

Yoga and Stress Reduction: Mechanisms of Effect

CRYSTAL L. PARK

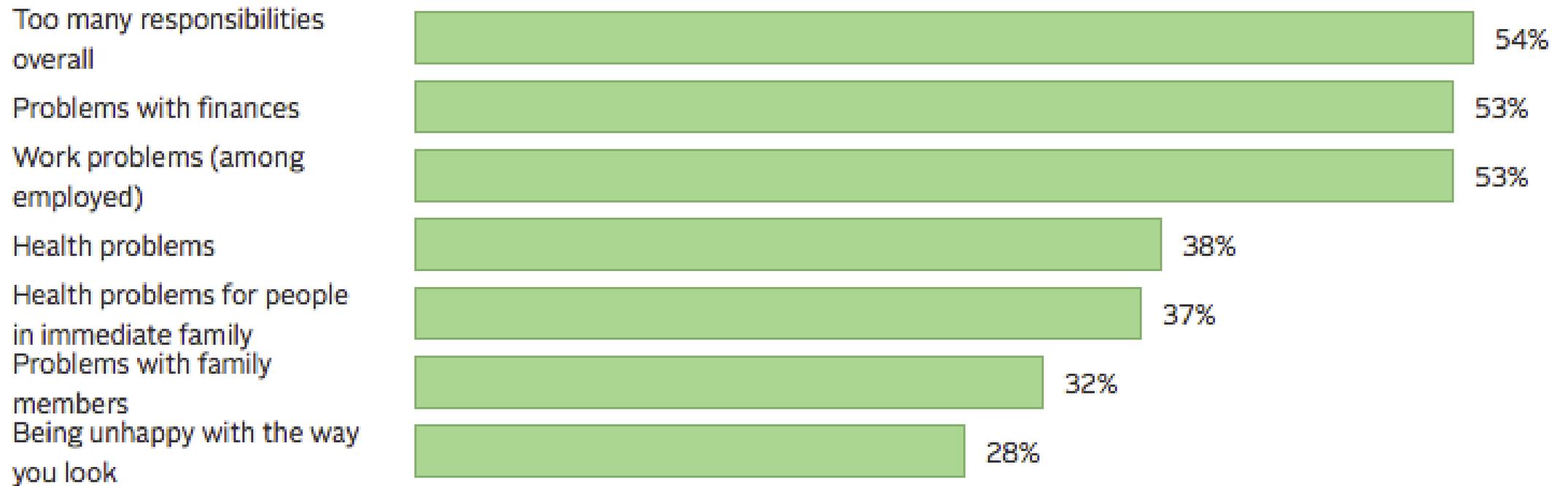
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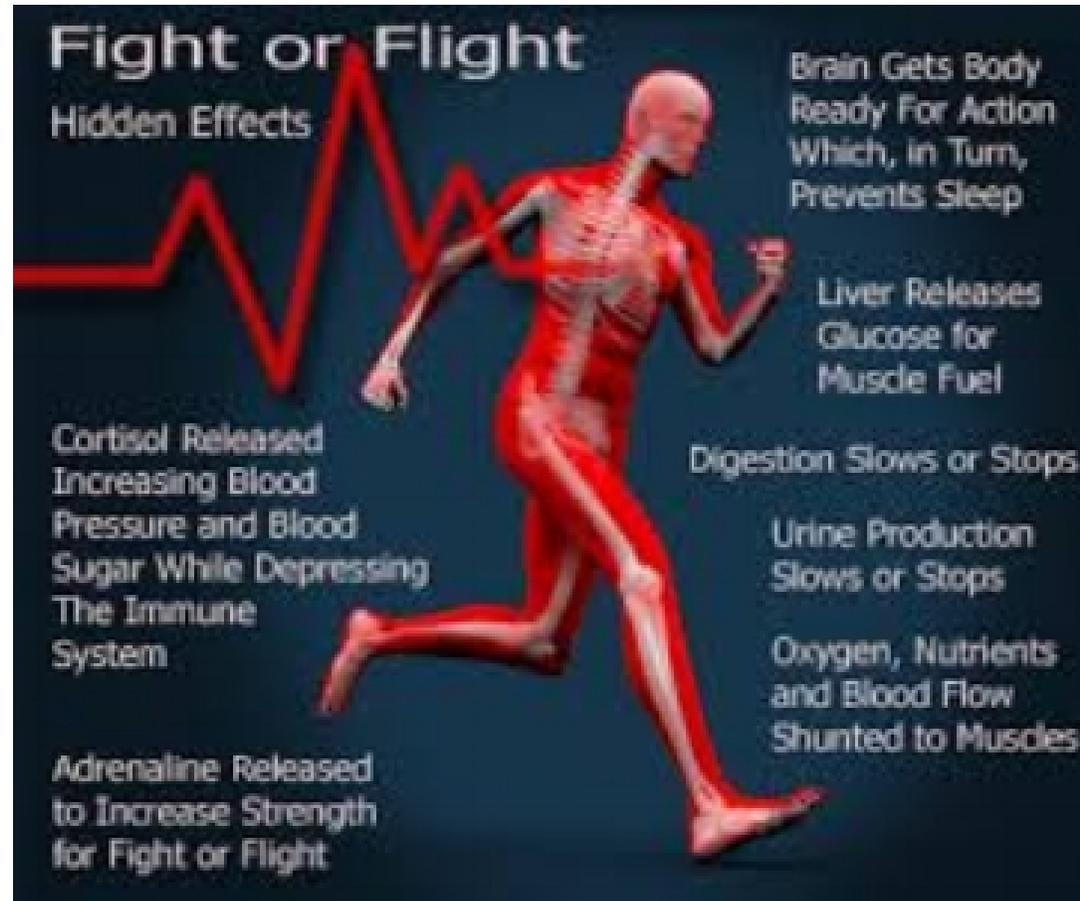
Defining Stress

- 1 Events or situations (Stressors), real or imagined
- 2 Physiological arousal
- 3 Transaction (Stressors x appraisals)

Stress = Stressors



Stress = Physiological Responses



Stress is often assessed with physiological markers

Neuroendocrine

- Cortisol
- Epinephrine
- Norepinephrine

Immune

- Interleukin-6
- Tumor necrosis factor-alpha
- C-reactive protein
- LDL cholesterol
- Triglycerides
- Glucose
- Insulin

Cardiovascular and Respiratory

- Systolic blood pressure
- Diastolic blood pressure
- Heart rate/pulse
- Heart rate variability (HRV)

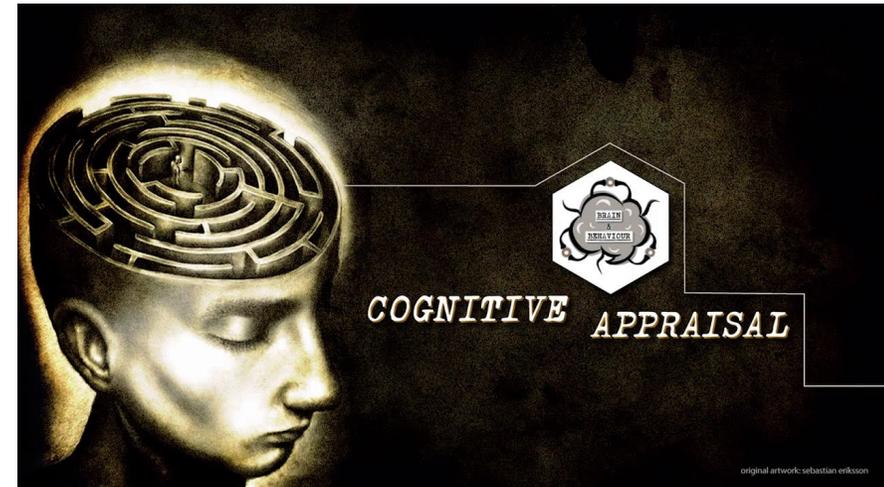
Stress = Transaction



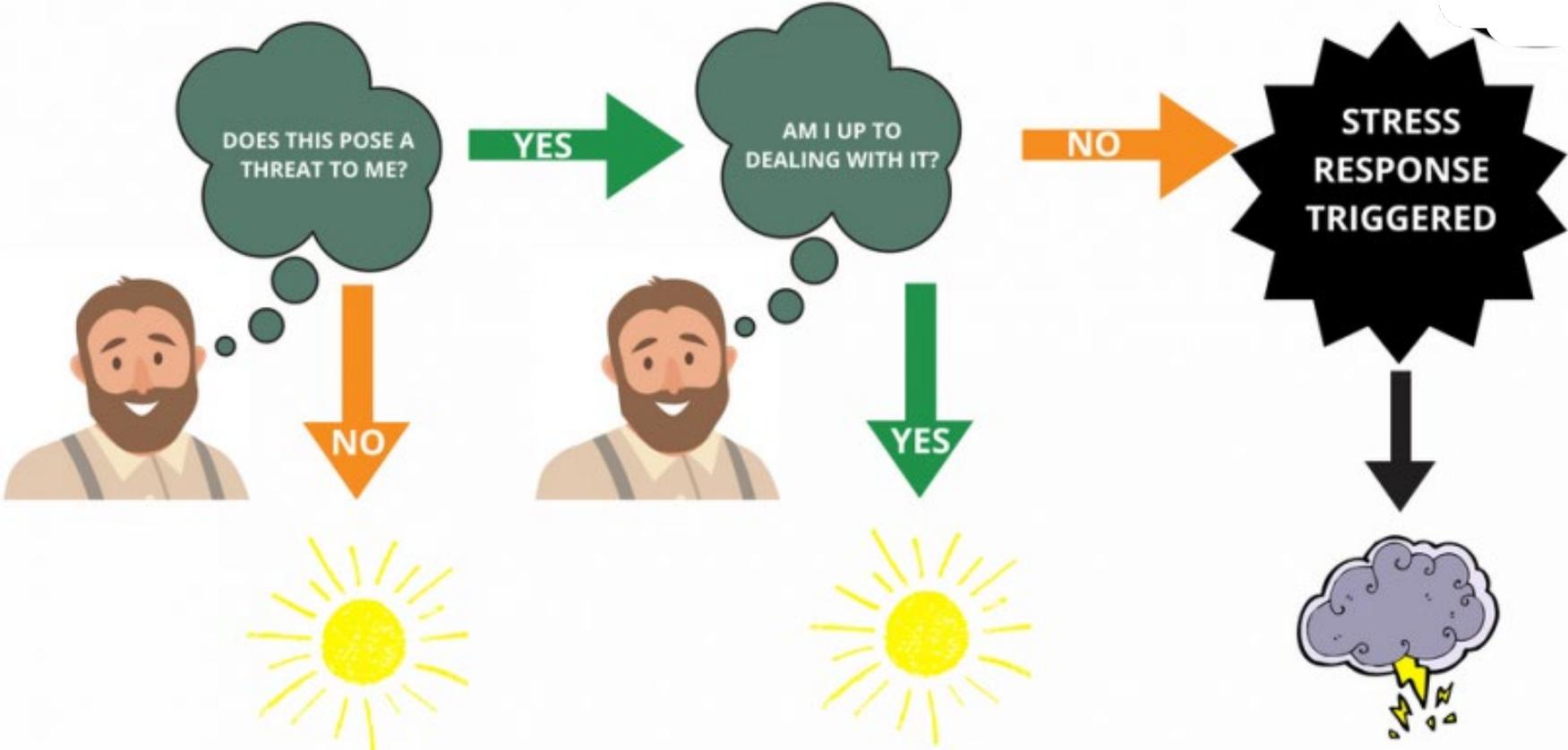
Stress = Transaction



X



Cognitive Appraisal



Temporal Dimension of Stress

Acute

Chronic

Allostatic Load



Stress is highly prevalent

LIVING

Americans are stressed out

By Max Jaeger

December 20, 2017 | 10:59am | Updated

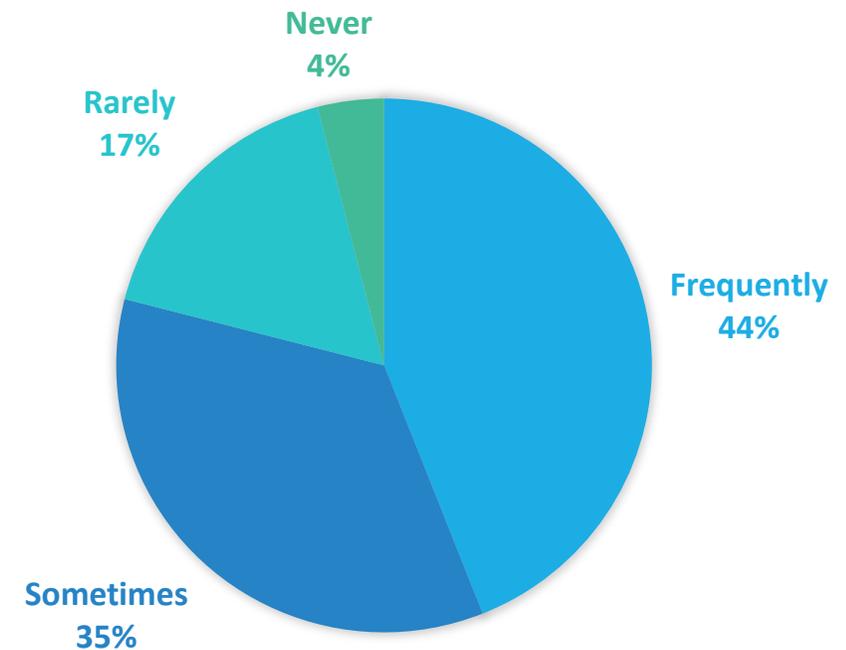


Getty Images

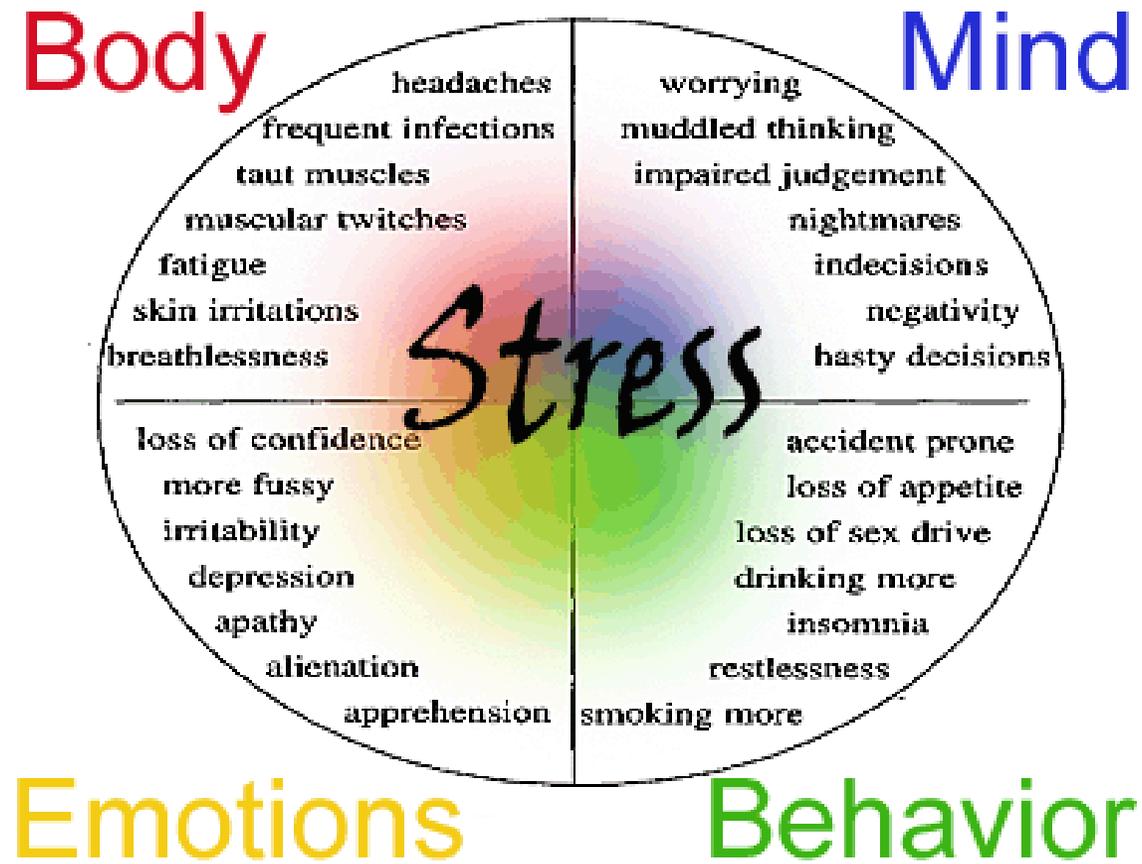
If you're feeling stressed, you're not alone.

MORE ON:

FREQUENCY OF FEELING STRESS IN DAILY LIFE



Stress has many pernicious effects



Stress contributes to many health concerns

Cardiovascular Disease

Obesity

Diabetes

Wound healing

Headaches

Insomnia

Asthma

Chronic Pain

Gastrointestinal Problems

Mental Health Conditions

Poll Question # 1

Personal Yoga Practice

I practice yoga:

- 1) 3- 7 times a week
- 2) 1-2 times per week
- 3) A few times per month
- 4) A few times per year
- 5) Never

Poll Question # 2

Personal Experiences of Yoga and Stress

If you practice yoga, how much would you say that it helps to reduce *your* stress?

- 1) Very, very much
- 2) Very much
- 3) Much
- 4) Not very much
- 5) Not at all

Does Practicing Yoga Reduce Stress? Research Evidence

Effects of Yoga on Stress Management in Healthy Adults: A Systematic Review

Cecilia S. M. Chong, BS; Megumi Tsunaka, BS; Hector W. H. Tsang, PhD; Edward P. Chan, BA; Wai Ming Cheung, PhD

Conclusion • This review revealed positive effects of yoga on stress reduction in healthy adult populations. However, the result should be interpreted with caution due to the small number of studies and the associated methodological problems. Further studies to ascertain yoga's long-term effects and the underlying biological mechanisms leading to its stress reduction effect should be conducted. (*Altern Ther Health Med.* 2011;17(1):32-38.)

The Effects of Yoga on Anxiety and Stress

Amber W. Li, PharmD and Carroll-Ann W. Goldsmith, DSc

Alternative Medicine Review Volume 17, Number 1

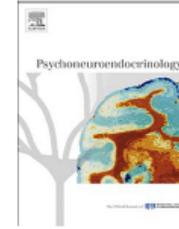
the role of yoga in improving the signs and symptoms of stress and anxiety. Of 35 trials addressing the effects of yoga on anxiety and stress, 25 noted a significant decrease in stress and/or anxiety symptoms when a yoga regimen was implemented; however, many of the studies were also hindered by limitations, such as small study populations, lack of randomization, and lack of a control group. Fourteen of the



Contents lists available at ScienceDirect

Psychoneuroendocrinology

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



Review

Yoga, mindfulness-based stress reduction and stress-related physiological measures: A meta-analysis



Michaela C. Pascoe^{a,*}, David R. Thompson^{b,c}, Chantal F. Ski^b

Forty two studies were included in the meta-analysis.

Interventions that included yoga asanas were associated with reduced evening cortisol, waking cortisol, ambulatory systolic blood pressure, resting heart rate, high frequency heart rate variability, fasting blood glucose, cholesterol and low density lipoprotein, compared to active control.

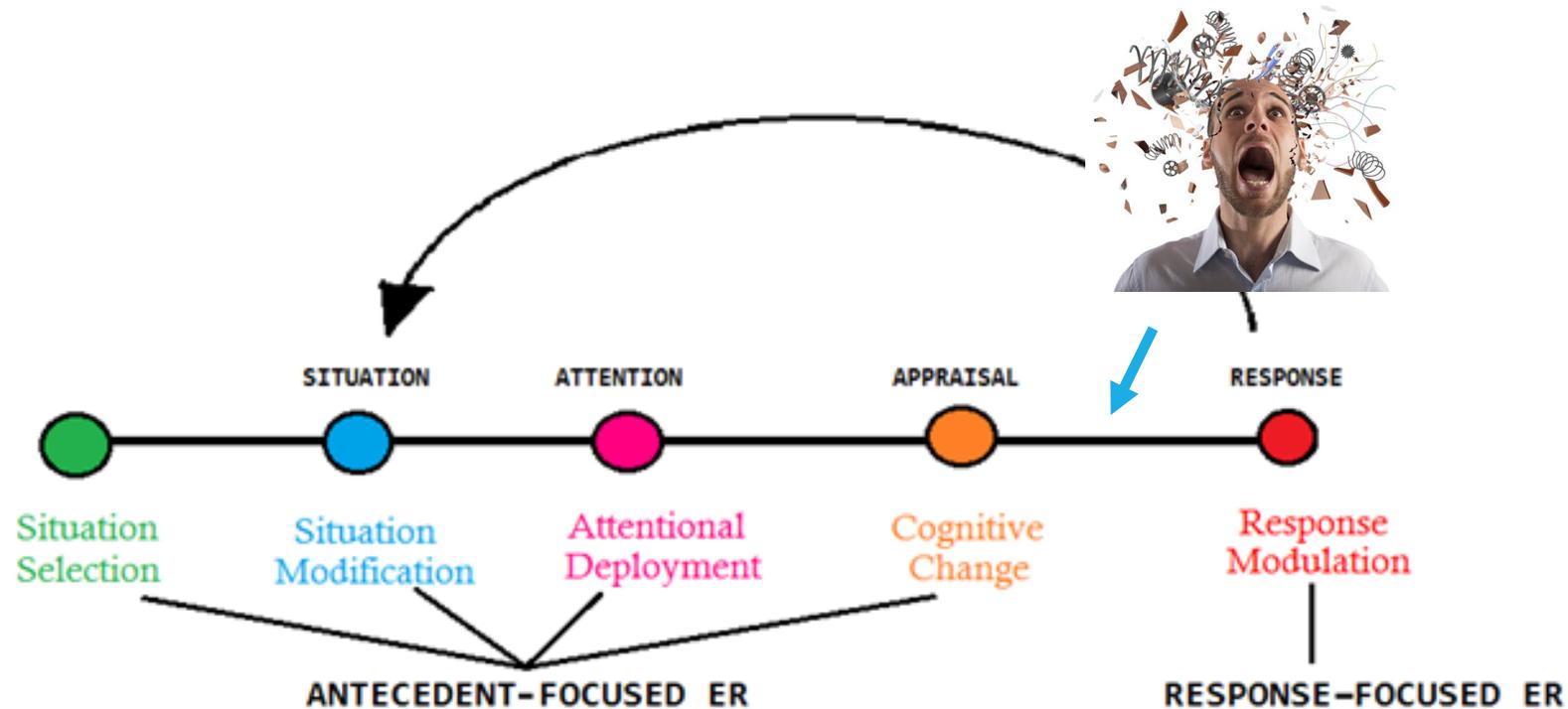
However, the reported interventions were heterogeneous.

Stress as unfolding transactional process

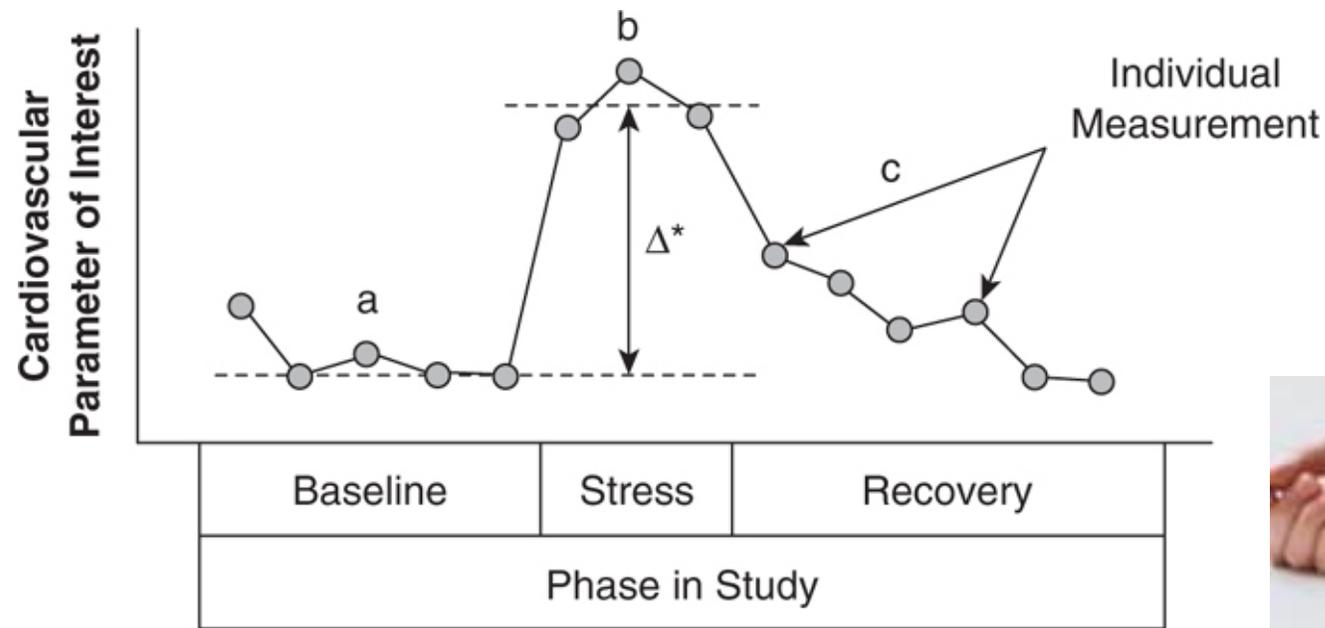
What are the processes through which stress develops?

How does yoga influence these processes?

Stress Exposure and Appraisal vs. Stress Response

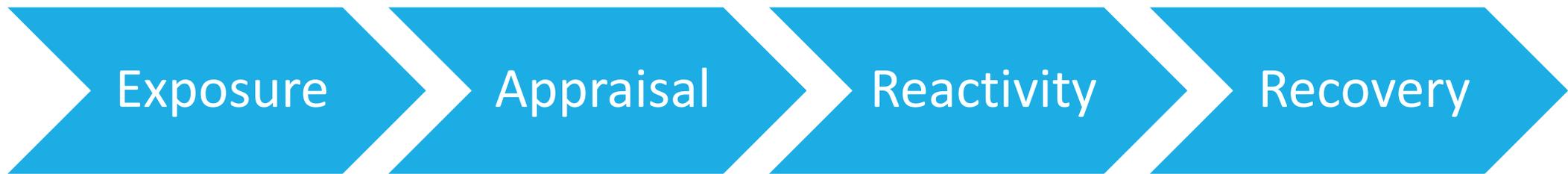


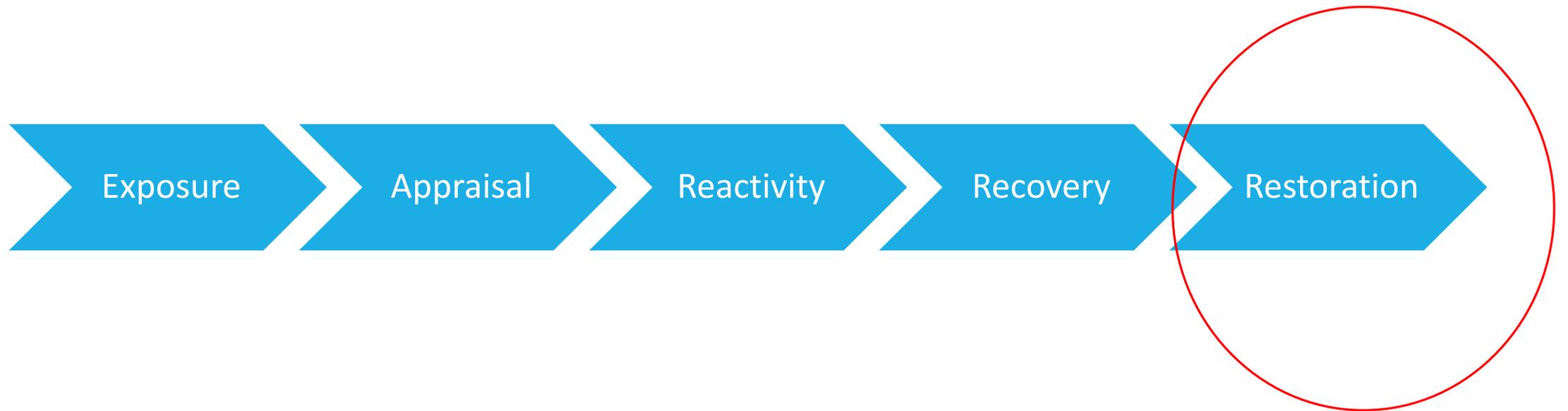
Stress Reactivity & Recovery



* Δ = reactivity change value



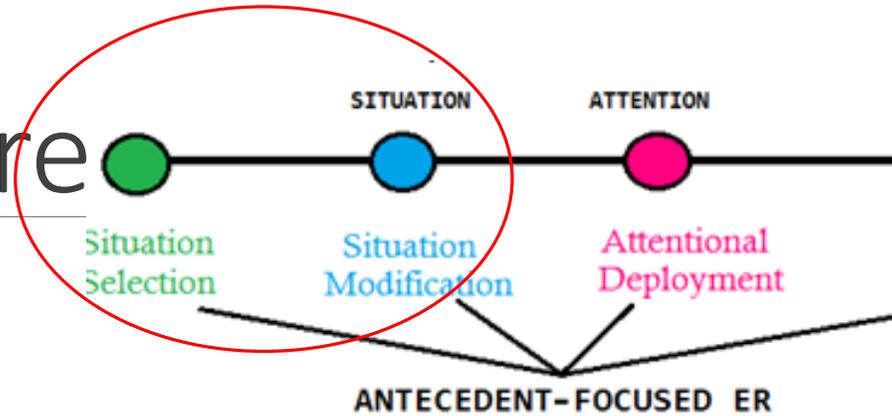




How does yoga mitigate stress?



Yoga and Stress Exposure



- Situation Selection/Modification
 - RCT of pregnant women; yoga group had improved social environment (Rakhshani et al., 2010)

Qualitative Research

“I Am a Nice Person When I Do Yoga!!!”

A Qualitative Analysis of How Yoga Affects Relationships

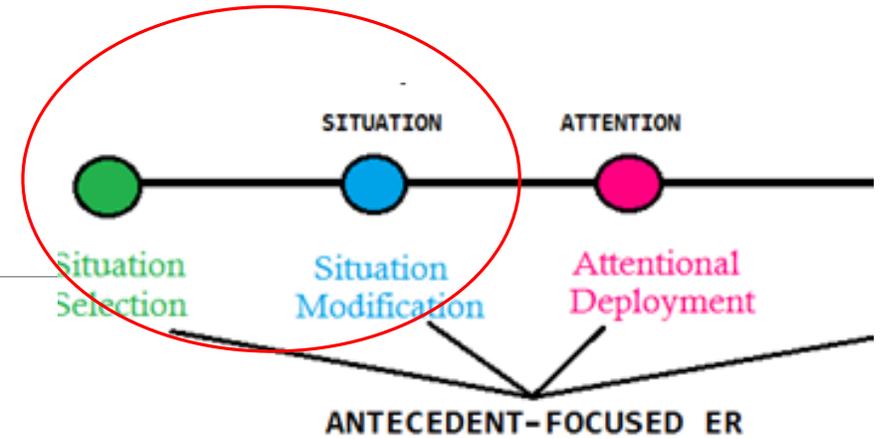
Alyson Ross, PhD, RN
University of Maryland School of Nursing
Margaret Bevans, PhD, RN

jhn

Journal of Holistic Nursing
American Holistic Nurses Association
Volume 32 Number 2
June 2014 67-77
© The Author(s) 2013
10.1177/0898010113508466
<http://jhn.sagepub.com>

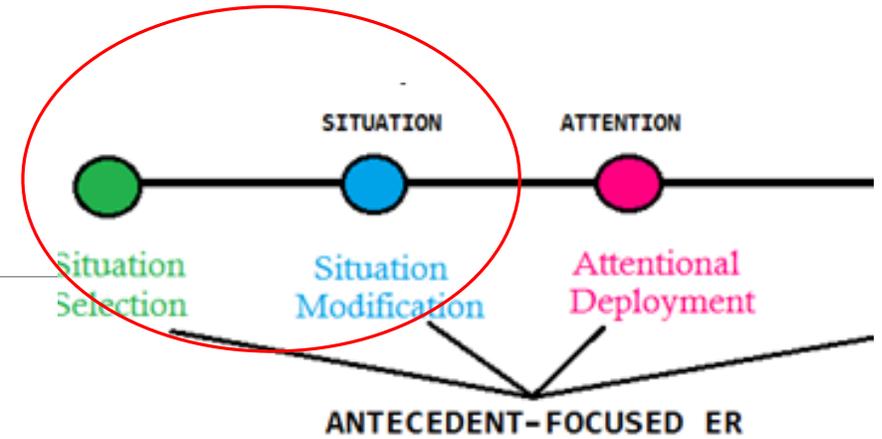
Yoga and Stress Exposure

- Self-control
 - Increased self-reported self-control in some--but

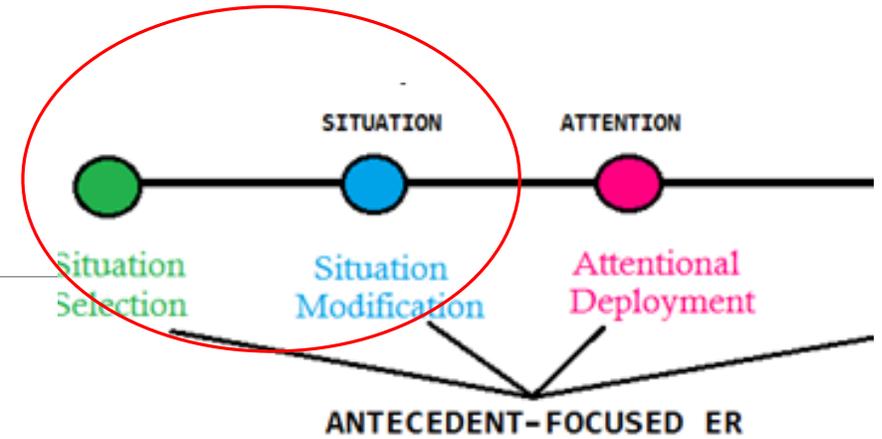


Yoga and Stress Exposure

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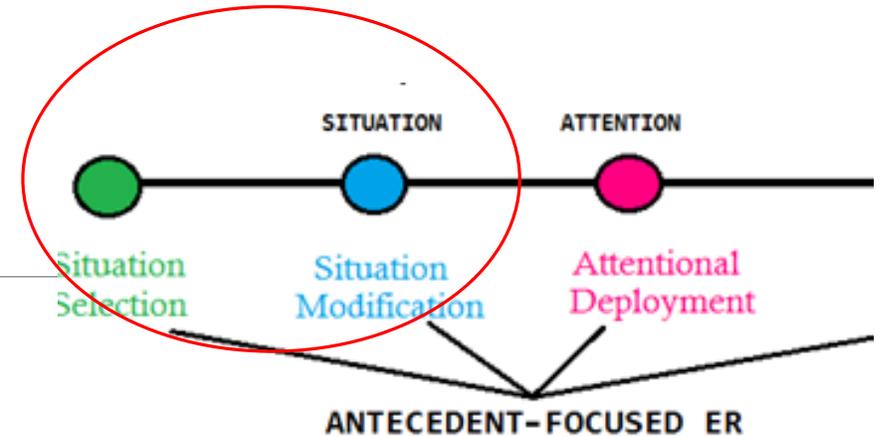
Yoga and Stress Exposure



- Self-control

- Increased improved self-control in some--but not
- No effects for self-control in a female prison population (Danielly & Silverthorne, 2017)
- Go-No-Go Task in a male prison population (Bilderbeck et al., 2013)

Yoga and Stress Exposure

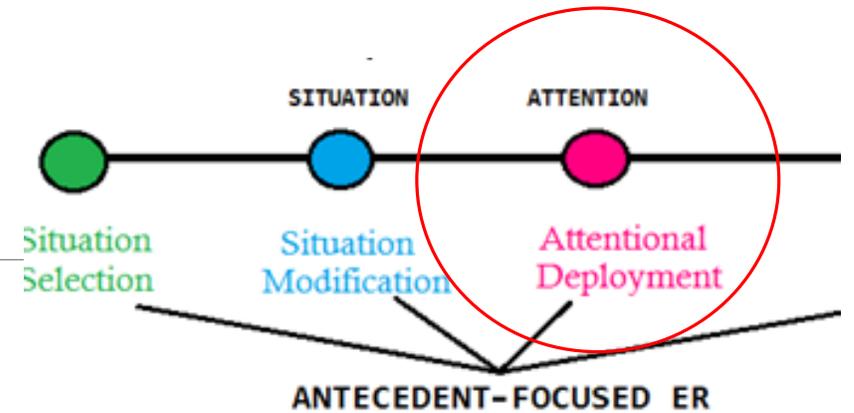


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- Increased self-reported self-control in some--but
- No effects for self-control in a female prison population (Danielly & Silverthorne, 2017)
- Go-No-Go Task in a male prison population (Bilderbeck et al., 2013)
- Single session: Effects for experienced yogis on Stroop task of inhibition at 10 mins. but not 5 mins. (Luu & Hall, 2017)

PURPLE YELLOW RED
BLACK RED GREEN
RED YELLOW ORANGE
BLUE PURPLE BLACK
RED GREEN ORANGE

Yoga and Stress Exposure

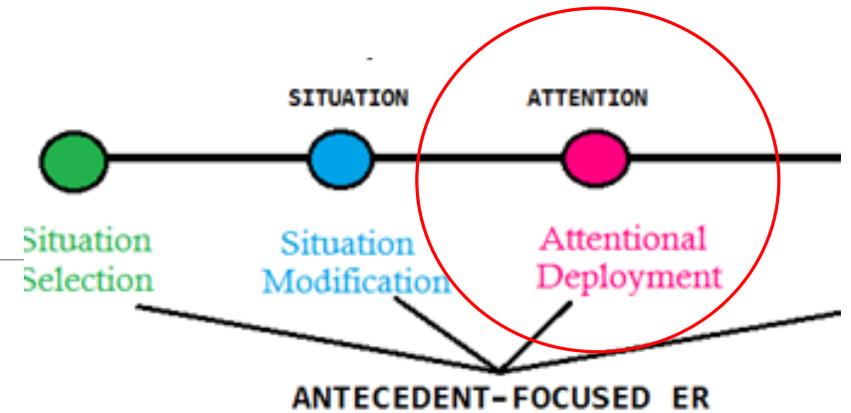


- Attention

- Mindfulness

- Observational (e.g., Brisbon & Lowery, 2011; Gaiswinkler & Unterrainer, 2016)
 - Change with intervention (e.g., Hewett et al., 2011) Bikram, no control
 - But...8 weeks of yoga vs. wait list both changed in mindfulness! (Shelov, Suchday & Friedberg, 2009)

Yoga and Stress Exposure



- Attention

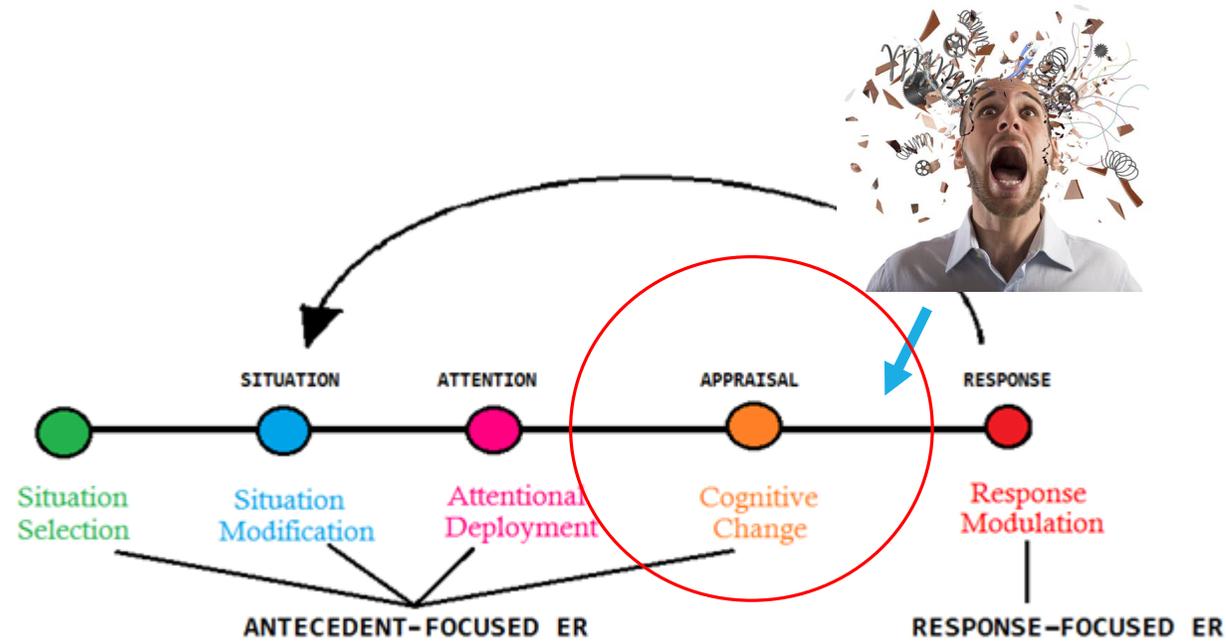
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- Rumination

- Sometimes (e.g., Kinser et al., 2013), but not always (e.g., Danielly & Silverthorne, 2017)

Yoga and Stress Appraisal



Yoga and Appraisals



Acute Stress

- Challenge vs. threat?
- Pain: Villemure et al. (2013)

Yoga and Appraisals



Acute Stress

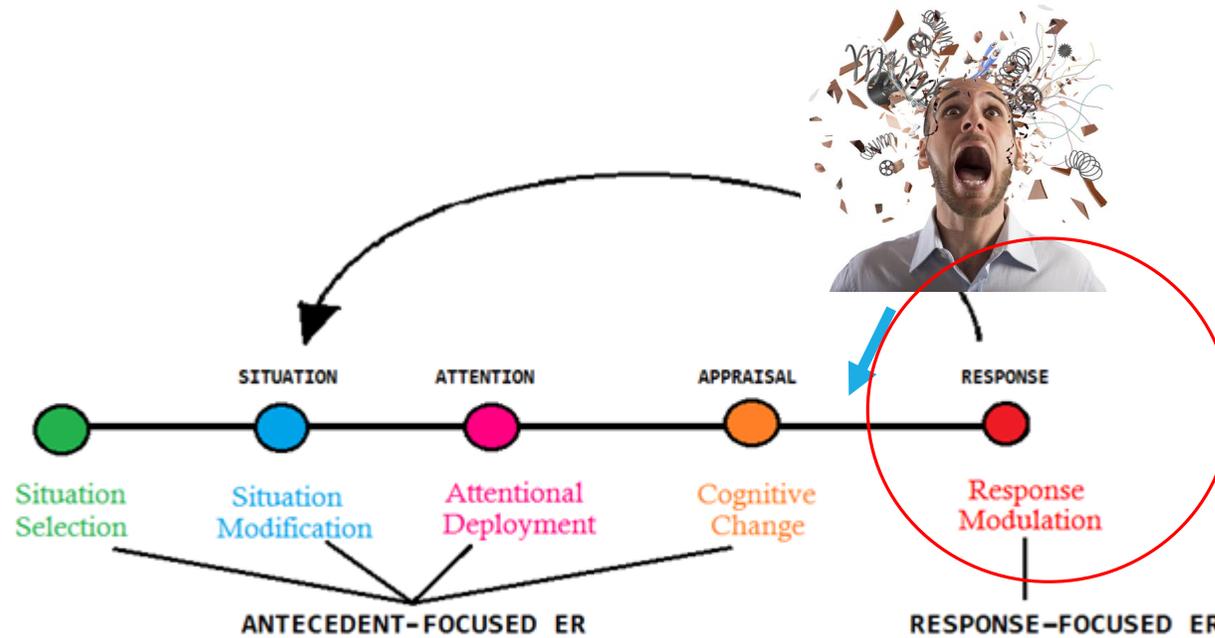
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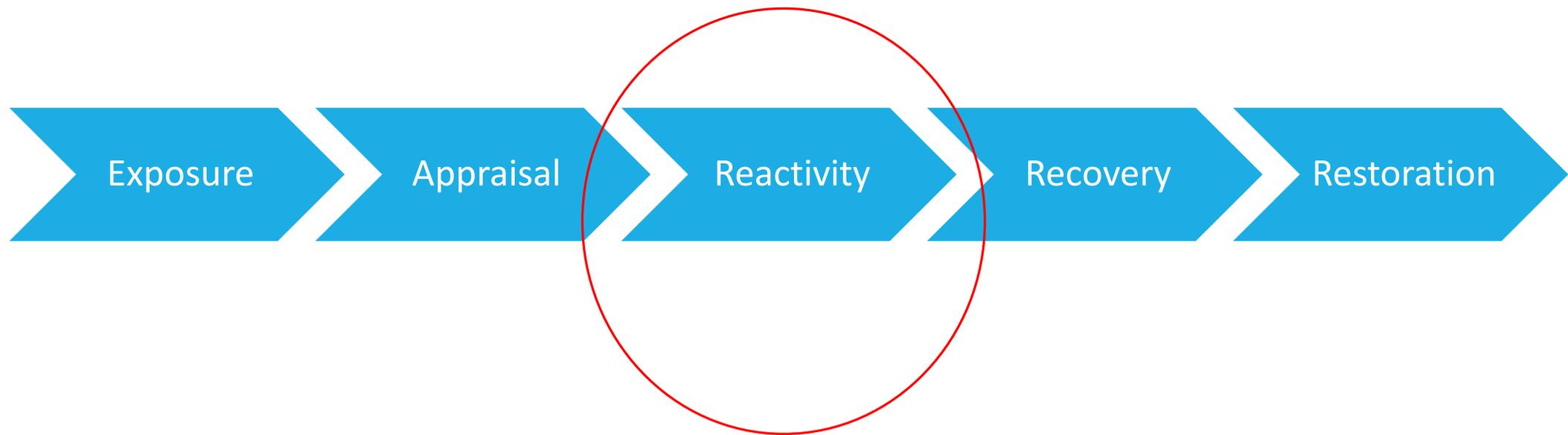
Cumulative Stress/Allostatic Load: Copious evidence

- Perceived Stress Scale: In the past month, how often have you....
 - been upset because of something that happened unexpectedly?
 - felt that you were unable to control the important things in your life?
 - felt nervous and “stressed”?
 - felt confident about your ability to handle your personal problems?
 - felt that things were going your way?



Yoga and Responses to Stress





Heated Hatha Yoga to Target Cortisol Reactivity to Stress and Affective Eating in Women at Risk for Obesity-Related Illnesses: A Randomized Controlled Trial

Lindsey B. Hopkins, Johnna L. Medina, Scarlett O. Baird, David Rosenfield, Mark B. Powers,
and Jasper A. J. Smits
Southern Methodist University

Modified Trier Stress Test



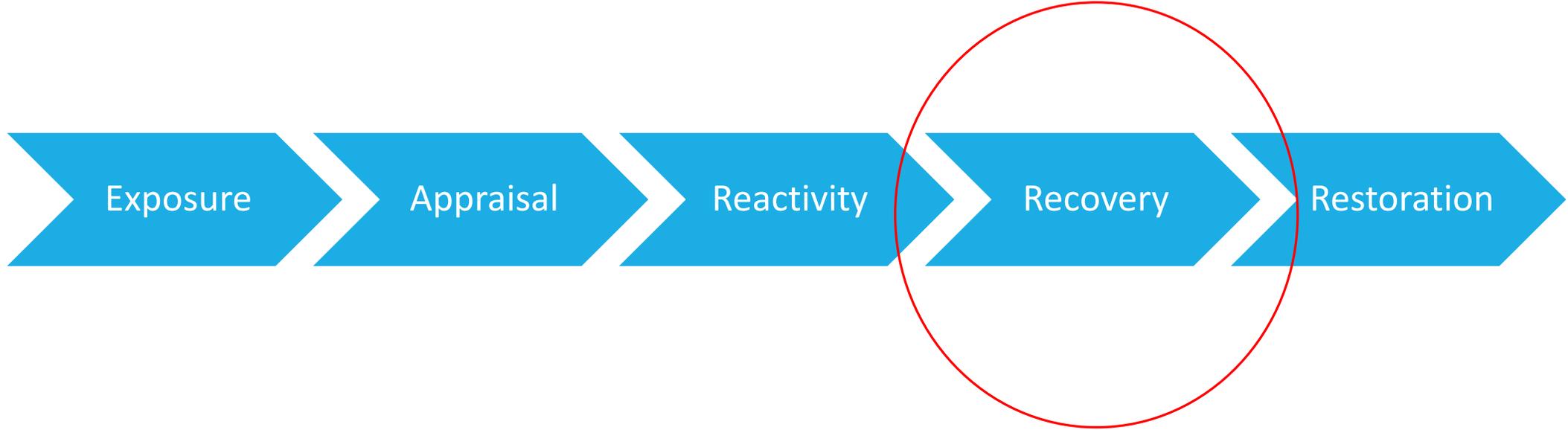
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Southern Methodist University

Modified Trier Stress Test

Cortisol reactivity (only those with elevated reactivity)





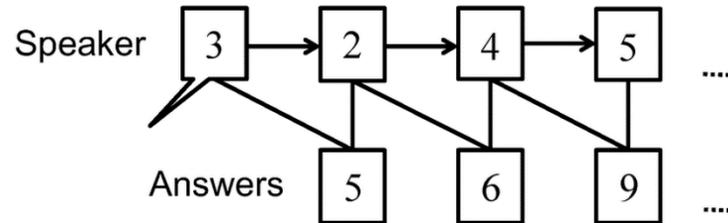


A single session of hatha yoga improves stress reactivity and recovery after an acute psychological stress task—A counterbalanced, randomized-crossover trial in healthy individuals



Mateus J. Benvenuti^{a,c}, Eduardo da Sliva Alves^{a,d}, Scott Michael^a, Ding Ding^b, Emmanuel Stamatakis^{b,e}, Kate M. Edwards^{a,*}

Paced Auditory Serial Addition Test



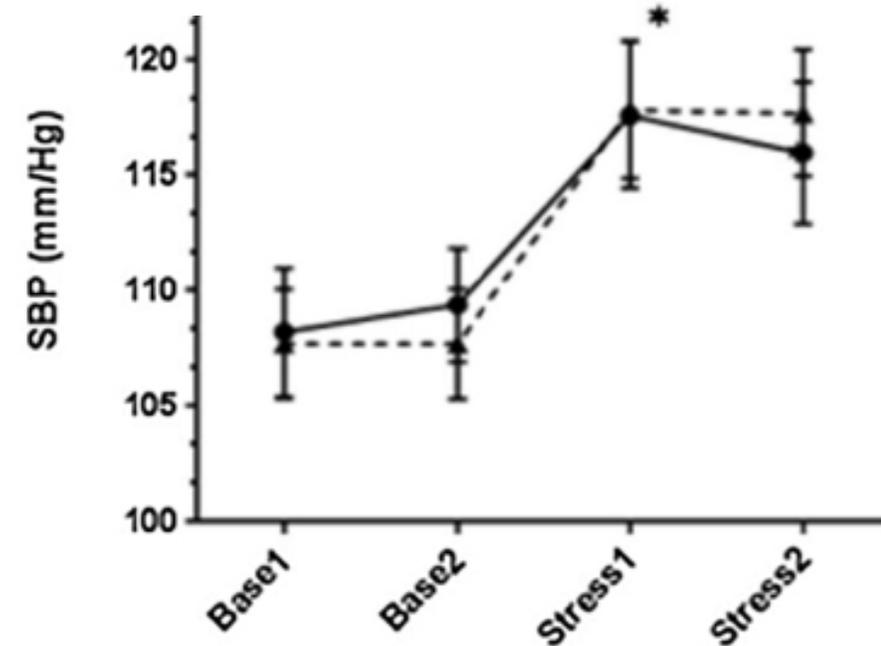
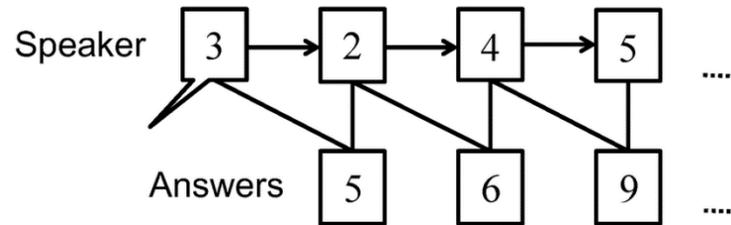


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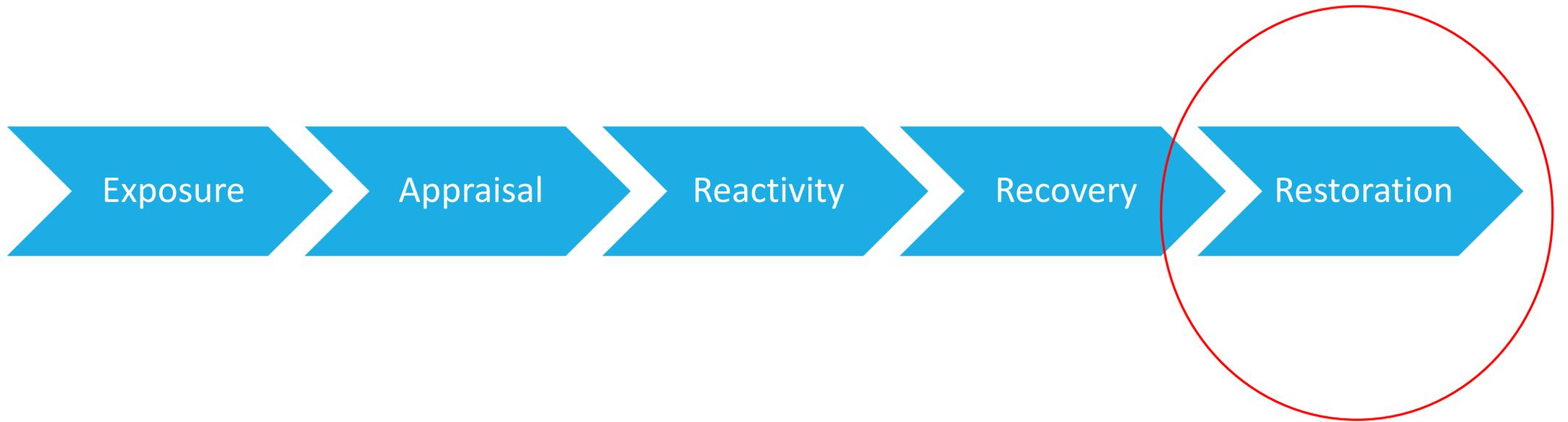


Yoga and Stress Recovery (Coping)

Villemure, C., Čeko, M., Cotton, V. A., & Bushnell, M. C. (2013). Insular cortex mediates increased pain tolerance in yoga practitioners. *Cerebral Cortex*, 24, 2732-2740.

- Yoga practitioners relied more on relaxation, acceptance, and nonjudgmental focusing on the pain
- Non-yogi controls tried to distract themselves or ignore the pain

Dale, L. P., Carroll, L. E., Galen, G. C., Schein, R., Bliss, A., Mattison, A. M., & Neace, W. P. (2011). Yoga practice may buffer the deleterious effects of abuse on women's self-concept and dysfunctional coping. *Journal of Aggression, Maltreatment & Trauma*, 20, 90-102.



Yoga and Restoration

Sleep

Cellular repair/immune functioning

Yoga and Sleep

- **Systematic Review (Balasubramaniam, Telles, & Doraiswamy, 2013)**
 - Grade C Evidence (3 RCTS)
- **Women with Diabetes (Ebrahimi, Guilan-Nejad, & Pordanjani, 2017)**
 - Yoga better than aerobic exercise in improving sleep
- **Menopausal women with hot flashes (Buchanan et al., 2017)**
 - Yoga, exercise, usual care—actigraphy—no differences!
 - Some evidence that yoga helped women who had particularly poor sleep at start

Yoga and Immune Functioning

J Behav Med (2018) 41:467–482
<https://doi.org/10.1007/s10865-018-9914-y>



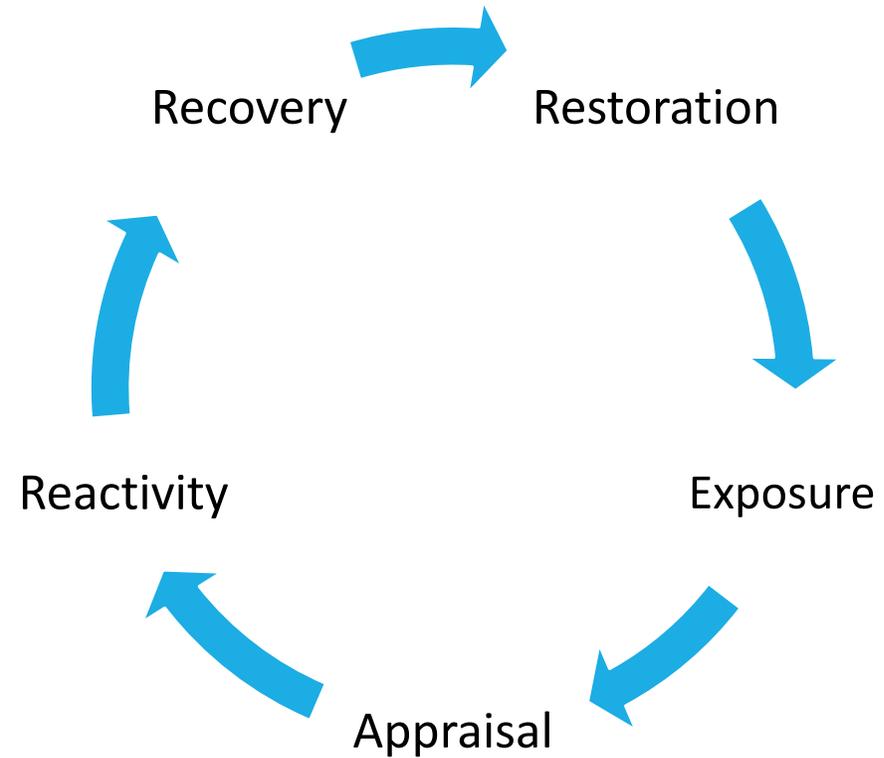
Yoga and immune system functioning: a systematic review of randomized controlled trials

R. I. Falkenberg^{1,4} · C. Eising² · M. L. Peters³

Even though the existing evidence is not entirely consistent, **a general pattern emerged suggesting that yoga can downregulate pro-inflammatory markers.** In particular, the qualitative evaluation of RCTs revealed **decreases in IL-1beta...IL-6 and TNF-alpha.** These results imply that yoga may be implemented as a complementary intervention for populations at risk or already suffering from diseases with an inflammatory component. **Beyond this, yoga practice may exert further beneficial effects by enhancing cell-mediated and mucosal immunity.** It is hypothesized that longer time spans of yoga practice are required to achieve consistent effects especially on circulating inflammatory markers. Overall, this field of investigation is still young, hence the current body of evidence is small and for most immune parameters, **more research is required to draw distinct conclusions.**



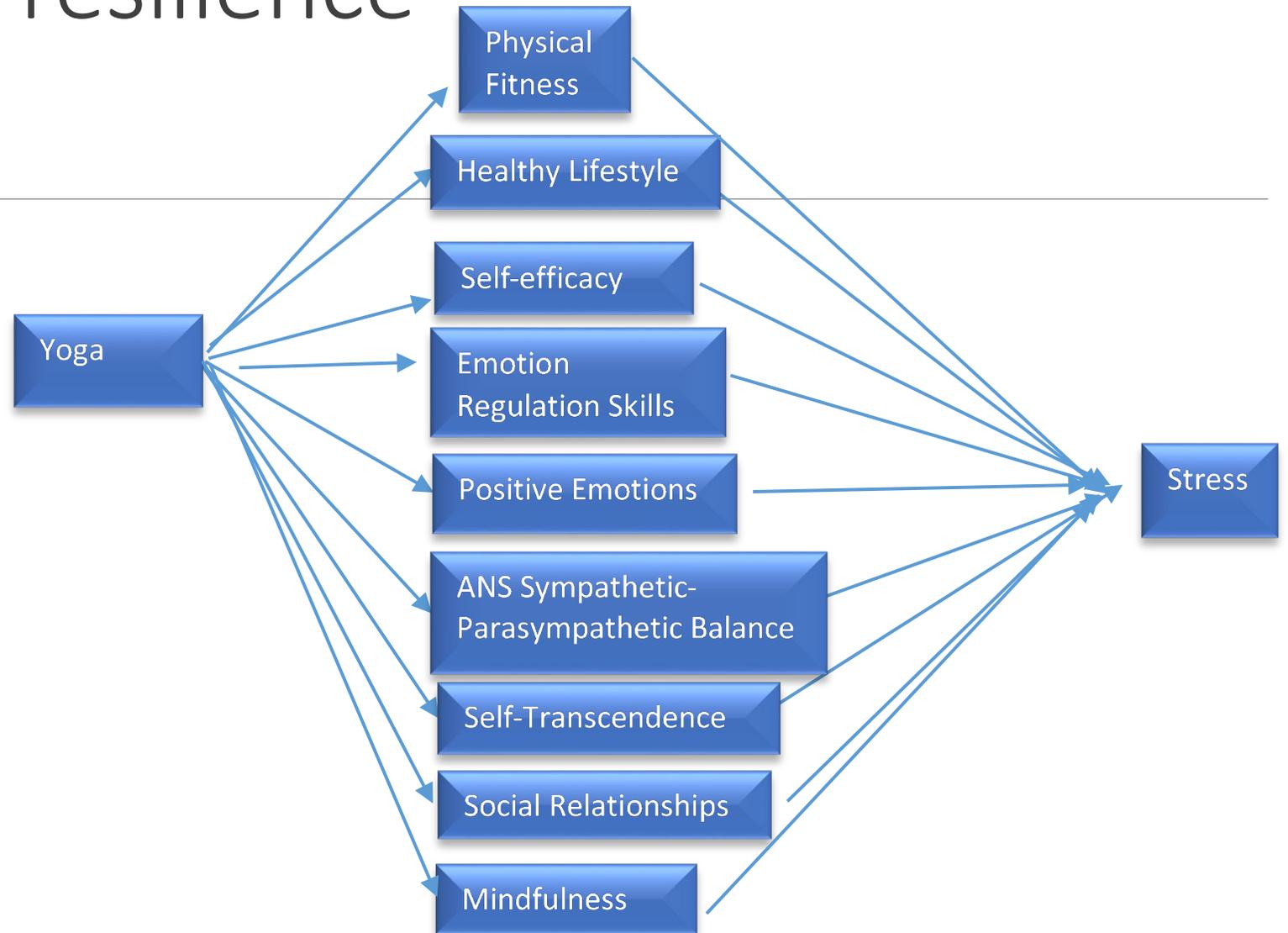
Yoga and Restoration



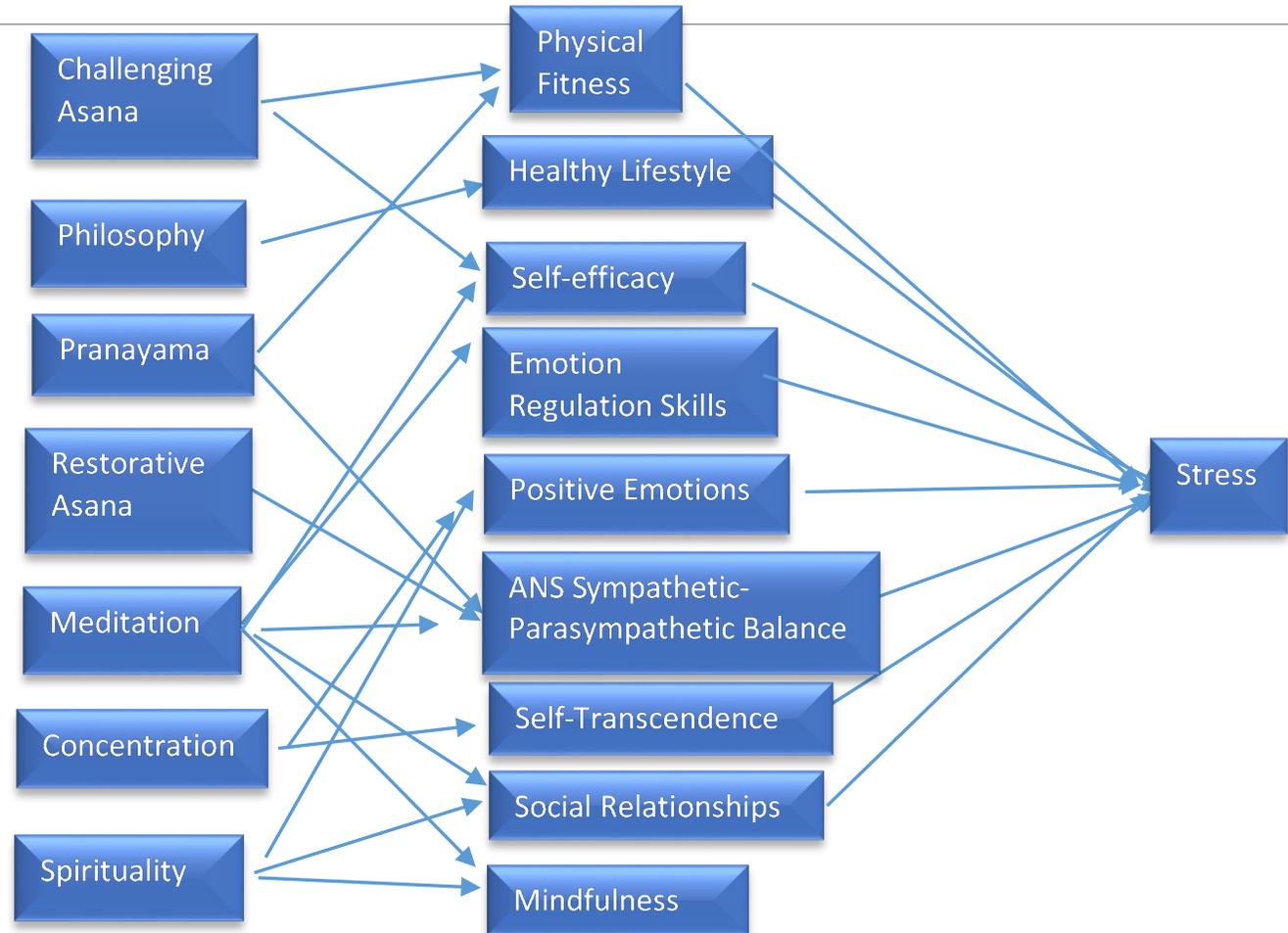
Yoga and Stress Resilience



Yoga promotes resilience



Yoga promotes resilience





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