

Assessing the Feasibility of VRAPT in Prison: A Qualitative Study of Therapists and Ward Staff

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Abstract

Background

Virtual Reality Aggression Prevention Training (VRAPT) is an immersive, cognitive-behavioral intervention designed to reduce reactive aggression in violent offenders. While earlier work has explored client perspectives, little is known about how VRAPT and virtual reality (VR) are experienced by therapists and ward staff within the prison context. Understanding professionals' views on usefulness, feasibility, emotional impact, and organizational conditions is essential for evaluating VRAPT's role in prison-based rehabilitation.

Methods

This qualitative study included 17 participants—7 therapists (Ts) and 10 ward staff who function as contact persons (CPs)—involved in a VRAPT pilot for prisoners within the Swedish prison and probation service (SPPS). Individual semi-structured interviews were analyzed via inductive content analysis, which identified manifest categories, followed by deductive comparisons between Ts and CPs and an analysis of latent themes. Coding was performed collaboratively across multiple researchers to enhance credibility and confirmability, following COREQ guidelines.

Results

Eight main categories emerged: Potential in VR, Feasibility of VRAPT, Advantages and disadvantages, Client selection, Collaboration, Between-session work, VRAPT's functioning, and Technology. The participants described VR as a powerful and emotionally engaging tool that enables realistic role-play, facilitates insight into triggers, and bridges the experiential gap between clients and staff. VRAPT was viewed as promising but somewhat rigid, with calls for greater individual tailoring, expanded focus beyond reactive aggression, deeper exploration of client histories, and improved organization. Ts emphasized clinical technique and technological challenges, whereas CPs focused on emotional impact, observable behavior, and needing a clearer understanding of the VRAPT concept. Three latent themes were identified: VRAPT and VR create unique opportunities if connected to the rest of SPPS care; VRAPT and VR are probably best when evoking emotions but can work anyway; Knowledge is key in understanding potential in VR; and the level of knowledge provides unique insights and ideas.

Conclusions

VRAPT appears feasible and valuable within prison settings, but its effectiveness relies on organizational support, adequate client selection, and collaboration between Ts and ward staff. VR holds significant promise as a relevant tool for offender rehabilitation, although VRAPT may require adaptation, either expansion for antisocial offender groups or integration as a module within broader treatment frameworks.

Background

Offender treatment is considered a vital part of interventions targeting criminal behavior. Several systematic reviews and meta-analyses have concluded that treatment for offenders is effective in reducing risk for recidivism if it is conducted with Risk, Needs and Responsivity methods (RNR; 1–5). Most studies in this area show modest or small effect sizes, and the focus of research on offender treatment is making what works work, in other words, delivering treatment with integrity^{6,7} and closely monitoring fidelity³ while continuing to develop better ways to reach more offenders and engage them in treatment. In recent years Virtual Reality (VR)-based assessment and treatment have been used and implemented within forensic treatment settings, with high acceptability among clients and professionals⁸. VR has been said to have a bright future in criminal justice practice if implementation is based on an understanding of its advantages and disadvantages⁹.

Clinical VR applications target cognitive, psychological, motor and functional impairments across several health conditions and are traditionally categorized into non-immersive, immersive and cave automatic virtual environments¹⁰. Immersive VR is typically used with head-mounted displays (HMDs), which aid in the control and continued perception of a specific stimulus for the user in the virtual world¹⁰. In other words, the immersive experience makes it easier to control the clinical processes within the virtual environment for an embodied, interactive experience, enabling innovative ways of providing treatment content that are not possible in traditional interventions¹⁰. New ways of providing treatment content can, for example, entail exposure to war-like environments for veterans with PTSD or learning to manage high-risk situations with a high degree of control and security in violent offenders.

VR operates through two key features: presence and immersion. Presence is an intuitive process¹¹ through which the individual experiences being in the virtual world as if it was real, whereas immersion is a feature of the VR system that enables the individual to act naturally in the virtual world¹². This can also be understood in terms of “transportation”, which refers to being cognitively, emotionally and imaginarily involved in a media narrative¹³, which VR could be especially suited to achieve⁹. In psychological treatment, VR environments are an increasingly applied

tool¹⁴ and have been evaluated for several psychiatric disorders^{15,16} for several purposes, such as exposure^{17–19}, embodied perspective-taking^{20–22} and skills training^{14,16,23}. Clinical VR applications have been deemed “ready for primetime” by leading researchers¹⁰ and as having passed the “proof of concept” for mental health care⁹.

One example of VR-assisted treatment for offenders is Virtual Reality Aggression Prevention Training (VRAPT)^{24–26}. VRAPT is a 16-session Cognitive Behavioral Therapy (CBT) intervention focused on reactive aggression. It has been shown to be accepted by Swedish forensic mental health inpatients^{27–29} and potentially effective for incarcerated violent offenders³⁰. Violent offenders describe that the VR environment in VRAPT makes the treatment feel real if it is tailored to their needs³¹. The main purpose of VRAPT is to learn how to manage risk situations for reactive aggression via self-control techniques. The VR environment in VRAPT is designed for skills training in emotion recognition and differentiation, role-play, perspective shifting, and exposure. When applied to a prison context, the VR environments in VRAPT transport the participants to virtual risk situations that mimic real situations they will probably encounter when they are outside the walls.

A recent meta-analysis revealed that there might be differences in effects between custodial-based treatment (e.g., prison) and community-based treatment for offenders, where custodial contexts seem to produce smaller yet more reliant effects than community contexts do³². Treatment is often homogenized in custodial settings, and the greater but more varied effects of community treatment may be due to its more flexible approach³². VR provides a unique opportunity to increase flexibility in skills training and tailoring to the needs of offenders in the prison context^{33,34} while maintaining treatment fidelity, which can be conceptualized as “flexibility within fidelity”³⁵. It seems that a VR-based approach within prison could harness power from both homogenization and flexibility if used correctly. Understanding how a new treatment program such as VRAPT is used and perceived by the staff observing the treatment process seems both reasonable and essential to shed light on the feasibility of the program in the context at hand.

The ward staff working in prisons have multiple functions, serve as key actors in impacting the quality of the prison environment and can have both direct and indirect impacts on offender treatment programs³⁶. Ward staff should function as prosocial models and collaborate with offenders within prison services to facilitate rehabilitation. This can include fostering motivation and engagement in prosocial activities, guiding through problem solving and facilitating attitude and behavior change³⁶. To date, the most comprehensive model of prison staff practices is Core Correctional Practices (CCP), which is an extension of effective correctional treatment³⁷ and is used within the Swedish prison and probation service (SPPS). The CCP involves five principles: 1) a strong working relationship or alliance, 2) effective use of authority, 3) effective modeling and reinforcing prosocial attitudes and behaviors, 4) teaching problem-solving skills, and 5) effective use of community resources³⁷. It is essentially about building a positive social climate, treating prisoners with equality and respect and helping them build prosocial identities and attitudes, which is important for both the implementation of treatment programs and their effectiveness³⁶. In that way, the role of the ward staff and how they are engaged in a treatment program such as VRAPT may influence the outcome and feasibility of the program.

When understanding the feasibility and usefulness of a novel treatment program, it is both ethically sound and clinically reasonable to interview service users, which was done in conjunction with a pilot on VRAPT within the SPPS³¹. Adding a professional view of VRAPT by interviewing therapists (Ts) and ward staff provides additional layers of understanding. Ts guiding the clients through treatment have an inside perspective of how the program works and the change process of their clients. They can describe if the treatment protocol works as intended and, in the case of VR, if it is useful as hypothesized. Ward staff that collaborate closely with participating clients also have a unique perspective on the treatment process. By observing from the outside but in the clients’ living environment at the ward, their perspectives become an ecological validation of the intended impact and feasibility of the program. Together, both Ts and ward staff are part of the supporting environment for the client to change in.

This study aimed to explore the feasibility of VRAPT in SPPS through an understanding of the treatment environment in which VRAPT was delivered on the basis of the perceptions and experiences of Ts and ward staff. The two main research questions were as follows:

- What experiences and perceptions do Ts and ward staff who function as contact persons (CPs) have on using VR in the prison setting and the usefulness of VRAPT?
- What differences in experiences and perceptions could be found between Ts and CPs on using VR in the prison setting and the usefulness of VRAPT?

During the years 2020–2023, the COVID-19 pandemic held the world in a gridlock. The Swedish VRAPT pilot³⁰ was, however, possible to conduct and started in 2020. Since the pandemic was suspected to impact the feasibility of VRAPT, this study also aimed, second, to explore Ts’s experience working with VRAPT during the COVID-19 pandemic.

Method

Settings

The study was conducted with staff working in one medium- and one high-security prison within the SPPS. Participants were recruited from ordinary wards at prisons, but some staff also worked within a high-security ward at the high-security prison.

Sample

The staff sample consisted of Ts (n = 7) and CPs (n = 10), making the sample in this study N = 17 corresponding to the total sample of staff involved in the pilot study³⁰. All participants were employed and trained by the SPPS. Ts received training in VR and VRAPT and were under supervision during the pilot. No additional demographic data were collected about the sample. Even though the sample consisted of two different staff categories (subgroups), both served as direct aid and support for the change in the participating clients from the pilot. All Ts had first-hand experience using VR within VRAPT. The prior experience of using or trying VR among CPs varied from none to some experience, including the first time trying it during the VRAPT pilot.

Procedure

Interview guides for Ts and CPs were constructed when planning the VRAPT pilot with the aim of matching certain aspects of the interviews with client participants³¹. The match served the purpose of stringency between interviews, thus triangulating the experiences of using VR and VRAPT in prison. All interviews were audio-recorded, conducted individually at one sitting, and followed a semi structured format, ranging in time between 22–40 minutes for CPs and 28–56 minutes for Ts. Owing to the COVID-19 pandemic, all but one interview were conducted via telephone with the participants at their workplace. Only the consenting participants were present during the interviews. Each CP was asked to participate in the interview study when their participating client(s) had been administered their follow-up measure three months after VRAPT conclusion. Ts were interviewed at the end of the VRAPT pilot, with a focus on their collected experiences from the pilot (see Fig. 1).

Figure 1: Timeline of the VRAPT pilot

The interviews covered four topics: 1) knowledge and thoughts about VR in general, 2) VR in prison and probation services, 3) perceptions of VRAPT, and 4) working with VRAPT during the COVID-19 pandemic. No notes were taken during the interviews, and the questions were mostly open-ended, e.g., “What are your thoughts on Virtual Reality?” and “How can ward staff be more involved in the treatment process?” Even though the interview guides (see Appendix I) for the two subgroups were similar, they were not identical, thus making specific information unique to the subgroups in the sample. Only Ts received questions on their use of equipment, client drop-out, the COVID-19 pandemic and between-session assignments, and only the CPs received questions on client functioning before VRAPT and change at the ward during and after VRAPT.

All interviews with CPs were conducted by the first author (DI), and the interviews with Ts were conducted by a research assistant at the SPPS research department. The first interviewer was a licensed male psychologist and PhD student who had no prior relationship with any of the CPs. The second interviewer was a political scientist and investigator at the SPPS research department and had no prior relationship with any of the Ts. The participants were informed of the interviewers’ profession and role in the research project before the interview. Both interviewers were employed by the SPPS, which was known by the participants. The first author was also known to be a stakeholder in the VRAPT pilot project.

The aTrain™ software version 1.3.0 (38) was used for transcription. The first round of coding was performed independently by the first (DI) and second (AS) authors. Together with the third author (PE), the coding manual was set. PE also aided in resolving any disagreements in coding. The participants did not take part of the transcripts and did not provide any feedback on the results. A logbook (see Appendix II) was constructed and maintained to report research process development³⁹. This approach aimed at creating results that were credible, dependable, and transferable⁴⁰. The consolidated criteria for qualitative research (COREQ) guidelines for interviews and focus groups were followed to ensure high-quality reporting of important aspects of the research team, study methods, context of the study, findings, analysis, and interpretations⁴¹.

Analysis

Pooling the participants to a total sample rather than seeing them (only) as separate groups enables the analysis to focus on the overall usefulness and feasibility of VR and VRAPT within the prison context.

The interviews were analyzed through a qualitative content analysis (QCA; 41) with the aim of identifying manifest categories through an inductive approach. In QCA, the knowledge the researcher is applying to the data (inference contexts) should be explicit and clear when disseminating the research results⁴³. The inference contexts in this study were Prison, Violent offenders, RNR framework, Learning/conditioning theory (social, operant, respondent), Program facilitation, CBT, VR-assisted treatment, VRAPT protocol, CCP and Internal collaboration in organizations. These inference contexts form a backdrop for the discussion in this study.

In line with the inductive approach, a collaborative coding process was established following the steps of Coulston et al.⁴⁴. The coding processes started with the planning of the collaborative process, where two coders (DI and AS), one with specific knowledge of the fields of VR and VRAPT and the other with specific knowledge of qualitative methods, were used. Both shared knowledge on forensic institutional care, with experiences from working closely with ward staff, and Ts. The next step involved becoming familiar with the project aims and dataset. The first

round of coding was performed independently on the basis of the steps of the coding process following the QCA procedure ⁴², where meaning units were condensed and abstracted into preliminary codes and subcategories. Subsequent coding, as well as the development of the final main categories, was performed by collaboratively narrowing the selection of subcategories and reaching a shared understanding ⁴⁴. Since perceptions and experiences probably would differ between the two groups in the sample, a deductive analysis step was applied to answer the second research question about potential differences in perceptions and experiences, making the overall approach abductive ⁴³. As a final part of the QCA, as a means of finding a thread of underlying meaning, latent themes were analyzed ⁴². This was also done collaboratively. In summary, the abductive analysis process followed these steps:

- 1. QCA of manifest subcategories and categories with an inductive approach
- 2. Deductive analysis of differences between CPs and Ts in subcategories and categories
- 3. Qualitative latent content analysis for latent themes between categories

The research analysis was documented in the logbook (see Appendix II).

Table 1. Example of qualitative content analysis (QCA)

Table 1 Example of qualitative content analysis (QCA) (page 11)				
Meaning unit	Condensed meaning unit	Code	Subcategory	Category
You should have more so that you know what the goals are and what the client goes through in the process. And the next time I have a client, I will actually do it. I will interfere and maybe find out more.	Knowledge of the goals of VRAPT and how to act in VRAPT	Contact persons involvement	Contact person's role	Collaboration
Abduction			Differences between Ts and CPs	
Latent theme	42		A thread of underlying meaning	

Ethical considerations

The study was approved by the Swedish Ethical Review Authority (2019–02337). All participants provided written informed consent to taking part in the study. All the data were pseudonymized before analysis, and the recordings were deleted after the analysis was finished. Since the study is based on human subjects all methods were conducted in line with the declaration of Helsinki ⁴⁵.

It was a risk that participants could feel obliged or forced into participating since they were all recruited on the basis of their roles in the VRAPT pilot, which was already ongoing. Since all participants were employed by the SPPS, which is a hierarchical organization, there was also a risk that participants would fear being perceived as disloyal if they did not participate. However, all participants were recruited on the basis of the principles of informed consent with the possibility of dropping out without stating any reason. Both written and oral informed consent underlining the free will to participate was obtained before the interviews. Since one of the authors of the study was also the supervisor for the Ts during the VRAPT pilot, it was essential to find an extra interviewer, ensuring that the interview for the Ts was an opportunity to speak freely on every aspect of the pilot. The Ts were all interviewed by a person with whom they had no prior relationship.

Results

Overall, the analysis resulted in eight different main categories with between two and seven subcategories per main category. Each category is presented with its connected subcategories followed by differences between Ts and CPs.

Table 2. Categories, subcategories, and latent themes

Table 2
Categories, subcategories and latent themes (page 12)

Categories	Potential in VR	Feasibility of VRAPT	Advantages- and Disadvantages	Work between sessions	Client selection	Collaboration	VRAPTs functioning	Technology
Subcategories	VR as something new	Areas of improvement in VRAPT	Advantages with VR	Between session assignments	Client before VRAPT	Contact person's role	Outcome of VRAPT	Development of technology
	Other applications	Preconditions for VRAPT	Disadvantages with VR	Workbooks	For whom VRAPT fits	Knowledge about VRAPT	Influence of VRAPT	Use of technology
			Expectations on VR			Knowledge about treatment programs	VRAPT in comparison with other programs	Suggestions for VR
			Apprehensions with VR			Knowledge of VRAPT treatment goals	Treatment goals	
			Own experience of VR			Cooperation between staff	Other factors	
			Role-plays in VR			Cooperation with clients		
			VR feels real			COVID-pandemic		
Latent themes	VRAPT and VR create unique opportunities if connected to the rest of the SPPS care VRAPT and VR are probably best when evoking emotions but can work anyway Knowledge is key in understanding potential in VR, and level of knowledge provides unique insights and ideas							

Categories

Potential in VR

The Potential in VR in general was described through two subcategories: **VR as something new** and **Other applications**. Overall, VR was described as something new and in being new also inherently positive in terms of its ability to impact violence and crime. A large variety of other applications of VR were mentioned, including using VR for visitors to prison, as a possibility for the clients to better understand their needs and for applications other than aggression treatment (e.g., anxiety, domestic abuse, substance abuse, impulse control in ADHD) or as a complement to other treatment programs in general. VR for staff training was mentioned by several participants, potentially aiding the ward staff role and skills in handling demanding situations at the prison, understanding one's own emotional reactions, and building stronger relations with the clients.

So, you could go much further in terms of training. In addition, you get a greater understanding, and preparation for why you do things in a certain way when a client might get upset or even get sad, you don't know how to react either. (CP5)

VR was also suggested for use as a brief intervention tool for the meetings of CPs with clients. VR was seen as being used for entertainment or as a form of relief or time off from prison, even as a sort of furlough for clients. Positive virtual environments of safety and kindness could be used for clients who have not had such environments in their childhood, helping them envision what to strive for in life.

Yes, and sometimes you may not know that this is what you have longed for. Because you can't visualize it for yourself. If you've never experienced something, it's hard to long for it. (CP10)

Differences between CPs and Ts

The CPs presented various suggestions on how to use VR in prison, but the suggestions were often vaguely described. Ts focused on clinical applications in treatment and saw VR mainly as a complement to other treatment programs, presenting examples. Additionally, the CPs saw VR as something new that the Ts did not. Both the CPs and the Ts spoke about using VR as an aid in staff training, but the CPs had more detailed descriptions of the purpose, value and how it could impact clients coping with the prison context and understanding clients better.

Feasibility of VRAPT

This main category consisted of two subcategories: **Areas of improvement in VRAPT** and **Preconditions for VRAPT**.

VRAPT was seen as a good program by the participants, although several said that they lacked sufficient knowledge about the program. Most statements in areas of improvement in VRAPT were about making VRAPT more flexible. More time to learn about the clients' history, experiences, and needs was mentioned by several. The use of functional analysis was wanted by several, and some expressed the need to go "deeper" into the problems of the clients. According to several participants, better adaptations to clients were expected to improve outcomes and avoid problems. Even though VRAPT is designed for reactive aggression, some participants stated that working with proactive aggression should be included. Emotion recognition assessment was described as taking up too much time in VRAPT, and participants mentioned that more space should be given to social and emotion recognition skills training. It was commonly stated that the role-play structure in VRAPT should be more flexible and not as repetitive as its current form to better match clients' needs. Furthermore, VRAPT sessions and the whole intervention were perceived as being too short, making the sessions slightly forced, according to some participants. Some participants acknowledged that adjusting the phraseology and style in talking in accordance with the antisocial group might be important to obtain a more powerful impact on role-play.

Instead of being a little too soft in the situation, using the same powerful expressions that they use against each other in this group. CP8

The participants described several preconditions for the feasibility of VRAPT in a prison context. Having to share few VRAPT equipment and using them at different wards in a large prison presents logistical challenges. These challenges could most often be solved but were also impacted by a lack of localities for conducting VRAPT. Having a specific VR room was seen as valuable. The group-based supervision for Ts was seen as helpful in being able to ask questions, share ideas and how to manage strong emotions in clients due to the VR experience, but more exchange between Ts was wanted.

We've had supervision in the project now, but I would like to have a small bank or a small supervision or exchange of experience between us who run VRAPT, there should be some kind of experience bubble, bank or supervision so that you are not just released into the Swedish prison and probation service and then we will just go on here on our separate islands. T5

Differences between CPs and Ts

The CPs often stated that they had no suggestions about improvement for VRAPT, mostly because of their lack of knowledge about VRAPT other than the importance of adapting the training to risk situations for the individual. Ts had the most suggestions for improvement of VRAPT with a high degree of detail to improve clinical utilization. Only Ts spoke about preconditions for doing VRAPT.

Advantages and disadvantages

In this main category, several subcategories regarding **Advantages with VR**, **Disadvantages with VR**, **Expectations on VR** and **Apprehensions with VR** were described by the participants. In addition, **Own experience of VR** and the specific advantages **Role-plays in VR** and that **VR feels real** emerged.

Most of the participants had no or little experience with VR, and for several, the VR environment used in VRAPT was their first encounter with VR. Having little or no experience made it difficult for several participants to feel certain about advantages or disadvantages, but they formulated expectations and apprehensions.

The general advantages and expectations of VR were the possibility of creating and experiencing different worlds in VR, allowing clients to come outside the prison walls through VR. Being in a situation while managing a strong emotion instead of just talking about it was highlighted as an advantage by a large majority. In extension, having shared experiences of such situations between clients and staff was seen as an advantage, bridging a "distance" in part inherent in the prison context. One CP had let the participating client (with aid from his Ts) use the VR system on the CP and said:

The benefits are not only for the client but also that we can experience what they get to experience. That you can mirror their world a little. This means that we can also have a different understanding. CP6

The most specific advantages of VR were that VR feels real and that it has a role-playing function. VR was described as realistic and strong in that clients could not hide their problems and could be surprised by their own reactions in the VR environment. The VR experience was described as intuitive, and clients could engage in situations they struggled with.

I think we should have this all the time. So just as much as possible. I don't know how it can work on other problems, but in regard to violence where you can provoke and you can really push what it is that these trigger points are. In this way, I think you can reach the client much, much better than

the client talking about it. Because here you can truly put feelings into words in your action. CP6

Role-playing was seen as an important part of VRAPT, evoking strong emotions that could rise quickly. Role-plays were also seen as important for matching clients' needs and were described as best when clients took part in shaping the scenarios. Some of the participants also stated that VR role-play made them feel more authentic and thus helped the client in a better way.

Well, I also feel that I got better at role-playing behind the screen. And I got a more direct connection. So, from that, I was able to act in a more authentic way in my role behind the screen, in relation to what I might have done if I had been myself in the role-play. Yes, so I think it has been a fantastic tool. T7

There were few general disadvantages and apprehensions, but they are relevant in relation to the advantages and expectations. A few participants spoke about the risk of providing a false sense of security to clients when they were able to manage scenarios in VR. Additionally, a small number of participants reflected on that clients perhaps only simulated progress to show that they could "finish the program." The most common potential apprehension mentioned by the participants was the risk of evoking strong negative emotions in clients. At the same time, challenges with getting antisocial clients emotionally aroused were mentioned, which might lead to a need for crossing boundaries in what one is usually comfortable saying or doing as a therapist.

You have to provoke even more. And I have had to cross my own boundaries. That is, in that way. And I have done that then in consultation in supervision and such. So, it's not something that I've just done myself. But I have brought it up and talked about it. But I thought that was very difficult. T2

Differences between CPs and Ts

The CPs spoke about the emotional impact on clients as an advantage, but Ts did not mention this at all. CPs also mentioned creating environments not found in the prison context and the possibility of making training safe to a much greater extent than Ts. Ts, on the other hand, spoke about the clinical application of VR as an advantage and how one could use it in practice to develop treatment processes. Ts did not speak about expectations at all, and apprehensions were about personal skepticism in the beginning or challenges in using the technology, whereas CPs mentioned more apprehensions. Ts described disadvantages in clinical and technical terms, whereas CPs described them as more tentative around evoking negative emotions. The CPs spoke more than Ts about that VR felt real and Ts more than did the CPs about role-playing in VR.

Work between sessions

The main category Work between sessions consisted of two subcategories: **Between-session assignments** and the client **Workbooks**.

Several participants spoke about how there are difficulties with working with between-session assignments in VRAPT, with descriptions of them being too hard, too large, workbooks being too repetitive and overcrowding and double-celling making clients worry about having workbooks in their living quarters. Some participants stated that you needed a "back-up" assignment, sometimes due to a lack of client's self-reflection skills, and that you also needed to adapt the assignments to avoid losing the client's motivation for treatment. Several participants also highlighted the prison context and noted that it is easier to work with assignments if more clients in the ward are in treatment and that working with both workbooks and assignments works better if there is support in the ward. The lack of support was described as both a question about ward "culture" and a "system error" within the organization, where ward staff simply did not have the time to support clients in their work between sessions.

But if you look at the nature of the homework assignments, they are certainly not difficult to complete. If it had been outside, outside of a prison environment, it would not have been any problem at all to conduct homework, but it is more about the cultures that exist. Partly between inmates but also in, so to speak, staff, you know it is tight, tight staff groups. Or what can I say that they are so stressed. The staff groups are so stressed that they have so little time for client contact that there is no room to sit even for fifteen minutes. T3

Differences between CPs and Ts

Mainly Ts spoke about the category of work between sessions, but some CPs spoke about their role in supporting, reminding, and following up between-session assignments.

Client selection

Overall, the main category Client selection was related to the ability to tailor VRAPT to different clients. The subcategories were **Client before VRAPT** and **For whom VRAPT fits**. A couple of participants stated that perhaps VR-assisted treatment may fit younger clients better or that age could be a factor in participant selection. A variety of client descriptions emerged from the material, painting a sort of gallery over differences between participants. Clients were described as both having worked with themselves and therefore being rather controlled before VRAPT and as

avoiding situations that could lead to conflict. Other descriptions focused on clients being agitated and conflict oriented when in a group but not one-on-one. Clients were also described as differing in their insight into their own problems before VRAPT or that they were high-strung, reacting quickly with violence to incidents at the ward. Difficulties in talking about emotions, being introverted and avoiding eye contact were some descriptions as well as a lack of empathy and being self-centered. Several clients were described as using proactive rather than reactive aggression. The reflections about whom VRAPT fits boiled down to the importance of good assessment and knowledge about the client before starting VRAPT, ensuring that the client needs treatment for reactive aggression and that the client can engage with the virtual environment.

But maybe you should choose those who are really prone to violence who have a lot of these feelings or something like that. Or maybe clients who have parole, maybe not a life timer or something like that. Of course, they should also receive treatment, but it is perhaps specifically for those who are messy and who have aggression problems. CP4

Differences between CPs and Ts

The CPs' descriptions of the clients before VRAPT focused on observed behavior, traits, and variation in triggers, whereas Ts spoke more about the needs of clients in a categorical or typological way, using theoretical phrasing such as reactive vs proactive aggression or in terms of insight.

Collaboration

The main category Collaboration spanned over seven subcategories: the **Contact person's role**, **Knowledge about VRAPT**, **Knowledge about treatment programs**, **Knowledge of VRAPT treatment goals**, **Cooperation between staff** and **Cooperation with clients**. Furthermore, a specific subcategory for Ts included experiences with the impact of the **COVID-19 pandemic** on working with VRAPT.

The CP's role was described in practical terms, such as VRAPT follow-up conversations with clients, helping with between-session assignments, providing support, motivating, and aiding in challenging situations, reminding of the purpose and goals for VRAPT and paying attention to and reinforcing positive behavior. Some CPs were actively taking part, sharing the experience in VR, and aiding in the program, whereas some CPs only observed or did follow-ups on VRAPT.

Overall, the CPs described little knowledge on treatment programs in general and VRAPT specifically, including VRAPT treatment goals. On the other hand, it was quite common for CPs to want more knowledge from Ts on treatment programs in general and from VRAPT specifically. Feeling safe in one's knowledge about VRAPT was described as related to being a better advocate for the program by several CPs.

Because if we are allowed to be part of this journey, we can assess how the client manages situations at the ward or other conflicts or similar things that can be triggering factors. And then we can also see a development and trace it possibly to VRAPT, which would be a contributing factor where the client has positively developed. I think that's important. CP10

Cooperation between Ts and CPs was framed largely by communication where an open dialog created a better understanding of the clients. Both Ts and CPs wanted more communication and identified it as a shortcoming, with prison work being fast paced with little time to spare. A few CPs acknowledged that the Ts had a special role in prisons but that the actual amount of time clients were in treatment was rather short. Some CPs had weak or nonexistent relationships with their clients, but CPs, Ts and some clients wanted CPs to be more involved and to have strong relationships with their clients. Ts stated overall that client cooperation had worked out nicely and that transparency was important and that trust developed over time in the intervention, talking about the training situations and avatars as something separate from the relationship between clients and Ts.

And I think that the collaboration, that is, is growing all the time because there is also more trust in me as a therapist if you say so. That in the beginning, you notice that they may be a little hesitant, like: what is she going to do to me now? So, they have a bit of a hard time maybe distinguishing that it's an avatar and not me. But the further you go, and this is the importance of talking about what is happening and that I also think about saying: Yes, but what did he say that made you? So that I don't say: But what did I say that upset you? Without me also referring to the avatars. I think it has helped a lot too. T2

Treatment programs could be perceived as "luxury interventions" if not properly understood how they are helpful, but sharing the VR experience between CPs and clients increased the knowledge of both the program and the client's needs. Cooperation was seen as valuable in developing new ways of helping the clients if it continued over time. One CP said this on communication with Ts:

I think so, because sometimes they can say, the therapists, that: Now we've done this, and keep in mind that he might react like this. But then so much happens in between and you have time to forget that you should act in a certain way when an incident happens. CP8

The Ts presented different experiences working with VRAPT during the COVID-19 pandemic. Some said that the pandemic had no or only minor impact, mainly through detailed hygiene routines, whereas others said that the pandemic had had a strong impact, especially in certain periods with ward closures, risk for one's own health or having to cover for sick colleagues. Some Ts stated that had it not been for the pandemic, more clients could have received VRAPT.

I wish I had been able to run four or five clients at least during this period. To kind of also get to feel and know exactly what I think. Because my assessment is also very impacted by the fact that I had too few clients. T7

Differences between CPs and Ts

Only the CPs talked about knowledge about VRAPT, VR and treatment goals. With respect to the role of CPs, CPs had more to say with concrete descriptions of how their role looked like and could look like, asking for mutual collaboration. The CPs also spoke more about the importance of being involved in treatment since it may impact the client in a more profound way. Ts spoke about the role of the CPs as important in following up, taking part, and being interested in and helping the client after VRAPT but did not talk about mutual collaboration in the same way. Ts spoke about cooperation with staff in general in terms of increasing their knowledge about what goes on in treatment and the importance of obtaining their own VR experience.

VRAPTs functioning

VRAPTS functioning was described in five different subcategories: **Outcome of VRAPT, Influence of VRAPT, VRAPT in comparison with other programs, Treatment goals, and Other factors.**

The outcome of VRAPT was described as change or learning in the clients during the time of VRAPT. Outcomes were described as both internal and external in terms of client functionality (see Fig. 2).

Figure 2. Outcome of VRAPT

Other descriptions of client outcomes included a shift in views on close relationships and new behavior triggering new reactions in others, making clients feel happier and more outgoing. Outcomes were also described as positive consequences for society overall through ripple effects such as clients being motivated to start studying or managing to remain in a ward through increased self-control. Change for one client was described as “incredibly impressive” and maintained over time as a change toward “a new life.”

And it's an exceptionally good example where you pick the client from the beginning. The goal was not to be transferred and to get to know one's signals, to use methods and to talk about it in the feeling, to stay in the feeling instead of giving it an outlet. T1

Outcomes were also described as “sowing a seed” for change, but that some clients needed more. For certain clients, it was hard to know what they had learned from VRAPT, for instance, because a client was in isolation and not exposed to any risk situations. Real-world situations were described as the final test of the VRAPT outcome. Some stated that there was no change or positive outcome for clients and that one client was described as having used violence after VRAPT. One CP raised the issue of potential negative VRAPT outcomes, such as an increased risk for violent relapses. Others raised the contextual issue of changing behavior in prison, at risk of “being eaten” by other inmates.

Influence of VRAPT was described as how participating clients reacted and were impacted during the treatment in terms of engagement and emotional impact. VRAPT was described as a treatment that had a significant impact on most of the clients, creating emotional experiences they could take to heart instead of just being told how to act. However, not all clients were impacted, and some clients were described as only finishing the intervention because of their relationship with the Ts. Clients were described as both being and not being triggered in anger during VRAPT. Clients were also described as growing from the VRAPT experience, feeling capable but at the same time being low or downhearted by the experience.

The emotional response in VR was seen as central, as clients' engagement in VRAPT with a lack of emotional response would make the virtual environment less realistic, ultimately impacting their sense of presence. Interestingly, however, even when clients were not emotionally engaged in VRAPT role-plays, experience suggested that skills could still be learned. The participants' suggested reasons for nonexistent emotional responses were potential failure in adapting to client triggers, lack of insight or callous unemotional traits in clients. Individual adaptation on the basis of client history was highlighted, as making the experience more real and playing around with the software and increased experience of working with several clients made it easier to adjust for better impact. The creation of relevant scenarios was seen as impacting motivation and insight. A few participants described it as difficult to predict client reactions to the VR experience. They also noticed that clients changed from being amazed to becoming accustomed to the VR environment over time, which could negatively impact their motivation. Learning the VR system was seen as key in creating an engaging experience. One Ts said the following about being bold as a therapist:

No, to dare, I think. That this is training for the clients. It's a pretty realistic program because most of the time the avatars do the job anyway, you talk and then you have control with one hand and so on. It takes time before you learn this so that it flows. But the actual effects still begin. I felt it the first time I used it: No, but this will never work because I can't control this character at the same time as I have to keep track of how the clients experience it and so on. It was a lot to keep track of, but it flows after a while; it takes a while to learn it, but when you have learned it, it's great. T1

VRAPT, in comparison with other programs, was described as “a completely different experience” and as being more engaging and challenging to clients with less talk and more activity and easier performing role-play. VRAPT was described as “niched” targeting only reactive aggression and therefore not all clients sentenced for violent crimes. It was also described as being “stripped-down” theoretically and not going in-depth as other interventions could, but that perhaps clients do not necessarily need to understand their behavior to act differently.

The participants worked actively with treatment goals, but goal attainment varied between the clients. Examples of goals were related to learning about personal triggers for aggression and how to manage those triggers. VR was seen as aiding goal attainment in general and continued work with goal attainment after VRAPT was common for most clients. Some client goals were perceived as not properly formulated in relation to VRAPT or that the VR experience simply did not work.

We then tried to check if we came closer to these goals along the way. And to some extent, we did. But maybe not because of the VR exactly. So, we tried to check in, are we doing the right things? And we did. But as I said, what the VR didn't give is the desired effect. So, if we say this: That the client could manage all situations in VR, which he would not have done in real life. T7

Other factors impacting the clients included events happening outside of prison life, a strong relationship with ward staff, being met in a fair and caring way, client attitude toward themselves, time to learn new tools, motivation and knowing one “must change” or being already on a “change journey.”

Differences between CPs and Ts

No CP knew about the treatment goals set up in VRAPT for their clients. The CPs tended to describe VRAPT outcomes in terms of what happens between sessions, whereas Ts tended to describe outcomes in terms of intrapersonal changes and what happens during VRAPT sessions. The CP descriptions tended to focus more on observable behaviors, and the Ts descriptions tended to focus more on client traits. Several CPs could not compare VRAPT to other treatments, simply because they did not know that much about either.

Technology

Technology as a main category was described in three subcategories: **Development of technology**, **Use of technology** and **Suggestions for VR**.

Development of technology was described as possibly benefiting the clients, mainly through better graphics, more variety in settings and adapting the settings to Swedish circumstances. Other specific functionalities were raised regarding clients being able to leave a situation in role-playing, setting up scenarios in more night-time environments and improving voice distortion to sound more natural. Technology was also described as quite abstract to understand, making it difficult to describe development.

The use of technology in VRAPT was described as simple by design and not difficult to learn but challenging in getting it to be “natural.” Not being used to technology could be a challenge, and the importance of feeling confident with the equipment was raised. Technological knowledge was also seen as impacting performance in line with the purpose of the treatment. Technological mishaps were rare, and most could be managed during the session, for example, through restarting the system. Setting up the system was seen as an issue due to the multiple cords and components, but using the technology with clients was seen as easy, especially when the software was updated.

Yes, I just think that with that software update, thoughts were of course raised, or my mental boundaries were pushed for what could be done with VR in treatment T3.

Additionally, one suggestion for VR was to use haptics to increase the intensity of the experience, simulating physical sensations such as pushing or shoving as a part of the conflict escalation in training of aggression management.

Differences between CPs and Ts

All statements on technology except for one were made by Ts. One statement from a CP was a generic reflection on how improved technology could suit clients better.

Latent themes

Three latent themes were discovered during the analysis. The first theme focused not only on the organizational context and connection between staff and its impact on VRAPT but also on how VR could come to best use in the prison context. The theme emerged from the main categories: Collaboration, Client selection, Work between sessions and VRAPTs functioning and was labeled; **VRAPT and VR create unique opportunities if connected to the rest of the SPSS care**. The second theme was about the expectation that VR is an emotional experience but that emotions may not always be present. The theme underlines the importance of emotional impact but nuances it in relation to other benefits of VR and VRAPT. The theme emerged from the main categories: Advantages and disadvantages, VRAPTs functioning and Technology and was labeled; **VRAPT and VR are probably best when evoking emotions but can work anyway**. The third theme emerged from how the participants spoke about VR

and VRAPT on the basis of their knowledge. VR can be seen as a powerful tool in diverse ways, depending on how much knowledge one has, and knowledge level (high or low) provides something unique. The theme emerged from the main categories; Potential in VR, Feasibility of VRAPT, Advantages and disadvantages, Collaboration, VRAPTs functioning and Technology and was labeled; **Knowledge is key in understanding potential in VR, and level of knowledge provides unique insights and ideas.**

Discussion

This study focused on prison staff (Ts and CPs) perceptions of and experiences with the feasibility of VRAPT and VR in the Swedish prison context. The main findings show that the feasibility of VRAPT in prisons is a matter of harnessing the unique power of emotional and behavioral activation in VR and that VRAPT relies on extending treatment outside the treatment room through internal collaboration between Ts and ward staff. VR was perceived as a powerful tool, both intuitively from the sidelines and initiated from within VRAPT, especially if emotionally activating for the clients. VRAPT was seen as a valuable program that should address a wider scope of needs in the antisocial group, also targeting proactive aggression. Depending on the level of knowledge and experience of VR and VRAPT, the perceptions differed between staff groups, but VR as a tool was perceived as having greater potential than VRAPT itself. Additionally, it seems as if VR in itself provided professionals with a newly won or rediscovered view of their roles and capabilities toward the clients, making them see opportunities and even feel more authentic in their work. Even though most experiences and perceptions were positive around VR and VRAPT, there were apprehensions about VR, perhaps evoking negative emotional reactions. VR and VRAPT seem to be feasible within the prison context, but the feasibility of VRAPT depends on its ultimate construction (what to do in treatment?), clinical applications of VR (how to do it and why do it that way?) and organizational structures around VR-assisted treatment (for whom could it fit and under what circumstances does it work the best?).

The prison context has a special impact on treatment, partly in that it produces homogenous, reliable, precise but small effects due to the high degree of control and restraint in the context³². In this study, both Ts and CPs viewed VR as a way of increasing flexibility, making training feel and be more real, tailoring to the clients' needs and exposing them to "their" risk situations. However, even though VR was seen as a flexible tool, VRAPT was perceived as slightly too inflexible in its structure, with tasks being too repetitive. The different applications described for VR underline how it can be a tool for both staff and clients to cope with the prison context. Suggestions such as VR-assisted furlough or experiencing "kind, safe and positive environments" for clients show how VR could be perceived as a sort of "relief" from prison. On the other hand, descriptions of the possibilities of tailoring VR scenarios to client risk situations and sharing experiences with staff imply a focus on being here and now, coping with the prison context hands-on. Therefore, from a contextual point of view, VR could be used as a coping tool both to obtain relief from prison and to increase skills in managing challenging situations occurring in prison life. In a way, this goes hand-in-hand with how prison often is perceived as a paradox — safe and monotone as well as risky and impacted by rule-of-force between inmates⁴⁶.

So, coping with the paradox of imprisonment demands a mix of relief and hands-on risk management, especially for violent offenders with an increased risk of recidivism. There were several aspects of risk, need and responsivity factors mentioned in the material that have a direct link to violent offenders as a treatment group. Areas of development of VRAPT were recurrently about increasing flexibility in addressing more needs, targeting both proactive and reactive aggression, antisocial personality patterns and violent cognitions, and tailoring the treatment content to idiosyncratic needs. The flexibility in that way was seen as a way of making treatment go both "deeper" and more spot on, as well as including more needs. Theoretically, targeting both reactive and proactive aggression is a reasonable idea since there is a complementary link between them⁴⁷. Additionally, both emotions and antisocial attitudes are key in social information processing⁴⁸, and hostile attributional bias can impact impulsive behavior such as aggression⁴⁹. Violent offenders can also perceive their violence as normal⁵⁰, potentially due to a lack of social problem-solving skills and perceived options⁵¹. An interview with clients participating in the VRAPT pilot indicated that the scope of reactive aggression was too narrow for the antisocial group³¹ despite the application of the general aggression model (GAM, 49). The Ts wanted more tools for assessment and time to learn about the clients' history of violent behavior, for example, through functional analysis (FA), which is a core technique in CBT. Multiple sequential FA can help antisocial violent offenders see the long-term negative consequences of their violent lifestyle⁵³. Even though forensic case formulation research still shows mixed evidence on key components of formulation⁵⁴, a more inclusive and responsive forensic case formulation approach⁵⁵ can capture idiosyncratic themes and better understand the interplay between dynamic risk factors⁵⁶. Whether a case formulation approach would be suitable for VRAPT is beyond the scope of this study, but ultimately, it is about better understanding the individual client learning history in VRAPT and how the client's violent behavior has become conditioned through social, operant, and respondent learning processes, in many cases forming both reactive and proactive aggression.

Learning theory also provides perspectives on the theme of VR needing to be emotional. On the one hand, VR and VRAPT were seen by the participants as potentially increasing the risk for negative emotional experiences, which eventually could impact the risk for violence. There are documented adverse effects of both traditional treatments and VR interventions⁵⁷. Cybersickness is one of the most common adverse effects of VR⁵⁷, and a recent systematic review on VR-assisted interventions in forensic settings did not find any harmful adverse effects⁸, although few studies on VR therapy have investigated this topic⁵⁸. As proposed by Rizzo & Koenig¹⁰, if we accept that VR can evoke strong positive emotional processes, then we must accept that negative processes may arise. The participants in this study, however, did not report any clear adverse effects beyond what was already known in the literature.

On the other hand, some of the Ts described difficulties in inducing clinically relevant levels of emotional response in several clients. Some clients were described as callous and unemotional or not having anger issues. This could be due to client selection and an overrepresentation of proactive aggression found in the antisocial group of violent offenders, which was highlighted by several participants. There was also a description of a client that went from being enthusiastic about VR in the beginning of VRAPT to feeling more neutral and not as engaged over time. Other clients had trouble feeling present at all in VR. This may have been due to not being properly immersed in VR or other factors related to engagement and motivation. VR is not a quick fix for engagement, and adherence to VR treatment over time is a rather unexplored area ¹⁰. Additionally, a strong emotional reaction is not the same as or a prerequisite for presence ⁵⁹. Presence is an intuitive process ¹¹ making you feel as being in the virtual world ¹². If one has personality traits that could be described as callous-unemotional or affectively shallow, most likely, one would respond in the same way in the VR environment, regardless of perceived presence. Simply put, VR might still be a useful tool for the treatment of violent offenders with callous-unemotional traits using proactive aggression, but VRAPT was designed for violent offenders with an exclusive focus on reactive aggression ^{26,27}. In addition, a proper assessment of presence is a good thing to do before starting treatment.

All psychological treatments based on CBT strive for the generalizability of behavior change to everyday living. This ecological relevance also applies to VR-assisted treatment ¹⁰. One core aspect of interventions targeting offenders may be strengthening the vividness of the future self, which seems to predict delinquency ⁶⁰. A deepened connectivity to a future prosocial self may be lacking in VRAPT, especially for this antisocial group. Ts are asking for a deeper understanding of clients' history as well as valued direction in life. In van Gelder's experimental study ⁶⁰, VR was used for clients to meet their future self to connect with more sound choices, avoiding delinquency. VRAPTs focus on risk management, and triggers for reactive aggression in the present seem to mean that the intervention may miss important aspects of offender treatment needing to be based on strengths and reinforcing behaviors and plans for a valued direction in life.

Finally, one of the main findings in this study was the participants' descriptions of the need for better internal collaboration to get the most out of VR and VRAPT in the prison context. According to Small and Hackett ³⁶, successful rehabilitation rests on unified aims and goals between professional groups capitalizing on common investments in reducing offending. Most of the CPs lacked knowledge of treatment interventions in general and VRAPT specifically; consequently, they also lacked knowledge of treatment goals for the clients. From a therapeutic community perspective, success depends on staff and prisoners working toward shared goals ⁶¹, and positive collaboration is linked to the development of rehabilitative prison cultures and is a key aspect of meeting individual needs ³⁶. Both the CPs and Ts wanted better collaboration to aid their clients but highlighted the prison context's negative impact on that collaboration. Most of the CPs wanted a clearer role in relation to VRAPT and observed that being more involved and understanding the intervention better would aid in the support between sessions and after VRAPT. This is in line with Small and Hackett's ³⁶ description of staff roles, which serve as an add-on to enhance positive work within prisons. Both vantage points acknowledge the potential of VR and VRAPT while seeing that VR has potential in expanding each role. Some CPs could even see themselves using VR with their clients. When they described that a clearer role and better understanding of VRAPT could enable them to be better problem solvers while reinforcing new skills and prosocial behavior in clients, CPs provided several examples of the main principles of CCP ³⁷.

There were relevant differences between the two subgroups that are important to highlight. Ts had a clearer role in the organizations, working with treatment programs, whereas CPs also functioned as ward staff. The role of ward staff entails a greater variety of work assignments and a broader and sometimes dual unclear role of security and rehabilitation ³⁶. CPs' description of the role of Ts as "special" could be an indication of this. The responsibilities and advocacy of the clients also differed in how the Ts, and the CPs spoke about their roles. Ts were more inclined to take greater responsibility for client change in VRAPT and CPs for overall stability and calmness at the ward. This seems reasonable from both vantage points, but as one CP stated, the time in VRAPT and any other treatment is rather short in comparison to the rest of the time in prison for the clients, making CCP a valid extension of treatment. Both groups, however, saw how VR and VRAPT could aid in both clients' change and stability in the ward, especially when CPs become an extension of VRAPT. Both CPs and Ts also tended to look at CPs as needed for knowledge about VRAPT. Since it was rare that CPs knew about the treatment goals for their clients, sharing that information might be the first "low-hanging fruit" in setting new practices for internal collaboration. Both T and CP perspectives are valuable in the development of VRAPT. The Ts initiated within-perspective provides depth, clarity and pinpoints what is most important in VRAPT, whereas the intuitive perspective of CPs from the sidelines provides innovative ideas and works as a reminder of identifying potential adverse effects of using VR in treatment.

A final organizational perspective on VR and VRAPT in prisons concerns smooth organization with proper localities to use, time to set up, transport and prepare VRAPT sessions and supervision and support in performing VR-assisted treatment. Supervision and support were important for Ts to not feel alone in the practice of using VR. This resonates with how Rizzo and Koenig ¹⁰ write about ethical codes for using VR and the need for specialized training and certification in the safe and ethical use of VR for therapy. The COVID-19 pandemic seems to have been perceived as relatively easy to manage in terms of hygiene routines and performing VRAPT sessions by most Ts but was also described as having an impact on the implementation of the pilot study, probably reducing the number of clients receiving VRAPT and extending the time period for the pilot with shutdowns and isolation of both staff and clients.

Strengths and limitations

The study is rather unique in its design, as it analyzes interview data from two different yet connected staff groups working within the prison system. Both Ts and CPs were aiding in client change during the VRAPT pilot, and the combined experiences and perceptions provided rich knowledge on how VR and VRAPT were perceived as feasible and best implemented within the prison context. The study followed the COREQ guidelines⁴¹ in presenting its findings to make interpretation of the methodological quality easier for readers. Qualitative research should strive toward achieving trustworthiness through displaying credibility, transferability, dependability, and confirmability⁶². The authors' experience with qualitative methods and working within forensic institutional care adds to the credibility of the study as well as the identification of and reflection on inference contexts as defined by Krippendorff⁴³. Preexisting knowledge of a field or context for specific research is a strength in making analysis sharp and easy to apply but can be a limitation if the authors miss important nuances in the material. The collaborative coding process enabled joint reflexive practice on this issue. The findings in this study are similar to the findings from Swedish forensic mental health services using VRAPT (e.g., highlighting the selection of clients on the basis of type of aggression, role-play as an essential part, underlining the need for staff to have more knowledge on VRAPT (63), adding to this study's transferability. The staff within SPPS worked at different security level prisons, which also added to transferability. The total sample of staff from the pilot participated in the study and a variation of individuals from both subgroups are represented by quotes related to all categories. Taken together, the inductive approach with a manifest content analysis capturing nuances in the material, together with the deductive analysis highlighting differences and latent themes across categories and subgroups, made for a rich abductive analysis. A research process logbook was used (see Appendix II) to add dependability and transparency and make the process and results auditable. Finally, but certainly not least, the collaborative coding process following the steps of Coulston et al.⁴⁴ increased both dependability and confirmability in peer debriefing and reflexive journaling. The study's limitations were that interviews were conducted at different time points for Ts (at the end of the pilot) and CPs (when their participating clients finished VRAPT). However, interviewing Ts after each client would not have been relevant for the research questions, and both groups were interviewed when their role in the pilot ended. Another limitation was that only Ts were asked about the impact of COVID-19 on the implementation of VRAPT. The CPs could provide insights into crucial differences and a better understanding of the impact of COVID-19 at the ward level. A last but highly relevant limitation is the fact that the production and publication of research is slower than technological development. The software edition used in this trial is old by now, making some of the technological development suggestions no longer relevant.

Conclusions

This study suggests that the implementation of VRAPT in prison settings is both feasible and conceptually promising but contingent on key organizational, clinical, and contextual conditions. At its core, the added value of VR lies in its capacity to evoke situated, experiential learning through realistic, emotionally, and behaviorally activating scenarios, thereby enhancing skills training beyond what can typically be achieved through traditional role-play-based treatment.

The findings indicate that the feasibility and potential effectiveness of VRAPT depend less on the technology itself and more on how it is embedded within the broader rehabilitative context. In particular, accurate client selection, sufficient organizational support, and functional collaboration between Ts and ward staff are critical determinants of successful implementation. Without integration into everyday prison practices and the continuity of support beyond the treatment room, the benefits of VR-assisted interventions risk remaining isolated and underutilized.

The results further highlight the tension between the flexibility inherent in VR as a tool and the perceived rigidity of VRAPT as a structured program. To address this, future development should either expand VRAPT to better align with the broader behavioral profiles of violent offenders, incorporating elements relevant to proactive aggression and antisocial patterns, or refine selection strategies to target individuals for whom a reactive aggression focus is most appropriate. A particularly promising direction may be to reconceptualize VRAPT not as a stand-alone intervention but as a modular component within a broader, CBT-VR-assisted treatment framework, thereby allowing greater flexibility while maintaining clinical integrity.

This study underscores that the successful implementation of VR-assisted interventions in correctional settings requires a systems-level perspective. VR should be understood as a tool that can amplify existing rehabilitative processes. Its effectiveness will therefore depend on how well it is implemented and integrated into the CBT framework and the relational, organizational, and cultural dynamics of the prison environment.

Abbreviations

CA
Content analysis
CBT
Cognitive behavioral therapy
CCP
Core correctional practices
COREQ

Consolidated criteria for qualitative research
CP
Contact person
FA
Functional analysis
HMD
Head mounted display
RNR
Risk, need, responsivity
SPPS
Swedish prison and probation service
T
Therapist
VR
Virtual reality
VRAPT
Virtual reality aggression prevention training
QCA
Qualitative content analysis

Declarations

Ethics approval and consent to participate

The study was approved by the Swedish Ethical Review Authority (2019–02337) and was. All participation was based on written and oral informed consent with the possibility of dropping out without having to state any reason for doing so.

Informed consent was obtained from all the therapists and all the ward staff functioning as contact persons involved in the study.

Consent for publication

Not applicable

Availability of data and materials

The transcripts supporting the conclusions of this article will be made available by the authors, without undue reservation.

Competing interests

The author(s) report no potential conflicts of interest.

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Authors' contributions

All authors contributed to the article, and authorship is ordered on the basis of their relative contributions. As the first author, DI participated in planning the study; collecting and analyzing the data; and writing and revising the article. AS, the second author, participated in analyzing the data and revising the article. The third author, PE, assisted in the analysis and revision of the article, and CD, the fourth author, assisted in the revision of the article. MW, the last and senior author planned the study, acquired funding, aided in the analysis and revised the article.

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Figures

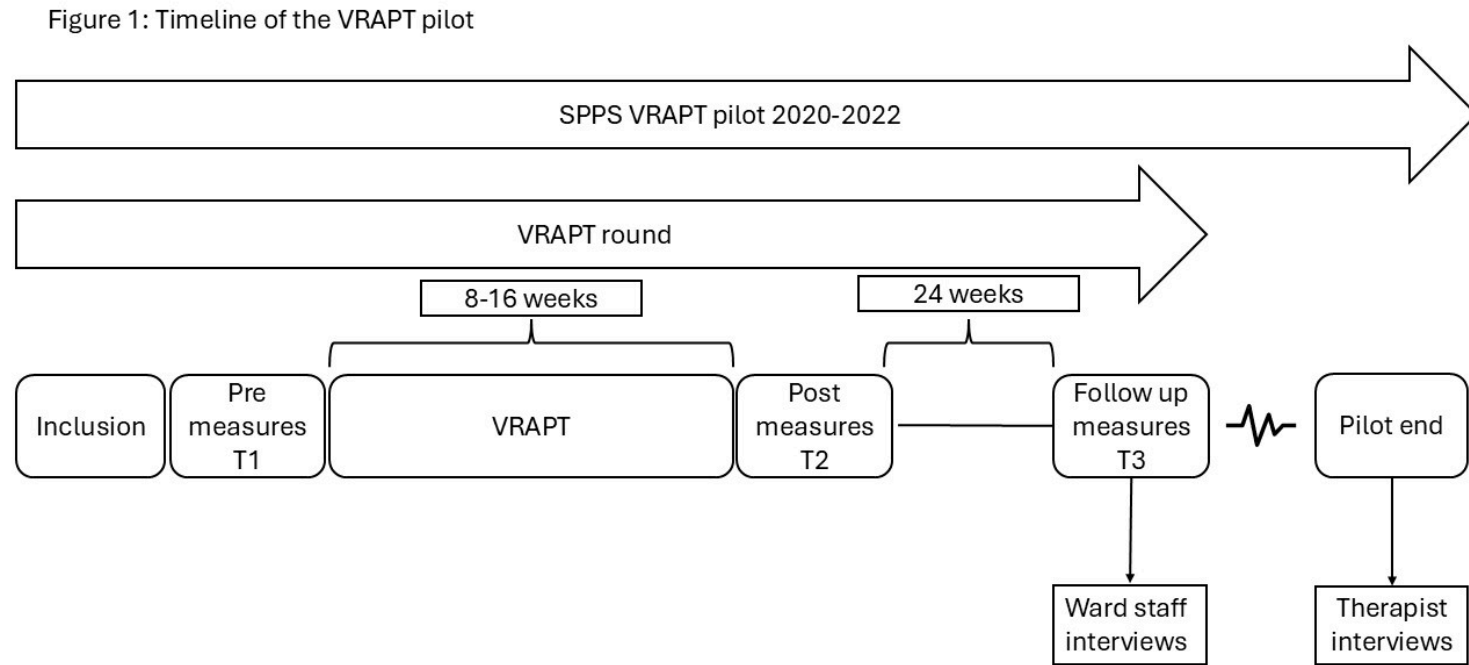


Figure 1

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Figure 2: Outcome of VRAPT

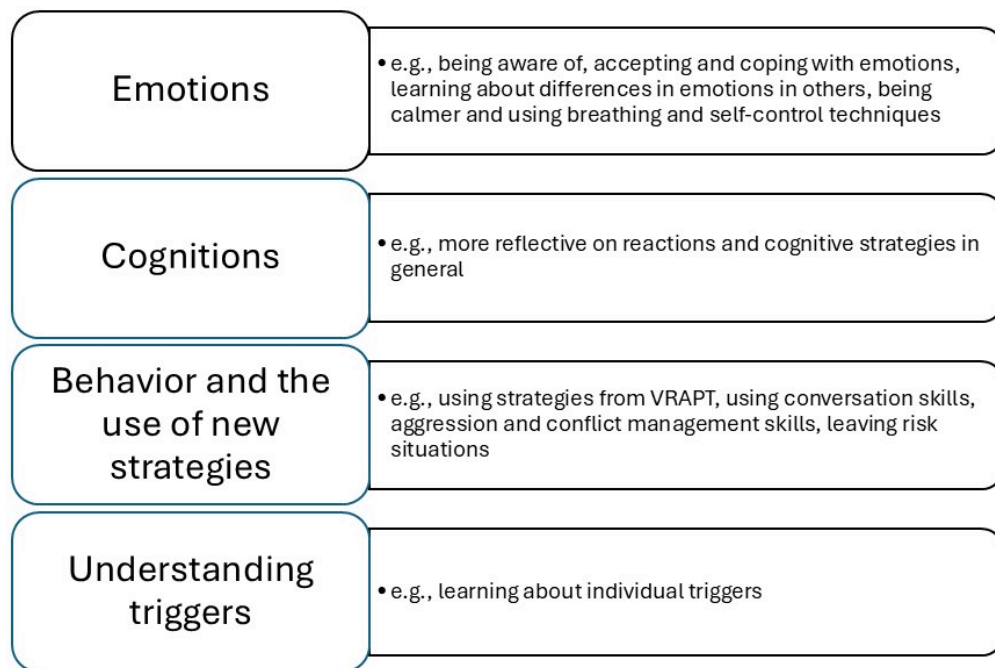


Figure 2

See image above for figure legend.

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