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# Mindfulness for resilience, wellbeing and sustainable performance

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# Mind wandering and happiness

- “In conclusion, a human mind is a wandering mind, and a wandering mind is an unhappy mind. The ability to think about what is not happening is a cognitive achievement that comes at an emotional cost.”
  - Killingsworth MA, Gilbert DT. A Wandering Mind Is an Unhappy Mind. *Science* 12 November 2010: Vol. 330. no. 6006, p. 932 DOI: 10.1126/science.1192439



# Allostatic load

- Prolonged stress leads to wear-and-tear on the body (allostatic load)
  - Mediated through the Sympathetic Nervous System
- Allostatic load leads to:
  - Impaired immunity, atherosclerosis, metabolic syndrome, bone demineralization
  - Atrophy of nerve cells in the brain
    - **Hippocampal formation:** learning and memory
    - **Prefrontal cortex:** working memory, executive function
  - Growth of **Amygdala** mediates fear response
- Many of these processes are seen in chronic depression and anxiety
  - McEwen BS. Ann N Y Acad Sci. 2004;1032:1-7.

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# Stress and telomere shortening

- Study on healthy premenopausal women showed that psychological stress associated with:
    - higher oxidative stress
    - lower telomerase activity (telomerase repairs DNA telomeres) leading to shorter telomere length
  - These are known determinants of cell death/longevity
  - Women with highest levels of perceived stress c/w low stress women have shorter telomeres
    - Average equivalent at least 9-17 years of additional ageing
  - Implications for how, at the cellular level, stress may promote earlier onset of age-related diseases
    - Epel ES et al. Proc Natl Acad Sci U S A. 2004;101(49):17312-5.
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# Mind wandering and ageing

- Study on healthy women
- The greater the level of mind wandering, the greater the level of telomere shortening (a marker of biological age)

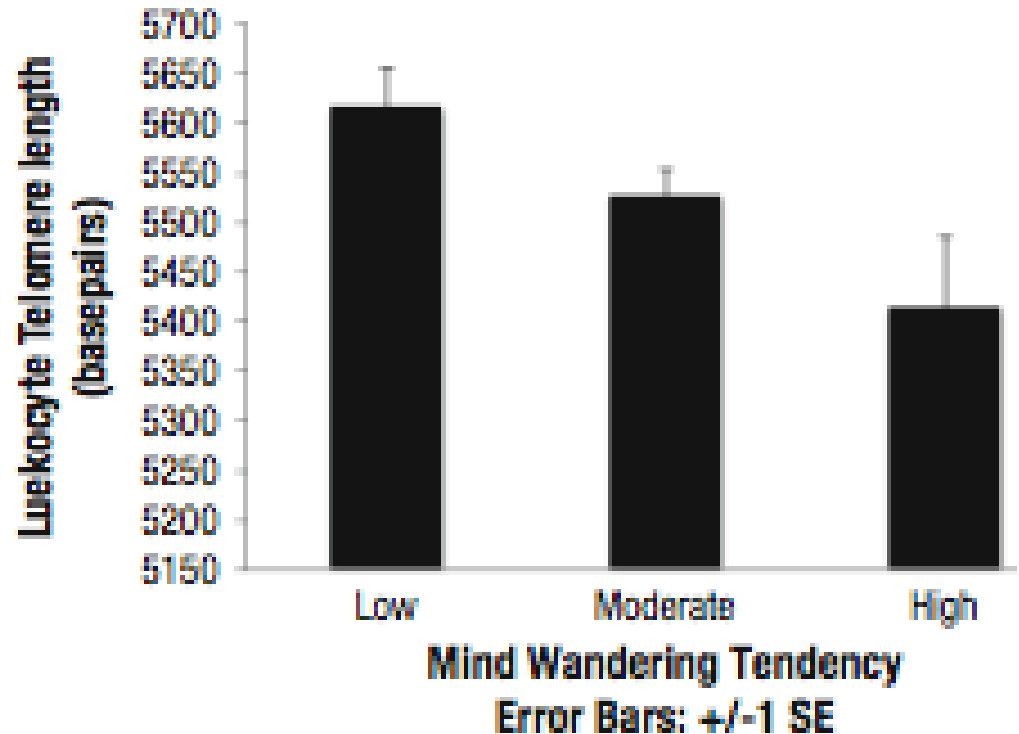
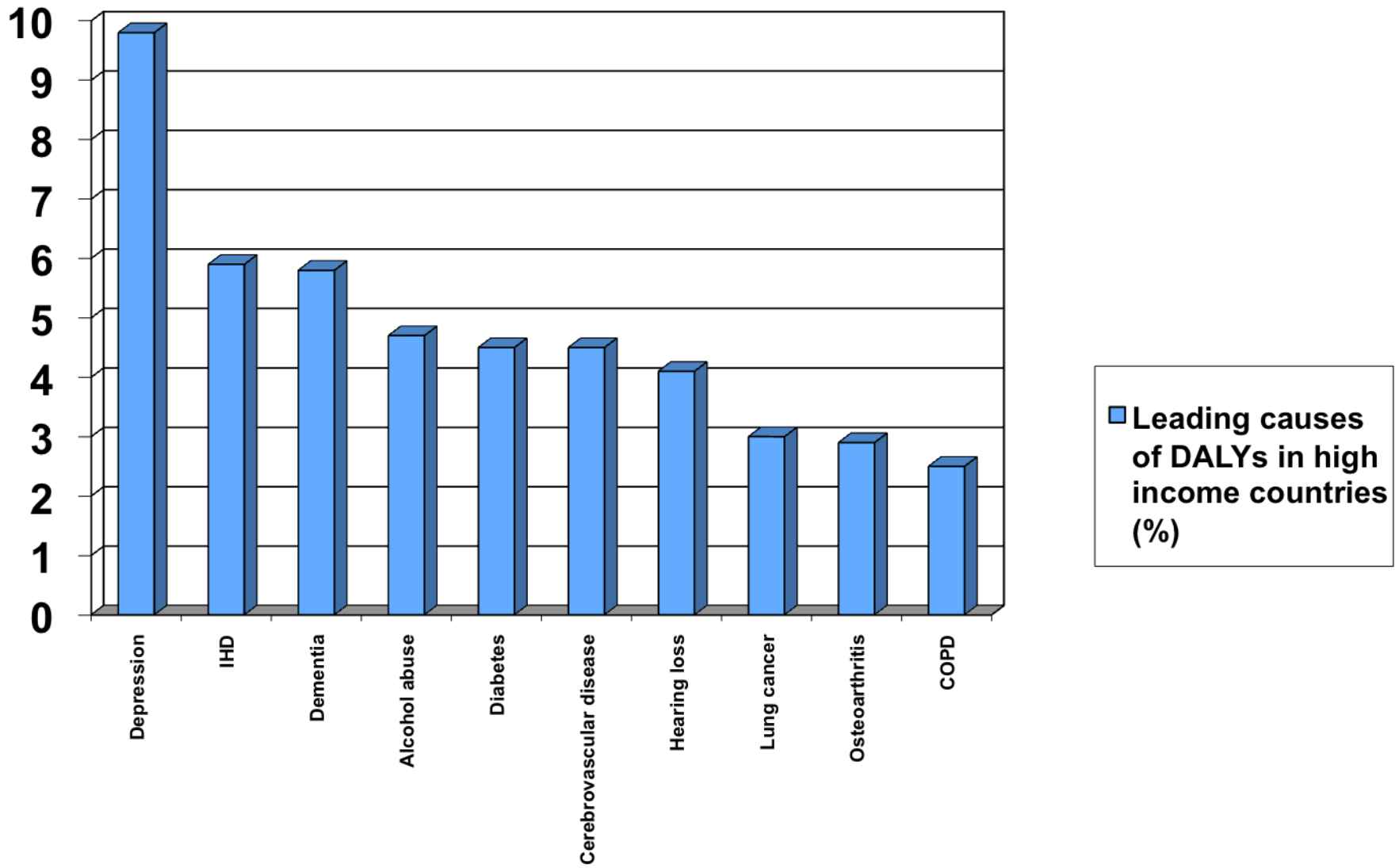


Fig. 1. Leukocyte telomere length by greater mind-wandering group.

Epel ES, Puterman E, Lin J, Blackburn E, et al. Wandering Minds and Aging Cells. *Clinical Psychological Science* 2012, in press.



Mathers CD, Loncar D. Projections of global mortality and burden of disease from 2002 to 2030. PLoS Med. 2006 Nov;3(11):e442.

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# Burnout and psychiatric morbidity in new medical graduates

- 8 months into internship: 75% interns had burnout
  - 73% (of interns) met criteria for psychiatric morbidity on at least one occasion
    - Willcock SM et al. Burnout and psychiatric morbidity in new medical graduates. Med J Aust. 2004;181(7):357-60.
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# Burnout

- Burnout characterised by:
    1. Emotional exhaustion (feeling emotionally overloaded with work)
    2. Depersonalisation (cynicism, active disengagement from one's job)
    3. Decreased personal accomplishment (inefficacy)
      - Maslach C, Leiter MP. Early Predictors of Job Burnout and Engagement. *Journal of Applied Psychology* 2008;93:498–512.
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# Nurses and burnout

- High levels of burnout among nurses particularly in highly demanding groups
    - E.g. “More psychiatric nurses employed in mainstream services suffer ‘higher’ burnout on the emotional exhaustion subscale when compared with forensic nurses (35.8% vs 15.6%).”
      - Happell B, Martin T, Pinikahana J. Burnout and job satisfaction: a comparative study of psychiatric nurses from forensic and a mainstream mental health service. *Int J Ment Health Nurs*. 2003 Mar;12(1):39-47.
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# Nurses, burnout and quality of care

- “Organizational factors play a crucial role in the development of health professionals' job burnout, which in turn impacts the patient experience and quality of care.”
  - Significant patterns with regard to quality of care and job strain
  - Higher levels of depersonalisation, withdrawal, poor judgment and errors
    - Montgomery A, Todorova I, Baban A, Panagopoulou E. Improving quality and safety in the hospital: The link between organizational culture, burnout, and quality of care. *Br J Health Psychol.* 2013 Apr 23. doi: 10.1111/bjhp.12045.
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# Doctor health and medical errors

- Study determined prevalence of depression and burnout among residents medical staff in 3 US hospitals
  - 20% of residents met criteria for depression
  - 74% met the criteria for burnout
  - Depressed residents made 6.2 times as many medication errors as residents who were not depressed
    - Fahrenkopf AM, Sectish TC, Barger LK, et al. Rates of medication errors among depressed and burnt out residents: prospective cohort study. *BMJ*, doi:10.1136/bmj.39469.763218.BE (published 7 February 2008)
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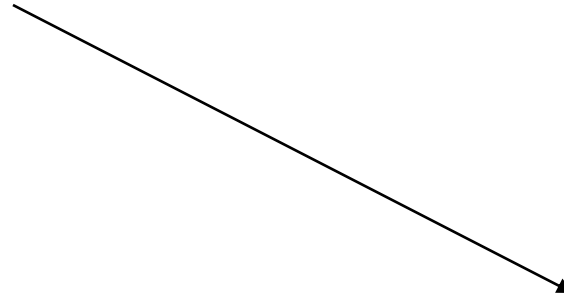
# Add the following

- 1000
  - 40
  - 1000
  - 30
  - 1000
  - 20
  - 1000
  - 10
- The first law of performance is to pay attention: beware of automatic pilot
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# Three regions of the brain

- Frontal lobes (prefrontal cortex) centre for executive functioning
  - Attention regulation
  - Working memory
  - Reasoning and decision making
  - Emotional regulation
  - Appetite regulation
  - Impulse control
  - Directs immune system
- Limbic system – emotion centre
- Mesolimbic reward system – appetites



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# Roots of Diagnostic Errors

- Confirmation bias: the pursuit of data that support a diagnosis over data that refute it
  - Anchoring bias: a resistance to adapting appropriately to subsequent data that suggest alternative diagnoses
    - Sibinga EM, Wu AW. Clinical Mindfulness and Patient Safety. JAMA 2010;304(22):2532-3.
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# Attention Deficit Trait

- Newly recognized neurological phenomenon: attention deficit trait (ADT)
    - Response to hyperkinetic environment
  - Trying to deal with too much input, results in:
    - Black-and-white thinking; perspective and shades of grey disappear
    - Difficulty staying organized, setting priorities, and managing time
    - Feel a constant low level of panic and guilt
      - Hallowell EM. Overloaded circuits: why smart people underperform. Harv Bus Rev. 2005 Jan;83(1):54-62, 116.
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# Mobile phone use and motor vehicle accidents

- Driver's use of a mobile phone within 5 min before a crash associated with fourfold increased likelihood of crashing (OR 4.1)
  - McEvoy SP, Stevenson MR, Woodward M. The contribution of passengers versus mobile phone use to motor vehicle crashes resulting in hospital attendance by the driver. *Accid Anal Prev.* 2007 Nov;39(6):1170-6. Epub 2007 Apr 9.





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# Multitasking

- “In 2005, the BBC reported on a research study, funded by Hewlett-Packard, and conducted by the Institute of Psychiatry at the University of London, that found, workers distracted by e-mail and phone calls suffer a fall in IQ more than twice that found in marijuana smokers.”
    - Christine Rosen, “The Myth of Multitasking.” The New Atlantis [thenewatlantis.com](http://thenewatlantis.com). Spring 2008. Web. 14 Apr. 2011.
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# Multitasking or task-switching?

- Multitasking is an illusion (misnomer)
  - Switching happens so fast that it appears we are performing multiple tasks simultaneously like the concurrent performance of several jobs by a computer
  - Reality is that we are switching back and forth between tasks
    - <http://ucsdcfm.wordpress.com/2011/07/01/our-brains-are-evolving-to-multitask-not-the-illusion-of-multitasking/>
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# The Default Brain

- Active tasks
  - Tasks associated with paying attention
  - Brain efficient and quiet
- Default state (mode)
  - Mind is inattentive, distracted, idle, recalling past, daydreaming
  - Areas active in default mode similar to areas affected by Alzheimer's Disease

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# Default mode network

- High default mental activity in psychopathology (e.g. depression, anxiety, schizophrenia and autism)
  - Default activity decreased or deactivated when paying attention (e.g. experienced mindfulness meditators)
  - In experienced meditators even when default network active, regions associated with self-monitoring and cognitive control are co-activated: reduced vulnerability to default thinking
    - Brewer JA, Worhunsky PD, Gray JR, et al. Meditation experience is associated with differences in default mode network activity and connectivity. Proc Natl Acad Sci U S A. 2011 Dec 13;108(50):20254-9.
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# What is mindfulness?

- “The faculty of voluntarily bringing back a wandering attention over and over again, is the very root of judgment, character, and will. No one is compos sui if he have it not. An education which should improve this faculty would be the education par excellence.”
    - William James, Principles of Psychology, 1890
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# Applications of mindfulness

- **Mental health**

- E.g. depression relapse prevention, anxiety, panic disorder, stress, emotional regulation, addiction, sleep, eating disorders, psychosis

- **Neuroscience**

- E.g. structural and functional changes in the brain, neurogenesis, (dementia prevention) amygdala, executive function, working memory

- **Clinical**

- E.g. pain management, symptom control, cancer, metabolic, hormonal, weight management, genetic function and repair

- **Performance**

- E.g. sport, academic, leadership

- **Spiritual**

Results suggest that MBSR may help a broad range of individuals to cope with their clinical and non-clinical problems. Grossman P. J Psychosomatic Research. 2004;57(1):35-43.

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# Mindfulness and attention regulation

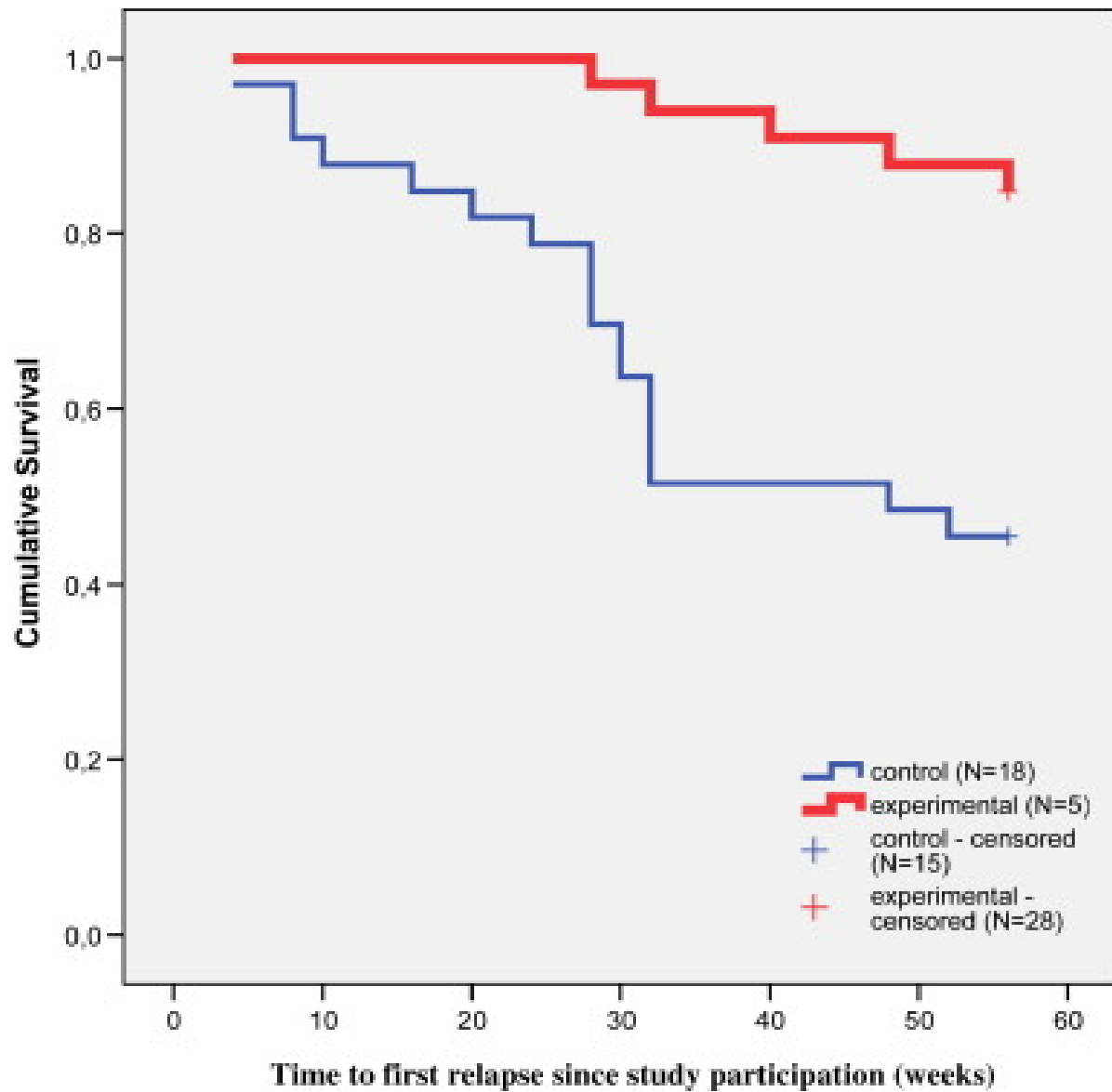
- Mindfulness involves paying attention (attention regulation) and attitude (openness, acceptance)
  - Attention regulation has three aspects
    1. To know where our attention is
    2. To prioritise where the attention needs to be
    3. For the attention to go there and stay there
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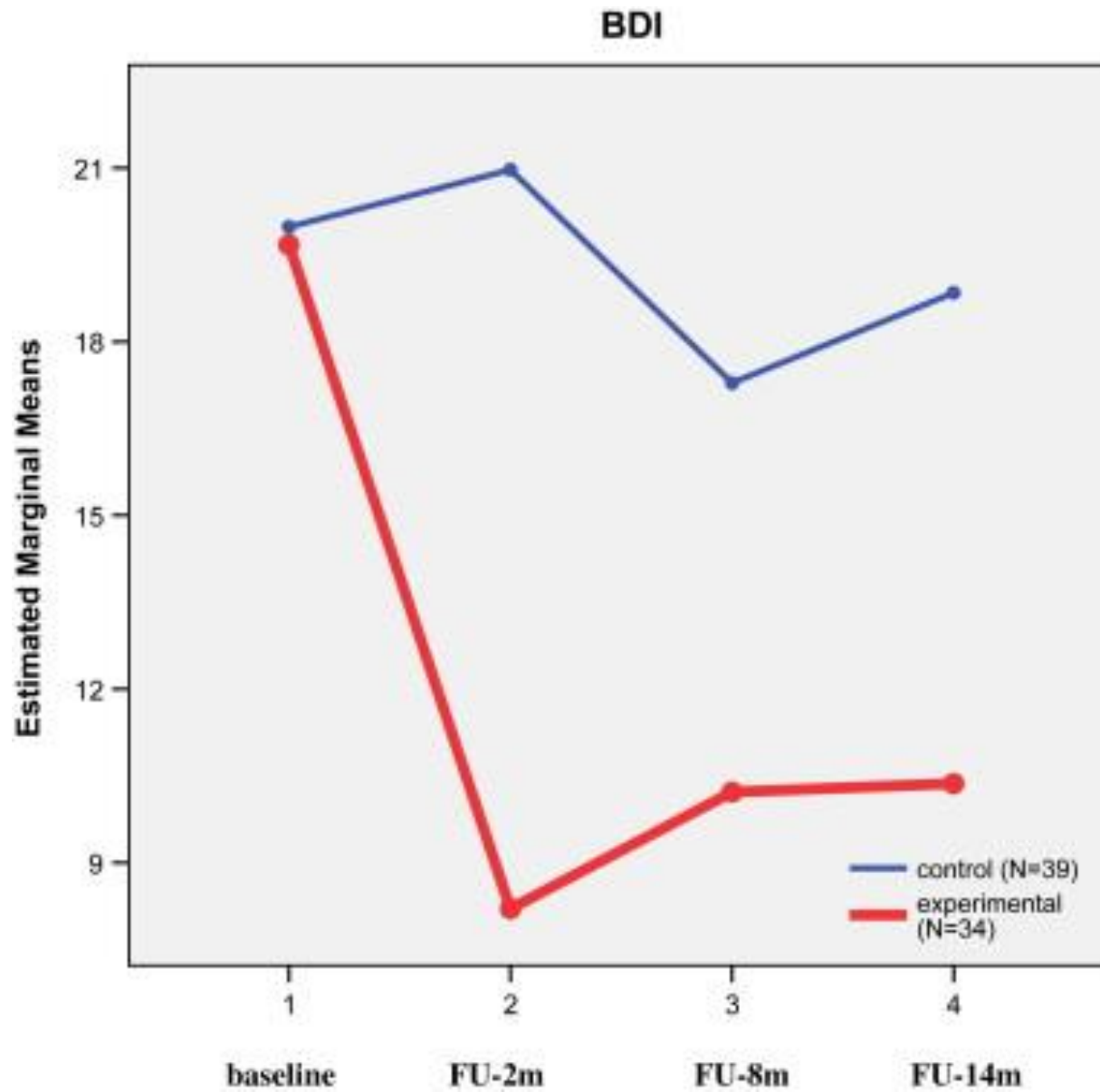
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# MBCT and depression

- RCT investigated the effects of Mindfulness-based cognitive therapy (MBCT) on the relapse in depression, time to first relapse and the quality of life
    - 106 recovered depressed patients with a history of at least 3 depressive episodes
    - Treatment as usual (TAU) vs MBCT plus TAU 1 year f/up
  - Relapse/recurrence significantly reduced and the time until first relapse increased in the MBCT plus TAU c/w TAU
  - MBCT plus TAU group also showed a significant reduction in both short and longer-term depressive mood, better mood states and quality of the life
    - Godfrin KA, van Heeringen C. The effects of mindfulness-based cognitive therapy on recurrence of depressive episodes, mental health and quality of life: A randomized controlled study. *Behav Res Ther.* 2010 Aug;48(8):738-46.
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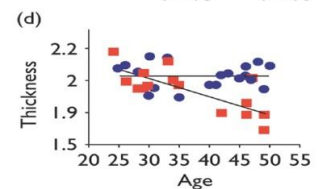
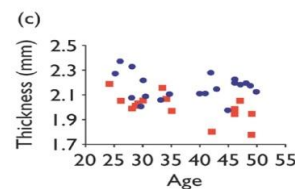
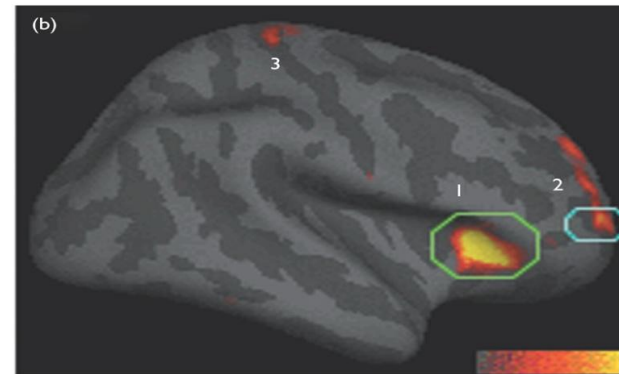
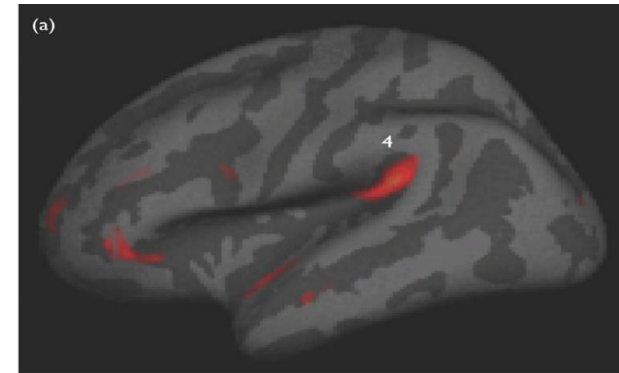






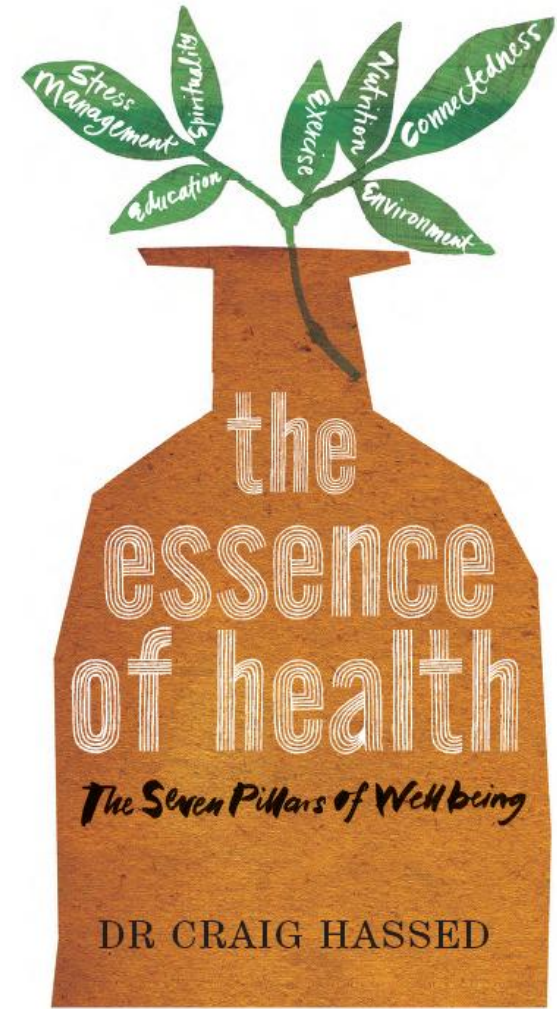
# Mindfulness and the brain

- Mindfulness training improves functioning in areas related to executive functioning, attentional control, self-regulation, sensory processing, memory and regulation of the stress response
  - Thickening of cortex in regions associated with attention, self-awareness and sensory processing thicker in meditators
  - “The regular practice of meditation may have neuroprotective effects and reduce the cognitive decline associated with normal aging.”
    - Hölzel BK, Carmody J, Evans KC, et al. Stress reduction correlates with structural changes in the amygdala. *Soc Cogn Affect Neurosci*. 2010 Mar;5(1):11-7.
    - Hölzel BK, Carmody J, Vangel M, et al. Mindfulness practice leads to increases in regional brain gray matter density. *Psychiatry Res*. 2011 Jan 30;191(1):36-43.
    - Kilpatrick LA, Suyenobu BY, Smith SR, et al. Impact of Mindfulness-Based Stress Reduction training on intrinsic brain connectivity. *Neuroimage*. 2011 May 1;56(1):290-8.
    - Lazar SW, Kerr CE, Wasserman RH, et al. *Neuroreport*. 2005;16(17):1893-1897.
    - Pagnoni G, Cekic M. *Neurobiology of Aging*. 2007;28(10):1623-7.



# Essence program and student wellbeing

- Study of 2006 cohort of medical students found that 90.5% of students personally applied strategies
- Improved student wellbeing noted on all measures of wellbeing even in the pre-exam period
  - Reduced depression, hostility and anxiety subscale
  - Improved psychological and physical quality of life
    - Hassed C, de Lisle S, Sullivan G, Pier C. Adv Health Sci Educ Theory Pract. 2008 May 31. [Epub ahead of print]



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# Mindfulness and mental flexibility

- Mindfulness leads to:
    - reduced cognitive rigidity via the tendency to be "blinded" by experience
    - “a reduced tendency to overlook novel and adaptive ways of responding due to past experience, both in and out of the clinical setting.”
      - Greenberg J, Reiner K, Meiran N. "Mind the trap": mindfulness practice reduces cognitive rigidity. PLoS One. 2012;7(5):e36206. Epub 2012 May 15.
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# Mindfulness and practitioner wellbeing

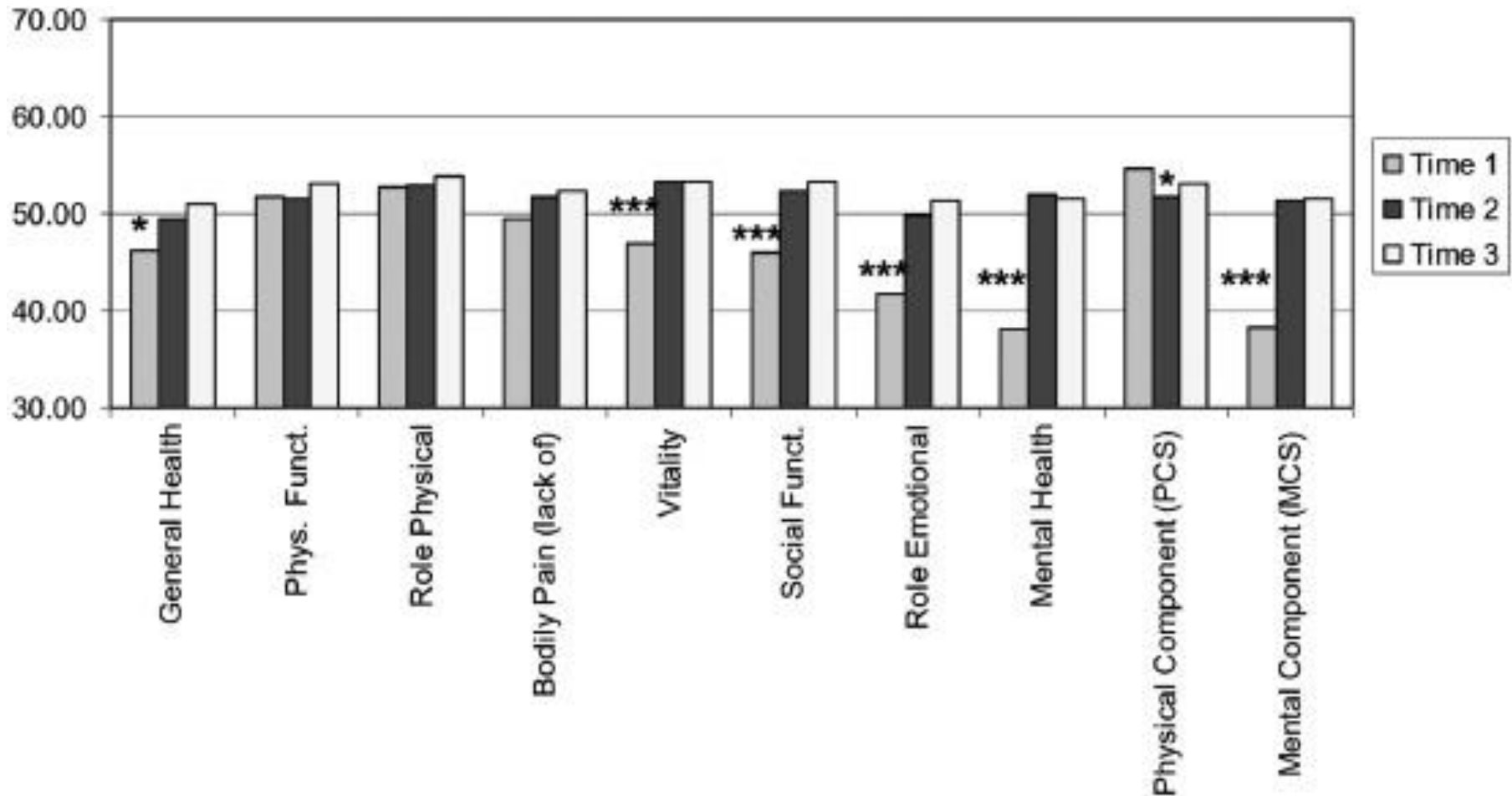
- An 8-week mindfulness program: improvements on all measures of wellbeing including:
    - Mindfulness
    - Burnout (emotional exhaustion; depersonalization; personal accomplishment)
    - Empathy and responsiveness to psychosocial aspects
    - Total mood disturbance
    - Personality (conscientiousness; emotional stability)
  - Improvements in mindfulness correlated with improvements on other scales
    - Krasner MS, Epstein RM, Beckman H, et al. JAMA. 2009;302(12):1338-40.
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# Mindfulness for nurses

- Study implemented an innovative new model of delivering Mindfulness-Based Stress Reduction (MBSR)
    - Replaced six of the eight traditional in-person sessions with group telephonic sessions (tMBSR)
  - Between baseline (Time 1) and the end of the 8-week tMBSR intervention (Time 2) participants showed improv't in general health, decreased stress, decreased work burnout, and improvement in several other areas
  - Improvements sustained 4 months later (Time 3)
  - Individuals who continued MBSR practice after program demonstrated better outcomes than those that did not
    - Bazarko D, Cate RA, Azocar F, Kreitzer MJ. The Impact of an Innovative Mindfulness-Based Stress Reduction Program on the Health and Well-Being of Nurses Employed in a Corporate Setting. J Workplace Behav Health. 2013 Apr;28(2):107-133.
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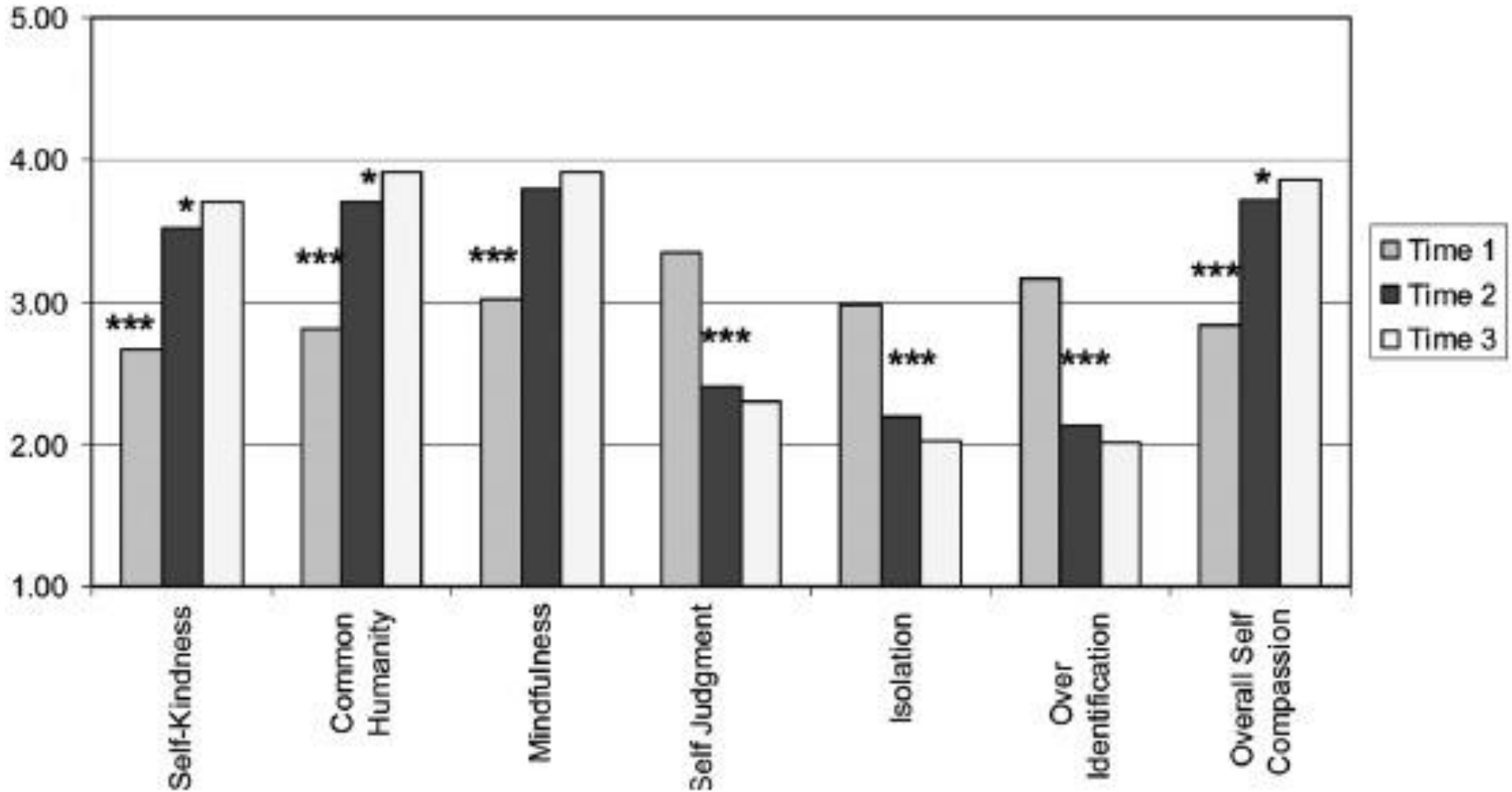
# Mindfulness for nurses



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# Mindfulness for nurses



Bazarko D, Cate RA, Azocar F, Kreitzer MJ. The Impact of an Innovative Mindfulness-Based Stress Reduction Program on the Health and Well-Being of Nurses Employed in a Corporate Setting. *J Workplace Behav Health*. 2013 Apr;28(2):107-133.

# Mindfulness for nurses

Figure 8A. Perceived Stress

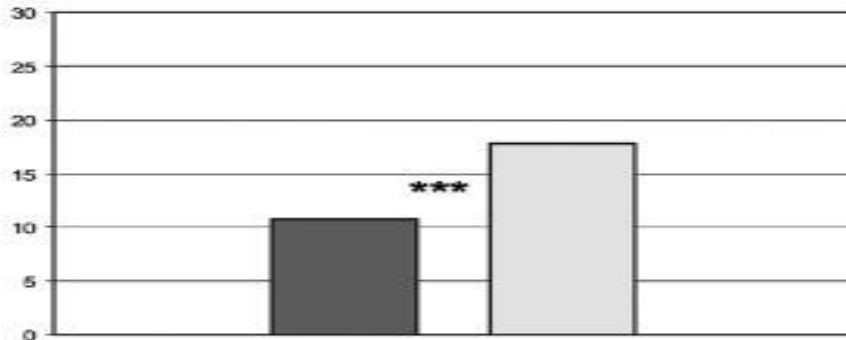


Figure 8B. Burnout

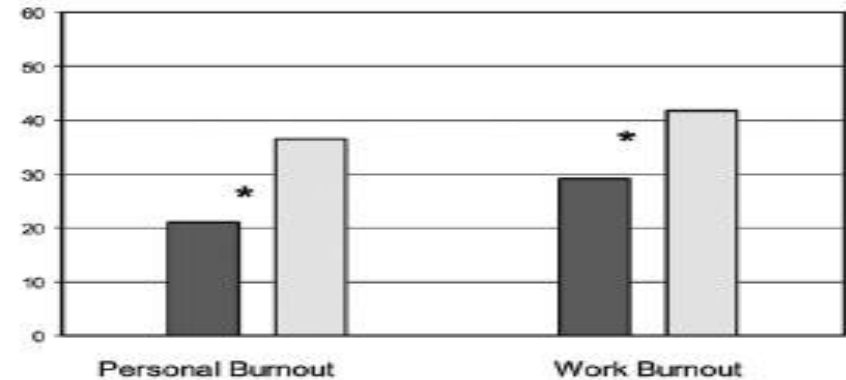


Figure 8C. Overall Self-Compassion

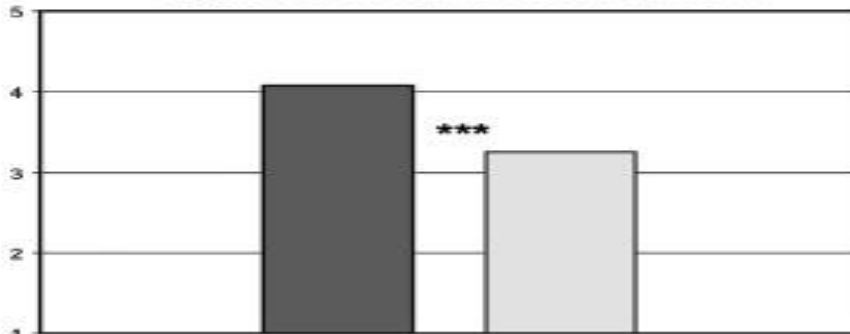
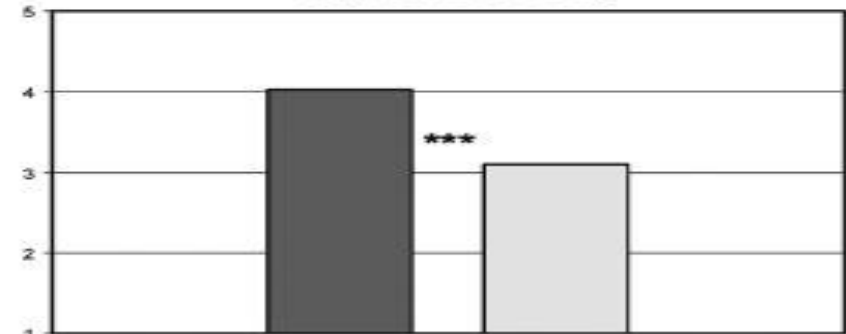


Figure 8D. Serenity



# Mindfulness, exercise & the cold

- RCT evaluating effects of meditation or exercise on incidence, duration, and severity of acute respiratory infection (ARI)
- Adults >50 years randomized to 1 of 3 study groups:
  - 8-week training in mindfulness meditation,
  - 8-week training in moderate-intensity sustained exercise
  - control (no intervention)
    - Barrett B, Hayney MS, Muller D, et al. Meditation or Exercise for Preventing Acute Respiratory Infection: A Randomized Controlled Trial. *Ann Fam Med* 2012 10:298-299.
- ARIs and days of illness:
  - Control group: 40 ARIs and 453 illness days
  - Exercise group: 26 ARIs and 241 illness days
  - Meditation group: 27 ARIs and 257 days of ARI illness
- ARI symptom severity
  - 358 for control
  - 248 for exercise
  - 144 for meditation
- Days off work
  - 67 missed in the control group
  - 32 in the exercise group
  - 16 in the meditation group

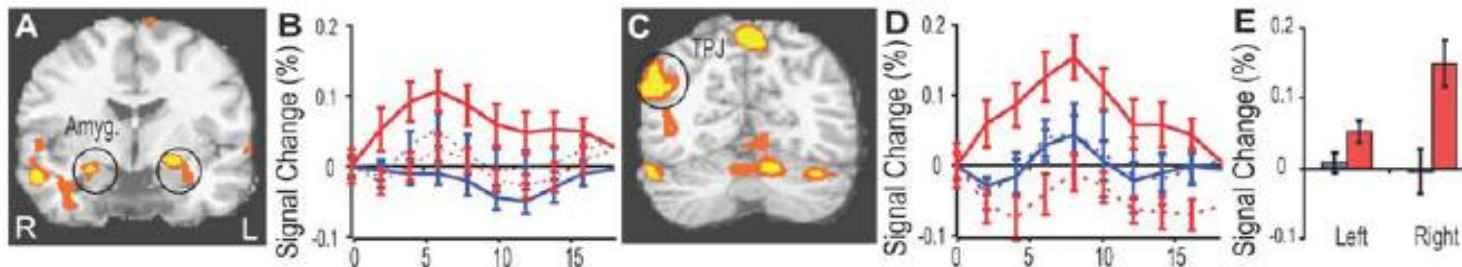
# Emotional Intelligence & mindfulness

- Mindfulness related to aspects of personality and mental health
  - Lower neuroticism, psychological symptoms, experiential avoidance, dissociation
  - Higher emotional intelligence and absorption
    - Baer RA, et al. Assessment. 2004;11(3):191-206.

EI	Definition
<b>Self-awareness</b>	Ability to recognise and understand emotions, drives and effects
<b>Self-regulation</b>	Can control or redirect disruptive impulses, can think before acting
<b>Motivation</b>	Passion for work that goes beyond money or status, energy and persistence
<b>Empathy</b>	Ability to understand emotions of others, skill in interacting with others
<b>Social skill</b>	Can manage relationships and build networks, can find common ground, rapport

# Meditation and compassion

- Limbic brain regions implicated in empathic response to another's pain
- Meditators have more active empathic response
  - Activation in insula greater in expert than novices
- Empathy w/o stress reduces carer fatigue
  - Lutz A, Brefczynski-Lewis J, Johnstone T, Davidson RJ. PLoS ONE. 2008 Mar 26;3(3):e1897.

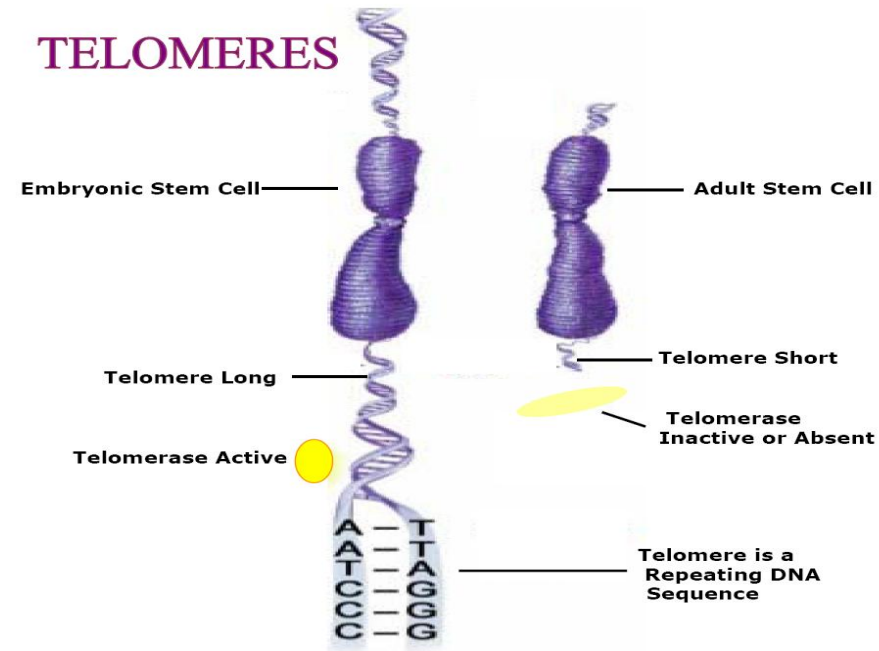


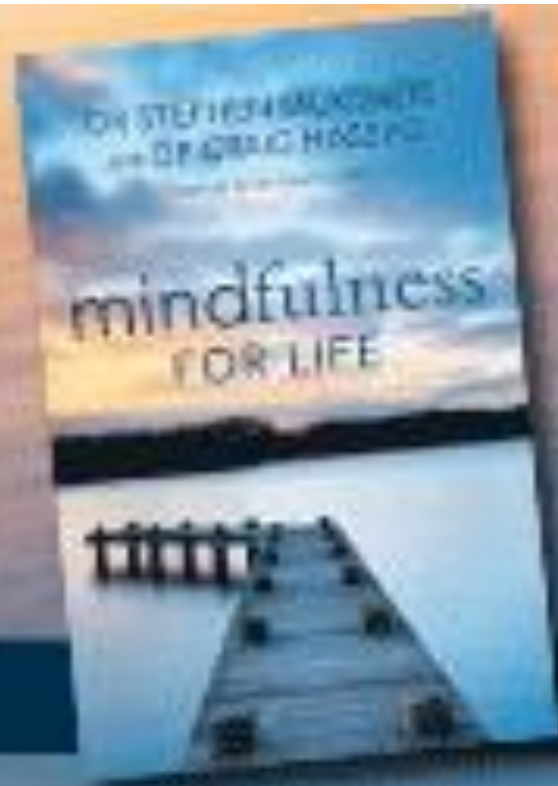
**Figure 3. State by Group Interaction:** **A.** (Amyg.) stands for amygdala ( $y = -5$ , color codes: orange,  $p < 2.10^{-3}$ , yellow,  $p < 5.10^{-4}$ ). **B.** Impulse response in (Amyg.) for 15 experts (red) and for 15 novices (blue) during rest (dashed line) and compassion (full line). **C–D.** Same as **A–B** in TPJ;  $y = -61$ . **E.** Side by side effect and side by side by group effect in TPJ on the average impulse response between meditation and rest; experts are in red, novices in blue.

doi:10.1371/journal.pone.0001897.g003

# Mindfulness and cellular ageing

- Meditation may slow genetic ageing and enhance genetic repair
  - “...we propose that some forms of meditation may have salutary effects on telomere length by reducing cognitive stress and stress arousal and increasing positive states of mind and hormonal factors that may promote telomere maintenance.”
    - Epel E, Daubenmier J, Moskowitz JT, Folkman S, Blackburn E. Can meditation slow rate of cellular aging? Cognitive stress, mindfulness, and telomeres. *Ann N Y Acad Sci.* 2009 Aug;1172:34-53.





# mindfulness

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