

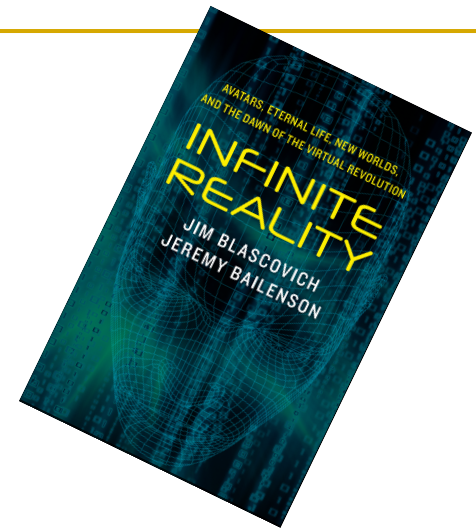


Virtual Reality, Challenge and Medical Treatment

Jim Blascovich
May14, 2011



The Biopsychosocial Model of Challenge/Threat Meets Virtual Reality



Overview

- Medical Philosophy
 - BPS Model of Challenge and Threat
 - Immersive Virtual Reality Technology
 - Synergistic Health Applications
-

Philosophies of Medicine

- 20th Century Western Model of Medicine
 - Based on Cartesian dualism
 - (separation of mind and body)
 - Biological cause and effect
 - Cures based on “Magic Bullets”

 - Wholistic Model
 - Based on Monism
 - (integration of mind and body)
 - Held sway for the better part of human history and re-emerged during the late 20th Century in the West
 - Integrative biopsychosocial treatments
-

“Points”

“A relaxed attitude lengthens life..” Proverbs 14:30

“The secret of health for both mind and body is ... to live the present moment wisely and earnestly.” - **Siddartha Guatama Buddha**

“It is our attitude at the beginning of a difficult task, which more than anything else, will affect it’s successful outcome.” - **William James**

“Counterpoints”

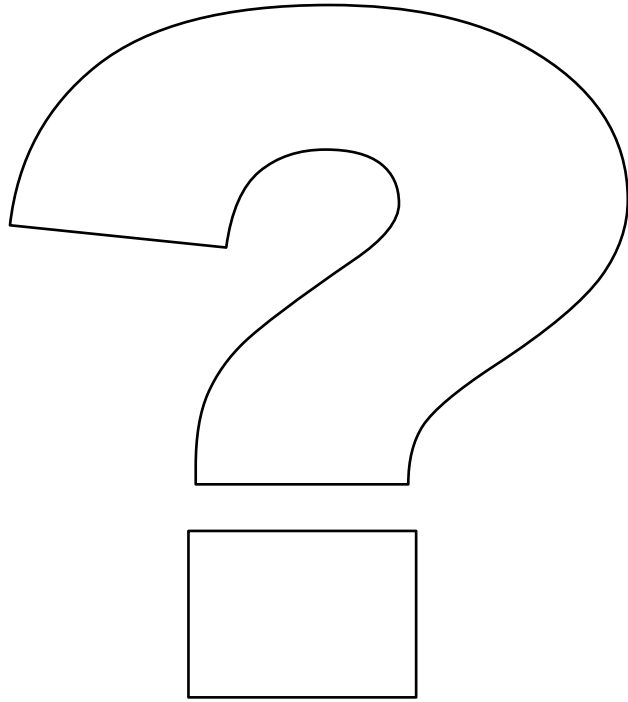
..., it is time to acknowledge that our belief in disease as a direct reflection of **mental state** is largely folklore.

Marcia Angell, M.D.
NEJM, June 13, 1985

...there's no evidence .. that an upbeat attitude can prevent any illness or help someone recover from one more readily. Cancer doesn't care if we're good or bad, virtuous or vicious, compassionate or inconsiderate. Neither does heart disease or AIDS or any other illness or injury.

Richard P. Sloan, Ph.D., Professor of Behavioral Medicine, Columbia University
NYT, January 24, 2011

What is meant by “mental state” or
“upbeat attitudes” in such
discourse?



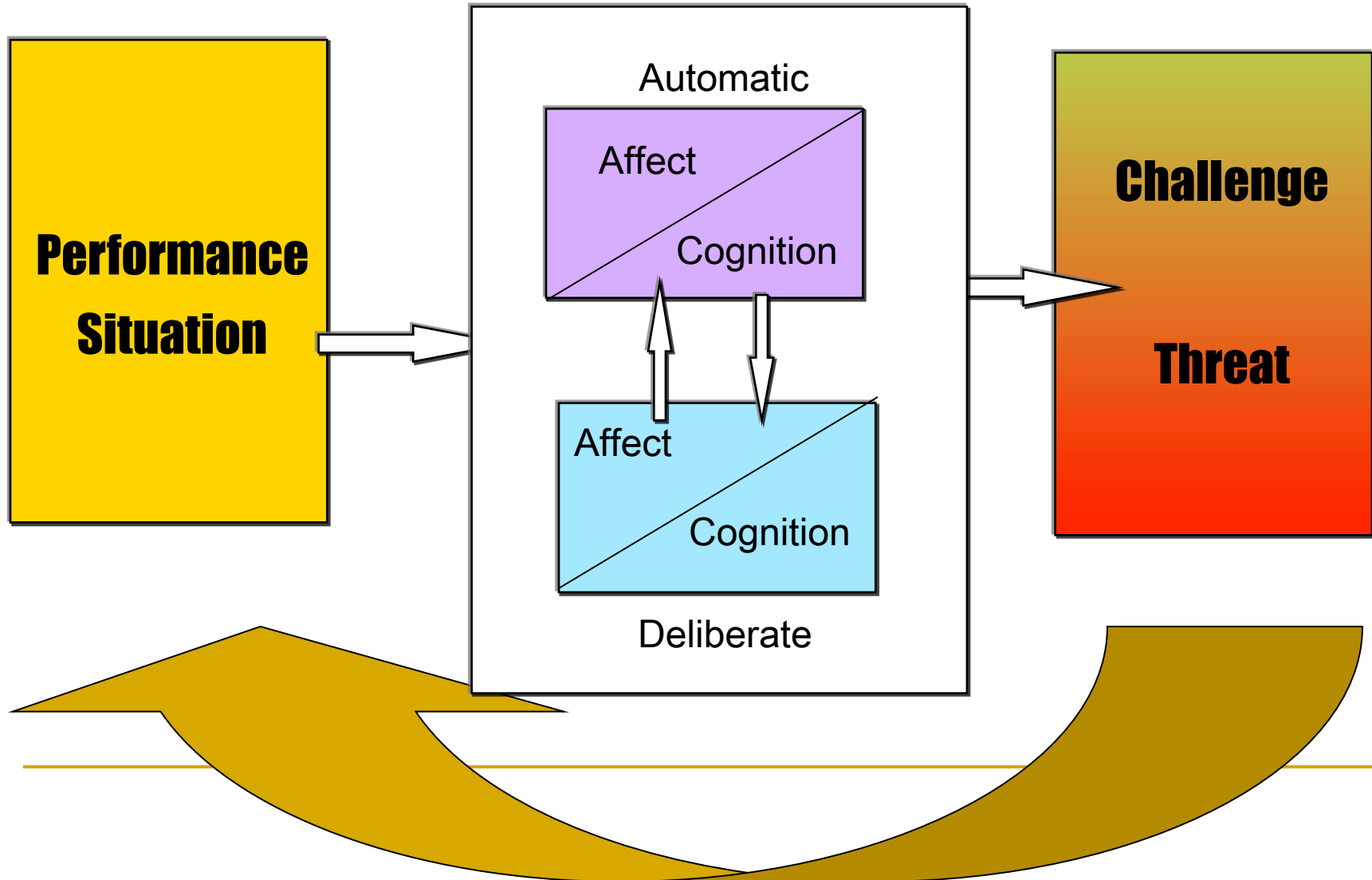
“Mental States” or “Attitude”

- Can mean many things colloquially.
 - Categorically
 - Affect—positivity vs negativity of feelings
 - Cognition—automatic vs deliberate thoughts
 - Motivation—challenge vs threat
 - Can physicians prescribe an attitude?
-

The Biopsychosocial Model of...



Processes

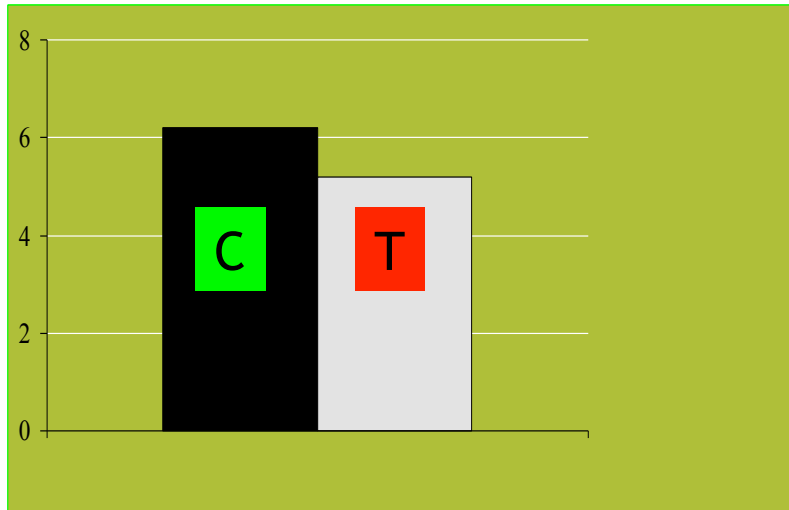


Key Motivational States

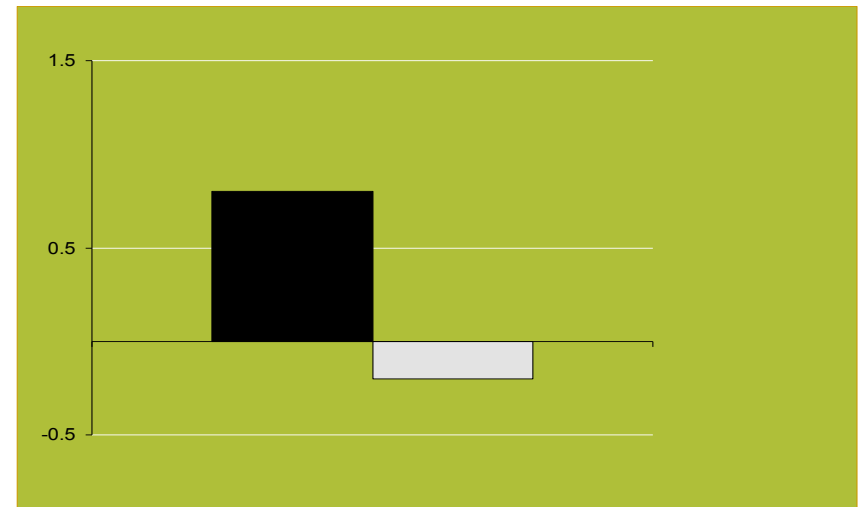
- **Challenge**--when resources roughly equal or outweigh demands
 - Indexed by Dienstbier's neuroendocrine-based markers of physiological toughness (SAM Axis)
 - **Threat**--when demands outweigh resources.
 - Indexed by Dienstbier's neuroendocrine-based markers of physiological weakness (SAM +HPA Axis)
-

Cardiovascular patterns associated with physiological toughness/weakness

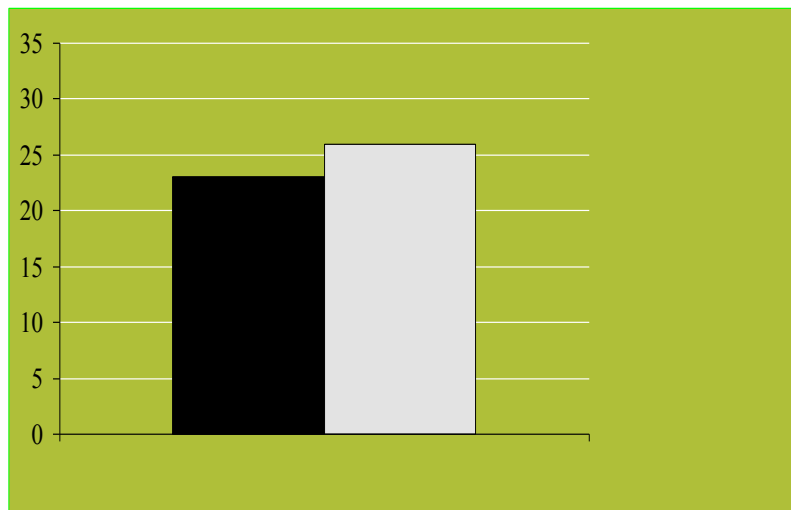
Ventricular Contractility (PEP x (-1))



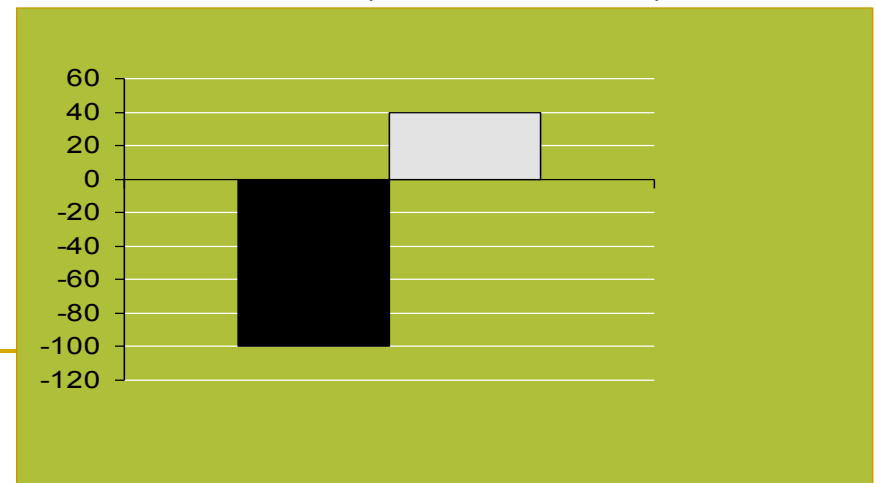
Cardiac Output (L/m)



Heart Rate



Total Peripheral Resistance (Resistance Units)



DIENSTBIER' S CARDIOVASCULAR INDEXES



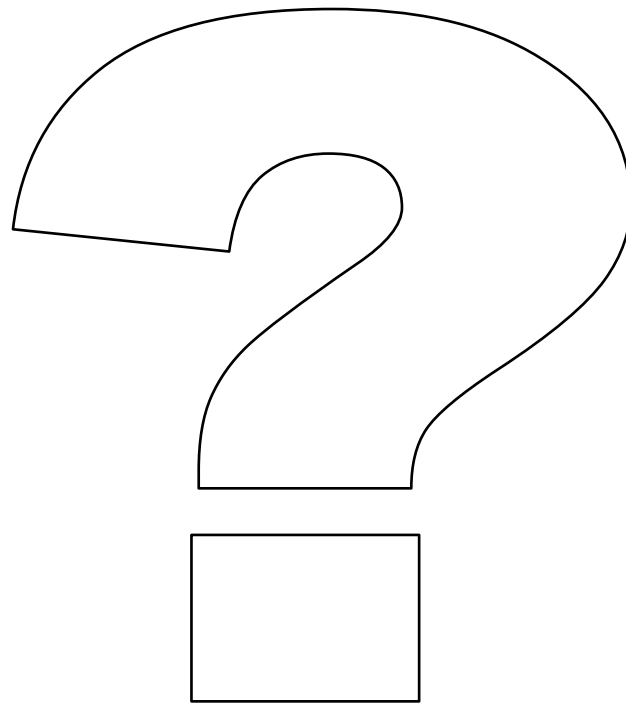
■ Challenge

- ❑ HR increases
- ❑ VC increases
- ❑ Vasodilation
- ❑ Blood Flow increases

■ Threat

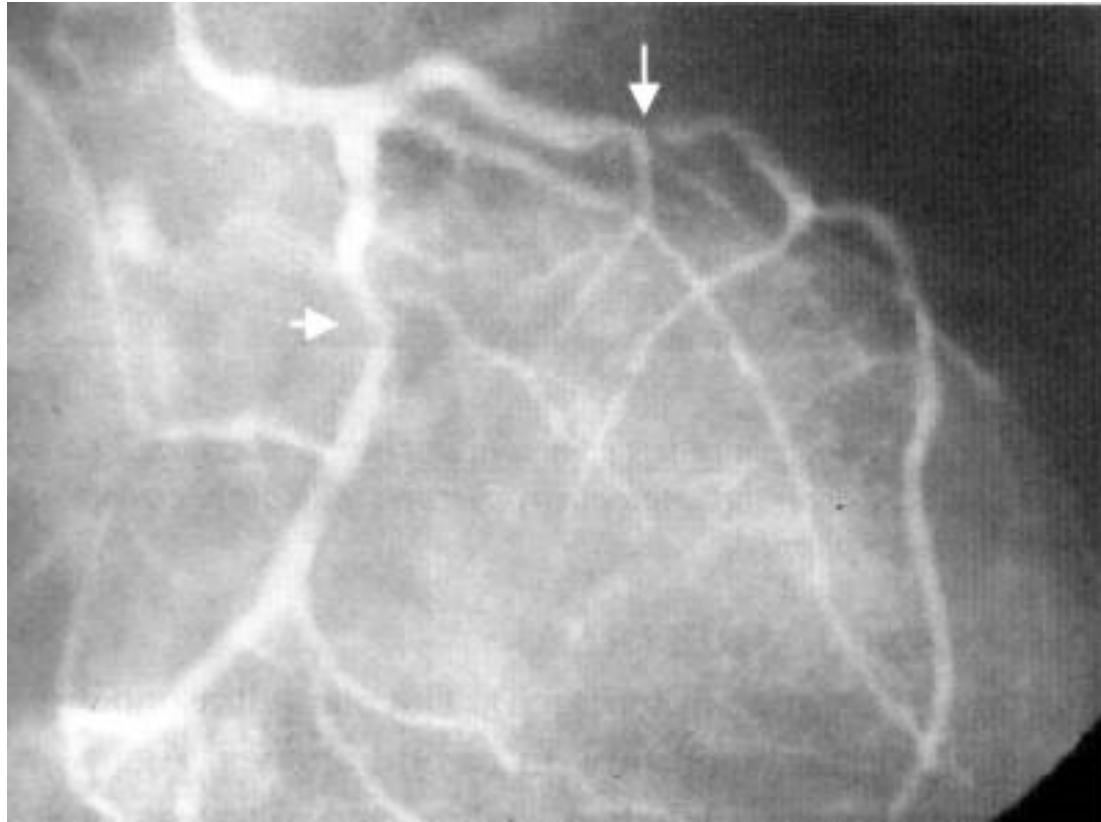
- ❑ HR increases
- ❑ VC increases
- ❑ Vasoconstriction
- ❑ Blood Flow is static or decreases

Does threat lead to negative health effects?



■ Proximally

- ❑ Threat causes vasoconstriction and increased blood pressure.
 - ❑ Repeated vasoconstriction and increased blood pressure leads to coronary heart disease
-



■ Distally

- Threat causes immune suppression (Kiecolt-Glaser & Glaser)
 - Immune suppression puts people at greater risk of disease via pathogens.
-

What are antecedents to threat?

- Dispositions
 - Type A



Type A Behavior Pattern

- Intense Drive; Ambition; Need for Achievement
 - Time urgent; competitive; need to control
 - Aggressive, Hostile
 - Multitasker
 - Talks fast, walks fast, finish other's sentences
 - Rarely sees doctor; never sees psychiatrist
 - Seldom out sick
 - Values respect, not liking
 - Hates vacations
 - Accepts and sticks to difficult goals
-

What are antecedents to threat?

- Dispositional
 - Type A
 - Defensive Pessimism





Contents lists available at ScienceDirect

Personality and Individual Differences

journal homepage: www.elsevier.com/locate/paid



The effects of negative reflection for defensive pessimists: Dissipation or harnessing of threat?

Mark D. Seery^{a,*}, Tessa V. West^b, Max Weisbuch^c, Jim Blascovich^d

^a Department of Psychology, University at Buffalo, The State University of New York, Park Hall, Buffalo, NY 14260-4110, United States

^b New York University, United States

^c Tufts University, United States

^d University of California, Santa Barbara, United States

Defensive Pessimism

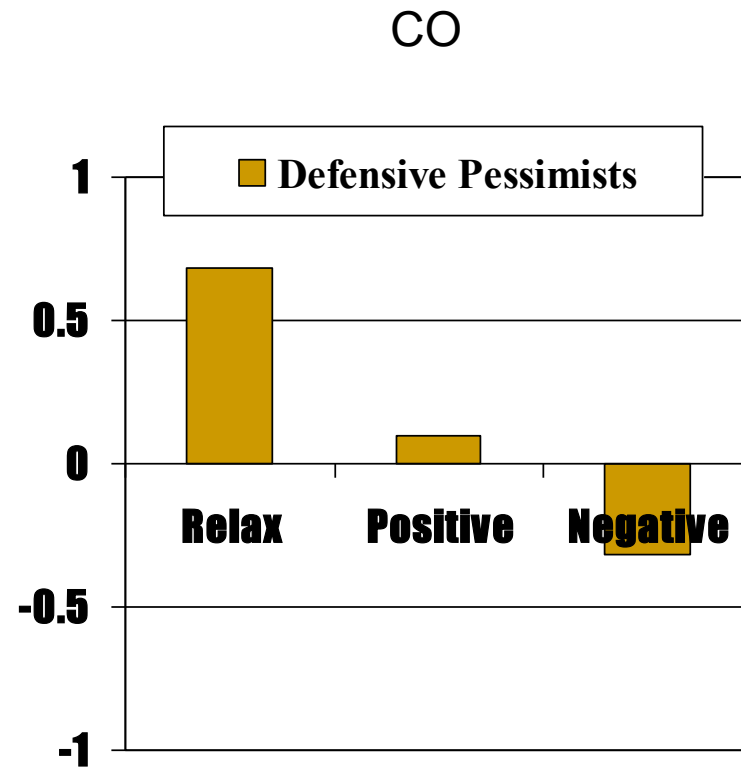
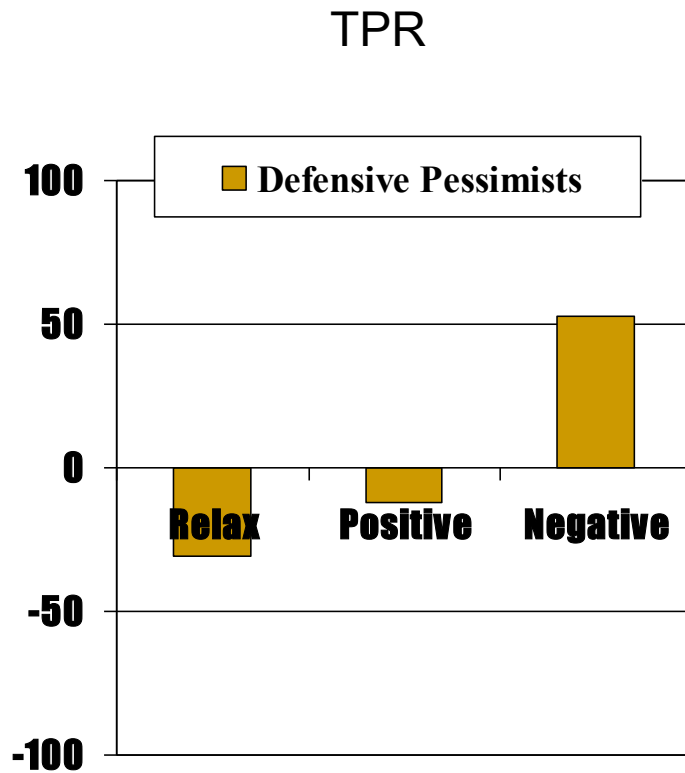
- Academic Defensive Pessimism
 - Imagery Manipulation
 - negative
 - neutral
 - positive
-

Remote Associates Task (RAT)

- blue, smell, head, and ?
 - cold, white, ball, and ?
 - Shakespeare, king, skunk, and ?
-

Results

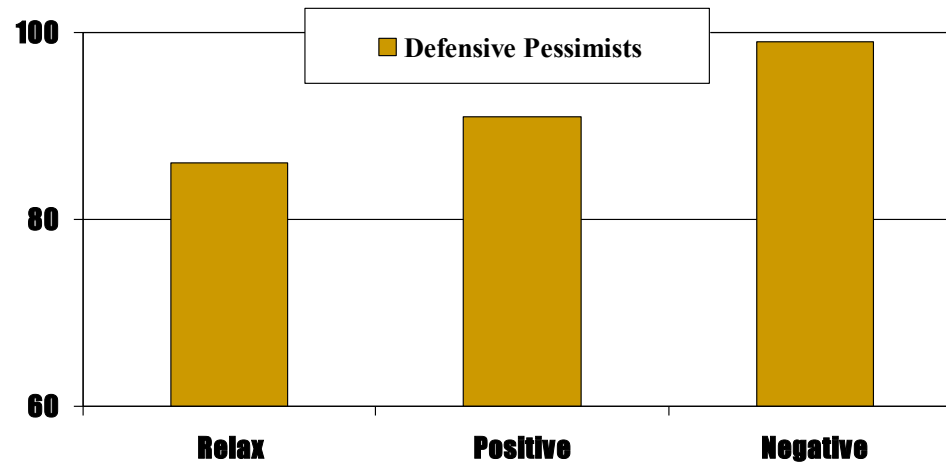
(Seery et al., 2008)



Results

(Seery et al., 2008)

Performance



What else facilitates threat?

- Dispositions Cognitions
 - Type A
 - Defensive Pessimism
 - Affectively Negative Environmental Cues
 - Stigma
-

Stigma

...is associated with membership in groups devalued by the socially dominant cultural group...

--Crocker, Major & Steele, 1998

Bearer's Perspective



Members of stigmatized groups...

- experience threat via prejudice and discrimination
 - Directly
 - Indirectly
 - have disproportionately high morbidity and mortality
-

Dispositions associated with challenge

- Belief in a Just World
 - Resilience (Major et al.; Taylor et al.)
 - Self-esteem
 - Optimism
 - Control
-

Other psychological concepts

- Attitude (define)
 - Functionality
 - Affective Cues in the Environment
 - Grounded Reality (e.g., music, pets)
-

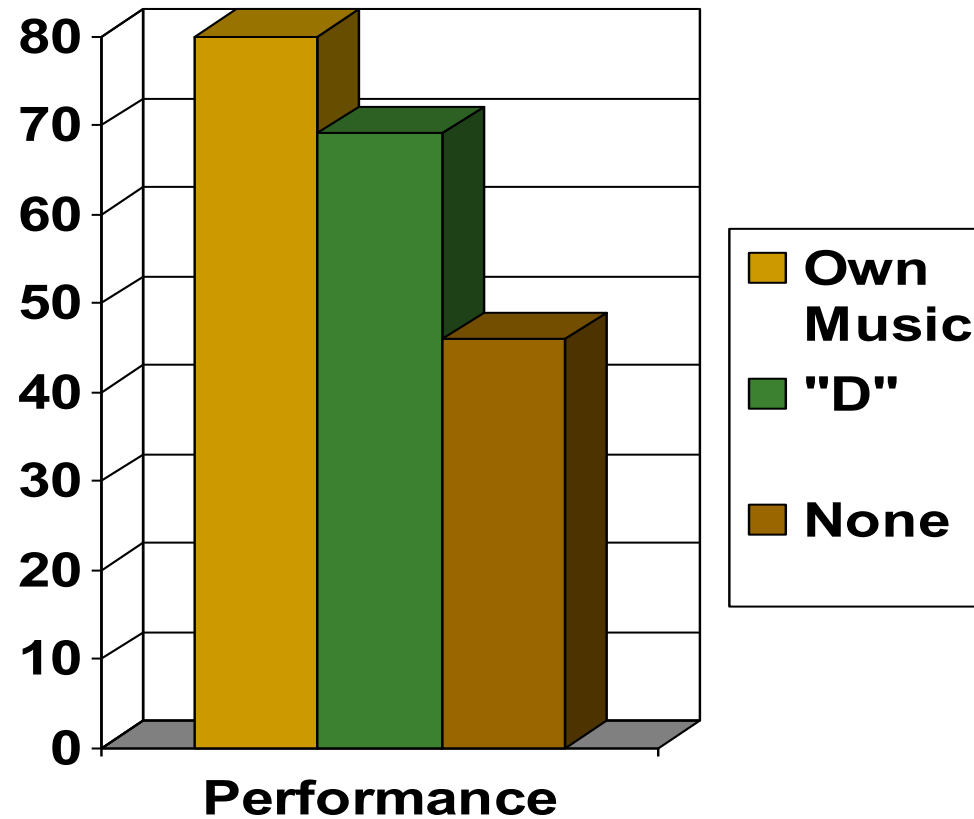
Music and Surgeons

Allen & Blascovich, *JAMA* (1994)

- Background
 - Participants
 - Recruitment
 - Design
 - Procedures
 - Music conditions (own, Pachelbel, none)
 - Serial subtraction
 - Results
-

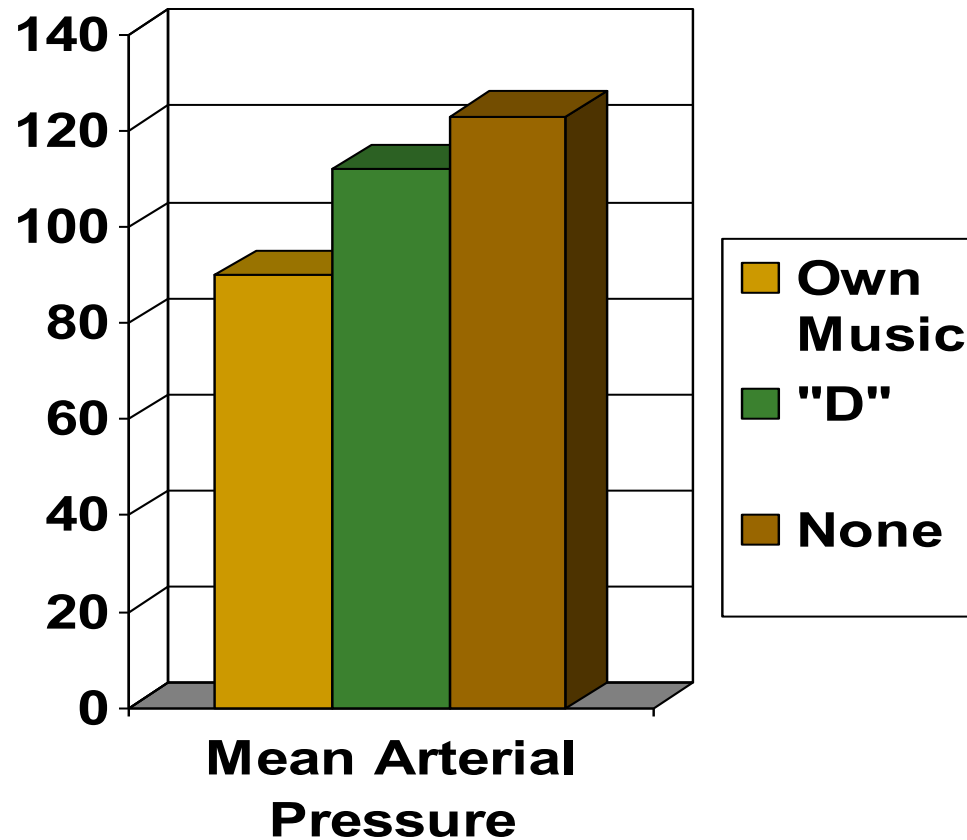
Music and Surgeons

Allen & Blascovich, *JAMA* (1994)



Music and Surgeons

Allen & Blascovich, *JAMA* (1994)



The Truth about Dogs and Cats



Allen, Blascovich, Tomaka & Kelsey 1991

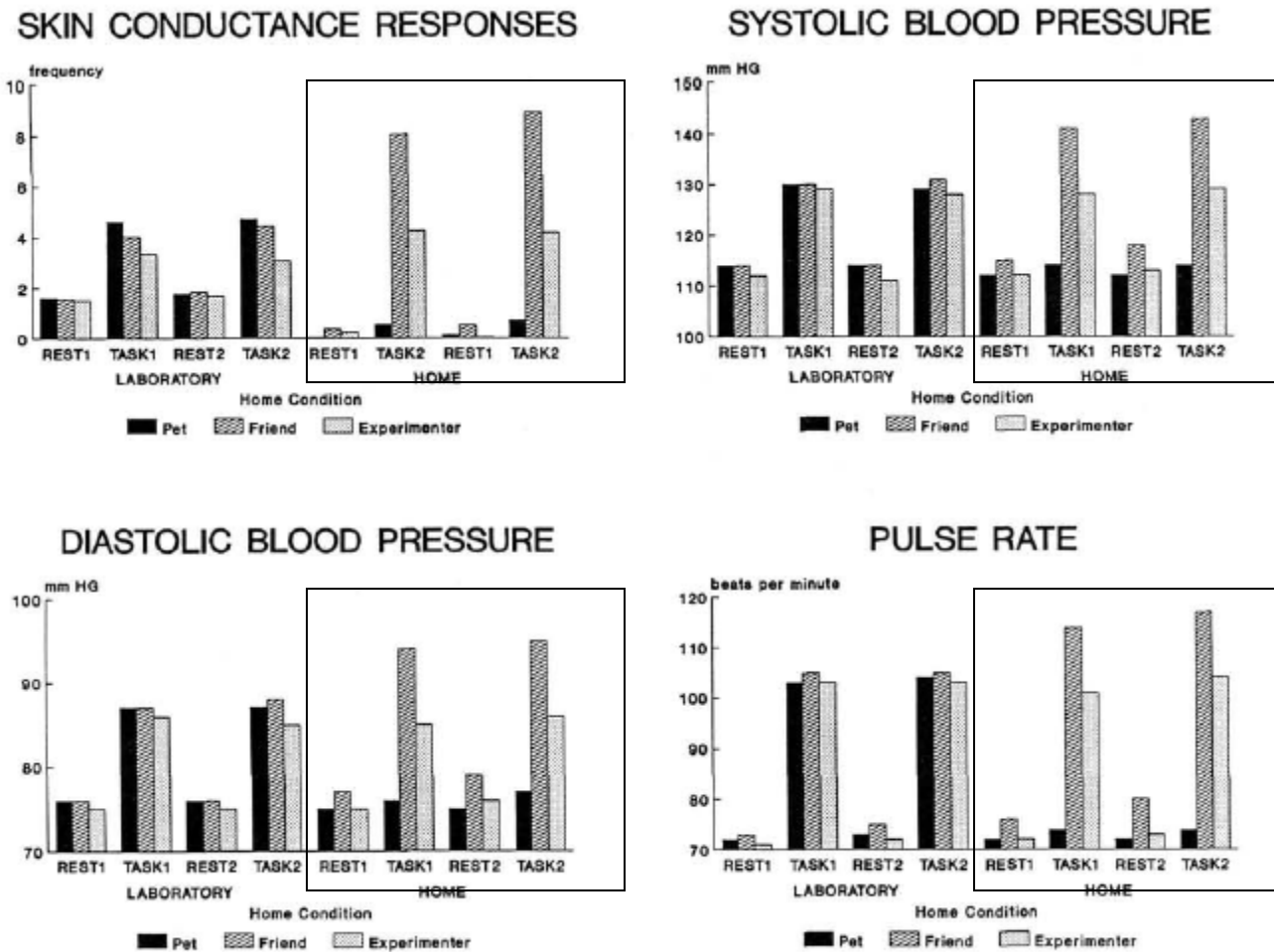


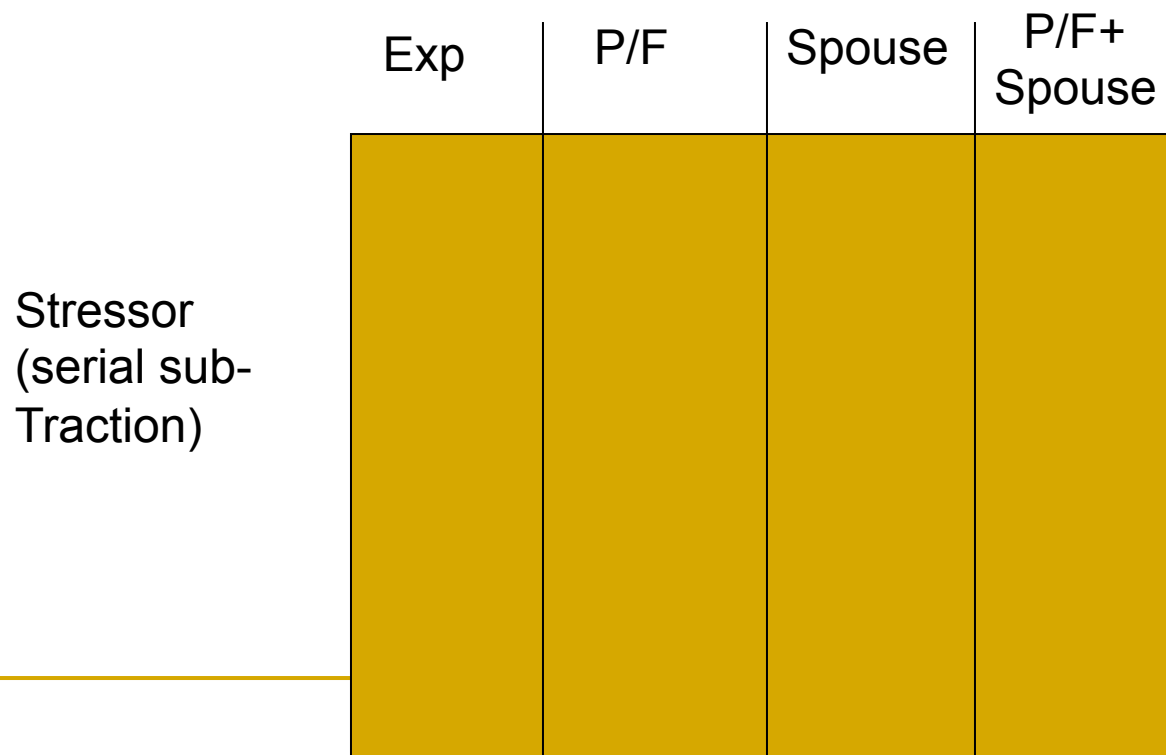
Figure 1. Mean autonomic measures by home condition, place, task, and period.

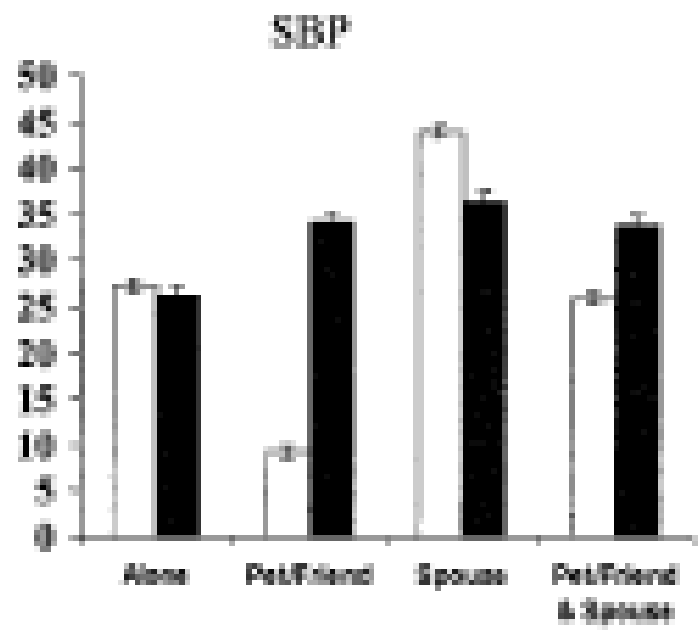
Cardiovascular Reactivity and the Presence of Pets, Friends, and Spouses: The Truth About Cats and Dogs

KAREN ALLEN, PhD, JIM BLASCOVICH, PhD, AND WINDY B. MENDES, MS

Psychosomatic Medicine 64:727-739 (2002)

Home





Virtual Reality

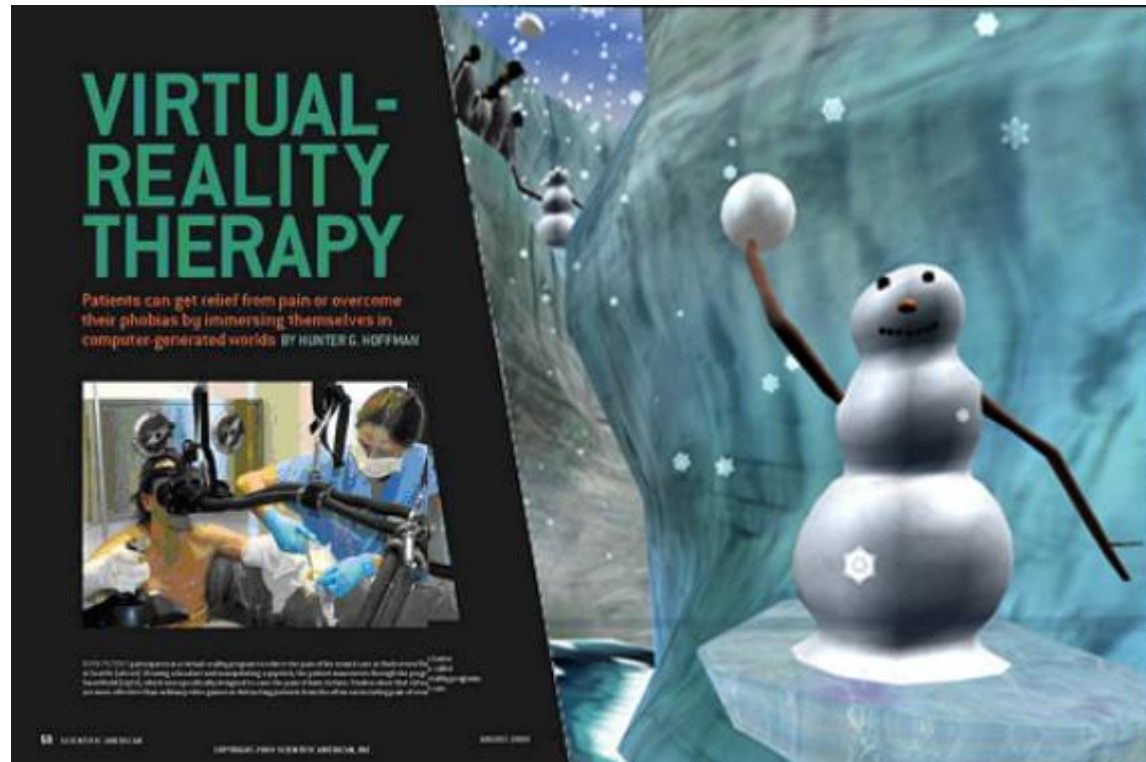
**“On Facebook, 273 people know I’m a dog.
The rest can only see my limited profile.”**



Via virtual reality technology, threat and
can be reduced via **distraction**...

Really?

In burn patients...



BY HUNTER G. HOFFMAN

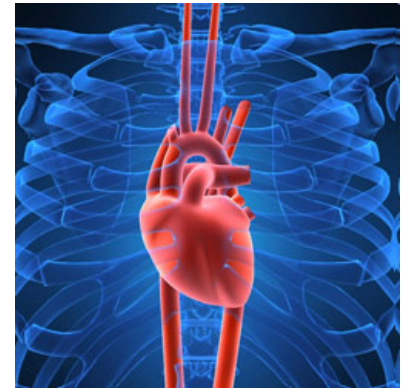
...and in chemotherapy patients.



A breast cancer patient at Case Western Reserve University Comprehensive Cancer Center receives instruction from Dr. Susan Schneider on how to use virtual reality as a distraction to ease the stress of a chemotherapy session. Photo courtesy of Dr. Schneider.

Dr. Susan Schneider

Reducing threat is only half the story.

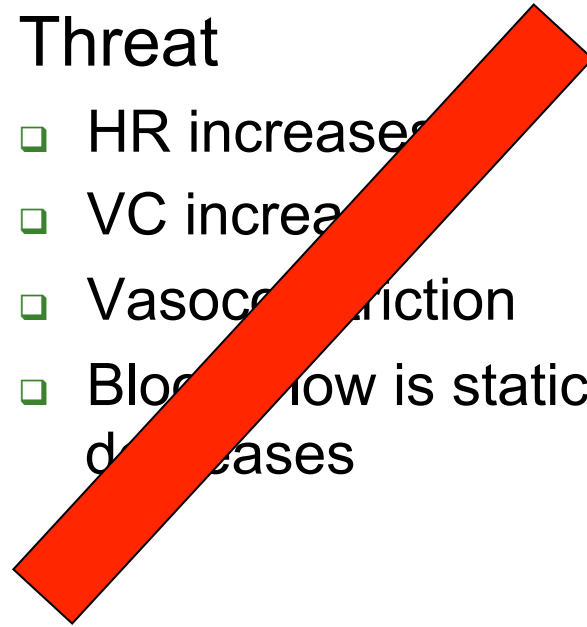


■ Challenge

- ❑ HR increases
- ❑ VC increases
- ❑ Vasodilation
- ❑ Blood Flow increases

■ Threat

- ❑ HR increases
- ❑ VC increases
- ❑ Vasoc constriction
- ❑ Blood flow is static or decreases



Chemo Dosage

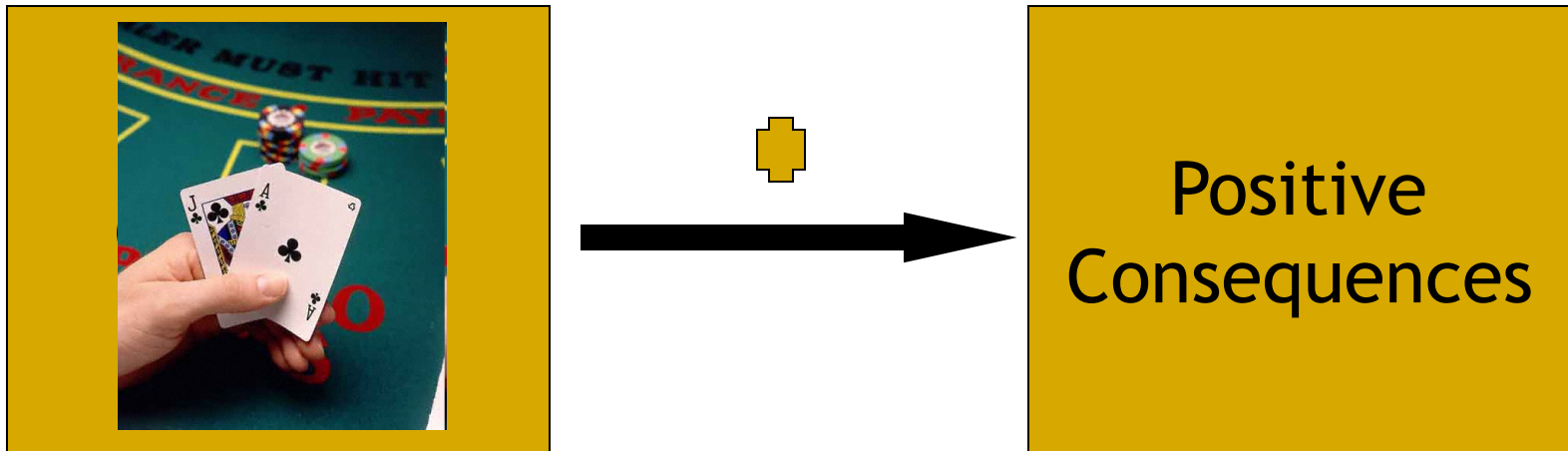
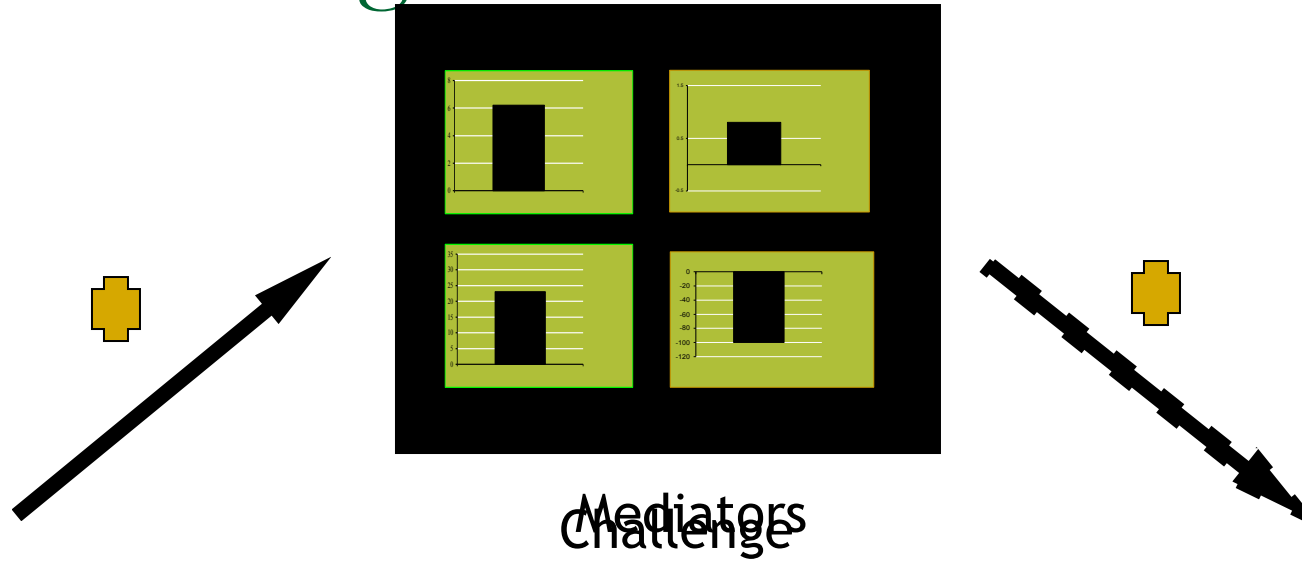
- Initially based on body weight.
 - Adjusted according to effectiveness
-

Hypothesis

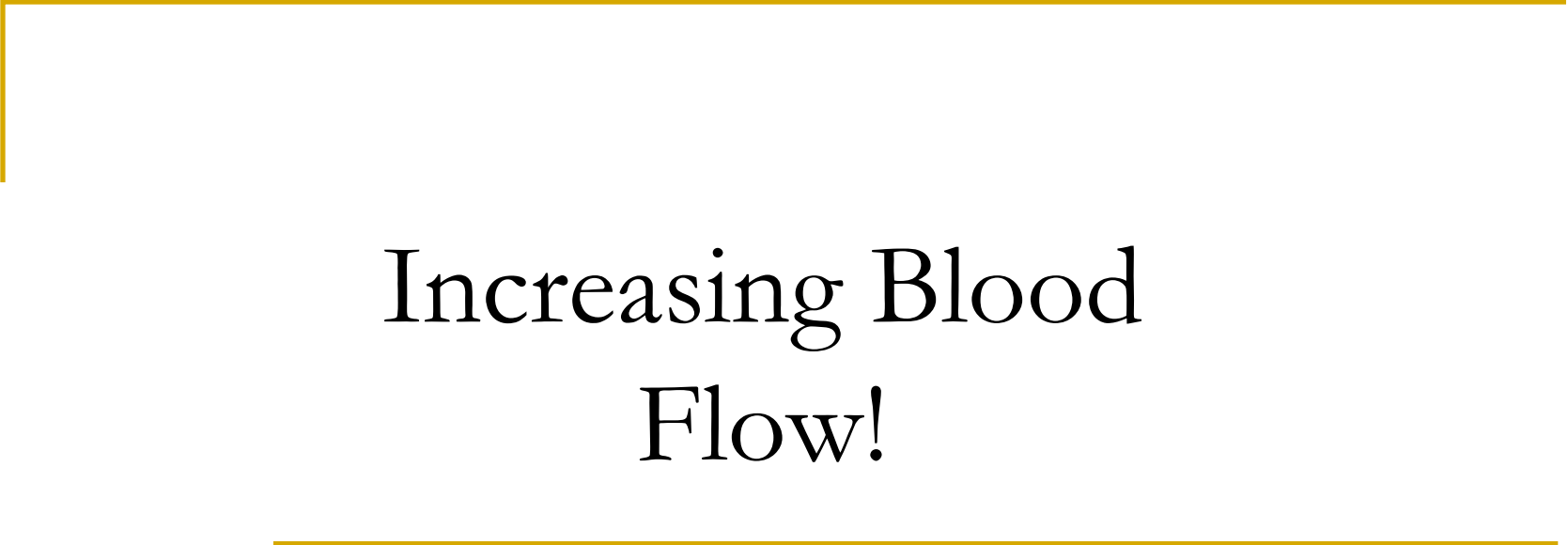
Using virtual reality technology, blood flow can be increased via virtual immersion of the patient in activities in which the patient has a resource to demand ratio advantage (i.e., **is challenged**).



Challenge as a Mental State



What is virtually induced “challenge”
good for?



Increasing Blood Flow!

Blood Flow

- Generally increases the efficacy of medication
 - Delivery of pharmacologic agents

 - Decreases side effects
 - Less toxicity
 - Better elimination of waste products (metabolites and necrotic tissue)
-

Increasing the efficacy of medications!



Increasing the efficacy of chemotherapy!



Increasing the efficacy of radiation!





Research Objective

- Increase the efficacy of cancer treatments such as radiation and chemotherapy.
 - Reduce the potentially insidious harm during treatment that comes to cancer and other patients via social stigma.
-

Research Issues

- Test the hypothesis that challenge effects (e.g., increased blood flow) can be sustained in VR environments.
 - Test the hypotheses that such blood flow potentiates chemotherapy and/or facilitates removal of waste products from treatments such as chemotherapy and radiation.
-

Thank you!
