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The added value of virtual reality to parent–child interaction therapy: a qualitative study with parents and therapists

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Abstract

Background Virtual reality (VR) is one of the most rapidly growing technological advancements being studied, developed, and implemented in mental health care. It offers a wide array of possibilities that go beyond the traditional ways of providing mental health care services. Many interventions require clients to learn new skills in order for change to occur. Relevant to this study, behavioral parent-training (BPT) interventions are focused on the acquisition of parenting skills in order to change child behavior. VR was added to the Parent–Child Interaction Therapy (PCIT) – a known BPT intervention – as an additional practice tool. In the present study, which is part of a larger study, the qualitative experiences of (PCIT-)VR from both parents' and therapists' perspectives are evaluated, as well as their suggestions for implementation.

Method Semi-structured interviews were conducted with eleven parents. Five therapists participated in a focus group and three additional semi-structured interviews were conducted with therapists. To analyze, a combination of deductive and inductive thematic analysis was used.

Results Responses from interviews were divided into three categories: (1) parents' evaluation, (2) therapists' evaluation, and (3) suggestions for implementation from both parents and therapists. Next to a positive overall experience with PCIT, a large number of parents were also positive about the addition of VR to treatment. Both parents and therapists experienced VR as a useful additional practice tool. The additional practice in VR led to a boost in confidence in using positive parenting skills. There were mixed experiences regarding the ease and immersion of the tool. Suggestions for implementation from both parents and therapists were to make the tool more appealing and realistic, to vary more in VR modules and to improve certain practical aspects.

Conclusion Adding VR to PCIT is still a pioneering piece of technology within PCIT. The value of this VR tool lies in the provision of the possibility to practice with skills outside of the therapeutic encounter, which has the potential to instill confidence in using those skills. Given the positive experiences regarding PCIT-VR, it is important to further develop the VR tool. We believe that ultimately, PCIT-VR can potentially serve as a customized way for parents to practice what they are taught during the treatment.

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Keywords Parent–child interaction therapy, Virtual reality, Qualitative, Added value, Technology

Introduction

In recent years, using technology to boost mental health interventions has increased immensely. More specifically, virtual reality (VR) is one of the most rapidly growing technological advancements being studied, developed, and implemented [1]. VR is defined as a computer-based application that simulates a virtual environment, aiming to immerse users to the extent of seemingly being there [2]. In other words, it can serve as a digitally manipulated representation of real-life scenarios. Conventionally in mental health care, there is a therapist and a client, where forms vary from face-to-face to fully online. In between sessions, clients can receive homework, but therapists are aware this is not always completed. Now, with the addition of technology, there is a wide array of possibilities that go beyond the traditional ways of providing mental health care services. In fact, VR technology may serve as an instrument for the transfer of clinical and theoretical knowledge [3]. Through immersion and interaction in VR, it is possible to create a link between theory and practice in a safe environment. In other words, through a digitally manipulated version of reality, a client can safely practice deepening their understanding and practice with the modules and techniques they are being taught by their therapist during treatment, both in and out of sessions. Practicing in VR can serve as a stimulant for clients, and therapists can follow their progress virtually.

Currently, VR in mental health care is well-researched for exposure-based treatments for adults for a variety of different psychiatric disorders such as schizophrenia, posttraumatic stress disorder, anxiety disorders and eating disorders [4–7]. Effect sizes for these studies are moderate to large and are usually maintained at follow-up. These are promising results, as VR allows people to practice with difficult real-life scenarios in a safely created virtual environment while being coached through these scenarios [7]. Furthermore, a meta-analysis showed positive results when VR is used as a social skill training tool, especially when the aim of the tool is to create a practice space to learn and increase knowledge-based skills [8]. This research suggests that VR is suitable for developing and training social skills ranging from basic to complex, and interventions based on these theories will benefit most from using VR [8]. To further illustrate, experiential learning theories suggest that greater learning outcomes are produced when performing skills [9, 10]. Therefore, these theories are often referred to when explaining what is involved in learning and developing skills. Moreover, deliberately

practicing in different contexts can help generalize what is learned. Accordingly, these theories together suggest that to learn skills, they must be practiced. This implies that it could be beneficial to create a virtual practice space for any skill that warrants rehearsal to foster proficiency.

In mental health care, many interventions require clients to learn new skills in order for change in behavior, emotions, and cognitions to occur. Relevant to this study, behavioral parent-training (BPT) interventions are focused on the acquisition of parenting skills in order to change child behavior [11]. A meta-analysis regarding VR interventions for children with disruptive behavior showed that although some positive outcomes have been reported, there is currently limited evidence for using VR for behavior change in children [12]. Within BPT interventions, research identified six factors that are important for an intervention to be considered effective [11]. These are positive parent–child interaction, positive communication skills from parents, consistency and predictability from parents, learning the time-out procedure, praising positive child behavior and ignoring negative child behavior, and finally, practicing with these skills to internalize the abovementioned points [11]. In other words, an effective BPT intervention teaches parents a set of parenting skills and provides ample opportunity to practice these skills. Currently, to our knowledge, there is no BPT intervention that offers VR as a tool to practice in-treatment taught skills in a virtual environment.

With this in mind, VR was added to the renowned BPT intervention, Parent–Child Interaction Therapy (PCIT) [13] as an extra skill practice tool for parents [14]. PCIT is an evidence-based treatment for young children with disruptive behavior (aged 2–7) and their parents. PCIT stimulates parents to use positive parenting skills, that reinforce the child’s adequate behaviors, ultimately leading to an improvement in the parent–child relationship. Furthermore, the therapist coaches parents to set safe and effective boundaries for their child’s behaviors. Through these skills, PCIT aims to diminish child disruptive behavior and parenting stress, whilst increasing a positive parent–child relationship [15]. As a BPT intervention, the theoretical foundation of PCIT lies in attachment theory [16] and social learning theory [17]. In the context of the intervention, attachment theory depicts *why* the parent–child relationship is critical for child development and social learning theory depicts *how* to practically

help parents improve their relationship with their child. The addition of VR focuses on the latter, as it serves as a way to practice the positive parenting skills taught in-session at home, thus allowing parents to ultimately improve the parent–child relationship.

Earlier research in PCIT has shown that adding technological augmentations, such as Pocket-PCIT (which is an online resource with information and practice possibilities for PCIT) have been successful in increasing treatment completion rates [18]. However, to date, there are no studies that have added VR to augment PCIT. In the present study, which is part of a larger study (see study protocol [14]), the qualitative experiences of VR from both parents' and therapists' perspectives are evaluated, as well as their suggestions for implementation. Approaching the VR-augmentation qualitatively allows us to describe how participants value the practice tool. Furthermore, qualitative research in new implementations is considered valuable and research encourages interventions to use it alongside quantitative methods [19, 20]. Therefore, this qualitative paper is complementary to the quantitative evaluation of PCIT-VR [14].

The aim of this study was to evaluate PCIT-VR from the perspective of parents and therapists who were involved in it by investigating their experiences as users and exploring what parents and therapists deemed as the (added) value of VR to PCIT. We also investigated both their suggestions regarding implementation. The research questions that followed from this were “what is the value of practicing with VR in PCIT, and what is necessary to implement a VR tool in clinical practice?” which we sought to answer from two perspectives. Ultimately, we hope to explore whether VR can serve as a valuable supplement to a BPT intervention to improve accessibility, and enhance treatment effects.

Methods

Design

This article is part of a larger study that used a combination of methods to evaluate PCIT-VR [14]. Here, we solely present the qualitative findings of the larger study and will therefore only focus on the design and set up of the qualitative study. However, to gain understanding of the larger study, we first present a short summary of the overall set up. A single-case experimental design (SCED) was used to recruit families; a full explanation of the study design and selection procedure can be found in the published study protocol [14]. Between baseline and intervention phase, there was a pretreatment measurement. After the intervention phase, a posttreatment measurement and 6-months follow-up measurement took place. These two measurement points are relevant for this study. All families were randomized to be in the

baseline phase for a minimum of four, five or six weeks. They then all entered the intervention phase, where they received PCIT. All parents in the study received the VR component, which was randomized to be given at the start of intervention, after three sessions or after six sessions. Participants could only receive VR as a part of the study as it was not part of normal clinical practice.

Setting

Treatment

Parent–child interaction therapy PCIT is a treatment for young children between the ages of 2 and 7 with disruptive behavioral problems and their parents. This evidence-based intervention consists of two phases where parents are coached live by therapists while they play with their children. The first phase (Child-Directed Interaction [CDI]) focuses on teaching parents to use child-centered interaction skills, and the second phase (Parent-Directed Interaction [PDI]) focuses on teaching parents to set effective and safe limits for their children. During CDI, parents are stimulated to use positive parenting skills such as labeled (and unlabeled) praises, reflections and behavior description (henceforth PRIDE-skills [Praise, Reflect, Imitate, Describe, and Enthusiasm]). These skills positively reinforce their child's behaviors, which ultimately leads to an improvement in the parent–child relationship. In addition, they are taught to decrease questions, commands and criticisms as these verbalizations negatively impact the parent–child interaction. The CDI phase is completed when parents achieve the skill acquisition requirement (i.e. 10 labeled praises, 10 reflections, 10 behavior descriptions and no questions, commands or criticisms) during a weekly five-minute observation time that takes place at the beginning of each session. In the PDI phase, parents are taught to give effective commands and how to consistently respond to their child's compliance and noncompliance to structure their behavior in a developmentally appropriate way. The PDI phase, and thus the intervention, is deemed completed when 75% of parents' commands are effective, they score their child's behavior lower than 114 on the Eyberg Child Behavior Inventory (ECBI), and parents feel confident enough to manage their child's behavior on their own [21]. There is no set number of sessions in PCIT, but the treatment rather allows parents to go at their own pace and naturally progress to a subsequent stage when meeting skill criteria. If two caregivers are involved in PCIT, a session consists of each parent separately playing with their child one after the other.

VR component The VR component in the treatment serves as an additional skill training tool that parents

can practice with at home. The VR component consists of pre-recorded 360 degrees videos in a PCIT playroom portraying a child actor playing with PCIT appropriate toys, such as construction toys or crayons and paper. Parents can see the child play in the video, after which it stops and asks parents to use a PRIDE-skill by selecting an answer by looking at one of the two boxes in which the respective answers are posed for 3 s. Parents are posed a statement such as “Give a labeled praise.” for which they have two options to answer with, such as “That is a beautiful tower you built.” or “Good job!”. After having selected the answer, parents are given feedback on their answer. In the above example, if parents would have selected the first answer, they would see the feedback “That was a good ‘labeled praise.’” When selecting the second answer, they would see “That was unlabeled praise. Try to say on what behavior they did a good job. For example, ‘that was a beautiful tower you built.’” The video then continues to another scene of the child playing. The more parents select the correct PRIDE-skills, the less they are offered to see further examples. Parents receive more elaborate feedback (such as the above example) if they are not selecting the correct answers. After a few different scenarios, parents also get the possibility and are encouraged to practice different positive parenting skills (out loud), without receiving feedback on every possibility. In a VR practice session, parents are shown scenes to practice labeled praises, reflections, behavior descriptions and ignoring unwanted behavior. A session in the VR headset lasts approximately 10–15 min. The VR-headset configuration included a smartphone housed within a head-mounted display, providing an immersive VR experience with three degrees of freedom (3DOF). This means parents can pivot their head up and down, side to side, and tilt left or right, simulating a natural look around, but without the capability to move forward, backward, or to the sides within the virtual space. Parents were gifted VR headsets (VRi EVOLUTION 3s) to practice with at home. The pre-recorded 360 degrees videos were streamed over a network on mobile phones, meaning parents had to have internet to be able to see the videos.

Participants

Parents

The parents included in the current qualitative study, all completed the posttreatment measurement and six completed the follow-up measurement as a part of the larger study. These two measurement points included qualitative interviews that are discussed here. Eleven parents participated in the qualitative study. These included: (1) two married couples where both parents participated

together in treatment with their child and were subsequently interviewed separately, (2) two divorced couples where both parents participated together in treatment with their child and were subsequently interviewed separately, and (3) three single parents (all mothers) who participated alone in treatment with their child and were subsequently interviewed. The total number of children in treatment for whom the interviewed parents cared was seven. At treatment baseline, demographics were collected for parents and children. The age of the mothers ranged from 31 to 42, the age of the fathers ranged from 35 to 60. The age of the children ranged from 2 to 7; there were four boys and three girls.

Therapists

All therapists that provided PCIT in the clinical practice at the time of the study, were approached to participate; all consented. Five PCIT therapists participated in a focus group. Three PCIT therapists who could not attend were individually interviewed after the focus group. At the time of the interviews, the years of experience in PCIT varied between three and seventeen years ($M=6.11$). Two therapists in the focus group and two of the interviewed therapists had no concrete experience with VR, because not all families wanted to participate in research and therefore not all therapists had the opportunity to work with it. This means that the level of experience with PCIT-VR when the interviews were conducted varied from no experience with having parents in treatment who practiced with VR to currently having parents in treatment practicing with VR. All therapists were trained and certified by a certified PCIT-trainer. Their training process included an initial 40-h workshop, followed by mandatory bi-weekly consultation with a PCIT Global Trainer.

Data collection

Firstly, we recruited families to participate in the research study for PCIT-VR. After referral to clinical practice, inclusion, consent to participating in the PCIT-VR research project, therapist allocation and a pretreatment measurement, families would start their PCIT-VR treatment. They received PCIT with the addition of VR (see study protocol for full explanation [14]). Once their treatment was completed, or they had dropped out of treatment (only in one case in this qualitative sample), the first author (IS) contacted parents for the post-treatment measurement in the form of a house visit that included a qualitative interview. At 6-months follow-up, another house visit was planned. A second qualitative interview to look back on their experiences of using VR during intervention and postintervention took place. The interviews at posttreatment and follow-up used the

same format. Secondly, IS reached out to the still active PCIT therapists in order to examine their experiences regarding PCIT-VR. A focus group and additional interviews were conducted with these PCIT therapists.

Interviews parents

Semi-structured interviews with parents were held. Questions focused on the views of, and experiences with PCIT and the added component of VR. They were asked to explain whether, and if so, how VR contributed to the treatment. In addition, they were asked about their parent–child relationship, their child’s behavior, PRIDE-skills, their competency in parenting and what they considered working elements in the treatment. A sample item from the interview was *“What elements of PCIT do you find most valuable? How, if anything, did VR contribute to this?”* (see Appendix A for full item list). The interviews were all conducted by IS and lasted approximately 45 min. They were transcribed by a research assistant. The transcription was subsequently checked by IS. Results were based on fifteen parent interviews. More specifically, three participants were only interviewed at posttreatment and the remaining six participants were interviewed at both timepoints (posttreatment and follow-up). All aspects of the interviews were coded, but in this paper we specifically focused on outcomes related to their experiences with VR.

Focus group and interviews with therapists

For reasons of convenience, a focus group was organized via Teams during a standard PCIT-intervision group meeting. The focus group was led by IS and the second author (MA), and one independent researcher took notes and observed during the session, in order to record non-verbal information. PCIT therapists were asked about their views regarding the added component of VR to the treatment, how it was for them to work with families who received VR in treatment and whether they would recommend implementation of PCIT-VR outside of this research project. A sample item from the focus group was *“What challenges have you experienced or do you see with implementing VR?”* (see Appendix B for full item list). The focus group lasted approximately 45 min and was recorded and transcribed by a research assistant and checked by IS and MA. After the focus group, three therapists who did not attend the focus group were contacted for interviews. They received similar questions and were asked to further reflect on statements that their PCIT colleagues had made during the focus group. The interviews lasted approximately 30 min and were recorded and transcribed by IS. Results were based on one focus group with five therapists and three individual interviews.

Data analysis

A combination of deductive and inductive thematic analysis was used [22, 23]. Our deductive framework was based on the research questions and known PCIT concepts from literature. The deductive framework consisted of a distinction between positive and negative experiences, and suggestions for implementation in both respondent groups. The inductive steps consisted of coding and identification of themes and subthemes. The parent interviews were coded in the software MAXQDA 2022 [24] by IS and a research assistant. Three parent interviews were coded independently by IS and the research assistant. The codes were discussed until consensus was achieved. The remaining parent interviews were divided in half. The interviews the research assistant had coded were checked by IS as a second coder. Three interviews coded by IS were checked by MA as a second coder. Likewise, the therapist focus group and their three individual interviews were coded by IS in the software MAXQDA 2022 [24]. The coding of the focus group and of one interview was checked by MA as a second coder. As a next step, themes and subthemes were identified by IS and MA. Themes were based on the deductive framework; subthemes were identified by clustering similar codes within each of the themes in order to describe core experiences in using the VR tool and main suggestions for implementation. The subthemes were subsequently discussed and refined in a meeting with GW and consequently agreed upon by all members of the project group. For all subthemes, quotes were selected by IS and were agreed upon by all members of the project group. All quotes from the interviews were translated from Dutch to English by a native Dutch and English speaker.

Results

As the aims of the study were to evaluate PCIT-VR from the perspective of parents and therapists and to explore their suggestions for implementation, three overarching categories are presented. These were: (1) Parents’ Evaluation, (2) Therapists’ Evaluation, and (3) Suggestions for Implementation. Parents generally expressed similar opinions in the posttreatment and follow-up interviews, regardless of whether they had practiced in the 6-months period between the two measurement points. For parents who were interviewed twice the data was combined.

Parents’ evaluation

Under parents’ evaluation, the following themes were identified: (1) Experiences regarding PCIT, (2) Positive Experiences regarding VR, and (3) Negative Experiences regarding VR.

It is relevant for the parental evaluation of VR to understand how parents experienced the treatment in general.

Therefore, we start by illustrating the experiences parents had with PCIT, after which the VR evaluation will be reported.

Experiences regarding PCIT

Predominantly, parents were content with effects PCIT had on them and their child in terms of gained PRIDE-skills, diminishing child disruptive behavior and increased confidence in parenting their child. Commonly, parents were positive about their own gained parenting skills and the improvement in their interaction with their child. Due to the gained parenting skills, parents expressed being able to communicate better with their child, understand their child better, and experience a less stressful situation at home (e.g. “*[Child] is much more steerable, [child] has way less anger outbursts. [...] PCIT-VR has absolutely helped reduce parental stress.; I have become more consistent; I noticed I give compliments during the day now.*”). Parents mentioned enjoying time with their child more. One parent expressed not having or needing external professional help anymore for the first time in their child’s life since their treatment. Moreover, parents stated that they believe that PCIT gave them a good base and structure to be able to handle their child’s behavior if new problematic behaviors should arise. All parents expressed that their child’s behavior improved due to PCIT, but that the child still occasionally had outbursts or were difficult to handle. However, parents now felt more able to handle these disruptions. Parents were most positive about having learned to praise their child for wanted behavior and to ignore unwanted behavior, and were able to integrate these skills in their daily life. Other skills such as giving direct commands were also mentioned to be useful in daily life situations. A few parents were positive with the time-out procedure, but simultaneously worried that the usability would decrease over time given the increasing physical strength of their child. Many parents were still doing special playtime with their children, although not structurally.

Positive experiences regarding VR

There were four subthemes that further expressed parents’ positive experiences with VR. These were ‘easy access to a different world’, ‘skill visualization’, ‘opportunity to practice’, and ‘increased confidence in skills’.

Easy access to a different world

Most parents expressed that they found the application easy to use and that they felt it was compatible with what they needed. Parents mentioned that simply using their smartphone made it accessible. Several parents specifically stated the ease of using it in their home and being immersed in a virtual world (e.g. “*You just sit on*

the couch and you’re suddenly in a different world”; “*Just that you have a calm setting to practice. So that when you practice with your child you can also have the time and stay calm*”). The fact that the virtual environment provided a calm setting made it worthwhile. Some parents experienced being fully immersed and present in the virtual world and stated that seeing the video through a VR headset gave a different experience than if the videos were just on a computer screen (e.g. “*Yeah it’s funny because it is as if I am in there and then the boy or girl is angry, because you can’t see anything else, no matter what you do.*”).

Skill visualization

Most parents expressed that practicing in the VR application was a valuable addition to their treatment, and multiple parents specified that it was especially helpful at the start of the treatment. Parents believed the value of VR lay in the fact that it was a complimentary and visual tool to the theory taught in treatment. It allowed them to visualize the theory and the PRIDE-skills, rather than only read or hear about it (e.g. “*[The verbal explanation was] visualized in VR. So it was a complementary element to the entirety, it just made it complete*”; “*What I found comforting was that you could practice the theory in a semi practice setting, [...] without needing to read something again, but just go through it and see the reactions of what happens [...] it was more expressive than papers*”). One parent specified that as someone with dyslexia, having a visual aspect really helped to grasp the theory.

Opportunity to practice

Parents expressed that VR helped to internalize the protocol, ultimately allowing for the PRIDE-skills to wear in due to additional practice. Some parents said that VR really helped them to grasp the PRIDE-skills more quickly, and it might have led to fewer sessions in the first phase of PCIT. Furthermore, practicing in the virtual environment, allowed them to make mistakes with the newly taught skills whilst not practicing with their own child (e.g. “*[It helped] to rehearse [with VR] without [child] because in the beginning you still need to practice, think about what to say and you make mistakes*”). A few parents stated that practicing with VR at home really felt like a substitute for a session. It allowed them to practice the PRIDE-skills at home with feedback. A parent explained how on the one hand seeing the PCIT room setting at home in VR, allowed for internalization of the skills at home, but on the other hand, how practicing with VR at home also led to recognition and clarity during the PCIT-sessions. Overall, all parents believed that VR led to a deeper subconscious understanding of the PRIDE-skills (e.g. “*On the long-term, I believe you take it into*

your subconscious, that it sticks. [...] Seeing the images flash back into your mind. I think you register it better”). All parents that believed VR was a valuable addition to their treatment, also expressed that they would recommend using VR during PCIT to other parents. Reasons they mentioned were that it helps to gain understanding of the skills, it works as a reminder of how to implement the skills and it stimulates weekly skill practice.

Increased confidence in skills

A by-product of practicing with VR is that it led to less stress and gave parents more confidence. This confidence was not only in using the skills, but also in their own parenting ability in general (e.g. *“I think with any time you learn new things, ... [the scenarios] are a way to gain self-confidence”).* Furthermore, two parents indicated at 6-months follow-up to have picked up VR tool again in a moment of self-doubt to remind themselves of the PRIDE-skills. They stated that it was comforting to have a tool at hand for a quick reminder and confidence boost. They saw their child’s behavior shift again when reapplying the PRIDE-skills as a result.

Negative experiences regarding VR

There were two subthemes that further expressed parents’ negative experiences with VR. These were ‘lack of an appealing virtual world and boredom’, and ‘insufficient alignment with treatment phase’.

Lack of an appealing virtual world and boredom

Several parents mentioned that they experienced little to no immersion when using VR, which led to overall frustration and lack of motivation to practice with VR. These parents expressed that the VR videos were boring and that sometimes the duration was too long. One parent only experienced these frustrations because the application was not compatible with her/his phone, which led to technical problems which devalued their VR experience. Two parents, who both had previous experiences with animated VR, specifically stated that the current application did not fulfill their VR expectations; they rather believed that the 360 degrees pre-recorded video version of VR was not immersive enough and it did not create presence for them (e.g. *“It did not really give the immersion feeling and also because it didn’t trigger like an anxiety for me”).* Moreover, one parent mentioned that the VR application was lacking immersive and interactive VR features. Due to the lack of an appealing virtual world, this parent experienced boredom and dissatisfaction. Additionally, parents expressed that there was no increasing difficulty in the videos. This was partially because the (actor) children did not behave in the manner they were used to seeing with their own child, but they remained

calmer. Parents therefore experienced less reality when practicing with VR than they would do when practicing with their own child (e.g. *“I found it easy and fun to do, but I noticed quickly it’s especially theory that you apply in a kind of semi-practical situation. So I found that the real practicing [with my child] helped more”).* Two parents (that did enjoy practicing with VR) had less of an immersive experience due to experiences of nausea, and thus did not put the headset on, but simply watched the videos from their phone.

Insufficient alignment with treatment phase

The parents that expressed satisfaction and experienced practicing with VR as valuable, often simultaneously experienced a discrepancy between the VR videos and their treatment when they entered the PDI phase of PCIT (i.e. second phase of treatment). They stated that they missed VR videos to support their newly entered treatment phase. They felt as though their CDI skills were imbedded in their system and they now desired virtual support in learning the new PDI skills, such as giving effective commands and using the time-out procedure (e.g. *“[...] And then in PDI, you kind of just lose it. What we did in treatment is recognizable and then suddenly the worlds [from sessions to VR] grow further apart, that demotivates after a while”; “At the time I really thought oh yes but then in the second part, you just miss it because [VR] is still related to part one. At part two I missed it.”).*

Therapists’ evaluation

Under therapists’ evaluation, two themes were identified, namely (1) Positive Experiences regarding VR, and (2) Negative Experiences regarding VR.

Positive experiences regarding VR

There were three subthemes that further expressed therapists’ positive experiences with VR. These were ‘technology fits in the current world’, ‘practice opportunity for parents’, and ‘confidence boost for parents’.

Technology fits in the current world

Therapists experienced the use of VR technology as augmentation of treatment. They stated that in the current climate, young children and adolescents are surrounded by technology so much that not implementing it in treatment would cause the mental health care system to lag behind. Moreover, they believed VR could complement current therapeutic techniques and approaches, thus creating new variations to enhance therapy. (e.g. *“Well I think that it really fits with how the world is developing now, [...our children] are so interconnected with technology, [...], it would be logical for us to work with that too”; “it [VR] actually provides some variety to therapeutic*

techniques that we already have. [...] Not as a substitute, but rather as an addition I would say.”).

Practice opportunity for parents

All therapists saw the added value of practicing with VR in PCIT and the potential benefit in adding VR to all PCIT trajectories. Primarily, this is because they see the potential VR has to help engrain the PRIDE-skills more deeply through additional guided practice. The classic expression ‘practice makes perfect’ is what therapist most strongly believed the VR-component could do. Additionally, they believed that VR could potentially help create more interest in, and affiliation with the treatment, as the VR component could be seen as attractive and an encouraging way to practice skills. They saw it as a safe way to practice the skills without parents needing to worry about the potential of not using the skills ‘perfectly’ towards their child whilst they were not yet fully proficient in the PRIDE-skills. (e.g. *“It is a safe way to practice. So I think that’s a worthy addition.”*) Furthermore, one therapist mentioned the added value of having a tool to practice with when parents are separated but participate in treatment together. It gives the parent an opportunity to practice, even without the presence of the child, which allows skills to be retained at a faster pace than without this opportunity. Correspondingly, one therapist noticed and heard back from parents that they actively used the VR tool during their treatment. This, in the therapist’s opinion, led to them being able to go through the first phase of PCIT at a fast pace. Another aspect mentioned by the therapists as valuable, was that VR provided parents with real-life examples of how they could use a specific PRIDE-skill, after which they would receive feedback on its respective use (e.g. *“It [VR] kind of gives you words of what you could say...”*). This mechanism is similar to the modeling and praising of a therapist during sessions.

Confidence boost for parents

Therapists mentioned that practicing the skills in a virtual environment can help increase or boost parents’ confidence in their skills (e.g. *The self-confidence part in practicing when you really practice with your child, those are really important things [...], it’s kind of like a pre-teaching. [...] You are back in the room for a bit.”*). Therapists were also of the opinion that VR could complement the instruction sessions, so that parents could listen to and read about the skills after first having heard about them, rather than needing to read the handouts. As such, parents who process information in an auditory or visual manner can benefit from the VR component early on. This could potentially increase their understanding of, and confidence in skill usage.

Negative experiences regarding VR

There were two subthemes that further expressed therapists’ negative experiences with VR. These were ‘possible challenges for parents’, and ‘VR does not account for human sensitivity’.

Possible challenges for parents

Despite seeing the value in VR, therapists were ambivalent in their opinions on whether they would offer VR to each family at the start of PCIT (e.g. *“I don’t know if with referral it’s suitable for everyone straight away, it comes down to motivation too. It might still be helpful if they would do it, but parents might just not do it”*). Several therapists stated or agreed that if parents were already overburdened in their day to day life, VR would simply function as an extra stressor or burden (e.g. *“A lot of families are already tired or overburdened [...] and they really have to do VR by themselves, in the sense that we [therapists] have little to do with that, [...] and that they [parents] have little space for VR if they are already worn out”; “But then it just feels like you are piling on more for families where it already feels like it’s too much.”*). Moreover, therapists agreed that VR would only work for parents with an interest in, or the patience for, this technological add-on because it would otherwise only cause friction due to asking them to complete a time-consuming and extra piece of homework. Furthermore, multiple therapists could imagine parents experiencing boredom with the product, which could lead to irritation or frustration. Therapists expressed not wanting to jeopardize their relationship with the parents, and would therefore rather just not offer the extra practice time with VR.

VR does not account for human sensitivity

Therapists held some reservations towards using VR in treatment. Specifically for PCIT, multiple therapists expressed doubt in the value of adding VR due to the fact that PCIT is already an evidence-based and effective treatment. In their eyes, a treatment based on the attachment theory, requires more sensitivity than solely focusing on learning and practicing skills (e.g. *“And maybe my overthinking is also that PCIT with VR might be too cold, in the sense that you are just learning and unlearning behavior”*). They were also unsure whether VR could account for the sensitivity, warmth and intonation that a parent needs in order to learn how to correctly use the PRIDE-skills and experience the positivity effects of the skills on their child. Moreover, their worry was that VR (in its current form) lacks the subtleness of a therapist, for example in timing or reactions to emotions. Due to their reservations and as a way to experience what parents are experiencing, most therapists expressed that they would benefit from practicing with VR themselves.

They expressed that it would allow them to gain deeper understanding of what they would be asking the parents to do (e.g. *“Shouldn’t we take the VR-headset home or something, so you can experience how it is [...] to get more feeling with it yourself so that we can really empathize with what parents are learning and hearing”*). Unrelatedly, but also part of therapists’ worries, was that unstable software, lack of user-friendliness and growing technological advancements would negate the effectiveness of adding VR, and rather lead to frustration for both therapists and parents.

Suggestions for implementation

The category suggestions for implementation, was divided into (1) Parents’ suggestions, and (2) Therapists’ suggestions.

Parents’ suggestions

There were two subthemes that further expressed parents’ suggestions. These were ‘make VR more realistic, appealing and align it with the sessions’, and ‘practical aspects’.

Make VR more realistic, appealing and align it with the sessions

Multiple parents claimed that VR should be more animated and should heighten emotions (such as fear or stress) more than it currently does. Either more variation in the child’s play or more expressive consequences could have improved this according to them. Following this line of thought, some parents were not triggered enough, feeling it resembled a computer multiple-choice task, rather than an experience in a VR headset. Therefore, their improvement suggestion was to set VR apart from a simple computer multiple-choice ‘game’, by elevating the videos to a next level (e.g. *“See if you can give the word virtual a meaning, it kind of just feels like a 3D video or movie. But the VR headset is too nice to use so sparingly.”*). One parent suggested to integrate an audio option rather than a visual/reading option to answer the questions in the virtual environment as that would feel more like real-life practicing and similar to practicing in the PCIT room. Not only did parents miss the VR component for the second phase of PCIT, as mentioned above, but they also would have wanted to see more variation in the given VR videos. This suggests more variation is needed in the videos for future development. Parents further expressed they would have liked it if the VR modules would be more aligned with what happened in the sessions (e.g. *“I think VR has a lot of potential, but it is still in the development phase and therefore a bit scarce. So I think it would be good to link the sessions to the VR [practice moments].”*).

Practical aspects

Several parents advocated for giving each parent a personal online environment with all the paperwork from PCIT (such as the sheet with PCIT appropriate toys and the time-out decision tree), and include a VR worksheet in there that contained all the links. In addition, parents stated that including VR on the homework sheet would help parents remember to practice and make it more tangible. A last practical improvement mentioned, was to add a pause button in the VR environment, as this would add more flexibility in practice possibilities.

Therapists’ suggestions

There were three subthemes that further expressed therapists’ suggestions. These were ‘avoid extra work’, ‘more variation in VR’, and ‘practical aspects’.

Avoid extra work

Therapists stated their willingness to use VR with PCIT provided it would require little to no effort or extra actions from them. In order to make that feasible, various suggestions were made. For example, creating a helpdesk for any technical issues or involving the clinics’ administration office in sending VR information and links to the parents.. In order to prevent extra work, the VR component might be linked to the personal electronic medical records, thus automatically providing the parents with a new VR module after the session was registered (e.g. *“It just turns on automatically and every time I have a CDI session, it registers for example CDI session 4 and then I know that the thing goes on to the next level. Yeah so you don’t have to do an additional action to make it work. And it needs to be a bit user friendly, linked to their records so you don’t really need to look for it. And you don’t need extra software or anything.”*).

More variation in VR

Therapists also stated it is of importance to create more variation and different difficulty levels of VR modules, in order to prevent boredom for the parents (e.g. *“I think boredom [is a challenge]. It is difficult with this topic to keep it interesting.”*). A therapist suggested creating animated VR, rather than 360 degrees videos, as the therapist believed this could offer more personalization in the videos. Similar to parents’ suggestions, therapists also suggested evolving the current videos further; by for example, creating a supplemental VR module that would cover the second phase of PCIT. They believed that parents could benefit from practicing with the standard sentences used for the time-out in VR. Nevertheless, they also stated that simulating the time-out procedure in VR could be difficult to implement, as the emotional experiences that comes with the time-out procedure for the

child or the parent, could not be achieved through practicing the standard sentences in a VR environment. They suggested ‘real’ children, or parents’ own children should be used in these scenarios, rather than actor children in order to heighten these emotions.

Practical aspects

Therapists thought it would be beneficial to add a VR column to the PCIT Homework Sheet for parents to register their VR use and to make it a topic during sessions.

Discussion

The aims of this study were to qualitatively evaluate the addition of VR to PCIT, and to investigate suggestions for implementation through the perspective of the product’s receivers and providers (i.e. parents and therapists). The parents had a positive overall experience with the treatment PCIT. Topics in favor of VR that arose both in parents’ and therapists’ experiences, were that VR was useful as an additional practice tool, and that it led to a boost in confidence in using positive parenting skills, in addition to subjectively experiencing quicker skill acquisition. Furthermore, some parents evaluated the tool as easy and leading to be “in another world”, whereas other parents experienced discomfort, boredom and a lack of immersion. There were several suggestions for implementation of VR from both parents and therapists. Their common suggestions were to make the VR tool more appealing and realistic, vary more in the VR modules and improve practical aspects such as creating VR homework sheets. Parents added that VR modules should align with the treatment phase they were in (i.e. first or second phase of PCIT). Therapists specifically mentioned that no extra work should be required for them to use VR. In sum, both groups of respondents were largely positive about PCIT-VR, and both groups also stated that there was room for improvement in the tool. These suggestions are discussed below, as they should be taken into account for further research and development of PCIT-VR.

The experiences of parents confirm that additional practice with VR was experienced as beneficial to their trajectory. Therapists confirmed that when parents practiced with VR, they believed the positive parenting skills were retained at an increased rate. These findings are in line with the deliberate practice theory that suggests that the best way to become proficient in a skill is through practicing deliberately while also receiving feedback on aspects that still need practice [25, 26]. VR — as opposed to watching a video or using an app — can provide a sense of realness due to the immersion. Through practicing in VR, parents are not only probed to think about the skills, but it also allows them to see and experience them in the virtual environment [27]. In conformance, the fact

that parents received feedback while exercising in the VR application meant that they could further stimulate, experience and develop the skills that still required practice. Furthermore, a meta-analysis that evaluated VR applications for social skill development, suggested that VR applications were most effective when developing basic or complex skills [8]. As the positive parenting skills taught in PCIT are simple in its use (for example, repeating the child’s words is a reflection), but require practice to implement correctly, VR lends itself in this instance. Besides benefiting from the skill practice with VR, both parents and therapists believed practicing in VR could also provide a confidence boost to use the skills. To explain, parents may experience gained confidence as a result of practicing in VR as their acquired knowledge about the skills and their skill level may have increased. This feeling of confidence has also been found in other qualitative studies where VR has been used as a practice tool [28]. Within PCIT research, parents have also reported feeling more confident in parenting as a result of acquiring PRIDE-skills [29].

Considering that parents appreciated practicing the PRIDE-skills in VR during the first phase of PCIT, it is not surprising that they missed a VR practice opportunity for the second phase – PDI-phase – of PCIT. As they benefited and gained confidence in using positive parenting skills through practicing in VR, one could imagine the added value of practicing with effective commands and disciplining skills (i.e. the main taught skills during the PDI-phase) in VR as well. This again is in line with theories that suggest repetitive practice leads to expertise in a skill [9, 10, 26]. Moreover, a reason parents practiced less during the PDI phase of PCIT, is due to the discrepancy between the VR modules and what was being taught in the treatment. Therefore, parents recommended building a VR tool for this phase to create congruence between VR and the treatment phase. As our VR tool was a new technological add-on to the treatment, choices were made to only focus on creating modules for fostering positive parenting skills, as these are important in both phases of treatment. However, as parents state VR was beneficial for them in the first phase and they missed it in second phase, future research should focus on creating modules to allow parents to practice with effective commands and disciplining skills as well.

Withal, as the augmented version of PCIT with VR seems to provide parents with an extra practice-feedback moment and boosts their confidence in using PRIDE-skills, we can assume it is warranted to continue research into using PCIT-VR in practice. However, some challenges and limitations need to be addressed. Firstly, parents and therapists reported and envisaged boredom and frustration with the VR tool. Additionally, some

parents felt that the videos seen in the virtual world did not replicate real-life play situations enough. In previous research where VR was used as a learning platform, scenarios were similarly assessed either as too easy or more challenging than real-life situations [30, 31]. This suggests that diversifying scenarios and adding layers of complexity could improve the current VR tool. Secondly, therapists reported that they saw obstacles in incorporating VR in standard PCIT. Moreover, therapists were willing to implement VR in practice, provided it would not require additional steps or effort from them. This suggests that it is challenging to administer VR in a clinical practice that is not supported by a research setting. It is known that implementation of such a technological tool in clinical practice requires a systematic and conscientious approach [32]. Therefore, before being able to systematically integrate VR with PCIT in practice, its ease, usability and the availability of technical support must be increased. In addition, accomplishing implementation will remain an ongoing process, as research shows that quality implementation requires continuous assessment, negotiation, collaboration, monitoring and reflection [33]. Nonetheless, tackling these aspects would increase success and thus increase the probability of achieving implementation.

Furthermore, besides the necessary technical support mentioned above, it would be useful if the users in clinical practice would see the potential of the added value of VR. Implementing a technological add-on hinges on whether the providers responsible for promoting the product believe in its use, are able to convey the added value of it and have affiliation with it [34]. In other words, in the case of the current study, therapists should be able to convey the added value and have a positive attitude towards the VR product to be able to stimulate parents to use it. Additionally, concerns such as adding burden to families who are already struggling with extra homework were raised by therapists. The families described by therapists as overburdened are the ones to whom PCIT is offered in the clinical setting in the Netherlands. They often camp with a complex array of problems such as multiple psychiatric problems and financial stress [35]. These families are hard to reach, have a high risk of prematurely dropping out of treatment and are simultaneously in dire need of help. It is therefore understandable that when therapists are already concerned with a family's burden, they do not wish to add an extra layer of homework to an intensive treatment such as PCIT. We acknowledge that on the one hand, it is important to trust the clinical judgement of therapists in this. On the other hand, not daring to offer VR out of fear of creating extra pressure for families may not be the best solution either. We believe VR could in fact relieve some of the stress

for parents, as parents reported that VR has the potential to increase the speed of skill acquisition and that it instills confidence for skill usage. This would suggest that VR could be extra beneficial to reach the skill acquisition requirement sooner. Offering VR in a customized manner to families, – for example, practicing with VR when parents are not capable of coming to a session due to life stressors – could be a solution for this population. Therefore, with our preliminary support that practicing in VR is of added value for parents, it is important to have therapists believe in the potential benefit of VR in PCIT for all families, and not just for a select subgroup. Rather, therapists should let parents decide whether VR could be beneficial for their trajectory, which is in line with common best practices around shared decision making. Research states that investing time and effort into therapists is one of the most important steps to successful implementation [36]. Therefore, it is necessary to change the therapists' perception and lower their threshold for implementation of VR. For future implementation steps, we strive to follow and adapt Kip and colleagues' steps to implement VR in practice [36].

Several limitations must be acknowledged. The interviews were conducted with a small number of parents from a clinical setting, of which some, but not all, were interviewed both at posttreatment and at follow-up. Although their opinions did not vary between posttreatment and follow-up, more follow-up interviews might have been useful. Although general consensus on the value of VR was obtained, more research where both qualitative and quantitative measures are employed is necessary to truly investigate the effectivity of PCIT-VR. However, that was beyond the scope of this paper, and thus needs to be further evaluated. Another important aspect to acknowledge is that parents had the choice whether or not to participate in the research project where VR was added to treatment. Therefore, there may already be a level of bias that only parents interested in technology participated. Furthermore, as IS was the main distributor of VR to parents; therapists were not very involved in the practical aspects of the process. IS also conducted the interviews and performed the study on effectiveness, which could potentially mean parents answered in a socially desirable way.

To conclude, adding VR to PCIT is still a pioneering technology within PCIT. In a world where telehealth is becoming more important, VR serves as an additional dimension to this as it has the potential to be an attractive piece of homework. The value of this VR tool lies in the provision of the possibility to practice with the PRIDE-skills outside of the therapeutic encounter, which can instill confidence in using the respective skills. However, it is important to note that this is not automatically the

case for all parents. Therefore, VR should be customized within the treatment in order to tailor for the wants and needs of parents. Given the positive experiences regarding the added value of VR to treatment, it is important to further develop the VR-tool. The current study provides preliminary evidence that with the right implementation efforts and taking into account the suggestions of parents and therapists, PCIT-VR can potentially serve as a customized way for parents to practice what they are taught during the treatment.

Supplementary Information

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Supplementary Material 1.

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Authors' contributions

I.C.A.S. collected and analyzed the data, wrote the main manuscript text. M.E.A. did secondary data analysis. M.E.A. and G.A.M.W. were major reviewers of the manuscript text. R.G.B., A.P. and R.J.L.L. reviewed and edited the manuscript. R.G.B. and I.C.A.S. designed the virtual reality platform being evaluated. G.A.M.W. contributed with knowledge about qualitative research. R.J.L.L. acquired funding and supervised the research. All authors have read and agreed to the published version of the manuscript.

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Availability of data and materials

The data are not publicly available due to privacy and ethical guidelines. The data presented in this study are available on request from the corresponding author.

Declarations

Ethics approval and consent to participate

The study was approved by the Medical Ethics Committee of the Academic Medical Centre of Amsterdam, the Netherlands (2020_143). Written informed consent was obtained from participants prior to the study and participation was voluntary. Informed consent for participants below the age of 16 was also obtained from their parents and/or their legal guardian(s).

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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