USE OF VIRTUAL REALITY TO REDUCE CLAUSTROPHOBIA DURING MRI SCANS
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Summary:
Rationale for the use of VR in the application of cue exposure in pathological gambling.

Gambling study design.

Clinical protocol: VR treatment program.

Practical Demonstration of the use of VR for pathological gambling.

CLAUSTROPHOBIA


A. Marked and persistent fear cued by the presence or anticipation of a specific object or situation.

B. Exposure to the phobic stimulus almost invariably provokes an immediate anxiety response, which may take the form of a situationally bound panic attack.

C. The person recognizes that the fear is excessive or unreasonable.

D. The phobic situation is avoided or endured with intense anxiety or distress.
CLAUSTROPHOBIA

FEAR OF SUFFOCATION

FEAR OF RESTRICTION

RESTRICTION OF MOVEMENTS

CONFINEMENT

Rachman (1990, 1997)

RATIONALE

MRI

- Magnetic Resonance Imaging (MRI): valuable diagnostic tool.
- MRI: a small tunnel-like, immobile, 40-50 minutes.
- 37% of MRI participants: moderate to severe anxiety, (Katz, Wilson & Frazer, 1994).
- Between 4 and 20% of patients refuse to undergo the MRI or terminate the test before completion (McGlynn, Karg & Lawyer, 2003; Melendez & McCrank, 1993)
MR Imaging (MRI)

- Restriction of movements
- Confinement

HIGHLY CLAUSTROPHOBIC

VR Distraction

Effective in acute pain:
- Wound care, physical therapy
- VR draws attention away from pain
- Patients experience less pain, they spend less time thinking about their pain and they experience less anxiety.

Effective in claustrophobia during MRI:
- VR environments could distract and "transport" the patient to a different and open space.
- Less sensation of restriction and confinement?
- Less anxiety?

Increment in the completion of MRI scans by patients with claustrophobic fears.

AIM OF THIS PRESENTATION

Preliminary data of the efficacy of a VR procedure to reduce the claustrophobic reaction in MRI.

STUDY DESIGN

1. Between subject design.
2. Two experimental conditions:
   VR distraction
   Music distraction
MEASURES

ANXIETY DISORDERS INTERVIEW SCHEDULE (ADIS-IV; Di Nardo, Brown & Barlow, 1994).

CLAUSTROPHOBIA QUESTIONNAIRE (CLQ; Rachman & Taylor, 1993; Radomsky et al., 2001).

MRI FEAR (0-4 scale).

BEHAVIORAL AVOIDANCE TEST: entering the mock MRI scanner and remain there for up to 10 minutes.
Before entering the scanner:
Level of expected anxiety.
Level of expected self-efficacy.
During the MRI scan: Level of anxiety every 3 minutes.
After coming out from the scanner: Anxiety, and self-efficacy.
BAT score: 0 = refused to enter; 1 = went into the device; 2 = stay from 0 to 2 minute; 3 = stay > 2 to 4 minutes; 4 = stay > 4 to 6 minutes; 5 = stay > 6 to 8 minutes; 6 = stay > 8 to < 10 minutes; 7 = completed the test.

EQUIPMENT

MOCK MRI SCAN:
Instrument Development Laboratory. University of Washington
EQUIPMENT

VR EQUIPMENT:
Dell (www.dell.com) 530 workstation with dual 2 GHz CPUs, 2 GB of RAM, a GeForce 6800 video card running.

HMD: Kaiser SR-80 (www.rockwellcollins.com)
MultiGen-Paradigm Inc’s Vega VR software (www.multigen.com) on the Windows 2000 operating system.

A trackball was used to interact with the virtual world.
STUDY PROCEDURE

Inclusion/exclusion criteria:

a) Meeting DSM-IV criteria for specific phobia, situational type (claustrophobia);
b) At least one year since the onset of the phobia;
c) Not being able to complete a BAT in the mock MRI;
d) No other psychological disorder in need of immediate treatment;
e) No psychotic disorder, substance abuse or bipolar disorder;
f) No severe physical condition such as epilepsy, or severe heart disease;
g) No history of severe motion sickness;
h) Reading and signing an informed consent form approved by the UW Human Subjects Committee.

STUDY PROCEDURE

Phase 1:
- Clinical interview: DSM-IV criteria
- Questionnaire: CLQ (Radomski et al., 2001).
- Behavioral Avoidance Test (MRI with no distraction)

IF MEETING CRITERIA FOR CLAUSTROPHOBIA:

Phase 2:
MRI with distraction:
VR distraction vs. Music distraction
PARTICIPANT

Female, 25 years, University degree.
Met DSM-IV criteria for specific phobia, situational type (claustrophobia).
Severity: 5 (0-8 ADIS-IV scale)
Met inclusion criteria
CLQ score = 47
MRI fear = 4 (0-4 scale)
Not able to complete BAT

RESULTS: Behavioral Avoidance Test

<table>
<thead>
<tr>
<th></th>
<th>Control MRI</th>
<th>MRI with Virtual Reality</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>PRE</td>
<td>DURING</td>
</tr>
<tr>
<td>Anxiety (0-10)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>Min 3: 5</td>
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<tr>
<td>Self-efficacy (0-10)</td>
<td>7</td>
<td>7</td>
</tr>
</tbody>
</table>

IMPORTANT: NO HABITUATION IN FIRST MOCK MRI (CONTROL)
RESULTS:

Note: Avoidance score: 0 = refused to enter; 1 = went into the device; 2 = stay from 0 to 2 minute; 3 = stay > 2 to 4 minutes; 4 = stay > 4 to 6 minutes; 5 = stay > 6 to 8 minutes; 6 = stay > 8 to < 10 minutes; 7 = completed the test.

CONCLUSIONS

- Preliminary evidence of the utility of VR to help reduce claustrophobic fear during MRI examinations.
- Our patient wasn’t able to spend 10 minutes in a mock MRI. However, she was able to complete the mock MRI while being immerse in a 3D computer-generated virtual environment.
- Her levels of anxiety dropped from 9 (control MRI) to 3 (MRI with VR).
- She felt more confident about her efficacy to complete the MRI after she underwent it with VR.
- This is the first study showing the utility of VR to alleviate claustrophobic symptoms during a mock MRI procedure.
- Very preliminary but encouraging results.
CONCLUSIONS

- VR is a unique experience that is able to take the user to different situations.
- Being able to feel “present” in a more open space while going through a MRI scan could help to reduce the feelings of confinement and restriction.
- If our results are replicated with larger samples, we will have a new procedure that could decrease the number of MRI examination failures.