
Applied Mindfulness: being in the zone for life and work

A/Prof Craig Hassed
Mindfulness coordinator
Monash University
Department of General Practice
craig.hassed@monash.edu

Today's session

- Brief introduction
 - Mindfulness experiments
 1. Mindfulness meditation - the formal practice
 2. Dealing with distractor influence
 3. Multitasking vs. efficient attention switching
 4. Mindful communication
 5. Mindfulness, stress and performance
 6. In the flow
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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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TELOMERES

Embryonic Stem Cell

Adult Stem Cell

Telomere Long

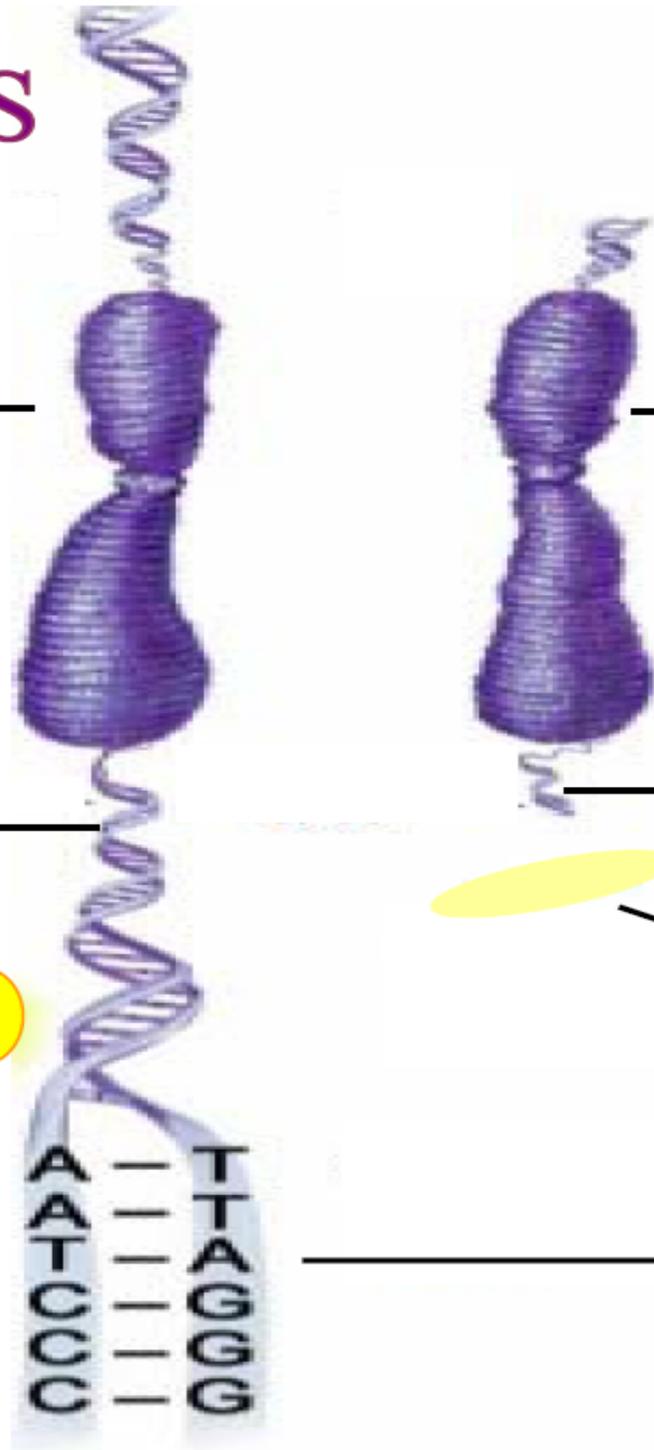
Telomere Short

Telomerase Active

Telomerase Inactive or Absent

A T
A T
C C C
G G G

Telomere is a Repeating DNA Sequence



Work stress and aging

- Study on whether work-related exhaustion (prolonged work stress – Maslach’s Burnout Inventory) associated with accelerated biological aging (telomere length)
 - Data from sample of 2911 of the Finnish working-age population aged 30-64
 - Individuals with severe exhaustion had leukocyte telomeres on average 0.043 relative units shorter than those with no exhaustion ($p=0.009$)
 - Association remained significant after adjustment for other factors
 - “These data suggest that work-related exhaustion is related to the acceleration of the rate of biological aging.”
 - Ahola K, Sirén I, Kivimäki M, et al. Work-related exhaustion and telomere length: a population-based study. PLoS One. 2012;7(7):e40186. Epub 2012 Jul 11.
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Mind wandering and ageing

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

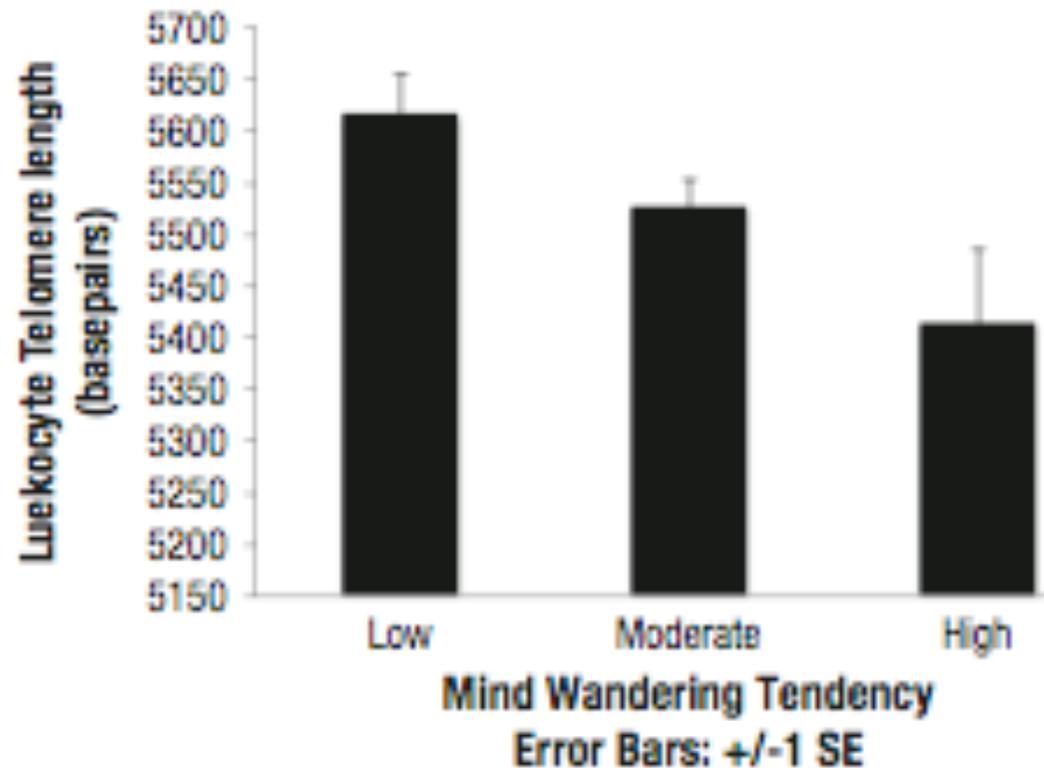
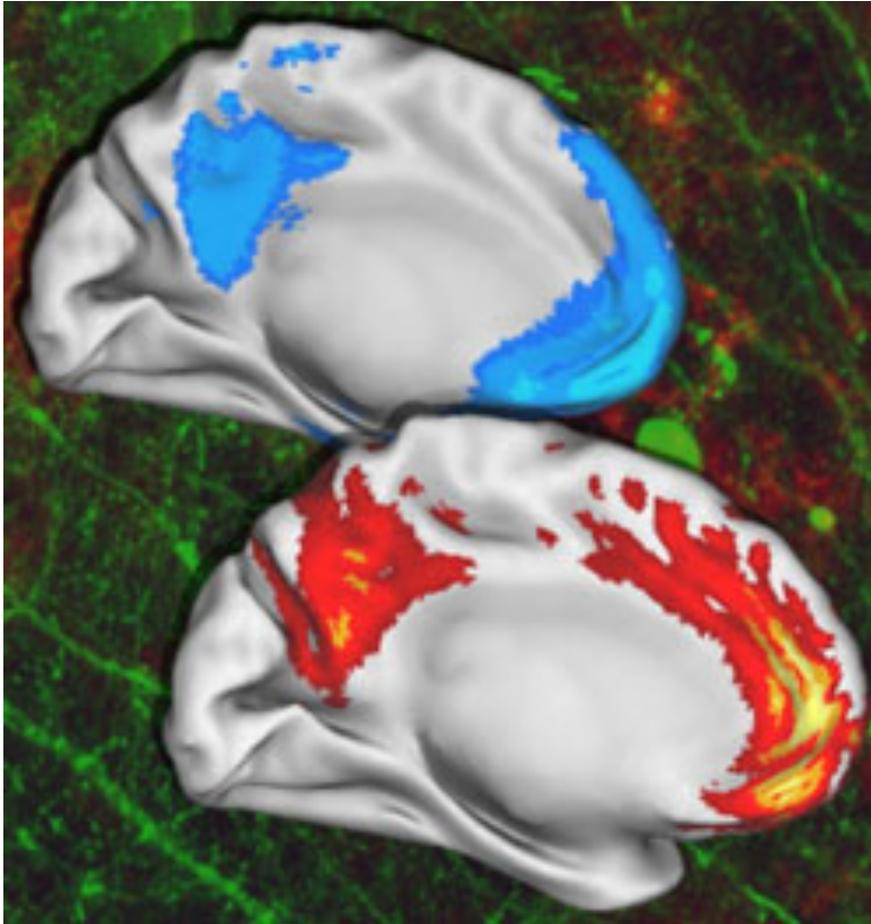


Fig. 1. Leukocyte telomere length by greater mind-wandering group.

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

The Default Brain



- Focused: on-task
 - Tasks associated with paying attention
 - Brain efficient and quiet
- Default state (mode)
 - Mind is inattentive, distracted, idle, recalling past, daydreaming
 - Operating on automatic pilot

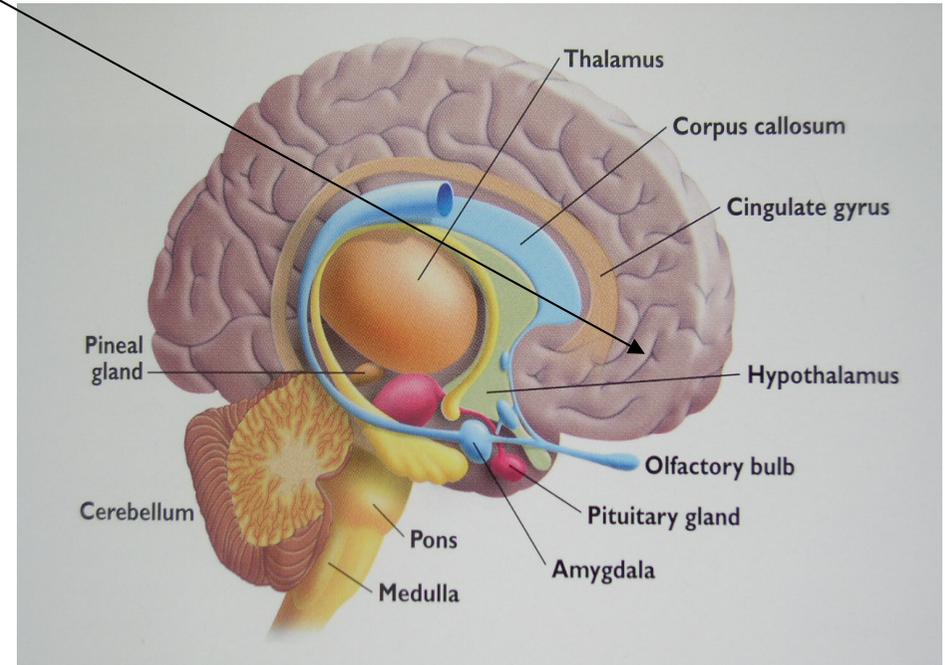
The Default Brain

Associated with

- **Stress** (Brewer et al., 2011)
 - **Anxiety** (Zhao et al., 2007)
 - **Depression** (Greicius et al., 2007)
 - **ADHD** (Uddin et al., 2008a)
 - **Schizophrenia** (Pomarol-Clotet et al., 2008)
 - **Autism** (Kennedy & Courchesne, 2008)
 - **Alzheimer's dementia** (Firbank et al., 2007)
 - **Criminal recidivism** (Aharoni et al., 2013)
 - **Reduced performance** (Brewer et al., 2011)
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Three regions of the brain

- Frontal lobes (prefrontal cortex) centre for executive functioning
 - ❑ Attention regulation
 - ❑ Working memory
 - ❑ Self-awareness
 - ❑ 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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- “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



Applications of mindfulness

- **Mental health:** E.g. therapeutic application for depression, anxiety, panic disorder, stress, emotional regulation, addiction, sleep problems, eating disorders, psychosis, ADHD, autism, reduced burnout, greater resilience
 - **Neuroscience:** E.g. structural and functional changes in the brain, stimulation of neurogenesis, possible prevention of dementia and cognitive decline, down-regulating the amygdala, improved executive functioning and working memory, reduced default mental activity, improved self-monitoring and cognitive control, improved perception of sensory input
 - **Clinical:** E.g. therapeutic applications for pain management, symptom control, coping with chronic illness (e.g. cancer and MS), metabolic and hormonal benefits (e.g. reduced allostatic load, cortisol), facilitating lifestyle change (e.g. weight management, smoking cessation), improved immunity (e.g. improved resistance, reduced inflammation), improved genetic function and repair, slower ageing as measured by telomeres
 - **Performance:** E.g. sport, academic, leadership qualities, mental flexibility and problem solving, decision-making, sunk-cost bias
 - **Education:** E.g. improved problem-solving, executive functioning and working memory, better focus, less behavioural problems, fostering growth mindsets
 - **Relationships:** E.g. greater emotional intelligence and empathy, improved communication, reduced vicarious stress and carer burnout
 - **Spiritual**
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Burnout and psychiatric morbidity in new medical graduates

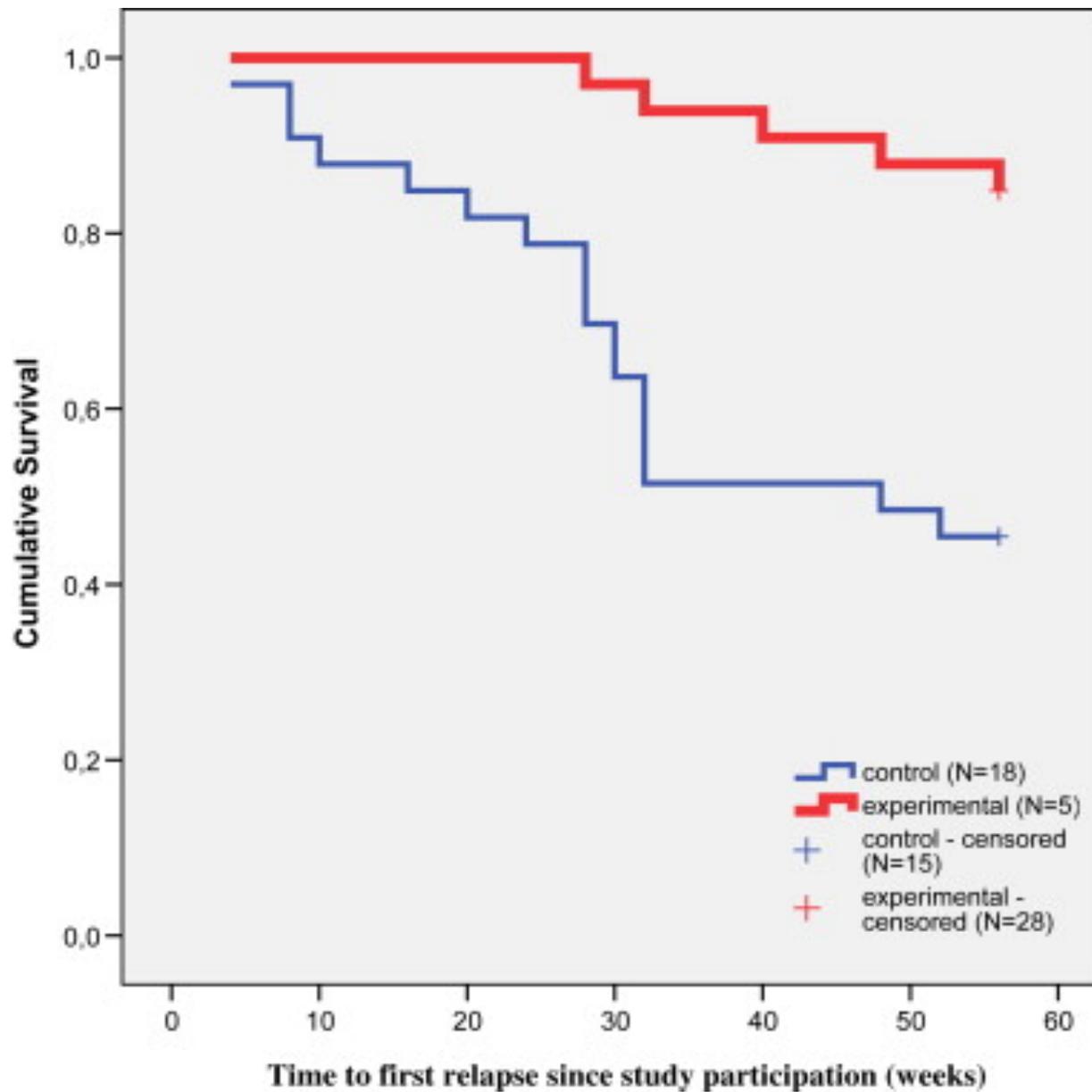
- 8 months into internship: 75% interns had burnout
 - 73% (of interns) met criteria for psychiatric morbidity on at least one occasion
 - Willcock SM et al. Burnout and psychiatric morbidity in new medical graduates. *Med J Aust.* 2004;181(7):357-60.
-

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)
-

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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Godfrin KA, van Heeringen C. Behav Res Ther. 2010 Aug;48(8):738-46.

Mindfulness and the workplace

- 8 week mindfulness program for ANU staff
 - Key findings include:
 - Increased self-rated performance (ECDP)
 - Improved wellbeing (PANAS)
 - Improved eudaimonic wellbeing (meaningfulness) (PWB)
 - Increase in work engagement (vigour and dedication) (UWES)
 - Increased authenticity (self-awareness, authentic behaviour, open relationships) (AI3)
 - Increased satisfaction with life (SWLS)
 - Improvements sustained at 6 month f/up
 - Atkins PWB, Hassed C, Fogliati VJ. (2015) Mindfulness Improves Work Engagement, Wellbeing and Performance in a University Setting. In Burke, RJ, Cooper, CL & Page, KM. Flourishing in Life, Work, and Careers, pp 193-209. Elgar, Cheltenham.
-

Mindfulness, management and work

- Randomized study of the effect of mindfulness on senior managers **found** enhanced participants' self-perception of leadership skills as a bundle of all five skills, and some individual skills
 - Amar AD, Hlupic V, Tamwatin T. Effect of meditation on self-perception of leadership skills: a controlled group study of CEOs. 10.5465/AMBPP.2014.300 ACAD MANAGE PROC January 2014
 - People higher in mindfulness less likely to feel frustration, even in unsupportive managerial environments: a protective factor in controlling work environments
 - Schultz PP, Ryan RM, Niemiec CP, Legate N, Williams GC. Mindfulness, Work Climate, and Psychological Need Satisfaction in Employee Well-being. Mindfulness September 25, 2014.
 - Mindfulness intervention group had significant decrease in perceived stress but increased mindfulness, resiliency, and vigour
 - Aikens KA, Astin J, Pelletier KR, et al. Mindfulness Goes to Work: Impact of an Online Workplace Intervention. Journal of Occupational & Environmental Medicine. July 2014;56(7): 721–731. doi: 10.1097/JOM.0000000000000209
 - Interventions should focus on workplaces as well as individuals
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Mindfulness and job stress

- RCT evaluated the effectiveness of 8-week mindfulness-based intervention (MBI) on mental illness risks (including psychological distress, prolonged fatigue, and perceived stress) and job strain (job control and job demands) for 144 employees with poor mental health
 - MBI group significantly lower on psychological distress, prolonged fatigue, and perceived stress
 - Job strain: job demands showed a significant decline but the significance disappeared when the demographic variables were controlled for
 - Huang SL, Li RH, Huang FY, Tang FC. The Potential for Mindfulness-Based Intervention in Workplace Mental Health Promotion: Results of a Randomized Controlled Trial. PLoS One. 2015 Sep 14;10(9):e0138089. doi: 10.1371/journal.pone.0138089. eCollection 2015.
 - Interventions for enhancing workplace resilience for individuals should not be divorced from the need to create work environments and systems sympathetic to wellbeing and being mindful
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Mindfulness and attention regulation

- Mindfulness involves **attention** and **attitude**
 - 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
 - Mindful attitude e.g.
 1. Openness
 2. Curiosity
 3. Acceptance
 4. Self-compassion
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Distractor influence

- Common scenarios

- External e.g.

- Open plan offices
 - Noise, movement in environment
 - Technology

- Internal e.g.

- Worries, thoughts, emotions, daydreams, pressure...
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Smartphones and cognitive performance

- Series of experiments: 520 college students performed tasks requiring focus, attention, and problem-solving skills
 - Some were asked to leave their smartphones in another room, others to keep them in their pocket or purse, and others to put their phones on the desk next to them
 - Performance on tasks of attention and problem-solving varied depending on the location of the smartphone:
 - Scores highest when the smartphone in the next room
 - Scores lowest when the phone on the desk
 - Impact of smartphone's location most dramatic among those most reliant on their phones
 - The effect not altered by having the phone powered off (vs. set to silent mode) or placed face down (vs. face up)
 - It may be that the power, convenience, and connectivity provided by smartphones come at a cognitive cost – “brain drain”
 - Ward AF, Duke K, Gneezy A, Bos MW. Brain Drain: The Mere Presence of One's Own Smartphone Reduces Available Cognitive Capacity. JACR 2017;2(2):140-154. Published online April 3. <http://dx.doi.org/10.1086/691462>
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Smartphones and cognitive performance

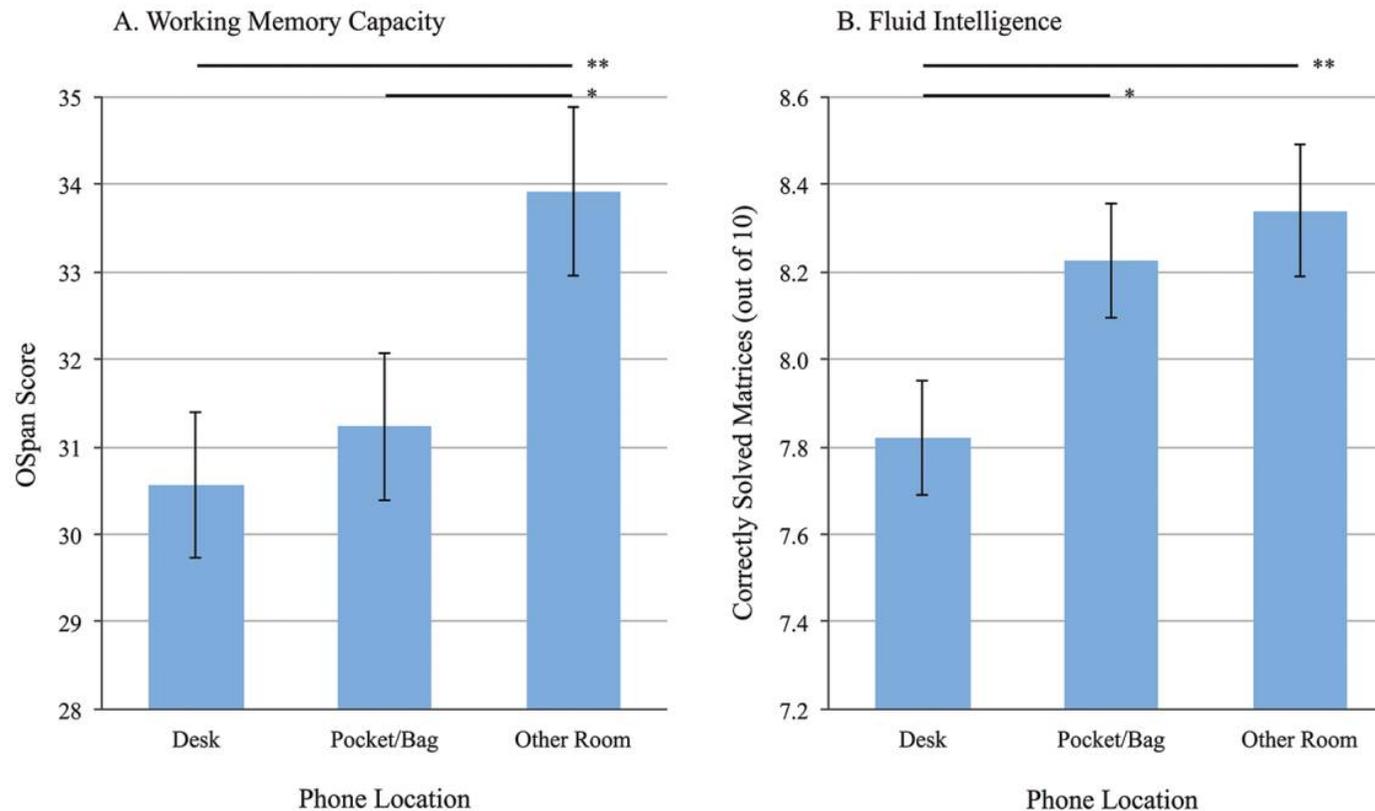
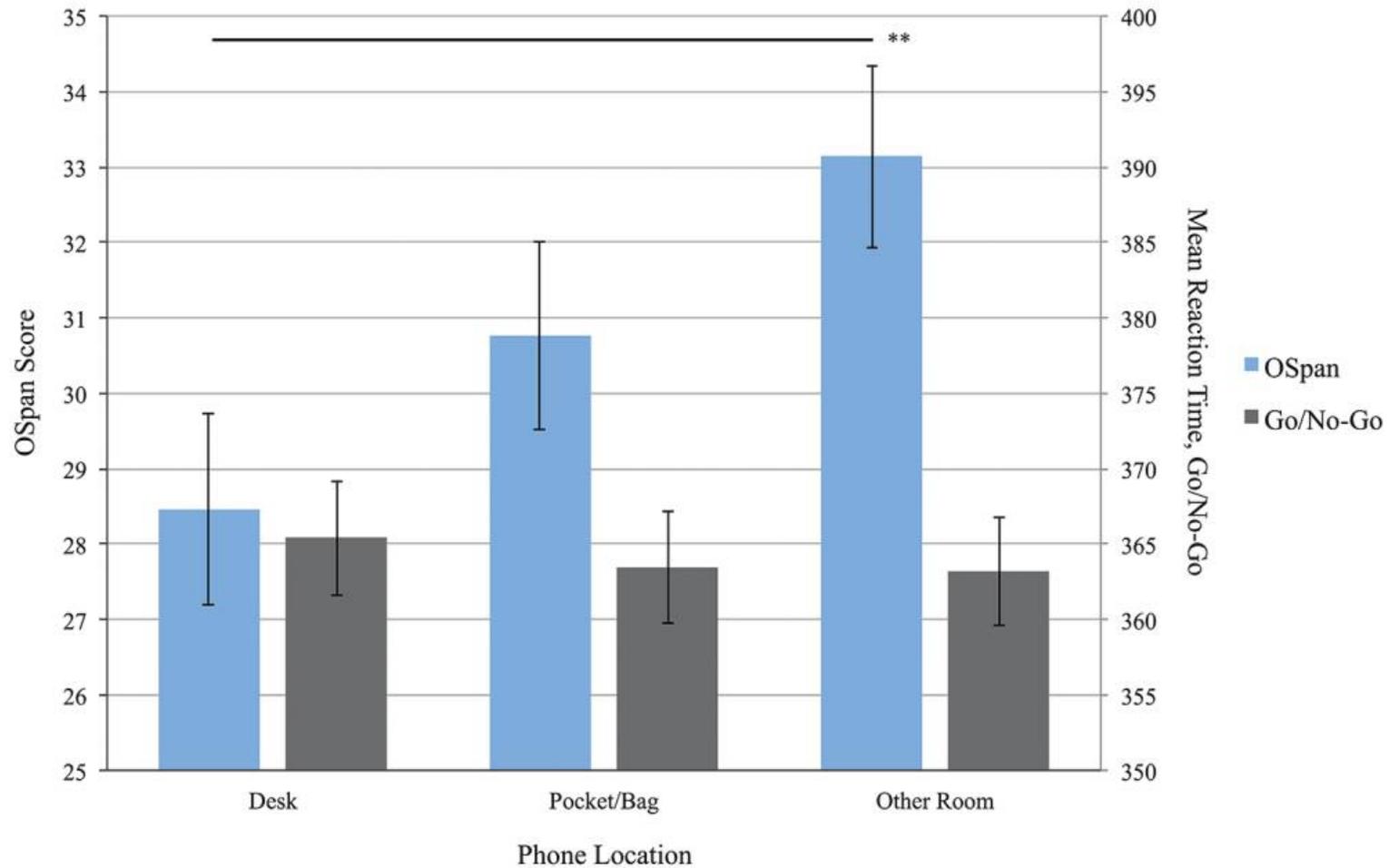
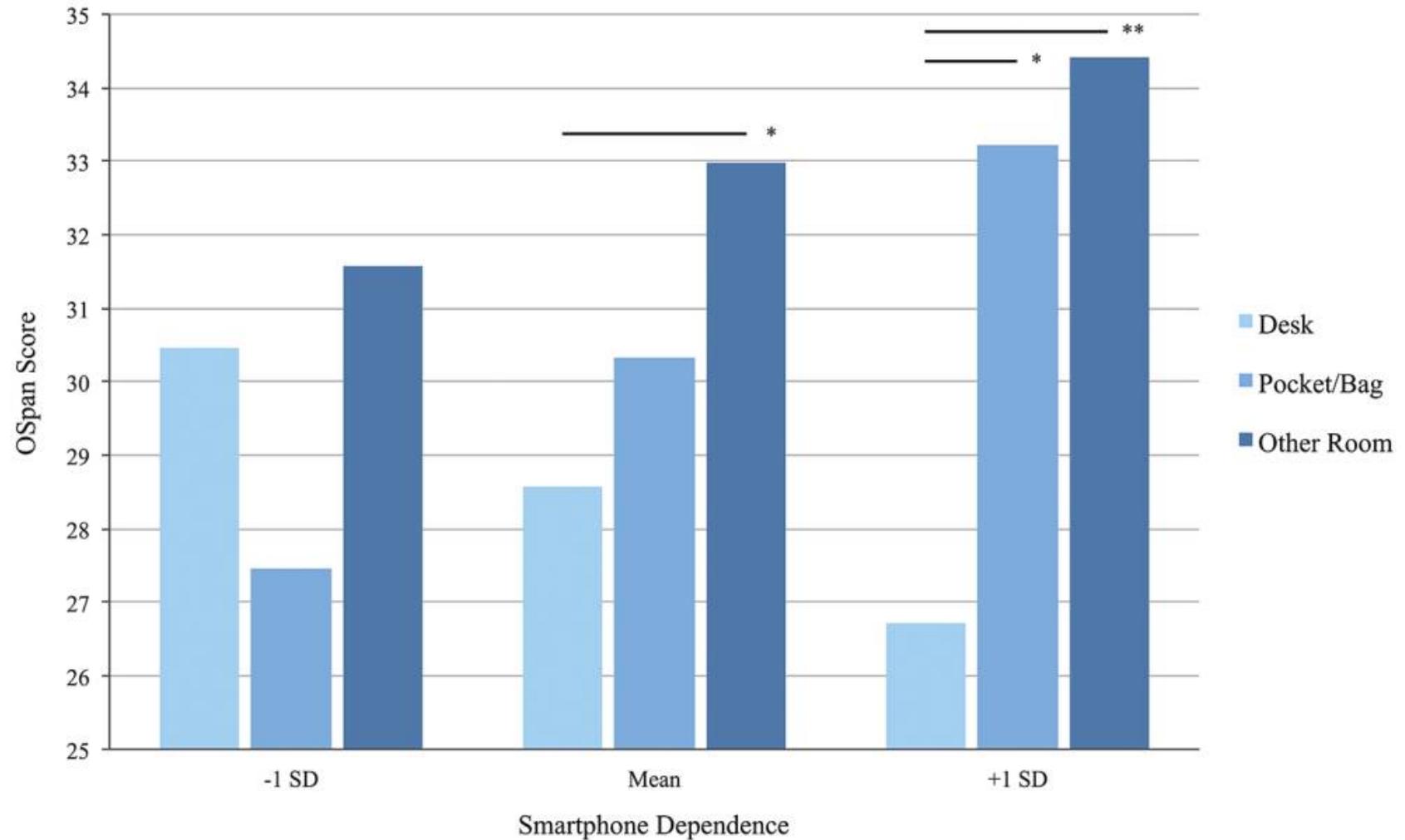


Figure 1. Experiment 1: effect of randomly assigned phone location condition on available WMC (OSpan Score, panel A) and functional Gf (Correctly Solved Raven's Matrices, panel B). Participants in the "desk" condition (high salience) displayed the lowest available cognitive capacity; those in the "other room" condition (low salience) displayed the highest available cognitive capacity. Error bars represent standard errors of the means. Asterisks indicate significant differences between conditions, with $*p < .05$ and $**p < .01$.

Smartphones and cognitive performance



Smartphones and cognitive performance



Dealing with distraction mindfully

- External: manage environment
 - Where possible, remove unnecessary distractions, minimise interruptions, minimise noise...
 - Internal: manage attention
 - No need to block things out – just choose what to be interested or uninterested in
-

Overloaded circuits

- “Bain and Company, the consultancy, has estimated that executives in the 1970s had to deal with fewer than 1,000 phone calls, telexes and telegraphs a year from people outside their company. These days, 30,000 external communications clog managers’ inboxes annually. As Henry Mintzberg asks in his 2009 book, *Managing*: “Might the internet, by giving the illusion of control, in fact be robbing managers of control? In other words, are the ostensible conductors becoming more like puppets?”
 - Financial Times, UK March 5, 2016.
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Falling attention spans

- According to a Microsoft Canada report, the average human's attention span is below that of a goldfish (8 sec vs. 9 sec)
 - “We are moving from a world where computing power was scarce to a place where it now is almost limitless, and where the true scarce commodity is increasingly human attention”
 - Satya Nadella
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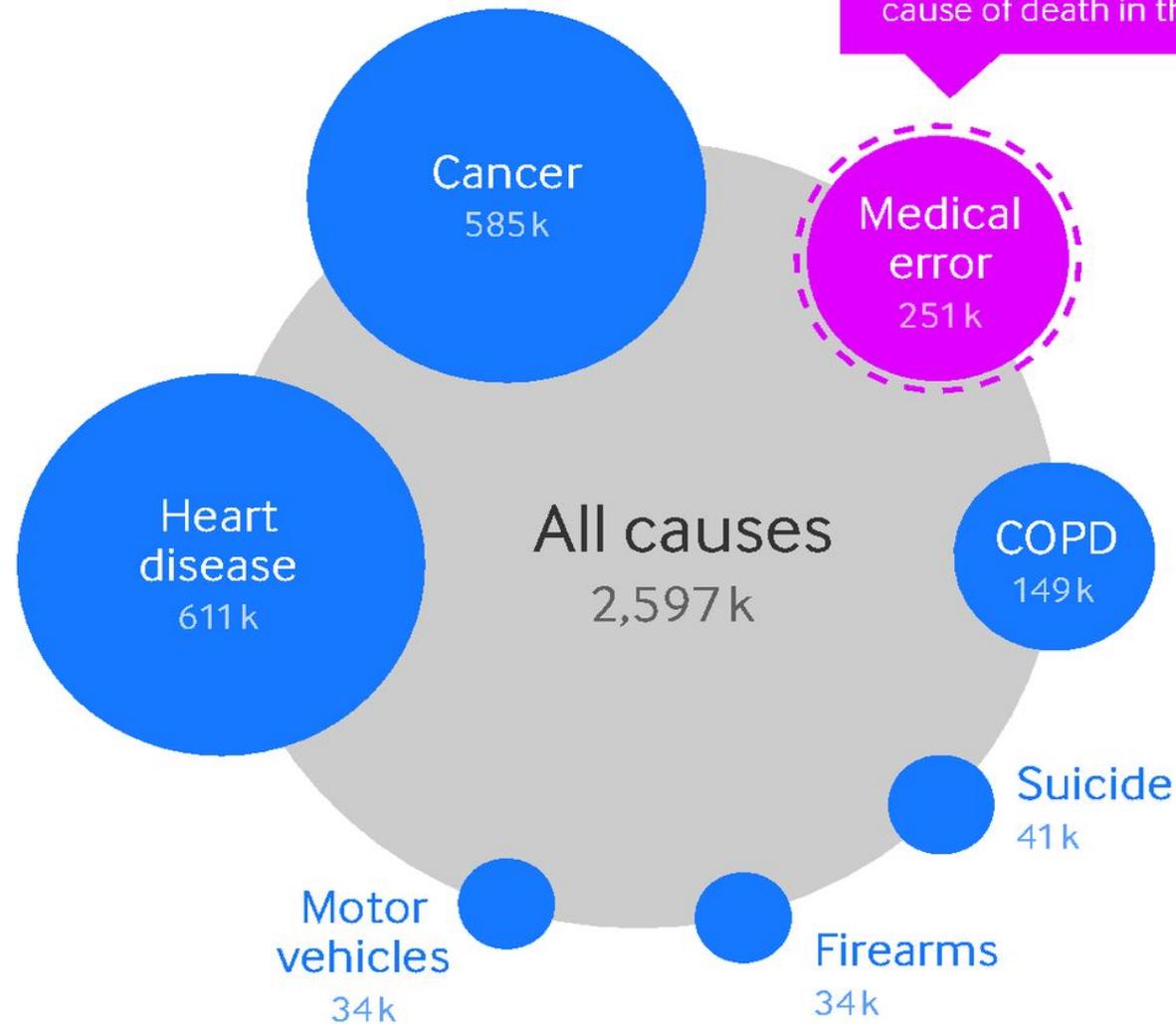
Attention Deficit Trait

- 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.
-

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.
 - Texting / emailing / internet while driving increased the risk 164-fold
 - Hickman JS, Hanowski RJ.
[An assessment of commercial motor vehicle driver distraction using naturalistic driving data.](#) *Traffic Inj Prev.* 2012;13(6):612-9. doi: 10.1080/15389588.2012.683841.
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Causes of death, US, 2013



Based on our estimate, medical error is the 3rd most common cause of death in the US

However, we're not even counting this - medical error is not recorded on US death certificates

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Data source:
http://www.cdc.gov/nchs/data/nvsr/nvsr64/nvsr64_02.pdf

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/>
-

The Illusion Of Multitasking

■ Attention switching

- So fast it *appears* we are doing multiple things simultaneously

■ Attentional blink

- **Lag time** of 200 to 500 milliseconds (0.5 second)
- Increased by **stress**
 - Slatger, Lutz, Greishchar et al. (2007)



Multitasking vs. efficient attention switching

- Multitasking is a myth – the human brain does not pay attention to multiple complex tasks at the same time
 - Efficient attention switching is useful – focus on one thing at a time
 - Manage the environment – remove unnecessary inputs
 - Avoid interrupting complex tasks
 - Don't multitask
-

Emotional Intelligence & mindfulness

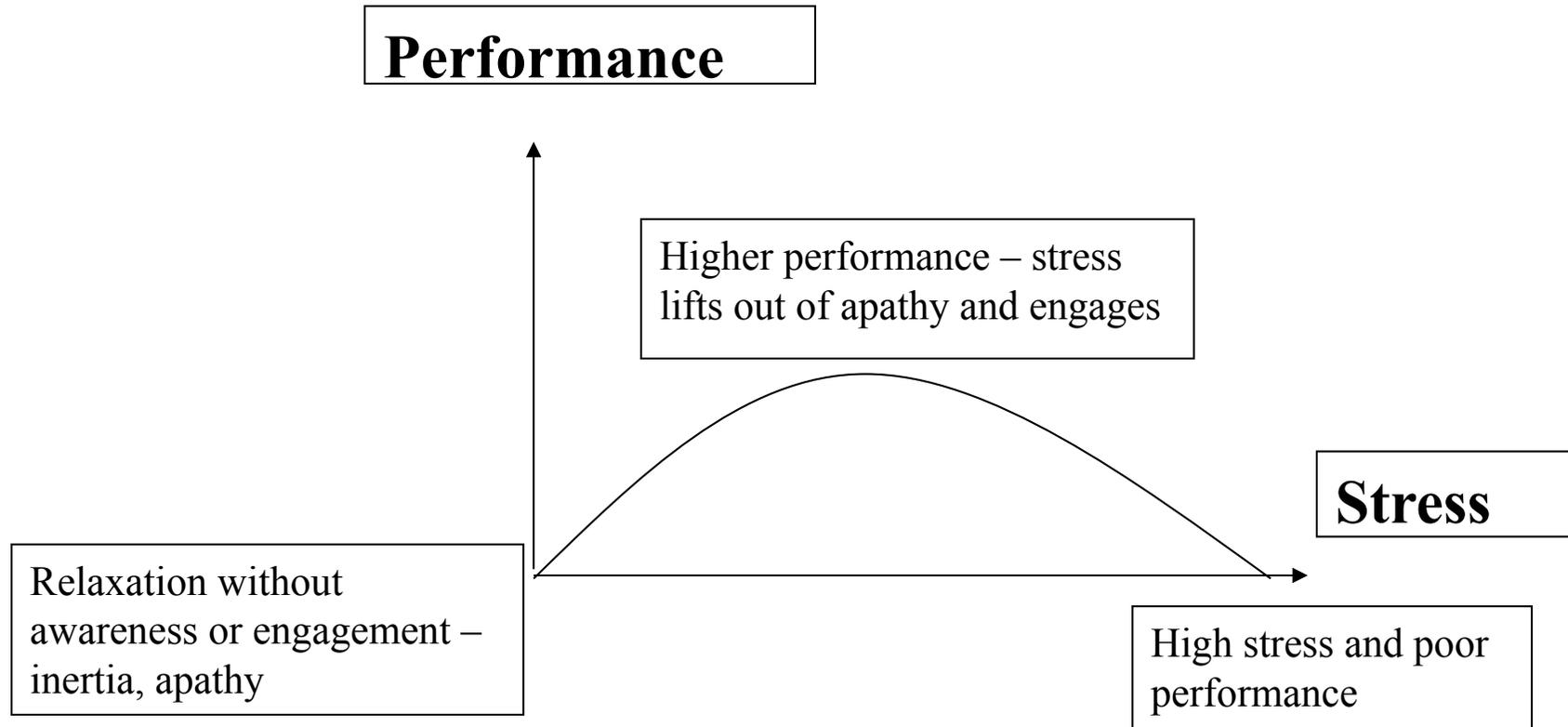
- Mindfulness related to aspects of personality and mental health
 - Lower neuroticism, psychological symptoms, experiential avoidance, dissociation
 - Higher emotional intelligence and absorption
 - Baer RA, et al. Assessment. 2004;11(3): 191-206.

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

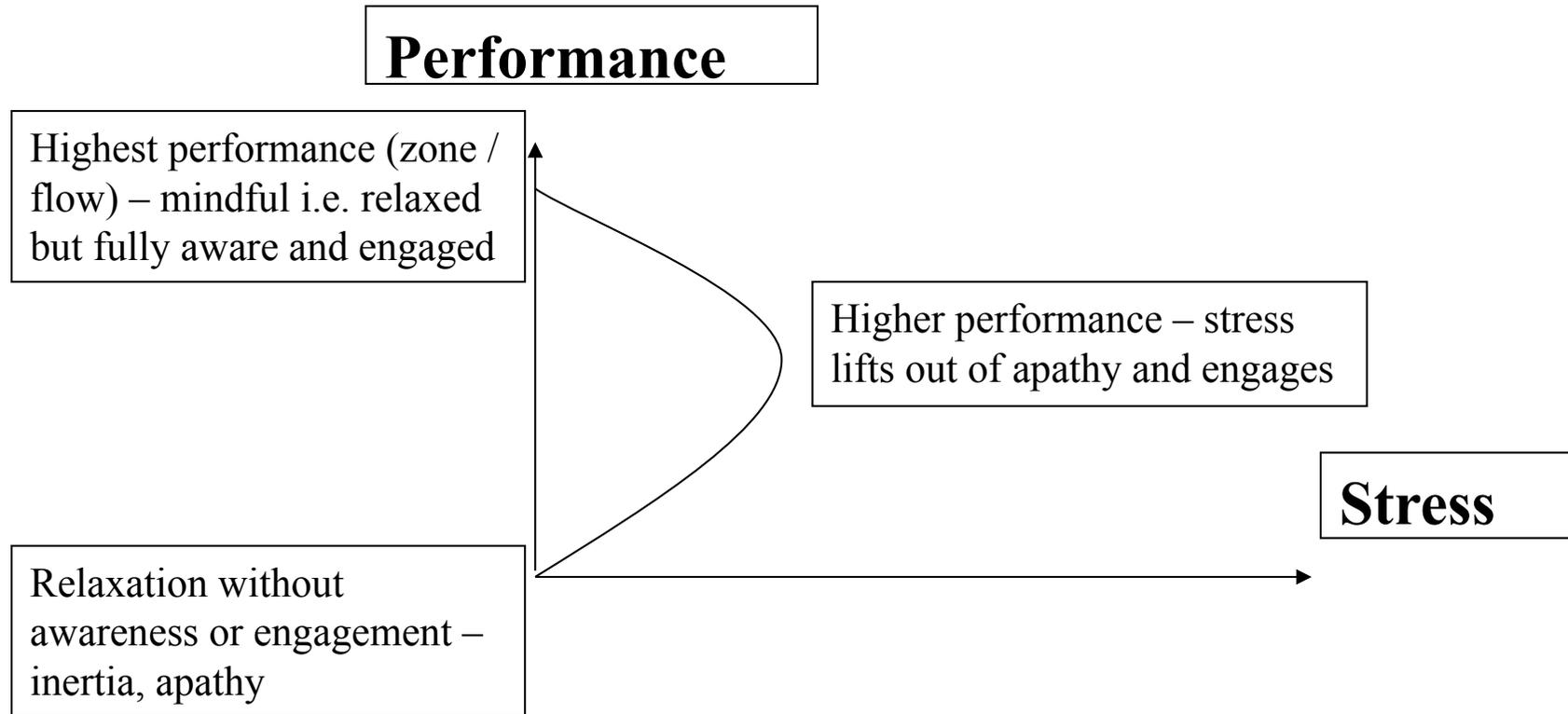
Mindfulness and communication

- Comparing clinicians with highest and lowest mindfulness scores: high-mindfulness clinician consultations:
 - Patient-centered pattern of communication (OR 4.14)
 - Both patients and clinicians engaged in more rapport building and discussion of psychosocial issues
 - Displayed more positive emotional tone with patients
 - Patients more likely to give high ratings on clinician communication and to report high overall satisfaction
 - Beach MC, Roter D, Korthuis PT, Epstein RM, et al. A Multicenter Study of Physician Mindfulness and Health Care Quality doi: 10.1370/afm.1507 Ann Fam Med 2013;11(5):421-428.
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Yerkes-Dodson Stress-performance curve



Hassed / mindfulness stress-performance curve



Interrupting the flow

- Average of **64 seconds** to **recover train of thought** after checking **email**
 - Check **every 5 mins** = waste **8.5 hours per week**
 - Jackson, Dawson & Wilson (2002)
 - Need to micromanage the attention and the environment e.g.
 - Remove unnecessary distractions / interruptions
 - Control the environment
 - Prioritise where the attention goes – is it urgent?
-

Mental overload and creativity

- Three experiments: subjects performed a free-association task while the level of mental load was manipulated in various ways
 - Subjects with low-load provided significantly more diverse and original associations compared with subjects in the high-load conditions, who exhibited high consensus (predictable, unimaginative, uncreative...)
 - Findings imply that activation of associations is narrowed under conditions of high mental load
 - Baror S, Bar M. Associative Activation and Its Relation to Exploration and Exploitation in the Brain. *Psychol Sci.* 2016 Jun;27(6):776-89. doi: 10.1177/0956797616634487.
-

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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Mindful practice

- In the context of medical practice, ‘mindful practice’ was a term coined by Prof. Ron Epstein in 1999
 - Refers to a clinician’s ability to be mindful while actively engaged in their work
 - “Mindful practice is conscious and intentional attentiveness to the present situation – the raw sensations, thoughts, and emotions as well as the interpretations, judgments and heuristics that one applies to a particular situation.”
 - Mindfulness is essential underpinning for self-monitoring and avoiding automatic pilot
 - Epstein RM. Mindful practice. JAMA. 1999 Sep 1;282(9):833-9.
 - Epstein R, Siegel D, Silberman J. Self-monitoring in clinical practice: a challenge for medical educators. J Cont Educ Health Prof 2008;28(1):5-13.
 - Epstein RM. Mindful practice in action (II): Cultivating habits of mind. Fam Syst Health . 2003;21: 11-17.
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Bias: the root 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. Clinician Mindfulness and Patient Safety. JAMA 2010;304(22):2532-3.
-

Mindfulness and ‘sunk-cost bias’

- Sunk-cost bias: “tendency to continue an endeavour once an investment in money, effort, or time has been made”
 - Often underlies escalation of commitment or entrapment
 - Large scale: disastrous military campaigns and over-budget public-works projects are publicly visible examples
 - Small scale: difficulty selling stock that has fallen in value, ignoring bad advice that one has paid for, deleting carefully written text from a manuscript, overstaying in dysfunctional relationships or jobs, gambling
 - Sunk-cost bias attenuated by drawing one’s focus away from the future and past and reducing negative affect through mindfulness meditation
 - Hafenbrack AC, Kinias Z, Barsade SG. Debiasing the Mind Through Meditation: Mindfulness and the Sunk-Cost Bias. *Psychological Science* 2014, Vol. 25(2) 369–376.
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Practicing mindfulness

- Formal practice
 - Mindfulness meditation
 - Informal practice
 - Mindful while engaged in daily activities and work
 - Cognitive practices
 - Perception
 - Letting go (non-attachment)
 - Acceptance
 - Presence of mind
 - Avoid the enemies of mindfulness e.g.
 - Multitasking
 - Unnecessary switching between complex tasks
 - Cognitive overload
 - Never unplugging
-

co-author of the bestselling *Mindfulness for Life*

DR CRAIG HASSED
& DR RICHARD CHAMBERS

mindful learning

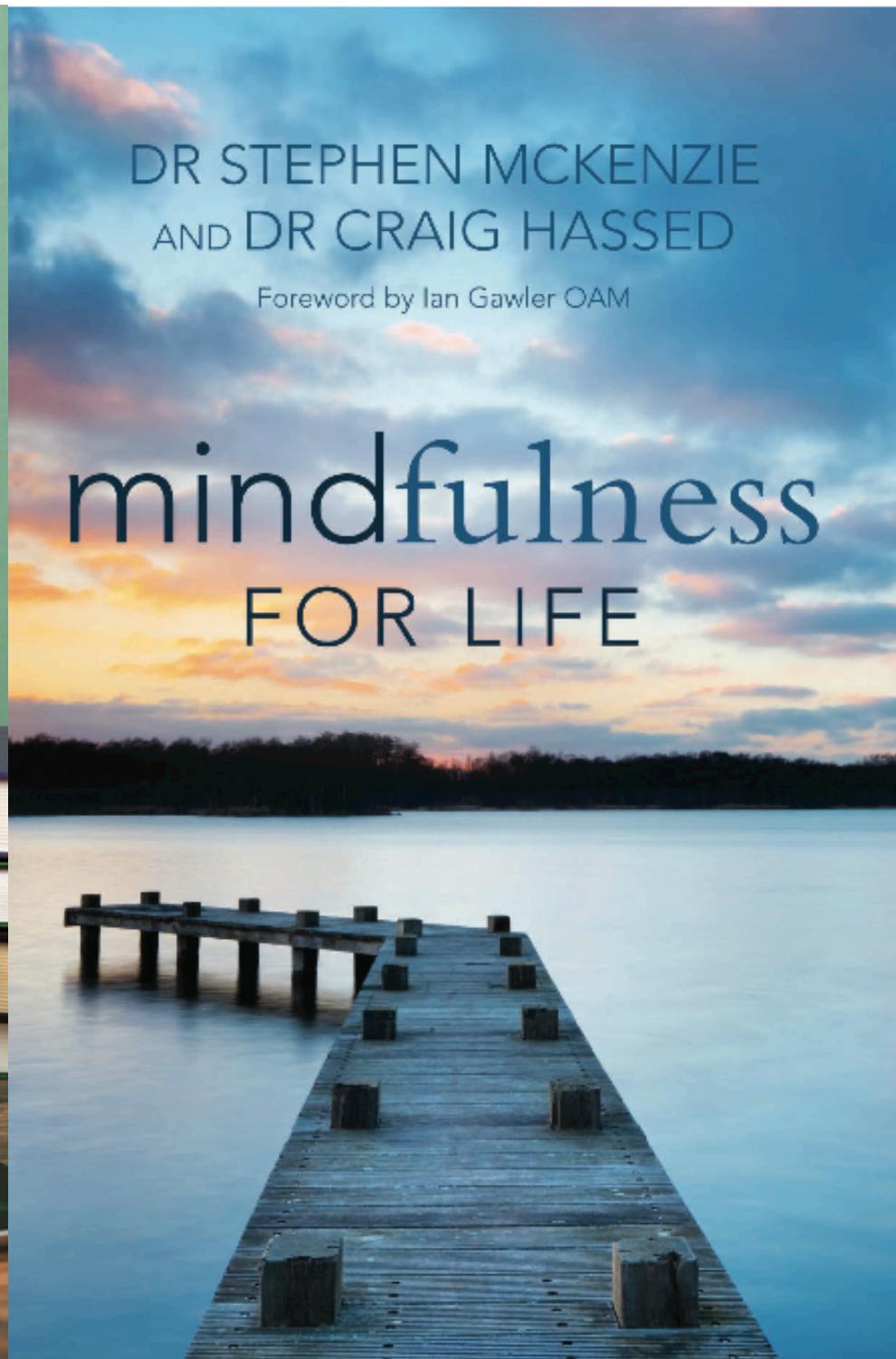
Reduce stress and improve brain
performance for effective learning



DR STEPHEN MCKENZIE
AND DR CRAIG HASSED

Foreword by Ian Gawler OAM

mindfulness FOR LIFE



Free 4-week online mindfulness course

- <https://www.futurelearn.com/courses/mindfulness-wellbeing-performance>
 - Collaboration between Monash University and FutureLearn (UK)
-