Mental Training for Surgeons: Better, Stronger, Faster and Happier?

Carter Lebares, MD
UCSF Department of Surgery Grand Rounds
June 8th, 2016

Mental Training for Surgeons
Why and How?

- The Problem(s): Burnout, Mental Health and Medical Errors
- The Cause: Stress - the good and the bad
- The Clue: Resilience - the ability to thrive under stress
- The Answer: Mindfulness - mental training for resilience
- The Outcome?: Happier, Stronger, Faster and Better
- *The Study: The Mindful Surgeon 2016*

Burnout, Mental Health and Medical Errors

- Burn-out: syndrome of emotional exhaustion, cynicism, and decreased effectiveness stemming from work-related STRESS

  - Depersonalization/cynicism and emotional exhaustion. Burnout is the loss of Physician - Pt connection. Burnout is a problem for us *and* our patients

- In MDs, B/O has been shown to correlate with decreased empathy, professionalism, pt compliance and quality of outcomes. Also with increased errors, depression, and distress.

MD B/O in literature since 1981, initially described in PCPs and front line physicians

Shanafelt, *Ann Intern Med* 2002 - Int Med Res, perceived diminished pt care
Firth-Cozens, *Soc Sci Med*, 1997 - MD perceived stress and dim qual of care
Scheepers, *Int J Behav Med,* 2015 - Syst. Rev, MD well-being and QO pt care
DiMatteo, *Health Psychol*, 1993 - MD characteristics influence pt compliance

B/O in Surgeons

- 2001: UMich surgery grads, ~600, Maslach BOI and novel questionnaire. 32% high emotional exhaustion, especially younger surgeons, esp those with perception of 'being overwhelmed'. *Not related to caseload, practice setting or payer mix. Strong relation to desire to retire early*

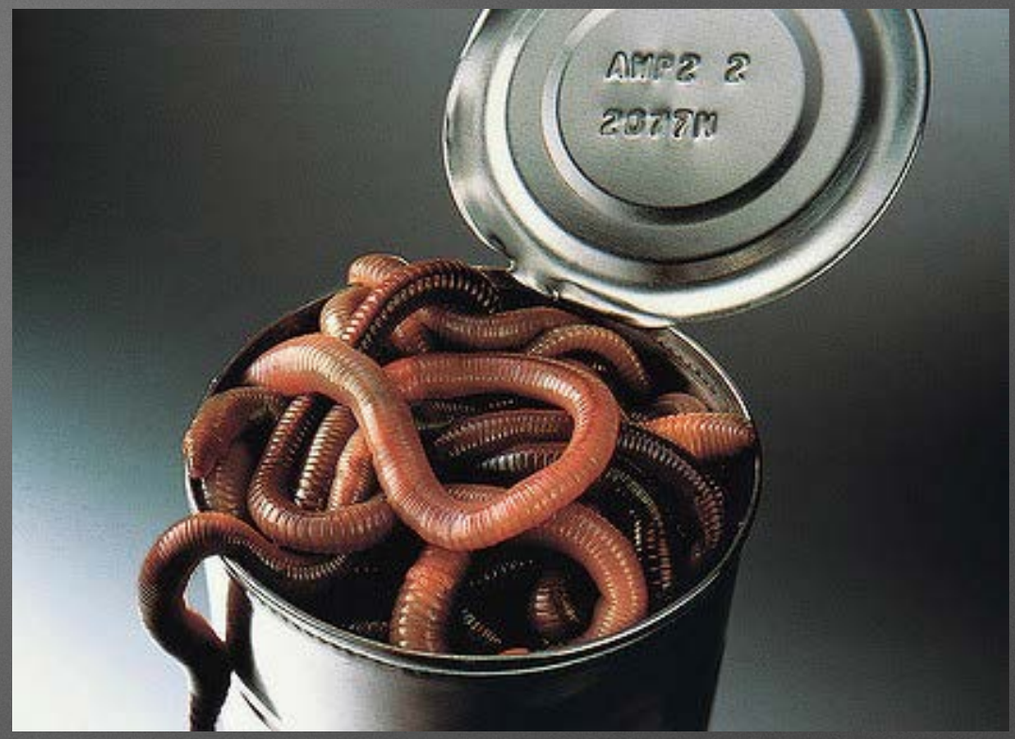
- 2005: US Transplant Surgeons, >200, 38% emo exh, 27% depersonalization. Predictors = questioning career choice, loss of personal life, reduced sense of control *(known relationship to perceived stress)*

Campbell, *Surgery,* 2001
Bertges, *Transpl Proc,* 2005

ACS 2008 Survey

- 24K Fellows surveyed, ~8K respondents (32%)

- 40% burn out



- OR time, and practice setting, protective

- B/O is an independent predictor of errors and depression on MV analysis

- Drill-downs showed relationship of B/O to distress, errors, and poor mental health.

Shanafelt, *Ann Surg,* 2009
Shanafelt, *Ann Surg,* 2010
Balch, *Ann Surg,* 2011

Journal of the American College of Surgeons

Volume 222, Issue 6, June 2016, Pages 1230–1239

‘Surgeon Burnout: A Systematic Review

- 39 studies of various quality examinig B/O in surgeons
- Gen Surg, Surg Onc, ENT, Neurosurg, Ortho, Transplant, Plastics, Microvascular
- B/O rates range from 37-53%, with emotional exhaustion rating highest in all groups, cynicism a close second.

- ***To date burn-out found at every level of training: Medical Students, Residents and Attendings.***
- ***Myriad other specialties: Anes, Emerg Med, Primary care, and Nursing.***

Prevention/Intervention

COLUMBIA UNIVERSITY MEDICAL CENTER

Program in Narrative Medicine

College of Physicians and Surgeons

BASIC NARRATIVE MEDICINE WORKSHOP

OCTOBER, 28 - 30, 2016 | Register at the early bird rate

Early Bird registration until midnight, September 9, 2016

Empathetics
neuroscience of emotions

Empathetics: Neuroscience of Emotions
Course Fees • Individual Modules: $125 • Purchase all 3 modules: $300

'Mindful Practice' for medical students

Univ Rochester, NY

Table 2. Characteristics of Mindful Practice

Active observation of oneself, the patient, and the problem

Peripheral vision, Preattentive processing, Critical curiosity

Courage to see the world as it is

Willingness to examine and set aside prejudices

Adoption of a beginner's mind

Humility to tolerate awareness of one's shortcomings

Compassion based on insight, Presence

TABLE 3. Personal Importance of Wellness Promotion Strategies as Rated by Surgeons

	Not Important to Me (0), n (%)	Minimally Important (1), n (%)	Moderately Important (2), n (%)	Essential (3), n (%)	Mean Score*	Rank
I find meaning in my work	46 (0.7)	347 (4.9)	2196 (30.9)	4521 (63.6)	2.6	1
I protect time away from work with my spouse, family, and friends	108 (1.5)	564 (7.9)	2416 (34.0)	4011 (56.5)	2.5	2
I focus on what is most important to me in life	46 (0.7)	509 (7.2)	3076 (43.4)	3463 (48.8)	2.4	3
I try to take a positive outlook on things	114 (1.6)	771 (10.8)	3113 (43.7)	3128 (43.9)	2.3	4
I take vacations	222 (3.1)	1168 (16.4)	2327 (32.7)	3397 (47.8)	2.3	5 (tie)
I participate in recreation/ hobbies/exercise	167 (2.4)	1076 (15.1)	2637 (37.1)	3233 (45.5)	2.3	5 (tie)
I talk with family, significant other, or friends about how I am feeling	324 (4.6)	1002 (14.1)	2569 (36.1)	3227 (45.3)	2.2	7
I have developed an approach/ philosophy to dealing with patients' suffering and death	298 (4.2)	1019 (14.4)	3306 (46.8)	2448 (34.6)	2.1	8
I incorporate a life philosophy stressing balance in my personal and professional life	468 (6.6)	1488 (21.0)	2904 (41.1)	2214 (31.3)	2.0	9
I look forward to retirement	1130 (16.0)	1877 (26.6)	2065 (29.3)	1986 (28.1)	1.7	10
I discuss stressful aspects of work with colleagues	898 (12.7)	2079 (29.3)	2824 (39.8)	1289 (18.2)	1.6	11
I nurture the religious/spiritual aspects of myself	1495 (20.9)	1936 (27.1)	1900 (26.6)	1817 (25.4)	1.6	12
I am involved in nonpatient care activities (eg, research, education, administration)	1527 (21.4)	1989 (27.9)	2319 (32.6)	1288 (18.1)	1.5	13
I engage in contemplative practices or other mindfulness activities such as meditation, narrative medicine, or appreciative inquire, etc.	4500 (63.5)	1495 (21.1)	742 (10.5)	352 (5.0)	0.6	14
I engage in reflective writing or other journaling technique	4832 (68.6)	1400 (19.88)	546 (7.75)	264 (3.75)	0.5	15
I have regular meetings with a psychologist/psychiatrist to discuss stress	6164 (86.6)	593 (8.33)	222 (3.12)	137 (1.93)	0.2	16

Shanafelt, *Arch Surg*, 2012

TABLE 5. Factors Independently Associated With Burnout

Independent Factor*	Odds Ratio (95% CI)†		*P*
Male	0.707 (0.588–0.849)		0.0002
Hours worked per week (for each additional hour)	1.018 (1.014–1.023)		<0.0001
Nights on call per week (for each additional night)	1.087 (1.055–1.121)		<0.0001
Specialty‡			
Pediatric surgery	0.607 (0.400–0.921)		0.0190
Urology	1.752 (1.293–2.374)		0.0003
Ophthalmology	1.726 (1.104–2.700)		0.0168
Has seen primary care provider in last 12 months	0.827 (0.726–0.942)		0.0043
Wellness strategies§			
Find meaning in my work	0.445 (0.387–0.512)	#1	<0.0001
Take a positive outlook	0.596 (0.515–0.691)	#4	<0.0001
Incorporate a philosophy of stressing work-life balance	0.633 (0.536–0.748)	—— #8	<0.0001
Focus on what is most important in life	0.806 (0.697–0.932)		0.0031
Take vacations	0.857 (0.749–0.982)	#5	0.0259
Nurture religious/spiritual aspects of self	1.189 (1.017–1.390)		0.0294
Discuss stressful aspects of work with colleagues	1.319 (1.104–1.575)	#10	0.0023
Regular meetings with psychiatrist	2.244 (1.460–3.449)		0.0002
Engage in reflective writing/journaling	3.865 (3.375–4.425)		<0.0001

*

20%

1) The most protective elements in this study involve the development of philosophies or meta-cognition regarding our work.

How often do we model, discuss or even consider these kinds of things as useful professional tools?

Shanafelt, *Arch Surg*, 2012

TABLE 6. Model of Independent Factors Related to High Overall QOL*

Independent Factors†	Odds Ratio (95% CI)‡	*P*
Married (vs single)	1.736 (1.409–2.139)	<0.0001
Hours worked per week (each additional hour)	0.983 (0.979–0.986)	<0.0001
Nights on call per week (each additional night)	0.924 (0.899–0.950)	<0.0001
Years in practice (each additional year)	1.020 (1.014–1.026)	<0.0001
CDC compliant with aerobic exercise guidelines (vs not)	1.250 (1.104–1.414)	0.0004
Wellness strategies§		
* Take a positive outlook on things	1.772 (1.560–2.014)	<0.0001
* Incorporate a life philosophy stressing balance	1.578 (1.365–1.823)	<0.0001
* Find meaning in work	1.523 (1.339–1.732)	<0.0001
Focus on what is most important in life	1.442 (1.266–1.642)	<0.0001
Take vacations	1.368 (1.201–1.558)	<0.0001
Participate in recreation/hobbies/exercise	1.246 (1.088–1.428)	0.0015
Talk with family/spouse/friends about feelings	1.244 (1.101–1.405)	0.0004
Protect time away from work with spouse/family/friends	1.198 (1.051–1.365)	0.0068
Regular meetings with psychiatrist to discuss stress	0.460 (0.298–0.710)	0.0004
Looking forward to retirement	0.376 (0.329–0.429)	<0.0001

2) Factors that enhance QOL DO NOT necessarily protect against burnout (e.g. exercise, protected personal time).

3) Factors that protect against burnout DO enhance QOL.

How's all this working for us?

The Problem is Growing

- Re-evaluation of burnout in MDs and general US working population. (n=7,000 in each group)
- From 2011 —> 2014, burnout among MDs increased 10% (45% to 54%, $p < 0.001$)
- On MV analysis risk of burnout for MDs vs general population had OR = 1.97.

Shanafelt, *Mayo Clin Proc*,2015

Burnout, Mental Health and Medical Errors

Compared to age-matched peers:

SI is 3x higher in surgeons, suicide 2.3x higher in MDs, depression is nearly dbl in Medical Student and B/O in trainees is 30% more common.

"Male sex, having children, and **working for the Department of Veterans Affairs** were associated with a lower likelihood of alcohol abuse or dependence."

25K ACS fellows, 29% response
15% EtOH abuse or dependence
M: ~13%, F: ~25%, Gen Pop: 9%
Medical Errors — OR 1.45
BurnOut — OR 1.25
Depression — OR 1.48

Shanafelt, *Arch Surg*, 2011
Devi, *Lancet*, 2011
Center, *JAMA*, 2003
Dyrbye, *Ann Int Med.*, 2008
Dyrbye, *Acad Med*, 2014
Oreskovich, *Arch Surg*, 2012

Burnout, Mental Health and Medical Errors

Cultural stigma and stoicism act as significant barriers.

Culturally, psychological health is still seen as a static character trait rather than a skill to be developed.

Result: technical and intellectual experts with little or no formal preparation for the inherent stressors of their work.

Result: 400 MD suicides in 2015 - double the population average

Thompson, Enhancing Mental Readiness in Military Personnel, 2006
http://www.rto.nato.int/abstracts.asp.
American Fndn for Suicide Prevention. Facts about MD depression and suicide, 2016
http://afsp.org/our-work/education

Burnout, Mental Health and Medical Errors

- IOM (1999) based on Harvard Practice Review and analysis of medical errors in Utah and Colorado (1980s). Estimate 45 - 98,000 preventable lethal medical events per year. Libby Zion death, 1984.

Of course, pts are not planes and biology is far more complex than flight.

To Err is Human, Inst of Med, 1999

Prevention/Intervention?

- Work-hour reform: Fewer hours, Structured breaks

Regulated duty hours highlight work-life balance but failed to change the overall magnitude of stress.

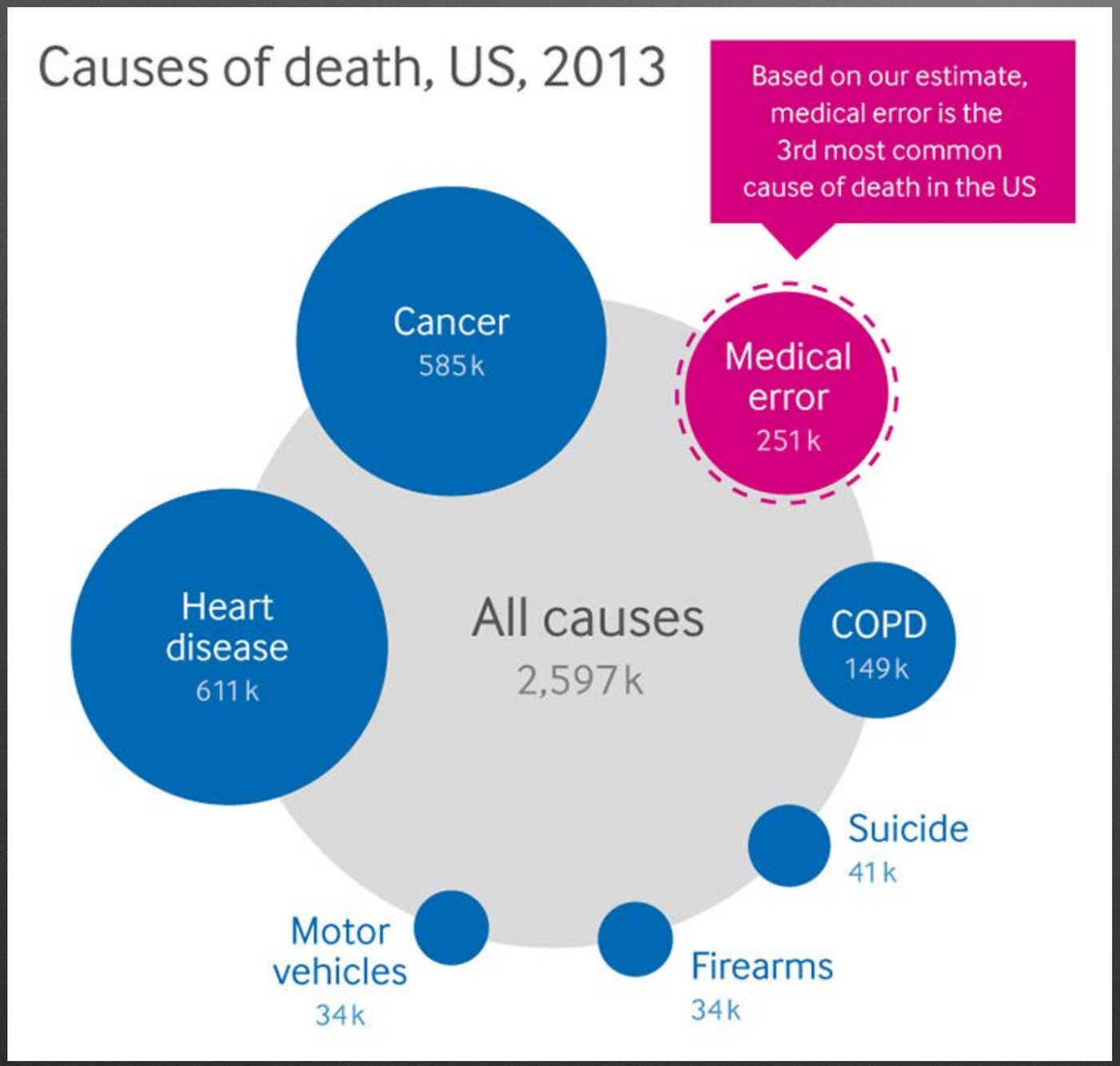
FIRST trial showed that flexibility had no impact on patient care or outcomes. Flexibility shifted the source of stress back to personal life while alleviating the component derived from interrupted pt care.

- Reporting, QI, Time-outs, Check-lists and Bundles

How's all this working for us?

Antiel, *JAMA Surg*, 2014
Bilimoria, *NEJM*, 2016

BMJ, 2016: Hopkins, Reanalysis Calculated Rate x 2013 Admissions



- Subsequent studies of lethal adverse events
- ~250K/yr
- 3rd leading COD

Leave, Qual Rev Bull, 1993
USD HHS, oig.hhs.gov, 2010
Landrigan, NEJM, 2010
Makary, BMJ, 2016

The Culprit: STRESS

- What Stress? : exhaustion, decision-fatigue, death, personalities, perceptions, complications, *surgery*

- Many of our stressors are *inherent, but* inherent doesn't mean immutable

- *Can 'stressors' really impact mental and physical health, much less performance to such a degree?*

Baumeister, *Neuropsychol*, 2014
Pinto, *Am J Surg*, 2014

Good, Bad and Toxic Stress

Nature of Stress + Individual Perception

Stress can prompt adaptation or survival

"Reflection vs. Reflexes"

Too toxic to ignore

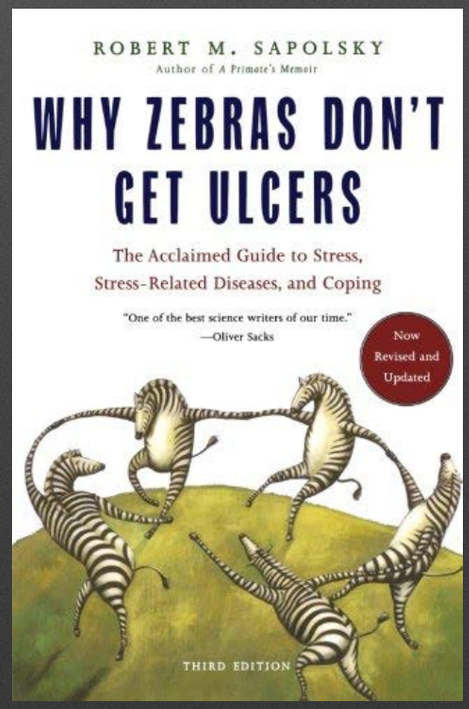
A stark warning about the societal costs of stress comes from links between shortened telomeres, chronic stress and disease, say **Elizabeth H. Blackburn** and **Elissa S. Epel**.

Entringer, *Am J Obstet Gyne*, 2013

Stress that is manageable can promote development

Stress that is threatening can put us in survival mode

Stress that is chronic, or overwhelming can be toxic



Good Stress —> Adaptation

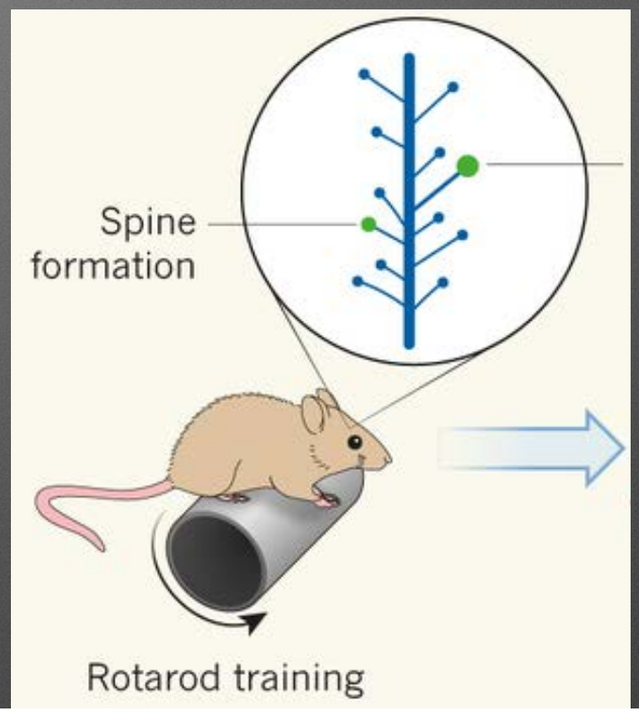
We have all experienced it

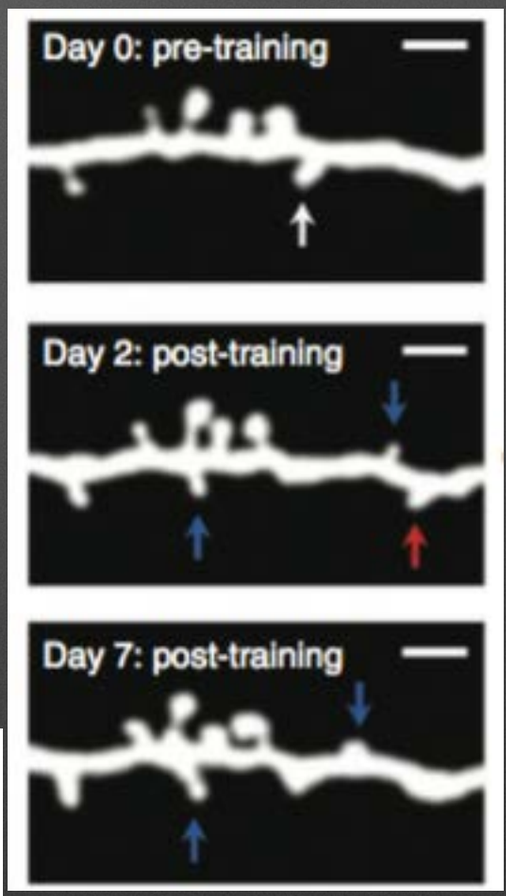
- Pimping
- Emergencies
- A heart-breaking patient
- A passionate attending

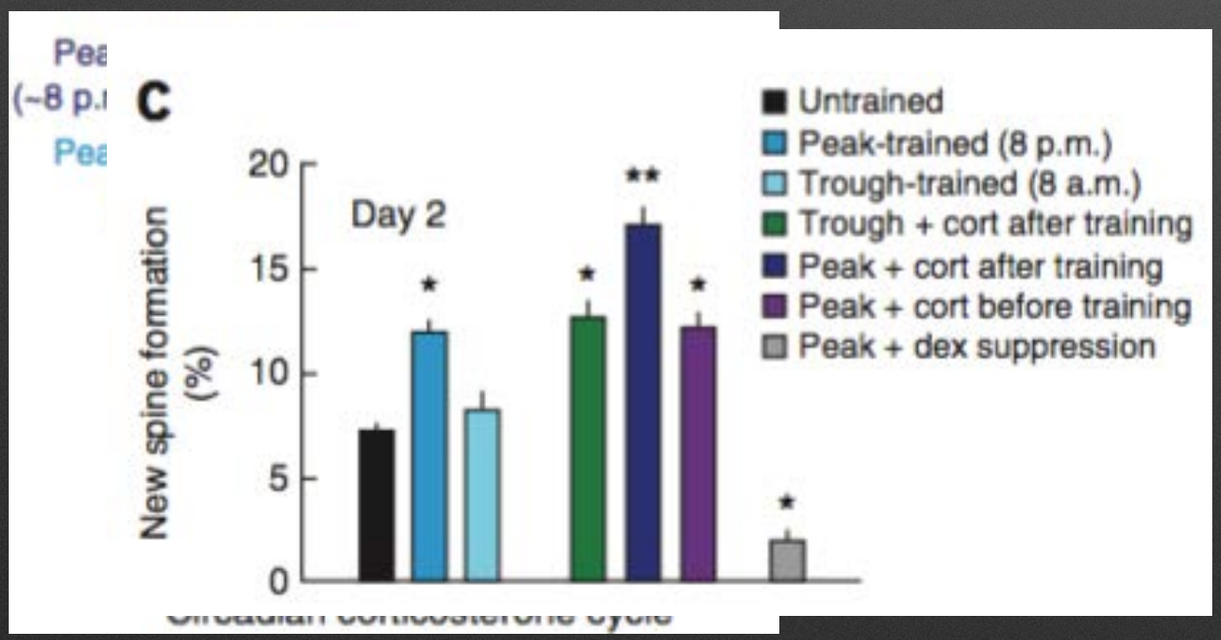
- Certain instances of stress enhance memory and learning and stimulate the mastery of new behaviors and skills - fundamental to our optimal development.

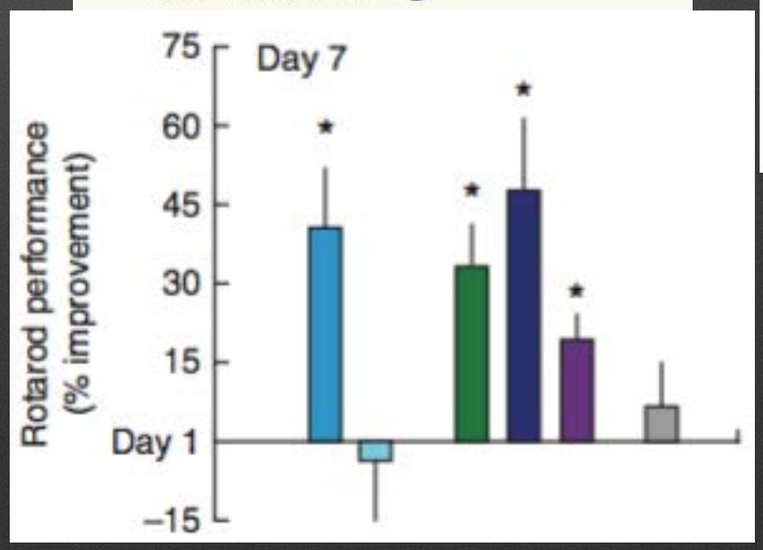
Some of the most indelible (and important) lessons of our training

Data backs that up:
Motor skill learning requires the natural oscillations of cortisol to optimize acquisition and maintenance of skills



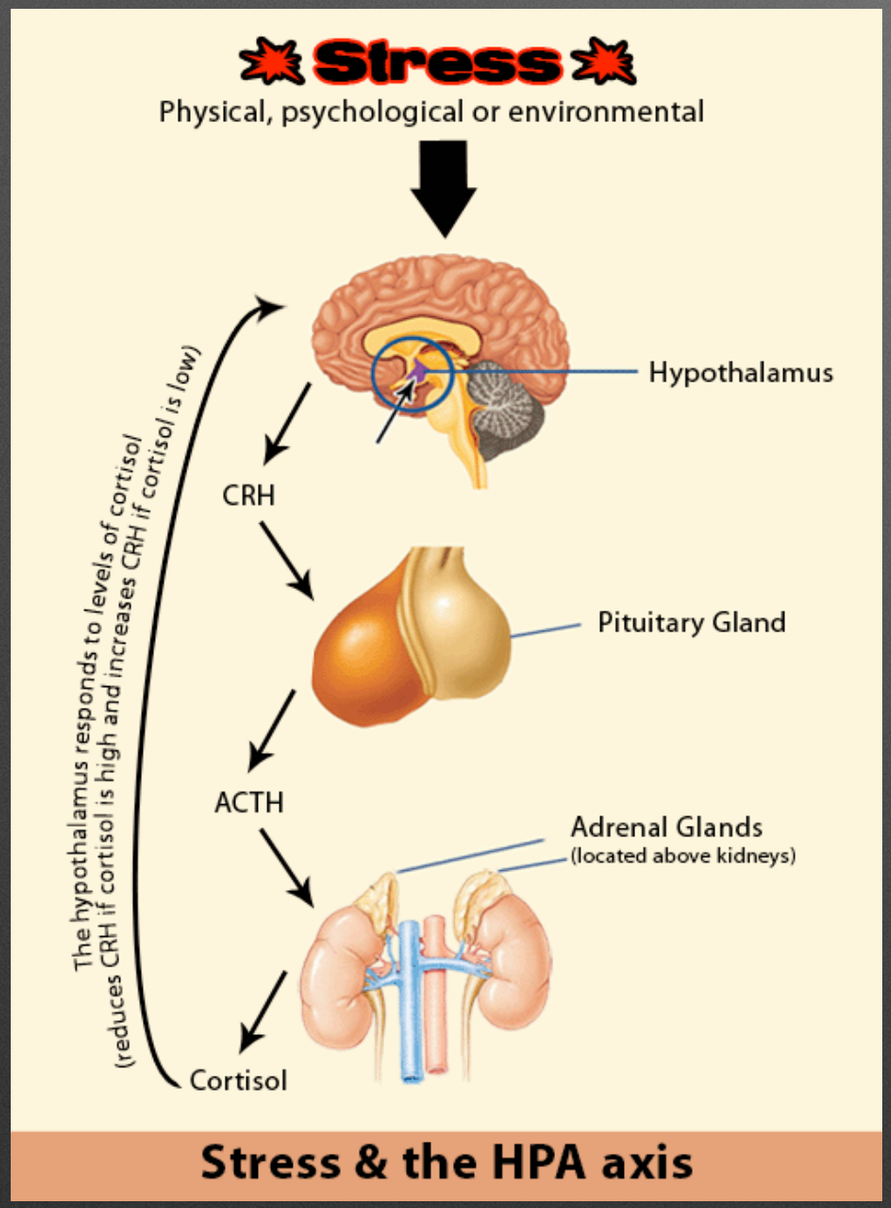






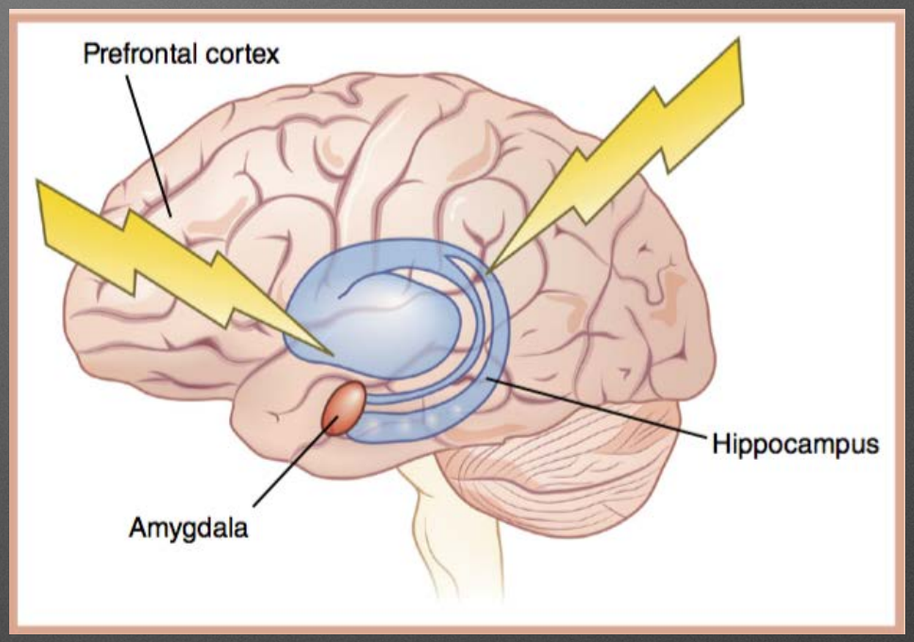
Liston, Nat Neurosci 2013

Bad and Toxic Stress: Chronic, Overwhelming, Severe



Stress & the HPA axis

When fight-or-flight becomes chronic, the HPA axis and the ANS disregulate



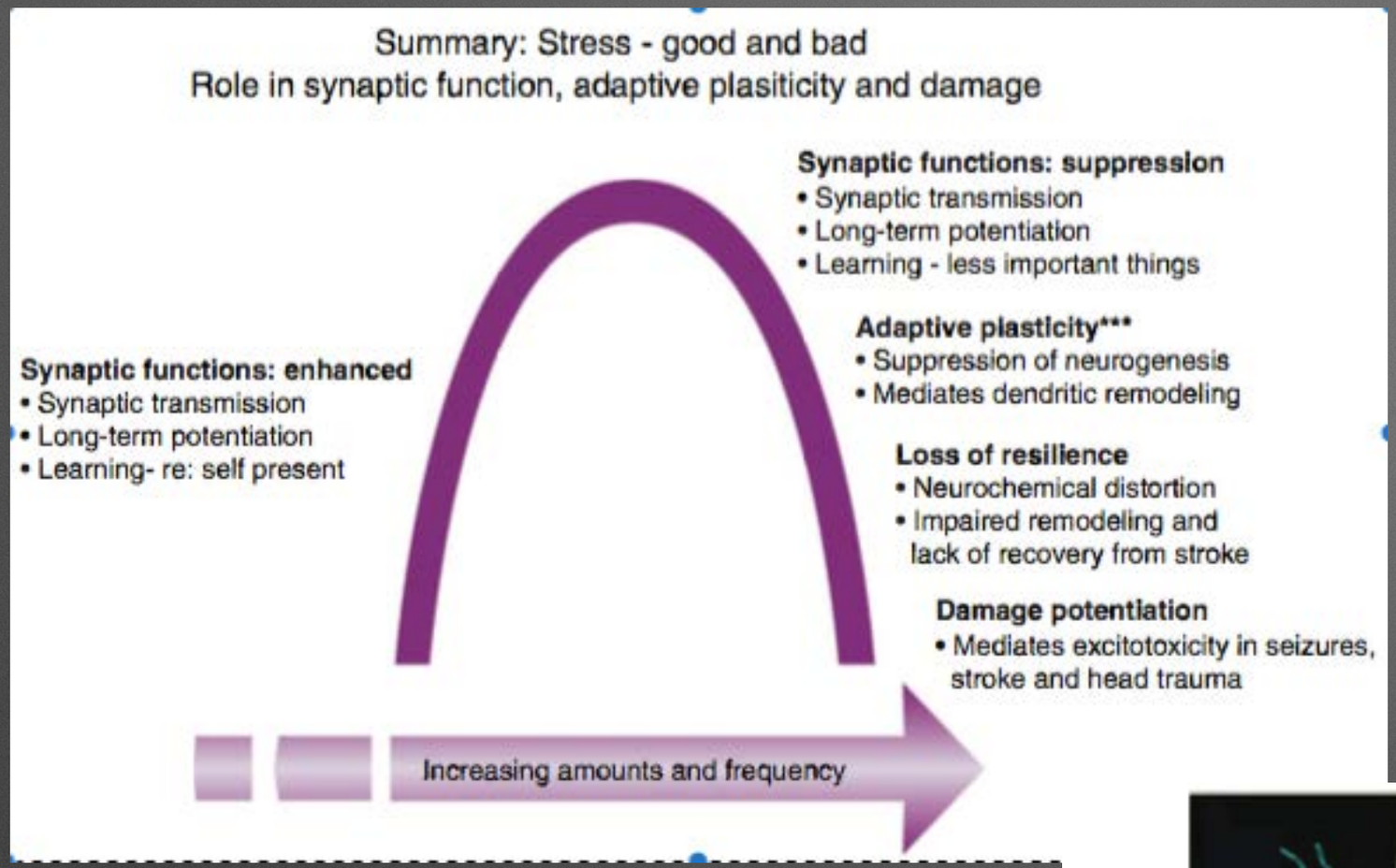
The hippocampus and PFC have a high concentration of GC receptors.

Hippocampus: Learning and Memory

PFC: Executive Functions - attention, short-term memory, planning, self-control

Karlamangla, *J Clin Epi*, 2002
McEwen, *Eur J Pharmacol*, 2008
McEwen *Nat Neurosci* 2015
McEwen, *Neuropsychopharm*, 2015

Stress is a Double - Edged Sword



Hippocampus and PFC:

ADAPTATION

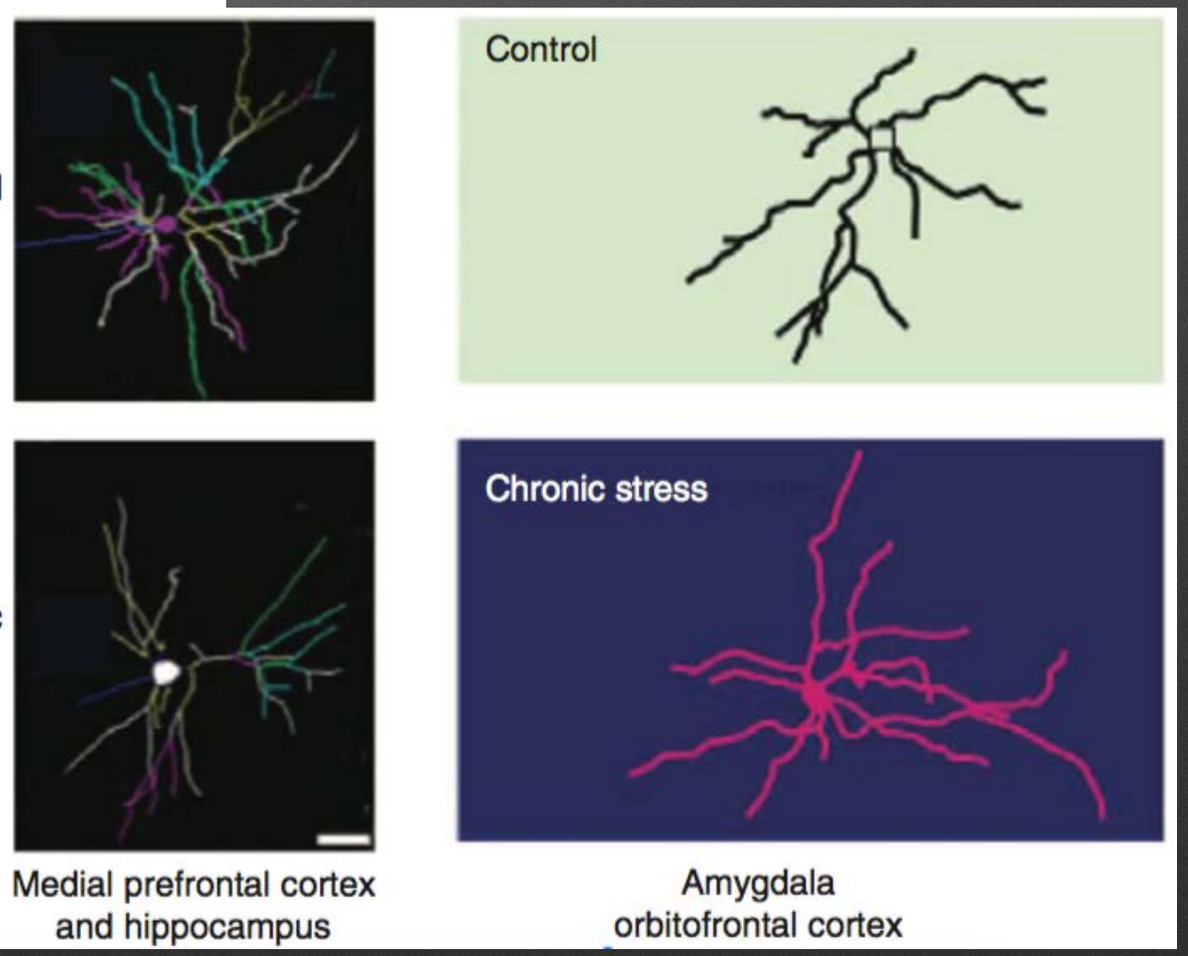
problem-solving

decision-making

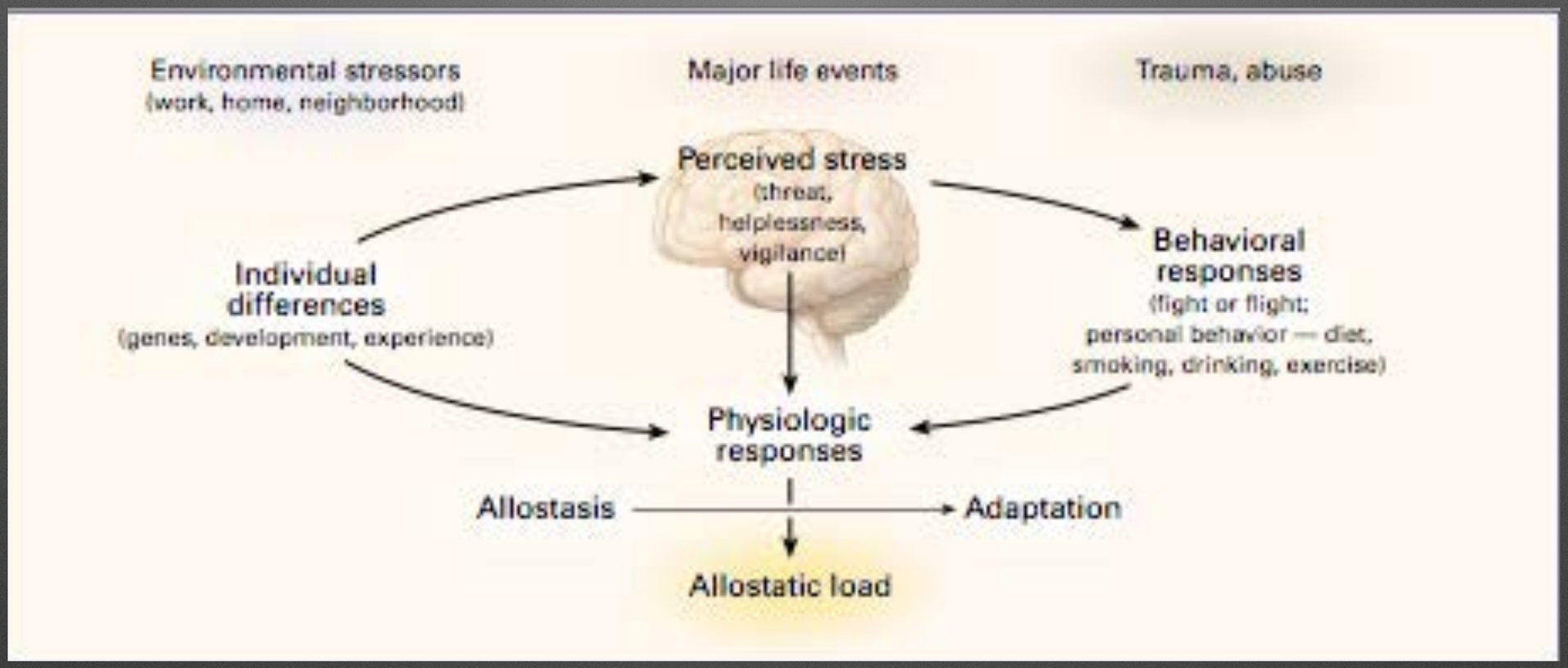
Amygdala:

SURVIVAL

reflexes, reactions



Stress changes the brain which regulates biosystems and determines behavior



The brain is the master switch

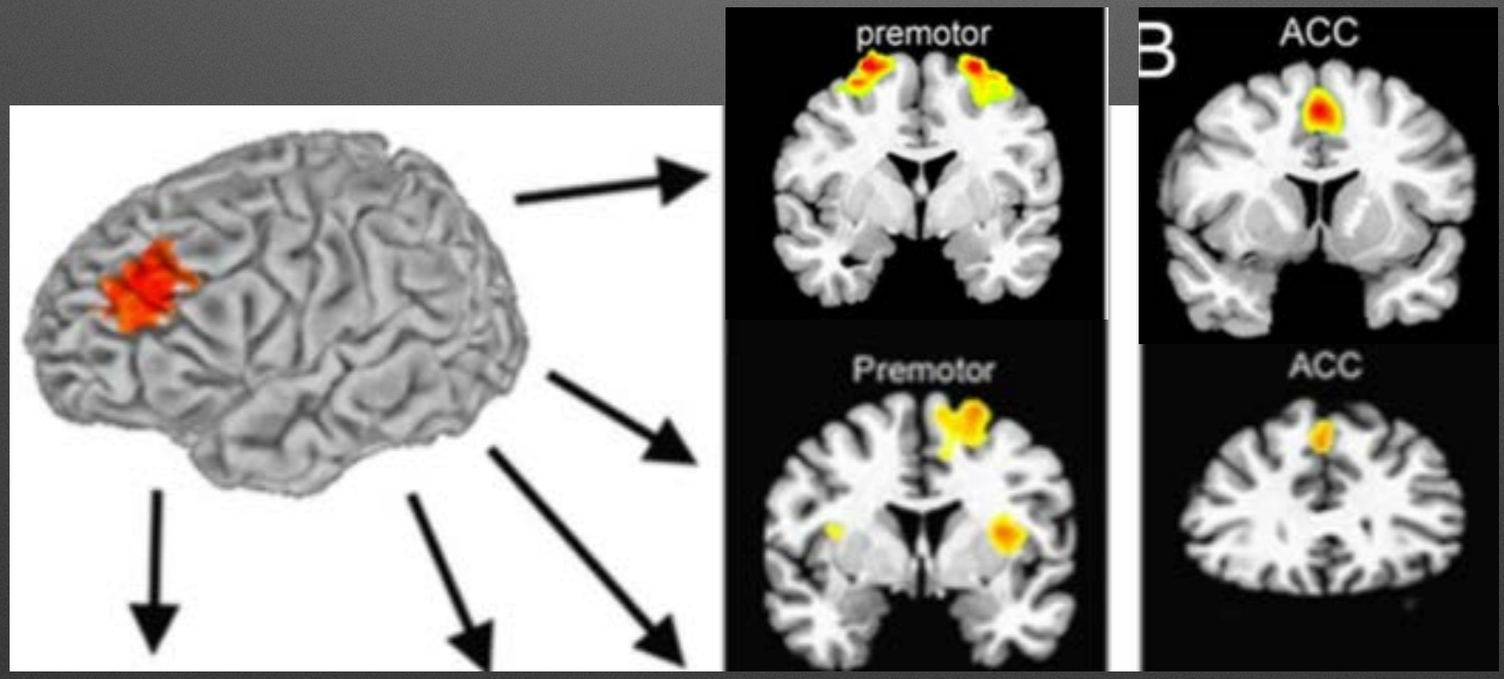
- Whether we employ reflection or reflexes depends upon the brain's PERCEPTION of what we face: is it a challenge? or is it a threat?

Do we engage and explore or fight and flee?

McEwen *Nat Neurosci* 2015

Stress Effects Performance

20 medical students, 1 mo of psychosocial stress (Step 1 prep),
underwent neuroimaging while performing a
PFC-dependent 'attention shifting' task.
1mo later repeat. Compared to unstressed controls.



Did worse on the task and showed changes in brain architecture:
Decoupling the PFC from areas involved in planning and problem solving
Coupling the PFC to areas promoting visual processing (vigilance, survival)

Liston, *PNAS*, 2009

Good Stress —> Inoculation

Stress inoculation (aka ‘stress resilience’) is the development of a tendency for the brain to perceive CHALLENGES rather than threats

In some literature, referred to as coping skills: seen as the major determinant of how an event impacts mental health and performance outcomes.

The prevailing model of resilience emphasizes that the initial appraisal of stress - not the presence or nature of the stressor itself - is critical to downstream coping.

Thompson, Enhancing Mental Readiness in Military Personnel, 2006
Lyons, *Front Behave Neurosci*, 2009

What is Resilience?

Resilience is the ability to thrive in spite of adversity; to reframe stressor as challenges and to face stressors in a regulated rather than reactive way.

Resilience is subserved by a remarkable psychobiology

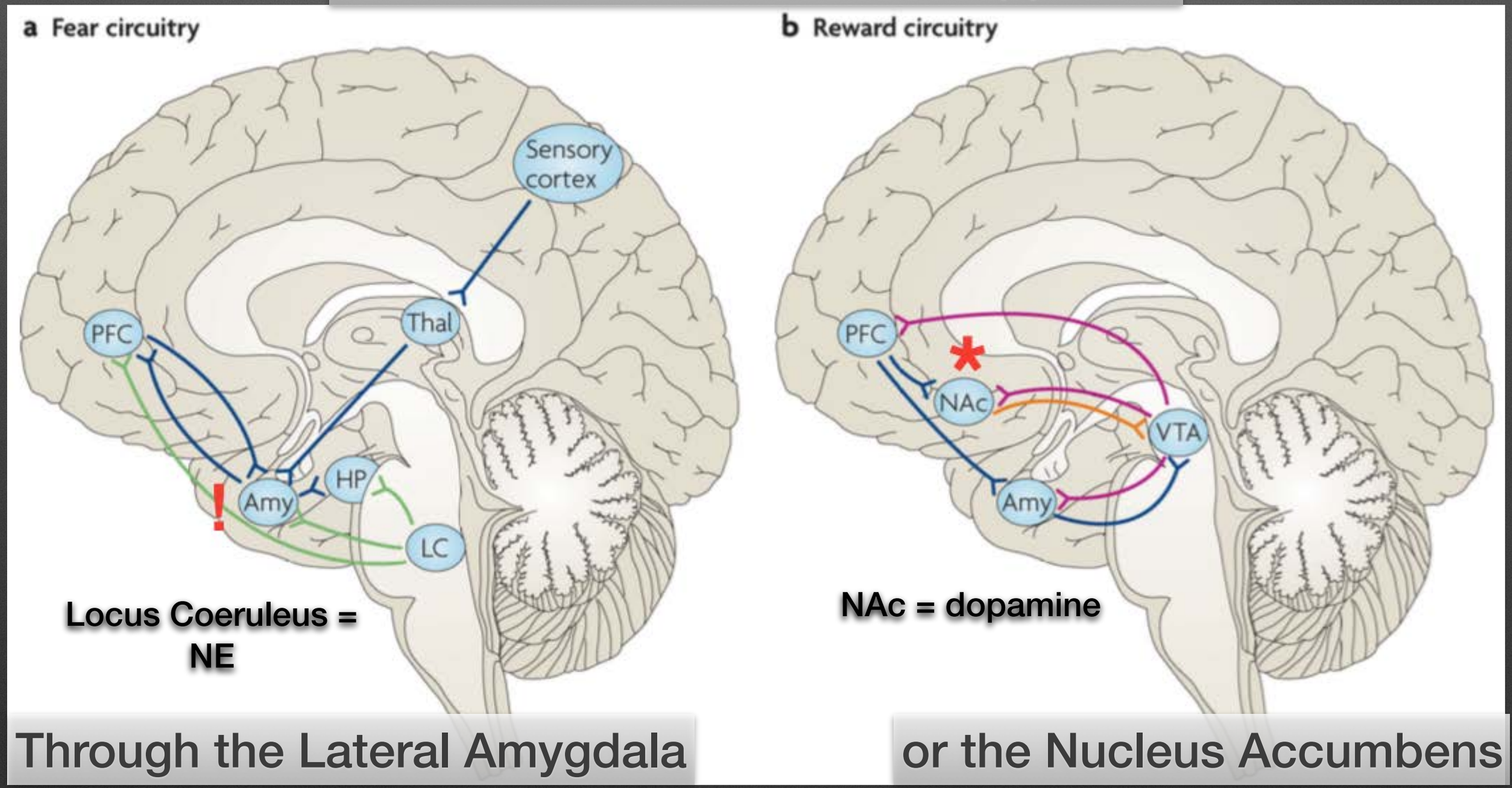
It manifests as people who triumph when everything suggests they should fail

Masten, Ann *NYAS*, 2006
Cohn, *Emotion*, 2009

Simply put resilience is resistance to stress

Psychobiology of Resilience

PFC controls the balance of appraisal



Through the Lateral Amygdala

or the Nucleus Accumbens

Feder, *Nat Rev Neurosci*, 2009
Wager, *Neuron*, 2008


What fires together wires together

Cognitive Appraisal = Emotional Control

Cognitive appraisal: What is this experience I'm having?
Emotional control: (AAAAAAAAAAHHHHHH!!!!)
Resilient outcome: We got this.

The *pause* between an event and one's reaction is key.
This is really hard!
Because our reflexes protect us. They are hard-wired for a reason. Because we don't like discomfort. And because we're surgeons.

How do we train our minds to do things a different way?

Mindfulness By Definition…

"Non-judgemental awareness of the present moment"

…is cognitive appraisal and emotional control

- Training one's mind to be aware of each moment and to create a pause before reacting (or not reacting).

The goal of mindfulness is to maintain awareness moment by moment, disengaging oneself from strong attachment to beliefs, thoughts, or emotions, thereby developing a greater sense of emotional balance and well-being.

- *SIT AND COUNT YOUR BREATHS FOR 1 MIN*
- *notice your thoughts, but don't follow them*
- *try to let your mind be 'empty'*

What Goes Through Your Mind?

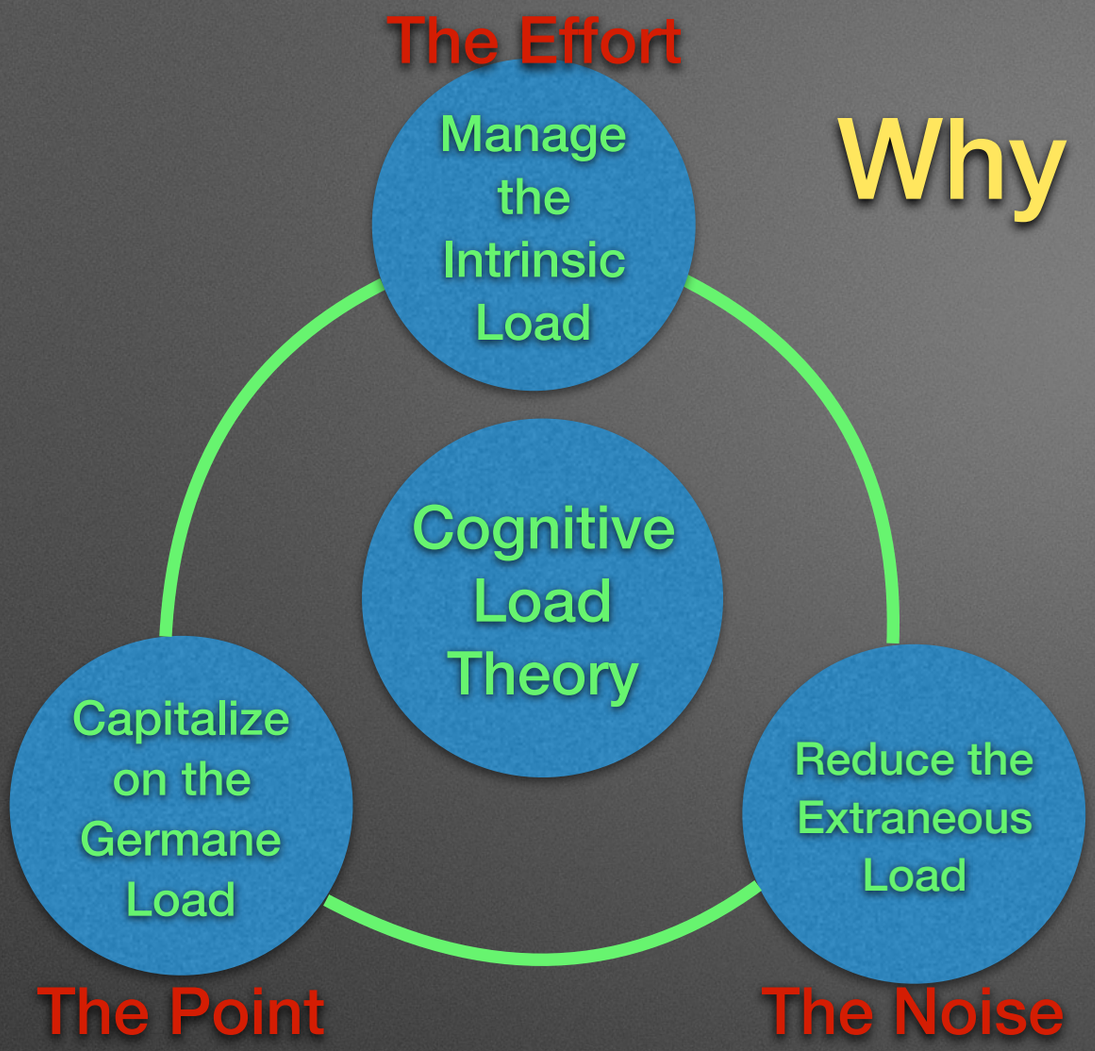
- For most of us; a lot of NOISE
- Groceries, resentments, to do lists, physical irritations, worries, music, plans, memories.
- Very little of what we think about pertains to NOW.

For most of us, sitting (in that noise) is really uncomfortable.

Habits of Mind

- Pausing to evaluate thoughts and events before ascribing meaning or significance *is* Cognitive Appraisal. And developing this ability enhances our resilience.
- Practicing ‘non-judgemental awareness’ enhances our ability to ‘pause’.
- The mental training for this is meditation. Creating new habits for your mind.
- Habits of mind are no different than habits of the wrist - they take reinforcement and practice.

Why Bother?



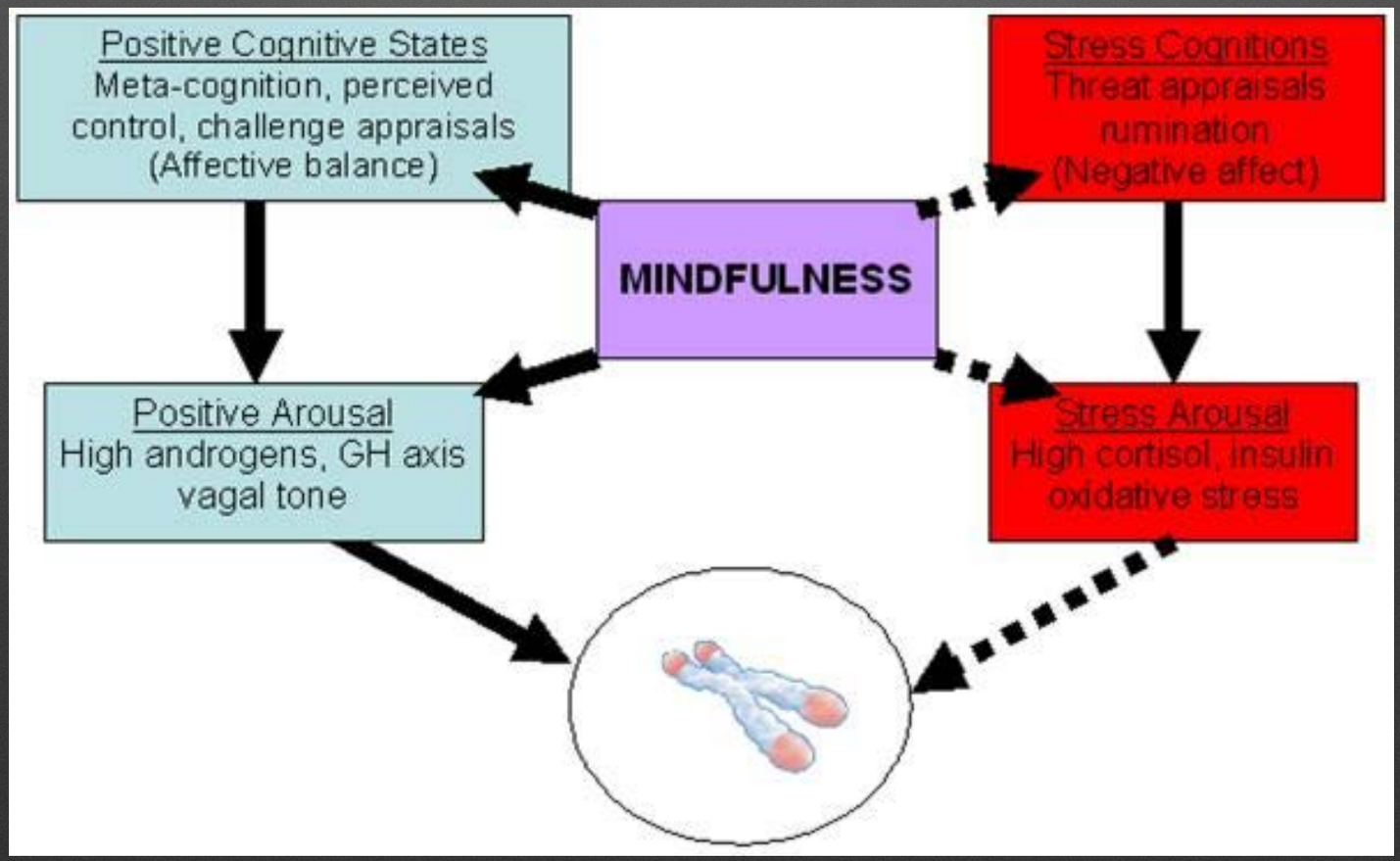
- **Cognitive Load:** the mental effort required to learn in the context of the **limited capacity** of short term/working memory

- **Cognitive Load Theory:** germane (the point), intrinsic (the work), extrinsic (the noise)

Young, *Med Teach,* 2014

Mindfulness Training Impacts Multiple Systems

- Mental training is a process-oriented skill, and because it changes the brain, it impacts many domains.

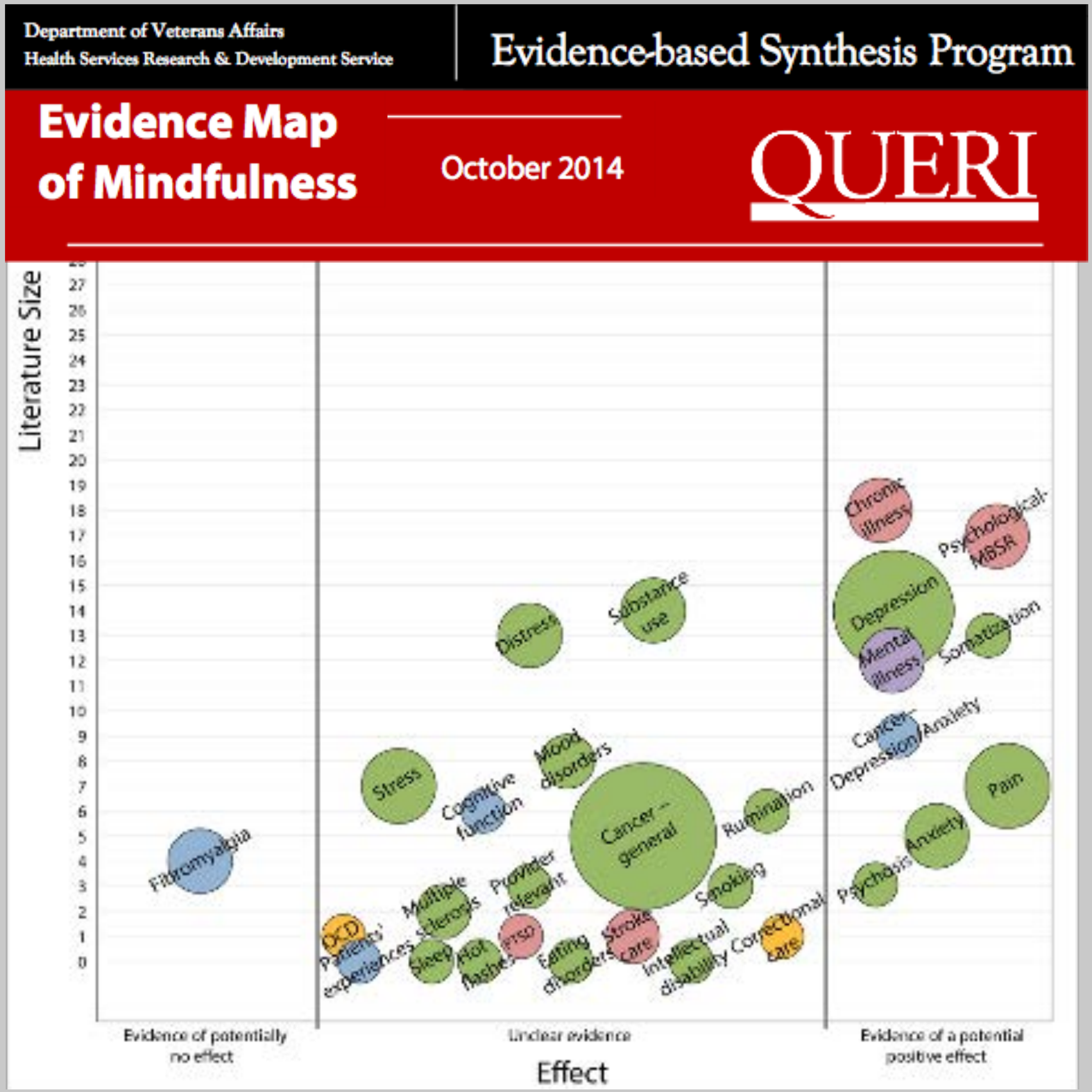


Epel, *Ann NYAS* 2009

MBSR: Mindfulness-Based Stress Reduction

Highly codified, non-religious, heavily studied

8 weeks
2.5h/week
45min/day
8h retreat



Kabat-Zinn, *Full Catastrophe Living*,1990

What Can MBSR/MFI Do?

Biologically & Psychologically

- **Chronic pain:** MBSR, subjective report, cohort, 50% reduction

- **Inflammatory illness:** Psoriasis, n=37, RCT, UVB +/- MBSR, plaque evaluation (Nurses (ub), Direct MD (b), Photo MD (b). *Faster clearing of plaque by 10d and improved subjective stress.*

- **Immune fnc:** HIV, n=48, RCT, found CD4+ Tcell counts remained stable in intervention groups but declined in controls over a 3mo period. (p=.02)

- **Burnout:** 70 PCPs, pre/post CME, evaluated well-being, distress, B/O and pt relations. F/u at 2, 12 and 15mo by survey. Sustained improvement in B/O at 15mo.

Ludwig, *JAMA*, 2008
Krasner, *JAMA*, 2009
Creswell, Brain *Behave Immun*, 2009
Kabat-Zinn, *Psychosom Med,*1998

What Can MBSR/MFI Do?

Biologically & Psychologically

- **Telomeres:** 4 RCTs to date, Obese, Chronic fatigue, experienced meditators and dementia caregiviers. Total n = 190, indicate that MF leads to increased telomerase activity (i.e. increased telomere length). Combined weighted effect size was significant with d=0.46, p = .001

- **PTSD in Veterans:** RCT longitudinal, n=21, eye-blink startle, RR, and self-report. Pre-post and 1yr f/u. Breathing-based meditation, 7d x 3h/d. Improvements on all measures (r = 0.93 post & r = 0.77, 1yr). 7:11 continued to practice intervention.

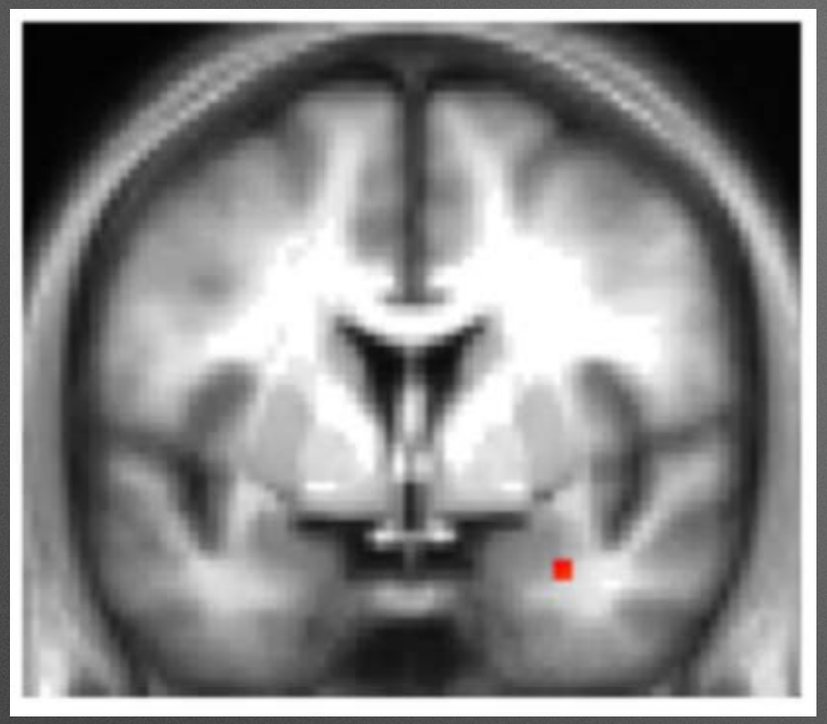
Seppala, *J Traum Stress*, 2014
Schutte, *Psychoneuroendo*, 2014

What Can MBSR/MFI Do?

Neuropsych and Neurocognition

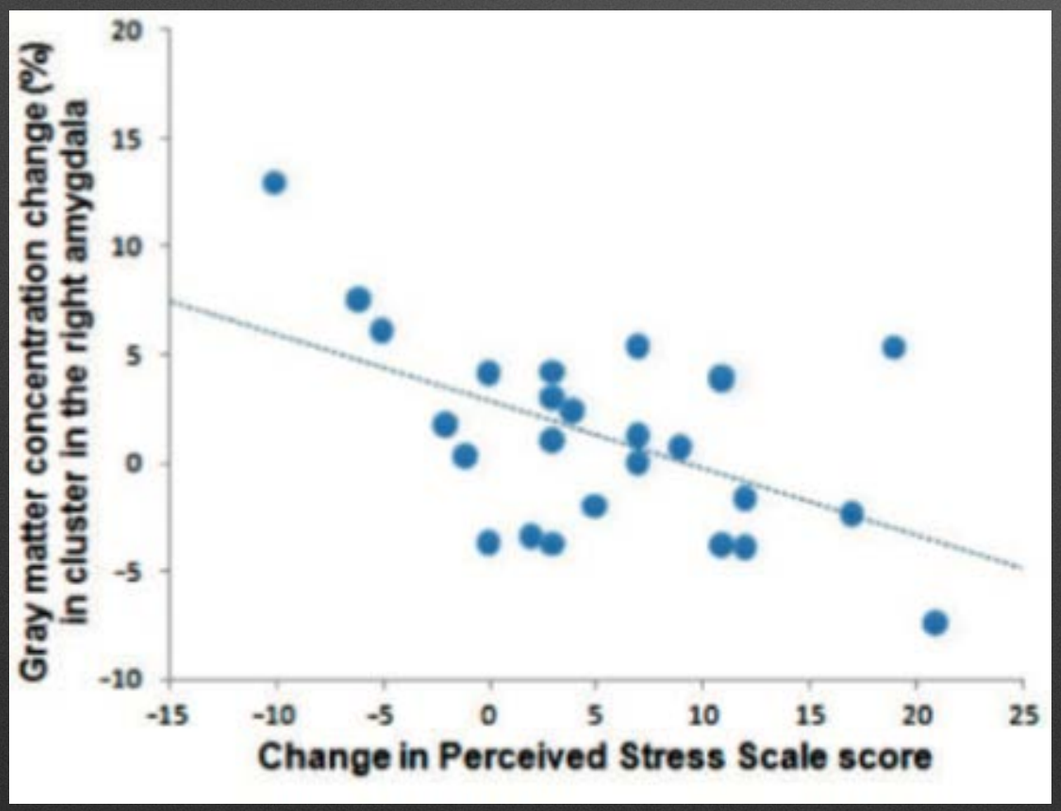
- Flook&Davidson, 2015 showed enhanced cognitive function, (self-control) in preschoolers after MFT. Also demonstrated objectively increased kindness and helpfulness to classmates.

- Jha, RCTs in 2010 & 2013, respectively, showed protection of WMC in pre-deployment Marines and maintenance of both self-control and attention performance in incarcerated youth.



MBSR Changes the Structure of Your Brain

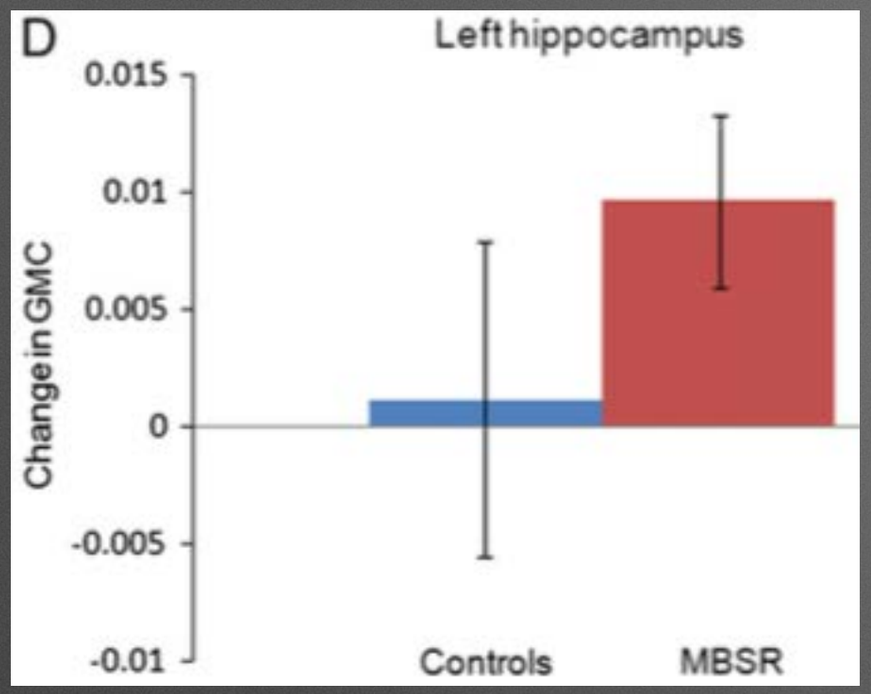
Cohort, n=26
Pre/Post
fMRI



Validated measures of stress MBSR

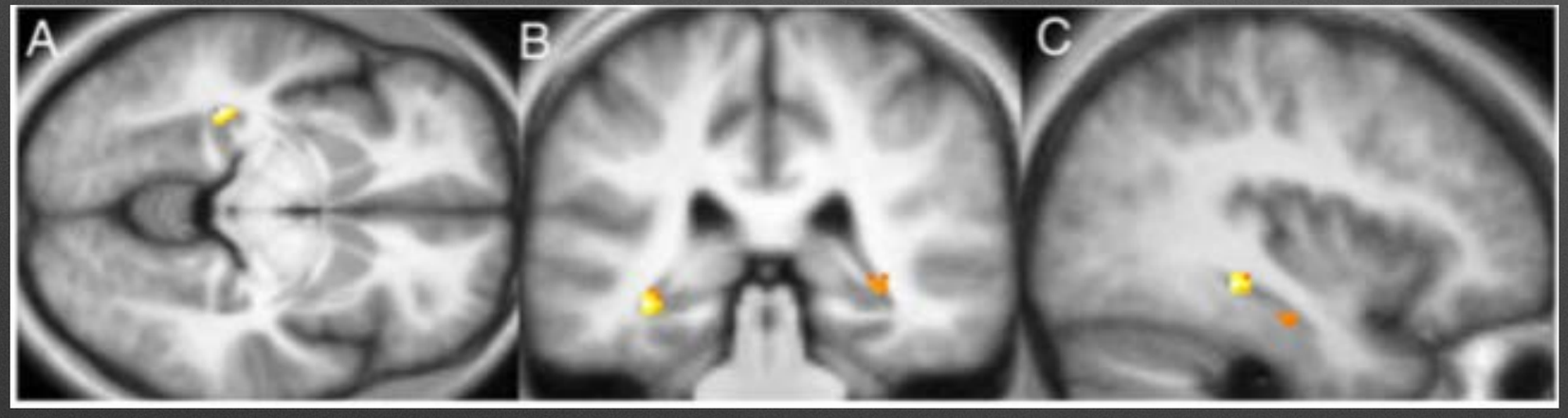
Reductions in perceived stress correlated with decreased amygdala gray matter density

Holzel, *Scan*, 2010



MBSR Changes the Structure of Your Brain

Cohort comparison n=16/17
MBSR
Pre/Post fMRI
Five Facet Mindfulness Q



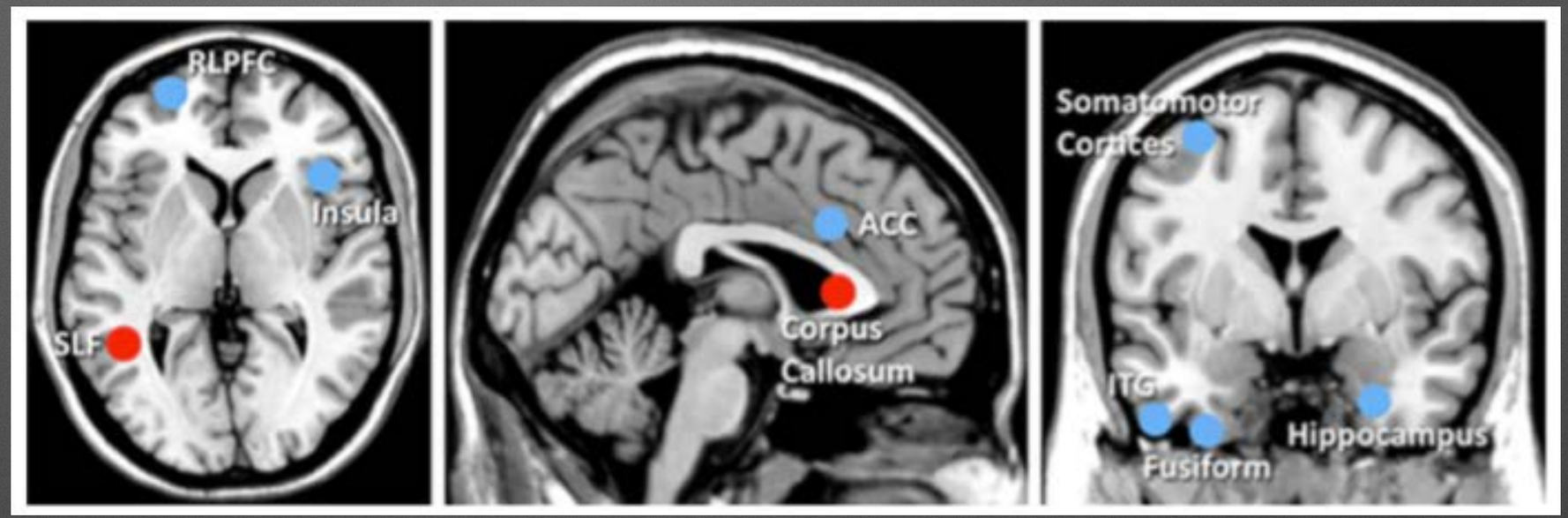
Increased HipC GMC
Improved awareness, observing, non-judging
(p=0.003)

"MBSR is associated with changes in gray matter concentration in brain regions involved in learning and memory, emotion regulation, self-awareness, and perspective taking."

Holzel, *NeuroImag*, 2011

MBSR Changes the Structure of Your Brain

Red = White matter
Blue = Gray matter



Systematic review and meta-analysis of MRI-neuroanatomic changes in meditation practitioners
21 studies, ~300 practitioners
8 regions consistently altered

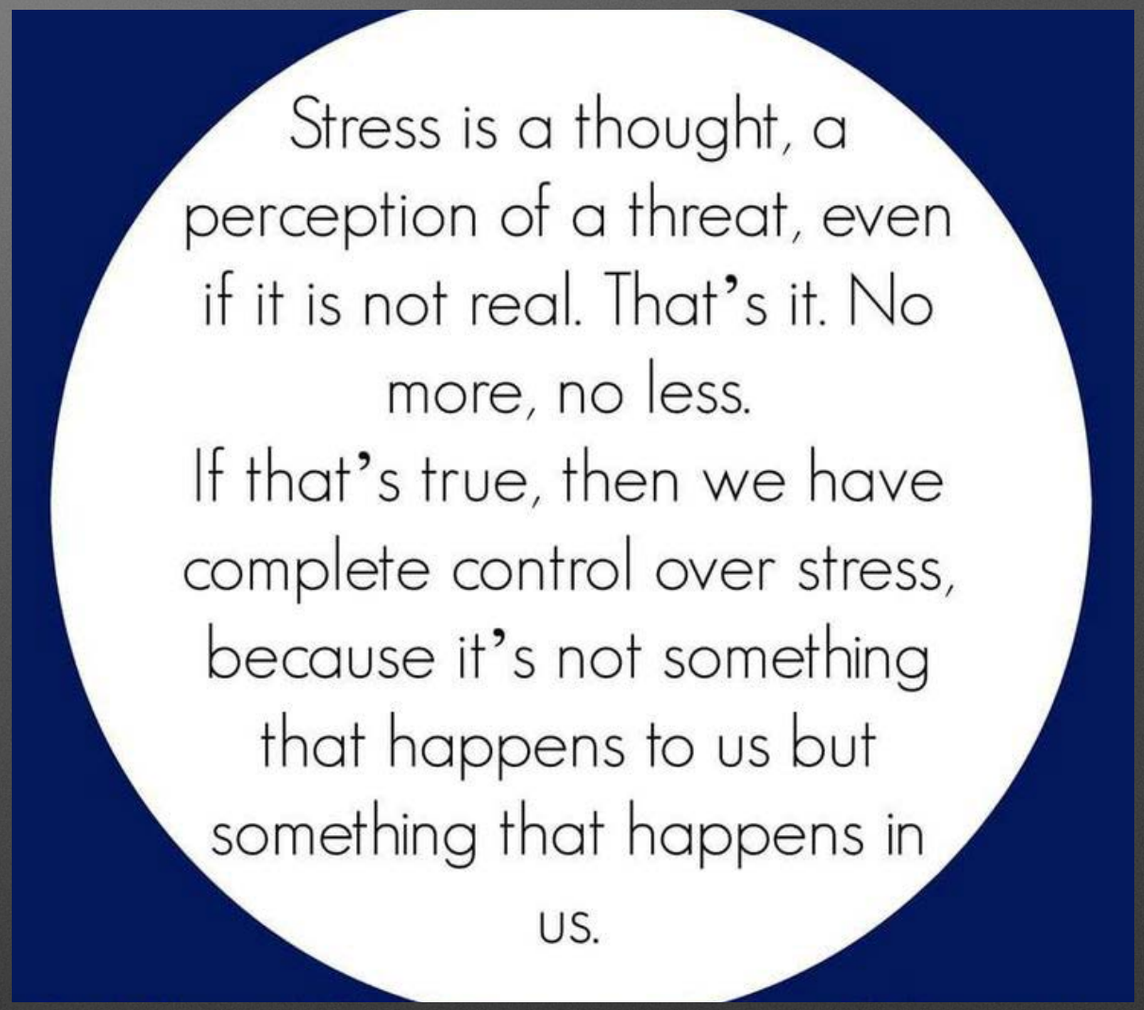
Meta-awareness
Memory consolidation
Inter- and Intra-hemispheric communication

Intero- and Exteroceptive body awareness
Self and emotional regulation

Fox, *Neurosci Behav Rev*, 2014

The Outcome: HAPPIER

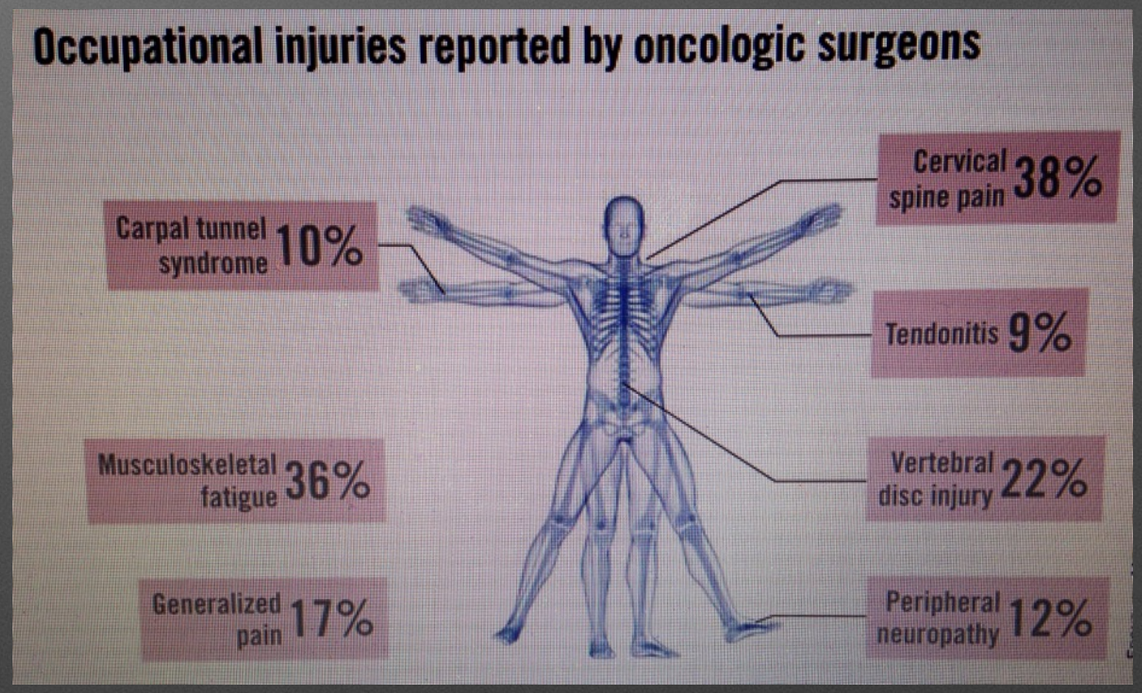
- Psychological benefits
  - Helps B/O in MDs, in others protects from depression and relapse
  - Reduces perceived stress by training cognitive appraisal - the pause between an event and one's response
  - Creates new habits of mind



Sound crazy? think about how you react to blood

The Outcome: STRONGER

- MF bolsters physiological health but how will it help us? We don't really know if/how much we're ailing.
  - But we know a few things:
    - Chronic pain
    - CV in Swiss study of MDs
    - Aging (allostatic load predicts functional decline)



Voss, SSO, 2016

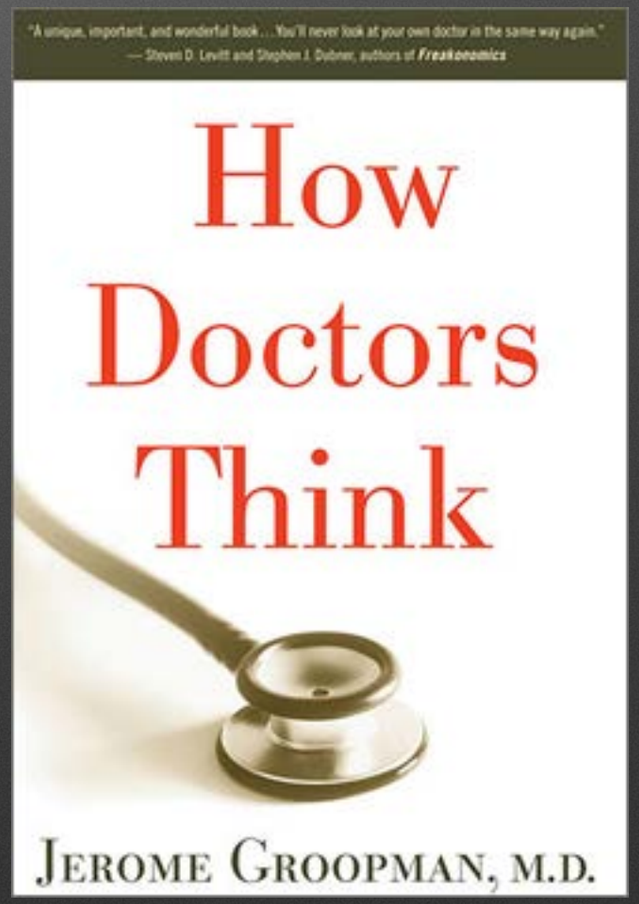
Davis, J Surg Res, 2014

Karlamangla, J Clin Epi, 2002

Domenighett, Schweiz Med Wachenschr, 1984

The Outcome: FASTER

- With enhanced executive functions that subserve more efficient learning, problem-solving, diagnosis and decision-making.



Groopman, *How Doctor's Think*, 2007

The Outcome: BETTER

- We're happier, potentially kinder, more connected.
- We're healthier, not just through exercise and appearance, but in our CV, metabolic and NE systems.
- We're sharper, with more efficient and less taxed cognition.
- We're TECHNICALLY improved
    - Is that possible? Drill down on the numbers

The Outcome: BETTER

Surgeon reviewers analyzed 444 surgical malpractice claims - random sampling form 4 liability insurers:

"Surgical safety research should focus on *IMPROVING DECISION-MAKING AND PERFORMANCE particularly in complex patients and circumstances"*
(i.e. under stress)

65% manual errors; 73% experienced surgeons;
84% routine operations

61% pt complexity (emergency, tough anatomy or prior surgery)

Regenbogen/Gawande, *Ann of Surg,*, 2007

Can MF help us become better in this regard?

Surgery is 1/4 technical and 3/4 intellectual

- Protects and enhances executive function:
  - Attention, WMC, endurance, and precision
- Changes the structure and connections of the brain:
  - Decreases reflexive amygdala
  - Growing the hippocampus - critical to consolidation of motor sequences, the seat of intrinsic learning and memory.
  - PFC enhanced dendritic branching and connectivity to hippocampus.

Albouy, *Neuron*, 2008

The Mindful Surgeon, 2016

- Works in others, how about in us?
- Pilot efficacy
  - 2016 in-coming interns (max n=44)
  - Randomized to MBSR or active control
  - Assessment at baseline, post and 1 year follow-up
- Parallell feasibility

Mindful Surgeon Study, 2016. n= ?		
	Collaborator/contact	**Specimens**
PHYSIO		
Telomeres/TA	Jue Lin Blackburn Lab UCSF (cell)	Peripheral Blood Cells (PBC) 8ml whole blood draw
RNA/Epigenetics	Steven Cole UCLA (office)	RNA 5-8ml whole blood
SNiPs	Cole/Jue Lin	DNA rs53576 (oxytocin receptor)
Allostatic Battery	Teresa Seeman UCLA	**Overnight Urine** SNS * = Epi, NE **Plasma** CRP
HRV	*NOT DATA http:// www.herringtoncatalog.com/products/biosport-heart-rate-monitoring-earbuds?*	ad lib use during study
Cortisol	[Mark.Laudenslager@ucdenver.edu] + Clemens Kirschbaum (clemens.kirschbaum @tu-dresden.de)	Hair 2cm closest to base/ follicle

PSYCH		
Composite Survey	Elissa Epel	Includes: CAMS-R, Grit, PHQ-9, Block Ego Resilience, PSS, Maslach
NEUROCOG		
WASI-II	Jessica Foley	
Digit-Symbol Test	Katherine Possin	
EXAMINER	Joel Kramer / Jordan Stiver	https:// ucsf.app.box.com/ files
FUNCTIONAL NEUROANATOMY		
rs-fMRI	Andy Kayser Chris Hess Lara Stables Chad Smiddy	
BOLD		
BOLD + Emotional Reappraisal		
DTI/Connectivity	Conor Liston 646-962-6154	
PERFORMANCE		
PATRIOT Electromagnetic Tracking	Polhemus Neil Schell	

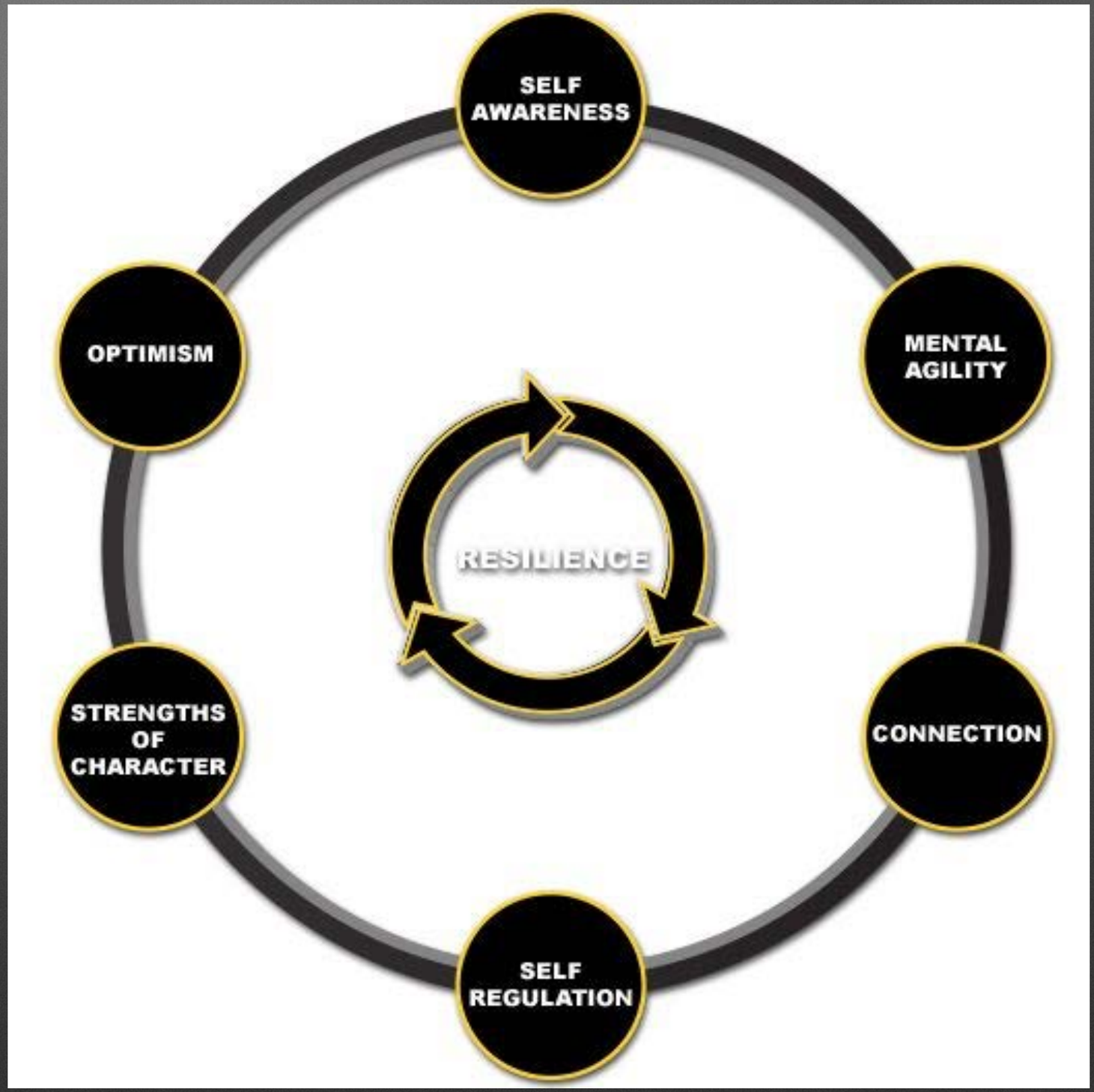
Seem Impossible?

US Army Chief of Staff
Post- middle-east conflict —> devastating PTSD and suicide rates
Unprecedented mandate to “Equip their minds”

Collaborated with Penn, pursued the evidence
Developed a system of mental training for resilience
First pilot in 2008, first longitudinal cohort 2009

Cornum, *Amer Psychol* 2011
Jarrett, *US Army Med Dep J*,2008
Lester, *Amer Psychol* 2011

Longitudinal, mandatory, recruits, NCO and Brass



Convergence

THANKS			
Hobart Harris	Elissa Epel	Bruce McEwen	The Canada Kids
Nancy Ascher	James Mitchell	Conor Liston	The Greek
Pat O'Sullivan	Wen Shen	Teresa Seeman	
Linda Reilly	Elizabeth Blackburn	Steve Cole	
Alexi Callen	Jue Lin		
Rachelle Breshnahan	Andrew Kayser		
Heidi Crist	Chris Hess		
ACS	Lara Stables		
Matt Lin	Chad Smiddy		
	Clinical Labs		
	CTSI		
	Pamela Derish		

Motorskill Mastery Depends on Decision Making

- How do we gauge this?
  - "Economy of motion": shorter path length, fewer moves, not faster but more economic so the overall procedure takes less time.
- What underlies this?
  - Appraisal: experience - sifting; memory; extrapolation; adaptation —> all underlie decision-making

Wolpert, *Curr Op Neurobio* 2012

studies linking stress and MDs have been around for awhile..

- As early as the 1980s, reports published examining illness and disability in MDs in US and UK found strong relationship to stress and new mental illness.

- Study of UK House Officers found remarkably high emotional distress.

- Swiss study, 1984, found CV pathology sig higher than average population.

- 'Stress in Surgeons' brought into focus with 1990 survey of nearly 700 Irish and British surgeons: diminished personal life #1 stressor, higher MHI subscale scores for '*free-floating anxiety*' and '*hysterical anxiety*' (all men).

Rawnsley, *J R Soc Med* 1988
Firth-Cozens, *BMJ*, 1987
Domenighett, *Schweiz Med Wachenschr,* 1984
Green, *BJS* 1990

Allostasis: our buffering capacity to events and insults
(rather than to O2 and HCO3 as in homeostasis)

Allostasis is adaptation, our ability to change in response to our environment. Allostatic load is the cumulative cost of adaptation

- Allostasis: ability to achieve stability through change - is critical to survival.
- ANS, HPA, CV, metabolic and immune systems respond to stressors and then return to baseline - ideally.
- Allostatic load is the wear and tear over time - especially with chronic overactivity.

Internal vs External Resources
Process-Focused Training

Meaning it applies in myriad domains

We propose that stress prophylaxis and intervention should be as commonplace as technical proficiency and clinical best practices, in recognition of the occupational hazard of stress.