A feasibility study into the use of a virtual reality experience and its impact upon emotional control in relation to undergoing Magnetic Resonance Imaging (MRI).

Submitted by Darren Michael Hudson, to the University of Exeter as a thesis for the degree of Doctor of Clinical Research, September 2023.

I certify that all material in this thesis which is not my own work has been identified and that any material that has previously been submitted and approved for the award of a degree by this or any other University has been acknowledged.

Abstract

Background

Despite developments in Magnetic Resonance Imaging (MRI) which have helped improve the patient experience, the procedure remains a source of anxiety for many. This can be expressed as claustrophobia due to the physical nature of the scanning equipment.

Traditional forms of patient preparation only go so far in representing what to expect from a scan, and so Virtual Reality (VR) has emerged as a potential way of providing enhanced support beforehand. Whilst there is early evidence that such use of VR lowers anxiety, there is a lack of understanding as to how this may be achieved and therefore how to enhance its effect.

Purpose

The purpose of this feasibility study was to assess whether use of the Biopsychosocial model of challenge and threat was appropriate to understand how virtual scan experiences may support emotional control associated with undergoing MRI. It also provided opportunity for feedback on what aspects of a virtual experience may be important for improvement, as well as how accepted such tools might be by potential patients.

Research Design

A convergent experimental mixed methods approach was used. Fifteen participants underwent a VR session comprising of two exposures to the virtual scan experience. Measures to assess their demand and resource appraisals of the experience, and reported anxiety throughout, were obtained, along with feedback on its realism, usefulness and application.

Results

Restriction was the dominant concern regarding claustrophobia and was shown to significantly reduce following exposure. Six participants were initially identified to be in a threat mindset, with all participants moving to, or lowering, a state of challenge over two exposures. Coil placement and entry into the scanner were triggers of elevated anxiety which lowered the second time. Time taken to progress through the

experience also shortened, in particular for scanner entry. Reported confidence in ability to cope significantly improved following completion of the VR session and was shown to have the greater impact. Overall, the virtual experience was considered realistic and well tolerated by users with some areas for improvement highlighted.

Conclusion

The theoretical framework used provides deeper understanding as to how the use of VR tools influence emotional response which can be improved through exposure. Most benefit is for those in a threat mindset through having opportunity to familiarise themselves with the scan environment and be informed on what to expect, but also receive required support away from pressures of busy scanning lists.

Lay Summary

Magnetic Resonance Imaging (MRI) scans can make people anxious because of the small, enclosed space. Virtual Reality (VR) is being used to help reduce this anxiety, but it is not fully understood how this works.
Therefore, the study aimed to explore further how VR can make people less anxious about scans and what parts of the VR experience were important.
15 people tried a VR session simulating an MRI scan and were asked how they felt and their thoughts on the experience.
Results showed VR reduced anxiety about undergoing MRI through lowering concern and increasing confidence to cope, especially for those with heightened anxiety initially. People thought the VR experience was pretty realistic and helpful, but there were some things that could make it even better.
Use of VR scan experiences can help people feel less anxious about MRI, especially if they are very worried at first. It helps them get used to the MRI environment and feel more comfortable. It could be most helpful for people who are really anxious about the MRI and need some extra support.