effective way to convey the CBT principles to individuals with ID, with a specific application to substance use disorder.

Introduction

Abusing substances that alter the individual's feelings, thinking processes, perceptions and behaviours is a problem all around the world (Armstrong, 2022). This is a prevalent issue in the Netherlands, where in 2023, 2.3% of the population had drug use disorder, which amounts to approximately 284,100 people (Have et al., 2023). Among the Dutch population, 6.6% have had a drug disorder in their lifetime. Between 2019 and 2022, the yearly prevalence of drug use disorder rose from 1.5% to 2.1% indicating that this is a growing concern (*Drugsstoornis | Leeftijd En Geslacht*, n.d.). In 2022, approximately 300,000 people suffered from alcohol use disorder among the Dutch population (*Alcoholism Statistics - AA Netherlands*, 2022). Both alcohol use disorder and drug use disorder are classified as substance use disorder (Fatséas et al., 2015; Foundation, 2021). The Diagnostic and Statistical Manual of Mental Disorders (5th ed.; DSM-5; American Psychiatric Association, 2013) defines substance use disorder as a mental disorder. It is determined by the inability to control the usage of the substance, and this makes the person unable to fulfil obligations in their daily life (American Psychiatric Association, 2013). The DSM-5 states that substance use disorder is recognised when the substance causes cognitive, behavioural and psychological symptoms. Individuals will continue to use substances, despite being aware of the negative effects associated with their use. In severe cases, the abused substances can alter the brain. These changes enhance relapse and the severity of craving for that substance (American Psychiatric Association, 2013).

The most common and effective treatment for substance use disorder is Cognitive Behavioural Therapy (CBT) (Zamboni et al., 2021). It encompasses the three fundamental principles, which are behaviours, thoughts and feelings (Fenn & Byrne, 2013). CBT's purpose is to improve well-being, by helping people to understand their reactions and behaviours in situations and teach them how to deal with those situations. For example, this is done by identifying the thoughts and feelings which are unhelpful and negatively impact one's behaviour (David & Szentágotai, 2006). CBT includes different methods, such as cognitive restructuring, behavioural activation, exposure therapy, problem-solving and skills training (Wenzel, 2017). Cognitive restructuring happens when the client replaces negative thoughts with positive ones, and behavioural activation is when the client replaces unhelpful behaviours with constructive ones (Čihařová et al., 2021). Exposure therapy occurs when the client is gradually exposed to triggering stimuli, while problem-solving and skills training teaches the client useful strategies and skills to help their everyday lives (Čihařová et al., 2021; Ugueto et al., 2014).

Other helping techniques include thought record, Socratic questioning, behavioural experiments, mindfulness and relaxation techniques (Wenzel, 2017). Making a thought record is a fundamental technique in CBT. It is a tool used to help the client report their risk situations and their thoughts, feelings, actions and consequences related to that risk situation. By doing this, it helps the client to rationalise their thinking. A thought record includes several steps, such as identifying the core belief, questioning the evidence of that belief, identifying evidence that is against the belief and then creating an alternative realistic belief (McManus et al., 2012). Mindfulness exercises teach the client how to be in the present moment and relaxation techniques help to reduce the stress and anxiety of the clients (Decker et al., 2019). To evaluate harmful thoughts Socratic questioning is used, which helps to analyse all perspectives of their thinking and check if they are correct and beneficial (Wenzel, 2017). Behavioural experiments are used to test the client's assumptions about specific situations. With this, the client can learn how to approach those situations from a different perspective (Bennett-Levy, 2003).

Many people who suffer from substance use disorder have an intellectual disability (ID) (Didden et al., 2020). ID is defined as limitations in two types of functions, cognitive functioning and adaptive skills. Cognitive functioning includes limited attention, working memory and language skills (Vicari et al., 2016). The level of cognitive functioning within ID individuals is characterised by an IQ score below 70. Limitations in adaptive skills are when an individual has difficulties in daily functioning, communication and social interactions (Boat et al., 2015; Adibsereshki et al., 2016). People with ID are especially at risk for substance use disorder (Didden et al., 2020). There are multiple reasons for this increased risk, such as people with ID know fewer coping strategies, are more impulsive and are prone to peer pressure (Van Duijvenbode et al., 2015). They are more vulnerable to traumas and they might have problems understanding the risks and consequences of their problematic substance use (Bhatt & Gentile, 2021). Many times people with ID are underdiagnosed or not diagnosed at all, which leads to undertreating their medical conditions (Bhatt & Gentile, 2021). However, it is crucial to treat them in a manner that respects and aligns with their capacities.

People with intellectual disability have difficulties during traditional CBT. CBT is less effective for them, and this is mainly because of their cognitive levels, communication difficulties and low engagement in the therapy process. For instance, it might be problematic for them to verbalise a risky situation or they have problems understanding abstract reasoning and using newly acquired skills (Kiewik et al., 2017). People with ID also have difficulties

with memory retention and attention. These limited functions impact the type and amount of information they can process. This is why the therapist should use easy language to make it easier for the client to understand. However, simplifying the content of the therapy is challenging. It is also difficult for people with ID to articulate their thoughts and feelings and this reduces the therapy's effectiveness (Dagnan et al., 2015). Since everyone has different cognitive abilities, therapists should tailor the therapy sessions according to the needs of people with ID. Tailoring the therapy requires different approaches, and that makes it difficult to use standardised CBT methods on the ID population (Oewel et al., 2024).

Furthermore, many times the therapists were not trained on people with ID, therefore they do not know how to treat them effectively (Hassiotis et al., 2018). When the therapy is too challenging for the person with ID, they can get uninterested and it is difficult to engage them. By losing the motivation the clients might experience failures which reduces their motivation even more. Due to these complications, there is an increasing interest in how to treat people with ID and substance use disorder more effectively (Chapman & Wu, 2012).

This is why, CBT+ was created, which is made for people who have substance use disorder and intellectual disability (Van Der Nagel & Kiewik, 2016). It provides suitable exercises, such as repetition, visualisation and the use of straightforward language to reduce the exercises' complexity. Even though CBT+ successfully targeted the people with ID, there are still some gaps which CBT+ could not bridge alone. This includes the skill to reflect on one's behaviour and how to use the skills which were learned during the treatment in real life (Van Der Nagel & Kiewik, 2016).

To minimise this gap between treatment and real life, Virtual Reality (VR) is under investigation to see if it has an added value to CBT for treating addiction. VR is not used for treating substance use disorder in traditional therapy yet, however, it is already used in treating phobias by progressively exposing individuals to their fears (Boeldt et al., 2019). Due to the virtual environment's effectiveness, this technology is more and more widely researched in the realm of therapy. It is hoped that VR can complement existing CBT, by improving the treatment with the following. VR is immersive in that it is interactive and the visuals help absorb the environment more deeply. This is important for people with ID because they can effectively engage in the treatment. They do not have to imagine scenarios, relieving the pressure on their cognitive functioning, because they can be placed in the VR environment, such as a bar or a park (Parsons & Mitchell, 2002).

It also provides a safe environment in the treatment room to be exposed to concrete triggers, and with that, the client can practise specific coping skills. According to Van

Duijvenbode et al., (2019) people with ID are prone to peer pressure. By using the bar scenario in VR, they can practise how to refuse a drink, even when the bartender is pressing them to buy an alcoholic beverage. Furthermore, by using VR the treatment can be personalised specifically to the clients' needs. For instance, they can reduce the scenario's complexity to fit it more to the specific ID client (Kiewik et al., 2017). In VR, they can practise everyday situations and they can use the newly acquired knowledge outside of the treatment room (Kip, 2021). This kind of generalizability is important because it increases the therapy's effectiveness.

Flashcards were designed to complement the usage of VR in addiction treatment. These flashcards represent VR-CBT exercises which serve as a guideline for the therapists. These exercises let clients practice the 6 D's, which represent 6 kinds of coping strategies used in SUD treatment. These 6 D's help people to practise challenging situations in order to improve their coping skills, reduce their cravings and help them to remain abstinent. The 6 D's are *Distance, Declare, Distraction, Different thinking, Different acting,* and *Doing great* (see Appendix A for the flashcards).

To test the 6 D's and to see if CBT and VR can complement each other, experts' opinions are investigated who are knowledgeable about CBT, SUD, and ID. Their input leads to a valuable insight into the theoretical background of CBT and aspects of ID. This is valuable since their feedback ensures that the flashcards are tailored to fit people with ID and represents the CBT principles. By doing this, it makes it possible that the flashcards can actually be part of CBT treatment. Therefore, the purpose of the study is to answer the research question. "*According to experts, how can the CBT components be integrated into the VR exercises, and do they accurately represent the CBT principles*?" Those CBT principles are namely behaviour, thoughts and feelings (Fenn & Byrne, 2013).

Methods

Participants

Semi-structured interviews were conducted with experts. They were included in the study if they were experts in CBT, substance use disorder, and dealt with people who have ID. People were excluded when they were not experts in the above-mentioned fields. These participants were provided by the university and were collected by a snowball sampling technique. 5 interviews were planned to be conducted, however, one of the participants could not participate due to personal circumstances.

Therefore, 4 interviews were conducted online in English between April 19. and May 13. 2024. The sample contained 2 males and 2 females with an average age of 48.56 and a standard deviation of 10.52. All of the interviewees were Dutch. They were working as therapists, psychologists or researchers and some of them were already familiar with VR or CleVR, while others only heard about it. They were recorded with their consent and their participation was voluntary. They were informed that they could deny their participation at any time without any consequences. None of the participants had to be excluded from this study. This study was approved by the BMS Ethics Committee (request number: 240437) of the University of Twente.

Materials and procedures

After contacting all the participants by email, it was decided that all of the interviews would be online. For the interviews Microsoft Teams was used, both as a meeting tool and as a recording tool.

Interview scheme

Before conducting the interviews, a semi-structured interview scheme (see Appendix C) was made with the help of two other researchers. Some of the questions arise from literature, others are designed for descriptive purposes or to address the research question.

The interview scheme started with a brief introduction, explaining that the interview was for a bachelor thesis. A summary was given about the topics which were discussed later on, such as general questions about addiction, CBT, intellectual disability and VR, a video about CleVR followed by some questions and the CBT-VR flashcards. Afterwards, it was stated that the interviews took approximately one hour. At the end of the introduction, it was asked if the interviewee gave consent to record the conversation. If the interviewee said yes,

the recording was started on the Microsoft Teams environment, and the interviewee was asked again to state their name and to state that they agreed to the recording.

The interview

The interview started with general questions, for instance, asking the person's area of expertise "*Could you tell me a bit about yourself and your profession?*". Then more questions were asked focusing on knowledge about substance use disorder and intellectual disability.

CleVR. It was explained that there is an existing VR software, which was designed to fit into CBT (VR-CBT) to help addiction treatment (*CleVR Products*, n.d.). This innovation, called CleVR, has already been used during treatment in different fields, such as depression, anxiety, autism etc. (*CleVR Products*, n.d.). However, this VR environment is still under development and testing, making it difficult to predict its effectiveness and how it should be integrated into current therapy. For the participants, a short video was shown about CleVR to help them imagine what the software can do. Figure 1. shows what a supermarket looks like in the VR.

Figure 1. *CleVR the view of a supermarket*

Figure 2. *CleVR set up with the client and the therapist*

Note. The two figures are from *CLEVR-Producten*. (n.d.). https://clevr.net/producten.html

Furthermore, it was also explained to the participants that this virtual world is not scripted, which means that the client and the therapist have to cooperate in order to set the virtual world for the client. The therapists can see the client's virtual world and can directly react to the client's actions (see Figure 2.). It was also explained that they can discuss how to choose the environment or personalise the people who are within this virtual world. For instance, the client and the therapist can agree that the scenario will take place in the park, they can agree on how many people should be around the client in the VR environment and also what kind of facial expressions should the people have (*CleVR Products*, n.d.).

It was also highlighted that in CleVR, the client and the therapist can agree if the police or a dealer should be around in the environment, or not, and they can also practise conversations with the police or with a dealer. After explaining some of these features, questions were asked about VR and CBT practices, for instance, "*How do you think VR exercises within CleVR can be implemented into CBT practices?*".

The six D's. Then the six D's were introduced which represented the VR exercises. The 6 D's are: *Distance*: going to a supermarket and walking towards the liquor department & hearing triggering sentences, *Declare*: asking for help, *Distraction*: using a relaxation exercise on a phone in a triggering situation, *Different thinking*: formulating helping thoughts, *Different acting*: ordering a non-alcoholic beverage in a bar, and *Doing great*: receiving compliments from a friend (see Appendix A for the flashcards). Figure 3. shows the first flashcard that represent *Distance*: going to a supermarket and walking towards the liquor

department. All of the flashcards have a goal and a description, then steps on what to do before putting on the VR headset, during the VR session and then in the end an evaluation.

Figure 3.

Flashcard 1. 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?

The purpose of the interview was mentioned again, which was to understand whether the VR exercises described on the flashcards are suitable to use in CBT and if they represent the same principles. Overall, 7 flashcards were presented, one participant evaluated only one flashcard, all of the others evaluated two. Each flashcard was discussed individually. It was asked if the purpose is clear of the flashcard and whether it should be improved and if it is possible to implement it in CBT practices. After discussing both flashcards, general questions were asked about the purpose of the flashcards. These questions focused on the flashcards' suitability in CBT, and whether the CBT principles are represented well. Finally, the interview ended and the recording was stopped and saved in the Microsoft Teams environment.

Data analysis

For the data analysis, all interviews were automatically transcribed in Word, using the transcribing function. Those transcripts were anonymized, which means that all of the interviewee names were deleted and replaced with numbers, such as Participant 1. Furthermore, all the institution names, or other information which could identify the participants were deleted and replaced with an "XXX". Then the transcription was corrected manually to correct the errors which were made by the transcription tool. Some of the "hmm", and "yeah" were also deleted, to increase the transcriptions readability. Afterwards, the transcripts were imported into ATLAS.ti which is a qualitative data analysis tool.

Coding process. Deductive coding: First, categories were used based on the interview scheme which helped the coding process. These categories were ID, VR, CBT, and Flashcards. Then the first transcript was coded and all codes were assigned to one category. Such as when a participant mentioned that people with ID had "*Learning difficulties*", that was assigned to the category ID. Afterwards, all of the other transcripts were coded in the same way. When all of the transcripts were coded, they were reviewed and updated again if some new codes were found, which made the whole process iterative.

Developing themes. The final themes were refined by using an inductive coding approach. First, the already existing topics were reviewed, and then more concrete themes were created from them. For instance, the category VR was divided into "*Usefulness of VR*" and "*Difficulties in VR*". Some codes were excluded which did not seem relevant to the research anymore. During the data analysis, new codes emerged that were added to already existing themes or new themes were created for them. By doing all these steps, it ensured that all important data was captured. All the themes and codes can be found in the Codebook in Appendix C.

<div align="center">**Results**</div>

The results will be discussed according to 6 predefined themes: *ID challenges, Usefulness of VR, Difficulties of VR, VR implementation into CBT, Flashcards: Usefulness and improvements* and *Representativeness of CBT principles in flashcards*, which are based on the interview scheme.

Theme 1. Intellectually disabled challenges

Table 1. represents the themes, codes and frequency of the code and which participants mentioned those codes, which are connected to challenges that people with ID have to face. The table shows that according to the participants, the most prominent problem they face is cognitive difficulties, and emotional and behavioural challenges. Some codes are merged in discussing the results because participants mentioned them together.

Table 1.

ID challenges

Theme	Code	Frequency of codes	Participants number
ID challenges		67	
	Cognitive challenges	22	1,2,3,4
	Emotional and behavioural challenges	19	1,2,3,4
	Environmental challenges	12	1,3
	Communicational challenges	5	1,2,4
	Academic and occupational challenges	5	3
	Daily life challenges	2	1,3
	Well-being challenges	2	3

Cognitive and communication challenges

Participants indicated that people with ID's main challenge is to transfer the learned skills from the treatment room to their day-to-day lives. Their basic reflective ability is lacking, which makes it difficult for them to be able to differentiate a thought from a feeling and explain how certain things feel to them. They have black-and-white thinking, everything

is good or everything is bad. *"So it's always very easy or always very difficult. And when it's always very easy, they can easily fall into the trap when it's late in the afternoon and they experience more craving, than, earlier in the day. So… and then it gets more and more difficult to walk in that supermarket and towards the liquor department. And when they think that it's always very difficult to be in a supermarket where there is a liquor department, then they might not do shopping at all."* - Participant 1.

Another participant mentioned that when someone with ID takes part in therapy, the therapist should check if those people truly understand what the therapist is saying. This is because they have a limited attention span. Thus, an adequate amount of information should be provided which is easily understandable for them.

Apart from memory and communication difficulties, it is difficult for people with ID to imagine things or situations during therapy. They have to learn specific skills in order to perform them in real life. They are highly impulsive, thus when they feel the craving, they act on it without thinking much. *"And the harder they call out that they won't relapse, the bigger the chance they are. And yeah… so you definitely need to be aware of that, when you work with these patients."* - Participant 3.

Even though, their cognitive impairment limits their chances to create helping thoughts. During the interviews, one participant highlighted some helping thoughts that people with ID might use during the treatment to stay clean. *"Yeah, it's very different for uh for clients because some of them are really into things like I'm strong enough. I can do this. I can resist. UM, I'm doing this for my mother. I want to be a better son. I don't want to do this because I want to be a better example for my children, and those kinds of thoughts, but yeah. It's these kinds of things that help them in difficult situations"* - Participant 3.

Emotional and behavioural challenges

When people with ID experience cravings, then that is usually strong and distracting. Their craving is immersive, therefore they have a hard time distancing themselves from the triggering situation. *"Craving is very immersive. People get… Despite their good intentions, they are sucked into it, so they have very much difficulty to distance themselves from it. So it's better at least at the beginning of addiction treatment to avoid things."* - Participant 2.

Additionally, they are impulsive and they can behave angry at people when someone does not believe them. *"So people sometimes say I tend to get very angry when someone doesn't believe me right away."* - Participant 2. *"People with an intellectual disability are*

very impulsive, so the minute they feel craving, they kind of anticipate and try to get some." - Participant 3.

Environmental, academic and occupational challenges

According to some participants, it is much more difficult to provide the necessary treatment for people who have ID. They have fewer skills in adapting to society, less chance of having or getting a job, or having a social support system such as family and friends. They might even have families that are also disabled or they do not have much family left. Usually, they do not have diplomas because they do not finish school. Hence, apart from these difficulties they also have housing issues. but even that is hard and to even finish or get a diploma. *"So a lot of them leave school without. Without a diploma or degree or anything, yeah."* - Participant 3.

Furthermore, they start using drugs or alcohol at a much younger age. They can get addicted more easily and when they are already using it, they do not think about any negative impact or their daily responsibilities, such as having to go to school or to work.

Daily life and well-being challenges

One participant stated that daily life and well-being challenges often include relapses. People from the general population usually have to relapse seven times until they get fully abstinent, and this number is higher in people who have ID. Another participant highlighted that people with ID might need professional help who can support them. *"Professional support either a couple of times a week or sometimes even daily or couple times a day. Uh of healthcare professionals who are there. And able to talk to them about, you know, the small things that can go wrong in their life so you can help them support them. Fix the problem so they don't have to relapse into. Yeah. Use drugs or use alcohol again."* Participant 3.

Theme 2. Usefulness of VR

Table 2. shows the codes associated with VR's usefulness. All of the participants agreed that VR can be a useful addition to the treatment of substance use disorder for people with ID. The code *More ways to practice* was mentioned the most often. Such as, VR makes it possible to practise the skills that the client learned in the treatment room, and people with an intellectual disability need much more practice to master those skills. *"So if I act something. I memorise it much better, so it's not seeing is believing. It's doing, it's believing."* - Participant 2.

Table 2.

Usefulness of VR

Theme	Code	Frequency of codes	Participants number
Usefulness of VR		64	
	More ways to practice	17	1,2,3,4
	Interactiveness	13	1,2,3,4
	Test thoughts and feelings	9	1,3,4
	Personalisation	7	1,2
	Safe environment	6	1,3
	Good transition between treatment and real-life	5	1,2
	Positive attitude towards VR	4	2,3,4
	Not realistic	3	2,3

The second prevalent code is *Interactiveness*. VR allows one to experience and then talk about those experiences. This can include discussions about what made the situation challenging and what are the needs of the client to refuse a substance in a substance-related situation. It's an active process that enhances communication skills not only during the usage of VR but also benefits the interactions with the therapist. It helps to set boundaries and adapt certain communication rules, such as listening to the other while talking and asking clarifying questions.

Test thoughts and feelings are also important according to the participants. With VR the client and the therapist have more ways to practise situations, instead of just role-playing with the therapist in a treatment room. With this technology, therapists can test ideas, such as practising how triggering a situation could be, for instance, going to a (virtual) bar for a person who has an alcohol use disorder. *"So you could use the VR environment to test specific addiction-related thoughts or cognition. While being in a safe environment with… instead of saying go home and see if that works."* - Participant 1.

The next code *Personalisation*, was also highlighted, since it is good to be able to manipulate and customise the environment, such as increasing or decreasing the number of

people and how they can behave in the VR environment. Two participants mentioned that one of the most useful additions of VR is that the triggering situations can be tested in a *Safe environment*. Using VR, practising skills in the environment can lead to a *Good transition between treatment and real life*, or at least minimises the gap between the treatment room and real life.

Some participants emphasised the fact that even though CleVR has a game look, and is obvious that it is *Not realistic,* it does not influence the effectiveness of the treatment. It is immersive and the main strength of it is that the therapist can interact with the client, thus the whole scenario is not scripted. Overall, all participants had a *Positive attitude towards VR* in addiction treatment.

Theme 3. Difficulties of VR

Table 3. shows the difficulties with VR which emerged during the interviews. One participant was talking from experience and mentioned that the client and the therapist are usually curious in the beginning about using VR. However, when this curiosity is satisfied after a couple of sessions, it becomes harder to encourage the client to continue with the VR sessions. Furthermore, the same problem happens from the therapist's side, because they have to face hard work when their excitement reduces.

Table 3.

Difficulties of VR

Theme	Code	Frequency of codes	Participants number
Difficulties of VR		9	
	Decreased engagement	2	2
	Need of special training	2	2,3
	Unwanted increase in craving	1	2
	Anxiety to role-play	1	2
	Absence of concrete guidelines	1	2
	Unknown effectiveness	1	2
	Lack of facilities	1	3

It was also stated that it would be beneficial to have a guideline in a manual, which would indicate the time and order in how VR should be used. This is important because when VR-CBT exercises are used, it can induce an unwanted increase in craving levels. Thus, the therapist should only go to the next VR situation if the tension within the client is low. If the tension is high, then the therapist could sensitise the client with the next VR exercise and the craving goes even higher instead of reducing it.

One participant highlighted the fact that some therapists find role-playing scary, according to a participant. They explained that research was done by them, and the result of the research showed that role-playing is one of the least favourable things to do as a therapist. This is why they emphasised that using VR needs special training. It is not enough to know all of the buttons in the VR system, therapists should learn how to do the role-play effectively. However, the effectiveness of VR is still under investigation as one participant stated that.

Another one indicated that addiction treatment organisations still need to be facilitated enough to use VR. *"A lot of companies are not ready yet to provide it. So it's actually, it's not that they don't want to. I'd say they're not able to because they don't have the facilities to do it or the knowledge to use it properly."* - Participant 3.

Theme 4. VR implementation into CBT

Table 4. shows the participant's opinion on VR implementation into CBT before watching the video of CleVR. All of the interviewees agreed that VR is a valuable tool to enhance CBT treatment, however, real-world interactions will not be substituted with it. VR could be an additional exercise that the therapist could use in order to expand the therapy. Furthermore, VR is a beautiful add-on to CBT exercises, still, it cannot stand on its own. This is why VR should always be offered in a combination with traditional CBT protocols.

Table 4.

VR implementation into CBT

Theme	Code	Frequency of codes	Participants number
VR implementation into CBT		9	
	Evaluation of VR as an addition to CBT	3	1,3,4
	Incorporate CBT in VR	2	1

Implementation methods	2	1,4
Equivalency of CBT principles in VR	1	2
VR as exposure therapy	1	3

It was highlighted that there are various ways to implement CBT into VR. All the protocols, role play activities and practical skills training of CBT can be easily implemented in VR according to a participant. However, complementing the CBT with some VR exercises does not change the therapy. *"Most importantly, you should convince or try to convince the users that it's the same as what they were already doing only by a different means. So I think it's very tempting to see when you implement VR to see it as something new, something different… It's exactly what they already did. Uh, only the format is different. So you should as much as possible I think try to add it to what you were already doing."* - Participant 2.

It was also mentioned that VR can be used as an exposure therapy. The clients can be exposed to challenging situations and they can practise how to react or behave in those situations safely.

Theme 5. Flashcards: Usefulness and improvements

Figure 1. indicates what the participants thought about the flashcards' usefulness. It is important to note that, when participants mentioned not useful concepts, most of the time they did not think that the whole flashcard was useless. They highlighted parts that they thought were not applicable to people with ID. Many of them suggested minor or major improvements (for raw data see Appendix C).

Figure 3.

Flashcards' usefulness
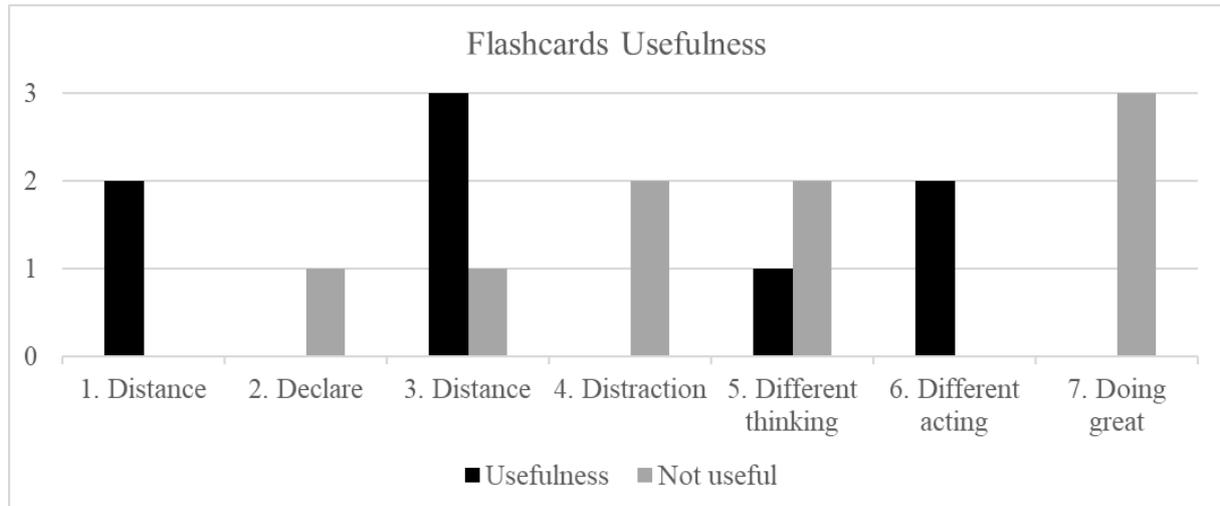
Usefulness and not as useful

Flashcard 1. and 3. *Distance*, and Flashcard 6. *Different acting* were perceived as useful cards. Participants argued that they saw the value in the exercise and they thought that using it would be a helpful addition. *"It's relevant. Ordering a non-alcoholic drink can be difficult for our clients. Especially with the substance abuse problems in a bar or at the pub."* - Participant 4. (Flashcard 6. *Different acting*)

Flashcard 5. *Different thinking* was perceived as a useful flashcard because having a strong helping thought is valuable. However, if the therapist cannot find a good helping thought with the client, then it reduces the therapy's effectiveness. The interviewee mentioned that it is even more difficult to find helping thoughts for people with intellectual disabilities. *"And once we're getting to use it because they might get the feeling like, Oh yeah, you see, this isn't helping. I can't do this. I'm not strong enough. It's not going to work."* - Participant 3. (Flashcard 5. *Different thinking*)

Flashcard 2. *Declare*, Flashcard 4. *Distraction*, and Flashcard 7. *Doing great* were not seen as useful from the participants' point of view. Flashcard 2. *Declare* was argued with the fact that it is more meaningful to practise asking for help in real life, and since most people take part in group therapy, that provides a good place to practise this skill. Flashcard 4. *Distraction* represents a relaxation exercise that the client could use in stressful situations. However, people with ID are not the type of people who would pick up their phones to avoid triggers. Flashcard 7. *Doing great* was the least useful card since a participant did not see any relevance in relation to substance use disorder or intellectual disability. They were convinced

that receiving compliments is not challenging for the people with ID and especially not to receive them from people they know.

Improvements of the flashcards

Flashcard 1. *Distance* is about going to a supermarket and walking towards the liquor department. The participant who analysed the flashcard mentioned that there is a discrepancy in the text because the goal of the flashcard is to learn to take a distance. However, the instruction is to walk towards the liquor department. She suggested that the first step could be to explore with the client, how they feel when they are in the supermarket in general. Afterwards, the second step could be to explore the thoughts and feelings of the client, by testing how far away they feel comfortable from the liqueurs and why. Furthermore, ask whether they feel the urge to approach that department and also ask if this exercise is helpful when it comes to their craving.

Flashcard 2. *Declare* is about asking for help. The suggestion to improve the flashcard was focusing on the part, that when the client asks for help from the therapist, the therapist is answering positively, however, a participant thought that it could be better when a negative response was given. " *So responding positively when a patient asks for help is great and they need to learn that they can get that response. But I think that especially in a VR environment, it is also good to practice. What do you do when your biggest fear becomes the truth.*" - Participant 1.

Flashcard 3. *Distance* is about being in the supermarket and hearing sentences such as "Your favourite beer is on sale, you cannot pass that up, can you?!". The interviewee suggested that, firstly, the client and the therapist should agree upon and identify challenging situations. Secondly, discuss what is the essence of the problem, why the client is not successful, and what makes the situation hard. This conversation should be in easy language, for instance, if the client's friend is pressuring them to use a substance, discuss why it is hard for the client. This is an important step because all clients have different motives, why it is difficult for them to refuse substances.

Flashcard 4. *Distraction* is about using a relaxation exercise on a phone in a triggering situation. It was suggested that instead of the relaxation exercise, they could do something else, such as play on the Candy Crush, open Facebook, call someone, or do something else on the phone. Because it is not realistic that people with ID would use a relaxation exercise in real life.

Flashcard 5. *Different thinking* is about formulating helping thoughts. Therapists most probably would struggle with this flashcard, because finding a helping thought for a disabled person is quite challenging. Furthermore, the therapist should always end the VR session with a positive experience. This means that in the beginning, the client is in an easy environment, afterwards, the therapist puts the client in a more difficult environment. Finally, the client is in an easier environment again, because, with this, the client has a positive experience and will remember that one more.

Flashcard 6. *Different acting* is about ordering a non-alcoholic beverage in a bar. No specific improvement was mentioned during the interview.

Flashcard 7. *Doing great* is about receiving compliments from a friend. It was suggested that receiving a compliment from a stranger would be a better option. Because the client has more difficulty in situations where they communicate with people whom they are not familiar with.

Theme 6. Representativeness of CBT principles in flashcards

Table 5. shows the interviewees' opinions on how CBT principles are represented on the flashcards. Overall, they thought that the CBT principles were represented quite well. However, while looking at Flashcard 1. *Distance* and Flashcard 2. *Declare*, one participant mentioned that a manual could be made for VR-CBT. That would help the therapists to use the flashcards how they were intended to be used.

Table 5.

Representativeness of CBT principles in flashcards

Theme	Code	Flashcards	Frequency of codes	Participant number
Representativeness of CBT principles in flashcards			7	
	Manual for implementation	1. *Distance* 2. *Declare*	2	1
	Suitable for CBT and	2. *Declare* 6. *Different*	2	1,4

learning new skills	*acting* 7. *Doing great*		
Cue exposure limitations in VR	3. *Distance*	1	2
Deficiency of CBT components	1. *Distance* 4. *Distraction* 5. *Different thinking*	2	1,3

Flashcard 2. *Declare,* 6. *Different acting* and 7. *Doing great* fits CBT principles accurately and they are properly designed for learning skills. Flashcard 3. *Distance* uses cue exposure when the client is exposed to triggers that might increase their cravings. According to one participant, this technique should not be used with VR. This is because it is too challenging for the people with ID, however other participants did not mention this when looking at different flashcards.

Flashcard 1. *Distance* represented the behavioural component of CBT well, but the cognitions and feelings components were missing from it. Flashcard 4. *Distraction* could represent behaviour better. On that flashcard, the CBT principles are more implicit and only recognisable after a while, albeit it still adheres to the fundamental principles of CBT. Flashcard 5. *Different thinking* represents the cognitive aspects well, however, if there were a client version of the flashcards, that could emphasise acting more because to think differently, you act differently. *"I like the idea of the flash cards. I think that's a good idea. But. Talking about it, I would say perhaps it's an idea to make one version for discussing with the clients more visual. So OK, if you would prioritise these, which one would you pick? And that there's more instruction flash card for the therapists. About the steps he or she should take."* - Participant 2.

All flashcard suggestions

After analysing the transcripts and making the codes, there were several suggestions that the participants recommended, however, those suggestions were not specific to one

flashcard. They were more on a general level applicable to all flashcards or the therapy process. This is why, this section is not based on specific interview questions but tries to see the suggestions as a whole.

One participant mentioned that a manual could be used for the flashcards specifically, to increase their effectiveness. The manual could contain specific steps and concrete processes on how to use the flashcards within CBT. Doing this would help the therapist's work and serve as a concrete guideline. *"I think it would help clinicians if the exercise is prompted within the manual. So if shows where in the manual, especially in the specific session that you are doing now… hey, you could try this, this exercise or this exercise would be useful… And like I said, there are different ways in which you can use it and to help clinicians see how they can use a specific exercise and what the benefits would be."* - Participant 1.

Furthermore, the therapists could also make an evaluation before the VR session, asking the client on a scale from 0 to 10 how capable they are of handling the situation. Then, after the VR session, ask the same question again, and see if it changed. By doing this, the therapist tries to increase the self-efficacy of the client.

"So in evaluating you could… OK, on scale of zero to 10. How do you think you are capable to handle the situation now? And at the end? OK. And has that changed on a scale of zero to ten and you have to of course say what is 0 and what is it 10. Hmm. Otherwise you get mix ups but. You want what I think what you in essence want is to increase the self efficacy. And I can hear that I can handle this situations better than before" Participant 2.

Two participants emphasised that instead of only the therapist having these flashcards, also the client could have another version, which helps to discuss and visualise the situation more. Then the client can prioritise the flashcards and pick from them, while the therapist would have different flashcards with more instructions and steps.

Discussion

The main goal of this study was to investigate if CBT components can be integrated into VR exercises by evaluating flashcards representing VR-CBT exercises. The research question was "*According to experts, how can the CBT components be integrated into the VR exercises, and do they accurately represent the CBT principles*?". The general view of the participants indicated that the CBT principles were integrated well into the flashcards, however, they suggested improvements in how to represent those principles better. The main findings were that participants recommended improving the applicability of the flashcards and integrating both positive and negative reactions in the scenarios. Furthermore, there should be a client version of the flashcards that are specifically designed for clients with ID as well as, a suitable manual for therapists should be provided. Also, the representativeness of the CBT should be improved in the flashcards, such that each CBT principle is equally represented in them.

Improving the applicability of the flashcards

Participants highlighted that many flashcards did not align with the needs of people with ID. They agreed that the scenarios needed to be more realistic and practical. This is supported by existing research, which shows mixed results on the effectiveness of specific CBT techniques, such as relaxation exercises (Lindsay et al., 1996). People with ID might not use relaxation techniques in triggering situations. Therefore, tailoring the exercises to fit better with the needs of people with ID and that are similar to real life scenarios could improve the applicability of flashcards and increase the effectiveness of the therapy.

Integrate positive and negative reactions

Including not only positive but also negative responses on the flashcards would be beneficial since it would prepare the client for real situations when they ask for help and they get rejected. By doing this the therapist is exposing the client to scenarios that the client is afraid of, and it is proven that exposure therapy is useful in the realm of substance use disorder, especially when combined with CBT (Byrne et al., 2019; Mellentin et al., 2017). When the client is exposed to negative outcomes, then with the therapist's help they can learn new coping skills. By doing this, the practicality of the flashcards is increased.

Design client version of the flashcard for people with ID

Making flashcards for the clients which are easily understandable, with a small amount of information and include colours and pictures would be beneficial. The client could choose from those flashcards with the therapist's help, therefore the client would be more engaged from the beginning. Having a client version would help the therapy process because previous research indicates that involving the client as much as possible and specifically tailoring the session for them improves the therapy's effectiveness (Boswell & Scharff, 2022).

Develop a manual for the therapists

Developing a manual for the therapists and using it as a guideline such as a step-by-step description of the implementation of the VR exercises would increase the whole process's effectiveness. This finding is supported by Buck & Dent-Brown (2014), where they claim that using guidelines with concrete steps improves the therapy's effectiveness and efficacy.

Improving the representativeness of CBT on the flashcards

In order to improve the effectiveness of the flashcards, it would be important that they all represent the CBT principles. However, the results showed that some of the flashcards were missing some parts of those principles. Specific flashcards were missing the cognitions and feelings. Therefore, improving the flashcards by incorporating behaviours, thoughts and feelings would be beneficial. Additionally, the therapist could use different flashcards when one was mastered. By repeating exercises and positively reinforcing the clients who are practising those would also enhance the effectiveness of the therapy. This is supported by the fact that repetition and reinforcement are core components of CBT (Joyce-Beaulieu & Zaboski, 2021).

Strengths

The strength of the study is that it is contributing to the field of VR CBT and ID. This is valuable since the research on this topic is limited. Using qualitative methods, a better understanding of experiences and perceptions from the experts is provided. It allowed an in-depth exploration of their view. By using this method, a highly detailed insight is gained. Moreover, using an inductive approach during generating the themes also offered a new perspective and deep insight. Furthermore, all participants were enthusiastic about participating in the interview and it is valuable to involve experts in designing final versions of the flashcards so that it fits better with reality and practice.

Limitations

The weakness of this study is that most experts did not have a chance to try the CleVR environment themselves, which means that they based their opinion on a video about CleVR, not on their experience with the tool. This influences the research's outcome because they might have proposed different ideas if they had the chance to experience the CleVR tool and perform the exercises themselves. Furthermore, the interviewer's lack of experience and expertise also impacted the details of the interviews. It was noticeable on the transcription that the quality of the interviews rose as the number of interviews increased, indicating that interviewer experience had an impact on the quality of the interviews. The reliability of the study is questionable since only 4 participants took part in the interviews. This indicates that if the study is replicated with different participants, then the results might differ as well, based on the background, knowledge and experience with VR of those participants. However, this study is a first starting point in analysing the suitability of using VR exercises in CBT and how they should be designed according to the CBT principles.

Recommendations

For future research, it is recommended that the flashcards would be used by the therapist with a client, the session would be observed and afterwards both the client and the therapist would be interviewed by the researcher. By doing this, not only the therapist's opinion would be heard but also the client's perspective would be seen.

It is recommended to try these flashcards with people who have already recovered from substance use disorder and see how they react and what they think because it might be problematic if some flashcards are too triggering for the people who are still in treatment, and their craving would increase instead of reducing it. Furthermore, making a manual and testing it would be useful in the future, because if there was an existing manual that encompasses guidelines and step-by-step processes on how to use the VR-CBT exercises then that would improve the therapy effectiveness.

Conclusion

This study shows that CBT principles are integrated well into the VR flashcards, although there is space for improvements in the VR exercises to represent the CBT principles better. The application of the flashcards could be improved by tailoring them to make them

more realistic for people with ID, enhancing realistic real life responses, designing a version for the client and developing a manual for the therapist. These guidelines can be used to further improve the deployability of VR exercises in CBT for people with ID and SUD.

Appendices

Appendix A

Flashcard 1. 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?

Flashcard 2. Declare

DECLARE

Goal	Asking for help.
Description	At home at the dining table, together with a friend / family member.

👥 **Asking for help** ★★

Template 2A

Triggers & Helpers

💚 Virtual character who resembles someone the client trusts

💚 Familiar surrounding

Before putting on the VR headset

1. Select a virtual character similar to a friend/family member the client would like to ask for help.

2. Discuss in advance how the client might ask for help. Practice first with something easy ("can you bring me to ... by car?") and only then start practicing asking for help with substance use.

👤 **VR session**

1. Small talk with the client until they interrupt you.

2. Respond positively when the client asks for help.

Evaluating

1. What were the clients experiences? Was it more difficult to ask for help when it came to his substance use?

Flashcard 3. 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?

Flashcard 4. Distraction

DISTRACTION

Goal	Doing something else
Description	In a messy home environment, with drugs and liquor.

🚶 Doing something else: relaxation exercise ★

Template 3A

Triggers & Helpers

⚡ Messy environment

⚡ Liquor / drugs

💚 Relaxation exercise

Before putting on the VR headset

1. Explain that doing something else can help cope with cravings / preventing substance use. In VR, you will practice doing something else through a relaxation exercise on a virtual mobile.

🧑 VR session

1. Have the client look around and describe all that they see. What do they feel and think? Would the client want to use in this situation?

2. Ask the client to rate their level of stress (1-10).

3. Ask the client to hold their hand at reading distance and do the relaxation exercise on the virtual mobile.

4. Again, have the client rate his stress. Has it decreased?

Evaluating

1. Did the client notice a difference in stress level? If the exercise did little to help, discuss other ways of distraction that might help the client.

Flashcard 5. 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)?

Flashcard 6. 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?

Flashcard 7. Doing great

Appendix B

Codebook of the themes and codes

Theme	Code	Definition
ID challenges		
	Cognitive challenges	Difficulties that are related to thinking, reading, understanding and memorizing.
	Emotional and behavioural challenges	Issues that are related to feelings and behaving.
	Environmental challenges	Difficulties that are connected to school, work, family, housing.
	Communicational challenges	Problems in communicating with others.
	Academic and occupational challenges	Issues in school and work.
	Daily life challenges	Problems in daily life, such

| | | as self-care and money. |
| | Well-being challenges | Difficulties in mental health. |

Usefulness of VR

	More ways to practice	VR offers a variety of situations to practice skills.
	Interactiveness	Users can interact within the virtual environment and get feedback from the therapist.
	Test thoughts and feelings	Explore and assess cognitive and emotional responses in controlled settings.
	Personalisation	VR can be tailored to meet special needs.
	Safe environment	It is risk-free to experiment without consequences in the real world.
	Good transition between treatment and real-life	It minimises the gap between the therapy and the real world.
	Positive attitude towards VR	Therapists find it engaging and beneficial.
	Not realistic	The VR does not represent the real world accurately.

Difficulties of VR

	Decreased engagement	Reduction of the interest over time.
	Need of special training	Therapists require an education on VR.
	Unwanted increase in craving	VR heighten the craving unwantedly.
	Anxiety to role-play	Therapists are scared of role-playing.
	Absence of concrete guidelines	Lack of protocols and standards on the VR use.
	Unknown effectiveness	Uncertainty in the effectiveness of VR.

	Lack of facilities	Insufficient knowledge and lack of equipment.
VR implementation into CBT		
	Evaluation of VR as an addition to CBT	Assessing the benefits and limitations of incorporating VR into traditional treatment.
	Incorporate CBT in VR	Integrate CBT principles within VR.
	Implementation methods	Strategies to implement CBT into VR.
	Equivalency of CBT principles in VR	Ensure that CBT is the same in VR and the real world.
	VR as exposure therapy	Using VR to expose the client to feared stimuli.
	VR designed on CBT framework	Creating VR on the basis on CBT ideology.
Representativeness of CBT principles in flashcards		
	Manual for implementation	A comprehensive guide to implementing CBT into VR.
	Suitable for CBT and learning new skills	Appropriate for CBT and skill acquisition.
	Cue exposure limitations in VR	Limitations of using VR in cue exposure.
	Deficiency of CBT components	Potential gaps of CBT principles in VR.

Appendix C

Flashcards raw data

Flashcards	1. Distance	2. Declare	3. Distance	4. Distraction	5. Different thinking	6. Different acting	7. Doing great
Improvement	4	5	6	2	6		1
Discrepancy	1						
Trigger	3	1		1		1	
Steps	1	1	2				
Usefulness	2		3		1	2	
Not useful		1	1	2	2		3
Difficult to implement					1		

Appendix D

Interview guide: Final interview questions

Interview guide

Introduction

- *Hi, how are you?*
- *I am*
- *Thank you for*
- *Lilla*
- *Thesis*

- *My thesis is about how to integrate CBT principles into virtual reality exercises to treat substance use disorders in individuals with an intellectual disability, according to experts.*

- *The overview of the interview*

- *First, we will talk about VR exercises, CBT, substance use disorder, and intellectual disabilities in general.*

- *Then, I will show you a video of CleVR, which is a VR framework that has been developed for CBT exercises*

- *Finally, I will show you flashcards, which are examples of VR CBT exercises*

- *45 minutes*

- *you can stop at any time without consequences*

- *the recordings and transcript of the interview will be anonymized*

Is it okay if I start the recording now?

Could you state your name and say that you consent to the recording?

General questions (ask these questions before showing the videos etc)

1. *Could you tell me a bit about yourself and your profession?*

   a. *May I ask your age?*
2. *What would you say is your area of expertise?*
3. *Do you play any role in addiction healthcare?*
4. *Do you also work with or research people who have intellectual disabilities?*

This research is focusing on people who have SUD and mild-ID

5. *What should be considered when treating clients with substance use disorder and intellectual disabilities compared to clients who have substance use disorder only?*
6. *Are you familiar with Cognitive Behavioural Therapy and can you explain briefly what CBT is?*
   a. *What are the basic principles of CBT?*
   b. *EXPLAIN:*
      i. *CBT is a widely used treatment, which is also popular for treating addiction. It aims to identify negative or dangerous thoughts, feelings, cognitions and behaviors and to replace them with useful and positive ones. This is done by teaching communication and refusal skills. And also coping skills like cognitive restructuring (for replacing the negative beliefs) and behavioral activation (done to focus on positive behaviors, takes focus off of negative ones).*

7. *What do you know so far about applying VR into CBT practices to treat substance use disorders?*

8. *How do you think VR can be implemented into CBT practices?*

Now I will show you a video about CleVR which is an interactive software that makes it possible to roleplay with virtual characters and the therapist can personalize those characters.

-   *CleVR's voice distortion techniques, participant does not recognize the therapist's voice*

-   *the therapist can tailor the virtual characters, with a wide variety of emotions and behaviors*

9. *Are you already familiar with CleVR or have you ever used it?*

Questions about CleVR video (show video) (additional photos?)

10. *What are the first things that come to mind after seeing this video?*

11. *How do you think VR exercises within CleVR can be implemented into CBT practices?*

    ○   *Can you give me some examples? What type of exercises can be implemented?*

    ○   *Are there specific elements a VR exercise should have to replace existing CBT exercises?*

-   *Now, that you have seen the video of CleVR*

-   *I will show you two flashcards*

-   *These flashcards are examples of VR exercises, according to the six D's used in addiction treatment. They represent coping strategies, the 6 D's are: Distance, Declare, Distraction, Different thinking, Different acting, Doing great. This is how we are planning to implement the CBT principles in VR exercises.*

-   *But now we will have time only to show you two flashcards*

-   *The purpose of this interview is to understand whether these VR exercises described on the flashcards are suitable to use in CBT and whether they represent the same principles.*

- *These flashcards, offer clinicians ideas about how to integrate VR in treatment and can be personalized based on the needs of their clients.*
- *The client will therefore not see these flashcards, but rather they serve as a starting point for the clinician.*
- *Now, I will show you the first flashcard*

Questions about flashcards (Show 1 flashcard and repeat with other flashcard)

12. *What do you think of this exercise?*
    And what do you think of the VR aspect?

13. *Do you think this exercise is understandable for people with intellectual disabilities?*
    Why (not)?

14. *Do you think the purpose of this exercise is clear for clinicians?*
    Why (not)?

15. *How do you think this exercise can be improved for people with intellectual disabilities, so that it fits better to substance use disorder treatment?*

What do you think about the difficulty of this flashcard?

16. *Do you think this exercise could be triggering for clients?*
    Why (not)?
        i. *And if it is triggering, would that still be acceptable in the context of treatment?*

(If they know the principles)

17. *What do you think about which CBT principle is represented on this flashcard?*
    What should be done to represent the CBT principles better?

18. *What do you think is needed to implement this exercise in CBT practice?*
    a. *More change or anything*

- *Show the other card*

General:

19. *When looking at all VR exercises (the flashcards), do you think these exercises are suitable for CBT?*
    - *Why?*

(If they know the principles)
20. *Are there any CBT principles that are missing from these exercises and play an important role in SUD? = IF they know the principles*
    - *Which one, and why?*
    - *Could the missing principles be represented / implemented in a VR exercise?*

21. *Do you have additional recommendations based on the flashcards you just saw?*
    Which?

22. *Do you think the VR exercises can serve as a starting point to personalize VR scenarios for specific clients?*

23. *Do you have additional recommendations based on using VR to treat substance use disorder on people with intellectual disabilities in general?*
    Which?

24. *Do you have any other questions or remarks based on this interview or the topics discussed in this interview?*
    Which?

Thank you for participating in this interview. If you have any questions that come up at a later point, you can contact me via this email with the mail with which I contacted you.

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