Commentary on Riva, G., Virtual Reality in Psychotherapy: Review

According to Riva, as virtual reality (VR) is set to enter mainstream psychotherapy delivery, it could be part of clinical psychology’s future. For the appropriate development of VR applications to be guaranteed, Riva argues that VR should be defined, and that the opportunities and the challenges it may provide to professional practice be understood. When outlining the current state of relevant clinical research to the development of VR in psychotherapy use, Riva observes that, since the early 1990s, virtual environments have been used as a medium for exposure in phobias. He notes that VR exposure therapy (VRE) has been shown to be as effective as “in vivo” exposure in the treatment of specific phobias (e.g., acrophobia, spider phobia, fear of flying). Its clinical application to more complex disorders (e.g., agoraphobia, claustrophobia, panic disorder, public speaking disorder, eating disorders) is currently being examined. He describes how VRE has also been used as an alternative to “imagery” exposure treatment with post-traumatic stress disorder.

Riva identifies several advantages of VRE when compared to “in vivo” or “imagery” exposure. VRE can be administered in traditional therapeutic settings (hence can be more controlled and possibly more cost effective); it can provide stimuli for individuals who have difficulty in imaging scenes; it can provide opportunities for those individuals who are too phobic to experience real situations; and it can generate stimuli of greater magnitude than other more standard techniques (it can therefore produce alternative and fantastic worlds). According to Riva, it is these advantages that arguably position VR as an “intermediate step between the therapist’s office and the real world.”

Nevertheless, before it becomes part of mainstream use, Riva also identifies several technological, practical, procedural, and ethical barriers still remaining for VR. VR devices, software, and protocols lack standardization, and only a few of the VR systems available are interoperable, rendering most systems only useful in the contexts in which they were developed. As noted by Riva, the above issues force most researchers to spend a lot of time and money designing and developing “one-off” VR creations. These barriers, when added to the particular safety and ethical issues associated with using virtual environments, lead Riva to conclude that much effort will be needed to move VR to commercial success and therefore to become part of routine clinical use.

Riva offers a thoughtful and stimulating commentary on VR in psychotherapy. However, in addition to the ideas provided by Riva and in line with the statement of the nature, purpose, and characteristics of clinical psychology offered by the British Psychological Society’s (BPS) Division of Clinical Psychology’s (DCP), it is the author’s contention that clinical psychology is more than psychotherapy for those of working age. “Clinical psychologists can work with individuals, couples, families, groups (therapeutic, staff), and at the organizational level (e.g., hospital wards, day centres, Community Mental Health Teams, National Health Service Trusts). They also work with all age groups from very young children to older people. They work with people with mild, moderate, and severe mental health problems, people with learning disabilities, people with physical and sensory handicaps, people with brain injury, people who have alcohol and other drug problems, and people with a range of physical health problems.”

When considering the assertion above, it may be argued that the above-mentioned benefits of using virtual environments may be extended to other clinical psychologists working in a variety of user group settings. Indeed, there are already examples of the use of VR in the field of neuropsychology rehabilitation, in older adult psychology services, and in pediatric services. Their use within learning difficulties services has also been discussed.
REFERENCES


TRESA ANDREWS, Ph.D.
South London and Maudsley N.H.S. Trust, London, United Kingdom
E-mail: tresa.andrews@nhs.net

VIRTUAL REALITY (VR) is a very powerful tool that has shown its potential in many fields. Its wide range of utility was quickly evident for both basic research and applications in different scientific ambits. Clinical psychology was also very interested in the versatility of VR and its use as a therapeutic resource. More than a decade has passed since the first clinical applications—which were focused mainly on the treatment of specific phobias, that is “virtual exposure”—were brought to the attention of academic and therapeutic audiences. The application of VR to clinical psychology is expanding fast to encompass more
complex disorders, such as eating disorders, panic disorder, and post-traumatic stress disorder. It is also beginning to encompass a broader range of psychotherapeutic approaches. After more than 10 years of work on VR clinical applications, a detailed reflection about the work achieved and the work in prospect is useful. This reflection should go beyond the initial enthusiasm, pointing out the weaknesses and strengths of VR. This is the purpose of Riva’s paper—to outline the current state of VR for use in psychotherapeutic contexts. If VR is expected to be an effective and efficient therapeutic tool, its utility should be extended from universities and research centers to “clinical reality.” Riva’s work also addresses this, and shows the opportunities and limitations of VR applications for professional practice.

As Riva points out, at first VR was defined as a collection of machines. However, this kind of definition was too restricted, and the focus changed quickly to include the individual who uses the technology. We prefer to consider VR as a human experience, that is, an advanced communication interface that enables the user to experience “other” worlds, “other realities.” This is why VR is so useful and versatile for psychotherapy. The focus of psychological treatments lies in modifying some of the person’s experiences, and it is necessary to create experiences that individuals assume as their own. As Osberg1 claimed, VR could be considered as an alternative reality based on perception, instead of as a perception based on reality; it may not be necessary to copy physical reality exactly. A user could experience a virtual world even when the virtual environment does not provide a complete or totally precise representation of the real world. Furthermore, VR could produce alternative and fantastic worlds, which is one of its more attractive features, especially for clinical psychology because the goal is to achieve important changes in the users.2

We have to be aware of VR’s limitations. Riva points out that some problems still remain. Some of them are mainly technological, but others are related to clinical issues. It is necessary to standardize VR devices, software, and protocols, and to take into account ethical issues. It is also necessary to continue working on VR’s utility for other clinical tasks, such as assessment and research. VR can be helpful to increase the ecological validity of our assessment tools, and it can be considered as an “ecological” laboratory where behaviors, feelings, and human experiences can be studied in a controlled and rigorous way.3 Furthermore, when VR is combined with the internet, its applications multiply.

However, many clinical psychologists still have misgivings about the use of VR. We need to keep working to offer empirical data about the efficacy of VR applications, to develop more user-friendly applications, to improve software and protocols, to individualize environments, and to decrease costs. We also need to keep working to disseminate the results of all this work. VR is a tool—only a tool—but one of the most powerful tools that the clinical community has had to date. There is general agreement that three “I’s” are needed to design a VR application: Interaction, Immersion, and Imagination. Imagination is also needed to transfer VR research to day-to-day clinical practice.

REFERENCES


ROSA M. BAÑOS, Ph.D.
Departamento de Personalidad, Evaluación y Tratamientos Psicológicos, Universitat de Valencia, Valencia, Spain
E-mail: Rosa.Banos@uv.es

Dramatic technological advances took place in the 20th century, and we are sure that these advances will be even more dramatic and faster in the 21st century. Some aspects that still seem scientific fiction today will become part of our daily life. One of these advances has been the development of virtual reality (VR). The progress achieved from the time of Sutherland, one of the pioneers of VR, is surprising even to researchers who work in the field.1,2
Riva’s aim is to present a state of the art review about the progress achieved in the application of VR to clinical psychology. Riva analyzes the present situation, and reviews most of the developments and clinical trials carried out for the treatment of many mental disorders. He describes in more detail the work done by his team about the use of VR for the treatment of body image disturbances in eating disorders. Then he presents his own vision of the rationale of this new technology in this field, analyzing the concept of presence. Finally, he presents the future of research in VR.

From Riva’s review, we can conclude that VR is no longer a promise of the future, but a present reality. This new technology offers many possibilities for psychology, including assessment, treatment, and research. In the field of clinical psychology, VR is a known, accepted, and widespread tool used in exposure treatments of anxiety disorders, especially phobic disorders. Virtual exposure has many advantages compared with “in vivo” exposure and “imagery” exposure. VR provides stimuli for individuals who have difficulty in imagining scenes; it represents an opportunity for those individuals who are too phobic to experience real situations; it can be performed within the privacy of the consulting room; and it can generate stimuli of greater magnitude than standard techniques. Its utility and effectiveness have been demonstrated in the treatment of many disorders (e.g., flying phobia, claustrophobia, acrophobia, driving phobia).^3^4

Furthermore, its use is being expanded, including in other anxiety disorders such as post-traumatic stress disorder and panic disorder.^5^6 The impact of VR applications is reflected in the growing number of publications, not only in specialized journals on VR (e.g., CyberPsychology & Behavior, and Presence: Teleoperators and Virtual Environments), but also in very prestigious classical journals in clinical psychology (e.g., Behaviour Research and Therapy, Behaviour Therapy, Clinical Psychology and Psychotherapy, and Journal of Behaviour Therapy and Experiential Psychiatry).

The time of expensive and big equipment is over, and we are demonstrating utility and effectiveness in several fields. Now, besides improving the VR applications, it is time to pay attention to other important tasks. It is urgent to reflect on and do research into the meaning of the increasing use of this new technology—that is, the benefits, the delimitation of parameters and variables that could be important to a good mastery of this tool, and the management of the possible negative side effects. We should not forget that VR can be understood as a new sense that becomes a part of our device to explore the world involving is-sense and evolution, ontogenesis, and filogenesis.

In summary, besides progressing in the development of more powerful VR systems, we should be on the alert and reflect on the effects of VR applications. Bateson^7^ stated, every intervention and each human artifact has a price, no matter how good the purpose of the agent of the intervention is. Finally, we are sure that VR will achieve important progress in the field of clinical psychology in the next few years. The efficacy of this tool in the treatment of some mental disorders has been demonstrated, and we have data that suggest that this new tool is well accepted by patients.^8^ It has also been shown that VR can be effective with relatively cheap hardware. All these issues suggest that VR will become a usual tool in the work of clinical psychologists in the future.

REFERENCES

THERE IS MUCH TO AGREE WITH in Riva’s review, although I prefer a more down to earth approach to the promises of VR and am less optimistic about the implementation of these technologies in daily clinical practice.

IMPLEMENTATION OF VR IN ROUTINE CLINICAL PRACTICE

Currently, there are a number of technological limitations that limit the widespread clinical application of VR at this moment. Apart from these technical impediments, which may be solved by technological developments in the near future, there are other reasons not to expect that VR psychotherapies will be applied in routine clinical practice in the near future. It took decades for behavior therapy to be accepted as one of the main schools of psychotherapy, despite its being evidence-based as demonstrated in hundreds of controlled outcome studies.1 Apparently, in the mental health field and in psychotherapy, in particular, there are other motives and arguments than an intervention’s approved efficacy that determine whether an evidence-based intervention will be accepted by the larger community of professionals or not. Especially when technology is involved, there are a number of reasons that will preclude large-scale implementation within a couple of years. Among psychotherapists, the value of the therapeutic relationship is felt to be very important, and for some therapy schools, even of paramount importance. When discussing our clinical research on VR,2,3 and our studies into psychotherapy delivered through the Internet,4,5 we sometimes get hostile reactions by psychotherapists because they—albeit incorrectly—feel that there is no place for a therapeutic relationship. However, as in any therapy, in technology-driven therapies the therapeutic relationship is important. Further, I am afraid that we must deal with a technology phobia among psychotherapists before widespread application of VR will occur. Most current psychotherapists, who are in their forties and fifties, are not familiar with technological innovations and are anxious about using them. Finally, some therapists feel threatened that, at the end of the day, technology-driven therapies will make their work superfluous. Perhaps it is more realistic to expect that in a few years time there will be specialized centers which will provide such therapies with sufficient technical support, than that VR will be integrated into routine clinical care.

IS VR EVIDENCE-BASED?

But what evidence is there for the effectiveness of VR in psychotherapy? Riva reviews a number of studies into eating disorders, anxiety disorders, and sexual dysfunctions and concludes that VR is highly effective. We recently reviewed research on VR in anxiety disorders, and our conclusions are more modest.6 Few studies have been published in which virtual reality exposure therapy (VRET) is compared to exposure in vivo, the golden standard for treatment of phobias to date. Promising results show that VRET is as effective as exposure in vivo in treating fear of heights and fear of flying, but as far as other anxiety disorders are concerned, the promise is as yet unfulfilled. With respect to the impressive series of studies into experiential cognitive therapy with a variety of eating disorders by Riva’s group, results support the effectiveness of VR. It should be noted, however, that VR was integrated in a multimodal treatment
program. There is a clear need to study the effectiveness of VR treatment for eating disorders as a stand-alone treatment. The same criticism applies to the application of VR in the treatment of impotence and premature ejaculation. When VR is not studied in isolation and compared with gold standard evidence-based treatments, any conclusions on the effects of VR as a therapeutic method are precluded.

**PRESENCE**

The most evidence for the efficacy of VR as stand-alone treatment is provided by studies with patients with acrophobia. However, the high dropout rates during therapy due to low levels of experienced presence temper the optimism somewhat. Some participants are not able to involve themselves in the virtual world to the extent that they experience relevant emotions, thus precluding extinction and emotional processing. Therefore, there is a clear need to study presence in more detail. There is some evidence that the quality of the system has some influence on the level of presence felt. The main techniques used to immerse participants in the virtual environment are a head-mounted display (HMD) or computer automatic virtual environment (CAVE). The CAVE is a multi-user projection-based VR system. The patient is surrounded by stereoscopic computer-generated images on four to six sides (cubicle). In a recent study with patients with acrophobia, we found that CAVE presentation of VR environments resulted in higher levels of presence than HMD presentation of these environments. However, this did not result in more anxiety reduction.

To date, most virtual worlds used in psychotherapy have concentrated on visual realism, but progress is limited by computer-processing power. There are some interesting developments in the area of creating emotionally evocative environments. In order to immerse patients into the virtual world, auditory and tactile stimuli may be added to virtual environments. For example, in our studies we use a railing for hold onto in a height virtual environment, and vibrations in the airplane-chair during take-off or turbulence in our flight virtual environment.

Morie et al. hold that, by combinations of sensory inputs designed to trigger emotional responses, a “feels real” rather than a photo-real world can be achieved. In their VR world, they make use of visceral low-frequency sounds, which may actually be below the threshold of hearing, but still can have impact, like a musical score does in movies. Smell is now hardly used in VR but may also enhance a “feels real” experience. There is quite some research suggesting that smell is associated with memories, and an integration of smells with virtual worlds might also enhance the “feels real” experience. Clinical applications are especially worthwhile in the area of cue exposure therapy for substance abuse and eating disorders, but are not restricted to these areas.

Finally, individual differences related to the experience of presence in VR need our attention. There is some evidence that such personal characteristics as degree of absorption and hypnotisability may mediate the effectiveness of VR. Other possible predictor variables for presence are the propensity of participants to get involved passively in some activity (like reading a book and watching movies), the ability to concentrate, and alexithymia. Research into these moderating individual traits will be of value because it may enhance selecting patients who profit most from treatment using VR.

**CONCLUDING REMARKS**

In sum, given the many advantages of VR over conventional psychotherapies and the results achieved so far, further research efforts in this area are needed. But the proof of the pudding is the effectiveness of VR treatment as stand-alone intervention versus the gold-standard intervention in the respective areas. There is a clear need for further controlled randomized studies evaluating VR therapies, especially for eating disorders, sexual dysfunctions, addictions, and other anxiety disorders than acrophobia and fear of flying.

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REFERENCES


PAUL M.G. EMMELKAMP, Ph.D.
Department of Clinical Psychology, University of Amsterdam, Amsterdam, Holland
E-mail: P.M.G.Emmelkamp@uva.nl

As Riva observed in his review, it is not without difficulties that virtual reality (VR) has become a recognized therapy tool. Having acquired an incontestable role in telemedicine,1 VR seems to be a promising support for psychotherapy in numerous clinical contexts. Riva’s review provides a clear and effective depiction of the state of the art in psychotherapy written from an experienced author in the field who has been involved in more than one application himself, and concludes with a list of possible explanations for the limits that cybertherapy may find in its development. However, current limitations cannot only be traced back to a poor technical flexibility, scarcity of clinical protocols, and high costs. In our opinion, these aspects, although important, are a part of the problem rather than its deep cause. We would like to extend the reflection on what is slowing down, whilst not stopping, a thriving growth in this area.

VR applications to psychotherapy move on a very dangerous cliff: expectations, high in any psychotherapy, are increased by the power with which VR and new technologies are popularly entrusted. In order to meet these expectations, cybertherapy has to undergo a reinvigorating cure itself, necessarily including the development of a shared vision on interaction in a mediated world. Such a shared vision allows avoidance of practical mix-ups and conceptual confusion that would seriously interfere with the therapeutic goal. VR-supported psychotherapy is always an interdisciplinary endeavour, where “boundary objects” are necessary to allow different communities to understand each other on a common terrain.2 The concept of presence in mediated environments could serve as an inclusive, fresh boundary object. Unfortunately, there is an abundance of independent presence definitions, almost outnumbering the amount of virtual environments, and a certain reluctance to capitalize on reflections already available in neighborhood fields on mediation, engagement, interaction, and ergonomics. These facts make presence contribution quite nebulous, and theoretical statements and individual studies difficult to translate into design guidelines for VR applications.3 To account for the way in which people manage to be present in a cybertherapy setting, some issues should be dealt with that are currently among the crucial ones in social science and technology application.

A therapeutic setting is much more complex than those usually considered in presence models,4 where the focus is almost exclusively on the digital simulation, and external events are considered only as a threat to a good virtual experience. These kinds of environment have a mixed (real-virtual) nature, and
existent models of presence like “Break in Presence” 5 cannot account for them. Moreover, a therapeutic setting is relational, symbolic, and immersed in the personal history of the patient and of the therapist, as well as in the simulation, constituting what can be defined as a hybrid environment. These considerations notwithstanding, the context in which a virtual environment is used, while at the top of the list in any other approach to human–computer interaction is completely disregarded in this field. It looks as if the excitement and the rhetoric of virtual environments as an artificial reality on its own were taken as a serious description of what actually happens during the session. Instead, the actual, sequential interaction with the system must be observed in the situated, contingent circumstances in which it takes place. 9,10

Another necessary entry in the agenda is a deep investigation on cultural factors. Virtual environments for psychotherapy are often inspired by real-life environments and interspersed with symbolic implications. While designers cannot be personally aware of the extent to which their work is located in their own culture, the possibility that the intended meaning of a simulation be subverted in another community is very high, along with the risk that the whole therapeutic strategy makes no sense at all in a different culture. The idea to scale e-health products for a worldwide distribution at no additional cost has then to be abandoned. A virtual environment, as many other psychological tools (e.g., questionnaires, tests), needs to be culturally adapted in order to make it compatible with the target users’ experience and with the general therapeutic goal. 12 The cultural dimension also provides a framework to discuss ethical and sustainability issues that are folded into the valuable goal of alleviating people’s psychic sufferance, as Riva reminds in his review.

The involvement of the body and of the physical setting in any cybertherapy is another point to be defined. The experience with the simulation is a complex one, incorporated and distributed on both physical and cultural-cognitive dimensions, as mentioned above. “What people perceive, how they conceive of their activity and what they physically do develop together,”13 says Clancey. The strict interconnection between cognitive-cultural dimension and body should be considered when planning psychotherapy using VR, because the use of the technology, the conditions during the session, and the involvement in the simulated experience rely on embodied coordinates. The moment of full presence in the simulation does not amount to a disappearance of the real environment, but to its reconfiguration with respect to the virtual action. A good model would admit that different configurations are possible and that selecting one as desirable is a choice.

The ultimate issue of any psychotherapy is the way in which the experience in the clinical setting relates with the real one. A general, flexible model that connects the virtual “experience” to a broader cultural, physical, and cognitive context may help understand the possible consequences of cybertherapy in everyday life.

REFERENCES

GIUSEPPE RIVA IS A LEADER in the field of the application of virtual reality (VR) to the therapeutic arena, and I am honored to be asked to comment on his review paper. I agree with many of Riva’s conclusions, in particular that, “VR thus becomes a very useful intermediate step between the therapist’s office and the real world.”

I would like to emphasize that VR is a tool to be used in therapy, not a replacement for any of the essential elements in therapy. To paraphrase poorly, bad therapy with VR is still just bad therapy. We have tried to emphasize this point from the beginning, and it has been stressed in every treatment manual we have written since the early 1990s. I believe the ultimate goal of any therapy is to decrease the patient’s functional impairment. For most, and with my cognitive behavioral theoretical orientation, this translates into some needed change in behavior.

Therefore, our use of VR-assisted therapy grew out of (1) my theoretical orientation (i.e., cognitive behavioral therapy [CBT] and information processing); (2) the needs of the patients we see (i.e., patients with anxiety disorders who generally require exposure therapy); (3) the obstacles to standard CBT therapy, especially exposure therapy (e.g., actually having to travel to the airport and an airplane, finding an audience); and (4) our desire to improve existing therapies or make them more accessible to therapists and patients or more efficient to implement. We don’t create new virtual applications and environments because we can or because it is popular; we have attempted to only create new applications where some advance is needed. As Riva points out, one of the obstacles to VR therapy is the expense, especially of creating the virtual environment, so the incremental advantage must justify the incremental cost. This is also exactly why VR therapies have required more empirical validation than existing therapies. There must be empirical evidence of the efficacy of VR therapies to justify their use. The same standards have not been applied to many existing therapies (e.g., psychoanalysis).

I would like to emphasize here also that the power of the virtual experience also requires extra sensitivity to ethical considerations. Elsewhere, we have discussed ethical issues in VR applications. Here, I’d like to emphasize three important points. One, therapists should use VR to enhance therapy rather than substitute for it. VR should be approached as a tool to be used by clinicians experienced with the types of patient problems and treatment they are treating. It is not meant to be a convenient way of attracting new patients or of administering a new type of therapy that they are not qualified to provide. Two, there is a different therapist–patient dynamic in VR therapy that must be taken into account. As in any social interaction, non-verbal communication is of paramount importance in the therapist/patient dyad. Much of this non-verbal communication comes from facial expression, body posture, hand gestures, and intonations. If patients are wearing head-mounted displays, they cannot see the therapist and therefore lose all of the non-verbal communication absorbed visually. Three, what is considered unethical in standard therapy would still be considered unethical in VR therapy. Variations on sex therapy have been held up as prime examples of this warning, but there are certainly others.

In closing, I think that VR-assisted therapy has great potential. We now have the ability to bring the real world into the therapist’s office in more than a verbal or imagined representation. Current projects in the Virtually Better laboratory not mentioned in Riva’s review include several studies with the fear of public speaking using virtual audiences, including in a self-help format, a current study of the virtual relaxation chamber with patients with chronic pain, a study examining the ability of VR to distract pediatric cancer patients during painful medical procedures, a larger controlled study of the virtual airplane for the fear of flying with 75 treatment completers, the use of VR exposure therapy combined with medication, and current studies applying VR to addictions with a virtual party for smokers and a virtual crack house for...
crack cocaine addicts. These are but a few of the potential applications of VR in therapy, and I encourage the development and testing of more applications.

REFERENCES


BARBARA O. ROTHBAUM, Ph.D.
Emory University School of Medicine, Atlanta, Georgia
E-mail: brothba@emory.edu