Independent Research & Further Reading

Guest: Dr Sahar Yousef

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Seven-Week Cognitive Training Programme

> *"I wanted to take young, healthy UC Berkeley undergraduates there at the peak of their cognitive abilities. Right? 18 to 22 years old. Their brains are perfect textbook. They're perfect, and they're insanely smart. And I'm like, I want to make them smarter.*
>
> *We ran the seven week training program. And lo and behold, those 18 to 22 year olds that are already perfect became better, so to speak. […] Their attention spans got better, general fluid intelligence increased, complex working memory increased. And this happened, mind you, in seven weeks."*

Dr Yousef's claim appears to refer to her 2018 PhD dissertation at UC Berkeley (Yousef, 2018), which has not been published in a peer-reviewed journal. In this study, healthy UC Berkeley students completed a seven-week attention-regulation course combining weekly classes, a training game and practice in daily life (n = 84 completers), and were compared with three control groups (n = 27–39 each). The trained group improved more than all control groups on a 4-minute test of sustained attention (SART) and on a complex working-memory task (Operation Span) and reported better every day executive function. However, it did not improve more than the controls on three simpler memory tasks, and the study included no test of fluid intelligence. The claim that the programme increased 'general fluid intelligence' is therefore not supported by the study. The attention and complex working-memory findings are consistent with her description, but several features of the study limit how far they can be relied on.

First, the design was not fully randomised, and the groups were also unequal in size (107 accepted into the training group compared with 30–44 in each control group). Analyses included only participants who completed the study, and dropout was also uneven. Second, the measured gains may reflect what was taught and not a general improvement in cognitive capacity.

Third, the reported effect sizes (d = 1.07 for attention and d = 0.58 for working memory) describe the trained group's change from before to after training, not the difference between the trained and control groups, and therefore overstate the effect attributable to the training. The study also did not report baseline scores or group means in the text, and measured outcomes only once, immediately after training, so it is unknown whether any gains persisted.

Finally, the results have not been published in a peer-reviewed journal. These findings should be regarded as preliminary, and larger, randomised, independent studies would be needed to confirm that such training improves attention or working memory beyond the tasks used to measure it.

Reference 1.

How Long Workers Stay on One Screen

> *"So he's sitting there, I swear, Steven, he probably got 30s, you know, the average, there was a study done, the new average. And this is, mind you, already years old. The stat 47 seconds is the average amount of time a knowledge worker stays focused on one screen before another one distracts him."*

The 47-second figure comes from the work of Gloria Mark. Using computer-logging software that recorded when workers switched between windows and screens, her group found that the average time spent on a single screen before switching fell from about 2.5 minutes in 2004 to about 75 seconds in 2012, and to an average of around 47 seconds in studies conducted from 2016 onwards (Mark et al., 2016).

This measure describes how long people stay on one screen or window, not how long they stay focused before being distracted. Many switches are deliberate and task-related (for example, moving between a document and a data source), and the studies involved relatively small samples of information workers in specific organisations. Mark's research does, however, also show that frequent switching is associated with higher stress and lower productivity.

Reference 2.

How Much Sleep Adults Need

> *"So that's the thing when you don't get enough sleep and mind you, that's a minimum of seven hours a night, right? We always want to shoot for 7 to 9 hours of high quality sleep."*

A joint consensus statement from the American Academy of Sleep Medicine and the Sleep Research Society recommends that adults sleep 7 or more hours per night on a regular basis to promote optimal health, noting that sleeping less than 7 hours is associated with adverse outcomes including weight gain, diabetes, hypertension, depression and impaired performance (Watson et al., 2015). The US National Sleep Foundation recommends 7–9 hours for adults aged 18–64 and 7–8 hours for those aged 65 and over (Hirshkowitz et al., 2015). These recommendations are population-level guidance. Individual sleep needs vary, and a small number of people appear to function well on less sleep for genetic reasons. The guidance also emphasises regularity and sleep quality, not only duration.

References 3, 4.

Effects of Sleep Loss on Cognition, Mood and Appearance

> *"If you're not getting enough sleep, it's impacting your cognitive performance, your emotional regulation. So you'll be irascible, you know, in the office and with other people. It's so the whole thing. You even look worse. Like the system is messed up. So sleep is for sure the foundation."*

Controlled sleep-restriction experiments show that limiting sleep to 6 hours or fewer per night for two weeks produces cumulative deficits in sustained attention and working memory comparable to one or two nights of total sleep deprivation, while participants underestimate how impaired they are (Van Dongen et al., 2003). Sleep loss also affects emotional processing: after a night without sleep, amygdala responses to negative images are about 60% greater and functional connectivity with the prefrontal cortex is reduced (Yoo et al., 2007), and a meta-analysis of experimental studies found that sleep loss increases negative mood and reduces positive mood (Tomaso et al., 2021).

The comment that people 'look worse' also has experimental support. In a study published in the BMJ, untrained observers rated photographs of people taken after sleep deprivation as less healthy, more tired and less attractive than photographs taken after normal sleep (Axelsson et al., 2010), and a later study found that people were less willing to socialise with those who had been sleep restricted (Sundelin et al., 2017).

References 5-9.

Monotasking, Distraction and Memory

> *"Focus and attention are so fundamental to all things personal and professional. Mind you, that means any kind of distraction that is diminishing your focus is impacting your memory."*

Human cognition exhibits severe constraints when attempting to execute multiple demanding tasks simultaneously. In the 'psychological refractory period' paradigm, responses to a second task are delayed when it follows a first task closely, suggesting a central processing bottleneck (Pashler, 1994). People can combine well-practised, automatic activities (such as walking while talking), so 'monotasking' is best understood as applying to tasks that require deliberate attention.

Distraction during the acquisition phase markedly reduces subsequent episodic retention across diverse retrieval formats. Unlike retrieval, which remains comparatively resilient to secondary distractions, encoding requires general cognitive resources, leaving it vulnerable to disruption.

References 10-19.

Changes in Attention Span Since the Smartphone

> *"And attention spans. Our ability to sustain attention has been linearly decreasing since the advent of this thing. And I don't want people to think it's just phones necessarily. It's this. It's notifications in general."*

The scientific literature identifies clear transient attentional disruptions from device interactions, but robust longitudinal evidence confirming a permanent, population-level decline in sustained attention capacity remains absent. Studies do show mobile alerts and physical presence induce transient cognitive disruption during active task execution. Research also links heavy smartphone and media multitasking to poorer performance on some attention tasks, and a recent meta-analysis found that heavier short-form video use is associated with poorer attention (Nguyen et al., 2025). However, most of this evidence is cross-sectional and cannot show that smartphones caused a population-wide decline (Wilmer et al., 2017). A 'linear' decrease since the advent of the smartphone has not been demonstrated directly in the literature.

References 20-24.

Women and the Tendency to Say Yes

> *"So I'm a default yes person. Um, I also find for women, it can be our default is naturally, I think more to yes, especially when it comes to people pleasing and other people."*

Evidence suggests women are more often asked, and more likely to agree, to take on tasks that benefit others but carry little career reward. In a series of laboratory and field studies, Babcock and colleagues (2017) found that women were more likely than men to volunteer for 'non-promotable' tasks, and that both men and women were more likely to ask women to do them. Importantly, when groups were all-female or all-male, the gender difference disappeared, which the authors interpret as reflecting shared expectations about who will say yes.

Personality research consistently finds that women score modestly higher than men on average on agreeableness, a trait associated with cooperation and a desire to maintain social harmony, but the distributions of men and women overlap substantially (Weisberg et al., 2011). The evidence therefore supports a tendency, on average, for women to agree to more requests, but it does not show that this is 'natural' as opposed to shaped by social roles and expectations (Eagly and Wood, 1999).

References 25-27.

Focus, Human Survival and Threat Detection

> *"What do you think has led to human survival? It is, in fact, our ability to focus […] We got to fire and weapons and things like this through intense focus. So the human brain has evolved to literally focus and tune out noise…"*
> *"But also, while I'm doing all this focusing, I got to keep an ear and an eye out for whether or not I might die and be attacked. And I need to see threats coming from a long mile away. So we have a hyper vigilant, both auditory and visual system."*

The idea that sustained, focused attention was central to human evolutionary success is a plausible narrative but is difficult to test directly. Anthropologists typically emphasise a combination of factors, including cooperation, social learning, language, tool use and the transmission of culture (Henrich, 2016). The control of fire, for instance, appears to have emerged gradually and to have been sustained through cultural transmission over many generations.

The second part of the claim, that human attentional systems are tuned to detect potential threats, is better supported. Experimental studies show that people detect threat-relevant stimuli such as snakes, spiders and angry faces faster than neutral stimuli (Öhman et al., 2001), and attention research distinguishes between goal-directed ('top-down') attention and stimulus-driven ('bottom-up') attention that is captured automatically by sudden or salient events (Corbetta and Shulman, 2002). This stimulus-driven system helps explain why movement, sounds and notifications in the environment are hard to ignore.

References 28-30.

How Much of the Cortex Is Devoted to Vision and Hearing

"Do you know about a third of the human brain like I and I say, the cortical real estate. So real estate across this human cortex is dedicated just to looking and listening. That's a lot."

"And that visual stimulation, as we were talking about before, huge part of your cortex is your visual cortex, your occipital lobe."

Vision occupies a large share of the human cerebral cortex. Mapping studies indicate that visual areas cover roughly a quarter to a third of the human cortex, a smaller proportion than in macaque monkeys, where visual areas occupy about half (Van Essen, 2004; Wandell et al., 2007). Auditory cortex occupies a considerably smaller area. The occipital lobe does contain the primary visual cortex, but visual processing extends well beyond it into the temporal and parietal lobes. The implication that the size of the visual cortex makes us especially susceptible to colourful screens is an inference (see the section on screen colour saturation).

References 31, 32.

Using Phones to Avoid Uncomfortable Emotions

"Now there's two ways to solve what you're overwhelmed about, right? You could either deal with it head on, which sounds like a heck of a lot of work, or you could avoid it. No emotional avoidance. Now, what's the fastest and easiest way in the modern world? We can avoid what's going on inside of us?"

"It is natural to numb. It is natural to avoid feelings of discomfort. […] They notice that every single time they sit down and there's a moment of silence, they grab for it. This is it's a natural thing because what our phones have done for us is created an exit, a very fast, cheap exit to reality."

Experiential avoidance, the unwillingness to remain in contact with painful internal experiences, serves as a primary vulnerability factor for problematic device habits. In clinical and community cohorts, individuals with elevated experiential avoidance often rely on accessible digital

media as a maladaptive safety behaviour. In a sample of 294 adults, excessive smartphone use acted as a maladaptive safety behaviour that significantly exacerbated the association between experiential avoidance and anxiety (Gordon et al., 2021). A 6-month longitudinal study revealed that experiential avoidance directly predicted transitions into high-risk addiction subgroups among adolescents (Song et al., 2026). Interestingly, a prospective multi-wave evaluation found that initial smartphone dependency predicted later increases in experiential avoidance, suggesting a mutually reinforcing cycle (Gerdan and Akgül, 2025). Emerging studies confirm that negative emotional states, specifically acute tension, social isolation, and an absence of environmental stimulation, prompt immediate mobile device engagement (Orsolini et al., 2025).

Most of this evidence is correlational, so the direction of the relationship is uncertain: people who are anxious or low in mood may use their phones more, but heavy use may also maintain or worsen these states.

References 33-43.

Smartphone Use, Addiction and Withdrawal

> *"And I teach a class, by the way, on digital dependence. And we do digital detoxes in the class. It's a behavior change course. So you have like hundreds and hundreds of young people going through withdrawal at the same time […] There should be no shame in the fact that a lot of people are finding themselves in this moment in time, very much addicted and dependent to either scrolling or their phones in general."*

Researchers remain divided on whether problematic smartphone use should be classified as an addiction; critics argue that it lacks clear evidence of tolerance, withdrawal and severe functional impairment and that labelling everyday overuse as addiction risks over-pathologising normal behaviour (Panova and Carbonell, 2018). On withdrawal, experimental studies of brief smartphone abstinence have reported increased craving and, in some cases, anxiety, but the effects are generally modest and do not resemble withdrawal from.

Radtke et al. (2022) conducted a systematic literature review of digital detox interventions and concluded that their effects on health, subjective well-being, and social relationships vary considerably across studies, with evidence showing positive outcomes, null results, and negative

consequences. The review systematically mapped findings across distinct domains of subjective and psychological well-being:

- **Depression**: In three extracted studies, intentional breaks from social media or general smartphone use yielded a significant decline in depression symptoms;
- **Anxiety**: Out of four studies evaluating anxiety via standardised inventories, three observed no detectable effect, while one study reported an anxiety decrease restricted solely to participants with mild-to-moderate baseline symptoms;
- **Mood and boredom**: A 24-hour digital detox intervention had no effect on mood, whereas an enforced seven-day social media abstinence trial provoked higher boredom levels;
- **Mental well-being**: Results were contradictory; one study reported a medium-sized increase in mental well-being after a 7-day detox, another reported gains in flourishing among depressed cohorts, while an experimental trial found no psychological well-being benefit;
- **Craving and withdrawal**: All three studies examining withdrawal dynamics demonstrated that craving significantly increased during and immediately following abstinence from smartphones or social media.

Critical methodological shortcomings across the existing evidence base include:

- Most interventions relied on subjective participant recall due to a lack of device-based measurements to verify compliance;
- Studies demonstrated an absence of short- or long-term follow-ups, leaving post-intervention sustainability unknown;
- Complete abstinence requirements created unrealistic demands that ignore modern functional reliance on mobile connectivity.

References 44-59.

The Electric Shock Study on Being Alone With Our Thoughts

> **Steven Bartlett:** *"So essentially the study is people get electrocuted before the study starts, and then they're put in a room on their own with a button that would electrocute them again. […] many people continue to shock themselves over and over again. And in the study, men shock themselves more than women. One particular guy in the study electrocuted himself hundreds of times […] And the conclusion from the study is that we'd rather electrocute ourselves than sit alone in silence these days."*

The study described is Wilson et al. (2014), which tested whether people left alone with their thoughts for 15 minutes would choose an unpleasant stimulus, and they found that some did. The key result was not that most people chose shocks, but that a substantial minority did: among 42 participants who had said they would pay to avoid being shocked again, 18 people self-administered at least one shock, while 57% never shocked themselves at all.

Wilson et al. interpreted this as evidence that many people preferred some stimulation, even negative stimulation, to doing nothing but thinking. A later commentary argued that this interpretation was too strong, because the same data also show that a majority did not shock themselves and spent nearly all the 15-minute period simply thinking.

The clearest subgroup difference was by sex: 67% of men (12 of 18) gave themselves at least one shock, versus 25% of women (6 of 24). Among men, the reported range was 0 to 4 shocks and the mean was 1.47, excluding one extreme outlier; among women, the range was 0 to 9 shocks and the mean was 1.00. Wilson et al. suggested the sex difference probably reflected higher sensation-seeking in men, not necessarily a sex-specific dislike of thinking itself.

The extreme case was one man who administered 190 shocks to himself during the 15-minute thinking period. Wilson et al. treated him as an outlier and excluded him from the reported male mean and standard deviation. That participant is real and comes from the original report, but he was highly atypical. The commentary emphasised that only a small minority gave themselves more than two shocks, so the 190-shock case should not be mistaken for the typical behaviour in the study.

References 60, 61.

Effects of Social Isolation on the Brain

> *"We are pack animals. At the end of the day, you and I can't survive in a silo on our own. We need each other. And the human brain actually, by the way, atrophies if you're left in isolation for too long. If you do not speak to other human beings, you do not interact with other human beings. When humans are left in isolation, really bad things start to happen to the brain."*

Neuroimaging evidence links chronic social isolation to lower total brain volume as well as localised cortical thinning and subcortical contractions. In a population-based panel study of 1,992 older adults followed over ~6 years, both baseline isolation and increases in isolation over time predicted smaller hippocampal volumes and regional cortical thinning, which the authors explicitly characterised as human brain atrophy. Whole-brain analyses show specific clusters of thinning across middle frontal and praecuneus regions as isolation scores increase.

Similarly, investigations using the UK Biobank found that individuals experiencing prolonged objective isolation exhibited lower GMV in temporal, frontal, and hippocampal structures, independently of subjective loneliness or depressive symptoms. In an analysis of 8,896 dementia-free older adults, individuals with infrequent social contact displayed smaller volumes in the hippocampus, temporal lobe, occipital lobe, and amygdala, alongside elevated white matter lesion burden. Regional volumetric reductions in the hippocampus have also been documented following extended periods of confined polar isolation.

The term atrophy accurately captures the macrostructural metric observed on magnetic resonance imaging (MRI), namely, progressive volumetric reduction and cortical thinning relative to cranial volume. However, describing prolonged social isolation as the definitive causal driver requires caution due to methodological limitations in human research:

- **Reverse Causality**: Preclinical dementia and early neurodegenerative pathology often reduce motivation and social engagement before noticeable cognitive decline manifests, introducing potential reverse causation;
- **Subjective vs Objective Dissociation:** Perceived social isolation (loneliness) primarily modulates functional connectivity and default mode network integrity, whereas objective isolation correlates more consistently with diffuse grey matter loss;

- **Confounding Risk Factors**: Cardiovascular morbidity, systemic inflammation, chronic stress, and depressive symptoms frequently co-occur with isolation and account for substantial variance in brain volume loss;
- **Cellular Mechanisms**: Animal models confirm that isolation induces oligodendrocyte remodelling, impaired neurogenesis, and reduced brain-derived neurotrophic factor, but these cellular processes cannot be verified non-invasively in human MRI studies.

References 62-76.

Connection, Novelty and Learning as Human Needs

> *"We all do have a natural, fundamental need for learning and novelty because again, survival, we have this natural, fundamental need to want to learn things and to grow, because this new piece of information might be a huge unlock for me to thrive even more in this world."*

Across neuroscience, psychology, and evolutionary accounts, humans and other animals often seek novelty and information without external reward, and information itself can carry intrinsic value. Several reviews explicitly frame curiosity as evolutionarily useful because it helps organisms reduce uncertainty, discover rewards, avoid dangers, and build adaptive behavioural repertoires that improve survival.

References 77-82.

Screen Colour Saturation and Attention

> *"So there are actual technology looks more visually stimulating. […] So it's super, super stimulated by all of that color saturation. So it's like, oh my gosh, they think of like a casino."*
>
> *"First you make the phone in and of it in and of itself less neurologically stimulating, literally the color saturation of your phone, the light that's emitted from the screen has been designed to keep your eyes locked on the device."*

Device Use

Across the studies, the clearest pattern is that removing colour from smartphones reduces use time, while more visually rich, saturated displays appear to sustain engagement. In parallel, laboratory and interface studies show that saturation and colour salience reliably shape where users look and how quickly they detect or process on-screen content, but brightness alone does not produce a simple, uniform increase in attention. The mechanism proposed across these studies is not that people stop checking their phones, but that phones become less gratifying and easier to put down once saturated colour is removed.

The app-level effects are narrower than the overall screen-time effect. Social media and internet browsing declined in one grayscale study, while video time did not (Holte and Ferraro, 2020). A later study found no significant moderation by image-based versus text/audio app category, although the mean reduction was larger for image-based apps, which fits the broader idea that colour-rich content is more affected (Dekker and Baumgartner, 2023). Grayscale also improved perceived control, reduced perceived overuse, online vigilance, and stress, but did not improve productivity or sleep quality in that sample.

Attention Capture

Across classic colour-attention experiments, high saturation and brightness often attract the most immediate attention. In one foundational study, maximum saturation and maximum brightness drew the most choices across backgrounds, and brightness-saturation levels mattered more than hue alone. More recent reading and interface work reaches a similar conclusion for early orienting: warm, highly saturated colours speed pre-attentive capture, and colour and background redistribute fixation patterns across app layouts.

Brightness and Contrast

Evidence on brightness is more mixed because many studies find that contrast, luminance balance, or context matter more than absolute brightness. In time-perception experiments, higher contrast lengthened perceived duration, whereas increasing target brightness actually shortened it, leading the authors to conclude that contrast was the primary determinant. Peripheral alert studies similarly found that high visual intensity was not necessary for strongest visibility, and that medium contrast could maintain attention without the irritation or cognitive load of stronger signals.

Brightness can still affect attention and fatigue under some conditions. Higher melanopic luminance made displays appear brighter and improved alertness and attention markers, but it also increased visual fatigue. Other display studies found that low brightness at night reduced visual fatigue, medium brightness in AR gave the best performance with least fatigue, and screen luminance interacted with room illumination. An fNIRS study adds that high brightness and saturation were rated as more attractive, while lower saturation increased pleasantness, suggesting that attention-grabbing settings are not always the most comfortable or preferred.

Overall, the evidence supports a fairly strong claim for colour saturation: it increases visual salience, captures attention, and appears to prolong time spent on devices. For brightness, the evidence is more conditional: it can alter alertness and attention, but its effects are often entangled with contrast, ambient light, task demands, and visual fatigue.

References 83, 100.

Greyscale Mode and Reduced Screen Time

> *"And research from my lab shows, by the way, this is for working professionals like you just going into grayscale, they spent one hour less on their phone."*
> Steven Bartlett: *"Have they ever tested that engagement with devices when they are in grayscale or in a different color saturation?"*
>
> *"I've tested it. So in my lab, we took a large sample of healthy working professionals, and all I did was turn their phones into gray and asked them to stay in gray for three weeks. That's it. And we saw, on average, people spent one hour less on their phones every single day. That's seven hours a week."*

We could not find a published, peer-reviewed report of the greyscale study from Dr Yousef's lab, so the claimed one-hour reduction cannot be independently verified. Published studies support the direction of the effect but report smaller reductions. In a study of about 200 US college students, switching to greyscale reduced screen time by an average of about 39 minutes a day (Holte and Ferraro, 2020). In a pre-registered Dutch study, a one-week greyscale intervention reduced smartphone use by about 20 minutes a day, with larger reductions for image-based apps, but the number of times participants unlocked their phones did not change (Dekker and Baumgartner, 2023).

A randomised field experiment comparing several screen-time strategies also found that design-friction interventions such as greyscale led to an immediate, significant reduction in objectively measured screen time relative to a control condition (Zimmermann and Sobolev, 2023). Thus, greyscale appears to be a simple, effective tool, with evidence suggesting typical reductions of roughly 20–40 minutes per day, and long-term effects have not been well studied.

References 101-104.

Variable Rewards and Addictive Behaviour

“And by the way, there's an entire field, intermittent variable rewards. You get these jackpots once in a while, right.”

“Human beings, believe it or not. Do not love consistent reward. We become more addicted when it's in fact intermittent and somewhat variable.”

“If it showed you every single thing that you wanted to see. […] Believe it or not, you'd be less likely to get addicted.”

The underlying principle is well established in behavioural psychology. Intermittent, variable rewards do not mean people dislike all consistent rewards, it means unpredictability can amplify wanting beyond what equally sized predictable rewards produce. The clearest evidence base is gambling, where variable-ratio or random-ratio schedules are treated as a central motivational feature of slot-machine play and other games of chance.

Direct human experiments are limited, but several papers extend the same logic to social media, gaming, and internet use. Social platforms deliver unpredictable likes, notifications, and messages that are argued to maintain habitual checking through variable reinforcement, and repeated social rewards appear to heighten sensitivity to reward cues. Gaming and loot boxes are described as parallel cases where uncertain reward delivery resembles gambling.

At the same time, addictive behaviour also depends on immediacy, delay discounting, cue salience, gratification, and limited alternatives, not reward variability alone.

References 105-112.

Love Bombing and Intermittent Reinforcement

> *"I have a whole theory on like people who are in toxic relationships, like seriously think about like love bombing. This is the science of love bombing. Like, I'm an asshole. I'm an asshole. I'm like, ghosting you and then bam! Oh, I hit you with a bunch of love. And people are like, oh, my. And then they become addicted to these toxic fucking relationships. Similar concepts."*

The literature supports a clear association between trauma bonding and cycles of alternating affection and harm, although much of the evidence is observational, qualitative, or theoretical. Love bombing appears to strengthen emotional attachment when it is part of a broader pattern of coercion, inconsistent affection, and power imbalance. A useful way to connect the two concepts is as a sequence: idealisation first, then unpredictability, then dependency. Several papers describe love bombing as an early stage marked by intense attention and fast-tracked emotional closeness, followed by devaluation, withdrawal, control, or discard. Trauma-bonding papers describe the next step: once affection becomes intermittent, the alternation of reward and harm strengthens fixation and makes leaving harder.

References 113-118.

Time on Social Media and Loneliness

> *"What is social media has done is it's created the illusion of social connection because we have the data to support. The longer you spend on these apps and on these platforms, the lonelier you are."*

There is evidence of an association between more time on social media and more loneliness, but for time-based measures the average effect is small and heterogeneous. Evidence is stronger for problematic social media use than for simple time spent: a meta-analysis of longitudinal studies found small bidirectional effects between loneliness and problematic media use, and a meta-analysis in adolescents and young adults found a moderate cross-sectional correlation for problematic use versus a much smaller one for time spent.

References 119-125.

How Much We Retain From Short-Form Content

> *"This is the hijack of social media. And short form content is you think you're getting that. But I promise you, just like with the Skittles, you end up getting off and you don't remember anything that you, by the way, you just watched test it. […] And this is you think you're learning. It's an illusion."*

In the literature, the strongest pattern is that fragmented, rapidly switching short-form videos in social-media-like formats tend to reduce memory accuracy, increase forgetting, and impair prospective memory relative to continuous long-form viewing, while well-structured educational microvideos often improve learning compared with long unsegmented lectures. A second pattern is that videos alone can create an illusion of understanding: learners often report similar or higher confidence, focus, or perceived retention than long-form conditions even when objective performance is worse or follow-up tasks are needed to calibrate self-assessment.

The direct retention evidence does support the claim for one important subtype: short videos that are fragmented, rapidly switched, or feed-like. In matched-content lab studies, these formats produced poorer immediate memory, higher forgetting, weaker event segmentation, and worse intention recall than long videos. The proposed mechanism is consistent across several studies: short-form feeds heighten bottom-up attentional capture while weakening top-down control, semantic integration, and network coupling needed for durable encoding.

That pattern does not generalise to all short videos. In education studies, brief videos of roughly 5-10 minutes, or longer videos split into meaningful segments, often improved learning gains, exam scores, engagement, or delayed retention compared with long unsegmented lectures. Broader higher-education evidence also suggests video usually helps learning when added to teaching, although that literature is about video overall, not specifically ultra-short feed content.

References 126-136.

Short-Form Content and Attention Span

> *"Next is choosing long form over short form."*
> *"No, but honestly, it's true. It's really it's not like made up short form content has even been shown, by the way, in some cases to increase attention span."*

The evidence suggests that heavier or more problematic short-form video use is associated with worse sustained attention, greater distractibility, and weaker executive control, especially in students and young people. The strongest synthesis, a meta-analysis of 71 studies with 98,299 participants, found moderate negative associations between short-form video use and cognition overall, with the largest links for attention and inhibitory control, and these patterns appeared across youth and adult samples. A youth-focused systematic review similarly concluded that heavy, unstructured use was consistently associated with more inattention and impulsivity, lower working-memory span and self-regulation, and preliminary neurobiological differences.

Most studies are cross-sectional and rely on self-report, several authors explicitly caution against strong causal claims, and longitudinal or experimental work is still limited. Even so, the pattern across reviews, surveys, behavioural studies, and neurophysiology is consistent: more intensive, compulsive, or immersive use tends to coincide with worse attentional control, whereas brief exposure alone does not always produce measurable deficits.

References 137-146.

Films and Empathy in Young People

> *"But yeah, but no long form content, like a film, like a good film has been shown to increase empathy in young people. Just think about that."*

Across the literature, fiction reading and film viewing are associated with higher empathy in children, adolescents, and young adults, but the evidence is stronger for some components of empathy than for others. The clearest pattern is that narrative engagement can improve social-cognitive outcomes, especially when young people become immersed in characters and then reflect on the experience through discussion.

Qualitative and review evidence indicates that adolescents often report both affective and cognitive empathy toward fictional characters, and some describe transferring those insights to real-life relationships. Broader integrative reviews likewise conclude that fictional narratives can support empathy by simulating social worlds and exposing readers or viewers to other perspectives.

The evidence is not uniform. A recent meta-analysis in children found an overall effect of storybook reading on empathy-related outcomes, but statistical significance held specifically for prosocial behaviour, not clearly for all empathy subskills. Experimental work in adults and young adults also suggests that literary fiction tends to improve mentalising more reliably than emotional sharing.

The most consistent moderator is transportation, or feeling absorbed into the story world. Adolescents themselves describe stronger empathic responses when books are well written, perspective-rich, and immersive, especially in first-person narration. For films, the evidence points in the same direction: audiovisual narratives appear to support empathy through vicarious social interaction, not simply through screen time. The path model shows that serial narrative exposure predicts empathy through these vicarious interactions, which is the strongest direct evidence here for a film-specific mechanism.

Several reviews also conclude that film or reading interventions work better when paired with discussion or guided activities. In children, empathy gains also appear more likely in individualised reading contexts than in group settings.

Some adolescent correlational findings weaken substantially after adjusting for IQ, gender, openness, and social network, suggesting that part of the association reflects confounding. Reverse causality also remains plausible, because more empathic people may be more likely to seek out fiction, and empathy itself predicts transportation into films.

References 147-157.

Short-Form Content, Mental Health and Cognition

> *"The problem is just like, what's gonna happen to her if we have too much short form, we already know this. You're more depressed. You're more anxious. Your attention span is shot. Like, why would you want that? You literally feel shittier and your brain operates at a lower level, cognitively speaking."*

Across recent reviews and meta-analyses, heavier or more problematic short-form video and social media use is associated with more depression, anxiety, and stress, with effect sizes usually in the small-to-moderate range. The strongest evidence comes from large syntheses: one meta-analysis of 71 studies found poorer cognition overall and poorer mental health with heavier short-form video use, especially for attention, inhibitory control, stress, and anxiety. A second meta-analysis of 58 studies found positive correlations with depression, anxiety, stress, loneliness, boredom, and negative affect, and it also showed that problematic use had stronger and more consistent links than routine time spent. A second meta-analysis of 58 studies found positive correlations with depression, anxiety, stress, loneliness, boredom, and negative affect, and it also showed that problematic use had stronger and more consistent links than routine time spent.

The cognitive findings point in the same direction. Reviews focused on short-form video use in youth and young adults report poorer attention, weaker inhibitory control, lower working memory, and worse self-regulation among heavier users.

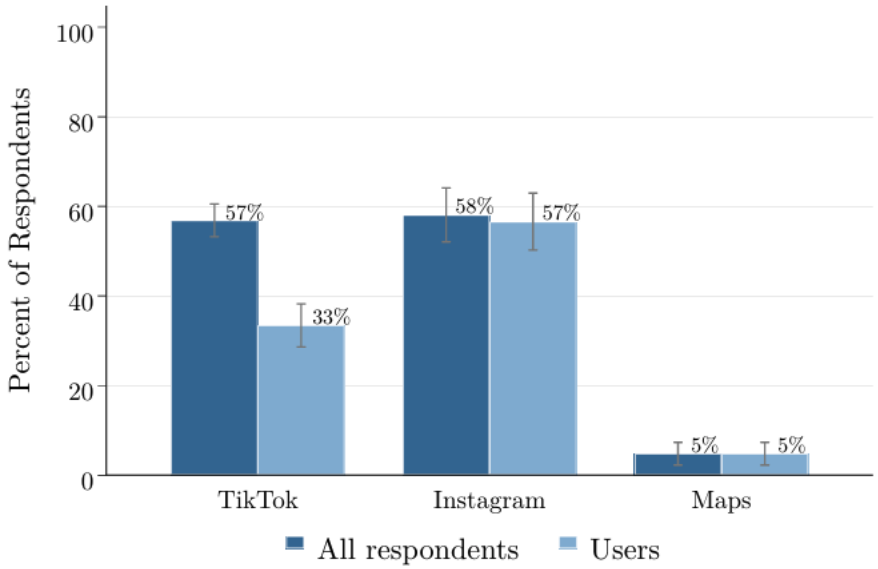
References 158-165.

TikTok Users Who Wish the Platform Did Not Exist

> **Steven Bartlett:** *"And with platforms like TikTok, when you look at the data, they found that 60% of active TikTok users experience negative welfare and would rather live in a world where it didn't exist, where the platform didn't exist. It ranks as number one in terms of, um, regret in this regard."*

The figure comes from a study by Bursztyn and colleagues, published in the American Economic Review, which surveyed US college students. Researchers asked participants whether they

would prefer to live in a world without TikTok or Instagram. Overall, 57% preferred a world without TikTok, while 58% preferred one without Instagram. Even among people who used these platforms, 33% preferred a world without TikTok and 57% without Instagram.



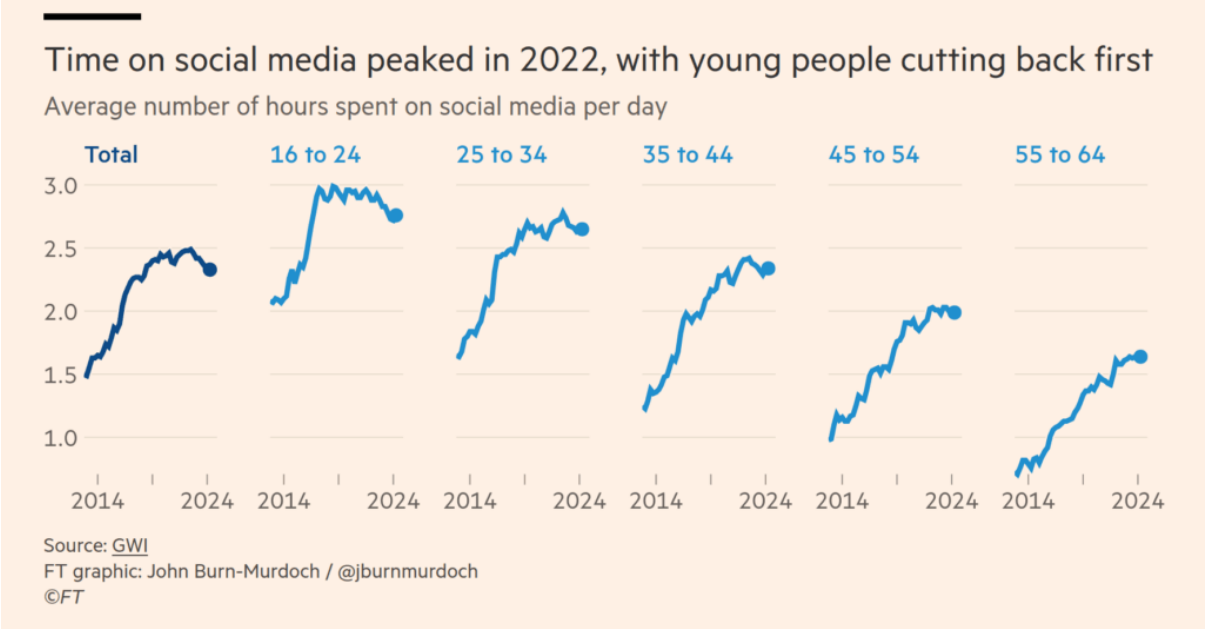
"Percentage of Respondents that Prefer to Live in a World without the Platform" from Bursztyn et al., 2025.

Reference 166.

Trends in Young People's Time Online

> **Steven Bartlett:** *"I saw the graphs from the Financial Times, which showed time spent online had started to plateau since 2022 for young people first."*

The reference is to an analysis by John Burn-Murdoch in the Financial Times (October 2025), based on survey data from the audience-research company GWI. The analysis found that time spent on social media peaked in 2022 and had fallen by almost 10% by the end of 2024, when adults aged 16 and over in developed countries averaged about 2 hours 20 minutes a day on social platforms. The decline was most pronounced among teenagers and people in their twenties, who had previously been the heaviest users.



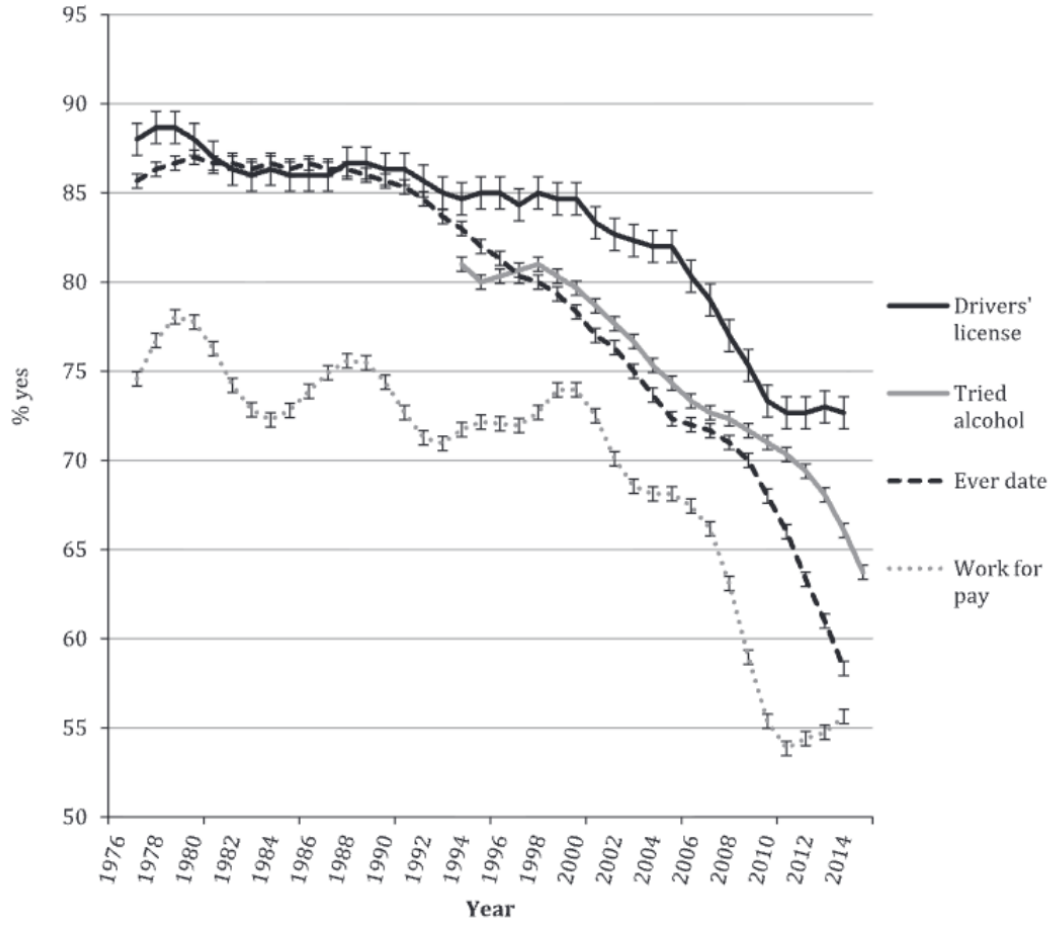
"Time on social media peaked in 2022, with young people cutting back first", from the Financial Times.

Reference 167.

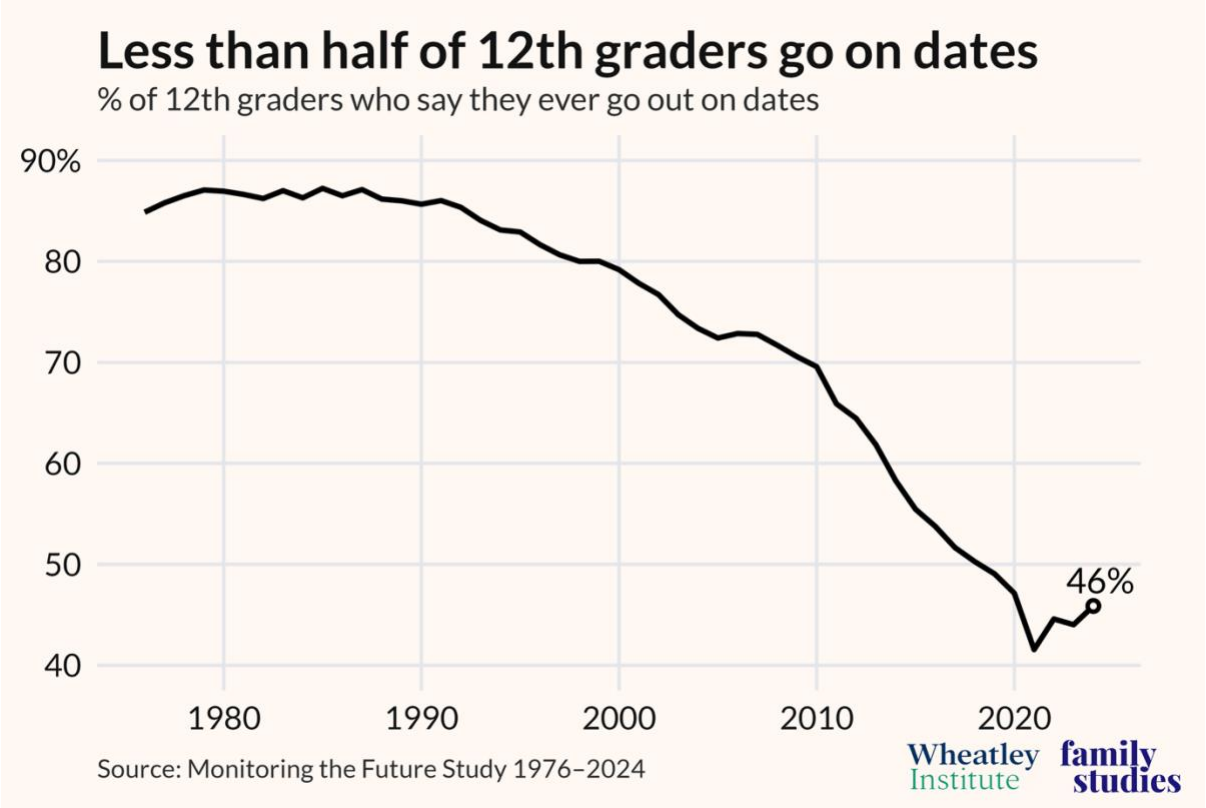
Dating Among High School Seniors

> *"So the stats are less than half of graduating high school seniors have ever been on a date compared to what was, I believe, something like 80 or 90%. And I would say our generation."*

Data from the Monitoring the Future survey of US high school students support the claim. Using this survey, Twenge and Park (2019) showed that the proportion of 12th graders who ever went out on dates fell from about 86% in the late 1970s to about 63% in 2015. More recent analyses from the Institute for Family Studies, based on the same survey, report that about 46% of 12th graders said they had ever dated in 2024, compared with roughly 85% in the late 1970s and 1980s.



"Percentage of U.S. 12th graders who have a driver's license, have ever tried alcohol, who ever go out on dates, and who for pay, 1976–2016 (3-year centered moving average with standard errors)" from Twenge and Park (2019).



"% of 12th graders who say they ever go out on dates" from the Institute for Family Studies.

References 168, 169.

The Decline of Nightclubs, Dinner Parties and Socialising

> *"I think something like what is it? A third of UK nightclubs are also now like engagement in the nightclub scene has gone down to a third dinner parties, there's this recent piece in The Atlantic that just came out about the sort of the death of dinner parties."*

According to the Night Time Industries Association, citing data from CGA, about 480 UK nightclubs closed between June 2020 and June 2024, and some regions lost more than a third of their clubs over this period (e.g. Scotland and Wales lost more than a third, and Yorkshire about 45%). These closures reflect many factors, including rising costs, the COVID-19 pandemic and changing consumer habits, not only social isolation.

In an article published in The Atlantic on 1 October 2026, titled “Why Americans Stopped Throwing Dinner Parties”, journalist Derek Thompson explores the decline in Americans hosting friends and family at home. Drawing on historical survey data and recent polling by Data for Progress, the article reports that the share of Americans who host friends or family at least once a month fell from 42% in 1975 to 12% in 2026. Thompson discusses several potential explanations, including increasingly busy lifestyles, changing family responsibilities, smaller social networks and the convenience of digital entertainment. He places this decline within a broader trend towards reduced face-to-face social interaction. However, the figures measure hosting friends and family generally, not dinner parties specifically, and the survey data do not establish what caused the decline.

References 170, 171.

Keeping Your Phone Out of Sight to Improve Focus

> *“So you increase the friction. You do things like that phone parking lot bit like put your phone out of sight, out of mind, turn the notifications off. […] If I'm telling you this stuff is addictive and you want to do less of it, don't have it right there.”*
>
> *“Step three hygiene that we talked about before. You cut out the distractions hygiene, hygiene, hygiene. So phone out of sight, out of mind, notifications off…”*

The proposition that the mere physical presence of a mobile phone consumes mental resources originates from early experimental research. In seminal experiments, keeping a silent phone on the desk significantly reduced working memory capacity (WMC) and functional fluid intelligence compared to leaving it in another room. This interference occurred even when phones were placed face down or turned off, and participants largely reported not consciously thinking about their devices. These cognitive costs appear especially pronounced in individuals exhibiting high smartphone dependence.

Follow-up investigations have corroborated these deficits in specific settings. Proximity to a phone has been shown to impair attentional control during complex inhibition tasks such as the Stroop colour-word test, slow visual-spatial processing speed, and diminish recall accuracy during

memory tasks. Physically restricting phone access via lockboxes or removing it from view has yielded measurable improvements in working memory and processing speed.

Despite prominent initial findings, subsequent replications and systematic evaluations have challenged the universality of the brain drain effect. A comprehensive four-level meta-analysis synthesising 166 effect sizes across 4,368 individuals demonstrated that smartphone presence produced no significant pooled effect on cognitive performance (Hartanto et al., 2024). Similarly, a separate systematic evaluation across 56 studies observed a minor reduction in working memory capacity but null summary effects across other executive domains, including cognitive flexibility and inhibitory control (Parry et al., 2023).

Discrepancies in the literature often depend on cognitive task demands and individual psychological profiles. Negative presence effects consistently emerge only during cognitively demanding tasks, whereas simpler baseline tasks remain unimpaired. Furthermore, smartphone presence does not reliably disrupt short-term memory or prospective memory tasks.

Individual traits substantially moderate cognitive interference:

- High levels of fear of missing out exacerbate working memory deficits when a device remains visible;
- Elevated nomophobia or smartphone attachment predicts greater distraction and performance improvements when phones are removed;
- Pronounced emotion-related impulsivity increases cognitive susceptibility to available devices kept on silent.

In summary, placing a smartphone out of sight may improve focus and working memory for dependent users tackling complex problem-solving, but the meta-analytic evidence does not support broad claims of universal cognitive impairment.

References 172-185.

Focus Sprints, Productivity and Mistakes

> *"Now a focus sprint is a method of working. It's a method of working that according to research, our research has allowed people to do up to two times as much as they would otherwise do, while also reducing the number of mistakes."*
>
> *"Like, if I want to be able to tell people you can two X your productivity by working in this method. And I want to stand by that. I didn't want to say you can 1.3 X it."*

We could not find any peer-reviewed publication testing the 'focus sprint' method mentioned by the guest's lab. Several components are supported by research, including blocking distractions, setting specific goals, and planning concrete steps.

Task Switching and Error Reduction

Controlled studies consistently demonstrate that switching between tasks imposes substantial cognitive costs, including increased latency and heightened error rates. A meta-analysis of laboratory experiments found that structured interventions mitigating interruption costs increased primary task accuracy. Naturalistic clinical observations showed that multitasking during critical workflows nearly doubled prescribing errors, while interruptions nearly tripled them. Individual differences strongly moderate vulnerability to disruptions during task shifts. Higher working memory capacity accelerates recovery after an interruption, though structural interventions successfully suppress error rates regardless of an individual's baseline working memory.

Time-Blocking and Digital Restriction

Interventions mimicking focus sprints, such as the Pomodoro method or website blockers, show mixed behavioural compliance and variable gains. A systematic review found that passive awareness tools are largely ineffective, whereas strict digital blocking often triggers compensatory behaviour, such as users spending prolonged time on distractions once they bypass barriers.

Field experiments illustrate that strict focus restrictions can actively harm performance. In a randomised trial evaluating workplace internet blockers, complete access bans resulted in an estimated annual loss of 20.3 productive days due to participant backlash, whereas calibrated, partial restrictions increased productive days by 6.2. Furthermore, prolonged continuous focus

without scheduled pauses can escalate worker stress, whereas planned micro-pauses preserve focus and prevent executive fatigue.

Limitations in Productivity Literature

A comprehensive meta-analysis evaluating time management techniques determined that structured scheduling interventions primarily enhance personal well-being. Furthermore, under specific circumstances, intermittent task switching may induce compensatory speed or heighten creative novelty without degrading primary work quality. Claims asserting that single-tasking sprints double worker efficiency lack empirical verification.

References 186-196.

Cortisol and Adrenaline When Anticipating a Task

> *"First, set aside time in your calendar in advance to block the time off. You benefit from essentially anticipatory networks in the brain and body."*
>
> *"What's the feeling that you get before, like some big event or a big speech that you need to give like some butterflies? You get this like increase in cortisol and adrenaline, right? […] My brain is going to help me by giving me an extra boost in cortisol and adrenaline and all these amazing things so that I'm a little bit more focused and high energy […] So we know that if you can, you know, a focus sprint is coming, you're gonna get a little boost."*

It is well established that the body prepares physiologically for anticipated challenges. Anticipating a demanding performance triggers an anticipatory surge in cortisol and sympathetic arousal, but this state only improves focus and performance within moderate boundaries, shifting toward cognitive and behavioural impairment when physiological arousal becomes excessive. Simply placing a work session on a calendar has been argued not to reliably evoke an anticipatory rise in cortisol or adrenaline. A meta-analysis of 208 laboratory studies (Dickerson et al., 2004) confirmed that performance tasks reliably trigger cortisol increases only when characterised by social-evaluative threat, where an individual can be negatively judged by others, or high uncontrollability.

Interestingly, anticipating high next-day workloads enhances the cortisol awakening response (CAR), and a robust morning CAR proactively enhances working memory efficiency hours later. However, unregulated anticipatory stress suppresses cardiac vagal tone, triggering exaggerated cortisol reactivity that correlates with diminished free recall performance.

Scheduling a work session in advance does not inherently provoke an acute cortisol or adrenaline surge unless the session carries social judgment, high stakes, or uncontrollable difficulty. When anticipation does engage morning endocrine preparedness or sympathetic activation, performance improvements depend on maintaining positive cognitive appraisals and avoiding excessive distress.

The exact claim that scheduling a work session in advance triggers a beneficial cortisol and adrenaline 'boost' through 'anticipatory networks' has not, to our knowledge, been tested. Routine, non-threatening tasks are unlikely to elicit meaningful stress-hormone responses, and high anticipatory stress can impair performance. Blocking time in a calendar may help for other, better-supported reasons, such as making a concrete plan.

References 197-208.

Dopamine, Motivation and Breaking Tasks Down

> *"So instead of saying, I'm going to sit down and I'm going to work on X, unless you're going to finish X, that's not going to feel good. This has everything to do with dopamine. By the way."*
>
> *"Dopamine is the brain's primary. And consider it a motivation molecule. So it's going to get us not only excited and motivated to do a task, but it's also going to reward us a bit if we really do more than we even expected […] And this, by the way, increases your dopamine for getting this work done because it makes it manageable."*

Dopamine plays an established role in reward processing, learning and motivated behaviour, with clinical research in conditions such as Parkinson's disease and depression linking dopaminergic signalling to the willingness to exert effort for rewards. However, direct evidence that achieving intermediate sub-goals triggers dopamine spikes in healthy humans remains limited. This proposed response is largely inferred from broader neurobiological and computational models of reward and

motivation, not directly demonstrated through human neurochemical measurements. As dopamine operates as a dual engine for incentive motivation and reinforcement learning, breaking long tasks into manageable sub-goals harnesses this neurobiology by providing frequent intermediate predictive cues, sustaining dopamine ramps, and preventing motivation from decaying.

References 209-219.

Specific, Broken-Down Goals and Performance

> *"Like you need to be crystal clear in what the work product is going to be like. What's the outcome?"*
>
> *"People start something and I'm sure you've experienced this too. Then the moment they get done with, let's say step one B, and they don't immediately know what step one C is or what step two is. […] That's when you lose your focus in in deciding what the next step is."*
>
> *"Yes, you take that goal, whatever it is, and you break it down into a series of essentially subtasks and things that you're actually going to accomplish. […] It's an execution list with time blocked next to it."*

Goal-setting research demonstrates that defining precise performance targets and structured execution plans enhances performance over vague "do-your-best" instructions, while breaking larger objectives into concrete sub-tasks provides essential self-regulatory scaffolding. The empirical literature spans three primary dimensions: direct comparisons between specific and vague goals, the additive power of concrete implementation plans, and the structural utility of task-level subgoals.

Specific Goals Versus Vague Instructions

Locke and Latham's foundational framework shows, across hundreds of empirical studies, that setting specific, challenging goals leads to better task outcomes than vague instructions or no goals in about 90% of evaluated settings. Specific goals direct attention, mobilise mental effort, foster persistence, and stimulate the development of targeted task strategies.

In sustained cognitive tasks, specific goals significantly reduce attention lapses and reaction time decrements relative to baseline or unguided conditions. An empirical comparison demonstrates this reaction time advantage under defined goal conditions. However, important boundary conditions exist. When separating goal level from specificity, goal specificity primarily decreases performance variability, while goal height dictates the ultimate performance level. Furthermore, non-specific exploratory "open goals" can match or outperform specific SMART goals in novel tasks, creative thinking, or when novices acquire complex skills where rigid outcome pressures disrupt learning.

Role of Implementation Plans

Simply adopting an intention is often insufficient to guarantee action without detailed execution strategies. Implementation intentions, structured if-then plans specifying when, where, and how an action will occur, bridge this gap with medium-to-large effects on goal achievement across 94 tests.

References 220–234.

Thinking About Your Future Self and Decision-Making

> *"And you ask yourself with this three hours, what are my mights? What are the most important tasks that if I were to do them today, would make my day a success? Another phrasing for this that we've done research on is what will your future self thank you for?"*

Dr Yousef's own research does not appear to have been published. There is, however, a substantial literature on 'future self-continuity', the degree to which people feel connected to their future selves. Future self-continuity reliably enhances decision-making and long-term goal pursuit by bridging the psychological distance between current actions and future outcomes. Empirical research confirms that stronger perceived similarity and connectedness to future representations encourage foresight across financial, academic, and health domains. Perceiving a continuous connection to the future self consistently reduces temporal discounting, encouraging individuals to forego immediate rewards in favour of larger delayed benefits.

Translating future-oriented identity into goal attainment depends heavily on individual regulatory capacity and supportive contextual factors. Future self-continuity fosters goal attainment directly and through belief in successful pursuit, but this pathway requires pragmatic prospection and structured instructional scaffolding to maintain momentum. Systematic evidence shows that scalable interventions, such as writing prompts and age-progressed visualisations, produce small-to-large effects on behavioural goals.

References 235-245.

Noise-Cancelling Headphones and Auditory Adaptation

> *"I don't recommend listening to noise canceling or having noise canceling headphones on for more than 3 or 4 hours a day, because you start to become overstimulated by the real sounds of the world around you, because it changes your baseline of what the world ought to sound like. […] And you start, you start getting anxious and you start becoming overstimulated. And also your auditory system starts to actually adapt to the noise canceling."*

Direct empirical evidence linking prolonged active noise cancellation (ANC) use to central auditory adaptation, hyperacusis, or auditory processing deficits remains limited and largely theoretical. Instead, most peer-reviewed literature focuses on general headphone use, showing that high volumes and long daily use drive cochlear threshold shifts and speech-in-noise deficits.

Clinical hypotheses suggest that over-protecting the ears with constant noise attenuation could theoretically alter central auditory gain, exacerbate hyperacusis, or reduce auditory adaptation to complex environments. However, investigators emphasize that the empirical base cannot confirm these hypotheses, as individuals with preexisting anxiety or sensory processing differences may simply be more prone to using ANC devices as coping tools. Rather than provoking anxiety, short-term use of noise-attenuating headphones significantly reduces sympathetic nervous system reactivity, electrodermal activity, and perceived environmental stress.

No recommended daily time limit for noise-cancelling headphones has been established by professional bodies. Noise-cancelling technology may in fact help protect hearing by allowing people to listen at lower volumes in noisy environments; the World Health Organization's safe-listening guidance focuses on volume and duration of sound exposure (World Health Organization, 2022).

References 246-253.

Instrumental Music and Focus

> **Steven Bartlett:** *"What is your opinion on listening to music, to do work and putting headphones on? What does the science say?"*
> **Dr Sahar Yousef:** *"Science says people are different, of course, so some people seem to be distracted by it and they prefer silence. […] if you're gonna listen to music, ideally music with no lyrics at all, or lyrics in a language that you don't understand."*

Evidence indicates that background music, especially songs featuring lyrics in an understood language, frequently disrupts performance on complex linguistic and memory tasks, while individual factors like working memory capacity, baseline personality traits, and habitual listening styles determine susceptibility to distraction. This research question centres on three key dimensions: the general impact of background music across task types, the heightened disruption caused by intelligible lyrics, and the moderating role of individual differences.

Overall, listening to music with intelligible lyrics impairs performance on cognitively demanding verbal and memory tasks, but this disruption is attenuated in individuals with robust working memory capacity, high extraversion, or habitual listening practice.

References 254–260.

Thinking About Death to Clarify Priorities

> *"I'm a huge fan of talking about death because I find that it puts everything into perspective. It's more the finitude of life, the fact that life will end."*
>
> *"And the my humble opinion is that the best framing is to really think about yourself on your deathbed […] I'm a huge fan of doing this as often as one can bear."*

Psychological and thanatological research indicates that reflecting on one's own mortality can yield substantial benefits, provided it is approached deliberately. While unguided or pervasive reminders of death can trigger anxiety and defensive avoidance (see more below under 'High-Risk Conditions'), structured cognitive reflection encourages life satisfaction, authentic goals, and prosocial behaviour.

Confronting the reality of finite time frequently serves as an existential catalyst that clarifies priorities and deepens personal values. In clinical and palliative settings, structured contemplation helps individuals develop acceptance, ease fears about the dying process, and discover broader life meaning. A cross-sectional study of 501 adults showed that death reflection was positively linked to meaning through increased self-transcendence and authentic-self pursuit. Similarly, qualitative evaluations show that acknowledging impending finitude prompts individuals to defuse death-related fears, achieve emotional relief, and repair interpersonal relationships. Long-term contemplation can also reduce existential defensiveness, leading to lower negative affect when encountering mortality reminders.

Reorienting Toward Intrinsic Aspirations

Conscious death awareness fundamentally alters the content of personal goals by separating extrinsic markers of success from internal value. When individuals explicitly reflect on life's finitude, they tend to trivialise extrinsic pursuits such as material wealth, status, and physical attractiveness, redirecting their focus toward intrinsic goals like personal growth and close relationships. A survey of 10,195 adults found that neutral acceptance of death positively predicted a good life experience via the mediation of intrinsic goals, whereas extrinsic goal strivings suppressed this benefit. Similarly, prolonged processing of mortality fosters posttraumatic growth and helps maintain intrinsic motivations.

Engaging in deliberate death reflection prompts people to pursue goals that align with their authentic self and facilitates self-transcendence. In public reflection tasks, such as "Before I Die" community walls, contemplating finitude consistently leads people to prioritise leading an accomplished, productive, and purposeful life. Conceptual models of positive terror management show how mortality awareness can shift individuals toward these prosocial, growth-oriented trajectories.

Moderators of Priority Clarification

The degree to which death reflection aids goal pursuit depends strongly on psychological flexibility, baseline values, and age:

- Individuals with strong baseline intrinsic orientations experience higher life satisfaction when contemplating death, whereas extrinsically focused individuals experience decreased well-being;
- High psychological flexibility and curiosity allow people to process mortality cues deeply, which subsequently increases their state autonomy across life goals;
- Older adults facing limited time perspectives selectively allocate resources toward emotionally meaningful social targets who support their worldview;
- Educational attainment strengthens the capacity of youth to translate death attitudes into purposeful, constructive life plans and aspirations.

However, death contemplation can severely impair goal motivation if a person experiences low life satisfaction, lacks self-efficacy, or perceives the future as bleak. When individuals reflect on failure under mortality salience, they frequently exhibit fatalistic withdrawal from goal-directed activity, reduced sensitivity in their behavioural activation systems, and an unwillingness to delay gratification. When paired with meaningful psychological resources, deliberate death reflection systematically strips away trivial distractions and clarifies enduring life priorities.

Conditions

The psychological impact of death awareness depends heavily on psychological buffers and individual coping approaches. An analysis of seven studies involving 3,331 people found that meeting psychological needs can protect against existential anxiety and lower life satisfaction when people are reminded of death. Conversely, suppressing mortality awareness without processing it often fails, producing covert symptoms of depression and distress.

Age and health contexts also shape how individuals engage with death cognition. While older adults often reflect on life review and legacy, middle-aged and older adults can simultaneously experience elevated death reflection and heightened anxiety if existential support is absent. Furthermore, brief mindfulness interventions have been shown to reduce specific fears regarding dying, underscoring that structured contemplative routines buffer against morbid rumination.

High-Risk Conditions

It is most dangerous when mortality reflection becomes death anxiety. Across meta-analyses, death anxiety is moderately to strongly associated with anxiety, depression, and overall psychological distress, and these links are often stronger in clinical or medically ill samples.

Risk rises when people lack meaning in life, because mortality primes increase death anxiety specifically in those low in meaning. Risk also rises with low self-esteem or weak internal psychological resources, because repeated death thoughts reduce life satisfaction, vitality, meaning, and exploration while increasing negative affect, state anxiety, and later social avoidance in low-self-esteem people.

Warning Signs

It becomes dangerous when death-focused thinking starts driving avoidance or compulsions. Experimental studies show mortality reminders can increase compulsive handwashing, social avoidance, body scanning, perceived symptom threat, and medical reassurance seeking, especially when the cue matches the person's existing fears.

Low need satisfaction, low personal need for structure, insecure attachment, weak close relationships, and not working during crisis periods all appear to increase vulnerability to harmful effects of mortality salience. In contrast, death literacy, reflective discussion, self-determined coping, and supportive relationships tend to reduce death anxiety.

So, reflecting on mortality becomes dangerous when it is repetitive, fear-driven, and poorly supported, or when it worsens functioning, distress, avoidance, or healthcare decisions. It is least safe in people with existing psychopathology, serious illness, low meaning or self-esteem, and chronic exposure to death cues.

Final Notes

In conclusion, evidence suggests that one should reflect on mortality intentionally, calmly, and within a framework of life values, and not through perpetual, unguided rumination.

References 261–273.

Progress on Meaningful Work and Good Days at Work

> **Steven Bartlett:** *"And there's this incredible, um, Harvard Business Review study where they ask people what their favourite day in work was. And it was when they had a small feeling of progress."*
> **Dr Sahar Yousef:** *"So if again, which brings us to step three. Beautifully that progress principle. I know that Harvard study. I love that Harvard study. What gives rise to the best days at work is when people get to make progress on the most meaningful work."*

The study referenced is by Teresa Amabile and Steven Kramer at Harvard Business School, and it analysed nearly 12,000 daily diary entries from 238 knowledge workers across 26 project teams. They found that, of all the events that could make a workday positive, the most important was making progress on meaningful work, even little progress, which they called the 'progress principle'.

References 274-276.

Removing Obstacles Versus Adding Solutions

> *"if you want a best way to increase the signal or to get to X, whatever it may be, is to remove obstacles as opposed to adding remove the obstacles, turn down the fucking noise, and you turn down the noise by cutting distractions."*

The principle described here that improvement often comes more easily from removing obstacles than from adding new elements is best known as the law of subtraction. The term "law of subtraction" seems to come from Matthew E. May's The Laws of Subtraction (May, 2012). Writing for a business and innovation audience, May argues that in an age of excess, effective solutions

often come from removing what is confusing, wasteful or superfluous. His rules include the idea that what isn't there can matter more than what is, and that doing something is not always better than doing nothing. He illustrates these with examples from design, strategy and organisational practice.

In the same year, Nassim Nicholas Taleb popularised the related (and older) concept of *via negativa* in Antifragile (Taleb, 2012). Taleb argues that knowing what not to do is more reliable than positive prescriptions, because harm is easier to identify than benefit. In complex systems such as health, economics or organisations, each intervention creates new interactions that are hard to predict, whereas removal tends to carry less hidden risk. He suggests, for example, that eliminating a harmful habit such as smoking does more for health than adding supplements or treatments.

Experimental research has since confirmed that people tend to neglect this approach. Across a series of experiments, Adams et al. (2021) showed that people systematically overlook subtractive changes. When asked to improve objects, ideas or situations, participants overwhelmingly proposed additions, even when removing an element would have been simpler and more effective. They considered subtraction more often when explicitly prompted or under less cognitive load, suggesting that adding is the default.

In practice, the principle means asking "what can I remove?" before "what should I add?" That might mean removing friction that stops a good habit, cutting unnecessary steps from a process, or reducing commitments that crowd out more valuable work.

References 277-280.

Visible Timers, Progress Markers and Work Speed

> *"Set a timer, set a timer. Human beings and fun fact most mammals are highly influenced by what are called markers of progress, which means if we see time ticking by, we will just work faster. This is the science behind cleanup songs for kids, by the way."*
>
> *"Here comes the science of clean up songs. […] And because the time is ticking by and the song is going to end, they all of a sudden start getting very goal oriented and focused, and they start putting the toys away, especially near the end of the song."*

Visual feedback representing proximity to an end state reliably accelerates performance and effort across diverse tasks. In cognitive domains, visible progress indicators such as a filling progress bar significantly increase response speed without impairing accuracy. As individuals approach a goal, their rate of actively sampling progress cues accelerates sharply, accompanied by distinct physiological markers such as increased tonic pupil dilation. Hierarchical drift-diffusion modelling indicates that approaching an endpoint lowers response caution while increasing information processing rates. Furthermore, manipulating visual feedback, such as using faster countdown displays or clear graphical representations, decreases perceived duration and reinforces persistence.

However, the motivational lift of progress tracking depends heavily on framing and structure. Performance often follows a non-monotonic pattern where motivation sags at the halfway point, the classic "stuck in the middle" phenomenon, because individuals shift between referencing their starting point and their finish line. The empirical shifts across task positions demonstrate how midpoint slumps emerge before final acceleration occurs.

Additionally, providing artificial head starts accelerates task completion, termed the endowed progress effect. Conversely, discrete milestones can occasionally induce complacency if individuals feel they have achieved an intermediate benchmark.

References 281–289.

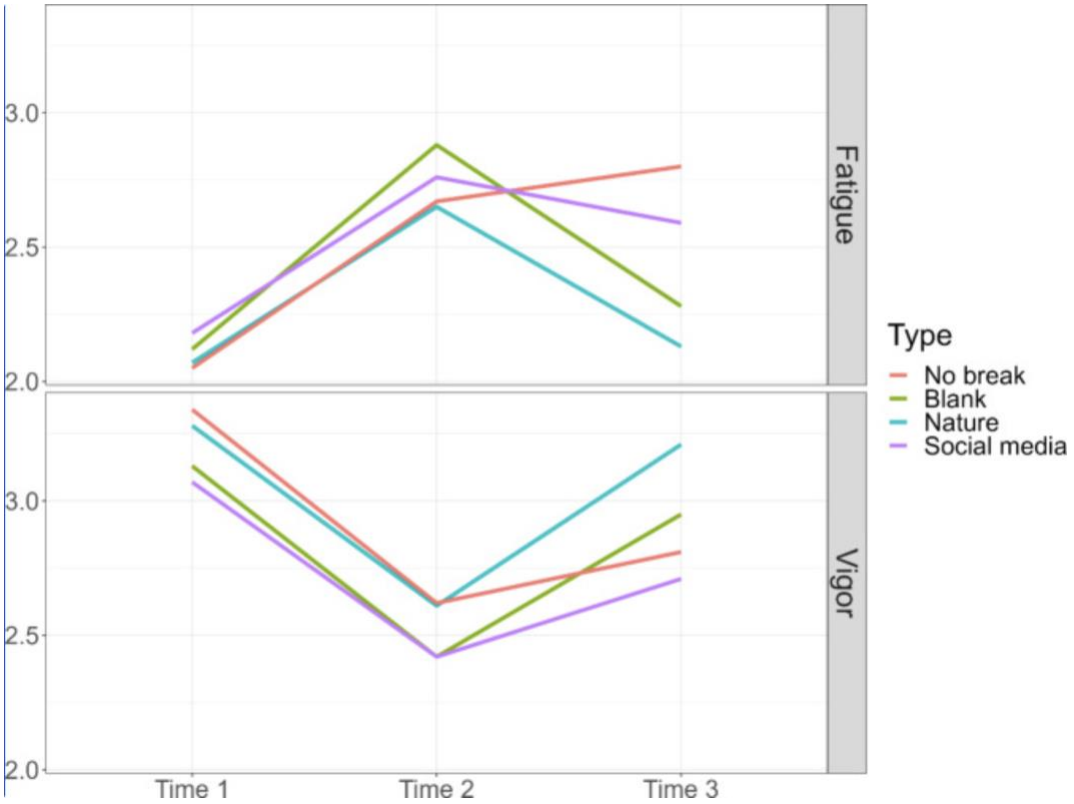
Nature Breaks Versus Scrolling

“Some other thing, by the way, there was a 2024 nature paper that just came out that actually measured everybody's fatigue levels. […] they put them into four different groups. One of those groups was no break at all. […] But the other options were TikTok style scrolling, looking at nature or just staring ahead of yourself.”

“It turns out the best kind of break is, in fact, no surprise there. Being exposed to nature. […] But shortly thereafter, it's just doing nothing at all. The worst kind of break is pretty much like no break at all is the tactile style scrolling.”

“*And the worst break was TikTok style scrolling. It was on par with just literally no break at all.”*

The study described appears to be Grobelny and colleagues (2024), published in Scientific Reports (part of the Nature portfolio). In this pre-registered experiment, 308 employees completed a fatiguing clerical task and were then assigned to one of four conditions: no break, a 4-minute 'blank' break, a 4-minute nature break (viewing natural landscapes with sounds) or a 4-minute social media break (watching short, algorithmically recommended videos). Nature breaks led to full recovery of energy and fatigue to baseline, whereas social media breaks provided only partial recovery and were rated as less relaxing than blank or nature breaks. A small correction is that social media breaks were better than no break at all, rather than 'on par' with it, as mentioned. Fatigue increased most in the no-break group. The results are consistent with a meta-analysis showing that micro-breaks boost vigour and reduce fatigue (Albulescu et al., 2022) and with research on the restorative effects of nature (Kaplan, 1995).



Employee resource levels across break conditions and time from Grobelny et al., 2024.

References 290–298.

Regular Exercise and Energy Levels

> *"If he exercises, he's more energized after that literally gains energy from expending it […] I expend energy in the gym and lo and behold, Steven, I'm tired afterwards because I've expended energy and it's likely because I don't have a consistent practice. When I have when I have had a consistent practice in the past. I do gain energy…"*

Scientific research robustly shows that chronic physical activity alleviates persistent fatigue and increases energy levels, while acute exercise bouts can induce temporary fatigue depending on training status, duration, and intensity. This distinction involves two key facets: long-term adaptations that elevate baseline vitality, and immediate post-exercise responses that differ between untrained individuals and conditioned populations.

Long-term physical activity alleviates chronic fatigue while enhancing subjective energy states across healthy and clinical cohorts. A multivariate meta-analysis of 81 randomized controlled trials (7,050 participants) determined that exercise training significantly decreases fatigue, enhances energy, and increases vitality. These beneficial adaptations occur across varied demographics, with population-level observational studies establishing an inverse dose-response relationship between regular activity and persistent exhaustion.

The physiological and psychological adaptations underlying these benefits reflect enhanced oxidative capacity and psychological detachment from daily stressors. Habitual inactivity diminishes mitochondrial density, capillary perfusion, and muscle oxidative potential, accelerating peripheral fatigability during routine activities. Structured training reverses this deconditioning by augmenting capillary density, elevating enzyme activity, and accelerating cardiovascular recovery. Randomized trials also show that low- to moderate-intensity training mitigates study- and work-related fatigue, improving emotional exhaustion and sleep quality.

While chronic training elevates baseline energy, a single bout of exercise produces transient physiological strain that is markedly more fatiguing for untrained individuals. Sedentary individuals exhibit faster accumulation of blood lactate and accelerated and deplete phosphocreatine reserves more quickly during acute exertion, driving rapid peripheral muscle fatigue. In untrained individuals, acute exercise can also prompt behavioural compensation where physical fatigue depresses non-exercise physical activity for the remainder of the day. High exercise intensities exacerbate this vulnerability, provoking protracted physical exhaustion. Consequently, low-to-moderate intensity protocols are necessary for untrained or chronically fatigued individuals to prevent acute overload while establishing chronic endurance gains.

References 299, 308.

Meditation and Attention Control

“So when we meditate, we're focusing our attention and we're maintaining our attention. So when your attention drifts off, you go and you grab it and you drag it back every single time you grab it and you drag it back to focus, it's like a little bicep curl for that attention network in the brain.”

“You're exercising. It's very good for your brain. In fact, it will make your attention span even better. […] It will literally strengthen your mind and make you better at the act of attention and focusing. But you will in the beginning, like if you're new to meditation that don't come for free, it's like walking for the first time into a gym. You're gonna walk out tired.”

Scientific research establishes that meditation improves multiple aspects of attentional control in beginners, while also indicating that conventional concentrative practices can initially demand substantial cognitive effort and mental resources.

Meta-analytic evaluations show that meditation training reliably improves generalised attention, the alerting network, and executive control, particularly for accuracy-based tasks. Interventions yield significant benefits on sustained attention, working memory updating, and inhibitory control.

Although meditation aims to develop stable, effortless concentration over time, early stages of practice demand significant top-down cognitive control. For novices, directing attention toward a chosen object while monitoring and suppressing spontaneous mind-wandering relies heavily on frontoparietal networks, making initial practice mentally demanding.

Task performance research suggests that conventional focused meditation can induce attentional fatigue toward the end of multi-week courses because it requires sustained, effortful focus. However, when practices incorporate restful alertness or restorative nature contexts, novices experience reduced mental fatigue and immediate executive gains without cognitive strain.

In summary, meditation training robustly improves attention and attentional control in beginners, but the practice itself remains cognitively effortful until concentrative stability matures.

References 309–319.

Absorbing Activities as a Break From Rumination

> *"So when you do something that is cognitively challenging enough to demand your whole attention, then all of a sudden your brain can actually just sort of let go and not think about all of the rumination and all the worries and all the different things."*

Empirical research shows that cognitively demanding and absorbing activities disrupt perseverative cognition by competing for working memory and central executive resources. Rumination and worry share common underlying cognitive processes characterized by abstract, internal, and repetitive thinking, which diminish when attention is fully directed to external, structured tasks.

Depressive rumination and anxious worry rely heavily on central executive control and internal working memory capacity. Spontaneous mind-wandering frequently acts as an initial catalyst for negative perseveration, especially when combined with elevated negative affect. Engaging in attentionally demanding tasks interrupts this process by forcing an attentional shift from internal self-preoccupation toward present-moment sensory cues.

While immersive distractions mitigate perseverative thinking, important boundary conditions exist regarding clinical distress and physiological recovery. In survey studies, distraction and absorbing activities remain the most frequently reported self-management strategy for interrupting rumination and worry. However, brief positive distractions alleviate depressed mood without always erasing long-term vulnerability if underlying negative beliefs remain unchanged. For instance, in a laboratory experiment involving waiting periods, flow induced by adaptive computer tasks successfully reduced negative affect and heightened positive affect but failed to eliminate subjective worry entirely. Consequently, while cognitively absorbing activities reliably suspend state rumination in real time, sustainable reduction in chronic worry requires repetitive attentional training or structured behavioural integration.

References 320-332.

Boredom and Creativity

Steven Bartlett: *"If I wanted to solve a very complex problem or come up with my best ideas. Well, is there anything else you'd recommend?"*

Dr Sahar Yousef: *"Yeah, it would be the boredom."*

"There is science behind this. […] The science behind innovation and creative insight is the process of truly understanding and thinking about the problem. So loading up all of the data related to the problem that you're trying to solve."

"So there you are in a gridlock of certain neural networks where you're thinking about the problem are the next step. Walk away. Walk away. You have this loosen. Loosen the networks, stop hyper focusing […] You're not going to come up with a new idea. If you stay hyper focused on the problem, you need to introduce a new stimulus."

"The best thing you can do is load it up and go walk the damn dog. Go do something else. Wash the dishes. Take a shower […] These neural networks begin to loosen. New neural networks are becoming activated. […] So you have those amazing insights. Typically when you loosen and you walk away."

Empirical research strongly supports the need for prior problem preparation to enable creative insight, whereas evidence that boredom or unstructured time directly enhances creativity remains mixed and methodologically disputed. While popular narratives suggest idle time fosters innovation, experimental findings on boredom and unstructured intervals present divergent results across creative domains.

The evidence supports incubation after preparation as a real contributor to creative problem solving, but it does not support a simple claim that boredom itself reliably increases creativity. Across the literature, the strongest pattern is that stepping away from a problem can help when the problem has first been encoded well, and when the break permits loosely associative thought.

Incubation means setting a problem aside and returning to it later, and the main meta-analytic result is that incubation has a positive average effect on problem solving, with especially

strong benefits for divergent thinking tasks. That effect is moderated by conditions: longer preparation periods strengthen later incubation benefits, whereas cognitively demanding interpolated tasks weaken them. The evidence also suggests that low-demand activities can be more helpful than complete rest for some linguistic insight problems, implying that the helpful ingredient is not mere idleness but a mental state that allows internal processing to continue.

Mind wandering is the leading candidate for that internal processing. In a highly cited experiment (Braid et al., 2012), an undemanding task during incubation improved performance on previously encountered creativity problems more than a demanding task, rest, or no break, and the helpful condition produced more mind wandering without more explicit problem-focused thought. Follow-up work converges on the idea that this benefit is problem-specific: greater mind wandering predicts improvement mainly when people return to the same prompt, not when they switch to a new one, which argues against a general “creative mood” explanation.

The boredom literature is much less settled. A recent scoping review found studies pointing in positive, negative, contradictory, and null directions, and concluded that a clear causal effect of boredom on creativity is not currently supported. Some experiments report that induced boredom can improve divergent thinking or remote associations, which underpins the popular claim that boring tasks spark ideas. But when boredom arises from the creative task itself, it appears to impair performance once practice effects are controlled.

A related distinction is between boredom and unstructured time. Studies of rest and idle thought suggest that more creative people are often less bored, not more, during unconstrained time because their thoughts move more freely and associatively. That means unstructured time does not automatically generate creativity; it seems more accurate to say that some people use unstructured time creatively because they remain mentally engaged, not bored.

Overall, the evidence favours this narrower conclusion: preparation plus incubation often helps creative insight, especially when the break allows associative offline processing of an already loaded problem. The evidence does not support the broader claim that boredom by itself reliably makes people more creative.

References 333–345.

Recalling Tip-of-the-Tongue Words

Steven Bartlett: *"Is that why we can't remember the word or the thing or the person's name when we're really, really thinking about it? And then suddenly we stop thinking about it and it pops back in. Huh?"*

Dr Sahar Yousef: *"Yeah, it's all if you think about it electrically, I think that's what it makes it easy to think about. You've got this electrical gridlock of of neural networks that are active. […] The best thing that you can do is load up the information. […] Now get up, walk away and go do something else."*

Tip-of-the-tongue (TOT) states usually resolve better after a brief break, mainly because continued search can sustain interference. Across three direct incubation studies, TOTs were more likely to resolve after a delay filled with unrelated questions than on an immediate retest. That advantage was largest for stronger TOTs, and TOTs in general resolved more often than retrieval failures without a TOT feeling.

The classic explanation for the incubation benefit is blocking and recovery: an incorrect but related word or pattern of activation temporarily dominates retrieval, and stepping away lets that interference weaken so the target can be accessed on the next attempt. Neuroimaging fits this view by showing TOT-specific engagement of anterior cingulate and prefrontal regions linked to conflict monitoring and control, with delayed frontal activity suggesting prolonged conflict resolution during the search state.

Stopping is not always best. Newer work suggests repeated retrieval attempts can temporarily help people access known information and reduce later recurrence of TOTs, and resolving a TOT can produce corrective learning instead of merely waiting it out. TOTs also seem to recruit sustained effort and motivation while they last. People spend longer trying to retrieve during TOTs than non-TOT failures, and stronger or more imminent TOTs are more likely to end in successful recall, which suggests incubation works best when activation is already close to threshold.

References 346–356.

Repeatedly Talking About Trauma and Rumination

> *"I find that in the modern world we've gotten ourselves into a bit of a pickle where we've made it okay to continue to rehash and exhaustively talk about and think about our traumas."*
> *"But when you do that, you're just deepening the damn neural networks. […] You do not make your feelings and you know the thoughts that you end up ruminating on. Go away by talking about them over and over and over again in the exact same way. If you keep doing that, you're just deepening and deepening that, that, that neural network. So it's even more robust and strong."*

Repeatedly thinking about trauma in an unstructured, repetitive way is consistently linked to higher PTSD symptom severity, and this pattern appears across cross-sectional, longitudinal, experimental, and review evidence. Rumination is typically defined as repetitive negative thinking about the causes, consequences, and implications of trauma, often including "why" questions, counterfactuals, and perseveration on distress. The key distinction is that evidence-based trauma-focused treatments do not ask patients to merely dwell on trauma; they use structured, time-limited revisiting to reduce avoidance, process trauma memories, and change maladaptive beliefs.

Rumination Versus Processing

Rumination is repetitive, sticky thinking about why the trauma happened, what it means about the self, and why the distress persists, and it is consistently tied to greater PTSD severity, especially intrusive re-experiencing. Constructive processing is more deliberate and organised: it engages the memory while allowing distance, integration, and meaning-making, instead of endless circular analysis. Rumination tends to be abstract and repetitive, often centred on "why" questions and counterfactuals that do not resolve. Constructive processing tends to be more concrete, reflective, and coherent, which appears to support new learning. Rumination is associated with overgeneralization, stronger negative emotion, and less decentering, whereas constructive processing is associated with accommodation of corrective information and a healthier distance from the trauma material.

Experimental evidence fits that distinction. When trauma-exposed participants were instructed to ruminate, they showed larger increases in subjective distress than when distracted, and rumination was no less distressing than trauma imagery, arguing against the idea that

rumination is helpful processing. Other work suggests rumination partly worsens PTSD through experiential avoidance, even when people feel cognitively preoccupied with the trauma.

During CBT for PTSD, both symptoms and rumination tend to decline over treatment, although the evidence that rumination itself is the main mechanism of change remains preliminary. Cognitive studies showed that during prolonged exposure therapy, reductions in negative trauma-related beliefs tend to occur before PTSD symptoms improve. This relationship appears stronger than the reverse pattern, in which symptom improvement precedes changes in trauma-related beliefs. This helps explain why revisiting trauma in therapy does not simply become rumination. In PE or trauma-focused CBT, the aim is not prolonged dwelling but targeted engagement that reduces avoidance, tests beliefs, and builds a more integrated memory representation. Clinically, rumination can still interfere when it masquerades as emotional engagement, because patients can sound deeply engaged while circling the same unresolved questions and exhausting their capacity to benefit from exposure.

Important Caveats

The evidence does not suggest that every form of "revisiting" trauma is beneficial in every context. Unstructured early debriefing should be distinguished from prolonged Exposure therapy (PE) or Cognitive Processing Therapy (CPT), and some analyses raise concerns about detailed recall very soon after trauma, although that literature remains methodologically limited. Some evidence also suggests that exposure is not the only route to improvement. Metacognitive therapy and other non-exposure approaches can reduce PTSD symptoms, and one review argues that the specific exposure format used in PE is not necessary for remission in all patients.

Final Notes

Overall, the literature supports a clear distinction: passive, repetitive rumination tends to strengthen distress, whereas structured therapeutic revisiting in evidence-based trauma treatments usually reduces PTSD symptoms, even though not all patients fully recover, and exposure is not the only effective treatment pathway.

References 357–371.

Redirecting Attention to Break Rumination

> *"So the only way out is to stop that. You have to redirect your attention. So my solve for things like rumination is acknowledge why it's happening in the first place. And then quite quickly after that, redirect your attention when it's happening. […] Be careful which ones you feed because whichever one you feed will in fact become stronger and louder."*

Rumination is repetitive, passive, negative thinking that usually starts when someone is distressed and keeps attention locked on causes and consequences instead of solutions. It tends to worsen mood, interfere with problem-solving and daily action, predict depression onset and relapse, and show up across other forms of psychopathology as well. Rumination appears to persist because several mechanisms reinforce each other: habit formation, weak executive control, abstract overthinking, unresolved goals, and negative information bias. Newer network evidence also suggests there is not one single pathway into rumination; common contributors include positive beliefs about rumination, reduced effortful control, and cognitive self-consciousness.

Practical Steps

An evidence-based sequence is to first notice the trigger, then stop fighting the thought, then shift from abstract "why" questions to concrete next steps, and then do something absorbing or useful. This sequence matches treatments that use functional analysis, mindfulness or acceptance, and repeated practice to weaken the ruminative habit.

Psychological treatments for rumination encompass specialised cognitive therapies and mindfulness frameworks. A meta-analysis of 55 randomised controlled trials demonstrated that cognitive behavioural therapy (CBT) effectively reduces repetitive negative thinking, with interventions specifically tailored to repetitive thinking achieving significantly larger effects than generic approaches. Rumination-focused CBT specifically targets habitual abstract processing and passive analytical styles through functional analysis and behavioural activation. Mindfulness-based interventions (MBIs), including mindfulness-based cognitive therapy (MBCT), consistently decrease ruminative thinking. Meta-analyses demonstrate that MBIs perform comparably to traditional CBT and behavioural activation in mitigating rumination.

Rumination is maintained by attentional control deficits, particularly an inability to disengage focus from negative information. Eye-tracking paradigms show that high brooding

rumination is linked to sustained attention toward sad cues and impaired attention toward positive cues. At the neural level, rumination involves heightened default mode network (DMN) engagement, whereas attentional redirection relies on frontoparietal network (FPN) recruitment to inhibit task-unrelated thoughts.

Treatments alter these trajectories by training attentional redirection:

- Brief mindfulness practices reduce emotional go/no-go commission errors, systematically strengthening inhibitory attention control;
- Emotional acceptance broadens processing styles by significantly decreasing local task interference relative to rumination;
- High-demand distraction tasks disrupt resource depletion, freeing executive working memory capacity;
- Distraction using mental imagery enhances parasympathetic activity and produces better mood recovery than verbal distractions.

In summary, effective rumination interventions function primarily by restoring executive capacity and deploying attention away from self-referential distress loops.

Note: Individuals seeking treatment should consult a licensed clinician for individualised clinical care.

References 372-385.

Chronotypes and How Common Each Type Is

"And there are three chronotypes. There is am shifted individuals. These are essentially this is like the science behind morning birds."

"Those are am shifted individuals and it's all about their cortisol levels first thing in the morning. That is about, by the way, 25% of the human population. It's not the majority."

"So you and I belong to a tiny subset of the human population. According to research from, uh, my lab, it's, uh, we're at about 16% from what we've gathered around the world. So 16% of the human population is PM shifted, meaning genetically, we tend to be able to stay up quite late and we can sleep in and our energy levels rise as opposed to shoot up early in the morning and then linearly decrease as the day progresses."

"Then you have the vast majority of the human population and those are people who are bi phasic. […] they peak once in the morning, they come down for the biggest afternoon dip comparatively to all those three types. And then they um, will then come back up for a second wind…"

Chronotype Classification Frameworks

Circadian typology reflects individual phase preferences in sleep-wake schedules, body temperature, and endocrine secretion across the 24-hour day. Standard assessment relies heavily on the Morningness-Eveningness Questionnaire (MEQ) and the Munich Chronotype Questionnaire (MCTQ). Across these tools, researchers typically use a **three-category system** that distinguishes morning types (larks), evening types (owls), and intermediate or neither types. Biological markers confirm these categories: evening types show a circadian phase delayed by two to three hours relative to morning types, notably in core body temperature, cortisol acrophase, and dim light melatonin onset (DLMO).

- **Standard psychometric instruments** categorise individuals along a continuum ranging from extreme morningness to extreme eveningness using validated cutoffs;
- **Biological phase markers** demonstrate a roughly two-hour delay in rest-activity acrophase and a three-hour delay in melatonin secretion for evening types;

- **Objective concordances remain moderate**, as behavioural sleep metrics and endogenous DLMO categorisations frequently align in only a subset of participants.

Evidence for Biphasic and Multimodal Chronotypes

While the traditional model treats circadian preference as a linear spectrum, recent studies investigate multimodal and bimodal variations. A distinct "biphasic" or bimodal chronotype has been documented in individuals whose questionnaire responses show morning preferences for certain behaviours alongside evening preferences for others, averaging into a neutral composite score. Cohort data from the EPISONO study identified a 16% prevalence of bimodal types, which were associated with younger age, higher daytime sleepiness, and elevated apnea-hypopnea indices. A nationwide Korean study identified bimodal individuals at 4.8% prevalence and noted links to elevated rates of mood and dysthymic disorders.

When referring to the biphasic chronotype, the guest is likely explaining the intermediate or neither category (not what was explained in the previous paragraph), as that is indeed the most common (see next heading).

Population Proportions of Chronotypes

In general adult populations, most individuals fall into the intermediate or neither category, typically representing 50% to 70% of cohorts. True morning and evening extremes represent smaller subsets that shift markedly with age and demographic characteristics. For instance, in an older cohort of 652 adults, morning types made up 39.26%, while evening types comprised 9.20%. Conversely, among adolescents and university-aged individuals, evening preferences surge substantially, accounting for nearly 40% of the population.

- Intermediate typologies dominate across diverse national and regional demographic surveys;
- Morningness increases with age, rising from low proportions during adolescence to dominant percentages in middle-aged and older populations;
- Eveningness peaks in late adolescence, correlating with higher rates of social jetlag, sleep debt, and metabolic risks before declining into adulthood.

Genetic and Molecular Architecture

A person's chronotype is fundamentally anchored by endogenous circadian machinery that drives individual differences in internal period length and phase of entrainment. Chronotype is substantially heritable but not predominantly genetic**: most twin and family studies place heritability around 40–54%**, with the rest of the variance explained mainly by non-shared environmental factors. Specifically, family studies demonstrate that chronotype is a heritable complex trait driven by the additive contribution of multiple common variants. Single-gene mutations in core circadian pacemaker genes can produce pronounced familial shifts in sleep timing, while broad population variance reflects polygenic inheritance.

Large-scale genome-wide association studies (GWAS) have identified hundreds of specific genetic variants that regulate this timing preference. A landmark analysis of 697,828 individuals expanded known chronotype loci to 351, revealing that participants carrying the highest polygenic load of morningness alleles woke on average 25 minutes earlier than those carrying the lowest. These mapped loci implicate core clock components such as *PER2* and *RGS16*, as well as *NR1D2*, signalling pathways in the pituitary and hypothalamus, and retinal phototransduction pathways.

Environmental and Entrainment Factors

Environmental and entrainment factors shape chronotype mainly through light exposure, seasonal photoperiod, and the social clock, which together determine how the biological clock aligns to the 24-hour day. The literature treats chronotype as the phase of entrainment produced by interactions between endogenous circadian properties and external time cues, and not as a fixed preference independent of context.

Light is the dominant environmental zeitgeber for human entrainment, and both the timing and strength of light exposure shift sleep timing and chronotype expression. Spending more time outdoors in bright daylight shifts sleep earlier, while weaker time cues increase variation in sleep timing and favour later schedules. Modern light environments often push timing later. Artificial light at night, screens, and reduced morning daylight exposure are associated with later and shorter sleep, and modern lifestyles likely blunt normal seasonal responsiveness by buffering people from natural light-dark cycles.

Seasonal change modifies chronotype because solar irradiation and day length vary across the year, especially with latitude, and the circadian system makes continual small phase adjustments to stay aligned. Evidence suggests that people differ in photoperiod responsiveness, partly because of differences in circadian light sensitivity, prior light history, endogenous period, and variants in

genes such as *PER2*, *OPN4*, and *PER3*. Under natural light-dark exposure, humans show clearer seasonal entrainment. Camping studies found earlier sleep onset and longer winter sleep under natural conditions, supporting the idea that industrial lighting masks part of the circadian response to season.

Work, school, and other fixed schedules are the main nonphotic constraints on entrainment in daily life, often overriding preferred timing without necessarily changing the underlying chronotype. This mismatch between biological and social time is social jetlag, and it is largest in late chronotypes, who accumulate more weekday sleep debt and partially repay it on free days. Social jetlag appears highly prevalent in modern societies because of inflexible schedules, workload, shift work, and evening technology use, although its prevalence and correlates vary across populations.

Across studies, the broad conclusion is that chronotype is partly inherited through many circadian gene variants that influence internal clock timing, but its real-world expression is continually shaped by light exposure, season, age, and social schedules.

References 386–397.

The Body's Internal Clock

> *"And I kept you up until 2:00 in the morning. Oh, don't you worry. That pituitary gland is very strong. Your body knows when it's 5:00 in the morning. It doesn't even need to see light. It naturally will wake you up. […] So it's those people that naturally wake up at early hours of the day, regardless of when they went to bed the night before."*

The hypothalamic suprachiasmatic nucleus (SCN) acts as the body's main internal clock. When an early riser stays up late, their awakening the next morning is dictated by the master circadian pacemaker located in the SCN. Despite elevated homeostatic sleep pressure from acute sleep loss, the internal transcription-based timing loops within the SCN operate largely independently of bedtime, emitting a time-locked circadian arousal drive that terminates sleep. The SCN acts as the principal circadian clock coordinating sleep-wake cycles through autonomous molecular transcriptional-translational feedback loops (TTFL). In individuals entrained to an early schedule, SCN neurons anticipate habitual dawn by accelerating action potential firing and activating downstream wake-promoting networks before sleep homeostatic recovery is finished.

Two-Process Sleep Regulation

Sleep architecture is governed by a two-process model comprising Process S (homeostatic sleep debt) and Process C (circadian arousal drive). While sleep propensity accumulates monotonically during extended waking, the circadian pacemaker independently dictates the phase timing of sleep termination. A single delayed bedtime does not acutely phase-delay the cellular clock within the SCN unless paired with substantial nocturnal phase-shifting light exposure. Consequently, cortisol rises and core body temperature nadirs occur on their regular early schedule. As Process C delivers its wake-promoting signal at the habitual morning time, the circadian drive overpowers remaining homeostatic pressure, triggering early morning arousal despite truncated sleep duration.

The Role of the Pituitary Gland

As mentioned, the suprachiasmatic nucleus (SCN) is the structure that keeps the body locked to its habitual morning phase, because it is the brain's master circadian pacemaker, is entrained mainly by retinal light, not simply one atypical bedtime, sustains autonomous rhythmicity, and times sleep-wake output through hypothalamic relay circuits that promote arousal at the expected morning hour. Meanwhile, the pituitary gland does not set that wake time, but acts downstream as a circadian endocrine relay, receiving hypothalamic signals and converting them into timed hormone release that prepares the body for waking, especially through the HPA axis, so ACTH output helps drive the normal pre-wake cortisol rise and broader metabolic readiness. The pituitary also appears to help stabilise that schedule, because anterior pituitary AVP-V1b signalling contributes to the SCN's resistance to abrupt phase shifts (shown in mice), helping explain why a single late night often does not immediately delay an established early-rising rhythm.

References 398–411.

The Sentinel Hypothesis of Chronotype Diversity

> *"If you and I were in the same tribe along with my team and your team, and we're all like, okay, we're we're a village now together. And everybody went to bed at 10 p.m. and woke up at 6 a.m.. What would happen in the middle of the night when a competing tribe comes to slaughter? All of us."*
>
> *"You need a 24 over seven team. You need to make sure someone's always awake."*

The idea described is known as the 'sentinel hypothesis'. In a study of the Hadza, a hunter-gatherer population in Tanzania, researchers fitted 33 adults with activity monitors for 20 days. Across the study period, all individuals were simultaneously asleep for only about 18 minutes in total, and a median of eight people were awake at any given time during the night. Age largely explained variation in sleep timing, with older individuals tending to wake earlier, consistent with the idea that chronotype variation provides a form of night-time vigilance (Samson et al., 2017). The authors propose that this variation may have evolved partly because it reduced the group's vulnerability to nighttime threats, although this evolutionary explanation is difficult to test directly.

References 412, 413.

Evening Types and Creativity

> *"PM shifted people are also have a tendency to be the most artistic and creative."*

The literature does not converge on a single chronotype advantage in creativity research, and several studies state directly that the evidence linking chronotype to creative performance remains sparse or inconclusive. Across studies, outcomes depend on what is measured, with different results for divergent thinking, convergent thinking, self-reported creativity, artistic populations, and time-of-day effects**.**

Eveningness has been associated with intuitive and imaginative styles and with higher openness, novelty seeking, and sensation seeking, traits often discussed as creativity-related but not direct proof of higher creative performance (Simor and Polner, 2017). However, they found no direct

association between chronotype and either convergent or divergent thinking overall. That same study reported a specific interaction for convergent thinking: late chronotypes performed better on the Compound Remote Associates task when tested at nonoptimal times, and this effect remained after accounting for sleep disruption, while insomnia symptoms themselves predicted lower convergent-thinking scores.

An exploratory study of 120 participants (Giampietro and Cavallera, 2007) found that evening disposition correlated with the ability to apply divergent thinking strategies to visual content, while also noting age-group differences and no significant sex difference. Other performance-based studies reported different patterns. In 163 participants tested in the morning or evening, higher morningness predicted greater ideational fluidity, while flexibility showed a positive but non-significant relation with morningness and no synchrony effect was detected (Roeser et al., 2015).

Studies of artistic groups more consistently link eveningness to artistic identity and preference than to objectively superior creativity scores. In a sample of 835 adults, performance musicians were more evening-oriented than non-performance musicians, and composing musicians had the lowest morningness-eveningness scores in the whole sample (Gjermunds et al., 2019). The same study discusses eveningness as potentially advantageous for divergent and original thinking, but those remarks are interpretive.

A survey comparing 230 art students with 251 management students found that art students reported greater confidence in their creative ability and were much more likely to say they felt creative after 10 p.m (Wang and Chern, 2008).

As a research record, the field supports a mixed pattern in which eveningness aligns more clearly with certain creative traits, artistic populations, and preferred working times than with a broad, uniform advantage on objective creativity tests.

References 414-418.

Time of Day, Cognitive Performance and Creativity

> *"Our cognitive abilities are different throughout the course of the day, which means when we do certain things does matter, at least in some small part. […] but knowing your chronotype can at least help you when it's possible, when it's possible to schedule brainstorm meetings, because you are going to be more creative at the times when you're dipping."*

Circadian rhythms regulate cognitive functioning, leading to optimal performance when testing matches an individual's circadian peak, a pattern termed the synchrony effect. A systematic review (Chauhan et al., 2025) found that 45.3% of studies in young adults and 83.3% of studies in older adults reported significant synchrony effects, particularly across attention, inhibition, and memory tasks.

- **Executive control and memory** improve during circadian-optimal times, exhibiting enhanced working memory accuracy and reduced Stroop interference;
- **Neural activation patterns** confirm peak alignment, showing increased inferior frontal cortex top-down activation at optimal times alongside heightened motor cortical excitability;
- **School and developmental findings** demonstrate synchrony in youth episodic verbal memory and crystallized intelligence, with evening chronotypes experiencing morning performance decrements.

However, synchrony is not universal across all domains, as general processing speed and simple reaction times often show null effects.

Tasks requiring creative insight and divergent thinking often display a reversed synchrony effect, showing superior performance at non-optimal times of day. Interestingly, reduced inhibitory control during circadian off-peak periods permits broader attentional focus and processing of peripheral cues, facilitating cognitive restructuring (Wieth and Zacks, 2011). Put simply, this means when you're a little tired at your "wrong" time of day, your brain is less strict about ignoring distractions. That's bad for focused work but can help creative problem-solving, because ideas you'd normally dismiss get a look-in. This is an interesting finding, but it comes from a single study with university students and should be interpreted cautiously.

References 419–429.

Cognitive Biases, Mental Shortcuts and Brain Energy

Dr Sahar Yousef: *"These are the shortcuts we're talking about. […] It's just trying to it's trying to decrease the amount of energy that it takes to make all of the decisions. Otherwise, this. The world is far too stimulating and full of way too much data and information. It would overwhelm us."*

Steven Bartlett: *"It's against our survival instincts of energy conservation […] Like even doing this conversation now requires a lot of thinking. It's burning a lot of calories."*

A heuristic is a simple rule or shortcut that ignores some information to make decisions faster and with less computation. A cognitive bias is the error that happens when that shortcut misfires and leads to a systematically wrong judgment. Heuristics often save effort, and people use them more when they are depleted or under limited capacity. But heuristics are not just sloppy substitutes for logic: in uncertain settings, less information and simpler rules can sometimes be more accurate, a pattern called a less-is-more effect. Biases do not always come from laziness alone. Some errors happen because people lack the right mindware such as statistical knowledge, fail to notice that a shortcut should be overridden, or cannot sustain the override once started.

The brain is expensive overall, but much of that cost is paid all the time just to keep it running, even at rest. Newer reviews argue that doing a hard mental task usually adds only a small marginal cost to total brain energy use. Older studies suggested that effortful reasoning uses up blood glucose and pushes people toward heuristics, and some experiments found that sugar drinks reduced heuristic responding. But later reviews say the simple glucose depletion story does not hold up well, because measured metabolic changes are small and the effects may reflect motivation or task regulation, not necessarily refuelling the brain.

Current accounts focus more on local brain changes than on total calories. Hard cognitive work appears to alter metabolites in control regions such as the lateral prefrontal cortex, which can make further control feel costlier and shift choices toward easier options. Heuristics are the brain's shortcuts for reducing mental work, and people often prefer them because controlled thinking feels costly. But that "cost" is usually computational and regulatory, not a large increase in the brain's total glucose or calorie consumption.

References 430-442.

Multitasking and the Cost of Task Switching

Dr Sahar Yousef: *"What we're attempting to do is get a sense of what we call your switch cost. Your switch cost is the amount of time and energy that you essentially waste every single time you switch your attention from A to B, B to C, so on and so forth. […] There is a cost biological law."*

Steven Bartlett: *"I got to number eight. So that was my maths isn't great, but that is 40% of the speed as when I just focused said differently, 60% slower when I."*

Steven Bartlett: *"So on a daily basis, theoretically, I'm losing potentially 60% of my productivity theoretically, just by switching between two different types of tasks at once."*

Task-switching costs are well established. Alternating between cognitive tasks reliably degrades both speed and accuracy compared to continuous single-task execution. In reaction-time paradigms, local switch costs typically introduce an immediate latency penalty ranging from 50 to several hundred milliseconds per individual switch. Providing explicit advance preparation time reduces these temporal delays, but an unavoidable residual switch cost consistently persists even after several seconds of preparation. In addition to local transitions, operating within mixed-task environments incurs global "mixing costs" reflecting the cognitive overhead of maintaining competing task configurations in working memory.

Concurrent multitasking between attention-demanding tasks is considered a myth because central executive processes operate largely as a serial bottleneck. Neuroimaging and behavioral findings show that sequential task switching and concurrent dual-tasking recruit distinct but overlapping frontoparietal networks, indicating that cognitive resources cannot simultaneously serve two un-automatized goals.

- Central response selection limitations prevent simultaneous decision-making, forcing the cognitive system to alternate execution serially;
- Task switching forces active task-set reconfiguration, requiring time to suppress obsolete rules and activate new parameters;
- Lingering task-set inertia from prior actions produces proactive interference that impairs ongoing accuracy and working memory maintenance.

Generalisation to Real-World Productivity

Simple writing demonstrations, such as alternating between writing letters and numbers, illustrate the fundamental mechanics of cognitive interference, but they fail to capture the multi-dimensional structure of natural work settings. Controlled demonstrations capture transient, fine-grained task alternation, whereas workplace interruptions involve complex, dissimilar tasks spanning prolonged temporal blocks.

Translating laboratory switch costs into macroeconomic productivity loss remains challenging because field studies vary widely in how they define and evaluate workplace disruption, presenteeism, and efficiency. Nevertheless, research examining everyday tasks, such as combining vehicle operation with typing or argumentative reasoning, confirms that multi-task interference substantially degrades real-world operational safety and performance.

References 443-455.

Attention Residue Between Tasks

> *"By the way, there's a there's a name for that concept that you were just you were feeling it. It's palpable. It's called attentional residue."*
> *"You carry into the next task all the shit, the baggage from the previous task, unless you close out. I say get cognitive closure. […] Try to, as much as possible, get cognitive closure when you multitask."*

Attention residue occurs when cognitive resources remain focused on a previous task after an individual has transitioned to a subsequent activity. Rather than operating as full parallel multitasking, attention residue specifically reflects persisting cognitions about a completed or interrupted prior event during serial task execution. Because human attentional and working memory capacities are fundamentally limited, lingering task-set activations deplete the executive resources available to process subsequent goals.

This cognitive carry-over consistently degrades subsequent task performance across both laboratory and applied domains. Attention residue leads to elevated error rates, slower processing speeds, and reduced cognitive engagement on the new objective. In cognitive control research,

closely related manifestations such as attentional inertia and task-set inertia demonstrate that individuals systematically misallocate visual attention toward prior, now-irrelevant stimulus rules or locations. Furthermore, persisting engagement in an earlier activity can impair subsequent episodic memory encoding for new task-relevant targets.

References 456-463.

Priming the Mind to Notice Opportunities

> *"The way to become more lucky is to prime the mind to train it. I would say to look for luck."*
>
> *"It will look for data and evidence to support its beliefs either way. So if you ruminate, if you stay in that victim mindset […] What you will notice are closed doors […] This thing is designed to look for the evidence and find the evidence that confirms its beliefs. It's constantly scanning. So if you prime this thing. Oh. You'll find your luck because your luck is right there."*
>
> *"You, I promise you, you're gonna see opportunities. […] It's just gonna happen because it's top of mind for you. And your brain is designed to look for the evidence and the data to support its beliefs."*

This research mainly covers two questions: how people notice unexpected opportunities, and how prior beliefs shape what information they look at and trust. The second topic has the stronger direct evidence base, especially from lab experiments on attention and information sampling, while the first is more conceptual and often studied through serendipity, entrepreneurship, and luck beliefs.

Opportunity Recognition

Researchers describe serendipity as noticing something unexpected and then doing something useful with it, and not pure random luck. In this literature, the key personal qualities are alertness, curiosity, and intuition, because these help people notice weak cues that others might miss. Opportunity beliefs are treated as their own psychological category, separate from luck, good fortune, and bad fortune.

One entrepreneurship paper argues that happier, more confident people tend to experience more serendipity, especially when their surroundings support social connection and independent thinking. A related conceptual paper proposes that superstitious or luck-based beliefs can reduce anxiety, make coincidences feel meaningful, and increase action, but can also become fatalistic and discourage action.

Information Sampling

Lab experiments show that after people make an initial choice, they tend to give more weight to later evidence that supports that choice. This effect appears in both perceptual tasks and numerical judgments, which suggests it is not limited to political or emotional topics. Researchers interpret this as a form of selective attention during later evidence evaluation.

Other experiments show that bias appears not just in how evidence is weighted, but in what people choose to inspect. Participants sampled more information from the option they had already chosen, and this tendency became stronger when they felt more confident in their first decision. When the experimenter controlled what participants saw, this effect largely disappeared, which suggests that personal control over sampling is a key part of the bias.

Broader Patterns

Several papers argue that selective exposure does not stop once people encounter opposing information, because biased processing can continue during interpretation and later judgment. . Neural evidence suggests that conflicting evidence can still be encoded accurately in the brain, but it has less influence on later reports when it clashes with a previous choice.

Some authors argue that these biases reflect both motivation and mental shortcuts and not simple irrationality. One model shows that if people simplify belief updating because tracking all dependencies is too memory-intensive, confirmation bias can emerge naturally during evaluation, assimilation, polarisation, and source selection.

Final Notes

Taken together, the literature describes a broad pattern in which opportunity noticing depends on cue detection, mindset, and context, while attention and evidence use are strongly shaped by prior choices, confidence, goals, and existing beliefs. The easiest-to-see findings come

from experiments on sampling and selective exposure, while the luck and serendipity research adds a more interpretive picture of how people recognise and act on opportunities.

References 464-474.

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