CYBERTHERAPY 2006

USE OF VIRTUAL REALITY TO REDUCE CLAUSTROPHOBIA DURING MRI SCANS
A. Garcia-Palacios, H. Hoffman, T. Richards & Sam Sharar
University of Washington, USA. Universitat Jaume I, Spain

CLAUSTROPHOBIA

DSM-IV (APA, 2000): Anxiety disorder. Specific phobia, situational type. Fear of confined spaces

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)

MRI

- Restriction of movements
- Confinement
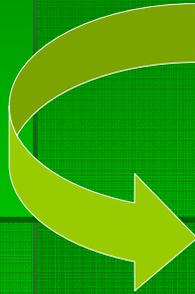
HIGHLY

CLAUSTROPHOBIC

VR distraction

Effective in acute pain:

- Wound care, physical therapy
- VR draw attention away from pain
- Patients experience less pain, they spend less time thinking about their pain and they experience less anxiety.

Hoffman, Patterson, & Carrougher, (2000); Hoffman, et al., (2001) (2004).

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 QUESTONNAIRE (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.

VR
ENVIRONMENT

SNOW WORLD
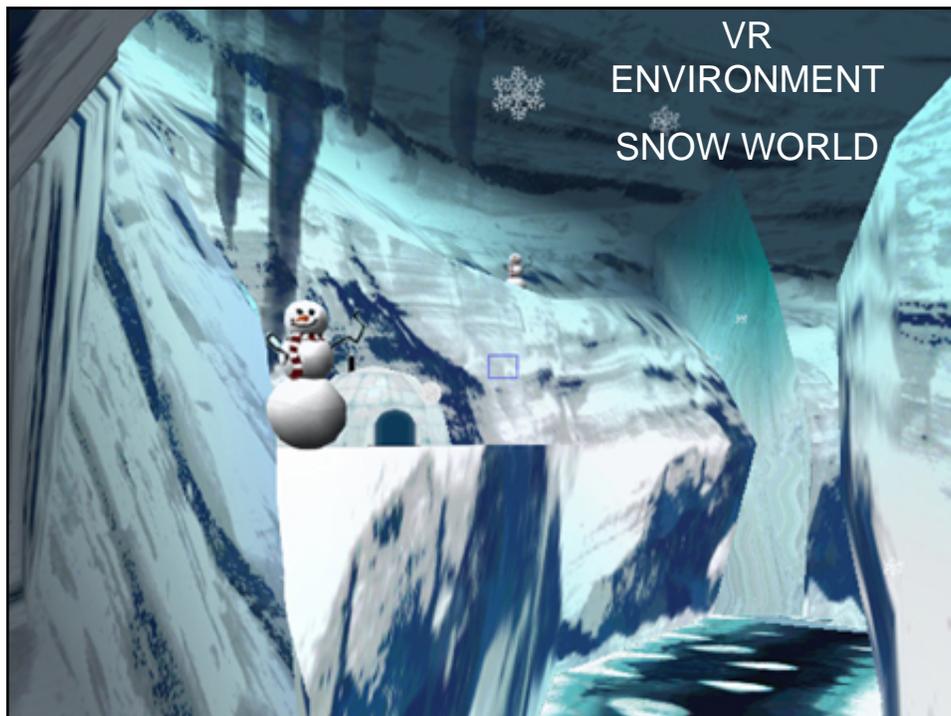
STUDY PROCEDURE

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

Phase1:

-   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)

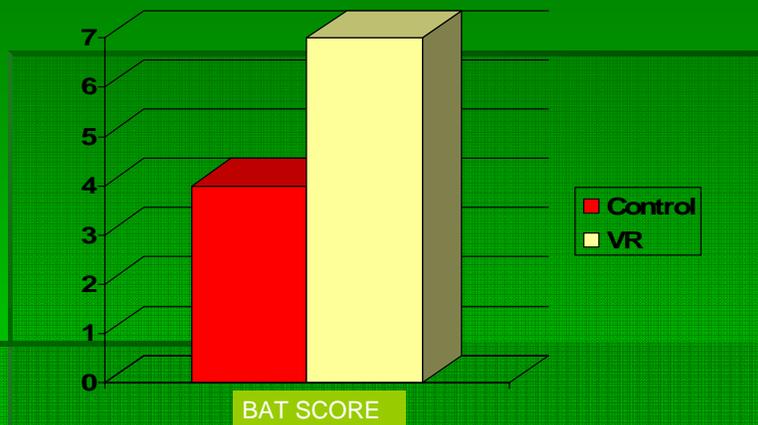Met inclusion criteria

CLQ score = 47

MRI fear = 4 (0-4 scale)

Not able to complete BAT

RESULTS: Behavioral Avoidance Test

	Control MRI			MRI with Virtual Reality		
	PRE	DURING	POST	PRE	DURING	POST
Anxiety (0-10)	9	Min 3: 9 Min 6: 9	9	9	Min 3: 5 Min 6: 3 Min 10: 3	3
Self-efficacy (0-10)	7		7	7		10

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.

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