Advances in the Prevention, Assessment and Treatment of Posttraumatic Stress

- **Treatment**
  - PTS VR Exposure Therapy
- **Prevention**
  - VR Resilience Training
- **Clinical Training**
  - Virtual Human Patients
- **Promoting Access & Assessment**
  - SimCoach – Online Healthcare Support Agent/SimSensei

Virtual Reality integrates real-time computer processing, interface technology, body tracking & sensory displays to support a user to interact with and/or become immersed in a computer generated simulated environment. Within such controllable, dynamic and interactive 3D stimulus environments, behavioral action can be motivated, recorded and measured.

"...a way for humans to interact with computers and extremely complex data in a more naturalistic fashion."
**The Evolution of the Tool-Using Animal**

The 1st Link Aviation Simulator (1929) evolved into Virtual Reality (2014).

**Virtual Reality as a Simulation Technology**

Virtual reality arrives at a moment when computer technology in general is moving from automating the paradigms of the past to creating new ones for the future.

(Myron Krueger, 1993)

To Test and Train Piloting Ability

1st Link Aviation Simulator (1929)

To Test, Train and Treat Psychological, Cognitive, & Motor Functioning

Virtual Reality (2014)

**A Revolution in Clinical VR Application R&D**


1994

2014
**Exposure for Anxiety Disorders**

The aim of exposure is to help the patient to confront the feared stimulus in order to correct the dysfunctional associations that have been established between the stimulus and perceived threat (e.g., it is dangerous, I can't cope).

- Heights
- Flying
- Driving
- Spiders/snakes
- Public Speaking
- Claustrophobia
- Generalized Social Phobia
- Panic Disorder w/Agoraphobia
Fear of Flying (Emmelkamp, Schuemie et al.)

Aviophobia: Fear of Flying

Early version of the Virtually Better Inc. Fear of Flying Application

Previ Inc. 2000
San Diego Airport Scenario

New version of the Virtually Better Inc. Fear of Flying Application

New version of the Virtually Better Inc. Social Phobia/Addiction Applications

VR Anxiety Disorders Meta-Analysis

VR Anxiety Disorders Meta-Analysis

Research Article

VIRTUAL REALITY EXPOSURE THERAPY IN ANXIETY DISORDERS: A QUANTITATIVE META-ANALYSIS

David Oung, 1,2 Santina Hocevar, 1 Ana Maria Garcia-Rosello, 1 Cristina Barcia, 1 1 Virtual Reality Centers

Virtual reality exposure therapy (VRET) is a promising intervention for the treatment of anxiety disorders. The main objective of this meta-analysis was to compare the efficacy of VRET used as a behavioral or cognitive-behavioral supplement, with one of the classical evidence-based treatments for anxiety disorders. A comprehensive literature search was conducted using multiple databases, retrieving 2186 abstracts, of which 1080 were eligible for inclusion. Finally, 107 studies were included in the final analysis. The results showed that in the case of anxiety disorders, (1) VRET has the lowest total efficacy, (2) the post-treatment result shows a similar efficacy between the behavioral and the cognitive-behavioral interventions, incorporating a small anxiety reduction, (3) the post-treatment result shows a similar efficacy between the biological and the cognitive-behavioral interventions, incorporating a small anxiety reduction, (4) VRET has a potential real-life impact, similar to that of the classical evidence-based treatments, (5) VRET, with a good stability of results over time, similar to that of the classical evidence-based treatments. (6) There is a dose-response relationship for VRET, and if there is no difference in the dropout rates between the virtual reality exposure and the in vivo exposure, indicate that the observed. Dissemination and Anxiety 23(4), 311–321.

Virtual Reality Exposure Therapy for Anxiety Disorders

- Heights
- Flying
- Driving
- Spiders/snakes
- Public Speaking
- Claustrophobia
- Generalized Social Phobia
- Panic Disorder w/Agoraphobia
- Posttraumatic Stress Disorder
The Military Mental Health Challenge

“...The percentage of study subjects whose responses met the screening criteria for major depression, generalized anxiety, or PTSD was significantly higher after duty in Iraq (15.6 to 17.1 percent) than after duty in Afghanistan (11.2 percent), or before deployment to Iraq (9.3%)” (Hoge et al., 2004)

DSM-5: Exposure to actual or threatened a) death, b) serious injury, or c) sexual violation, in one or more of the following ways:
1. directly experiencing the traumatic event(s).
2. witnessing, in person, the traumatic event(s) as they occurred to others.
3. learning that the traumatic event(s) occurred to a close family member or close friend; cases of actual or threatened death must have been violent or accidental.
4. experiencing repeated or extreme exposure to aversive details of the traumatic event(s).

Posttraumatic Stress Disorder

Symptoms

Hyperarousal
Intrusions: Nightmares/Flashbacks
Avoidance of Cues/Places
Emotion/cognitive Alterations

BAD NEWS: “There is not enough reliable evidence to draw conclusions about the effectiveness of most treatments.”

GOOD NEWS: “There are sufficient data to conclude that exposure therapies -- such as exposing individuals to a real or surrogate threat in a safe environment to help them overcome their fears -- are effective in treating people with PTSD.”

Posttraumatic Stress Disorder

Why use Virtual Reality to Deliver Exposure Therapy?

“...some patients refuse to engage in the treatment, and others, though they express willingness, are unable to engage their emotions or senses.”

(Difede & Hoffman, 2002)

Engagement Is Fundamental!
OIF/OEF - Will it drive advances in technology for TBI, PTSD, Prosthetics, Rehab?

Institute of Medicine 2012/2014 Report on PTSD

“The DoD and the VA should support research that investigates emerging technology approaches (mobile, telemedicine, Internet-based, and virtual reality) that may help to overcome barriers to awareness, accessibility, availability, acceptability, and adherence to evidence-based treatments.”

The National Academies Press

Full Spectrum Warrior
X-Box Game Conversion for OIF/OEF PTSD

Institute of Medicine 2012/2014 Report on PTSD

In: Telemedicine and E-Health

Reger, Gahm, Rizzo, Swanson & Duma
Soldier Evaluation of the Virtual Reality Iraq

Major Goal:
Customize Graduated Exposure based on Patient Needs

Virtual Iraq
Global PTSD Requirements

- Multiple Scenario Settings
- Selectable User Perspective Options
- Library of "Trigger" Stimuli
- Highly Usable "Wizard of Oz" Clinician Interface
- Integrate Scent, Vibration and Phys. Props
- Use Physiological Monitoring to Assess User State in Session

Major Goal: Customized Graduated Exposure based on Patient Needs

User-Centered Feedback from Iraq and WAC-Ft. Lewis

- HMD comfort = 7.2/10
- Tracking update = 7.4/10
- Graphic realism = 6.7/10
- Audio realism = 7.2/10
- Navigation = 6.2/10
- Side effects = 3/27; 1DC
- Much useful qualitative feedback on architecture, olfactory cues, human content, landscape, etc.

Rager, Gahm, Rizzo, Swanson & Duma Soldier Evaluation of the Virtual Reality Iraq in Telemedicine and E-Health

TATRC-Funded User-Centered Design Protocol in Iraq

CPT. GREG REGER PH.D.
96TH MED. DET.
COMBAT STRESS CONTROL TEAM
TALLIL AB ISA ADDER IRAQ

2004
Virtual Iraq/Afghanistan
Various City and Desert Scenes

Different User Perspectives
Provocative "Fog of War" Settings

BRAVEMIND
PTS Virtual Reality Exposure Therapy

Scenario Settings
Location, Time of Day, Weather, etc.

User Perspective
Alone, Patrol, HUMVEE, Helicopter, etc.

Real-Time Psychophysiological Display
TRIGGER Stimuli

Challenges
Need to Guard Against the perception that VR Tools are designed to eliminate the need for a Well Trained Clinician

Technology doesn't "fix" anyone, it is simply a tool for extending the skill of a clinician.

"Wizard of OZ" Clinician Interface

Wireless Tablet Option
"Wizard of OZ" Clinician Interface

EnviroScent System

- Gunpowder
- Cordite
- Body Odor
- Garbage
- Burning Rubber
- Diesel Fuel
- Iraqi Spices

Multisensory Stimuli

Scent and Vibration

Night Vision

HMD

Rig

Courtesy of Quantum 3D

Base Shaker

Platform

Natural Navigational Control

Increase Speed

Forward

Navigation (D-Pad)

Back

Clinical Research

Skip Rizzo, Barbara Rothbaum, John Ditella, Greg Reger CTR, Josh Sotulnik, Rob Mazay LCOR, Kevin Holloway, Judith Calor Manlyrose

Gerard, Mike Riley COL, Greg Gahm CCL, & Russell Shilling CDR

Clinical

Research

Integrate Scent and Vibration

Natural Navigational Control

Graphic Rendering by:

Clinical Research

Skip Rizzo, Barbara Rothbaum, John Ditella, Greg Reger CTR, Josh Sotulnik, Rob Mazay LCOR, Kevin Holloway, Judith Calor Manlyrose

Gerard, Mike Riley COL, Greg Gahm CCL, & Russell Shilling CDR

Emory University (Rothbaum et al)

Clinician Administered PTSD Scale (CAPS)

PreTreatment & PostTreatment

4 Sessions

PCL-M Score - Symptom Severity

PreTreatment PostTreatment


PTSD Checklist-Military (PCL-M)

PreTreatment & PostTreatment

6 Sessions

Open Clinical Trial Protocol
Naval Medical Center San Diego

- **Session 1**
  - Clinical interview to identify the index trauma, provide psychoeducation on trauma and PTSD, and instruction on a deep breathing technique for general stress management purposes.

- **Session 2**
  - Provide instruction on the use of Subjective Units of Distress (SUDS), the rationale for prolonged exposure (PE), including imaginal exposure and in-vivo exposure. First experience with imaginal exposure of the index trauma and an initial hierarchy exposure list was constructed with the first item assigned as homework.

- **Session 3**
  - Present rationale for VRET and have the participant experience the VR environment without recounting the index trauma narrative for approximately 25 minutes with no provocative trigger stimuli introduced. The purpose of not recounting the index trauma was to allow the participant to navigate Virtual Iraq in an exploratory manner and to function as a “bridge session” from imaginal alone to imaginal exposure combined with virtual reality.

- **Sessions 4-10**
  - Focus on engagement in Virtual Iraq while recounting the trauma narrative.

---

**Demographics**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Treatment Completers</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>n=20</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>19 (95%)</td>
</tr>
<tr>
<td>Female</td>
<td>1 (5.0%)</td>
</tr>
<tr>
<td>Age</td>
<td>28.1 (±8.4)</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>14 (70%)</td>
</tr>
<tr>
<td>Divorced</td>
<td>2 (10%)</td>
</tr>
<tr>
<td>Widowed</td>
<td>1 (5%)</td>
</tr>
<tr>
<td>Separated</td>
<td>1 (5%)</td>
</tr>
<tr>
<td>Never been</td>
<td>2 (10%)</td>
</tr>
<tr>
<td>Branch</td>
<td></td>
</tr>
<tr>
<td>Army</td>
<td>2 (10%)</td>
</tr>
<tr>
<td>Marines</td>
<td>18 (90%)</td>
</tr>
<tr>
<td>Rank</td>
<td></td>
</tr>
<tr>
<td>E1-E2</td>
<td>2 (10%)</td>
</tr>
<tr>
<td>E3-E4</td>
<td>9 (45%)</td>
</tr>
<tr>
<td>E5-E6</td>
<td>6 (30%)</td>
</tr>
<tr>
<td>E7-E9</td>
<td>3 (15%)</td>
</tr>
</tbody>
</table>

All subjects had been unsuccessful at some form of previous treatment!
Among Iraq War veterans: “...those whose responses were positive for a mental disorder, only 23 to 40 percent sought mental health care. Those whose responses were positive for a mental disorder were twice as likely as those whose responses were negative to report concern about possible stigmatization and other barriers to seeking mental health care.” (p. 13).
Military Cognitive Test in VR (w/Parsons et al)

Better prediction of real-world cognitive performance within highly controllable context relevant VR simulations

• Enhanced Ecological Validity
• Flexible Stimulus Delivery
• Advanced Response Capture
• Psychophysiological Integration Options

The Vision

Enhancing Therapy w/ Cycloserine (RCT) (w/Difede/Rothbaum/Reist et al)

Virtual Floor

Table 1: Change in Anxiety

<table>
<thead>
<tr>
<th>Group</th>
<th>Pre-Treatment</th>
<th>6 Months Follow-Up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Placebo</td>
<td>-70</td>
<td>0</td>
</tr>
<tr>
<td>DCS</td>
<td>-60</td>
<td>-50</td>
</tr>
</tbody>
</table>

P<.05

DCS group showed significantly greater decrease in anxiety in virtual reality setting at 3-month follow-up.


Neuropsychopharmacology (12 November 2013) doi:10.1038/npp.2013.317

PTS/TBI fMRI Trial (w/Frey et al)

2009, 2014

Annuals of the New York Academy of Sciences Issue: Psychiatric and Neuroimaging of the Deployment-Related Brain Injury 3rd, 2014 (w/Frey et al)

Post-Treatment

Assessment of PTS Post-Deployment (w/Roy et al, Costanzo, Jovanovic, et al; Unger et al; Pollack et al.)
Combat Medic/Corpsmen Version

Virtual Vietnam

Military Sexual Trauma project

Psychological Resilience Training

R&D Spawned from BRAVEMIND

Virtual Reality Goes to War

Advances in the Prevention, Assessment and Treatment of Posttraumatic Stress

- STRIVE: STress Resilience in Virtual Environments

Skip Rizzo, Ph.D.
Associate Director Medical VR
Institute for Creative Technologies
University of Southern California

J. Galen Buckwalter, Ph.D.
Research Scientist
Institute for Creative Technologies
University of Southern California

- Treatment
  - PTS VR Exposure Therapy
- Prevention
  - VR Resilience Training
- Clinical Training
  - Virtual Human Patients
- Promoting Access & Assessment
  - SimCoach – Online Healthcare Support Agent/SimSensei
"To be clear, CSF will serve as a catalyst for changing Army culture—from a culture in which behavioral health was once stigmatized to a culture in which psychological fitness is recognized as every bit as important as physical fitness."


"...we are moving beyond a "treatment-centric" approach to one that focuses on prevention and on the enhancement of the psychological strengths already present in our soldiers."


The Emotional Obstacle Course

STRIVE: The Movement Towards Resilience

STRIVE: Stress Resilience in Virtual Environments

- STRIVE is an IMMERSIVE INTERACTIVE NARRATIVE using Virtual Iraq/Afghanistan Exposure Therapy content to create a series of 30 “Band of Brothers” type episodes that conclude with exposure to stressful situations not unlike what SMs would experience in OIF/OEF.

- The episodes can be seen as stations in an emotional obstacle course.

- Virtual Mentor Character conducts the AAR debrief immediately after the incident and guides the user through the training content (e.g., psychoeducational, psycho self-awareness, mindfulness, stress management tactics, Positive Psychology CBT activities)

- Visualizations used to support learning

- Coping Skills are taught in the context of these simulations that underlie psychological fitness and resilience implementing content from evidence-based approaches endorsed by the DOD and from humanitarian aid worker training.

Episodes Created Thus Far

Ep 1: Humvee – “On the Road Again”
Ep 2: Humvee – “First Hit”
Ep 3: Dismounted Patrol – “Culture Shock”
Ep 4: Dismounted Patrol – “The Innocent”
Ep 5: Dismounted Patrol – “Loss of a Leader”

In both Soldier and Marine Formats

STRIVE: STress Resilience In Virtual Environments

Two Episodes that Address Death and the Grieving Process

Ep 1: Humvee – “On the Road Again”
Ep 2: Humvee – “First Hit”
Ep 3: Dismounted Patrol – “Culture Shock”
Ep 4: Dismounted Patrol – “The Innocent”
Ep 5: Dismounted Patrol – “Loss of a Leader”

Episodes Created Thus Far

In both Soldier and Marine Formats

Key Biomarkers will be measured that have been demonstrated to predict poor stress response, including PTSD (Allostatic Load).

Systematic Measurement of psychophysiological and hormonal aspects of acute stress before and during stress exposure and during stress resilience training.
The Colorado National Guard Project
Pre/Post Deployment Study

- Primary Aims of the Project
  - Can we teach Psychological Resilience and Emotional Coping prior to Deployment
  - Can VR Resilience Training reduce later incidence of PTS reactions
  - Can we predict in advance who may be at risk for Psychological Health problems
  - Can we develop a better assessment of Psychological Health at pre-Deployment
  - Can we better detect Psychological Health problems upon the return home

Virtual Human Agents
Autonomous virtual characters that can have meaningful interactions with human users
- Reason about environment
- Understand and express emotion
- Communicate through speech & gesture
- Play the role of teachers, peers, adversaries

Virtual Patients Lab
Sexual Assault Patient Prototype

Virtual Patients Lab
Justina: A Virtual Patient with PTSD
Subject Testing 4/3/2008
Virtual Patients Lab

Virtual Patients – Military and Civilian Applications

Collaboration with the USC School of Social Work Masters in Military Social Work Program

USC Social Work Military MSW Program

SickCall

Justin

Collaboration with the USC School of Social Work

Masters in Military Social Work Program

Virtual Patients Lab

Miles: Motivational Interviewing Learning Environment Simulation

Virtual Reality Goes to War

Advances in the Prevention, Assessment and Treatment of Posttraumatic Stress

TRAINING
• PTS VR Exposure Therapy
• PREVENTION
• VR Resilience Training
• CLINICAL TRAINING
• Virtual Human Patients
• PROMOTING ACCESS & ASSESSMENT
• SimCoach – Online Healthcare Support Agent/SimSensei

SimCoach - An Intelligent Virtual Agent for Healthcare Support

USC Institute for Creative Technologies

Breaking Down Barriers to Care in Service Members, Veterans and their Families

• An online intelligent, interactive Virtual Human Agent program
• Designed to attract and engage Service Members and their significant others who might not otherwise seek help
• Create an experience that will motivate users to take the first step to empower themselves with regard to their Healthcare
• Support users’ efforts to understand their situation better, explore available options and initiate the treatment process when needed.

SimCoach will not provide diagnostic or therapy services.

SimCoach Lives at: http://www.simcoach.org

Problem to be Solved—Barriers to Care

• For Service Members, Veterans and their Families, the need for healthcare information is growing at an astounding rate.
• Since 2004, numerous blue ribbon panels of experts have assessed the current DOD and VA healthcare delivery system and provide recommendations for improvement.
• The consistent theme across these reports:
  – Improve healthcare dissemination and delivery system
  – Improve awareness and access to care
  – Reduce the Stigma of help-seeking
• New methods are required to reduce barriers to care.

One Solution: SimCoach

SimCoach Lives at: http://www.simcoach.org
The Present and Future

- Driver for Military & Civilian Health Care Research
- Architecture and Toolkit for Authoring Online Agents
- Expanded Mil & Civilian Health SimCoach/SimSensei Applications
  - BraveHeart (MLB/Atlanta Braves Welcome Back Vets Program)
  - Virtual Patient Clinical Training (USC Keck School of Medicine)
  - Professional Quality of Life Assessment (Army Medical)
  - Assertiveness Role Play Agent for Depression (Northwestern U)
  - Support Agent for Aging in Place with Early Dementia (USC Gero)
  - Virtual Librarian (USC Norris Medical Library)
  - Stress Resilience Mentoring (DoD Army/Navy/Marines)
  - Autism Job Interview Training (Dan Marino Foundation)
- Expansion of Military Health SimCoach Characters/Topics
  - Depression, Suicide, Sexual Assault, Family Issues, TBI, Addiction, Fitness

BRAVEHEART

Virtual Human Authoring Toolkit
On the horizon...
Asperger’s & Alzheimer’s Depression & Epilepsy

Job Interview Training System for High Functioning Persons with Autism Spectrum Disorder

Job Interview Training System for Unemployed Veterans?? (age 18-25: 25% unemployed)

VIRTUAL BUDDY FOR IN HOME COMPANIONSHIP AND SUPPORT FOR PERSONS WITH MILD DEMENTIA
Detection and Computational Analysis of Psychological Signals

SimSENSE!

A Kiosk-Based Intelligent Healthcare Guide that can Sense your State

Using a WebCam, Kinect and a Microphone – to give “eyes” and “ears” to a SimCoach!!!

Automatic Behavior Analysis (using MultiSense)

Visual
- Gestures
- Head gestures
- Eye gestures
- Arm gestures
- Body language
- Body posture
- Prosody
- Eye contact
- Head gaze
- Eye gaze
- Facial expressions
- FACS action units
- Smile, frowning

Verbal
- Lexicon
- Words
- Syntax
- Part-of-speech
- Dependencies
- Pragmatics
- Discourse acts

Auditory
- Prosoody
- Intonation & voice quality
- Vocal expressions
- Laughter, moans

Psychological Distress: DAIC Datasets

<table>
<thead>
<tr>
<th>Condition</th>
<th># subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>General population (Craigslist)</td>
<td>63</td>
</tr>
<tr>
<td>Face-to-face</td>
<td>185</td>
</tr>
<tr>
<td>Wizard of Oz</td>
<td>61</td>
</tr>
<tr>
<td>Military population</td>
<td>57</td>
</tr>
<tr>
<td>Face-to-face</td>
<td>8</td>
</tr>
<tr>
<td>Wizard of Oz</td>
<td>181</td>
</tr>
<tr>
<td>Total</td>
<td>555</td>
</tr>
</tbody>
</table>

Distress Assessment Interview Corpus (DAIC)
Psychological Distress Indicators

- Vertical eye gaze: Distress significantly more downwards
- Smile intensity: Distress significantly lowered
- Legs fidgeting: Distress significantly shorter
- Sadness (FAC) Total: Significantly higher

Visual Behavior Indicators (webcam captured)

- Vertical Head (and Eye) gaze
- Smile intensity/Duration
- Smile Total equivalent
- Distress
- No-Distress

Visual Behavior Indicators (MS Kinect captured)

- Self-adaptor duration in hand regions are significantly increased for all four conditions
- Self-adaptor duration in head region are significantly increased for PTSD condition
- Leg-fidgeting duration is significantly increased for Distress condition

Voice Quality Indicators (microphone captured)

- Across all 4 conditions there is a tendency of increased tense voice (reduced pitch variability and "breathy" voice predominant) especially in the depressed group.
- Conforms with findings in literature since: Flint, et al. 1993
- Vocal Parameters (delay, space between words, etc.) are strong predictors of distress and are currently undergoing focus in our lab.

12 Core Distress Indicators

- Affect:
  - Joy display
  - Anger display
  - Sadness display
  - Smile intensity/duration
- Engagement:
  - Vertical eye/head gaze
- Variability:
  - Speech intensity
  - Speech dynamic variation

Behavioral Indicators of Psychological Distress

Individual Change over time AND Normative Comparisons
Do user react differently to Virtual Human Agents?

- Compare responses when participants believe they are interacting with an avatar is controlled by a human (WoZ: human framed or by an AI agent run by software)

Computer-framed (N=77) vs. Human-framed (N=77) interactions

Do user react differently to Virtual Human Agents?

Users generally feel more comfortable disclosing personal information to Virtual Humans

User Comments

- “This is way better than talking to a person. I don't really feel comfortable talking about personal stuff to other people.”

- “A human being would be judgmental. I shared a lot of personal things, and it was because of that.”

- “It was helpful to have someone listen to me non-judgmentally.”

The Colorado National Guard Project

- Primary Aims of the Project
  - Can we develop a better assessment of Psychological Health at pre-Deployment?
  - Can we better detect Psychological Health problems upon the return home?
  - Can we predict in advance who may be at risk for Psychological Health problems at:
    - Immediate Return Home
    - Longer Term (6 Months & 1 Year)

SIMSENSEI: ELICITING HONEST HEALTH STATUS

Importance of Anonymity to Encourage Honest Reporting in Mental Health Screening

“…Reporting of depression, PTS, suicidal ideation, and interest in receiving care were 2-fold to 4-fold higher on the anonymous survey compared with the routine Post-Deployment Health Assessment.”


The Military Sexual Trauma Clinical Assessment and Treatment Project

- Primary Aims of the Project
  - Can we better assess Hi-Stigma distress at baseline?
  - Will we see change over the course of treatment?
  - How will this compare with Paper and Pencil, and Psychophysiological Assessment?
  - Which is a better predictor of long term outcomes?
A Telemedicine Decision Support Tool

WAR Sucks!
But it does drive advances in:
- Medicine
- Psychology
- Neuropsychology
- Rehabilitation

(War Wound to Kill Ratios)
- Civil War = 7
- WWII = 2.4
- Korea = 2.6
- Vietnam = 3.0
- OIF/OEF = 9
(Fischer, Klarman, and Oboroceanu, 2007)

WAR Sucks!
But it does drive advances in:
- WWI: Army Alpha/Beta kicks off Civilian IQ testing movement
- WWII: VA Internship program signals the birth of psychology as a clinical profession in the USA; Alex’s and Luria’s visionary work with Russian Vets with TBI sets the stage for clinical neuropsychology!
- WWII: NIMH is formed on Truman’s executive order to address combat neurosis!
- Arab-Israeli Wars: Further drives developments in neuropsych rehabilitation
- Vietnam War: Drove recognition of PTSD as a clinical disorder
- OIF/OEF: Will it drive advances in technology for TBI, PTS, Prosthetics, Rehab?

Civilian Translation:

PTSD Occurrence
- Suburban Pets: 5%
- Firefighters: 11%
- Military Veterans: 20%
- Female Law Enforcement: 25%
- Rural Veterans: 35%
- Older Children: 50%

A Copy of this talk is available for all attendees. Please cite the source if you use any of the materials from this talk.
ftp://ftp.ict.usc.edu/arizzo/Summa
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“It would be strange, and embarrassing, if clinical psychologists, supposedly sophisticated methodologically and quantitatively trained, were to lag behind internal medicine, investment analysis, and factory operations control in accepting the computer revolution.” - Paul Meehl, 1987

The End (for now)

“It would be strange, and embarrassing, if clinical psychologists, supposedly sophisticated methodologically and quantitatively trained, were to lag behind internal medicine, investment analysis, and factory operations control in accepting the computer revolution.” - Paul Meehl, 1987