

An Analog Study of Simulation Trauma Severity: Sensitivity of 'Bus-World' for VR Exposure Therapy

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- **Over 900 Israelis have been killed in a prolonged series of attacks, including: shooting incidents, car bombings and suicide bomb attacks on public transportation.**
- **Since the beginning of the Intifada (uprising) in September 2000, 7590 Israeli civilians have been treated for trauma in the aftermath of deadly terrorist attacks.**

• On the other side, between September 29, 2000 and July 8, 2003, 2,572 Palestinians have been killed, and more than 41,000 injured

No one wins.....



- Many victims of terrorism display severe emotional reactions, even in the absence of a physical injury.
- Some develop Post-traumatic Stress Disorder (PTSD).
- Symptoms include:
 - shock and numbness
 - fear, anger, depression
 - decrease in daily occupational or leisure-based activities

Who is affected by terrorism?



Virtual Reality as an intervention

- **VR has been shown to be highly effective for the treatment of phobias**
(Hodges, Anderson, Burdea, Hoffman, & Rothbaum, 2001).
- **Virtual Vietnam (VV) – has been created for the treatment of Vietnam war veterans with PTSD**
(Rothbaum, et al., 1999; 2001).



Virtual reality as an intervention of PTSD

- **World Trade Center**
(Difede & Hoffman, 2002).
- **Full Spectrum VR Application for Iraq War PTSD**
(Rizzo, et al., 2005)



Study Objectives

- **To design and build a simulation of a terrorist suicide bus bombing attack in Israel**
- **To investigate the physiological and subjective responses of healthy individuals to this virtual environment**

Methods

Participants

- **30 healthy volunteers (12 males, 18 females)**
- **Aged 23 to 63 years, (Mean=40.2, SD=13.1)**
- **Convenience sample**

Inclusion Criteria

- All subjects Posttraumatic Diagnostic Scale (PDS) < 1.1
(range of normal scale)

Exclusion Criteria

- Without a history of PTSD
- Without a history of any form of treatment related to trauma
- Were not present at a terrorist attack

Instruments

- **Post Traumatic Diagnostic Scale (PDS)**
 - (Foa, 1995)
- **Short Feedback Questionnaire (SFQ)**
 - (Kizony et al. 2003) - an abbreviated version of Witmer & Singer's (1998) Presence Questionnaire.
- **Subjective Units of Distress (SUDs)**
 - (Wolpe & Adams, 1991)
- **Heart Rate Monitor**

BusWorld

Built by Ari Hollander of Inprint Interactive
www.inprintit.com
Designed with Hunter Hoffman at the UW HIT Lab
www.wspells.com
ADDITIONAL SOUNDS AND TEXTURES
www.soundeffects.com
Photo Editing: www.shilling.co
Ariel Rosenberg

Virtual Reality Therapy for Survivors of Juvenile Trauma
PTSD Therapy
The University of Haifa

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Procedure

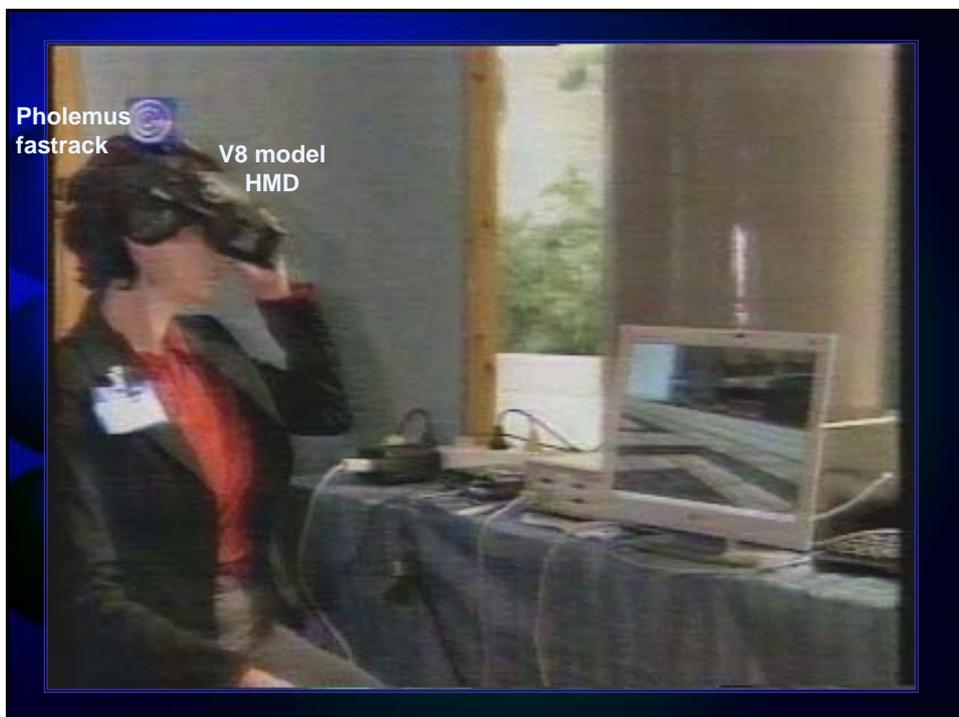
- Institutional Review Board approval
- Participant agreement
- Screening for exclusion criteria (PDS)
- Exposure for 90 s to each of four graded stages of Bus-World:

Stage 1: street scene, bus stop, no bus

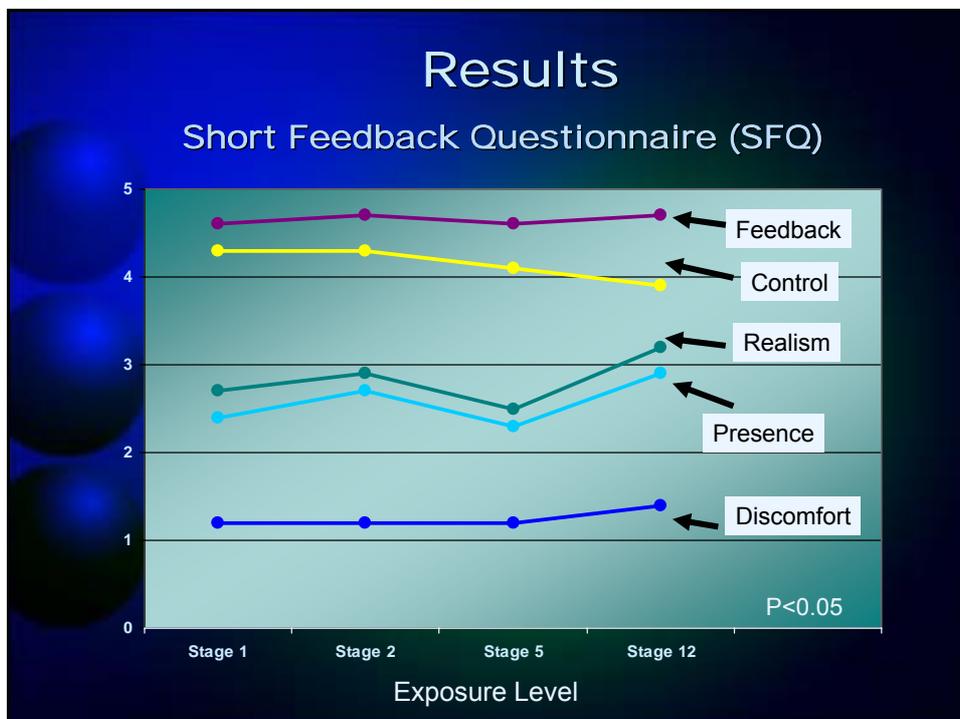
Stage 2: bus arrives at stop but does not explode

Stage 5: bus explodes with fire and smoke, no sound

Stage 12: bus explodes loudly with all visual effects,
loud crowd sounds and sirens, human remains

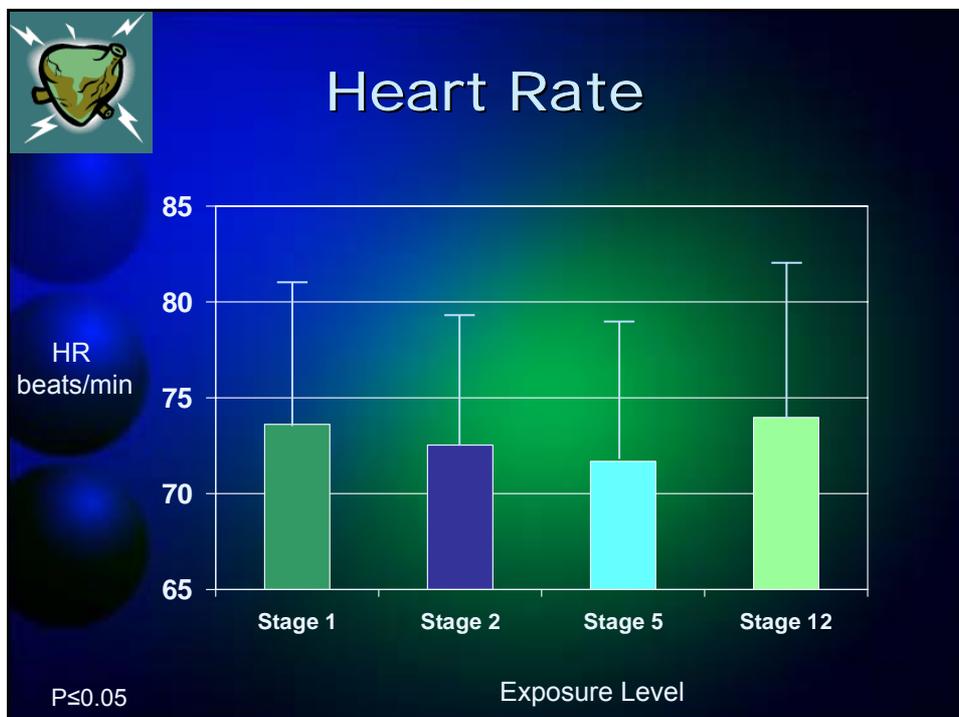


- Immediately following each exposure, heart rate was measured and the participants were asked to rate their SUDs and to complete the SFQ.



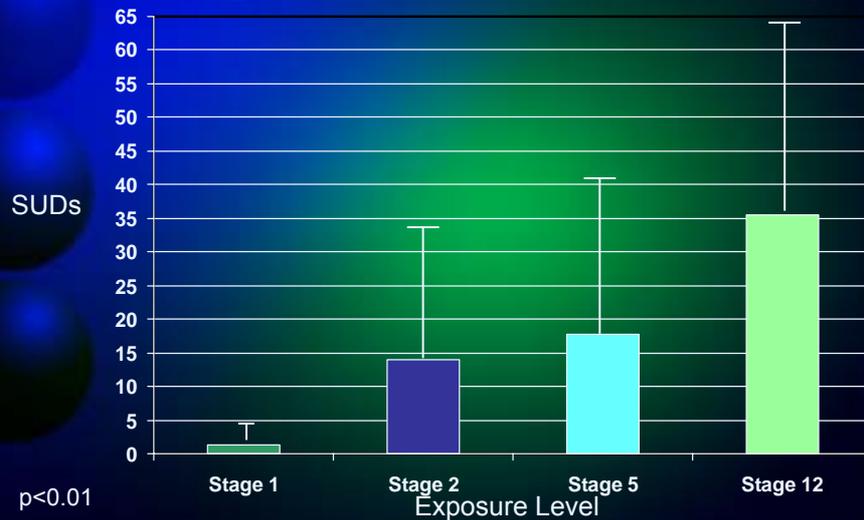
Short Feedback Questionnaire (SFQ)

- Significant differences in sense of being in environment between the 4 stages of exposure
- Increasing the exposure:
 - ✓ increase in sense of being in environment
 - ✓ decrease in feeling of control
 - ✓ increase in perception that environment is realistic
 - ✓ no differences regarding feedback and discomfort



Subjective Units of Distress (SUDs)

Increasing the exposure → increased anxiety



Summary of Results

- **Performance experience** – participants felt comfortable, few side effects
- **Subjective presence** – significantly affected by exposure
- **Heart Rate** – significant but small differences, no functional meaning
- **SUDs** - anxiety increased with the severity of exposure. (Rothbaum et al., 1995; Wilhelm et al., 2005)

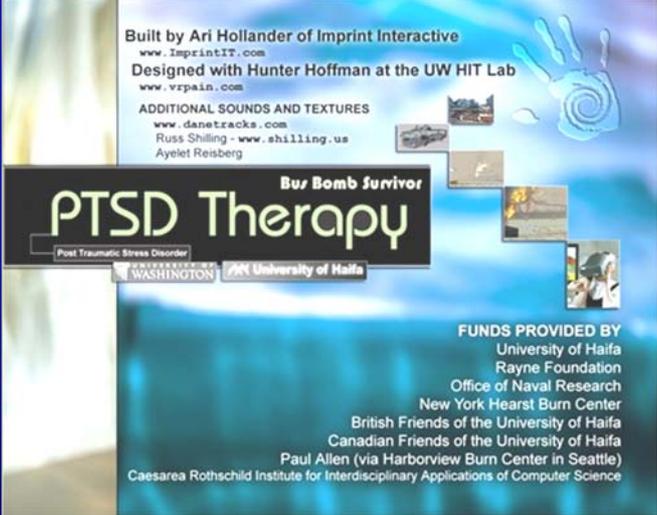
Discussion

- **Sensitivity of 'BusWorld' - Potential to provide graded exposure**
- **Importance of Analog studies – testing the scenario before you test it on symptomatic subjects**
- **Limitations- Responses of non-symptomatic subjects may differ from symptomatic subjects** (Robillard et al., 2003)

Future Studies

- **Test simulation with wider sample of participants who differ in age, culture, and exposure to trauma**
- **Use real time, continuous measures of physiological response**
- **Add feedback to the environment (smell, vibration via sub-woofer)**

Acknowledgment



Built by Ari Hollander of Imprint Interactive
www.imprint17.com
Designed with Hunter Hoffman at the UW HIT Lab
www.vrpain.com

ADDITIONAL SOUNDS AND TEXTURES
www.danetracks.com
Russ Shilling - www.shilling.us
Ayelet Resberg

Bomb Survivor
PTSD Therapy
Post Traumatic Stress Disorder

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