Innovations in Practice: Avatar-based virtual reality in CAMHS talking therapy: two exploratory case studies

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Background: Avatar-based virtual reality therapy is an emerging digital technology that can be used to assist the treatment of common mental health problems. This may be particularly appealing to young people who are highly familiar with digital technologies and may provide a medium to facilitate communication within face-to-face therapy. **Method:** We present two case summaries of young people who used ProReal, who had difficulties engaging in talking therapies. ProReal is a software package providing avatar-based virtual reality therapy, used as part of talking psychological therapies provided within a CAMHS outpatient clinic. Young people completed pre and postuse routine outcome measures and took part in qualitative interviews assessing their experience of ProReal. **Results:** Outcome measures showed a reduction over time. The two young people felt ProReal was highly accessible, with both young people positively describing how ProReal helped them externalize their inner worlds to help them to reappraise their thoughts, feelings and experiences. They also reported ProReal being a helpful tool to facilitate communication with the clinician. **Conclusion:** These case summaries demonstrate how ProReal can be readily integrated into clinical practice and how it can facilitate communication and therapy with young people who find it difficult to express themselves.

Key Practitioner Message

- Young people may find it difficult to engage with talking psychological therapies for many reasons, including being uncomfortable in the new situation and being unsure about expressing their thoughts and feelings.
- ProReal is an avatar-based virtual reality programme (accessed via laptop/PC) that can be used to construct and visualize experiences, helping to facilitate communication between the young person and therapist.
- Case reports with two young people attending CAMHS describe how ProReal was helpful to them to engage in therapy and in addressing their presenting psychological issues.

Introduction

Worldwide, the estimated prevalence of mental disorders in children and young people (CYP) is 13.4%, with anxiety disorders being the most prevalent (Polanczyk, Salum, Sugaya, Caye, & Rohde, 2015). NICE (2013, 2014) recommends Cognitive Behavioural Therapy (CBT) for depression and anxiety disorders in CYP. Understandably, CYP describe being nervous and apprehensive about visiting Child and Adolescent Mental Health Services (CAMHS), and as such it is essential that the process of therapeutic engagement is made as easy as possible (Bone, O'Reilly, Karim, & Vostanis, 2015).

Given their widespread use and popularity, digital mediums may have a role to play in the delivery of mental healthcare. These encompass a variety of technologies, with internet-delivered CBT and gamified interventions being two of the more widely evaluated with CYP (Hollis et al., 2017). CYP and clinicians have preferences for using digital technologies in complimenting mental healthcare, rather than replacing face-to-face treatments (Hollis et al., 2017).

One digital technology that can be used alongside face-to-face support is avatar-based virtual reality therapy. This involves asking clients to represent themselves in a virtual environment, providing them with a visual representation to explore their presenting issues (Rehm et al., 2016). This may be appealing to CYP who find it difficult to talk about mental health and to understand and explain the various factors involved in their mental well-being.

In a qualitative study exploring Swedish CYP's views of community health clinics, CYP expressed preferences for utilizing activities within sessions to help their engagement, communication, and choice to disclose:

younger adolescents spoke about using nonverbal ways to express their thoughts and feelings (Persson, Hagquist, & Michelson, 2017). Digital avatar-based therapies may provide a creative outlet for expression, akin to play therapy (van Rijn, Cooper, & Chryssafidou, 2018) and be a medium of communication for the CYP and therapist to share within therapy (Rehm et al., 2016).

One avatar-based programme, ProReal, has been tested in group and one-to-one settings, including with adults in a forensic setting (van Rijn, Cooper, Jackson, & Wild, 2017), with adults diagnosed with borderline personality disorder within an outpatient service (Falconer et al., 2017), and with secondary school children in school-based counselling (Cooper, Van Rijn, & Chryssafidou, 2018; van Rijn et al., 2018). Clients reported that ProReal helped them to communicate their experience to others (e.g. explaining their relationships and feelings) and aided them in developing insight, expressing their emotions, and developing empathy in understanding other peoples' perspectives. Given this, there is potential for ProReal to be used within CAMHS within therapist-led sessions. We are not aware of any published papers describing or evaluating the use of avatar-based therapy within this setting. We therefore know little about the potential ways in which avatar-based therapy can be used to compliment therapeutic work or how CYP would perceive this intervention.

This paper reports two case studies whereby ProReal was an adjunct to CBT in a CAMHS with one clinician (PS). It reports the way ProReal was used, outcomes, and client acceptability. The research was approved by East Midlands Nottingham 1 Research Ethics Committee (ref: 16/EM.0039), and informed written consent was attained from the two cases, with parental consent to participate.

ProReal: Avatar-based therapy

ProReal is a laptop/desktop-based digital programme in which CYP can create 'landscapes' illustrating visual representations of their inner and outer worlds. The programme runs on a moderately powered laptop with information being stored locally. The landscape is created via touch screen, keyboard or mouse. They are populated with neutral human form avatars (no facial features or gender) which they label or name. Their size, colour, posture and position can be changed and emotional and cognitive dialogues can be added (e.g. see Figure 1). Avatars can be positioned anywhere (e.g. castle, river, crossroads, forest) and props can be added (e.g. bridges, fires, treasure chest) for CYP to symbolically represent their world. The scene can be viewed from an avatar's perspective, or from a roaming or birds-eye view. The CBT for each case was not manualized but individually and collaboratively formulated for the participants presenting problem. Generally, ProReal was used to identify and illustrate thoughts, feelings and behaviours, and the relationships between them. In both cases, the participants were then asked to think about and represent what needed to change to see an improvement in their current emotional state. PS received 3 hrs of face to face training from ProReal Ltd, which involved an introduction to the software and personal practice, using the software to explore his own experiences. Practice with family, friends and fellow therapists was encouraged with monthly online supervision being provided for case discussion.

Methods

Case summary X

X (12-year-old, male) was referred to CAMHS from the Paediatric liver transplant service. X had a number of traumatic experiences related to his surgery and medical treatment and was presenting with acute anxiety and posttraumatic flashbacks. He had become increasingly aggressive, had recently been suspended from school and had started self-harming.

X reluctantly attended the initial CAMHS meeting with his mother and was very uncommunicative. He clearly stated that he would not talk about his posttraumatic flashbacks but recognized he had an anger issue. ProReal was discussed as a nonverbal way of helping X to visualize his worries and feelings and he agreed to a trial.

ProReal was used to facilitate a CBT-based intervention where X was helped to identify his thoughts, feelings and behaviour and the links between them. For each session, X and PS sat side by side, focused on the computer screen, as X created various landscapes to
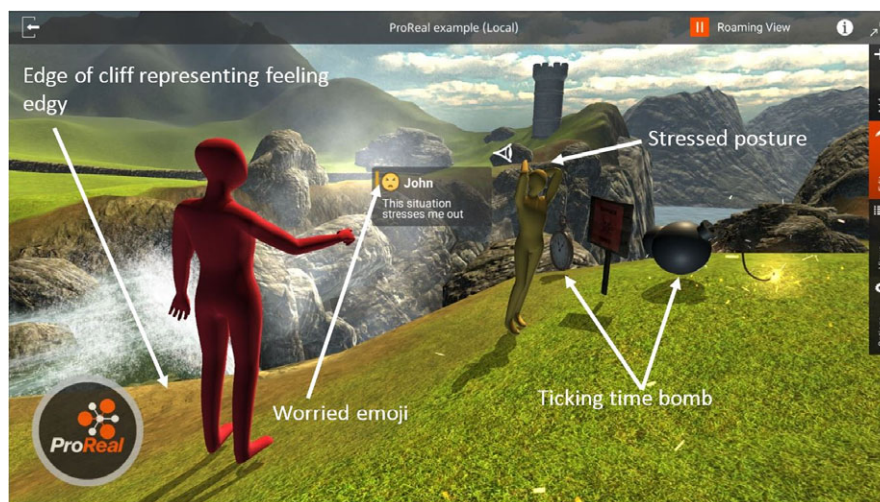

Figure 1. Screenshot of ProReal in use: props, avatars and landscape used to represent stressful aspects of a situation (as labelled)

describe how he was currently feeling. After each session, the scene was saved and was returned to at the start of the next session. PS engaged in a curious dialogue about the scene, clarified meanings, summarized feelings and encouraged X to reflect on what needed to change to help him feel happier and less worried.

The first session was spent entirely with ProReal creating a personalized visual formulation. In subsequent sessions ProReal was used flexibly as a visual summary of the formulation and to prompt the development of coping skills. Time spent with ProReal reduced as more time was spent practicing coping skills.

Although outwardly presenting in an aggressive way, X created a scene depicting himself as anxious and worried. He chose a nervous/scared avatar posture next to a fire adding 'you get cold when you are nervous'. He added many props as defences to keep himself safe. He positioned an elephant in the grounds to trumpet if someone approached; secured the gateway to the castle with a wall, a bomb and a shield and then added a key in the castle to lock the door. Sessions explored how each prop could be developed into coping skills (e.g. relaxation, breaking challenges into small steps, alternative helpful thinking) which X practiced between sessions. X engaged well with ProReal and after five sessions reported feeling happier (RCADS depression subscale reduced from 9 [t-score = 56] to 5 [*t*-score = 45]), and less distressed (Total RCADS reduced from 37 [*t*-score = 51] to 30 [t-score = 47]). X's change in depression scores indicate reliable change while there is no indication of reliable or clinically significant change in his overall RACDS score. X was coping well with school, was regularly attending and was in no major trouble. He reported that his flashbacks had reduced and there had been no further incidents of self-harm. In view of this progress and X achieving his goal (anger management increased from 3 to 9 on the goal progress chart), we agreed that no further appointments were required.

Case summary Y

Y (15-year-old, male) was urgently referred to CAMHS by his GP with suicidal thoughts and low mood. He described a 2-year history of persistent and repetitive, negative, critical and destructive thoughts and low mood. He disclosed a previous suicide attempt and although was not currently self-harming, presented with non-specific suicidal ideation.

Y had previous unsuccessful input from CAMHS. He did not believe that further talking therapy approaches would help and was unwilling to engage in CBT- or mindfulness-based therapy. He was also reluctant to talk about his negative thoughts, fearing that this would make them stronger and harder to control. ProReal was discussed and Y felt that this non-verbal approach might help him to express and challenge his destructive thoughts.

ProReal was used flexibly as part of a CBT-based intervention to facilitate a personalized formulation to help Y express his negative thoughts. He then learned to develop a different relationship with his thoughts where they were noticed but he did not engage with them. Y and PS sat side by side focusing on ProReal whilst Y created various scenes. In the first session, Y created a safe place inside a castle where his negative thoughts could not reach him. In the second session, Y created himself

as an avatar which he positioned in the castle and added his girlfriend for support. It was in the third session that he felt able to externalize his negative thoughts in another avatar which was positioned outside the castle, behind a wall. The fourth session explored the content of these negative thoughts. The visual representation helped Y to recognize that his negative thoughts were separate from him and that they did not control him. The final session continued this process and led to his avatar ignoring the negative avatar and Y feeling that he did not need to listen or respond to his negative thoughts. Y's suicidal thoughts reduced through therapy (RCADS statement 37 'I think about death': reduced from 'Often' to 'Never'). Symptoms of depression reduced (RCADS depression subscale: 14 [t-score=66] to 3 [t-score=39]), as did anxiety (RCADS anxiety subscale: 59 [t-score=73] to 5 [t-score=<37]). Y's depression and anxiety reduction represent both reliable and clinically significant change. The goal progress chart showed that was less troubled by negative thoughts (increased from 1 to 9) and we agreed to close the case.

Results

Postuse feedback was gathered through telephone interviews by a researcher not involved in therapy delivery (RG). Interviews assessed the young person's experience of using ProReal (e.g. ease of use, likes, dislikes) and whether ProReal was beneficial to their sessions (e.g. what aspects were helpful/unhelpful). The interviews were transcribed verbatim (by EBD). Brief codes summarizing what participants said were made and compared and contrasted to categorize patterns in the data.

Accessibility

Both participants found ProReal straightforward to use after some familiarization. They felt that ProReal's appearance was 'average' and sufficient for its therapy purpose – it was not as detailed as video games but not unappealing either.

External visualization of internal world

Both young people emphasized visualization through ProReal, allowing them to externalize their experiences, thoughts and feelings. Visualization encouraged perspective taking and reappraisals of their experience. Y described how using ProReal allowed him to break down and work through problems:

> I was able to compartmentalize all of the stuff that was going on, and I was able to [...] put it into a software that I was able to control, navigate and that I could monitor, and that kind of gave me some confidence in doing that in real-life

Both described how they liked being able to add inner voices and emotions to avatars, and animated postures, which aided expression of feelings and the interpretation of situations:

> the fact that you could add like inner voices and emotions greatly helped how to, like, how my mood reflected every time I met with [the clinician]

They also described how they liked being able to explore the landscape and the usefulness of the props in

symbolizing aspects of their experience and feelings. Even though there were several props which they felt they could not apply to themselves, they could see how they would be useful to others. They described how being able to represent and externalize their experiences (and associated thoughts and feelings) meant they could express themselves and better communicate their situation, thoughts and feelings to the clinician.

> I could get like [the clinician] to see how things were for me, to make him understand what it's like... sort of how you're thinking and feeling and things that are going on, without you having to, yeah, think of the words and verbalize it

> it was able to give a visual representation of how I was feeling and what I was thinking and what kind of situation I was in to [the clinician] without me needing to explain it very much, I was sort of able to do my thing and [the clinician] was able to interpret it quite accurately actually

Facilitating communication
ProReal meant that participants did not necessarily have to talk as much as they might in a normal therapy session: this was seen as useful by X as he mentioned not being a natural talker, and the visualization of his experience meant he did not have to 'just' talk about his experiences.

> I didn't use [ProReal] an awful lot but that benefited me cos it meant that I could work side by side with actually talking to [the clinician] about it and explaining it in a visual way so that helped

Discussion

These two case studies show how an avatar-based software can be used to facilitate communication during face-to-face psychological therapy with young people. Routine outcome measures showed postuse improvements in mental health with qualitative feedback providing positive support for the avatar programme. Both young people were verbally uncommunicative and not fully willing to engage in traditional talking-based approaches. Feedback suggested that the externalization of internal thoughts, feelings and experiences helped the young people express how they were feeling. Although we are limited in reporting findings from two cases, their experiences align with those from previous research into avatar-based counselling (Cooper et al., 2018; Rehm et al., 2016; van Rijn et al., 2017, 2018). A key theme from this research centred around the software allowing young people to express themselves outside of 'just using words all the time' (van Rijn et al., 2018).

Our two young people felt ProReal was both easy to use and helpful in their therapy, and was reported to be appealing and attractive. Students in the previous evaluation of ProReal provided many suggestions for improvements, including more varied virtual environments and more realistic props (van Rijn et al., 2018). This highlights the continuing tension in the development of technology that is attractive and engaging without being 'state of the art' and expensive.

Finally, the use of avatar programmes in CAMHS will depend on the attitudes and perspectives of clinical staff. Previous work with computerized programmes highlights that clinicians are cautious about their use (Stallard, Richardson, & Velleman, 2010). Understanding and addressing some of the potential concerns such as lack of expertise, time or effectiveness, can be addressed through ongoing training and support.

We did not conduct a follow-up assessment with these participants. We therefore cannot ascertain the longevity of treatment effects and cannot generalize the two cases to other CAMHS patients. Both cases were adolescent males and young females may have different views; qualitative evaluation of ProReal in a school counselling setting found that compared to females, males reported the software to be more helpful in facilitating the therapeutic relationship (Cooper et al., 2018; van Rijn et al., 2018). Furthermore, the therapy was carried out by one highly experienced clinical psychologist and our results may not reflect the skills of other therapists. Previous research has also shown that reductions in psychological distress tend to be associated with more time spent training with ProReal (Cooper et al., 2018). Our results may therefore also reflect PS's specific ProReal training.

Conclusion

These case studies provide a brief insight into how avatar-based virtual reality can be integrated into psychological therapies within CAMHS. Avatar therapy may be particularly useful for young people who have difficulties verbally communicating during one-to-one talking therapy. Further research is needed to explore the potential use of avatar therapy within CAMHS and how it can be used as an effective adjunct to traditional talking therapies. A feasibility and acceptability trial for both patients and clinicians is required, as well as cost-benefit analysis weighing up the soft/hardware and training costs against the efficacy of the adjunct.

Acknowledgements

Conflicts of interest

The authors have declared that they have no potential or competing conflicts of interest.

Ethical approval

The research was approved by East Midlands Nottingham 1 Research Ethics Committee (ref: 16/EM.0039). Informed written consent was attained from the two cases, with parental consent to participate.

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References

Bone, C., O'Reilly, M., Karim, K., & Vostanis, P. (2015). 'They're not witches..' Young children and their parents' perceptions and experiences of Child and Adolescent Mental Health Services. *Child: Care, Health and Development, 41*, 450–458.

Cooper, M., Van Rijn, B., & Chryssafidou, E. (2018). Avatar-based counselling for psychological distress in secondary school pupils: Pilot evaluation. *British Journal of Guidance and Counselling*, 1–14.

Falconer, C.J., Cutting, P., Davies, E.B., Hollis, C., Stallard, P., & Moran, P. (2017). Adjunctive avatar therapy for mentalization-based treatment of borderline personality disorder: A mixed-methods feasibility study. *Evidence Based Mental Health, 20*, 123.

Hollis, C., Falconer, C.J., Martin, J.L., Whittington, C., Stockton, S., Glazebrook, C., & Davies, E.B. (2017). Annual Research Review: Digital health interventions for children and young people with mental health problems – a systematic and meta-review. *Journal of Child Psychology and Psychiatry, 58*, 474–503.

National Institute for Health and Care Excellence (2013). *Depression in children and young people*. NICE Guideline QS48. Manchester, UK: National Institute for Health and Care Excellence

National Institute for Health and Care Excellence (2014). *Anxiety disorders*. NICE Guideline QS53. Manchester, UK: National Institute for Health and Care Excellence.

Persson, S., Hagquist, C., & Michelson, D. (2017). Young voices in mental health care: Exploring children's and adolescents' service experiences and preferences. *Clinical Child Psychology and Psychiatry, 22*, 140–151.

Polanczyk, G.V., Salum, G.A., Sugaya, L.S., Caye, A., & Rohde, L.A. (2015). Annual research review: A meta-analysis of the worldwide prevalence of mental disorders in children and adolescents. *Journal of Child Psychology and Psychiatry, 56*, 345–365.

Rehm, I.C., Foenander, E., Wallace, K., Abbott, J.-A.M., Kyrios, M., & Thomas, N. (2016). What role can avatars play in e-mental health interventions? Exploring new models of client–therapist interaction. *Frontiers in Psychiatry, 7*, 186.

Stallard, P., Richardson, T., & Velleman, S. (2010). Clinicians' attitudes towards the use of computerized cognitive behaviour therapy (cCBT) with children and adolescents. *Behavioural and Cognitive Psychotherapy, 38*, 545–560.

van Rijn, B., Cooper, M., & Chryssafidou, E. (2018). Avatar-based counselling for young people within school counselling. Qualitative analysis of client experience. *Counselling and Psychotherapy Research, 18*, 59–70.

van Rijn, B., Cooper, M., Jackson, A., & Wild, C. (2017). Avatar-based therapy within prison settings: Pilot evaluation. *British Journal of Guidance and Counselling, 45*, 268–283.