



# 1 in 4

**A fight against statistics:**  
How immersive technology has  
the potential to accelerate our  
response in the global battle  
against mental illness

**oxfordvr**

Immersive technology for mental health

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## Foreword

It's difficult for many of us to appreciate the scale of mental health problems today. The figure of 'one in four' represents the number of people in the world affected by mental health disorders at some point in their lives.

The how and why of rising mental health cases is multi-faceted and the subject of on-going research effort. At Oxford VR, however, we believe that we can play a significant role in meeting the challenges for modern healthcare by providing clinically validated, cost-effective and user-centred cognitive treatments for clinical conditions such as anxiety disorders, psychosis, depression and addictions.

We do this via immersive technology. Virtual Reality (VR) allows us to simulate the physical world and thus to deliver automated mental health therapies in an engaging and effective way to many more people than currently possible. Oxford VR is developing an entire suite of VR resources and activities that can be combined to tackle a wide range of conditions and disorders.

For nearly 20 years Oxford VR's Chief Clinical Officer, Professor Daniel Freeman, has been pioneering the use of VR to understand and treat mental health conditions. Driving this research has been the belief that immersive technology can deliver significant positive impact to patients, the health system and the wider economy.

At Oxford VR we are striving to improve access to the best psychological therapies. Immersive technology will allow us to do that. This is a very exciting and inspiring time.

**Barnaby Perks, CEO  
Oxford VR**

# Introduction



## Mental health: a real & present crisis

The World Health Organisation puts mental illnesses among the leading causes of disease and disability in the world, with depressive disorders the fourth leading cause of global disease burden. It also states that by 2020 mental health is expected to rank second behind ischaemic heart disease<sup>1</sup>.

The effects of mental illness don't just impact the individual; they are much more far reaching. Family members, employers, economic productivity and health and welfare systems are all affected. In fact, mental health problems represent the largest single cause of disability in the UK and the cost to the economy is estimated at £105 billion a year – roughly the cost of the entire NHS<sup>2</sup>.

There's no shortage of high-quality, evidence-based psychological treatments for many mental health problems. Treatments have been verified by dozens of clinical trials. What is lacking is the skilled clinicians to deliver them.

<sup>1</sup> World Health Organisation, World Health Report 2001

<sup>2</sup> NHS England, 'Five Year Forward View for Mental Health', 2016



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# How consumer technology has accelerated the potential of digital health



**Help in the hand for base level healthcare conditions via mobile apps**

In a connected and high-tech world many people are turning to self-help mobile apps on smartphones. Today, hundreds of apps exist for depression alone. These help to identify low mood, steer the user away from negative thoughts and coach a positive approach to daily life. However, these tools alone are not enough to treat the gamut of mental health conditions.



**Acceptance of gaming as a medium to entertain, excite and engage**

From its earliest incarnation in the 1970s, through the video arcade era of the 1980s and 1990s, to the home console entertainment systems of today, computer gaming is a mainstream part of modern society. The mass adoption of smartphones and mobile devices in recent years has only served to further the acceptance of gamified and animated applications through the use of CGI.



**Augmented and virtual reality - simulating the physical world in a virtual environment**

Technological innovations such as VR are opening up exciting new possibilities. Virtual reality was first developed in the mid-1960s and essentially the elements haven't changed greatly over the years – a computer generates an image, a display system presents the sensory information and a tracker feeds back the user's position and orientation to update the image.

What is new is the sophistication and affordability of the technology. VR has entered the consumer electronics world via gaming headset devices like the Oculus Rift and HTC Vive.

They offer a whole new way to play, immersing the user deep in adventures and experiences inside a simulated world. (Augmented reality takes this a step further, with computer-generated objects added to the real world.) But these technologies are not just for gaming.

VR can also transform the way society tackles mental health problems.

# The case for immersive therapy technologies



## CBT and talking therapies changing the way people think and behave

In England treatment options for mental health have increased significantly since 2008 via the Improving Access to Psychological Therapies scheme, which aims to expand access to services<sup>3</sup> and train 10,500 therapists by 2021<sup>4</sup>. Yet providing timely treatment to everyone who needs it will remain challenging: demand for treatment far outstrips supply.

Talking therapies such as Cognitive Behaviour Therapy (CBT) are generally effective for problems such as anxiety and depression. Such therapies focus on changing the way the individual thinks and behaves.

However, the most powerful change happens when people are directly presented with the situations that cause them distress and learn in that moment how to think, feel and behave more constructively.

<sup>3</sup> Adult Improving Access to Psychological Therapies programme, 2018  
<sup>4</sup> The Guardian, 'Don't dismiss tech solutions to mental health problems', 11 July 2018



## How does VR help?

Oxford VR's automated VR treatments use a virtual coach or life-like avatar to enable quick, cost-effective and high-quality access to therapy services. This technology complements face-to-face therapy, helping to share therapeutic workload and facilitating a large increase in the number of patients who can be treated.

In VR we can create powerful simulations of the scenarios in which psychological difficulties occur. For example, it negates the need for a therapist to accompany a socially anxious patient to a real-life crowded shopping centre. Furthermore, situations that are almost impossible to build in to a course of therapy - for instance, the kind of traumatic event that can cause PTSD - can be recreated

This means taking cognitive treatments out of the consulting room and into the real world, with the therapist acting more like a personal trainer or coach.

Unfortunately, however, this rarely occurs. Even when therapists recognise the value of this approach, time is at a premium.

“Oxford VR’s treatment scenarios trigger the same psychological and physiological responses as a real-world situation. Yet patients know they are safe and secure in a virtual world.

This offers extraordinary potential for mental health treatments.”

and experienced by the patient in a carefully controlled way as often as necessary.

VR has another advantage. Because the situations are not real, patients have the confidence to try things they would normally avoid. For example, someone with social anxiety worried about entering a busy café can practise - as many times as they like - more positive ways of thinking and behaving in a VR scenario. A person with fear of heights who would never dream of venturing to the top floor of a shopping centre will try it out in VR. Yet although it is a computer-generated environment, the mind and body behave as if it were real. This means that the lessons learned in VR transfer into everyday life.

# Why Oxford VR?



## The bridge from academia to clinically validated therapies

Digital health innovations, like any other treatment modality, need to be underpinned by scientific evidence showing the clinical, operational and long-term financial benefits to patients and health systems. Built on nearly two decades of research at Oxford University, the team at Oxford VR is well positioned to produce evidence-based therapies that can transform treatment access and operating economics for the world's most common, costly and debilitating disorders.

Led by Chief Clinical Officer, Daniel Freeman, Professor of Clinical Psychology and NIHR Research Professor at the University of Oxford, the team

recently completed the first review of every study that has used VR to assess, understand and treat mental health conditions<sup>5</sup>. In over 25 years, and 285 studies across the range of anxiety disorders, the results unequivocally confirm that VR is a proven modality for delivering rapid, lasting improvement for patients.

Even more exciting is the new and real evidence of the projects and applications being developed at Oxford VR. This work confirms that VR treatments can be an enormously valuable treatment option, either when undertaken over several weeks or, in some cases, in short sessions such as half days.



## Oxford VR's treatments for phobias, anxiety, psychosis, depression and addiction

In early 2018 Oxford VR conducted one of the largest randomised controlled trials of fear of heights treatments, in which 100 people who had suffered a fear of heights for an average of 30 years were randomly allocated either automated VR therapy or no treatment. The VR therapy was delivered via 30-minute interventions in a clinic, where a virtual assistant guided users through a cognitive treatment programme. On average, people spent approximately two hours in VR over five treatment sessions.

The findings, published in the *Lancet Psychiatry*<sup>6</sup>, showed results that were better than outcomes typically delivered by premium face-to-face therapy. All participants in the VR group showed a reduction in their fear of heights, with the average reduction being 68%. Half of the participants saw a reduction in their fear of over 75%. These results demonstrate the dramatic effects on psychological wellbeing that automated VR therapy can produce.

Oxford VR is a partner in the ground-breaking NHS-funded gameChange project. People with psychosis can find day-to-day life so anxiety-

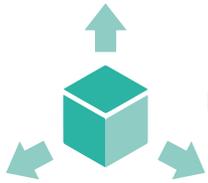
provoking that they withdraw. Everyday tasks like getting on a bus, doing the shopping or speaking to other people can become extremely challenging.

It is well documented that what works best is active coaching in the situations that trouble people, helping patients move beyond their fears. However, this is difficult without a skilled therapist who has the time to get out and about with patients. Equally, patients can often find the idea frightening. The gameChange study will take people into sophisticated simulations of the real-life scenarios they find troubling. These scenarios are delivered in a graduated way so patients are never presented with situations beyond their ability to cope.

Furthermore, Oxford VR is also working on an immersive treatment to help young people with social anxiety. Treatments for depression and addiction, two global afflictions with major impact both on individual wellbeing and society at large, are also a central part of its strategy to tackle the most prevalent, debilitating, and costly psychological disorders.

<sup>5</sup> Psychological Medicine, 'Virtual reality in the assessment, understanding, and treatment of mental health disorders', 22 March 2017

<sup>6</sup> Lancet Psychiatry, 'Automated psychological therapy using immersive virtual reality for treatment of fear of heights: a single-blind, parallel-group, randomised controlled trial', 1 August 2018



## Under the hood – how is VR therapy built?

Each Oxford VR treatment is carefully designed to tackle a specific clinical condition. There is no “one size fits all” approach to mental health disorders. Instead, treatments are based on proven therapeutic protocols, and Oxford VR is developing a suite of VR resources and activities that can be combined to tackle a wide range of conditions.

It is this clinical expertise informed by decades of research and clinical practice that informs the development of roleplay situations inside the immersive environment.

In order to achieve the high-quality simulations that will promote the best clinical experience, Oxford VR’s developers are drawn from the gaming industry. They are able to apply their animation, illustration and programming skills to help ensure the treatments are engaging, imaginative, and even in some cases enjoyable, which promotes a greater likelihood of a patient completing the treatment. For example, the fear of heights simulation isn’t just about walking across bridges or climbing stairs. It also asks patients to rescue a cat from a tree, paint a picture while standing on the edge of a balcony, and ride in a hot air balloon.

Oxford VR’s treatments are delivered by a virtual coach called Nic. She guides the user through the therapy, asking questions about thoughts and feelings, and providing instruction, advice, and encouragement. This virtual therapist is another of the factors that sets Oxford VR apart from other providers in this space. It overcomes the shortage of real-life therapists to improve access to therapy whilst also providing a talking, emotive guide that consistently presents the therapeutic intervention in an engaging, but standardised way thereby ensuring adherence to protocol.

Attention to detail in development is key to ensure the avatar is as convincing as possible. To do this, Oxford VR works with specialist actors to capture the natural gait of the human body, voice and facial movements.



## Plug-in and Play

When Oxford VR delivers an application to a clinic or therapy centre, it provides everything needed to get started with delivering services: the VR headset, the VR therapy applications, training and ongoing support.

This ‘plug-and-play’ proposition overcomes potential internal barriers to technological change and IT interoperability issues. All the hardware that therapists and their support teams require is provided. Thorough training is delivered to extract the maximum value from therapy sessions and ongoing hardware and training support services are guaranteed.

The therapy set-up is equally versatile, recognising that some patients are home-based and are unable, by their very clinical conditions, to travel to clinics. The solution is therefore portable to bring benefits directly to patients beyond the traditional walls of the hospital, clinic or therapy setting.



# Dispelling the myths and scepticism

Not everyone agrees with a tech-powered approach to mental health. For some professionals, the therapist-patient relationship is at the heart of the treatment. Freud stressed the importance of 'transference' between patient and therapist and counselling pioneer Carl Rogers believed that "the therapist's empathy for their [sic] patient is enough to bring positive change".

But if we're serious about addressing the mental health crisis, we have to let go of the idea that therapy can only be done face-to-face and recognise the huge gains tech interventions can potentially provide.

Immersive VR technologies will not replace human clinical interventions. Instead, Oxford VR's interventions are designed to complement existing treatments, accelerating access to evidence-based psychological therapies.



## A safe and regulated option

To safeguard patients, treatments for complex psychological conditions require both clinical expertise and regulatory compliance. Oxford VR's products are developed in accordance with medical device regulations and undergo robust clinical trials.

This is not innovation for innovation's sake: the priority is making a safe and lasting difference to psychological health, giving therapists safe and effective tools that they can rely on.

## An eye on the future...

The future of VR for the treatment of mental health conditions is an exciting one, promising positive effects for patients, the health system and the wider economy.

The evolution and affordability of consumer VR hardware & equipment means that effective, engaging, and automated therapy can be made available to huge numbers of people, despite a shortage of skilled mental health clinicians.

Whilst rigorous testing and clinical evaluation are vital going forward, Oxford VR has broken new ground by proving that automated VR therapy can effectively treat mental health disorders.



Now, the mission is to continue development of treatments to tackle the most common, debilitating and costly psychological problems, and to extend global healthcare relationships so that these interventions reach the people who need them most.

Oxford VR has a global presence, with an ever-growing base of healthcare collaborators and technology partners from around the world. It is committed to leading the vanguard of VR treatments that will offer not only a powerful and scalable complement to existing treatment options, but also help provide faster access to high-quality therapy for the 'one in four' people who so urgently need it.

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