Clinicians on incorporating VR exercises in CBT coping skills for individuals with substance use disorders and intellectual disabilities: a qualitative study

Bart Ligtenberg
Section of Positive Clinical Psychology & Technology
Behavioural Management and Social Sciences, University of Twente
Bachelor's Thesis Psychology
First examiner: Meike Berkhoff, MSc
Second examiner: Hanneke Kip, Dr
July 3, 2024

Abstract

A relatively large number of individuals diagnosed with substance use disorder (SUD) is also diagnosed with an intellectual disability (ID). A common treatment for SUD is cognitive behavioural therapy (CBT). As the ID target group was often overlooked in the development of treatments, there are certain challenges associated with using CBT to treat SUD for those with an ID. Virtual reality (VR) could help work around some of these challenges. The problem is that VR has not been widely implemented in the treatment of SUD for those with an ID yet, as it is, among other things, complicated to use. Therefore, the Triggers & Tech project from the University of Twente developed eleven flashcards on VR coping skill exercises, using the VR framework of CleVR. This research aims to provide recommendations on how to incorporate VR flashcard exercises into existing CBT coping skills to treat SUD of individuals with an ID according to clinicians. To provide these recommendations, five clinicians were interviewed using a semi-structured interview guide. The clinicians were recruited via convenience sampling. First, considerations towards the ID target group and the use of VR were discussed. This was followed by questions on the needs and attitudes towards CleVR. Finally, the flashcard exercises were discussed with the participants.

The interviews led to four general recommendations. The first is making sure there are sufficient guidelines for both the use and the implementation of the exercises. The second is to be mindful on how to interact with clients with an ID. The third is to add enough customization and adaptability to the scenarios of the exercises. The final recommendation is to include the ID target group and their caregivers in the development of exercises. This research can be used to make future VR flashcard exercises. Additionally, this study uses practical examples of flashcard exercises, and therefore delivers concrete input on how to improve these exercises. This input can then be used to create or improve VR exercises for the treatment of SUD for clients with ID. Future research could implement the changes recommended by this study and test how clinicians experience these exercises when they have to use it in practice with their clients.

Key terms: cognitive behavioural therapy, intellectual disability, substance use disorder, virtual reality, coping skill exercises

Introduction

Addiction is a large problem for many societies, including the Netherlands, where in 2021, over 50.000 were in treatment for substance use disorders (or SUD) (LADIS, 2023). The biggest group, consisting of around 25.000 individuals, were in treatment for alcohol abuse, followed by cannabis, cocaine, and opiates. The Central Bureau of Statistics (CBS) indicated that the percentage of Dutch individuals that have used drugs in the past year has increased from 8 to 10 percent between 2015/2016 and 2021/2022 (Derksen & Hupkens, 2023). According to the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; DSM–5; American Psychiatric Association, 2013), SUD is characterized by 11 symptoms that include using more or longer than intended, inability to stop or manage use, and craving.

Within the group of individuals with SUD, a high percentage of individuals also have an intellectual disability (ID) (Van der Nagel et al., 2014). According to the DSM-V (American Psychiatric Association, 2013), an ID is characterized by a chronic impairment of someone's general mental abilities in the conceptual, social, and practical domain. The higher percentage of individuals with an ID who have a SUD can be explained by the fact that individuals with ID often have risk factors for SUD that include a low socio-economic status, loneliness, (traumatic) life-events, lack of purpose, family problems, and a lack of support from their network. Additionally, individuals with ID often feel the urge to fit in with society and feel the need to be autonomous and make their own decisions (Van der Nagel et al., 2014). Also, they tend to overestimate their own abilities and therefore seem smarter than they are, leading others to overestimate them as well. The combination of being overestimated and the urge to be autonomous can lead to failure and damage to confidence, as well as a higher susceptibility to group pressure. All these risk factors can contribute to the development of substance use disorders (Van der Nagel et al., 2014). Despite all this, the group of individuals with SUD and intellectual disabilities were often overlooked until the beginning of the 21st century (Van der Nagel et al., 2014). The consequence of this is that they were also overlooked in the development of traditional treatments, and therefore many treatment forms are not adapted to the cognitive abilities of individuals with ID (Van Duijvenbode et al., 2015).

A common treatment for SUD is Cognitive Behavioural Therapy (CBT) (Boness et al., 2023). CBT is a treatment form which is based on the theory that disorders such as SUD are based on maladaptive behaviours and thoughts stemming from dysfunctional beliefs (Thaysen-Petersen et al., 2023). Here, beliefs lead to specific patterns in thoughts, emotions and behaviours that result in continued substance use or relapse. CBT aims to target identify and change these beliefs, as well as improve coping skills to prevent further substance use and/or

relapse (Thaysen-Petersen et al., 2023). CBT is also applicable to individuals with SUD and intellectual disabilities, although some methods of CBT need to be changed in order to fit the target group (Van der Nagel et al., 2014; Kiewik-de Vries, 2019). A difficulty of using CBT to treat individuals with SUD and intellectual disabilities stems from a difficulty to generalize scenarios discussed during the CBT to everyday practice, as well as the focus of CBT on identifying thoughts, feelings, and emotions (Van der Nagel et al., 2014). A version of CBT that is modified to fit the needs and abilities of those with ID is CBT+, which uses more repetition, more use of active work forms, and more use of a trusted person of the client (Van der Nagel & Kiewik, 2016). Another way to make CBT more suitable for individuals with an ID is by practicing with real life situations, yet this can be difficult and dangerous as the therapist and client then have to travel to locations that can trigger and where not all variables can be controlled. Virtual Reality (VR) can simulate triggering situations and environments whilst remaining in a safe, confidential, and clinical environment (Langener et al., 2021a; Thaysen-Petersen et al., 2023; Tsamitros et al., 2021).

Several pilot studies show that VR is potentially an effective method to treat SUD (Langener et al., 2021b; Amista et al., 2017; Tsamitros et al., 2021; Segawa et al., 2020; Park et al., 2014). VR cue exposure therapy (VR-CET) seems to be effective and increasingly popular for treatment of SUD (Tsamitros et al., 2021; Emmelkamp & Meyerbröker, 2021). Here, repeated exposure to substance in a realistic context can lead to a reduction in cravings and can therefore prevent relapse (Tsamitros et al., 2021). A downside of VR-CET and CET when applied to SUD in general is that it aims to induce cravings. It does not focus however on how to deal with these cravings and therefore positive effects of the treatment might be short-term (Byrne et al., 2019; Monti et al., 1993). Additionally, the renewal effect, spontaneous recovery, and reinstatement might occur, which all pose a treat towards extinction of cue reactivity (Concklin & Tifffany, 2002). Spontaneous recovery is the re-emergence of the original cue response after a switch in the context of the trigger, because the decreased cue reactivity does not always generalize to different situations (Conklin & Tiffany, 2002). This means that a client may have reduced their cravings in a bar setting thanks to CET, yet this may not then be the case for different environments (Byrne et al., 2019; Conklin & Tiffany, 2002). Spontaneous recovery is the re-emergence of the original cue response after the passage of time, also poses a treat towards extinction of cue reactivity (Conklin & Tiffany, 2002). Finally, reinstatement is the re-emergence of a stimulus response after being presented with stimuli that were removed, such as meeting old friends who you used substances with, may also increase cue reactivity (Conklin & Tiffany, 2002). These three effects of renewal, spontaneous recovery,

and reinstatement can be mitigated by integrating cue exposure within CBT and Coping Skills Training (CST), which could be a way to improve CET (Amista et al., 2017; Rohsenow et al., 2001). This could then work towards stimulus control and response instead of mere exposure. However, there is a lack of knowledge on how to approach this in practice.

These elements are the focus of VR-CBT, which is made up out of cognitive restructuring and skills training of practical coping mechanisms (Langener et al., 2021a). This is aimed to help overcome psychological responses related to SUD. One of the advantages of VR-CBT is the ability to tailor the therapy to specific scenarios suitable to the client (Langener et al., 2021b). Here, clients can confront their cravings and triggers in a controlled environment, meaning that they do not have the possibility to actually engage with the addictive behaviours. VR-CBT has shown promising results in training coping skills and reducing craving in individuals with SUD (Langener et al., 2021a; Park et al., 2014; Langener et al., 2021b; Segawa et al., 2020). This could be an improvement over the aforementioned CET, as CBT aims to learn the client skills to cope with cravings and cues (Amista et al., 2017). Additionally, clients with SUD and intellectual disabilities tend to also have difficulties with a short attention span and abstract reasoning which could pose problems when trying to identify high risk situations and convert negative feelings (Van der Nagel et al., 2014; McHugh et al., 2010). VR can help with this by using a more active work form as well as making triggering situations more tangible. Finally, the use of avatars in the virtual environment that the client could interact with are also deemed useful as this could make VR situations more realistic (Skeva et al., 2021).

However, the use of applying VR in CBT has not yet widely spread to clinical practice (Lindner, 2021; Nolet et al., 2020). Although many clinicians seem favourable towards VR in therapy, they seem to hold financial and usability concerns (Lindner et al., 2021). This is because of concerns of relapse caused by overconfidence or over triggering, the risk of traumatizing the client by exposing them to a cue, as well as concerns regarding the feasibility to create realistic situations, engagement, and representation (Skeva et al., 2021). Additionally, the use of VR might seem expensive and cumbersome, and may not match the clinicians' preferences and current clinical trends (Nolet et al., 2020). Moreover, many clinicians note that VR techniques should always be combined with other types of treatment (Skeva et al., 2021). In essence, although clinicians are often willing to use VR, they require more guidance in doing so by means of for instance training, as well as organizational and technological support (Kouijzer et al., 2023). In order to provide more guidance on the use of VR exercises within CBT, the project group of the Triggers & Tech project of the University of Twente developed flashcard exercises to guide clinicians in their use of VR.

Therefore, a problem in the implementation of VR into CBT for individuals with SUD and ID lies not as much in the effectiveness of the therapy itself as feasibility tests show promising results, but within the adoption of the technology within the healthcare sector itself, as it is not yet integrated within existing therapies. More insights must be provided into the needs of clinicians in order to implement VR approaches into their current CBT practices. In order to gain these insights, CBT exercises must be translated to VR exercises, and it is yet unclear how to do this, and whether these exercises can be translated one on one. The aforementioned Triggers & Tech project has developed such flashcards to use in the CleVR VR framework, yet it is still unclear how to incorporate these into CBT practice. The research question of this thesis therefore is: *How to incorporate VR flashcard exercises into existing CBT coping skills to treat substance use disorder of individuals with an intellectual disability according to clinicians?* To answer this question, four sub questions are formulated:

1. *What should be considered when treating individuals with substance use disorders and intellectual disabilities according to clinicians?*
2. *What should be considered when using virtual reality exercises according to clinicians?*
3. *What are considerations for CleVR for the treatment of SUD for individuals with ID according to clinicians?*
4. *What are the attitudes and recommendations of clinicians on the flashcard exercises?*

Methods

Participants

For this thesis, participants were selected out of already existing contacts provided by the supervisor of this thesis by means of convenience sampling. The participant pool was made up out of Dutch clinicians working in the field of substance use disorder, and who have experience treating these clients using cognitive behavioural therapy. Additionally, the aim was to include clinicians who not only work with CBT and SUD, but also have experience with ID. In total, five clinicians agreed to participate, with whom an interview was conducted. Of these participants, one was male and four were female. All participants have a background in the Mental healthcare sector. This ranges from working as a healthcare psychologist in training to become a specialist to social work. Three participants also have a background in the research field, ranging from VR research to research on SUD and ID research. All participants have a background with CBT, although in some cases only by using aspects of CBT, and not the entire protocol. Additionally, all participants have a background in working with or doing research on ID in combination with SUD. Finally, all participants have

a background with VR, although this is most commonly of an exploratory nature, as most do not use VR as a treatment with clients. The frequency of the work experience and experience with VR, ID, and CBT are shown in Table 1. There are more professions than respondents, as most respondents worked numerous functions at the time of the interviews. The data was collected between April 22 and May 13, 2024. Ethical approval was granted by the University of Twente on April third, 2024, with request number 240437.

Table 1

Work experience and experience with CBT, ID, and VR of the participants

Field	Participants
Mental healthcare	5
Training	1
Education	2
Research	3
Experience with CBT	5
Experience with ID	5
Experience with VR	5

Materials and procedure

CleVR

The vocal point of this study is CleVR. CleVR is the VR framework used for this study which allows for VR sessions with a client, in which different types of environments can be selected. The client can then be put into one of these environments, after which different scenarios can be run through. The therapist can view the client's environment through a different screen and give commands to the environment and non-playable characters in the environment, such as facial expressions, background noises, make people say something to you or follow you. Additionally, the therapist can take on the role of a character and talk to the client in VR via a voice morphing microphone. CleVR has provided a YouTube video to showcase its capabilities (CleVR Virtual Reality, 2022).

Flashcards

This research makes use of eleven flashcards that represent different CBT coping skill exercises that can be applied in a VR environment. The exercises were developed by the project group of Triggers & Tech project at the Psychology, Health & Technology department at the

University of Twente. In total there are six coping skills, that all start with an A in Dutch. These six skills are translated into “Distance”, “Declare”, “Distraction”, “Different thinking”, “Different acting”, and “Doing great”. All coping skills except “Different acting” had two flashcards, with each flashcard representing a VR exercise. Each flashcards showed the goal and description of the exercise, the triggers and helpers within the exercise, the degree of difficulty of the exercise, what to do before putting on the VR headset, what to do during the VR session, and how to evaluate the VR session. Table 2 provides a general overview of all the flashcard exercises. The full English version of these flashcards can be seen in Appendix A.

Table 2

Overview with general descriptions of the flashcard exercises

Exercise	Coping skill	Description
1	Distance	Client learns to take distance from substance in a supermarket near the liquor department
2	Distance	Client learns to take distance from substance in a supermarket near the beverage department
3	Declare	Client learns to say no in a situation that fits the client
4	Declare	Client learns to ask for help at home
5	Distraction	Client learns to do something else in a messy home environment, with drugs and liquor
6	Distraction	Client leans to focus on something else in a messy home environment, with drugs and liquor
7	Different thinking	Client formulates and practices helping thoughts in a situation that fits the client
8	Different thinking	Client discovers and replaces dangerous thoughts in the pub or at home with friends
9	Different acting	Client practices other behaviours at the bar to order a drink
10	Doing great	Client learns how to receive compliments in the living room with a friend
11	Doing great	Client learns how to receive compliments and reward themselves in the living room with a friend

Interview

The interviewer scheduled an interview with the participants per mail. The participants could select either a face-to-face interview or an online interview via Microsoft Teams. All interviews were planned online. The interview started with an introduction of the researcher and the research topic. Then, the participant was orally informed about the consent form and the data handling. A semi-structured interview scheme was used in order to gain insights into how to improve the aforementioned flashcards exercises for individuals with ID that are diagnosed with SUD according to clinicians. This scheme was based on and inspired by the flashcard exercises and initial literature search on what is already known about the implementation of VR, such as articles by Skeve et al. (2021), Nolet et al. (2020), and Kouijzer et al. (2023), that gave an overview of possible limitations on the implementation of VR. The interviews scheme had a funnel structure that started with general questions and then worked towards questions concerning specific exercises. General questions included topics such as current work, experience with ID, VR, and CBT, and their attitudes on VR for therapeutic means, such as *'could you tell me a bit about yourself and your profession?'* and *'would you consider using VR in treatment (again) and why (not)?'*.

This was followed up by the video of CleVR, after which questions were asked about the respondent's perception of the VR framework regarding suitability, realism, and their needs and expectations of this framework. examples of the questions are '*what are the first things that come to mind after seeing this video?'* or *'what would you need out of CleVR in order to use it in your own practices?'.* The video of CleVR was retrieved from YouTube (CleVR Virtual Reality, 2022), and is the same video as the one mentioned in the CleVR section.

Following this segment, the flashcards with a CBT exercise designed to be used in the CleVR VR environment were discussed with the participants. In total, each participant was shown two flashcards out of a total of eleven to reduce interview time. Participant one saw flashcards one and six, participant two saw flashcards two and seven, et cetera. After showing the flashcards, participants were asked questions specifically related to the shown exercise, such as *'what do you think of this exercise?'* and *'how do you think this exercise can be improved for people with intellectual disabilities, so that the purpose is clearer?'*. Then, the participants were asked questions on possible improvements on the VR technology and the shown exercises in general, as well as their general needs in order to implement the technology into their existing CBT practices.

Finally, some more general concluding questions were asked on the use of flashcards and VR as a whole, such as *'when looking at all VR exercises, do you think these exercises are*

suitable for CBT?' and *'what is needed to be able to use these exercises in your own practice?*'. The interview was recorded using the build in recording feature of Microsoft Teams. The full version of the English interview guide can be found in Appendix B. The interviews were conducted and transcribed in Dutch, and were analysed in English.

Analysis

First, the recorded data was transcribed into text, after which it was uploaded into Atlas.TI, a qualitative analysis tool. The transcription was then coded following an inductive coding approach in order to represent the original data as closely as possible. Initial codes were identified based on the interview guide. After a first round of coding, the coding scheme was shared and compared with other researchers in order to make sure it was reliable. After comparing the coding schemes, the transcriptions were submitted to an additional round of coding. The codes were then categorized under an overarching category and grouped per topic and then per category within that topic. For this, a deductive coding scheme was used as the codes were grouped based on the structure of the interview scheme. The groups and categories are explained in the codebook, which can be found in Appendix C. For all codes, a column was added stating how often a code was grounded, which means how often a code has been mentioned by the participants. Codes relating to general topics such as experience, intellectual disability in general, virtual reality in general, and CleVR in general were treated as generally applicable. Codes relating to the flashcard exercises were treated as flashcard specific unless they were labelled as general. For these code groups, an additional column was added in the tables in order to specify for which exercise the code is relevant for. Additionally, for all but the flashcard codes, a column was added to specify how many participants stated each code. This was not done for the flashcard codes as each flashcard was only discussed with one participant. The initial quotations were coded in Dutch, the categories and groups were coded in English. The outcomes of the coding scheme were shown in the result section and discussed in the discussion section of this thesis.

Results

In the following section, the results of the interviews will be discussed. Firstly, results regarding general preconditions towards ID and VR will be presented. Secondly, remarks concerning the participants attitudes towards the flashcard exercises will be shown. The final section will dive into recommendations of participants towards the flashcard exercises.

Preconditions of ID and VR

Table 3

Preconditions and characteristics of intellectual disability in general

Category	Code	Grounded	Number of participants
Difference ID and non-ID		15	5
	Describing emotions	1	1
	Means of interaction	10	4
	Complex problems	1	1
	Short attention span	1	1
	Differentiation craving and use	1	1
	Not many differences	1	1
Characteristics ID		4	3
	Equality important	1	1
	Difficulty to generalize	1	1
	Huge transition clinical to outpatient setting	1	1
	Factuality's do not always portray right picture	1	1
Recommendations ID		2	1
	Involving network	2	1

Table 3 shows the remarks that participants have provided regarding intellectual disability in general. This means that these remarks are not necessarily connected to the flashcards, yet can be used to learn about preconditions for implementing VR for people with ID. The participants mentioned that there is a difference between individuals with ID and those without ID, as those with ID generally have more difficulty **describing emotions**, have more **complex issues**, have a **shorter attention span**, and have **difficulties differentiating cravings from actual use**. Therefore, the participants recommended to consider the **means of interaction** by adapting the use of language and the use of images to match the ID target group. One participant noted that there were **not many differences** in treating someone with ID compared to someone who does not have ID, for as the fifth participant stated: *"the client and the request for help are central (...) I don't think that differs a lot per target group"*. According

to the participants of the interviews, characteristics of ID are that it is important to treat a client with ID with **equality**, that those with ID tend to have **difficulties generalizing**, that there is a **huge transition in moving from a clinical setting to an outpatient setting**, and that **factuality's do not always provide the right picture** of the client. As participant four stated: *"now there sometimes is a general picture out of what we call a care plan, that contain some more factuality's that sometimes do not give a good picture of the situation which you could use for the clinic".* The participants recommended **involving the network** such as the support system and the daily caregiver**s** of the client in the treatment process. As participant four stated: *"also the involvement of the network of caregivers, so things can be easier applied also in the daily life. Or that caregivers also help to practice in the daily life"*.

Table 4

Preconditions and attitudes on virtual reality in general according to the participants

Category	Code	Grounded	Number of Participants
Challenges VR		18	5
	Difficult	8	5
	Much discussed, little used	2	2
	Availability	1	1
	Cost	1	1
	Can be seen as game	1	1
	Conditions system	2	1
	Too little attention	1	1
	No outpatient possibilities	1	1
	Determination effectiveness	1	1
Benefits VR		6	5
	Immersion	3	2
	Possibilities that clinic does not have	1	1
	Can help skills training	1	1
	Can help inventory difficult situations	1	1
Prerequisites VR		3	2
	Aftercare	2	1
	Training	1	1

Attitudes VR		7	5
	Negative experience	1	1
	Increase application	5	4
	Do not use to just trigger	1	1

Table 4 shows the remarks of the participants to virtual reality in general. This means that these results are not specific to CleVR. The participants mentioned that the **difficulty** of using a VR system would pose a challenge to the use of VR most often, as users would need technical know-how as well as know how to use scenarios. As participant one mentioned: *"but to do online sessions or to convert other sessions to scenes, and how you do that (...). That needs a lot of guidance"*. The **conditions of the system** are also seen as a challenge. This means that setting up the system, all cables, technical support poses a challenge according to the participants. The benefit that is mentioned most often is the **immersion** of using VR. As prerequisites for the use of VR, the participants mentioned proper **training** for the system. Furthermore, participants recommended proper **aftercare** for clients, including debriefing the situation as well as closing a session with something positive. Participant one mentioned that *"eventually we also have it positive, because VR you have to, that is also a tip, if it is a negative experience, you have to close it positively".* The participants mainly mentioned that they want to **increase application**, as participant five stated: *"I think that offers many target groups an extra possibility to practice something. Or because it can do something that you cannot do inside of the room"*.

Participant attitudes CleVR

Table 5

Attitudes of the participants on the CleVR framework

Category	Code	Grounded	Participants
Needs of CleVR		15	5
	Personalize environment	6	3
	Technical knowledge	2	2
	Guidance and training	7	4
First impressions		8	5
	Useful social phobia	1	1
	Bad graphics	3	2

	Wants to use CleVR	1	1
	Already very detailed	1	1
	Software not user friendly	2	1
CleVR for CBT		8	5
	Can replace CBT aspects	4	2
	Can add to CBT aspects	3	3
	Can bring outside to inside world	1	1
Familiarity with CleVR		8	5
	Has used CleVR	4	2
	Been informed on CleVR	4	3
Benefits CleVR		6	2
	Repeatability situations	1	1
	Coping skills exercises	1	1
	Different environments	2	1
	Bride gap clinical to outpatient	2	1

Table 5 shows the remarks that the participants made regarding the CleVR framework. In terms of the participants' needs of CleVR, **guidance and training** in the use of CleVR and the ability to **personalize the environment** came forward most often. As participant four mentioned: *"I also think some extra training in yeah, what situations you would bring in. How do you handle that and that you discuss that with colleagues".* The first impression which was mentioned most frequently were the **bad graphics**, and that the **software is not user friendly**. All participants believe that CleVR could be **beneficial for CBT**. One reason for this is that CleVR could help **bring outside situations into a clinical setting**. Two of the participants have **used CleVR before** this interview, one of whom uses it in their own research and the other uses it for therapeutic means. The four others have **heard of CleVR** yet have not used it so far. Participants stated the ability to **repeat situations**, **train coping skills**, **use different environments**, and **bridge the gap between clinical and outpatient** care most frequently as benefits of CleVR.

Attitudes VR flashcard exercises

Table 6

Attitudes of the participants on the VR flashcard exercises

Category	Code	Grounded	Exercise
Usefulness flashcards		18 (100%)	
	Negative	5 (28%)	
	Too specific	2	9
	Environments lack adaptability	1	General
	Not useful	2	3, 10
	Positive	13 (72%)	
	Guidelines for personalization	4	General
	Useful as closing	1	10
	Useful for therapist	5	General
	Practical aspect	3	General
VR aspect		14 (100%)	
	Negative	6 (42.86%)	
	Difficult	3	8, 5
	Little addition to exercise	3	5, 10
	Positive	8 (57.14%)	
	Realistic	7	2, 4, 7, 8, 9
	Possibility adding options	1	5
Suitability ID		16 (100%)	
	Negative	13 (81.25%)	
	Lack of explanation to client	3	1, 5
	Too much text	1	2
	Difficult to put exercise into practice	1	3
	Type of exercise	5	5, 8
	Willingness client	1	6
	Trust aspect	2	6
	Location	1	1
	Positive	3 (19.75%)	
	Practical aspect	1	7

	Together	1	7
	Realistic scenario	1	6
Suitability CBT		12 (100%)	
	Negative	3 (25%)	
	Different type of training	3	5, 8
	Positive	9 (75%)	
	Fits goals	1	2
	Fits methods	8	General
Understandability		18 (100%)	
	Negative	11 (61.11%)	
	Help request	2	3
	Scenario	5	4, 8, 10
	Situation	3	7
	Helping thoughts	1	General
	Positive	7 (38.89%)	
	Information to therapist	4	2, 7, 10
	Clear	2	4
	Specific	1	General
Trigger aspect		20 (100%)	
	Potentially triggering	7 (35%)	
	Depends on client	3	1, 2, 5
	Insincere compliment	1	10
	Thoughts	1	8
	Virtual aspect	2	9
	Not triggering	6 (30%)	
	Situation	4	1, 10
	No substances	1	3
	Graphics	1	General
	Triggering	3 (15%)	
	Mentions substances	3	4, 6, 7
	Other remarks	4 (20%)	
	Important to request help	1	3
	Gives insight	1	4

	Not goal by itself	1	4
	Normal in SUD treatment	1	7
Other remarks		15 (100%)	
	Negative	9 (60%)	
	Makes assumption	3	1
	Compliment not sincere	2	10
	Risk doing exercise literally	1	3
	Unrealistic	3	9
	Positive	6 (40%)	
	Description is nice	1	1
	Approach exercise	2	7, 10
	Giving instructions own voice	1	2
	Would not remove anything	2	General

Table 6 shows the results of the attitudes of respondents on the VR flashcard exercises from appendix A. Next to stating the coding category, the code, and how often that code was mentioned by the participants, the table also shows to what exercise the code was relevant to. This subchapter will first show the attitudes of participants regarding the usefulness of the flashcards, then the attitudes regarding the VR aspect of the flashcards. This is then followed by how suitable participants thought the flashcards were for the ID target group. Fourthly, the results regarding the suitability of the flashcards regarding CBT are shown. Finally, other remarks that could not be divided in the aforementioned categories are shown. Each category is then subdivided into negative and positive remarks.

Usefulness flashcards

Generally, in the interviews it was mentioned more often that the exercises were seen as useful by the participants. This was because the exercises offered **guidelines for personalization**. As participant two stated: *"I think it is good that these kinds of cards are available for the caretaker, as a sort of manual on what you have to keep in mind before you enter a VR session, and also during the session and after".* Participants also mentioned that exercises were generally **useful for the therapist** and had a **practical aspect** such as the roleplay. As participant four stated: *"Yes, I think they are useful. Only because what I just said, just because the doing and practicing. Instead of talking about it".*

Reasons why some participants did not find the exercises useful were generally connected to certain exercises. In the case of exercise 9 (different acting) for instance,

participant four thought it to be **too specific**: *"On its own, it is a fine situation. Just the other one is far more general like, what is a difficult situation. And this is already an example of a difficult situation"*. Additionally, participant three thought the exercise **environments lack adaptability**: *"that the situation that the client was in, that you can recreate that. Yes, that would be awesome"*.

VR aspect

The participants had no general remarks towards the VR aspect of the flashcard exercises, although there were some comments regarding specific exercises. Several participants had a negative attitude towards the VR aspect of the exercises for exercise 8 (different thinking), 5 (distraction), and 6 (distraction). In the case of exercise 5 (distraction) and 8 (different thinking), participants stated that the VR aspect increased the **difficulty** of the exercise. for exercise 5 (distraction), participant five mentioned the use of the VR telephone negatively, as they are *"not sure if you have ever seen the telephone in the environment, but I do not find the breathing exercise very clear"*. In the case of exercise 8 (different thinking), participant three stated that *"it is not actually something external, but a process that takes place internally in their head"*, which could be difficult to do in VR. In the cases of exercise 5 (distraction) and 10 (doing great), the **VR aspect give little added value to the exercise** according to participant five, as the participants were not sure why someone would play this scenario in VR and not in real life.

What participants found positive about the VR aspect of the exercises is that it is **realistic**, as participant two mentioned for exercise 2 (distance): *"I have done regular roleplays in the past, and they feel very contrived because you are doing it in the consultation room. Then I am still the caregiver with the same voice, and the room did not change. So, I think the virtual reality environment really improves that"*. Additionally, participant five mentioned that VR gives the **possibility of adding options** to exercises: *"so that you always have multiple options and scenarios that can be a trigger (...) And that is the beauty of VR of course, because have that option"*.

Suitability for ID

Reasons on what makes the exercises fitting for people with intellectual disabilities were the **practical aspect** of the exercises, the **realistic scenarios** of exercise 6 (distraction), as well as the exercise being performed **together** with the caregiver. As participant one mentioned regarding the realistic scenario of exercise 6 (distraction): *"I am putting myself into a messy home environment with booze and drugs because that was not there in the old VR (...) Good that that has been adapted, because houses are never that tidy"*. Reasons why the

exercises would not fit individuals with an intellectual disability were the **lack of explanation of the exercise to the client**, there being **too much text** to explain it to a client, the **difficulty to put the exercise into practice**, the **willingness of the client** as the client could be unwilling to talk about difficult situations, and the VR **location** of the exercise. As for exercise one (distance), a client with ID would not often be in a café, according to participant one. Other reasons were the **type of exercise**, as participant three stated for exercise 8 (different thinking) *"I know, because I give that module, that they find it difficult anyway to describe these kinds of thoughts (...). We often have to work with an option board with different possibilities from which they can choose".* Participant one also mentioned that the **trust aspect** of exercise 1 (distance) does not fit the ID target group, as thrusting someone and the clients home situation might not be compatible. As participant one mentioned: *"You don't just have trust. And trust is often enormously damaged in the client's home situation as well (...). I don't know if the home situation with booze and drugs can be combined with someone you trust"*.

Suitability CBT

Regarding the CBT aspect of the exercises, most participants stated that they believed the exercises are suitable for CBT. Reasons for this were because participant two thought exercise 2 (distance) **fitted the goals** of CBT. As this participant stated: *"The goal is to learn to take distance from risky usage situations (...). Then I think that this matches the goal you aim for".* Additionally, participants deemed that the exercises **fitted the methods** of CBT as the exercises had exposure, a focus on thoughts, and a practical aspect. Reasons why some participants thought the exercises were not suitable for CBT were because they considered some of the exercises to be a **different type of training**, such as social skills training or emotional regulation training for exercise 5 (distraction) and 8 (different thinking). As participant five mentioned about exercise 5 (distraction), *"Cognitive behavioural therapy is often more about whether you are aware of your feelings, thoughts, and behaviour. And a breathing exercise is more of an emotion regulation actually, and a side effect is that people become calm".*

Understandability

Overall, participants deemed the exercises to be understandable regarding they provided sufficient **information to the therapist**. Additionally, participant two found exercise four (declare) to be very **clear** and concrete: *"these steps you can also go through with the client, of what you will do, why you will do it, and what they will practice with. Yes I find it very clear"*. Furthermore, participants found the exercises to be generally **specific** enough to understand.

Things that participants did not understand about the exercises was that it is **unclear where help is needed**, as participant three stated for exercise 3 (declare): *"but what does he (the client) want help for? That is not entirely clear to me. Out of this exercise then. Of course I know how CBT works, and because of that I can move forward with it, but I think for someone who has never seen that, then it is too little".* For exercises 4 (declare), 8 (different thinking), and 10 (doing great) the participants did not find the **scenarios** understandable. In case for exercise 8 (different thinking) for example, participant three stated *"I really have to read three times, if I want to understand it a bit. Especially because it is about internal thoughts. If I got it right, then you speak them out. And then you let the internal dialogue that usually plays in your head take place externally now?".* For exercise 7 (different thinking), participant two did not understand what kind of **situation** to use, whether they should use a situation where a client would usually use a substance but did not, or a situation where the client would not use altogether. Participant two also stated that the exercises generally miss some information of **helping thoughts**: *"you assume that the caregiver has sufficient knowledge of those helping thoughts (...). I assume that caregivers can do that. Otherwise you could maybe give some extra instruction"*.

Trigger aspect

According to participants, an exercise could be triggering. However, this would **depend on the client**, as not all clients are the same and some exercises trigger certain clients more compared to other exercises. Additionally, in the case of exercise 10 (doing great), participant five found it potentially triggering because of the **insincere compliment**: *"I think it (the compliment) could be a trigger if it is not meant"*. Participants three stated that the virtual aspect and the focus on **thoughts** could be triggering for clients. Participants did not think that exercise 1 (distance) and 10 (doing great) were triggering, as they did not consider those exercises having a triggering **situation**. Exercise 3 (declare) would not be triggering as there are **no substances** in the scenario. According to one participant, the triggering effect of the exercises would be limited by the **graphics** of the VR system. However, what participant thought was triggering for clients were that the exercises **mention substances**. As participant one stated for exercise 6 (distraction): *"if it is about alcohol or drugs, it is always triggering"*.

Next to stating whether the participant deemed the exercises to be triggering, they also stated that triggering the client is **important** when training the client **to request help**. Additionally, participants mentioned that a trigger **gives insight** into the client, that a trigger is **normal in SUD treatment**, and that triggering a client **should not be a goal on itself**.

Other remarks

Other positive remarks on the exercises included that participant five liked the idea of applause of exercise 10 (doing great). Additionally, participant two liked the **description** of an exercise, one liked that **approach of the exercise** as exercise 7 (different thinking) looked for exceptions, participant two liked that the caregiver was **giving instructions in their own voice** within the VR environment for exercise 2 (distance), and participant one liked the description of exercise 1 (distance). Additionally, two participants would generally not remove any of the information from the flashcards.

Negative remarks from the participants included that exercise 1 (distance) **assumes** in the debriefing that the exercise is exiting, and therefore rules out any other emotions that might be felt. Participant five stated that the **compliment is insincere** in exercise 10 (doing great), and would therefore not be effective. Participant three stated that for exercise 3 (declare), there is a **risk of doing the exercises literally** instead of seeing them as guidelines. Finally, participant four stated that they found the bartender **unrealistic** in exercise 9 (different acting): *"I wonder if in such a situation if it is not others who would encourage you to drink alcohol, instead of the bartender"*.

Recommendations

Content

Table 7 shows the recommendations the participants mentioned during the interviews. Regarding the content of the flashcards, participants recommended to **add guides**. Participant one mentioned for exercise 1 (distance) to add a guide on what information to give to the client before the exercise: *"do you assume that the client knows this (the coping skill), do you offer the information, or (...) do you want the client to come up with the solution themselves?"*. Additionally, participants recommended to add guides on how to perform roleplays for the clinicians. As participant one stated: *"and this is what we miss as practitioners is sentences or things for situations. So that there is a sort of piece or roleplay (...) so they can get by with it"*. Furthermore, participants recommended to add a client guide, such as flashcards and examples, to explain the exercise to the client. As participant four mentioned: *"What comes up to me is to maybe have some flashcards for the client (...). But with the CGT plus module you also actually make the agenda visual, today we are going to do this and that"*. As participant one stated: Finally, participant four recommended to be **clarify the situation** in exercise 4 (declare): *"maybe it should be included in the instructions, that it is really meant to express that helping thought"*.

Table 7

Recommendations based on the exercises

Category and code	Description	Grounded	Exercise
Content		17	
Addition of guides	Participants recommended adding more guidelines to the exercises	13	1, 2, 6
Clarification of situation	Participant recommended to clarify what is meant by the exercise	4	7
Customization		10	
Invitation to improvisation	Participant recommended to invite the clinician to improvise with the flashcards	2	3
Addition of variables and options	Participants recommended adding variable and options to exercises in order to tailer them to specific needs of the client	8	General
Suitability CBT		10	
Implementation guide CBT protocol	Participants recommended to add a guide on how to implement in CBT protocol	7	General
Practise saying NO	Participant recommended to practice saying NO in the exercise	1	8
Connection to G scheme	Participant recommended to connect the exercises to the G scheme of CBT	1	5
Focussing skill instead trigger	Participant recommended to focus more on training of a skill instead of triggering client	1	2
Suitability ID		33	
Client interaction	Participants recommended changes in how to interact with the clients	15	General
Involving ID in development	Participant recommended to involve the ID target group in development of exercises	1	General
Briefing and debriefing	Participants recommended to improve the briefing and debriefing of the exercises	9	General
Adaptability situation	Participants recommended to make exercises more adaptable to the needs of the client	6	5, 6, 9
Connection type of thoughts	Participant recommended to physically connect types of thoughts	1	8

Customization

Next to giving recommendations on the content of the flashcards, participant two also recommended to add an **invitation to improvisation** to the flashcards: *"by inviting the therapist that it is okay, that it is actually asked to use your own interpretation"*. Additionally, participants recommended an **addition to variables and options** to the exercises and the VR environment as inspiration for practitioners. As participant one mentioned: *"You could put it under options. Not that you have to put it in, you know, you could also keep it general then, you can give your own interpretation there, but I know that options, of what the possibilities are with this. You could put it under an options heading (...). For inspiration"*. Also adding variables that make the exercise more difficult, such as a family member that does not cooperate in exercise 3 (declare) to add to the customizability of the exercises.

Suitability CBT

Participants also provided recommendations on how to make the exercises more suitable for CBT. In general, participants would like to have an **implementation guide for the CBT protocol** on how to apply the exercises within the existing CBT protocol. As participant five mentioned: *"Yes, I miss how it is braided into the protocol a little bit. For instance, what kind of part of the treatment it is, and when you should add it. I don't know. I would be curious about that"*. Next to this general recommendation, participants also recommended to **practice saying no** in exercise 8 (different thinking), **connecting the exercises to the G scheme** of CBT in exercise 5 (distracting), and **focussing on the copings skill instead of the trigger** in exercise 2 (distance).

Suitability ID target group

Finally, participants made recommendations to improve the suitability of the exercises with the ID target group. First of all, several participants recommended a **modification of the client interaction** of the exercise, such as implementing the applause module to the end of every exercise, instead of as a separate exercise and personalizing the compliment compared to the way it is currently in exercise 10 (doing great). Another modification of the client interaction would be to let others push instead of the bartender in exercise 9 (different acting), as well as putting greater emphasis on the emotions that are experienced by a client during the exercises. As participant three mentioned: *"I think that sometimes you have to pay more attention to the emotion, because usually that withholds them from asking for help"*. Another thing to change regarding client interaction is changing how you question the client. As participant one mentioned: *"Look, with our ID target group, you cannot come up with just open questions, sometimes you have to give some closed or multiple-choice questions. So what kind*

of questions you ask and how is important for such an exercise". A final way of changing the interaction with the client is by adding more positive reinforcement to the exercises. As participant stated: *"some more fun things. Yes, you also have to add something in so that they continue to enjoy it a bit"*. Secondly, one participant recommended to **involve individuals with ID in the development** of these exercises. As participant three stated: *""We often see that things are being developed, but then it turns out that the patients are not involved at all".* Thirdly, participants recommended to improve the **briefing and debriefing** of the exercises. Participant one recommended to improve the briefing of the situation as in contrast to real life, clients do not know what to expect when putting on the glasses, which could cause error for them. Furthermore, participants recommended to take your time with the debriefing and add a moment of reflection after the exercises. As participant four mentioned: *"So for the second one it says what the client has learned, that you will see like okay, that you put that specifically on paper or something. And that you involve the personal coach with that piece, like the client has learned and practiced this and that today"*. Fourthly, it is recommended to change the **adaptability of the situations** in some of the exercises. Participants mentioned that every client is different and that some might not find a certain situation or scenario triggering which others would find triggering. Finally, one participant stated that exercise 8 (different thinking) might be difficult for ID clients and recommended to improve the **connection of types of thoughts** by physically connecting dangerous to helping thoughts with lines.

Discussion and conclusion

Consideration for individuals with an ID

The aim of this study was to find out how to incorporate VR flashcard exercises into existing CBT coping skills to treat SUD of individuals with an ID, according to clinicians. To answer this question, four sub questions were constructed. The first of these asks what should be considered for the treatment of individuals with an ID, according to the clinicians. The participants mainly stated that for treatment of individuals with an ID, it is important to consider how to communicate with the target group, by using more images and changing the use of language. This is in line with research from Van der Nagel et al. (2014), who state that individuals with and ID are often characterized by a limited working memory and a limited language use and understanding. Treatments can be adapted to this target group by the use of shorter sentences, a mix of verbal and nonverbal methods, and the avoidance of jargon. Furthermore, this study indicates that individuals with an ID tend to have difficulties with generalizing situations, which is also in line with research from Van der Nagel et al. (2014).

Finally, participants recommended to consider involving the network of individuals with ID in the treatment of clients with ID and the development of new treatments.

Considerations when using VR exercises

The second sub question asks what should be considered when using VR exercises, according to the clinicians. According to the participants, one of the main challenges in using VR is the difficulty of VR. This relates to the difficulty of using the system, but also to the difficulty in how to use VR scenarios and how to implement them within treatment sessions. This is in line with research from Nolet et al. (2020), who state that many researchers find the use of VR difficult and cumbersome. Additionally, some research suggests that some clinicians have concerns regarding the feasibility to create realistic VR scenarios, and would require more guidance in using VR, such as training and support (Skeva et al., 2021; Kouijzer et al., 2023).

Considerations for CleVR

The third sub question asks what the considerations of clinicians for CleVR are for the treatment of SUD for individuals with ID. This research indicates that participants found guidance and training important, which is in line with the aforementioned research from Kouijzer et al. (2023). Furthermore, participants stated that they would like to be able to personalize the VR environment, even more so than is currently possible within the shown CleVR framework. Additionally, participants thought CleVR to be a useful tool for CBT, as it could add to existing CBT. Finally, all participants are already in some way familiar with CleVR, as they have either used it in the past or have heard of it. This familiarity could aid in the implementation of such a framework as being aware of VR and the benefits it may have could facilitate implementation (Kouijzer et al., 2023).

Attitudes and recommendations of flashcard exercises

The fourth and final sub question asks what the attitudes and recommendations are of the clinicians regarding the flashcard exercises. Overall, the participants found the flashcards useful as they already provided guidelines for the personalization of VR exercises, making them useful for the therapist. The participants recommended adding additional guidelines such as a client guide with examples or flashcards for the client. This can then be used to further explain the exercises and give possible ways to cope with situations in a more understandable and applicable way. This is in line with research from Van der Nagel et al. (2014) and McHugh et al. (2010), which states that it can be hard to identify high risk situations and identify negative thoughts for individuals with ID because difficulties with attention span and abstract reasoning. Extra guidance can help dealing with these difficulties. Next to more guidelines for clients, additional clinician guidelines were also recommended on how to implement the exercises

within the CBT protocol and to provide tools for the roleplay. Research showed that clinicians often have usability concerns regarding the use of VR within therapeutic settings, as well as the lack of adequate training, which may slow down the adoption of these VR flashcard exercises (Chung et al., 2022a; Lindner et al., 2021). By providing more guidelines, these barriers could be overcome.

Additionally, by changing the way in which to interact with the client of some of the exercises in order to be more realistic and better fit the ID target group, the exercises can create a more realistic situation and yield more client engagement, which could lead to an increase in adoption (Skeva et al., 2021; Chung et al., 2022b). Participants suggest asking more open questions in both the VR session as well as the (de)brief and providing possible answer options to those questions in case the client does not know how to answer. Moreover, adding instance positive reinforcements to the exercises could keep them fun, which in turn keeps the client more motivated. Van der Nagel et al. (2014) mentions that offering a reward after successful completion of sessions are often appreciated by the client.

Thirdly, participants found that the environment lacked adaptability, and that the exercises were in some cases too specific. They therefore recommended to add variables and options to the flashcard exercises, so that scenarios can be more tailored to the client. This is in line with previous research from, as adding these aspects to exercises can help increase the ability of clinicians to fit the exercises to the situation of the client and therefore create more realistic situations (Skeva et al., 2021; Langener et al., 2021b). Personalization of the VR environment can lead to greater immersion and engagement with the environment (Pardini et al., 2022). This increase in immersion can then contribute to the implementation of these kinds of exercises.

Finally, participants recommended to include the ID target group and their caregivers in the development of the exercises, as they can provide valuable information on how to make the exercises suitable for the target group. Van der Nagel et al. (2014) and Van Duijvenbode et al. (2015) stated that the ID target group was often overlooked and therefore many treatments are not yet adapted to this group. Involving the ID target group in development of exercises can therefore aid in making the exercises more suitable for the ID target group.

Strengths, limitations, implications, and future directions

Strengths of this research are the study design, as this study conducted interviews with clinicians. This provides valuable information regarding the implementation of VR-CBT exercises from their viewpoint and states the importance of asking for input from the field when working on these kinds of exercises. Additionally, this research used concrete examples of VR

exercises, which has therefore delivered better input on how to improve the exercises. Limitations of this research include the small sample size of five participants. Because of this, every exercise has only been discussed with a single participant. Moreover, as one participant cancelled the interview, the final exercise has not been discussed, and therefore is not represented in the findings. Furthermore, this research only partially highlights all issues of the flashcard exercises as the flashcards have only been discussed instead of being practically performed. Therefore, not all of the limitations of the exercises became clear.

Additionally, this studies design is qualitative, which although giving specific data, is also susceptible to interpretational biases from the researcher. Although attempts have been made to limit this bias by cross referencing codes with other researchers, this bias cannot be completely eliminated. Additionally, this research does not provide an indication of intercoder reliability. Finally, all participants were Dutch. Therefore, the findings might not be generalizable to other cultures.

This knowledge can be used to improve current VR-CBT exercises, and the knowledge can be used in the development of future therapies and exercises. Additionally, as this research provided exercise specific feedback and recommendations next to more general remarks and guidelines, this research can also help to improve the flashcard exercises developed by the University of Twente research group Triggers & Tech.

Future research directions could be focusing on finding out what clinicians would think of these exercises after testing the suitability these exercises in real life, instead of discussing them. Additionally, all participants were clinicians in the mental healthcare sector. It would be interesting to see the viewpoints of researchers and the ID target group themselves and base the guidelines for designing VR exercises for people with ID and SUD on multiple viewpoints. Finally, it would be interesting to see what the results of this research would be once recommendations have been implemented in the exercises.

Conclusion

This thesis aimed to find out how to incorporate VR flashcard exercises into existing CBT coping skills to treat substance use disorder of individuals with an intellectual disability according to clinicians. The flashcard exercises were generally perceived to be useful as they provide guidelines already, however, participants missed some additional guidance on the use and implementation of the flashcard exercises. To improve incorporation of the exercises into existing CBT coping skills, participants recommended to add these additional guidelines, be mindful of how to interact with the ID target group as this could still be improved. Furthermore, participants recommended to add more variables and options to the flashcards, which would

help them tailor the exercise to the specific client. Lastly, participants recommended to include the ID target group and their caregivers in developing these kinds of exercises, as they can provide valuable input. Taking these recommendations into account when developing VR flashcard exercises could help increase the incorporation of VR flashcard exercises into existing CBT coping skills.

References

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders (5th ed.).* https://doi.org/10.1176/appi.books.9780890425596

Amista, N. F., Kim, J. J., & Kim, N. (2017). Trend and future of virtual reality for addiction treatment of substance use disorders: A systematic review. *디지털콘텐츠학회논문지, 18(8)*, 1551-1560. http://dx.doi.org/10.9728/dcs.2017.18.8.1551

Boness, C. L., Votaw, V. R., Schwebel, F. J., Moniz-Lewis, D. I., McHugh, R. K., & Witkiewitz, K. (2023). An evaluation of cognitive behavioral therapy for substance use disorders: A systematic review and application of the society of clinical psychology criteria for empirically supported treatments. *Clinical Psychology: Science and Practice.* https://psycnet.apa.org/doi/10.1037/cps0000131

Byrne, S. P., Haber, P., Baillie, A., Giannopolous, V., & Morley, K. (2019). Cue exposure therapy for alcohol use disorders: what can be learned from exposure therapy for anxiety disorders?. *Substance use & misuse, 54(12)*, 2053-2063. https://doi.org/10.1080/10826084.2019.1618328

Chung, O. S., Johnson, A. M., Dowling, N. L., Robinson, T., Ng, C. H., Yücel, M., & Segrave, R. A. (2022a). Are Australian mental health services ready for therapeutic virtual reality? An investigation of knowledge, attitudes, implementation barriers and enablers. *Frontiers in Psychiatry, 13*, 792663. https://doi.org/10.3389/fpsyt.2022.792663

Chung, O. S., Robinson, T., Johnson, A. M., Ng, C. H., Yücel, M., & Segrave, R. A. (2022b). Implementation of therapeutic virtual reality into psychiatric care: clinicians' and service managers' perspectives. *Frontiers in Psychiatry, 12,* 791123. https://doi.org/10.3389/fpsyt.2021.791123

CleVR Virtual Reality. (2022, April 12). *Promo (EN) CleVR SW4 - Dynamic Interactive VR software for Mental Health, Training and Education* [Video]. https://www.youtube.com/watch?v=4X5XeTD0kWM

Conklin, C. A., & Tiffany, S. T. (2002). Applying extinction research and theory to cue-exposure addiction treatments. *Addiction, 97(2),* 155-167. https://doi.org/10.1046/j.1360-0443.2002.00014.x

Derksen E., & Hupkins, C. (2023, December 14). *Drugsgebruik en (mentale) gezondheid*. https://www.cbs.nl/nl-nl/longread/statistische-trends/2023/drugsgebruik-en-mentale-gezondheid/3-drugsgebruik

Emmelkamp, P. M., & Meyerbröker, K. (2021). Virtual reality therapy in mental health. *Annual review of clinical psychology, 17,* 495-519. https://doi.org/10.1146/annurev-clinpsy-081219-115923

Kiewik-de Vries, M. (2019). *Prevention and intervention of substance use and misuse among persons with intellectual disabilities.* (Doctoral dissertation, Sl: sn).

Kouijzer, M. M., Kip, H., Bouman, Y. H., & Kelders, S. M. (2023). Implementation of virtual reality in healthcare: a scoping review on the implementation process of virtual reality in various healthcare settings. *Implementation science communications, 4(1),* 67. https://doi.org/10.1186/s43058-023-00442-2

LADIS. (2023). *Tussenrapportage kerncijfers verslavingszorg 2016-2021*. Landelijk Alcohol en Drugs Informatie Systeem. Houten

Langener, S., Van der Nagel, J., Klaassen, R., Van der Valk, P., & Heylen, D. (2021a). "Go up in smoke": Feasibility and initial acceptance of a virtual environment to measure tobacco craving in vulnerable individuals. *In 2021 IEEE 9th International Conference on Serious Games and Applications for Health (SeGAH) (pp. 1-8).* IEEE. https://doi.org/10.1109/SEGAH52098.2021.9551854

Langener, S., Van Der Nagel, J., van Manen, J., Markus, W., Dijkstra, B., De Fuentes-Merillas, L., ... & Schellekens, A. (2021b). Clinical relevance of immersive virtual reality in the assessment and treatment of addictive disorders: a systematic review and future perspective. *Journal of clinical medicine, 10(16),* 3658. https://doi.org/10.3390/jcm10163658

Lindner, P. (2021). Better, virtually: the past, present, and future of virtual reality cognitive behavior therapy. *International Journal of Cognitive Therapy, 14(1),* 23-46. https://doi.org/10.1007/s41811-020-00090-7

Lindner, P., Dagöö, J., Hamilton, W., Miloff, A., Andersson, G., Schill, A., & Carlbring, P. (2021). Virtual Reality exposure therapy for public speaking anxiety in routine care: a single-subject effectiveness trial. *Cognitive Behaviour Therapy, 50(1)*, 67-87. https://doi.org/10.1080/16506073.2020.1795240

McHugh, R. K., Hearon, B. A., & Otto, M. W. (2010). Cognitive behavioral therapy for substance use disorders. *Psychiatric Clinics, 33(3),* 511-525. https://doi.org/10.1016/j.psc.2010.04.012

Monti, P. M., Rohsenow, D. J., Rubonis, A. V., Niaura, R. S., Sirota, A. D., Colby, S. M., ... & Abrams, D. B. (1993). Cue exposure with coping skills treatment for male alcoholics: a preliminary investigation. *Journal of Consulting and Clinical Psychology, 61(6),* 1011. https://psycnet.apa.org/doi/10.1037/0022-006X.61.6.1011

Nolet, K., Corno, G., & Bouchard, S. (2020). The adoption of new treatment modalities by health professionals and the relative weight of empirical evidence in favor of virtual reality exposure versus mindfulness in the treatment of anxiety disorders. *Frontiers in human neuroscience, 14*, 86. https://doi.org/10.3389/fnhum.2020.00086

Pardini, S., Gabrielli, S., Dianti, M., Novara, C., Zucco, G. M., Mich, O., & Forti, S. (2022). The role of personalization in the user experience, preferences and engagement with virtual reality environments for relaxation. *International Journal of Environmental Research and Public Health, 19(12),* 7237. https://doi.org/10.3390/ijerph19127237

Park, C. B., Choi, J. S., Park, S. M., Lee, J. Y., Jung, H. Y., Seol, J. M., ... & Kwon, J. S. (2014). Comparison of the effectiveness of virtual cue exposure therapy and cognitive behavioral therapy for nicotine dependence. *Cyberpsychology, Behavior, and Social Networking, 17(4)*, 262-267. https://doi.org/10.1089%2Fcyber.2013.0253

Rohsenow, D. J., Monti, P. M., Rubonis, A. V., Gulliver, S. B., Colby, S. M., Binkoff, J. A., & Abrams, D. B. (2001). Cue exposure with coping skills training and communication skills training for alcohol dependence: 6-and 12-month outcomes. *Addiction, 96(8),* 1161-1174. https://doi.org/10.1046/j.1360-0443.2001.96811619.x

Segawa, T., Baudry, T., Bourla, A., Blanc, J. V., Peretti, C. S., Mouchabac, S., & Ferreri, F. (2020). Virtual reality (VR) in assessment and treatment of addictive disorders: a systematic review. *Frontiers in neuroscience, 13,* 1409. https://doi.org/10.3389/fnins.2019.01409

Skeva, R., Gregg, L., Jay, C., & Pettifer, S. (2021). Views of practitioners and researchers on the use of virtual reality in treatments for substance use disorders. *Frontiers in Psychology, 12,* 606761. https://doi.org/10.3389/fpsyg.2021.606761

Thaysen-Petersen, D., Hammerum, S. K., Vissing, A. C., Arnfred, B. T., Nordahl, R., Adjorlu, A., ... & Fink-Jensen, A. (2023). Virtual reality-assisted cognitive behavioural therapy for outpatients with alcohol use disorder (CRAVR): a protocol for a randomised controlled trial. *BMJ open, 13(3).* https://doi.org/10.1136/bmjopen-2022-068658

Tsamitros, N., Sebold, M., Gutwinski, S., & Beck, A. (2021). Virtual reality-based treatment approaches in the field of substance use disorders. *Current Addiction Reports, 8,* 399-407. https://doi.org/10.1007/s40429-021-00377-5

Van der Nagel, J. E. L., Kiewik, M., Didden, R. (2014). Cognitieve gedragstherapie bij problematisch middelengebruik bij mensen met een lichte verstandelijke beperking. In M. J. M. Schippers, M. Smeerdijk, M. J. M. Merkx (Eds.), *Handboek cognitieve gedragstherapie bij middelengebruik en gokken* (pp. 337-352). Perspectief Uitgevers.

Van der Nagel, J., Kiewik, M. (2016). *Handleiding CGT+*. Perspectief uitgever.

Van Duijvenbode, N., Van der Nagel, J. E., Didden, R., Engels, R. C., Buitelaar, J. K., Kiewik, M., & de Jong, C. A. (2015). Substance use disorders in individuals with mild to borderline intellectual disability: current status and future directions. *Research in Developmental Disabilities, 38,* 319-328. https://doi.org/10.1016/j.ridd.2014.12.029

Appendix A

Flashcards

Exercise 1 and 2

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?

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 3 and 4

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?

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?

Exercise 5 and 6

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.

DISTRACTION

Goal Focus on something else than substance use.

Description In a messy home environment, with drugs and liquor.

Changing the topic of conversation ★★

Template 3B

Triggers & Helpers

- Talking about something that induces craving
- News report on TV
- Feeling at ease

Before putting on the VR headset

1. Customize the virtual character to resemble someone the client trusts.
2. Discuss with the client different ways to change the topic of conversation (e.g. "Shall we talk about something else?", "I like to do ...")

VR session

1. Talk (as the virtual character) about a situation that you know will trigger cravings in the client (e.g., going to a party) and have the client interrupt you to change the topic of conversation.
2. Engage in the client's new topic of conversation.

Evaluating

1. Did the client manage to change the topic of conversation? Discuss what went well and what could possibly be improved.
2. Did the client experience cravings during the VR session? Did talking about something else help reduce cravings? Why (not)?

Exercise 7 and 8

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)?

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 9 and 10

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?

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?

Exercise 11

DOING GREAT

Goal Learn how to give compliments and reward yourself

Description In the living room with a friend

Rewarding yourself ★★

Template 6B

Triggers & Helpers

Give positive affirmation to the client

Before putting on the VR headset

1. Tell that you are going to practice giving compliments and rewarding yourself.
2. Discuss that in VR you are going to play a friend who is visiting, and who will ask about your substance use. If necessary, modify the virtual character together so that it resembles a friend of the client.

VR session

1. Have the client tell about a situation in which he managed not to use. Ask how he did this and try to get the client to compliment himself ("How did you think you handled the situation?").
2. Say "We should celebrate this!" and ask the client how to celebrate. If necessary, give ideas if the client can't think of anything themselves (e.g., go to the snack bar together)

Evaluating

1. Did the client feel proud? Can rewarding oneself help with persistence not to use?

Appendix B

Interview

Purpose of the interview

Questions with an Asterix (*) behind them deviate from the communal interview guide.

Introduction

Hello (..). Thank you for participating in my interview. My name is Bart Ligtenberg and I am a third year psychology student who is currently working on his bachelor thesis. This thesis is a part of a larger research called Triggers & Tech from Meike Berkhoff (m.h.berkhoff@utwente.nl). This interview is to help answer the research question of my thesis. The subject of this interview and my thesis is about how to incorporate existing cognitive behavioural therapy (CBT) coping skills into virtual reality exercises to treat substance use disorder of individuals with an intellectual disability according to clinicians. 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, a VR framework that has been developed for CBT exercises, about which I will also ask some questions. Then I will show you examples of VR CBT exercises and ask questions about that as well. Finally, I will ask questions on how to use the VR exercises in clinical settings and needs that you as a clinician might have in order to implement it. The interview is going to take approximately 30 minutes, and it is voluntary, meaning that you can stop at any time without consequences, and will be anonymized, as well as the recordings and transcript of the interview will be removed one year after the interview. Once again, thank you for participating. If you have any questions feel free to ask them at any given time.

For the sake of the recording and voluntary participation in this interview, I need your oral approval.

Start recording here

Do you therefore consent to participate in this interview, and are you aware you can stop at any given time? The date of this interview is (..).

General questions

1. Could you tell me a bit about yourself and your profession?
2. What would you say is your area of expertise?
3. Do you have experience in working with people with intellectual disabilities?

4. What should be considered when treating clients with substance use disorder and intellectual disabilities compared to clients who have substance use disorder only?
5. To what extent do you have experience with CBT?
6. What do you know so far about applying VR into CBT practices to treat substance use disorders?
7. Have you ever used VR in treatment or as an additional treatment with a client?*
    a. If yes: how did you use it?
    b. If no: why not?
8. Would you consider using VR in treatment (again) and why (not)?

Now that we have talked about some general questions regarding you and your work and the use of VR in therapeutic sessions, I would like to discuss CleVR with you. CleVR is the VR framework that we use for the exercises. In CleVR, you can have roleplays with clients in multiple settings. Additionally, you as a therapist can enact other virtual characters and interact with the client in the VT environment. This can then be used to practice for instance coping skills. I will now show you a video of CleVR to give you an idea of what it can do.

Questions about CleVR (show video and/or pictures first)

9. What are the first things that come to mind after seeing this video?
10. Are you familiar with CleVR?
11. How do you think the use of CleVR can replace existing aspects of CBT practice?
    a. Can you give an example?
12. What would you need out of CleVR in order to use it in your own practices?

Now that we have talked about the use of VR and shown you the video of CleVR, I will show you two flashcards. These flashcards are examples of VR exercises according to the six A's (in Dutch: afstand nemen, aangeven, afleiding zoeken, anders denken, anders doen, applaus). This is how we are planning to implement the CBT principles in VR exercises. These flashcards offer clinicians ideas about how to integrate VR in treatment and can be personalized based on the needs of their clients. These flashcards can also be selected based on which session of the treatment the client is in. The client will therefore not see these flashcards, but rather they serve as a starting point for the clinician. Now, I will show you two flashcards and ask you a few questions about them.

Questions about flashcards (show a flashcard and then repeat questions 13-19 with another flashcard, before moving on to question 20)

13. What do you think of this exercise?
    a. What do you think of the VR aspect?
14. To what extent do you think this exercise is understandable for people with intellectual disabilities?
    a. How (not)?
15. Do you have enough information on the flashcard to properly explain the goal of the exercise to someone with intellectual disability?
    a. If not, what are you missing?
16. How do you think this exercise can be improved for people with intellectual disabilities, so that the purpose is clearer?
17. To what extent do you think this exercise could be triggering for clients?
    a. How (not)?
    b. To what extent do you think it is still within the boundaries of this treatment to allow clients to do the exercise?
    c. Could it still be beneficial to do such an exercise?
18. Could you see yourself using this VR exercise in the future?
    a. Why (not)?
    b. How would you use it?
19. What do you think is needed to implement this exercise in CBT practice?
20. When looking at all VR exercises, do you think these exercises are suitable for CBT?
    a. Why?
    b. What do you feel is missing?
    c. What can be left out?
21. What is needed to be able to use these exercises in your own practice?
22. Do you have additional recommendations based on the flashcards you just saw?
    a. Which?
23. To what extent do you think the VR exercises can serve as a starting point to personalize VR scenarios for specific clients?
24. Do you have additional recommendations based on using VR to treat substance use disorder on people with intellectual disabilities in general?*
    a. Which?

25. Do you have any other questions or remarks based on this interview or the topics discussed in this interview?*
    a. 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 (b.j.ligtenberg@student.utwente.nl), would you like to receive a copy of the final version of my thesis?

Appendix C

Codebook

Table 8

Codebook

Group	Category	Description	Example
Experience	Mental healthcare	Mentions of participants from which it became clear the participant has working experience in the field of mental healthcare	Directing practitioner GGZ
	Training	Mentions of participants from which it became clear the participant has working experience in the field of providing training	Training
	Education	Mentions of participants from which it became clear the participant has working experience in the field of providing education	Master education Brein de Baas
	Research	Mentions of participants from which it became clear the participant has working experience in the field of doing research	PhD thesis
	Experience with CBT	Mentions of participants from which it became clear the participant has experience with CBT	CBT+
	Experience with ID	Mentions of participants from which it became clear the participant has experience with ID	ID treatment

	Experience with VR	Mentions of participants from which it became clear the participant has experience with ID	VR relaxed
Intellectual disability in general	Difference ID and non-ID	Mentions of the participant that made clear the difference in working with ID compared to non-ID, as well as what to take into account when working with ID compared to non-ID	Means of interaction
	Characteristics ID	Mentions of the participants that make clear the characteristics of the ID target group	Difficulty to generalize
	Recommendations ID	General recommendations on working with ID	Involving network
Virtual reality in general	Challenges VR	Mentions of the participants that states what they find challenges of working with VR, as well as challenges regarding the implementation of VR	Cost
	Benefits VR	Mentions of the participants on what they thought were benefits of VR	Immersion
	Prerequisites VR	Mentions of the participants on what they thought necessary before the implementation of VR is possible	Training
	Attitudes VR	Mentions of the participants on what their attitudes on VR based on their own experiences and expectations	Negative experience

Attitudes on CleVR	Needs of CleVR	Mentions of participants on what they would need from the CleVR framework in order to work with it	Guidance and training
	First impressions	The first impressions of participants after seeing the CleVR video	Bad graphics
	CleVR for CBT	Mentions of the participants relating to the role CleVR could play for CBT treatment	Can add to CBT aspects
	Familiarity with CleVR	Mentions of the participants on whether or not they are already familiar with CleVR before seeing the video	Has used CleVR
	Benefits of CleVR	Mentions of the participants on what they would think the benefits of using the CleVR framework could be for therapeutic means	Different environments
Attitudes exercises	Usefulness flashcards	Mentions of participants regarding whether or not they found the flashcard exercises useful	Practical aspect
	VR aspect	Mentions of participants on the VR aspect of the exercises	Realistic
	Suitability ID	Mentions of participants on whether or not they found that the exercises are suitable for the ID target group	Too much text
	Suitability CBT	Mentions of participants on whether or not they found that the exercises are suitable for CBT	Fits goals

	Understandability	Mentions of participants on whether or not they found the exercises understandable	Information to therapist
	Trigger aspect	Mentions of the participants on the triggering effect of the exercise on clients	Mentions substances
	Other remarks	Any remarks regarding the exercises that cannot be divided over the other categories within this group and are not recommendations	Bartender unrealistic
Recommendations based on the exercises	Content	Recommendations of participants concerning the contents of the flashcard exercises	Addition of guides
	Customization	Recommendations of participants concerning the customizability of the flashcard exercises	Invitation to improvise
	Suitability CBT	Recommendations of participants to improve the suitability of the flashcard exercises to match CBT	Connection to G scheme
	Suitability ID	Recommendations of participants to improve the suitability of the flashcard exercises to match the ID target group	Client interaction