Behavioral Medicine and Public Health

Competitors or Collaborators?

Stephen M Weiss, PhD, MPH
University of Miami Miller School of Medicine
John A. Rock, MD Visiting Scholar 2017

Public Health: History

Public Health: CDC

- …the science of protecting and improving the health of people and their communities… achieved by promoting healthy lifestyles, researching disease and injury prevention, and detecting, preventing and responding to infectious (and chronic) diseases.

Behavioral Medicine: History

- 1977 - Yale Conference
- 1978 - IOM/NAS Meeting

  Academy of Behavioral Medicine Research
  Society of Behavioral Medicine
- 1990 - International Society of Behavioral Medicine (26 national/regional societies)


Nigel Miller


ACADEMY OF BEHAVIORAL MEDICINE RESEARCH
Neal Elgar Miller

Behavioral Medicine

"The development and integration of biomedical, psychosocial and behavioral sciences' knowledge and techniques and the application of this knowledge and these techniques to prevention, diagnosis, treatment and rehabilitation."

Behavioral Medicine Scope

- Basic Science
  - Mechanisms
- Clinical Research /RCTs
  - Diagnosis/ Assessment
  - Treatment/ Intervention
- Disease Prevention /Health Promotion
- Dissemination and Implementation research

Disciplines

- Anthropology
- Biology
- Biostatistics
- Dentistry
- Epidemiology
- Genetics
- Health Economics
- Health Education
- Medicine
- Neuroscience
- Nursing
- Nutrition
- Pharmacology
- Physiology
- Psychiatry
- Psychology
- Sociology

Levels of Analysis

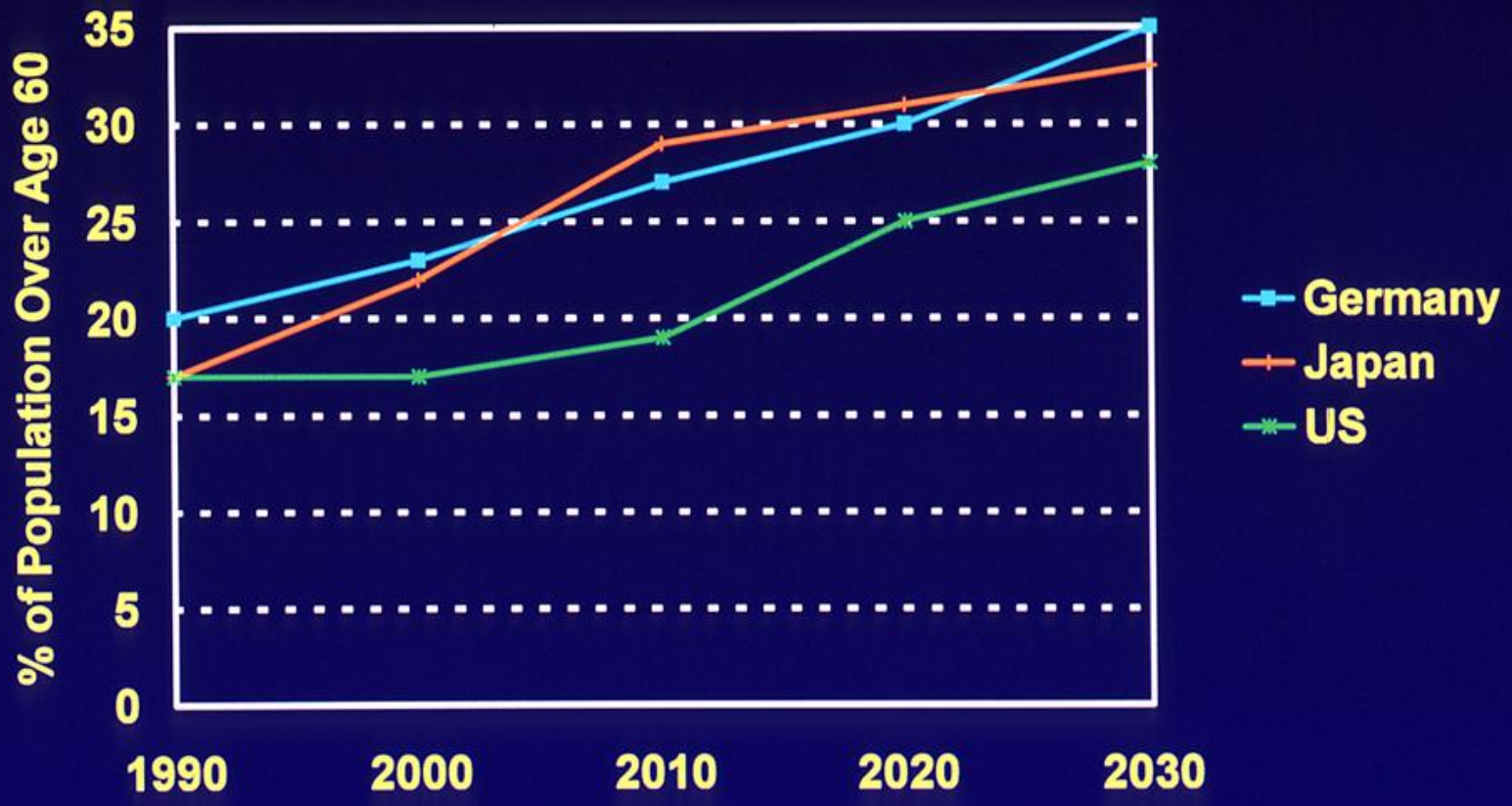
- Genetic
- Constitutional
- Physiological
- Psychological
- Psychosocial
- Sociocultural
- Environmental

Lifecourse

- Prenatal
- Neonatal/Child
- Adolescence
- Young Adult
- Middle Adult
- Senior Adult

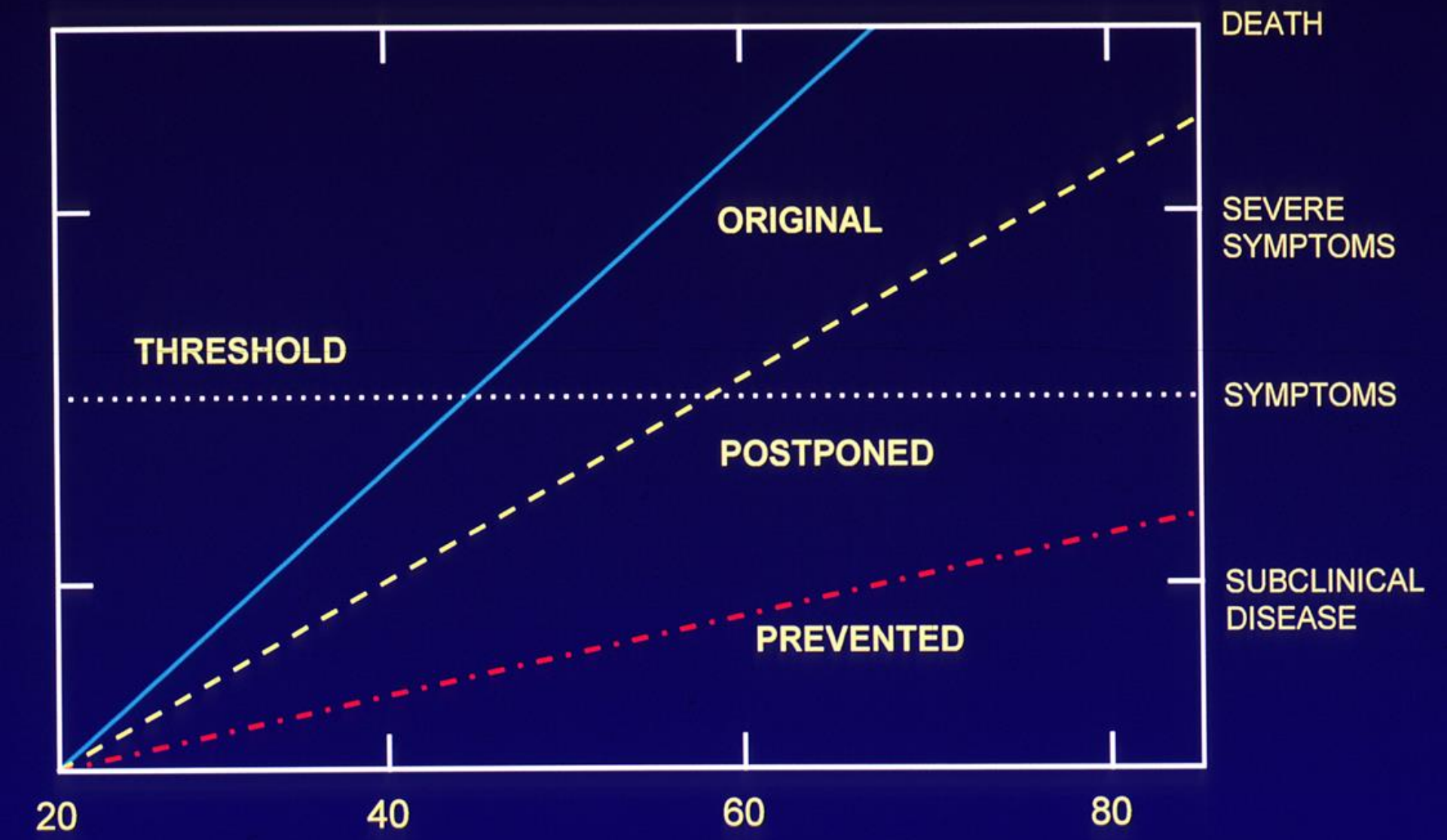
Population Longevity

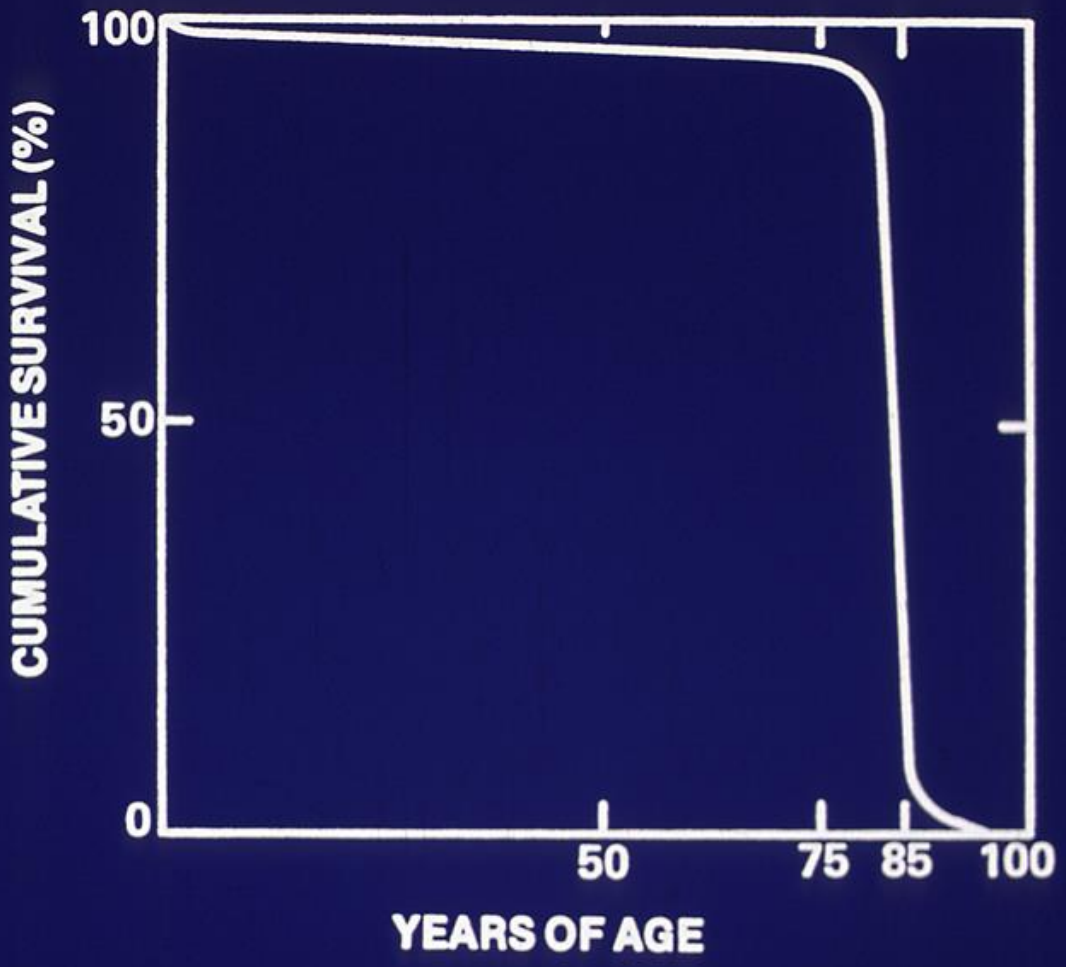
The Demographic Time Bomb



Source: World Bank

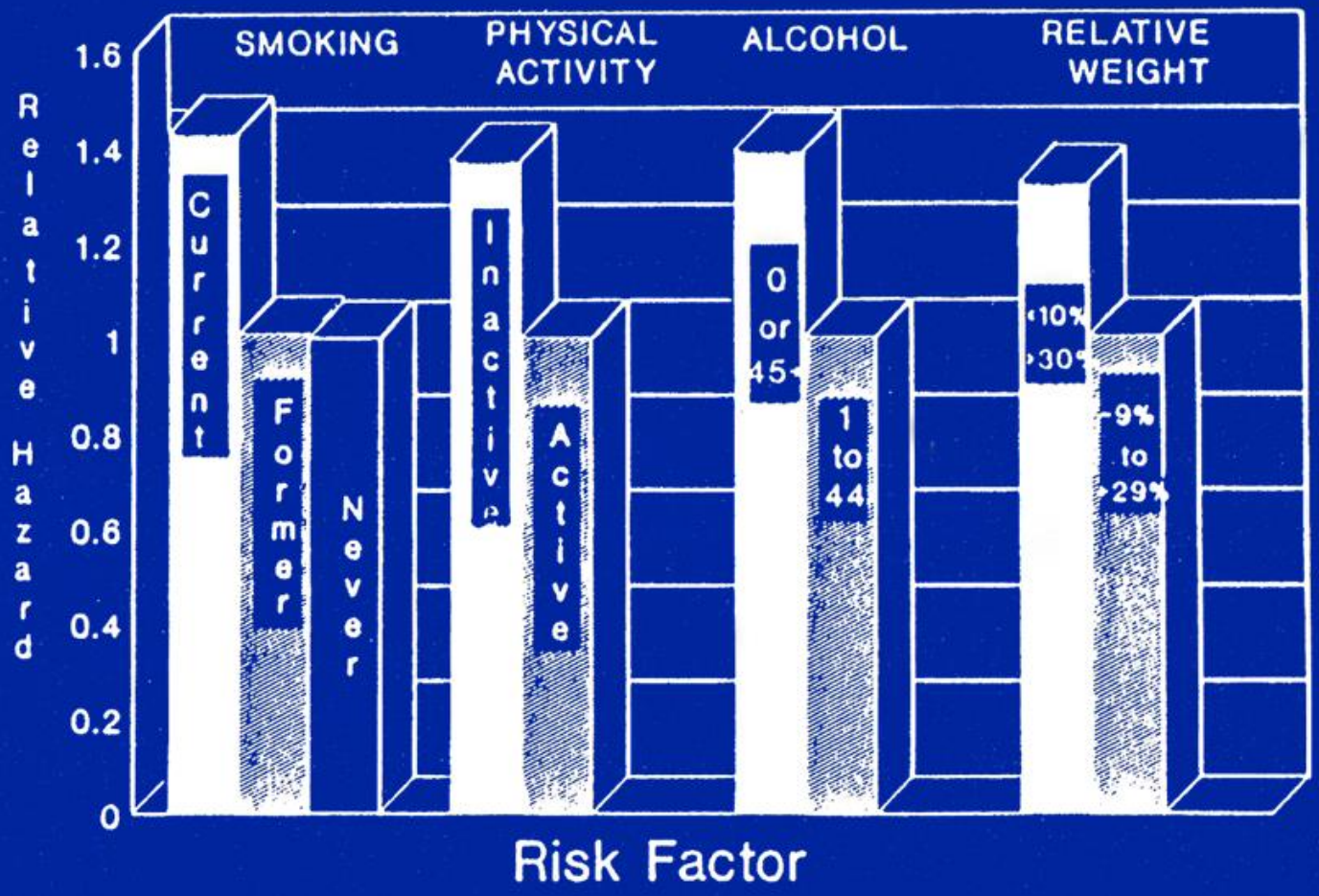
Compression of Morbidity- James Fries





THE RECTANGULAR SURVIVAL CURVE

HEALTH, AGING IN ALAMEDA COUNTY STUDY



Alameda County Study

Association between behavioral risk factors and 17-year risk of death in those 70-94 years.

Behavioral Medicine Challenges

- How does “behavior” contribute directly or indirectly to regulatory processes?
- How does the variability of functional state (“reactivity”) affect disease processes?
- What are the interactions between stress and other risk factors that may promote or inhibit disease processes?

Unique Characteristics

- Static measures → Dynamic measures
- Single factor → Interaction
- Multidisciplinary → Transdisciplinary
- Linear Relationships → Curvilinear
- Behav vs Pharma → Biobehavioral

Stress

"…the body's response to any real or imagined demand placed upon it."

- H. Selye, 1946

Stress

- Stress is a physiological response to some internal or external stimulus
- Stress can be good (“eustress”) or bad (“distress”)
- Stressors (internal or external stimuli) are part of our everyday existence

Stress Reactivity

- Reactivity to stress may be determined by our perceived ability to cope effectively with the stressor; our response to stressors typically take the form of mobilizing the body for “fight or flight”

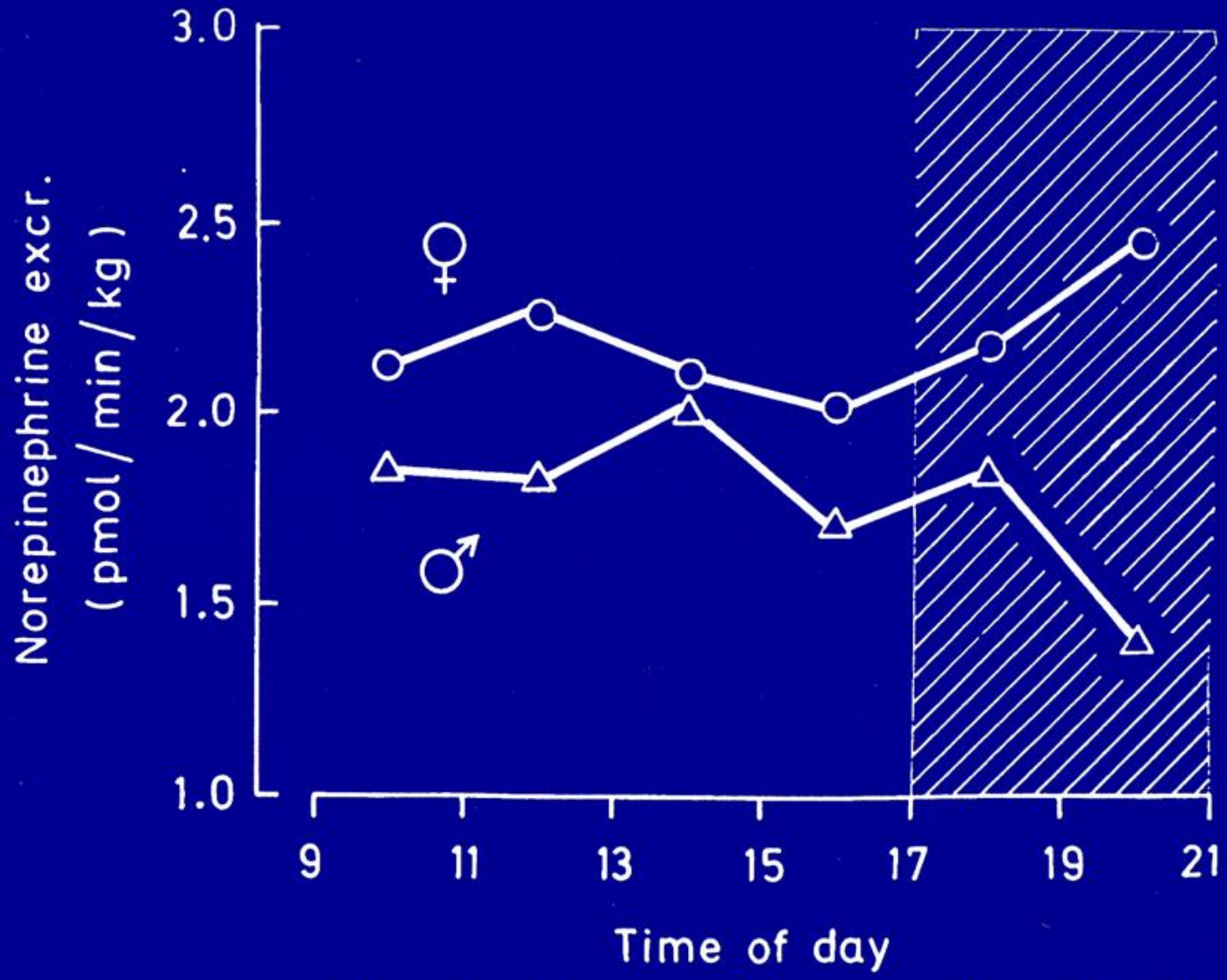
The Stress Response

- Liver releases sugars or fats
- Respiration increases
- Red blood cell production increases
- Heart beats faster and blood pressure rises
- Blood clotting mechanisms are activated
- Salivation and digestion cease
- Perspiration increases
- Pupils dilate

Average Changes of Blood Pressure (mm Hg) Associated with 15 Commonly Occurring Activities[a]

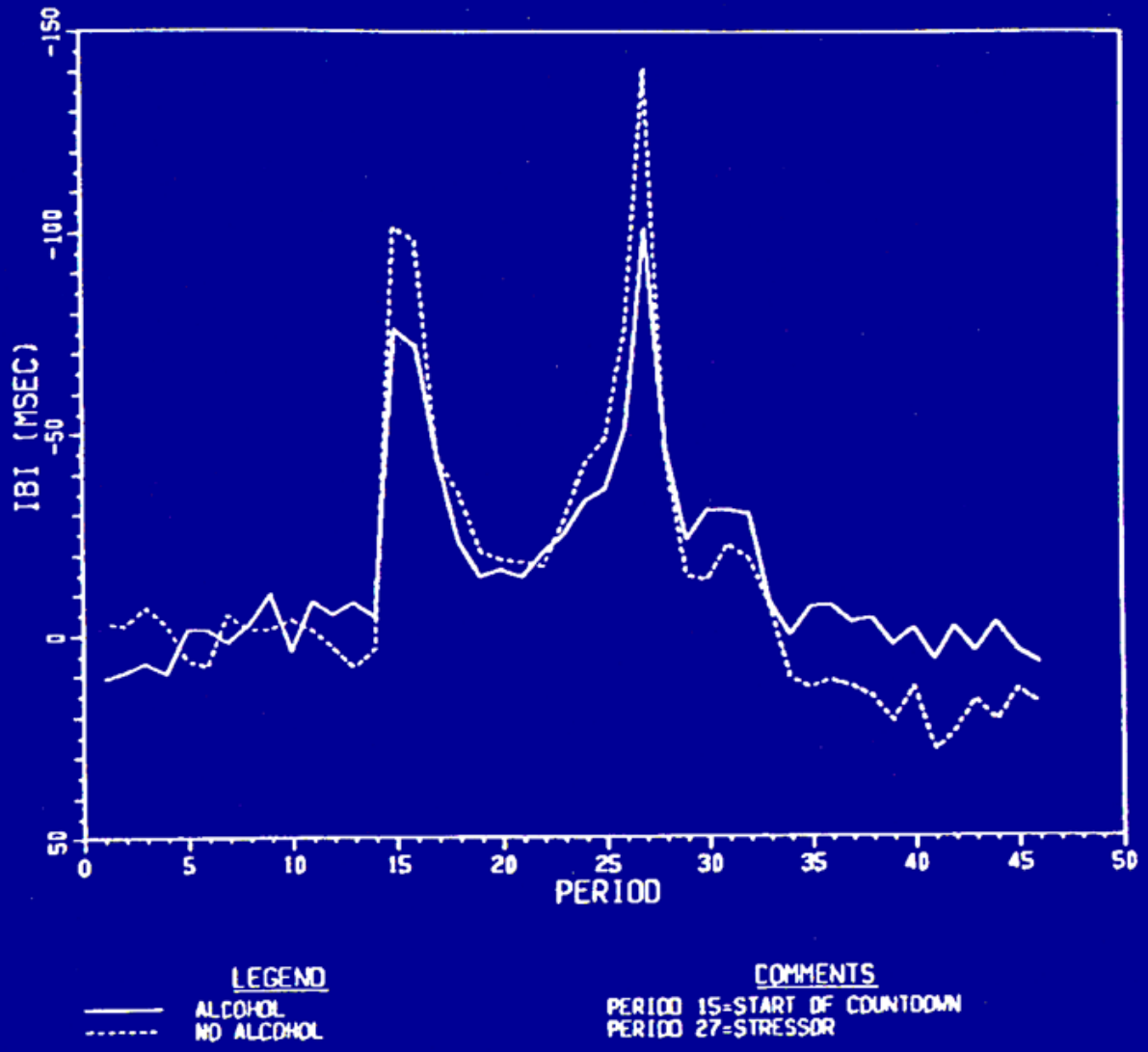
Meetings	+20.2	+15.0
Work	+16.0	+13.0
Transportation	+14.0	+ 9.2
Walking	+12.0	+ 5.5
Dressing	+11.5	+ 9.7
Chores	+10.7	+ 6.7
Telephone	+ 9.5	+ 7.2
Eating	+ 8.8	+ 9.6
Talking	+ 6.7	+ 6.7
Desk work	+ 5.9	+ 5.3
Reading	+ 1.9	+ 2.2
Business (at home)	+ 1.6	+ 3.2
Television	+ 0.3	+ 1.1
Relaxing	0	0
Sleeping	−10.0	− 7.6

[a]Changes are shown relative to blood pressure while relaxing.



Norepinephrine excretion in male and female managers during and after a day at work (28).

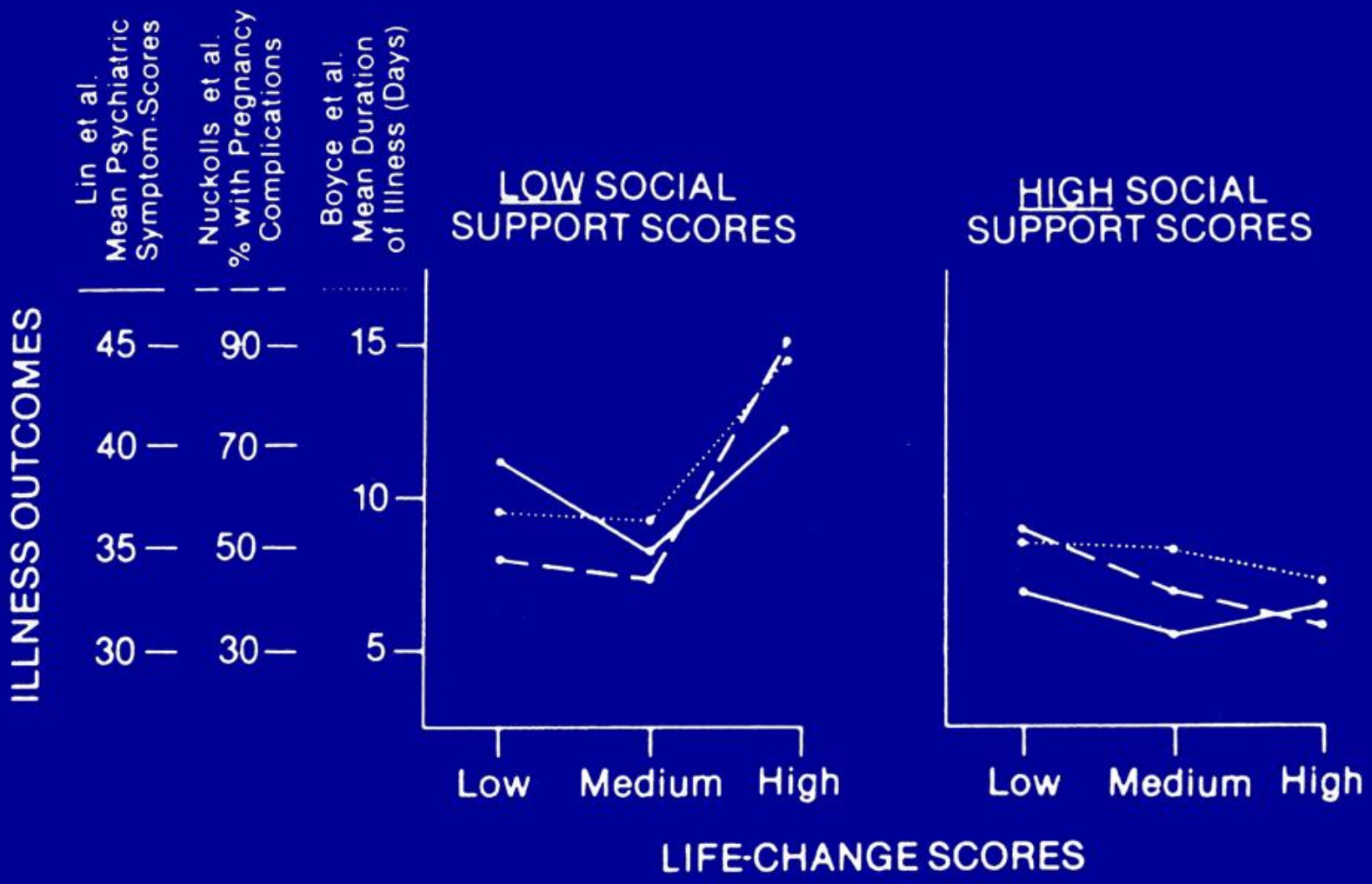
Modulators of Stress-Induced Reactivity



Alcohol dampens the heart rate response to stress.

Unique Characteristics

- Static measures → Dynamic measures
- Single factor → Interaction
- Multidisciplinary → Transdisciplinary
- Linear Relationships → Curvilinear



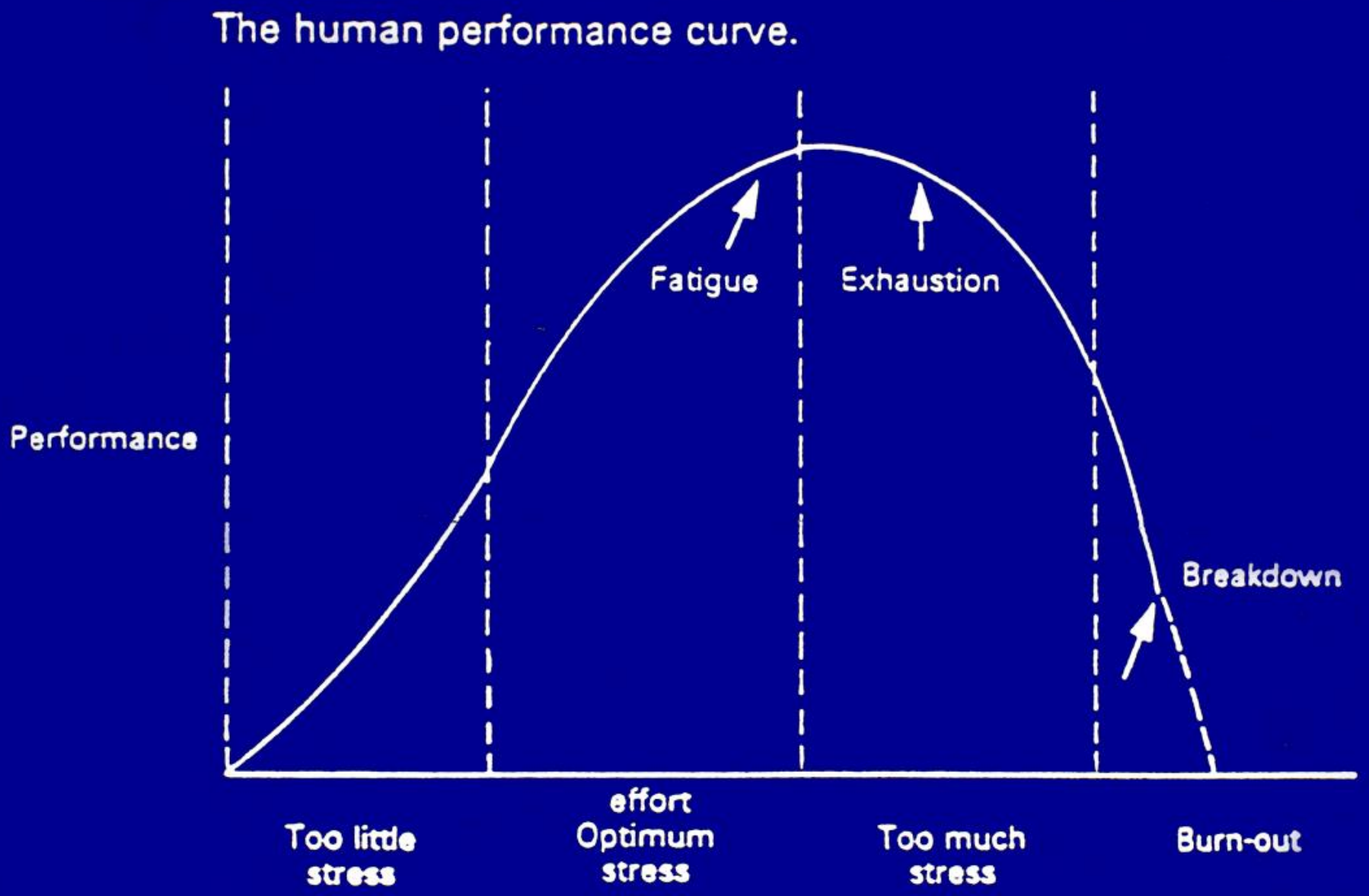
Interactions between social support and stressful life change in three study populations.

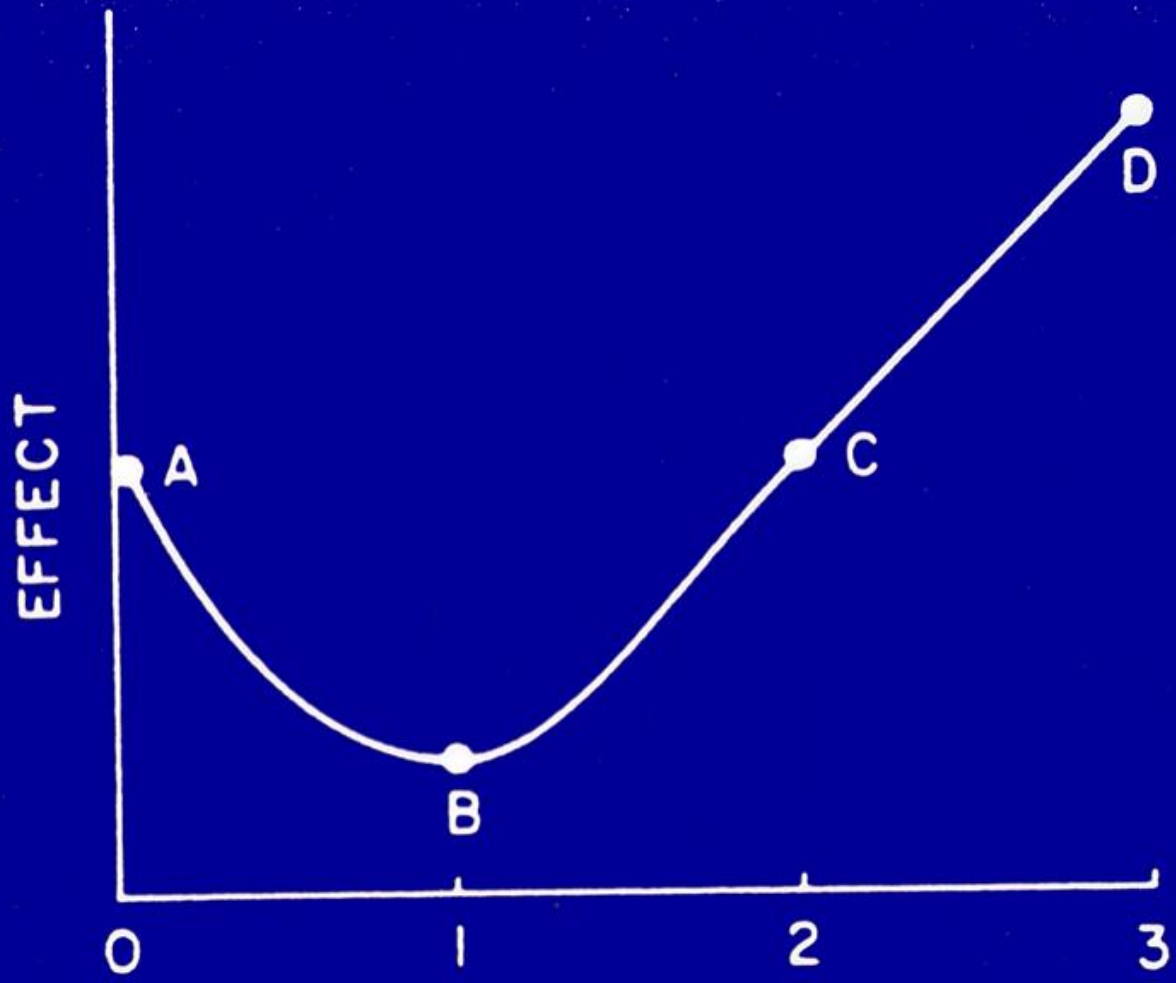
Unique Characteristics

- Static measures → Dynamic measures
- Single factor → Interaction
- Multidisciplinary → Transdisciplinary
- Linear Relationships → Curvilinear
- Behav vs pharma → Biobehavioral

Unique Characteristics

- Static measures → Dynamic measures
- Single factor → Interaction
- Multidisciplinary → Transdisciplinary
- Linear Relationships → Curvilinear
- Behav vs Pharma → Biobehavioral


The human performance curve.
Performance
Fatigue
Exhaustion
Breakdown
effort
Too little stress
Optimum stress
Too much stress
Burn-out



How a nonmonotonic dose-response, or time-response, curve can explain apparently contradictory results if only two groups (A-B, A-C, or A-D) are compared.

Unique Characteristics

- Static measures → Dynamic measures
- Single factor → Interaction
- Multidisciplinary → Transdisciplinary
- Linear Relationships → Curvilinear
- Behav vs Pharma → Biobehavioral

Clinical Conditions

- Cardiovascular Disease
  - Coronary heart Disease
  - Hypertension
- Immune System Disorders
  - Cancer
  - HIV/AIDS
- Diabetes

Determinants of Health

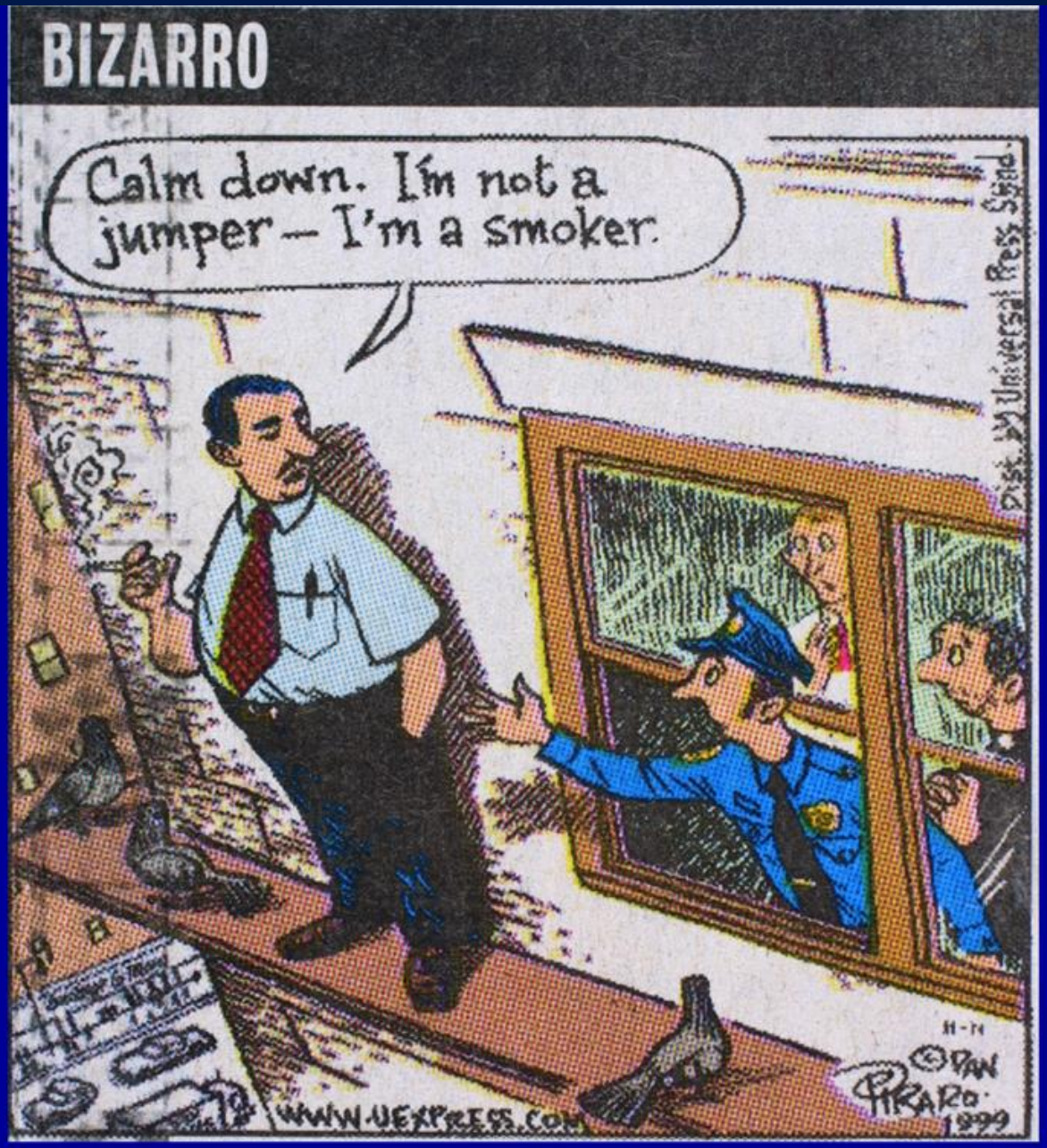
- Health Care Services
- Biology
- Environment
- Lifestyle

Contribution of the 4 Determinants to the 10 Leading Causes of Death

- Health Care Services – 10%
- Biology – 20%
- Environment – 19%
- **Lifestyle – 51%**

Lifestyle

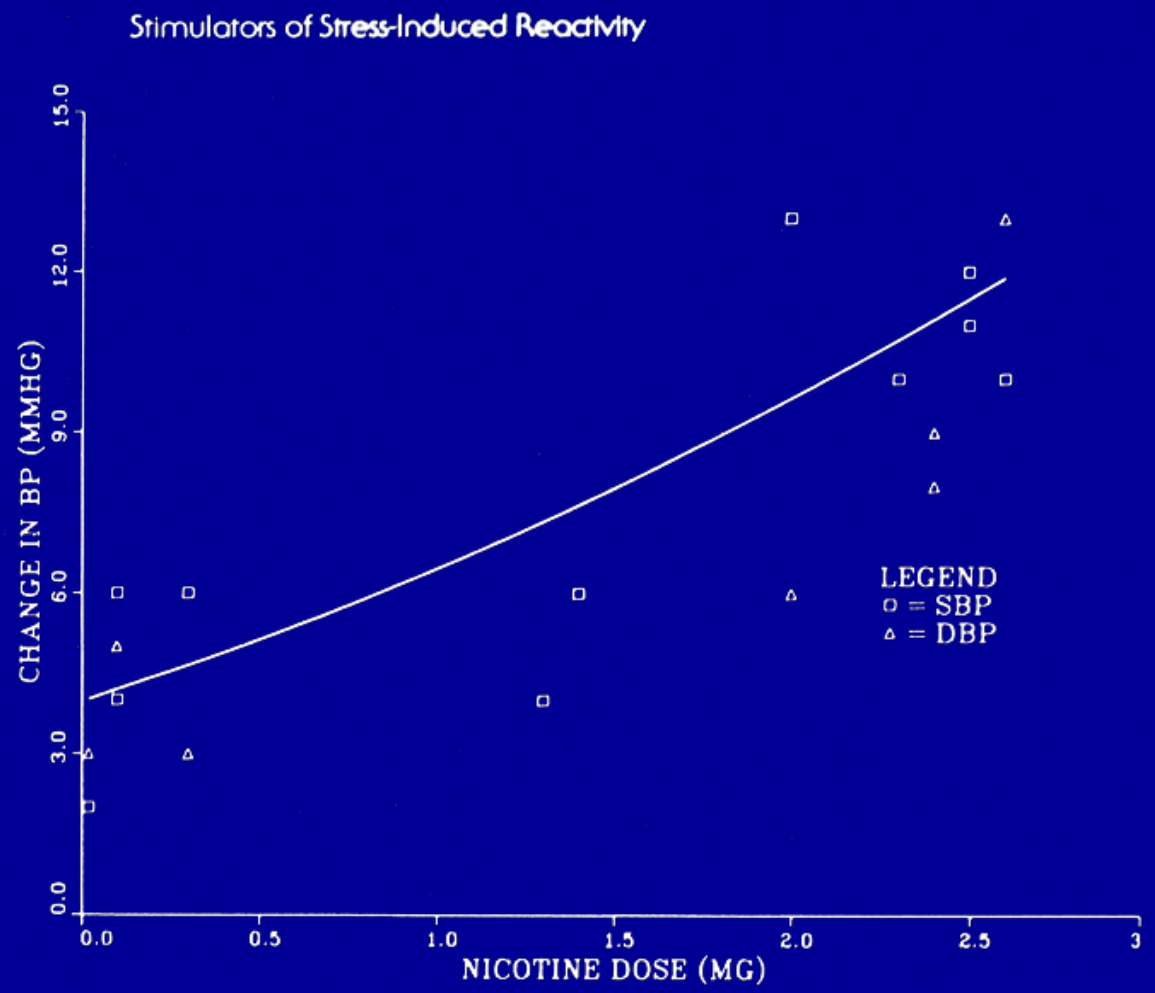
- What and how much we eat and drink
- Whether and how much we smoke
- How much exercise or physical activity
- How socially “connected” are we
- How we cope with our environment
- How supportive is our environment


BIZARRO
Calm down. I'm not a jumper – I'm a smoker.
Dist. by Universal Press Syndicate
WWW.UEXPRESS.COM
© DAN PIRARO 1999

Risk Factors

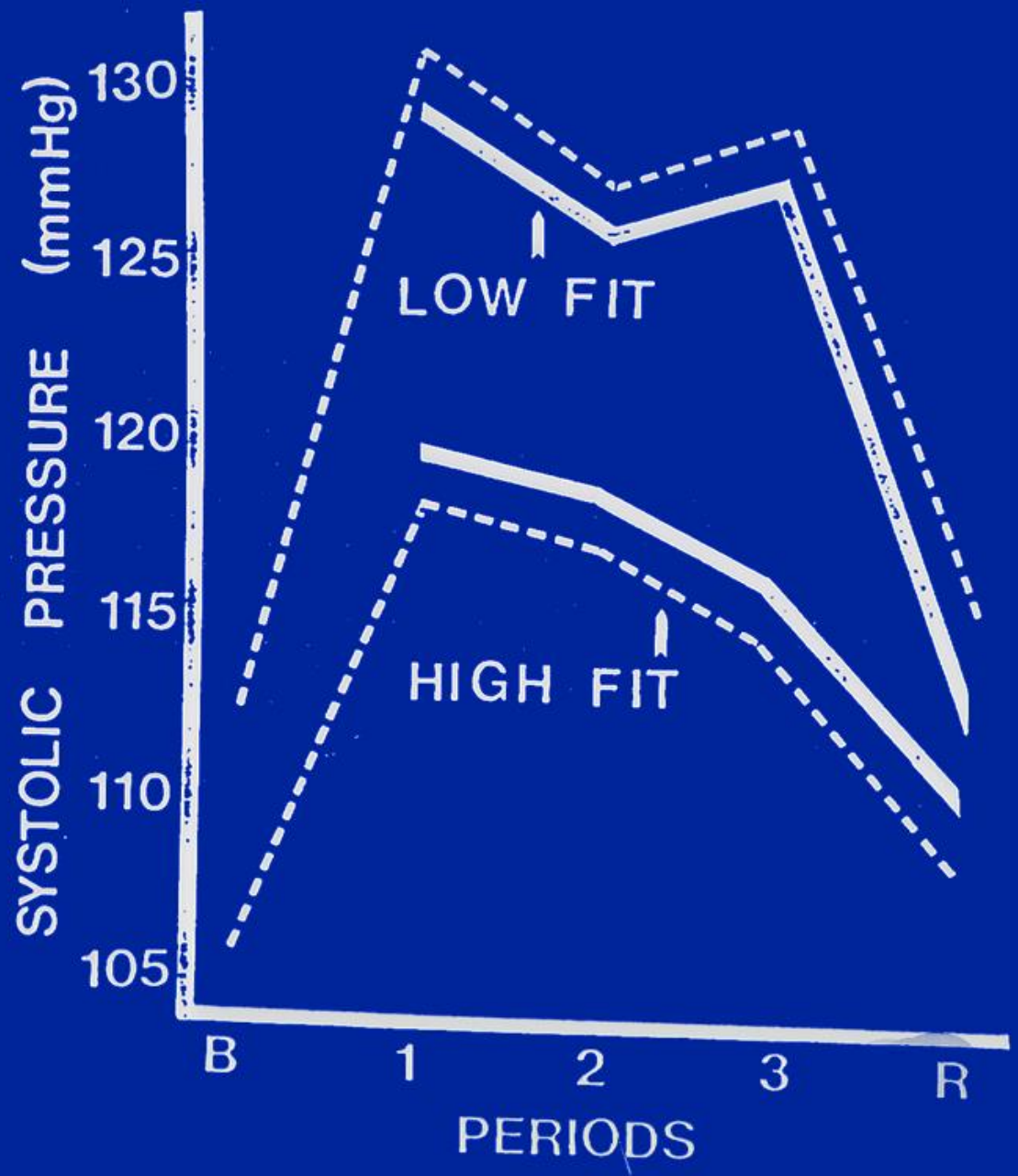
- Smoking
- High Blood Pressure
- High Serum Cholesterol
- Obesity
- Sedentary Lifestyle
- Insulin Resistance
- Stress
- Hostility/ Anger
- Social Gradient

Nicotine and Reactivity

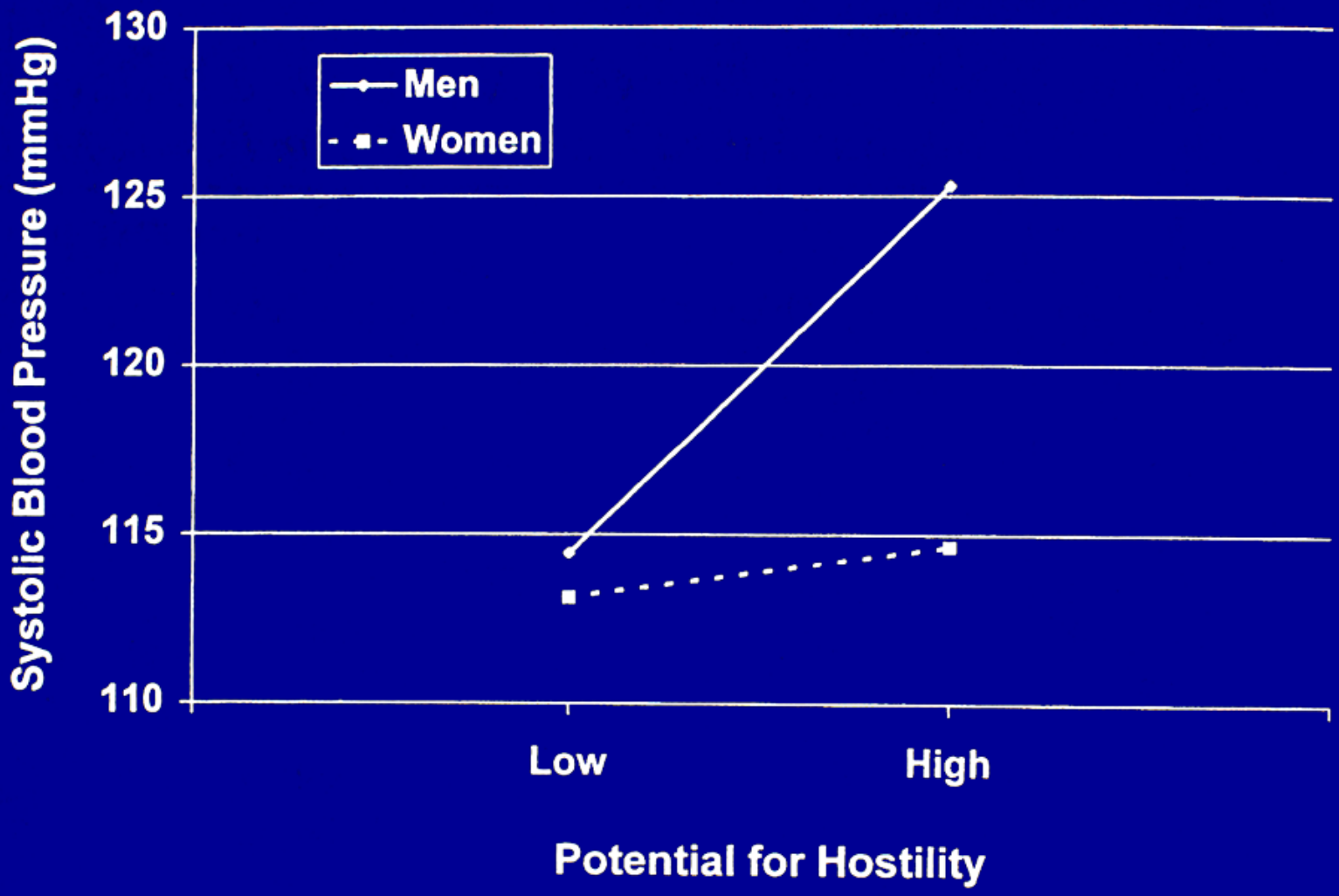


Blood pressure responses relative to placebo dose response. Systolic and diastolic values are presented separately, but only the systolic values are fit with the curve displayed. The best least squares fit to the systolic points was the linear equation $y = 3.8 + 3.0x$ accounting for 77 percent of the variance. A similar equation ($y = 3.5 + 2.4x$) accounted for 71 percent of the variance in the diastolic blood pressure points

Fitness and Reactivity



Hostility and Reactivity



Associations between gender and potential for hostility on ambulatory systolic blood pressure.

Future Challenges

- Epigenetics
  - gene-environment interaction
- Personalized medicine & diagnostics
- Biotech monitoring systems
- Population-based data mining