Editorial

The virtues of virtual reality in exposure therapy[†]

Lina Gega

Summary

Virtual reality can be more effective and less burdensome than real-life exposure. Optimal virtual reality delivery should incorporate *in situ* direct dialogues with a therapist, discourage safety behaviours, allow for a mismatch between virtual and real exposure tasks, and encourage self-directed real-life practice between and beyond virtual reality sessions.

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The treatment for many psychological disorders, especially cognitive–behavioural therapy (CBT) for anxiety disorders, commonly requires that patients confront their feared situations (exposure) while refraining from safety behaviours (response prevention). In this way, patients get used to the associated anxiety over time (habituation) and change their beliefs about the likelihood or catastrophic nature of their feared consequences (cognitive reappraisal). Exposure in real life (*in vivo*) is very effective, but the process of finding or engineering relevant real-life exposure conditions, such as social situations (job interviews, dating, public speaking), trauma-related scenes, thunder, heights, injury and other phobic stimuli, can be time-consuming, impractical or even impossible. To overcome the limitations of *in vivo* exposure, virtual reality has been effectively used to simulate feared situations and deliver *in virtuo* exposure therapy.[1,2]

Can therapy *in virtuo* be better than *in vivo*?

Bouchard and colleagues have investigated the use of virtual reality in the treatment of psychological disorders for over a decade. Their latest research report, published in this issue,[3] presents the results of a randomised controlled trial (RCT) that found virtual reality to be superior to *in vivo* exposure on self-reported outcomes of social anxiety, both post-treatment and at 6-month follow-up. Therapists rated the virtual reality as more practical and less burdensome than using real-life exposure stimuli. These results are striking for two reasons. First, the superiority of virtual reality contradicts other recent trials in social anxiety that showed *in virtuo* exposure to have inferior[4] or similar[5] effects compared with *in vivo* exposure. Second, the difference in outcomes was sustained after 6 months, even though in many comparative trials the gap between two effective therapy modalities – not only exposure – tends to narrow and even diminish at medium- to long-term follow-up.

The observed large effect of *in virtuo* exposure in Bouchard *et al*'s study is attributed by the authors to two reasons. First, there

was direct contact with a therapist during the *in virtuo* exposure tasks, in contrast to previous studies[4,5] in which patients and therapists were in two separate rooms and patients engaged only in dialogues with virtual characters. Second, therapists used the virtual reality to delve into the patient's exposure experiences more that they were able to do in real life. Either way, a meaningful interaction with a therapist seems to be an important active ingredient for *in virtuo* exposure. Therapeutic guidance is thought to be a significant modifier for patient engagement and outcomes in other technology-mediated mental health interventions.[6,7] Clinicians, researchers and patients often express mistrust and antipathy for technology when it is perceived as a threat to the 'real' therapist–patient interaction and when computer-generated responses of empathy – 'am sorry to hear this' – feel patronising and false.[8] Similarly, virtual reality's added value is not in imitating therapists, but in allowing therapists to maximise or expedite the returns from their interactions with patients.

Given that the aim of therapy is to improve people's lives and that virtual reality gains are generalisable,[2,9] we would expect that patients are able, willing and encouraged to apply in real life what they learn in therapy. In Bouchard *et al*'s study we infer that real-life application happened post-treatment, either spontaneously because patients improved, or as part of their relapse prevention plan. This may account for the sustained effects of *in virtuo* exposure at 6-month follow-up. Interestingly, to minimise the contamination of the 'virtual' with the 'real' during treatment, Bouchard *et al* discouraged real-life self-directed practice – in effect, exposure 'homework' – between *in virtuo* therapy sessions. This was similar to other virtual reality trials in social anxiety that either discouraged real-life exposure homework altogether[4] or incorporated non-exposure homework (such as practising in front of the mirror or keeping a diary).[5]

Homework in the form of self-directed exposure tasks between clinic sessions is common practice and an established therapeutic ingredient proven to enhance therapy outcomes.[10] Its absence did not seem to compromise the effects of *in virtuo* therapy in Bouchard *et al*'s study, although we do not know whether effects could have been greater should homework had been encouraged between virtual reality sessions. If virtual reality can achieve the same or even better results without self-directed real-life exposure practice, it may be a way of engaging patients who are unable or unwilling to carry out homework and may be considered 'unsuitable' for CBT or drop out because of it. Having said that, *in virtuo* therapy should not be disconnected from reality, but help the transition from clinic to real life. Optimal delivery that is true

to common practice and maximises the chances of improvement should encourage the use of real-life self-directed exposure practice, both as homework between virtual reality sessions and as relapse prevention after treatment.

Finally, Bouchard *et al* considered that a limitation of their study was that the virtual reality exposure scenarios were not matched to the *in vivo* ones, as had been done in previous trials;[4,5] yet, this may be a strength that accounts for the large effect of their *in virtuo* exposure therapy. Reasonably, experimental trials aim to match *in virtuo* and *in vivo* exposure in content and structure so that any differences in outcomes can be attributed to the differences between the virtual and the real when all other things are equal. Yet, the whole point of using virtual reality is to harness its full potential and go beyond what we can do in real life. For example, virtual reality can facilitate multicontext, tailored, mass practice of extreme exposure scenarios in a short period of time;[11] matching it to real life would mean that patients only experience the quantity and nature of scenarios that are possible *in vivo* and nothing more. With the proviso that patients follow-up on what they learn in the virtual world by applying it to real life, the optimal way of using *in virtuo* exposure is not to match it to *in vivo*, but to make full use of the virtual reality features that can have added therapeutic value over and above real life.

Future directions for *in virtuo* therapy

We need to move beyond circumscribed experimental comparisons and towards large-scale pragmatic RCTs where *in virtuo* therapy is delivered (a) as intended to be in routine practice and (b) in an optimal way that harnesses the full potential of virtual reality and uses treatment protocols that reflect modern theory, up-to-date evidence and crystallised clinical experience about what is likely to work best. First, both *in vivo* and *in virtuo* bona fide exposure therapies need to include response prevention (i.e. refraining from using safety behaviours to cope with anxiety) as in Bouchard *et al*,[3] and not encourage safety behaviours as in Freeman *et al*.[12] Second, we must allow for a mismatch between *in virtuo* and *in vivo* exposure tasks in terms of content, intensity and quantity, because only then we can make full use of what virtual reality can offer that real life cannot. Third, *in virtuo* therapy needs to integrate real-life self-directed exposure practice as homework between sessions and as relapse prevention post-treatment, given that this is true to common practice and important for maximising and sustaining outcomes. Finally, *in situ* direct dialogues with a therapist delving into the patient's virtual experiences can optimise learning from the CBT adage that the way we respond to and think about an experience shapes our feelings towards it.

Meta-analyses have shown that virtual reality's effects are similar to conventional treatments and can be transferable and generalisable to real life.[1,2,9] Future non-inferiority pragmatic trials are best placed to confirm whether, within an acceptable margin of difference, *in virtuo* exposure is no better or worse than

in vivo. Following on from this, the added value of virtual reality as a therapeutic tool hinges on its versatility, efficiency and ability to go beyond what we can do in real life, as well as on its potential to engage populations who for various reasons cannot benefit from conventional treatments. Virtual reality opens up a world of advanced therapeutic possibilities, but it is still far from influencing care pathways and improving patient outcomes in our day-to-day clinical practice. Despite the virtues of virtual reality, the proof of the virtual pudding is in the real-life eating.

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