
Mindfulness, mental health and motivation

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Falling attention spans

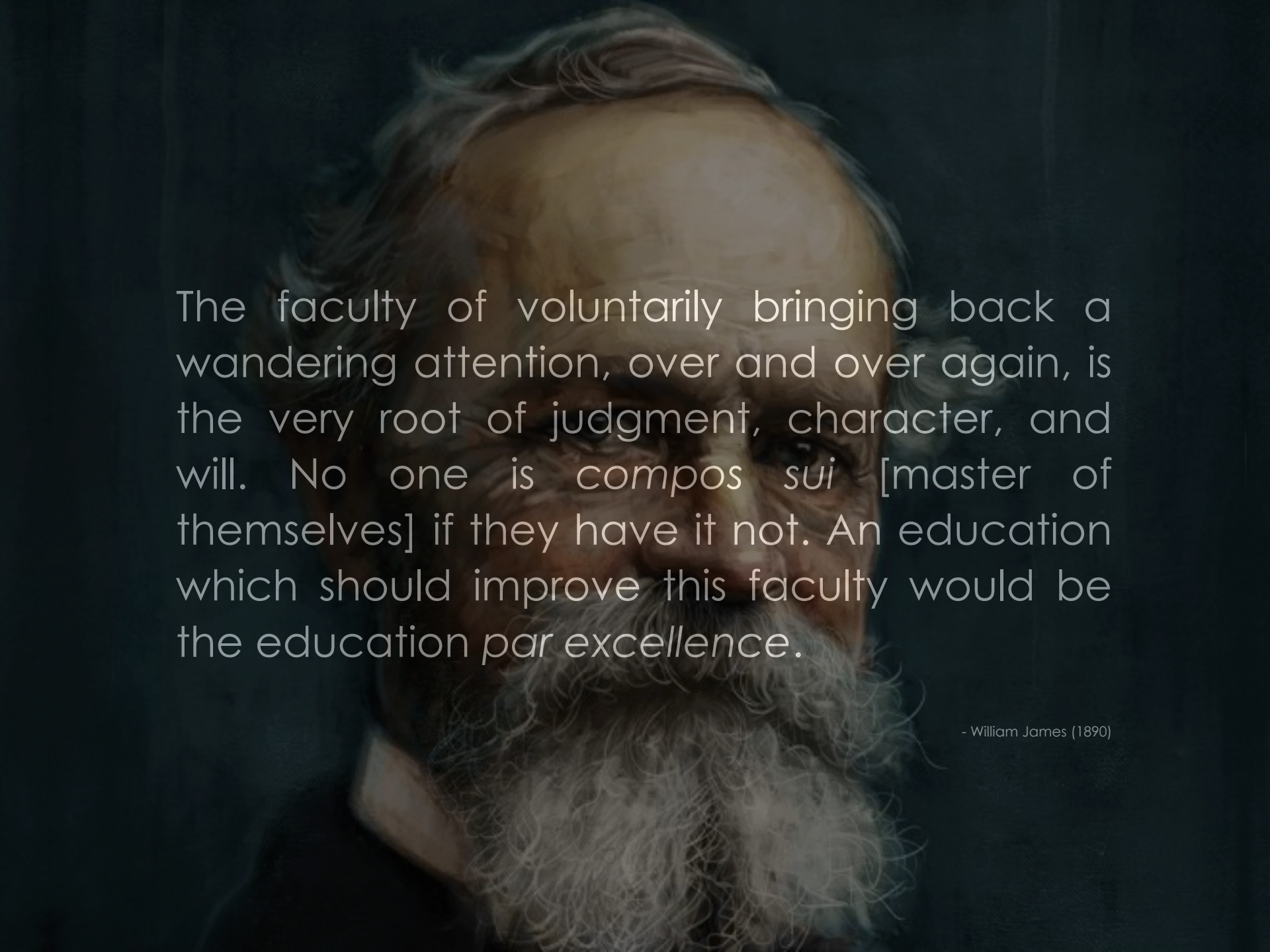
- Question: who has the longer attention span?
 - Humans
 - Goldfish
 - According to a Microsoft Canada report, the average human's attention span is below that of a goldfish (8 sec vs. 9 sec)
 - <http://time.com/3858309/attention-spans-goldfish/>
 - "...the true scarce commodity is increasingly human attention"
 - Satya Nadella – CEO Microsoft
 - <https://qz.com/232884/microsofts-new-worldview-marks-a-complete-change-from-what-made-it-huge-in-the-first-place/>
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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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The 'online brain'

- Review of psychological and neuroimaging research examined how the Internet may be changing our cognition (thinking) and brain
 - Internet can produce short and long-term alterations in areas of cognition and the brain
 - a) **attentional capacities**
 - b) **memory processes**
 - c) **social cognition**
 - Firth J, Torous J, Stubbs B, et al. The "online brain": how the Internet may be changing our cognition. *World Psychiatry*. 2019 Jun;18(2):119-129. doi: 10.1002/wps.20617.
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A close-up portrait of William James, an elderly man with a full, white beard and hair, looking slightly to the right. The background is dark and out of focus.

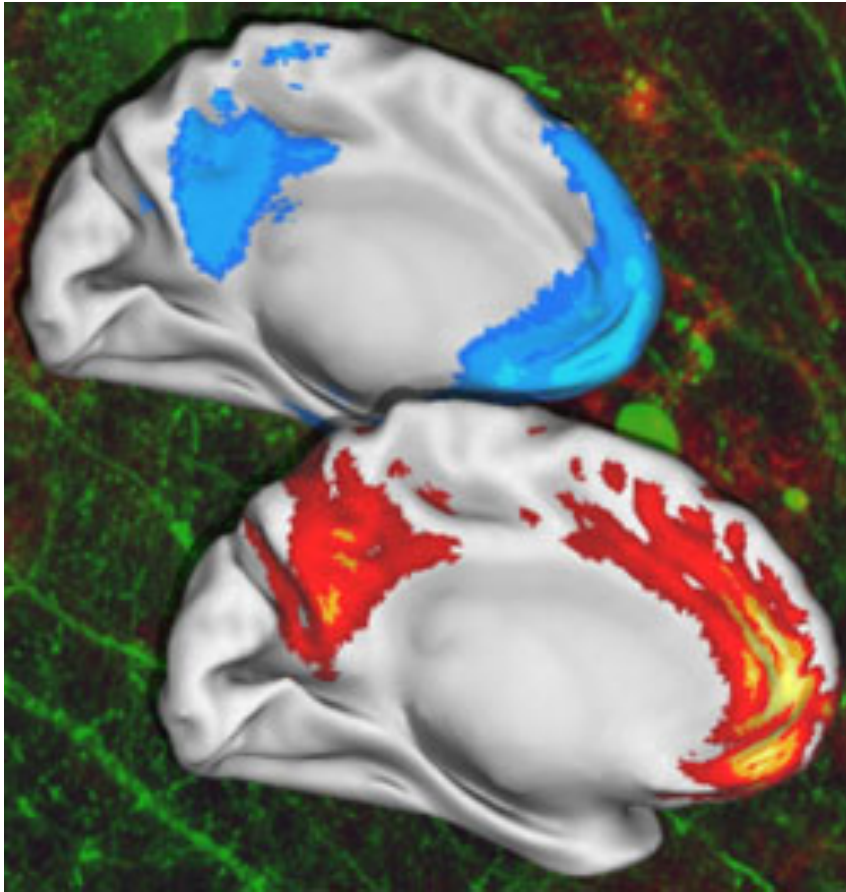
The faculty of voluntarily bringing back a wandering attention, over and over again, is the very root of judgment, character, and will. No one is *compos sui* [master of themselves] if they have it not. An education which should improve this faculty would be the education *par excellence*.

- William James (1890)

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.

The Default Brain



- Task Positive Network
 - Focused: on-task
 - Tasks associated with paying attention
 - Brain efficient and quiet
 - Executive function circuits activated
 - Reflecting
- Default Mode Network
 - Mind is inattentive, distracted, idle, recalling past, daydreaming
 - Automatic pilot
 - Executive functioning circuits offline
 - Ruminating

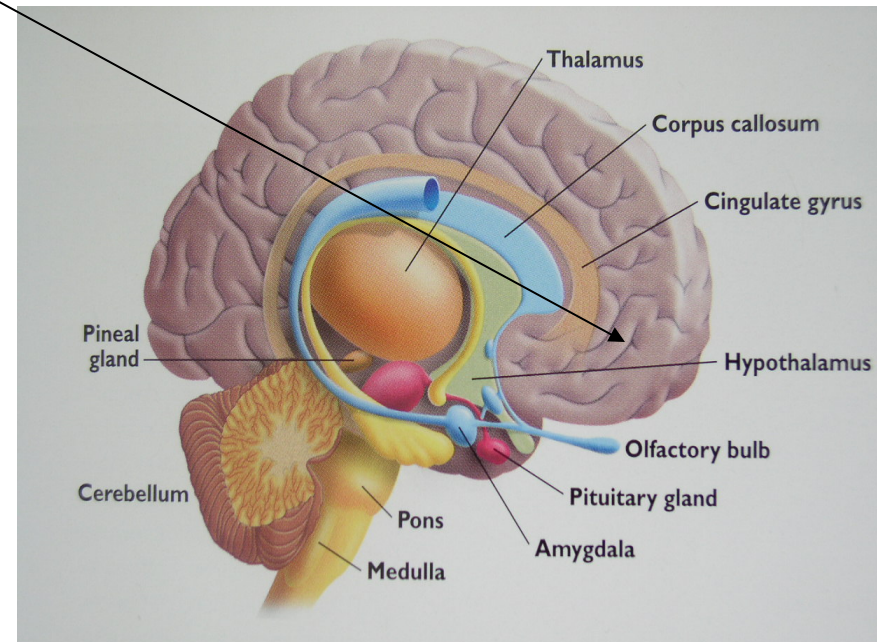
The Default Brain

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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Executive functioning

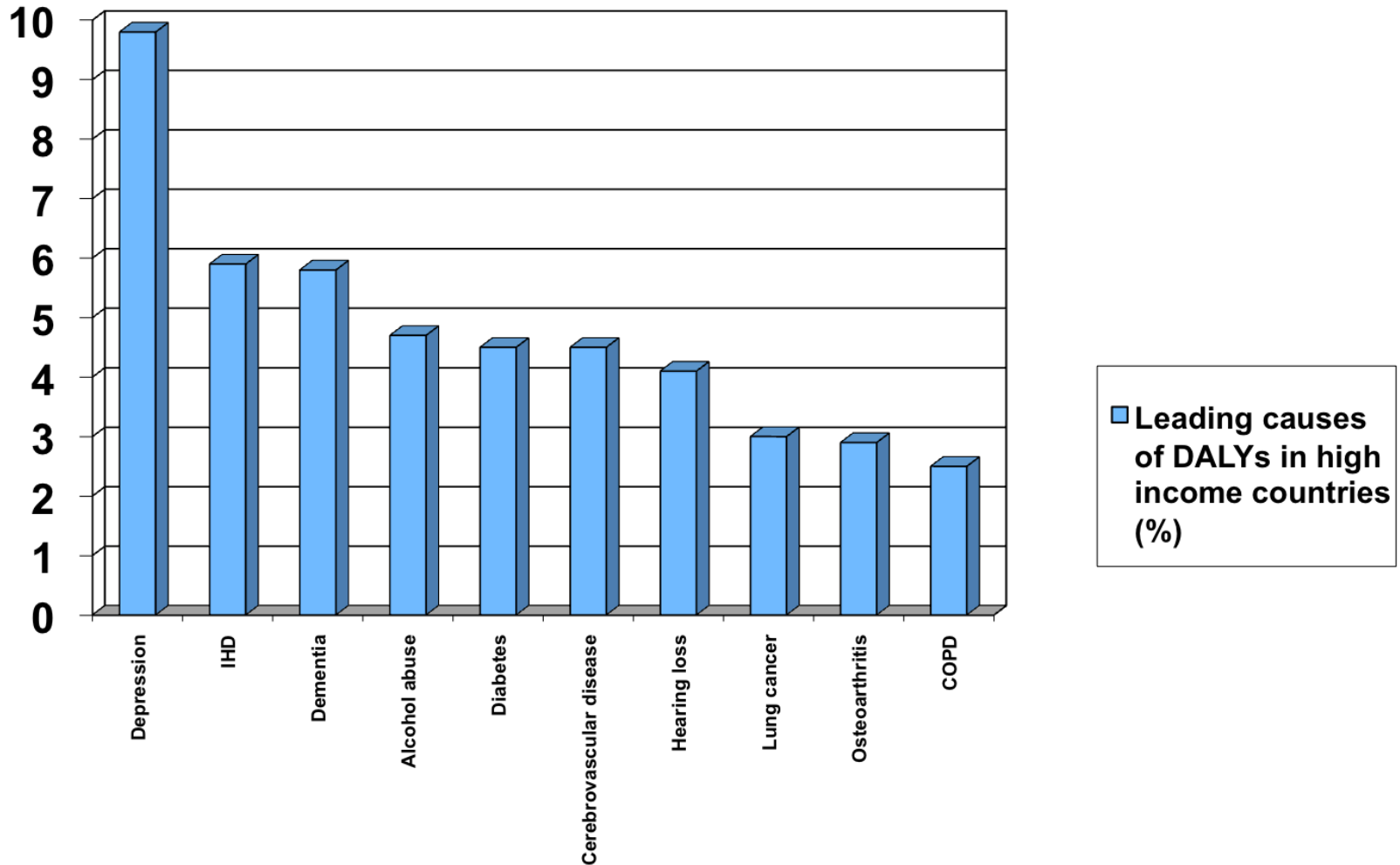
- Frontal lobes (prefrontal cortex) centre for executive functioning
 - Attention regulation
 - Working memory
 - Self-awareness
 - Reasoning and decision making
 - Emotional regulation
 - Appetite regulation
 - Impulse control
 - Directs immune system
- Limbic system – emotion centre
- Mesolimbic reward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



Number of new
mindfulness
publications in
peer-reviewed
journals listed
on PubMed
each year
1980-June2021

Search query: mindfulness

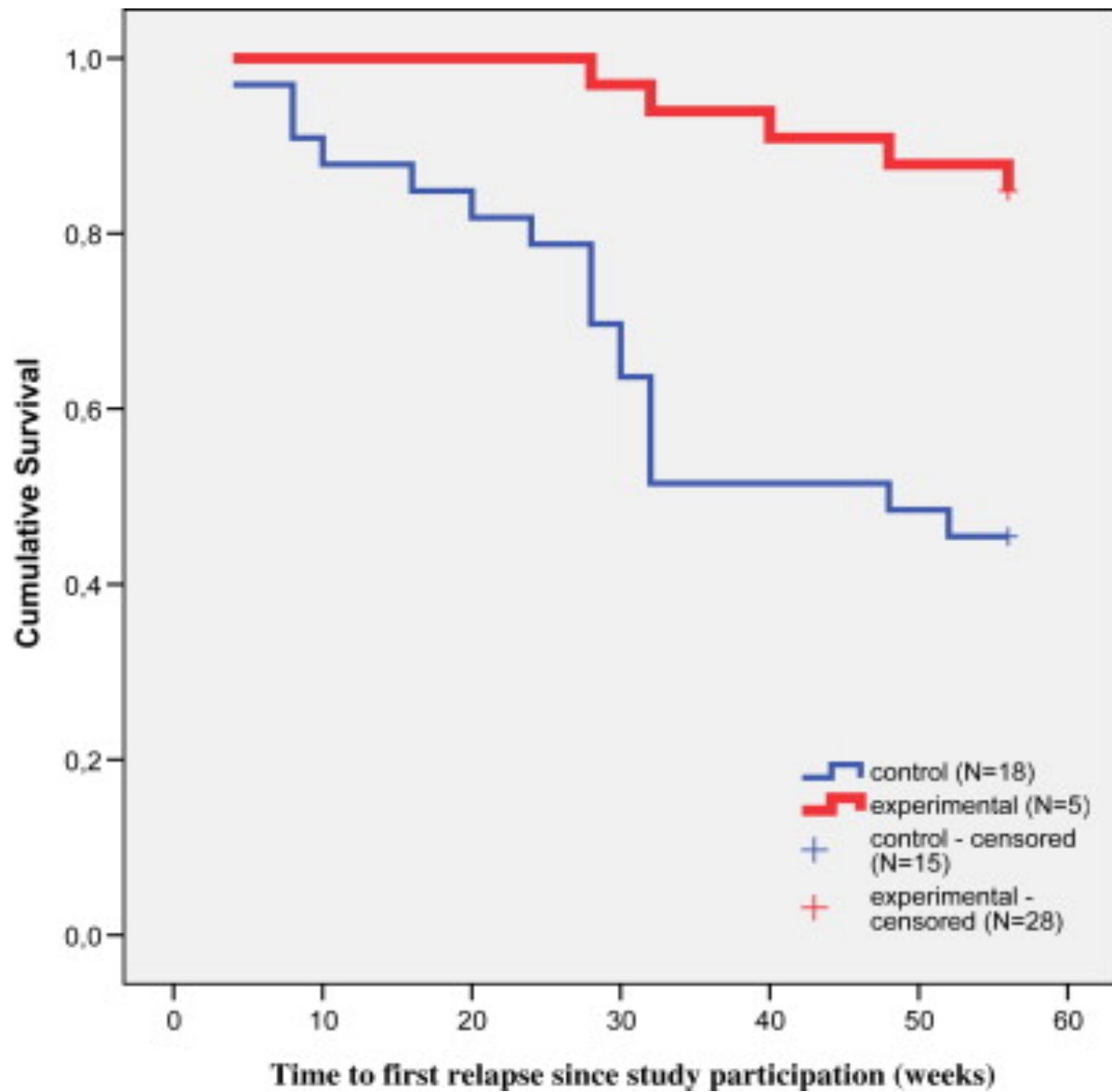
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2021	1786
2020	2870
2019	2459
2018	2221
2017	1909
2016	1740
2015	1522
2014	1272
2013	1002
2012	854
2011	688
2010	569
2009	483
2008	408
2007	354
2006	341
2005	218
2004	208
2003	208
2002	168
2001	176
2000	155
1999	141
1998	114
1997	118
1996	100
1995	116
1994	99
1993	81
1992	62
1991	70
1990	63
1989	59
1988	46
1987	38
1986	52
1985	34
1984	44
1983	29
1982	26
1981	31
1980	21



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

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 & adolescent mental health

- Meta-analysis of RCTs on efficacy of Mindfulness-based Interventions for children and adolescents' mental health and cognitive functioning
 - 33 studies including 3,666 children and adolescents included
 - Significant positive effects of MBIs for Mindfulness, Executive Functioning, Attention, Depression, Anxiety/Stress and Negative Behaviours
 - When considering only RCTs with active control groups, significant benefits of MBIs on Mindfulness ($d=.42$), Depression ($d=.47$) and Anxiety/Stress ($d=.18$)
 - “This meta-analysis reinforces the efficacy of using MBIs for improving the mental health and wellbeing of youth as assessed using the gold standard RCT methodology.”
 - Dunning DL, Griffiths K, Kuyken W, Crane C, Foulkes L, Parker J, Dalgleish T. Research Review: The effects of mindfulness-based interventions on cognition and mental health in children and adolescents - a meta-analysis of randomized controlled trials. *J Child Psychol Psychiatry*. 2019 Mar;60(3):244-258. doi: 10.1111/jcpp.12980.
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Practicing mindfulness

- Formal practice
 - Mindfulness meditation (focused attention)

- Informal practice
 - Mindful while engaged in daily activities and work

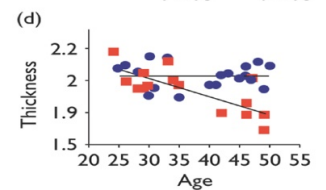
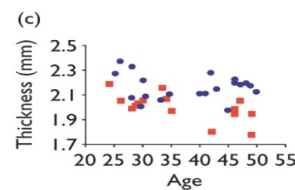
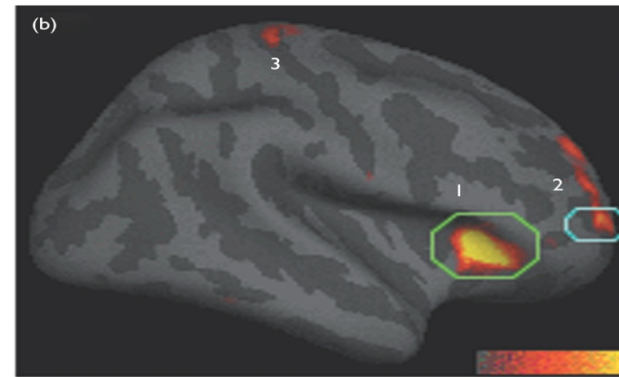
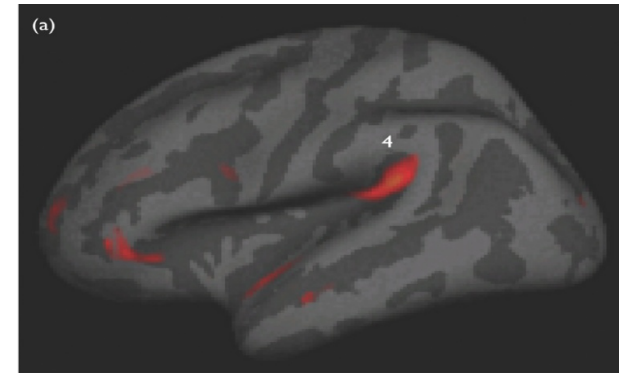


Mindfulness and attention regulation

- 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
 5. Equanimity
-

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.



The Technology Trap

- Digital technology **addictive**

- Activates same brain circuits as drugs

Sansone & Sansone (2013)

- More **classroom mobile use = lower grades**

- If used recreationally

Lepp, Barkley & Karpinski (2015)

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>

Smartphones and cognitive performance

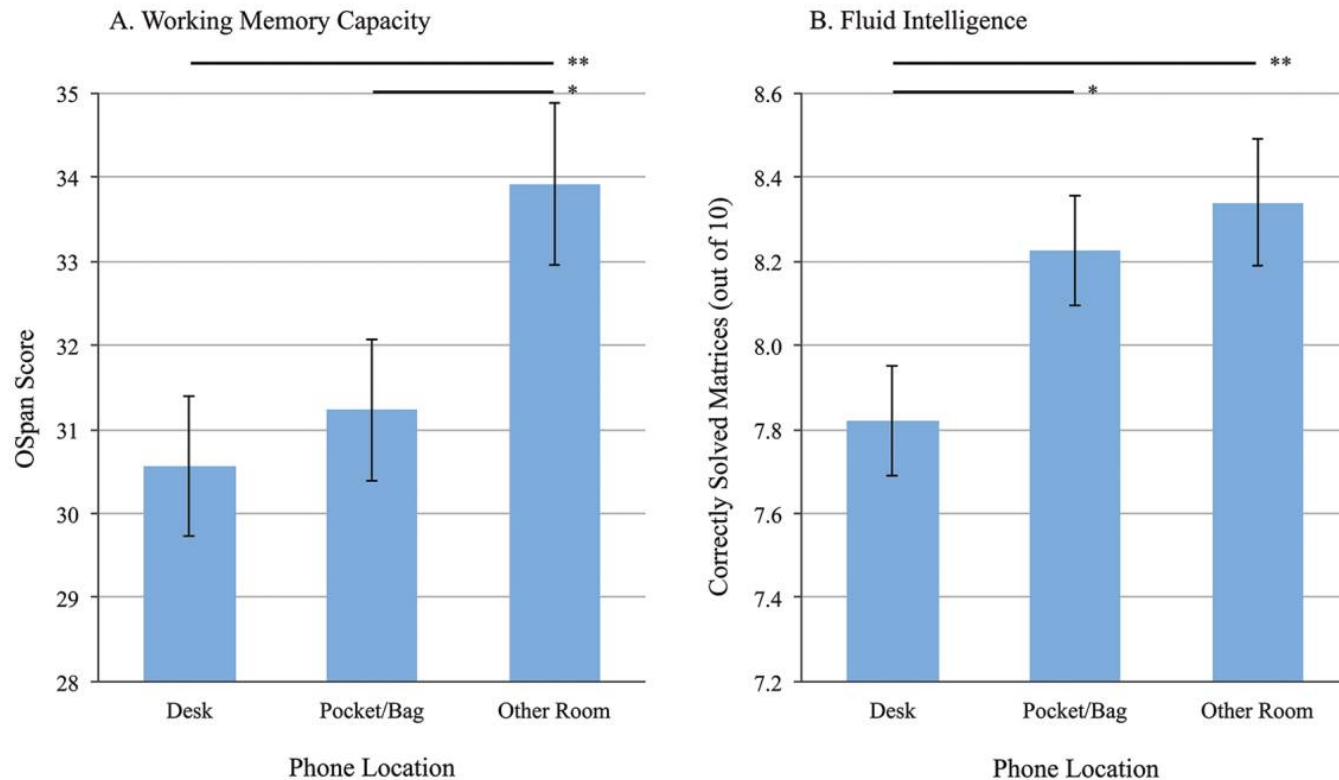
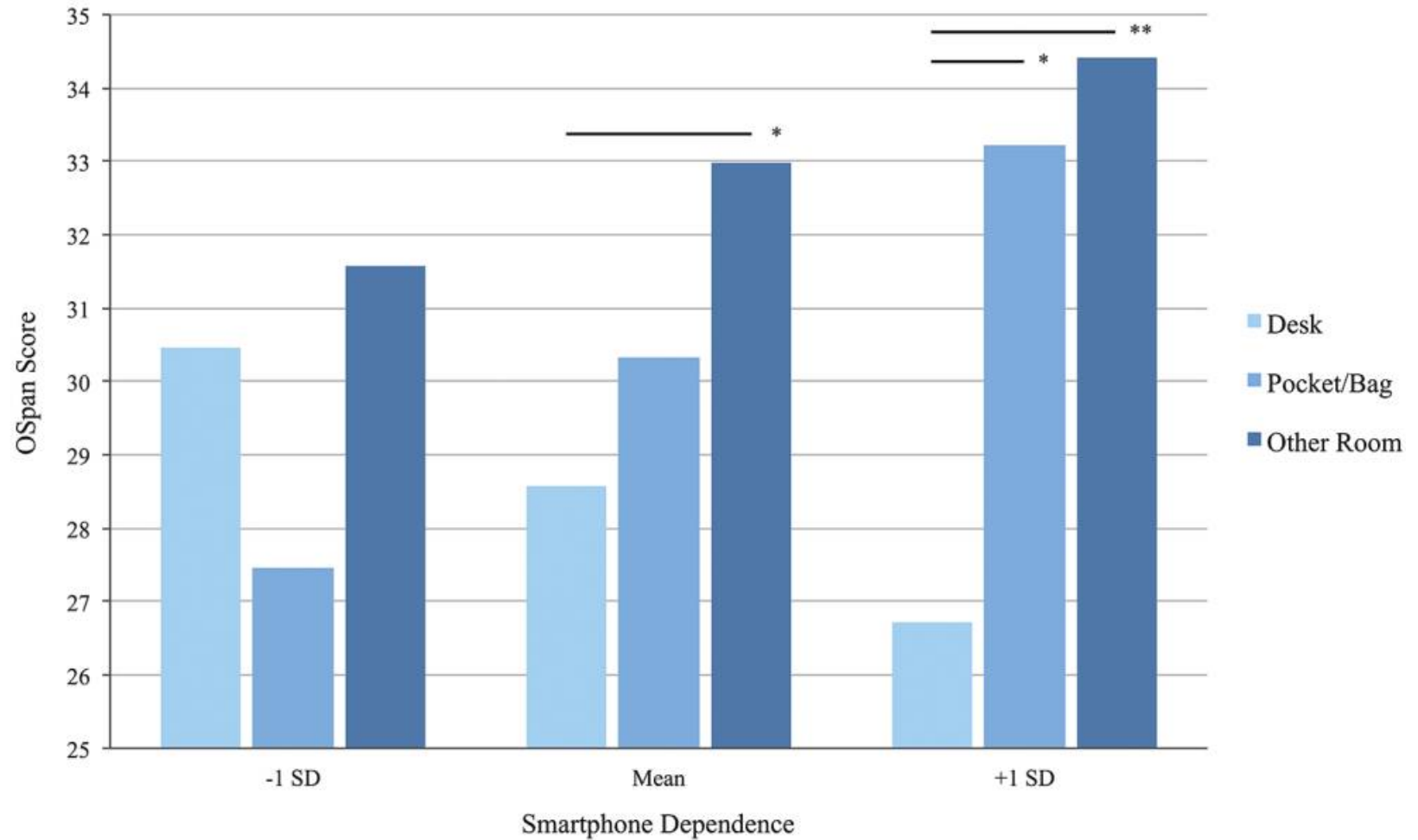


Figure 1. Experiment 1: effect of randomly assigned phone location condition on available WMC (OSpan Score, panel A) and functional Gf (Correctly Solved Raven's Matrices, panel B). Participants in the "desk" condition (high salience) displayed the lowest available cognitive capacity; those in the "other 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



Screen time and adolescent wellbeing

- Surveys of 1.1 million US 8th-12th graders showed psychological well-being (self-esteem, life satisfaction, and happiness) decreased after 2012
 - Adolescents who spent more time on screens (e.g., social media, Internet, texting, gaming) and less time on non-screen activities (e.g., in-person social interaction, sports/exercise, homework, religious services) had lower psychological well-being
 - The happiest teens used digital media for less 1 hr/day but after a daily hour of screen time, unhappiness rises steadily with increasing screen time
 - Twenge JM, Martin GN, Campbell WK. Decreases in Psychological Well-Being Among American Adolescents After 2012 and Links to Screen Time During the Rise of Smartphone Technology.. *Emotion*, 2018; DOI: 10.1037/emo0000403
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Internet addiction in teens

- Do young people engage in **compulsive Internet use (CIU)** because of difficulty regulating emotions, does CIU lead to emotion regulation problems, or are they reciprocal?
 - Longitudinal study of 2,809 adolescents assessed over 4 years measured relations b/w CIU and emotion regulation
 - **CIU preceded development of emotion dysregulation**
 - All subscales moved in a negative direction especially for difficulties setting goals and being clear about emotions
 - No evidence that emotion regulation difficulties preceded increases in CIU
 - Donald JN, Ciarrochi J, Sahdra BK. The consequences of compulsion: A 4-year longitudinal study of compulsive internet use and emotion regulation difficulties. *Emotion*. 2020 Advance online publication. <https://doi.org/10.1037/emo0000769>
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Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004)

- 36-item scale comprised of 6 subscales measuring difficulties with:
 - a) awareness of emotions (e.g., “I am attentive to my feelings”)
 - b) clearly understanding one’s emotions (e.g., “I have no idea how I am feeling”)
 - c) accepting one’s emotions (e.g., “When I’m upset, I feel guilty for feeling that way”)
 - d) impulsivity (e.g., “When I’m upset, I lose control over my behaviors”)
 - e) ability to engage in goal-directed behavior (e.g., “When I’m upset, I have difficulty getting work done”)
 - f) self-efficacy in identifying emotion regulation strategies (e.g., “When I’m upset, I believe that there is nothing I can do to make myself feel better”)

- From Donald JN, et al. *Emotion*. 2020 <https://doi.org/10.1037/emo0000769>
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Social media use and decision making

- “Results demonstrate that more severe, excessive Social Network Site use is associated with more deficient value-based decision making. In particular, our results indicate that excessive SNS users may make more risky decisions.”
 - Meshi D, Elizarova A, Bender A, Verdejo-Garcia A. Excessive social media users demonstrate impaired decision making in the Iowa Gambling Task. *J Behav Addict*. 2019 Jan 9:1-5. doi: 10.1556/2006.7.2018.138.
-

Social media & narcissism

- University students followed over 4-months
- “...problematic internet use may serve to discharge narcissistic personality traits for those who use social media in a visual way...”
 - Reed P, Bircek NI, Osborne LA, Viganò C, Truzoli R. Visual Social Media Use Moderates the Relationship between Initial Problematic Internet Use and Later Narcissism. *The Open Psychology Journal*, 2018; 11 (1): 163 DOI: 10.2174/1874350101811010163

Social media use and depression

- Study assessed association between Social Media use and depression in 1,787 adults ages 19-32
 - Compared with those in the lowest quartile, individuals in the highest quartile of Social Media site visits/wk and those with a higher global frequency score had significantly increased odds of depression (2.74; 3.05, respectively)
 - Strong, linear, dose-response trends
 - Lin LY, Sidani JE, Shensa A, et al. Association between social media use and depression among U.S. young adults. *Depress Anxiety*. 2016 Apr;33(4):323-31. doi: 10.1002/da.22466.
-

Social Media and mental health

- **“... social network sites benefit their users when they are used to make meaningful social connections and harm their users through pitfalls such as isolation and social comparison when they are not.”**
 - Jenna L. Clark, Sara B. Algoe, Melanie C. Green et al. Social Network Sites and Well-Being: The Role of Social Connection. Current Directions in Psychological Science Dec 19, 2017, <https://doi.org/10.1177/0963721417730833>
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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 & communication

- Comparing practitioners with highest and lowest mindfulness scores, the more mindful:
 - More client-centered
 - Engage in more rapport building
 - Display more positive emotional tone
 - More likely to rate highly on communication / have satisfied clients
 - 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.



Mindfulness & prosociality

- Review of studies on link between mindfulness – as both a personality variable and an intervention – and prosocial behavior
- Positive effect b/w mindfulness and prosocial behaviour for both correlational and intervention studies
 - Donald JN, Sahdra BK, Van Zanden B, et al. Does your mindfulness benefit others? A systematic review and meta-analysis of the link between mindfulness and prosocial behavior. *British Journal of Psychology* (2018)
DOI:10.1111/bjop.12338

Mindfulness and motivation

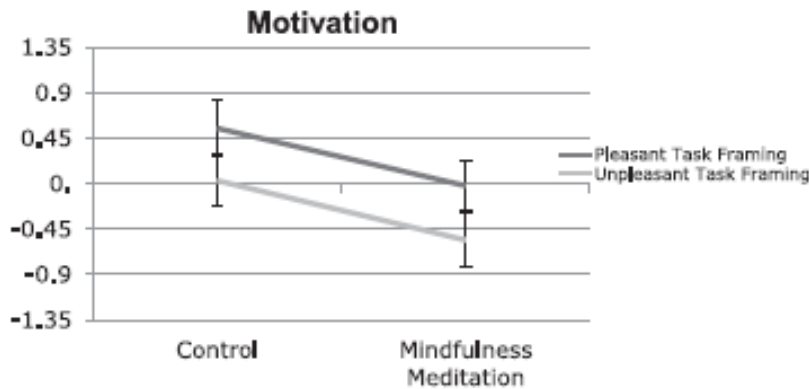


Fig. 1. Task motivation as a function of mindfulness condition and task valence framing condition in Experiment 2. Error bars indicate standard errors.

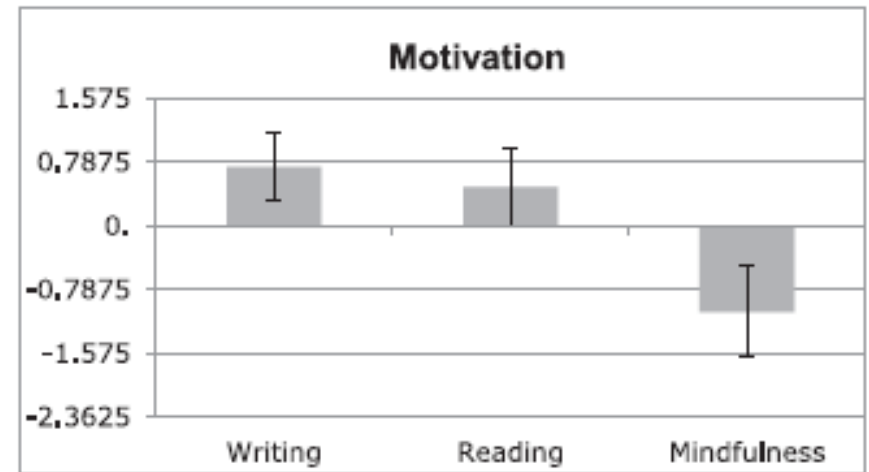


Fig. 2. Task motivation as a function of mindfulness, writing, or reading condition in Experiment 3. Error bars indicate standard errors.

From Hafenbrack AC, Vohs KD. From Mindfulness Meditation Impairs Task Motivation but Not Performance. *Organizational Behavior and Human Decision Processes* 2018;147:1-15.

<https://doi.org/10.1016/j.obhdp.2018.05.001>

Mindfulness and motivation

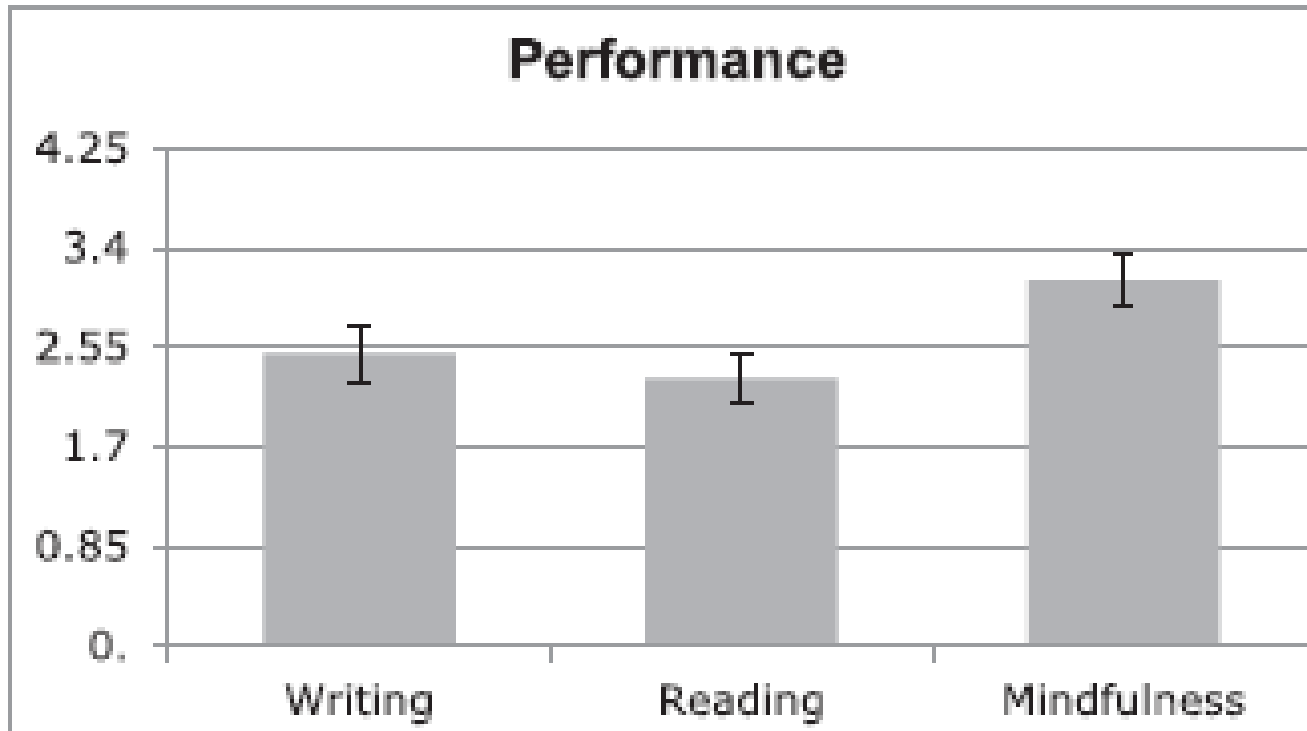


Fig. 3. Task performance as a function of mindfulness, writing, or reading condition in Experiment 3. Error bars indicate standard errors.

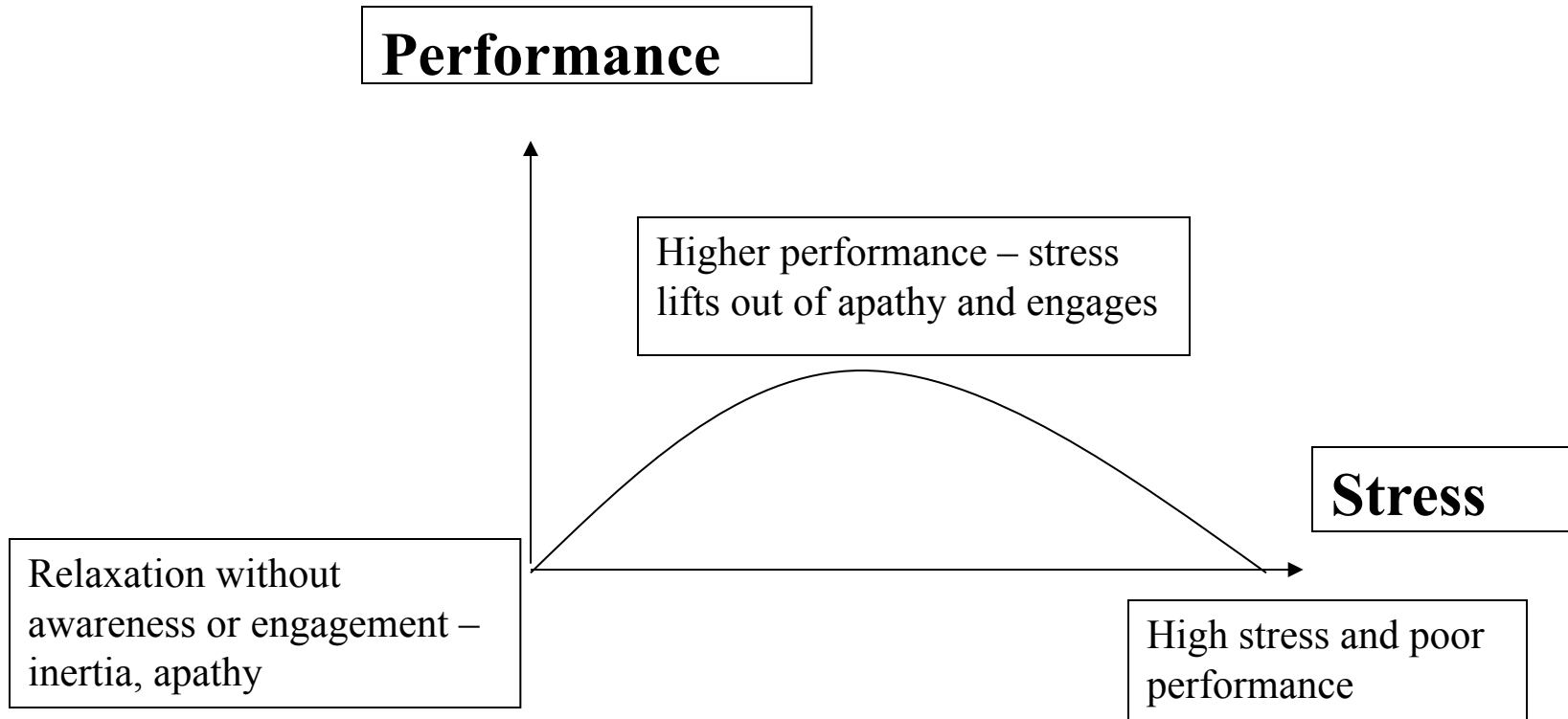
Mindfulness and exam anxiety

- Reduction of anxiety and improved performance of students on high stakes exams through the application of mindfulness training
 - Probably because mindfulness frees up working memory sources occupied by anxious preoccupation
 - Bellinger DB, DeCaro MS, Ralston PA. Mindfulness, anxiety, and high-stakes mathematics performance in the laboratory and classroom. *Conscious Cogn.* 2015 Sep 12;37:123-132. doi: 10.1016/j.concog.2015.09.001.
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Mindfulness and student performance

- Studies examined effects of mindfulness on the knowledge retention of tertiary students
 - Students randomly received either brief meditation training or rest
 - Then listened to a class lecture and took a post-lecture quiz that assessed students' knowledge of lecture material
 - Results: meditation improved students' retention of the information conveyed during the lecture
 - Jared T. Ramsburg, Robert J. Youmans. Meditation in the Higher-Education Classroom: Meditation Training Improves Student Knowledge Retention during Lectures. *Mindfulness*, 2013; DOI: [10.1007/s12671-013-0199-5](https://doi.org/10.1007/s12671-013-0199-5)
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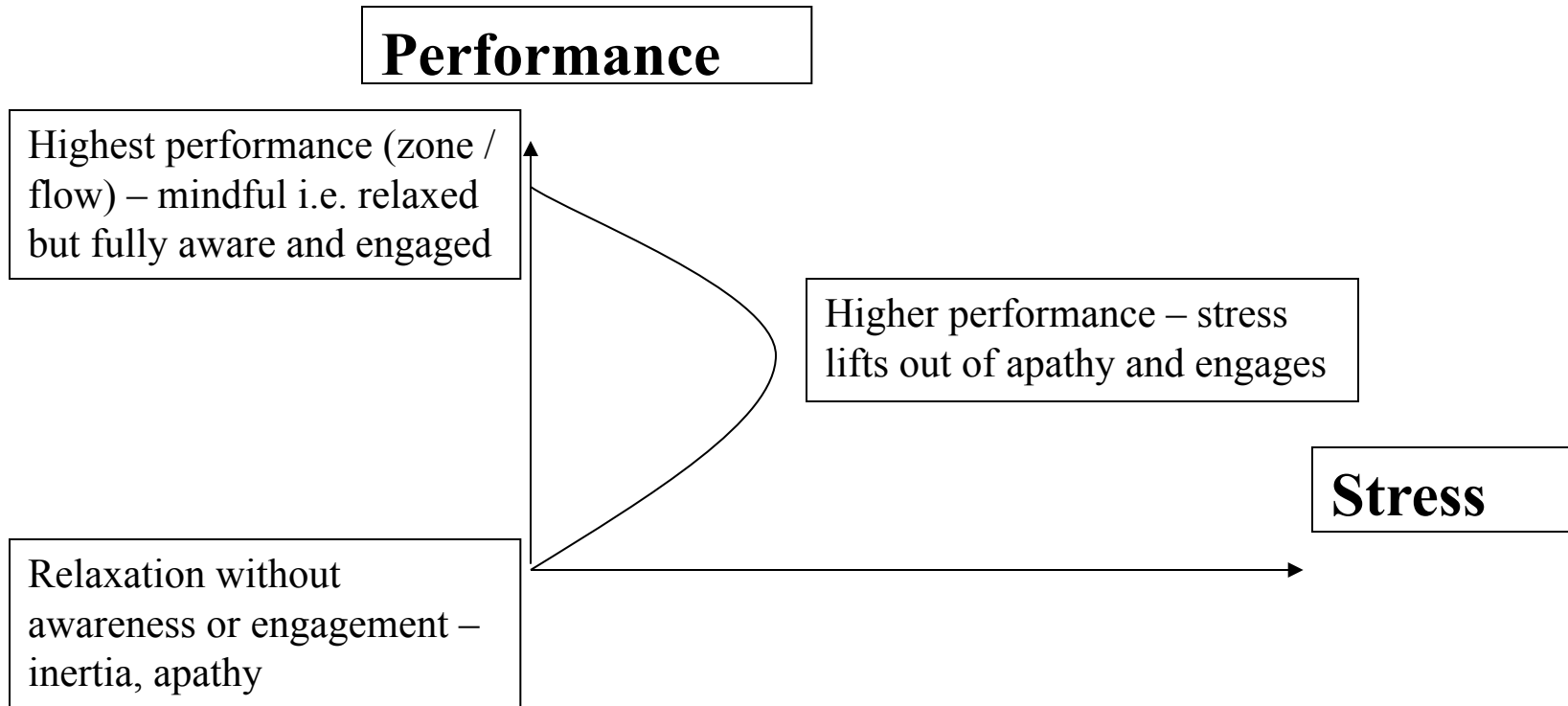
Yerkes-Dodson Stress-performance curve



Motivation

- Motivation generally measured in terms of:
 1. Arousal (i.e. stress)
 2. Future focus (i.e. worried about the outcome)
 - Mindfulness helps people to be:
 1. Calmer (not apathetic)
 2. Present focus (focused on task / process)
 - That is why so many high-performing individuals / teams use mindfulness
-

Mindfulness stress-performance curve



Mindfulness and perseverance

- Action crises: conflicts people face when deciding whether to continue pursuing or to give up a goal for which difficulties keep arising
 - Studies show that greater mindfulness predicts fewer action crises due to:
 1. greater intrinsic goal motivation
 2. ability to handle difficult emotions
 - Pers Soc Psychol Bull. 2021 Jan 27:146167220986310. doi: 10.1177/0146167220986310.
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Further resources

- Free 4-week online mindfulness course – Mindfulness for Wellbeing and Peak Performance
 - <https://www.futurelearn.com/courses/mindfulness-wellbeing-performance>
 - Collaboration between Monash University and FutureLearn
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