CHAPTER 24

The Scientific Evidence

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Here is the good news first. Tens of thousands of studies on mindfulness and meditation have appeared since I started teaching in 1987. These tells us that mindfulness has positive effects for people suffering anxiety, depression, pain, stress, insomnia, substance abuse and eating disorders. It helps with medical conditions such as cancer, hypertension, post-operative recovery, diabetes, irritable bowel, fibromyalgia, skin conditions and poor immune function. It seems to work in all populations from children to the elderly, and across a great variety of occupations.

Mindfulness seems to work, but the research is still struggling to explain *how*. Plausible hypotheses include: relaxation, enhanced body awareness, attention, thought control and emotional regulation. Let's look at each of these in turn.

Relaxation

Most people would describe relaxation as a major reason for meditating. The most uncontroversial aspect of the research is that meditation enhances parasympathetic activity (the so-called 'Relaxation Response'). This alone is enough to explain its beneficial effects on heart rate, blood pressure, immune function, digestion, pain tolerance and sleep quality. Learning to relax quickly and frequently during the day has the potential to permanently lower baseline levels of arousal and stress.

So is relaxation part of the answer? Not at all according to some psychologists. From the start, the psychological literature has devalued the idea that relaxation could be important. The pioneering writers constantly downplay its potential as an agent of change, and describe it as

a pleasant side-effect at best. This is despite the fact that some degree of physical relaxation is virtually guaranteed in any meditation, while achieving a 'state of nonjudgmental acceptance' is far less certain or measurable, even subjectively. I have yet to see any study that attempts to assess mindfulness in isolation from the confounding influence of relaxation. I'm sure it would be easy to design.

There is a long tradition in psychology of devaluing what happens in the body in favour of purely mental dynamics. I won't argue the obvious – that being able to consciously relax is crucial, and that doing so is both pleasant and good for you – but I suggest that you keep in mind the prejudice against it in the psychological literature. You can easily read dozens of scientific reports and not find a single reference to relaxation as a possible causative factor.

Enhanced body awareness

Meditation invariably enhances body awareness (and induces relaxation) whether that is the intention or not. This has many well-documented advantages. Enhanced body awareness correlates with a conscious awareness of one's emotions. It acts as an early warning device to pick up signals of over-reactivity. It helps to us recognise our biological needs and limits long before crisis point. It seems to enhance our ability to accommodate unpleasant moods and sensations ('negative affect tolerance'). It has the potential to increase empathy through the recognition of the body signals of others.

Enhanced body-awareness also alters the way that we think of ourselves. Our sense of self-identity operates through two distinct systems. The 'narrative' system relies on language, memory and a sense of purpose. This is 'doing' mode: 'This is me, my history and what I do.' The 'experiential' system relies on nonverbal, immediate interoception, and our sense of location in space. This is 'being' mode: 'This is how I feel in this moment.'

Meditation strengthens this bodily sense of self at the expense of the narrative sense, and consequently weakens excessive thought. If we feel grounded in our body, we are more able to see a thought as being 'out there,' outside the body. Each time we do so we implicitly give more value to embodiment and less to verbal chatter. Doing this thousands of times can train us to automate the response, and so reduce the tendency towards rumination and self-referential verbal narratives.

Attention and thought control

Attention is the essential skill in meditation. In fact, it consists of a variety of sub-skills. Learning to focus and *sustain* attention on the body is the antidote to the jumpy, anxious, scattered mind. Learning to *switch* attention away from a thought or behaviour ('let go and focus on the breath') breaks the opposite tendency to fixate and ruminate. Learning to *split* attention appropriately increases mental efficiency and coping skills.

Anchoring the mind in the body helps inhibit the secondary elaborative processing of the thoughts, sensations and emotions that arise while we meditate. Learning to 'name' or 'label' thoughts guarantees metacognitive awareness, and is so beneficial that we find it in many therapies. The MBSR emphasis on devaluing thoughts per se undoubtedly helps many patients also. This ability to take a more detached stance in relation to one's thoughts and feelings is called 'decentering' or 'defusing' or 'reperceiving' in the psychological literature.

These terms all suggest a general tendency to devalue thoughts per se. This is a common meditative strategy but I prefer the Buddha's approach. *Sati-sampajjana* is 'the conscious perception and evaluation' of something. Being conscious, it evaluates a thought accurately, as it deserves, rather than automatically diminishing it. It is closer to the older CBT term 'reappraisal' than to 'defusing' or 'decentering'. This may be the most important mindfulness skill in managing anxiety and depression.

The research also suggests that even a very brief mindfulness intervention can enhance our sense of self-control and discrimination. The reappraisal of any thought or impulse doesn't even need to be conscious. A two-second 'stop and look' pause is enough time for an implicit reappraisal.

Emotional control

Meditation lowers arousal. It may not change an emotion but it turns down the volume. Meditation also weakens thought, thereby reducing the verbal amplification of any situation. Meditation also requires that we sit still for several minutes. This means that we inevitably disarm our musculature and are less primed to act impulsively. This non-action is a profound signal from the body to the mind. It says, 'No great urgency. No need to act right now.' It undermines the primary role of emotion which is to initiate some kind of physical action.

Psychologists speculate that poor emotional regulation is a primary driver of anxiety and depression. Conversely, there is a strong correlation between self-reported mindfulness and good emotional control strategies. Mindfulness seems to help through mechanisms such as early intervention, reappraisal, exposure and the extinction of habitual responses. Paradoxically, trying to be 'nonjudgemental' invariably results in a re-judgement of the object. Most commonly we down-regulate its emotional charge. We see it as less important and therefore requiring little or no response. Some researchers now see this positive reappraisal, not acceptance, as the key mediator of therapeutic change.

Teasdale explains how even a few seconds of *conscious* perception are bound to result in an *automatic* reappraisal. To be mindful holds an object in working memory for long enough to recontextualise it. Just a second or two gives plenty of time for memories of similar past situations to arise. Since the mind automatically evaluates any new information and updates its assessments within milliseconds, being mindful of something will invariably modify the initial rule-of-thumb judgement.

Good meditators gradually learn to automate a more tolerant approach towards unpleasant stimuli, so they no longer need to cognitively control the process. Mindfulness thus contributes to our largely automatic reappraisals of moment-by-moment experience. Practised regularly, this produces a stable, dispositional tendency to be mindful.

Finally meditation enhances emotional control through brain mechanisms that are now well understood. Focusing and language are left-lateralised prefrontal cortex functions. Meditation thus results in front-back, left-right, 'reason-emotion' inhibitions. Although both hemispheres always work together, focusing enhances left-hemisphere dominance over the right. The left hemisphere is analytical and rational, and is associated with self-control and 'positive emotions'. Conversely, the right hemisphere is more inclusive but is also more vulnerable to emotional confusion. Dampening the right hemisphere thus improves mood and a sense of control.

A front-back inhibition also occurs. The 'rational' pre-frontal cortex inhibits the 'emotional' limbic system deep in the brain. The orbitofrontal cortex is highly active when we focus and use language, and the 'naming' function in meditation enhances this effect. fMRI shows that naming unpleasant emotional states results in a down-regulation of the amygdala. This means that even a few seconds of mindfulness ('Stop, look and evaluate') can speed up a return to emotional baseline after an over-

reaction. Over time this can be trained to become an automatic response, requiring little cognitive intervention.

So far, I haven't presented any substantial proof that meditation works. I've just presented some of the theories by which it *could* work. Let's now look at what the researchers, as opposed to the popular writers, are saying.

How good is the science?

"There is a widespread belief that meditation practice is scientifically certified to be good for just about everything", said Linda Heumann in her recent fine article in Tricycle magazine.[1] Mindfulness has gained respectability from the simple fact that so much research is being done on it, but how good is the science? Has journalistic and researcher exaggeration and hype inflated the public perception of mindfulness?

Many think so. Scott Bishop said: 'The popularity of MBSR grew in the absence of rigorous evaluation.'[2] Willoughby Britton is a clinical psychologist and neurological researcher in the field. When interviewed by Heumann above, she said: "The public perception of where the research is at is way higher than the actual level." Britton said that the public could be better educated in understanding the levels of rigour in science. "Because they don't know how to interpret science, they assume much higher levels of evidence" than is actually present.

Britton said the first level of science is a 'pre-post' study: the participant takes a questionnaire before and after an 8-week mindfulness course. If there is improvement, we know that something positive happened, but can we attribute that to the meditation? Is the practice the active ingredient or not?

Britton says that the benefits may have come from the social support factor of a group; or the presence of an inspiring teacher; or the placebo expectation of benefits; or the normalisation of symptoms; or the mood-lifting effect of just doing something. Moods moreover are fluid and a person could easily feel better after two months because of changes in her life circumstances, or simply because summer was coming.

Another problem is researcher bias. Researchers frequently try to use science to confirm what they already believe to be the case. If that person

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[1] Linda Heuman. 25 April 2014. www.tricycle.com/blog/meditation-nation

[2] Bishop. S. et al. 2004.

also has some professional involvement in mindfulness, there can well be a conflict of interest. This issue also applies to journalists who want another headline story on the miracle of mindfulness to further their careers. Nearly everyone in the field, including myself, faces this kind of conflict of interest or unconscious bias.

The common problems with most mindfulness research relate to the small size of studies; the lack of replication or peer-review; the lack of double-blinding or wait-listing; the selection criteria; the questions of dosage, durability and size of effect; the exclusion of confounding effects (such as relaxation); over-reliance on dubious self-reporting questionnaires; poor monitoring of participant adherence to practice protocols, and finally the lack of comparisons with other treatments. An enthusiastic new report in the media about the promise of mindfulness could have ignored or trivialised all of the issues in these last three paragraphs.

Fortunately we can trust some scientists to evaluate the science itself. We can't ever take the results from a single paper at face value, but the meta-analyses that summarise the conclusions from hundreds or thousands of papers are far more reliable. One of these meta-analyses reviewed nearly 20,000 research papers, and it has given us the very best positive evidence yet for mindfulness.

In 2014, Goyal et al. concluded: 'Mindfulness Meditation programs had moderate evidence of improved anxiety, depression and pain, and low evidence of improved stress/distress and mental health-related quality of life.'[3]

This suggests that mindfulness has virtually no proven benefits except for anxiety, depression and pain, and that these benefits are only 'moderate'. The results are hardly resounding but they do seem to be reliable, and this does make mindfulness promising for perhaps 10-20% of the population. They also match my experience as a teacher. I never claim that meditation will be able to help with anything other than anxiety, depression, pain and *insomnia*. I tell people with medical problems that mindfulness will be most useful in reducing the accompanying anxiety, but that a cure is unlikely.

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[3] Goyal et al. 2014. pp 357-368. The following sentences are not quite so encouraging: 'We found … insufficient evidence of any effect on positive mood, attention, substance use, eating habits, sleep, and weight. We found no evidence that meditation programs were better than any active treatment (i.e. drugs, exercise, and other behavioural therapies).'

Goyal's study is impressive because of its very high scientific standards. I have to repeat what I said before: it gives the very best positive evidence for the benefits of mindfulness that I have ever come across. Unlike other meta-analyses I have read, Goyal *did* find some genuine high quality trials but their final figures are damning. They accepted only 47 out of the 18,753 studies they reviewed.

This means that they rejected 97% of the studies as inadequate. Many of those rejects would have been talked up in the media, and would have contributed to the popular confidence in mindfulness. If we consider all the studies that were done but left unpublished because they produced no positive results, and the tens of thousands of shonky studies done in the last century, we get a very bleak picture. I would generously estimate that only 1% of the research on mindfulness is worth looking at twice.

In 2007, the University of Alberta's Evidence-Based Practice Center in Canada published a meta-analysis of the best 813 studies available at that time. It concluded that *none* of them achieved the standard of good research, but it did identify two issues that explained why. It argued that these will have to be clarified if mindfulness is ever to deserve scientific respect. These two issues are: 1. There are no generally accepted definitions of meditation. 2. There are no good hypotheses about how it works.

These are two axiomatic requirements for any science. Mindfulness hasn't yet got to first base, which partly explains the poor level of scientific evidence. Another meta-analysis puts it this way: "We conclude that to arrive at a comprehensive understanding of why and how meditation works, emphasis should be placed on the development of more precise theories and measurement devices."[4]

If mindfulness is to gain credibility, it will need to trim itself down to a workable definition and a hypothesis capable of being tested. Above all, it needs good technical terms free of ambiguities and contradictions. Otherwise, the word 'mindfulness' will go on meaning all things to all people, and will justifiably invite a backlash sooner or later. At some point, I think researchers will also need to differentiate between *sati* as 'attention and evaluation', and *sati* as 'a state of nonjudgmental acceptance' if they want to learn anything at all from what the Buddha actually said.

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4   Sedlmeier, Eberth et al. 2012.

The question finally comes down to what degree of proof we personally find acceptable. Do we have a high standard for proof or a low one? For reasons of professional integrity, I demand a high standard of proof. I admit that I am more difficult to please than most. Despite being a meditation teacher, I not want to be seen as another New Age enthusiast who will believe anything!

Whenever I find scientific claims in popular books or the media, I try to trace them back to their original sources in the research literature. I usually find that the claims are based on single trials that use far more nuanced expressions such as: 'a small but statistically significant increase.' When I read the fine print, even that modest effect tends to dissolve into the special circumstances of the trial. I've now read hundreds of the scientific papers. As a non-professional, I find it hard to precisely evaluate any of the claims beyond the abstract on the first page.

I have my own rough standards for interpreting scientific claims about mindfulness. These are: 1. Don't believe anything that comes from a single study. There is no possible way that all design faults could be eliminated. That only comes from multiple trials. 2. Don't trust any claim that does not refer to a traceable study. 3. Don't trust 'Chinese whispers' generalisations such as, 'Researchers now believe that…' Far too many researchers are willing to give credence to poor quality studies.

Finally, don't trust claims based on popular opinion or even widespread usage. Science is about proof not popularity. The histories of medicine and psychology are full of fads, and the resounding popularity of bloodletting over centuries was never a proof of its efficacy.

If Google, Monsanto and the US military have big mindfulness programs, this doesn't prove anything. The placebo and popularity effects can only go so far in mitigating a misplaced belief. Mindfulness is promising, but don't stop seeing your doctor just yet.