



# How to measure mindfulness

Since mindfulness practices are becoming increasingly used in clinical applications it is therefore incredibly important to be able to measure mindfulness.

But how do we measure something that is so intangible?

From psychometric scales to interviews, there are many different ways of measuring Mindfulness. At least 11 instruments are created to measure mindfulness. Here are a few common scales:

## Types of Scales

### 1. Five Factors Mindfulness Questionnaire (FFMQ) ([http://www.isps-dk.dk/Documents/Arrangementer/Five\\_Facet%20fra%20Ross%20White.pdf](http://www.isps-dk.dk/Documents/Arrangementer/Five_Facet%20fra%20Ross%20White.pdf))

*Baer et al (2006)*

Foundation: Mindfulness as a trait

Measuring: Mindfulness is related to five specific components

- (i) Observing
- (ii) Describing
- (iii) Non-judging of inner experience
- (iv) Acting with awareness
- (v) Non-reactivity to inner experience

### 2. Mindfulness Attention Awareness Scale (MAAS) (<http://www.ppc.sas.upenn.edu/mindfulnessscale.pdf>)

*Brown and Ryan (2003)*

Foundation: Mindfulness consists only of an attentional aspect (one-dimensional)

Measuring: Individual differences in the frequency of mindful states over time.

Method: 15-items self-report questionnaire  
6-point Likert scale from 1 (almost always) to 6 (almost never)  
Higher scores reflect more mindfulness

Further: Children and adolescent versions available

### 3. Kentucky inventory of Mindfulness Skills (<http://www.mindfulness-extended.nl/content3/wp-content/uploads/2013/07/KIMS-E-EN.pdf>) (KIMS)

*Baer et al (2004)*

Foundation: 4 mindfulness components:

- (i) Observing
- (ii) Describing
- (iii) Acting with awareness
- (iv) Accepting without judgment

Method: 39-item self-report inventory  
5 point Likert scale from 1 (never) to 5 (always true)  
Higher scores reflect higher levels of mindfulness skills

### 4. The Toronto Mindfulness Scale (TMS)

([http://www.newharbingeronline.com/excerpts/psychologyMomentMoment/Toronto\\_Mindfulness\\_Scale.pdf](http://www.newharbingeronline.com/excerpts/psychologyMomentMoment/Toronto_Mindfulness_Scale.pdf))

*Lau et al (2006)*

Foundation: Mindfulness as a state

Measuring: Mindfulness in a given situation

Method: 13-items self-report scale  
5-point Likert scale from 0 (Not at all) to 4 (Very much)  
Items contribute to a curiosity score and a decentering score

### 5. Effects of Meditation Scale (EOM)

*Reavley & Pallant (2009)*

Foundation: Mindfulness includes meditation and meditative experiences

Measuring: Two sub-scales  
(i) Experiences during meditation (EOM – DM)  
(ii) Effects of meditation in everyday live (EOM – EL)

### 6. Developmental Mindfulness Survey (DMS)

*Salloway & Fischer (2007)*

Foundation: Mindfulness is one-dimensional

Measuring: Prior difficulty ranking of the items

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## Which scale is better?

The answer seems to be dependent on the **research context and purpose** (Sauer et al, 2013). This is mainly because there is a **lack of common ground** when defining mindfulness. They all employed a variety of theoretical approaches such as the Buddhist philosophy or modern scientific perspectives. This makes it very difficult to grasp mindfulness as a whole.

For example, TMS is more useful for measuring state-mindfulness while KIMS and MAAS provide a general mindfulness score and are more suited for measuring trait-mindfulness. On the other hand, FFMQ measures specific components of mindfulness by integrating with other existing scales to differentiate specific components of mindfulness. Some scales such as the DMS are relatively new with little external validation and will require more empirical support.

Still, MAAS received the strongest support and KIMS and MAAS remain as the most common scales used by researchers.

## What is the problem?

Using psychometric scales is really beneficial from a researcher's point of view. It is convenient, quick and easily applied with well-known methodology and empirical support. But we need to realise that heavily relying on self-report questionnaires can create other problems. First, these types of questionnaires are based on introspective self-perception. We know people demonstrate a **better-than-average effect**. Hence, how would you know the standard of your own mindfulness without any prejudices?

Secondly, there could be a **shifting baseline** associated with your experience. Experts may realise how little they know about mindfulness while novices may think they know it all.

Finally, a **social desirability effect** can prevent a true reflection on the attitude about mindfulness where participants just want to fit in.

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# Therapies

**Mindfulness Based Interventions** (MBIs) are becoming increasingly popular in society. Findings suggest that MBIs which are otherwise known as "**Third Wave Therapies**" are effective treatments for several **disorders** and **somatic illnesses** such as mood and anxiety disorders and the reduction of psychological symptoms in cancer patients (Hofmann et al, 2010). There are multiple approaches designed to improve one's mindfulness techniques, please read below for more information on specific interventions.

## Mindfulness Based Stress Reduction

### Stress Reduction Kit



Directions:  
1. Place kit on FIRM surface.  
2. Follow directions in circle of kit.  
3. Repeat step 2 as necessary, or until unconscious.  
4. If unconscious, cease stress reduction activity.

The Mindfulness Based Stress Reduction (MBSR) programme was developed by Dr Jon Kabat-Zinn in 1979. Behaving as a psycho-educational intervention, the intention of MBSR is to teach individuals how to live in the present by practising mindfulness meditation techniques and combining this with gentle yoga and mind-body exercises. The programme lasts two months and individuals are required to meet weekly for approximately 2 – 2.5 hours at a time. Around 30 people gather in a classroom to practice mindfulness techniques and hold group discussions about their practices with the helpful guidance of an instructor. Additionally, MBSR includes a Day of Mindfulness which provides participants with the opportunity to silently practice meditation and yoga for several hours without being disturbed. In the sessions, participants typically learn mindfulness breathing, walking and paying attention to all of their senses.

### The efficacy of MBSR

Nyklíček and Kuijpers (2008) used a randomised controlled trial to compare the effects of MBSR to a waiting list control condition. The MBSR condition completed a typical 8 week MBSR programme, while those in the control group were on a waiting list for the entirety of the programme. 60 individuals took part in order to establish its effect on psychological well-being and quality of life. The intervention demonstrated significantly reduced feelings of stress and increased feelings of both positive affect and quality of life. In addition the authors concluded by suggesting the mindfulness therapy was a mediator for the aforementioned improvements.

### Clinical applications of MBSR

- Vollestad, Sivertsen and Nielsen (2011) reported **significant improvements on measures of anxiety and symptoms of depression** in patients with anxiety disorders after completing an 8 week MBSR programme compared to individuals in the waiting list condition. Furthermore, gains were maintained at six months follow-up.

## Mindfulness Based Cognitive Therapy

Mindfulness-Based Cognitive Therapy (MBCT) was adapted from MBSR by Segal, Williams and Teasdale (2002). Similarly to MBSR, the intervention lasts eight weeks and requires meeting weekly for two hours. MBCT was originally formulated to prevent the relapse of major depression. It utilises cognitive behavioural techniques and mindfulness exercises which teach participants to notice and identify thoughts and see them as "just thoughts" when depression becomes overwhelming. To find out more information about MBCT read this:



(<http://www.mbct.com/Index.htm>)<http://www.mbct.com/Index.htm> (<http://www.mbct.com/Index.htm>)

### The efficacy of MBCT

Two papers that were written by the developers of MBCT argued their results indicated a reduction of relapse by 50% among a clinical sample of depressed patients after being in the treatment condition (Ma and Teasdale, 2004; Teasdale et al, 2000). In addition, the UK National Institute of Clinical Excellence has recently endorsed the treatment intervention as being effective for the clinically depressed.

### Clinical applications of MBCT

A recent study wished to examine the effects of MBCT on depressive patients who either were or were not in a current state of **depression**. A randomised control trial

compared 102 patients in the MBCT and treatment as usual (TAU) group to 103 patients in the TAU alone group. Measures of the Beck Depression Inventory, rumination, worry and mindfulness skills were recorded. The results demonstrated patients in the MBCT + TAU group reported less depressive symptoms, worry and rumination and an increased level of mindfulness skills in comparison to the TAU alone group. The authors conclude by suggesting **MBCT is effective for patients who are both currently depressed and patients in remission.**

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## Acceptance and Commitment Therapy

In the 1980's Steven Hayes developed Acceptance and Commitment Therapy (ACT - said as one word, not letters), an empirically based psychological intervention. It is based on the relational frame theory (RFT); a comprehensive theory of human language and cognition (For more information on RFT please read: ([http://www.actmindfully.com.au/upimages/rft\\_simplified.pdf](http://www.actmindfully.com.au/upimages/rft_simplified.pdf))[http://www.actmindfully.com.au/upimages/rft\\_simplified.pdf](http://www.actmindfully.com.au/upimages/rft_simplified.pdf) or href="[http://contextualscience.org/theoretical\\_roots](http://contextualscience.org/theoretical_roots)")> ([http://contextualscience.org/theoretical\\_roots](http://contextualscience.org/theoretical_roots))[http://contextualscience.org/theoretical\\_roots](http://contextualscience.org/theoretical_roots) ([http://contextualscience.org/theoretical\\_roots](http://contextualscience.org/theoretical_roots))). Hayes describes ACT as a third wave therapy that combines commitment and behaviour-change strategies with mindfulness and acceptance techniques to increase psychological flexibility. Psychological flexibility is the idea that an individual should live consciously in the moment and change or continue behaviours dependent upon a given situation. A reductionist approach is discouraged as one is likely to miss the nature of the problem if symptoms are avoided; this has the potential to create a clinical disorder. Thus, instead of learning to control one's thoughts and behaviours (as in CBT), one is encouraged to notice and accept these thoughts and behaviours. This notion contrasts with Western psychology since it makes no attempt to reduce symptoms; instead symptom reduction is a by-product of the therapy (Harris, 2009: Actmindfully.com).

According to ACT, there are four concepts that **promote psychological distress** in an individual. These are easily remembered thanks to the **FEAR** acronym which stands for:

- Fusion of your thoughts
- Evaluation of your experiences
- Avoidance of your experiences
- Reasons for your behaviours

In order to **reduce distress** one should ACT:

- Accept your reactions and be present in a situation
- Choose and define a valued direction
- Take action towards these valued directions

## There are six core treatment principles to ACT

**Contacting the present moment:** Staying consciously connected and engaged with the here and now rather than becoming distracted with thoughts of the past or future. To remain present in the moment requires great awareness of both our surroundings and our inner selves.

**Cognitive defusion:** This attempts to reduce the effect undesirable thoughts have on an individual. There are an extensive number of techniques to help with this procedure, for example, by repeating words aloud until they lose all meaning.

**Acceptance:** This involves embracing thoughts, feelings and emotions that may upset us or cause us pain. One does not need to like these feelings but one should allow themselves to experience them nonetheless. For example, anxious people are encouraged to fully experience their anxiety rather than defending against it.

**Values:** An individual will consider what is of the utmost importance to them in numerous domains such as family, health and spirituality. They will not consider possessions but their interpersonal experiences and their desired qualities. Once their values are established, they can work towards attaining their goals and achieving a lifestyle that demonstrates these values.

**Self-as-context:** The ability to observe one's self; being fully aware of what they are experiencing at a given moment.

**Committed Action:** Doing what it takes to achieve a life that is rich with the values they desire even if pain arises; this is referred to as values-guided action. Many interventions may be promoted with this core principal if it supports an enriched lifestyle. Examples of these interventions include: goal setting, time management and learning to be assertive.

The six core principals do not work independently of one another; they all work together to create psychological flexibility.

**Highly recommended link** (particularly pages 9-11):

([http://www.actmindfully.com.au/upimages/act\\_made\\_simple\\_introduction\\_and\\_first\\_two\\_chapters.pdf](http://www.actmindfully.com.au/upimages/act_made_simple_introduction_and_first_two_chapters.pdf))[http://www.actmindfully.com.au/upimages/act\\_made\\_simple\\_introduction\\_and\\_first\\_two\\_chapters.pdf](http://www.actmindfully.com.au/upimages/act_made_simple_introduction_and_first_two_chapters.pdf)

## Measures for ACT

An extensive list of measures that have potential relevance to ACT have been compiled by Ciarrochi and Bilich for the University of Wollongong. For more information see here: (<http://integrativehealthpartners.org/downloads/ACTmeasures.pdf>)<http://integrativehealthpartners.org/downloads/ACTmeasures.pdf>

The **Acceptance and Action Questionnaire** (Hayes et al, 2006) is arguably the most well-known measure for this therapy as it establishes both mental health and the behavioural effectiveness using a 7-point Likert scale

## The efficacy of ACT

There has been an increase in the number of studies that support the use of ACT for several disorders. Powers, Vörding and Emmelkamp (2009) conducted a meta-analysis on 18 randomised controlled ACT trials to establish the efficacy of established treatments such as CBT and control conditions which include waiting lists, placebos and their current treatment. Their findings suggest ACT is superior to control conditions but it was not more effective than established treatments. Furthermore, it was not effective for treating distress related disorders such as anxiety or depression. Contrastingly, Öst (2008) found ACT was superior to established treatments. This discrepancy may be due to the inclusion of several different studies in the two review papers.

## Clinical applications of ACT

- Twohig, Hayes and Masuda (2006) reported a clinically significant **reduction in compulsions** for patients with **OCD** after 8 ACT sessions.

- Forman et al (2007) randomly assigned individuals with moderate to severe levels of **anxiety or depression** to either traditional cognitive therapy or to ACT. Improvements were equivalent between the two groups on **reducing depression, anxiety**, functioning difficulties and **improving quality of life** and satisfaction. The authors suggested ACT was equally effective compared to cognitive therapy.

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## Dialectical behaviour therapy

Borderline personality disorder (BPD) is characterised by impulsivity and instability with self-image, interpersonal relationships and emotions. Dialectical behaviour therapy (DBT) was developed by Marsha Linehan specifically for people with BPD, particularly those who self-harm or have suicidal tendencies; up to 10% of patients with BPD commit suicide (Lieb et al, 2004). DBT theorises that some individuals have more intense reactions to emotive situations. As a result, it takes them significantly longer to reduce their arousal levels back to baseline. DBT attempts to teach methods of coping with these intense emotional charges.

DBT programmes on the NHS offer treatment for a year. It usually involves weekly individual sessions and group sessions. In addition, patients are given an out-of-hours contact number if their symptoms worsen. The therapists will continuously discuss the patients progress with fellow therapists in order to establish progress. There is great importance weighted on the relationship between the patient and the client.

In DBT you are taught two main techniques adapted from CBT to change those unhelpful thoughts:

**Acceptance techniques:** Understanding the things that you do and what makes you a person. The therapist will explain that your behaviour makes sense, even if it is not in your best interest; for example, using drugs. You must accept that these actions are how you have learned to deal with difficult situations.

**Change techniques:** You are encouraged to learn more effective ways of dealing with the intense emotions by replacing any harmful behaviours you exhibit with more positive actions.

### This is a really good website for more information:

(<http://www.mind.org.uk/information-support/drugs-and-treatments/dialectical-behaviour-therapy/about-dialectical-behaviour-therapy>)<http://www.mind.org.uk/information-support/drugs-and-treatments/dialectical-behaviour-therapy/about-dialectical-behaviour-therapy> (<http://www.mind.org.uk/information-support/drugs-and-treatments/dialectical-behaviour-therapy/about-dialectical-behaviour-therapy>)

**This video depicts a DBT session with Marsha Linehan and a suicidal patient:** (Apologies for the expletive)

## The efficacy and clinical applications of DBT

Priebe et al (2012) aimed to assess both the effectiveness and cost-effectiveness of DBT in **reducing self-harm** in 40 female patients. They were randomised to either the DBT condition or the treatment as usual (TAU) condition. The results demonstrated for every two months completed in DBT, the risk of self-harm decreased by 9% relative to TAU. Though the DBT treatment cost on average £2000 more in total compared to TAU it does seem effective in reducing the risk of self-harm.

DBT has been recommended for female patients by the National Institute for Health and Clinical Excellence. For more information:  
<http://www.nhs.uk/Conditions/Borderline-personality-disorder/Pages/Treatment.aspx> (<http://www.nhs.uk/Conditions/Borderline-personality-disorder/Pages/Treatment.aspx>)

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## Criticisms of Mindfulness Based Interventions

In order to improve the research on mindfulness, it is necessary to establish a clear operational definition of the concept (Dimidjian and Linehan, 2003). As this has not yet been established it has hindered both the progress and the quality of the research in the field. Dunkley and Del Loewenthal (2013) argue that many therapists are aware of the importance of having personal experience with mindfulness techniques. However, they often fall short in being able to communicate why the skill will be beneficial. Furthermore, many papers are called under scrutiny due to methodological weaknesses. One major limitation to the mindfulness research is the apparent lack of studies that compare an active comparison condition (rather than a waiting list condition) to a Mindfulness Based Intervention hence the need for further scientific research (Vollestad, Sivertsen and Nielsen, 2011; Roemer and Orsillo, 2003).

## Therapists qualifications

With regards to MBSR, Brantley (2005) suggested that a qualified instructor would have a **Master's degree** in a health or education field; would have at least **three years of personal mindfulness practice**; spent at least two weeks on an **intensive mindfulness meditation** retreat; spent a significant amount of time practising yoga and finally would have completed an MBSR training programme. A similar practice is suggested for MBCT. DBT does not require therapists to have a personal formal meditation practice, yet they are required to practice mindfulness daily and be a member of a clinical team for consultation purposes. However, as mindfulness is such a personal experience, how can we be sure that the instructor has spent a significant amount of time practising these techniques?

**Thought-provoking question:**What are the differences between DBT and other Mindfulness therapies?

Therapy	Duration	Application
MBSR	Two months	<ul style="list-style-type: none"><li>• Reduce anxiety and depressive symptoms</li></ul>
MBCT	Two months	<ul style="list-style-type: none"><li>• Reduce depressive symptoms in individuals currently depressed and in remission</li></ul>
ACT	From 6-8 sessions to months, dependent on the individual	<ul style="list-style-type: none"><li>• Reduce compulsive behaviours in OCD</li><li>• Reduce anxiety and depressive symptoms</li><li>• Improves an individual's quality of life and satisfaction</li></ul>
DBT	One year	<ul style="list-style-type: none"><li>• Reduce tendency to self-harm</li></ul>

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## Applying Mindfulness

### Mindfulness and OCD

*Article used:* The Effectiveness and Acceptability of Mindfulness-Based Therapy for Obsessive Compulsive Disorder: A Review of the Literature (Hale, Strauss and Lever Taylor, 2012)

Obsessive-Compulsive disorder (OCD) is an anxiety disorder characterised by unwanted and persistent thoughts, impulses or images. A compulsion is often a repetitive behaviour such as washing your hands continuously or repeatedly checking that the oven is turned off. These compulsions are carried out in order to reduce the anxiety and distress an individual may feel with regards to the obsessive thoughts they have.

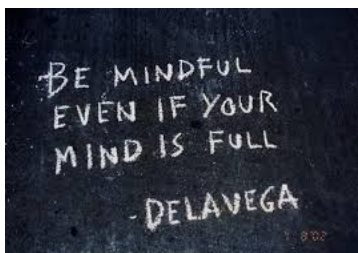
Most people with OCD are treated with cognitive behaviour therapy however there is a reportedly high drop-out rate. However, Hale, Strauss & Taylor (2012) describe mindfulness as a promising intervention for reducing the symptoms of OCD and as a result it also improves the patients quality of life. A weakness of the methodology is the small sample size used however it does highlight a positive relationship between OCD and mindfulness and therefore encourages more research to be conducted on this area.

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### Mindfulness and Depression

*Article used:* Preliminary Long-Term Follow-up of Mindfulness-Based Cognitive Therapy-Induced Remission of Depression (Munshi, Eisendrath and Delucchi, 2012)

People with depression report a significantly lower satisfaction in life plausibly mediated by the fact that they constantly feel tired, listless and lethargic. As a result of this, many studies have focused on the prevention of relapse when considering the treatment of depression. Munshin, Eisendrath & Delucci (2012) reportedly found patients with significant depressive symptoms decreased their level of ruminating and anxiety-provoking behaviours while increasing their mindfulness levels after being treated with mindfulness based cognitive therapy. These results were also found at a follow up 58.9 months later. This strongly suggests the treatment was effective. Although the study could be improved by including more than 18 patients it nevertheless highlights the potentiality that mindfulness can be an effective treatment for depression.



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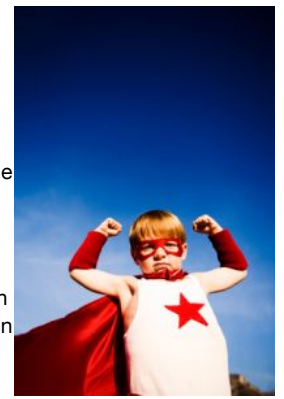
### Mindfulness and Self-Esteem

The application of mindfulness is not limited to clinical problems such as OCD, depression and chronic pain. Mindfulness can also be applied in our everyday life, for example, self-esteem. Self-esteem is related to a wide range of psychological outcomes including social confidence, pro-social behaviour, positive emotion and levels of life satisfaction.

So how does mindfulness affect our self-esteem?

A recent study by Pepping et al (2013) examined the relationship between mindfulness and self-esteem. The first part of the study examined which five components of mindfulness from FFMQ would predict self-esteem. The second part of the study examined the effect of a brief mindfulness induction on state self-esteem.

The first part of the study showed that four out of the five facets of mindfulness are related to self-esteem. High scores in non-reactivity, awareness, labelling and non-judging of experience showed a higher self-esteem and higher life-satisfaction rate. The result from the second part of the study also demonstrated that enhancing mindfulness led to a positive change in self-esteem and mindfulness has direct positive effects on self-esteem. Hence, mindfulness on self-esteem can lead to other positive psychological outcomes beyond self-esteem.



To conclude:

- Mindfulness represents a non-defensive strategy to regulate distress and increase self-esteem.
- Mindfulness assists individuals to develop secure high self-esteem and lower competence-based self-esteem.
- Improvements from mindfulness can be explained due to the attitudes individuals adopted to perceive thoughts and emotions and they were better to let go of negative thoughts.
- Since the results relied on self-report measures there will be variations and biases between individuals.
- The relationship between mindfulness and life satisfaction is complex and other mediators can change this association.
- The mindfulness group was only briefly exposed to mindfulness meditation. Therefore, it is hard to conclude whether the effectiveness of mindfulness in self-esteem would be temporary or permanent.

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## Mindfulness and Cognitive Performance

Cognitive abilities such as working memory capacity have thought to be fixed but recent training studies (Klingberg, 2010; Jaeggi et al, 2008) have shown that we are capable of enhancing these cognitive functions. However, studies failed to explain how improvements are possible from simple task-specific learning or strategies. Mind wandering is one of the abilities associated with impaired performances including the working memory capacity and fluid intelligence. It is defined as a shift of attention from a task to unrelated concerns.

Mrazek et al (2013) compared the effectiveness of mindfulness training and nutrition training for two weeks. The study tested a range of cognitive functions including mind wandering, reading comprehension and working memory capacity.

They found an increase in working memory capacity and improved reading comprehension on the GRE from mindfulness training. Enhanced performance as a result of mindfulness training can be explained through a reduction of distracting thoughts.

Hence, it seemed promising that mindfulness training improves cognitive function which was viewed as inflexible before. More importantly, mindfulness can be integrated into our daily activities and applied to a wide variety of settings. If we can redirect the skills learned from mindfulness training into our challenging tasks on a regular basis, then it seems to be an encouraging strategy for improving task focus and performance.

Still, before we jump to conclusions, we need to recognise that a variety of mechanisms can contribute to these changes. For example, in this particular study, the nutrition group also showed a slight lyimproved working memory capacity after two weeks of healthy eating. Therefore,



mindfulness might not be the only reason why working memory capacity was improved in this study.

Secondly, extensive practice on working memory capacity can generalise to increases in IQ and IQ can either improve or deteriorate throughout adolescence. So it is possible that the improvements in cognitive functions within the two week period are attributed to the slight changes in IQ or other confounding variables.

Lastly, it is hard to measure mind wandering. By using data based on self-report, the accuracy are questioned due to social desirability effects.

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## Neuropsychology

Studies have used different methods such as neuroimaging to understand what happens in our brain when we meditate and how these activations or lack of activation within our brain can produce functional changes both during and beyond the period of meditation.

Meditation has been associated with the activation of the dorsolateral prefrontal cortex (DLPFC), visual cortex, superior frontal sulcus, supplementary motor area and intraparietal sculus. More specifically, regional activation differences found between expert and novice meditators are associated in learning and memory processes, attention skills, emotional regulation and internal processing.

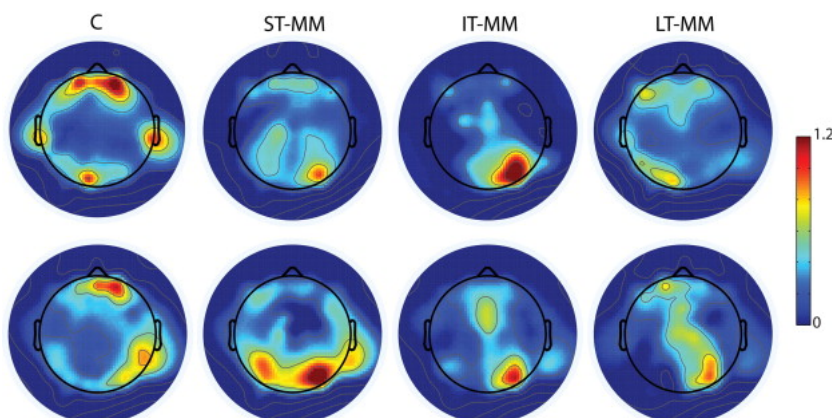


### Gamma Band Activities

Berkovich-Ohana et al (2012) examined the changes in default mode network activity within the gamma band EEG by comparing mindfulness meditation and healthy controls who had no prior meditation experience.

EEG results shows that mindfulness group exhibited lower frontal and mid-line gamma activities. The differences is more noticeable on the right hemisphere which is related to narrative self-references and the default mode network activity. An increase in right parieto-occipital gamma power in the mindfulness group also suggests an increase in attentional skills and is associated with awareness to internal and external sensory stimuli.

Overall, the findings support the idea that mindfulness induces from narrative self-referential processing towards an experiential self-reference processing.



An example of individual distributions of log gamma power ( $\mu V^2$ ) during RS. C=controls, MM= meditators.

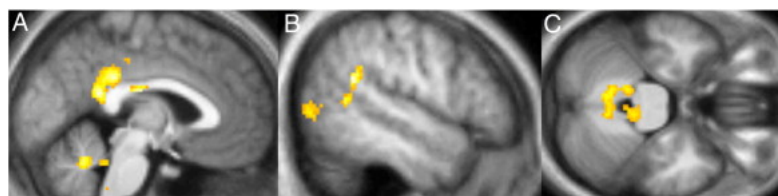
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### Grey Matter Density

Grey matter contains most of the brain's neuronal cell bodies. It undergoes development and growth throughout childhood and adolescence. An increase in grey matter means an improved functioning in the relevant area.

A controlled longitudinal study by Holzel and colleagues (2010) monitored the pre-post changes in grey matter concentration in an 8-week mindfulness based stress reduction (MBSR) programme.

After the 8-week MBSR programme, meditators showed a significantly greater grey matter concentration. The whole brain analysis showed increases in the posterior cingulate cortex, the temporo-parietal junction and the cerebellum in the MBSR group than controls. These brain regions are involved in emotional regulation, self-referential processing, integrating sensory perception and perceptual shift. More precisely, there are increases in grey matter concentration within the left hippocampus which is responsible for learning and memory processes. However, no significant difference was found in the insula, an area associated with the process of awareness.



Increase in gray matter concentration in the MBSR group from Pre- to Post-intervention in the exploratory whole brain analysis. A: cluster in the posterior cingulate cortex and cerebellum; B: cluster in the left temporo-parietal junction; C: cluster in the cerebellum and brainstem.



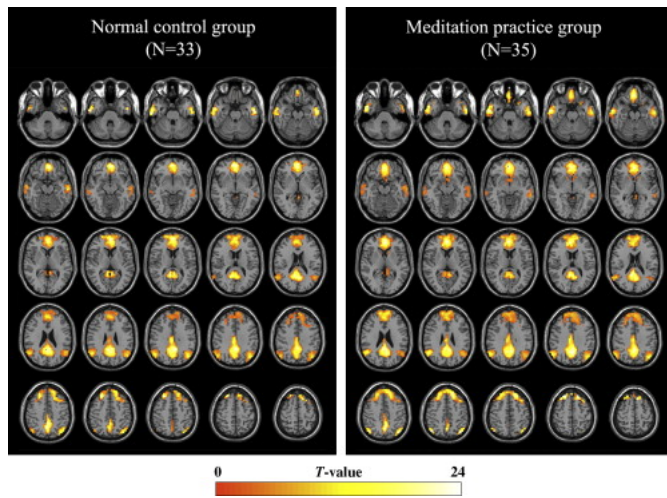
## Default Mode Network

The DMN is active when the individual is not focused on any external stimuli and correspond to self-referential thought.

Jang et al (2010) investigated the functional connectivity during resting state in meditation practitioners.

Data from an fMRI indicates that meditators have an increased functional connectivity in the anterior MPFC region. Meditators also showed a heightened activation in the default mode network (DMN). This result is in line with the benefits gained from mindfulness practice.

Given the results, Jang and colleagues concluded that long-term meditation practice may be associated with functional changes in regions related to attentional skills during and beyond the period of meditation.



Default mode network map for healthy controls ( $N = 33$ ) and meditation practitioners ( $N = 35$ ).

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## Criticisms

- It is noteworthy to mention that general exercise can also lead to structural changes in the hippocampus.
- Results from these studies may not be applicable to all situations e.g. Holzel and colleagues (2010) focused on structural changes during stress reduction. Hence, evidence from other domains are needed to further demonstrate any enduring structural changes in the brain that could support improved functioning.
- Different kinds of meditation target slightly different purposes. These differences might elicit a diverse pattern in functional connectivity or different degrees of structural changes.
- Many of these studies used young participants. To gain a more dynamic overview in structural changes in meditation, future studies could investigate the effects of mindfulness in older adults.

# Practical exercises

There are many practical exercises that you can complete in order to practice being mindful. Please click the link below for the exercises.

[Practical exercises](#)

## References

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## Summary



# MINDFULNESS

BY APAGE

## WHAT IS MINDFULNESS MEDITATION?

LIVING IN THE MOMENT



MINDFULNESS BEGAN AS A BUDDHIST TRADITION.

MINDFULNESS MEDITATION IS NOW RECOGNIZED BY PSYCHOTHERAPISTS AS A FORM OF COGNITIVE THERAPY.

IT'S A SEATED MEDITATION TECHNIQUE THAT FOCUSES ATTENTION ON BREATHING, BODILY SENSATIONS AND MENTAL RELAXATION.

WHAT MAKES MINDFULNESS UNIQUE FROM OTHER FORMS OF MEDITATION IS THAT THE PRIMARY FOCUS IS ON ONE'S CURRENT PHYSICAL STATE.

## HOW IT WORKS: THE SCIENCE OF MEDITATION

MINDFULNESS INVOLVES SIX NEUROPSYCHOLOGICAL PROCESSES THAT LEAD TO A PERSON'S MEDITATIVE STATE OF SELF-AWARENESS.





DECENTERING  
(LETTING GO OF THE EGO)

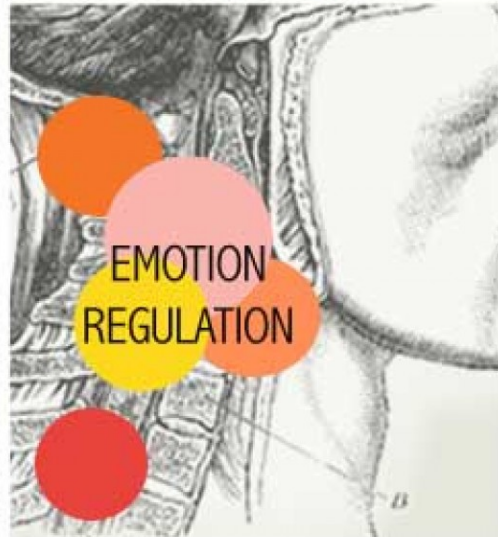


EXTINCTION &  
RECONSOLIDATION

(CHANGING BEHAVIORS OR  
ATTITUDES)



EMOTION  
REGULATION



PRO-SOCIAL  
BEHAVIOR



(A SENSE OF EMPATHY  
FOR OTHERS)

## THE MENTAL BENEFITS OF MINDFULNESS

MINDFULNESS INCREASES BRAIN GYRIFICATION (FOLDING OF BRAIN TISSUE), WHICH ALLOWS THE BRAIN TO PROCESS INFORMATION MORE EFFICIENTLY - PROVIDING A BETTER GRASP ON LIFE'S STRESSORS

FIGHTS  
PTSD

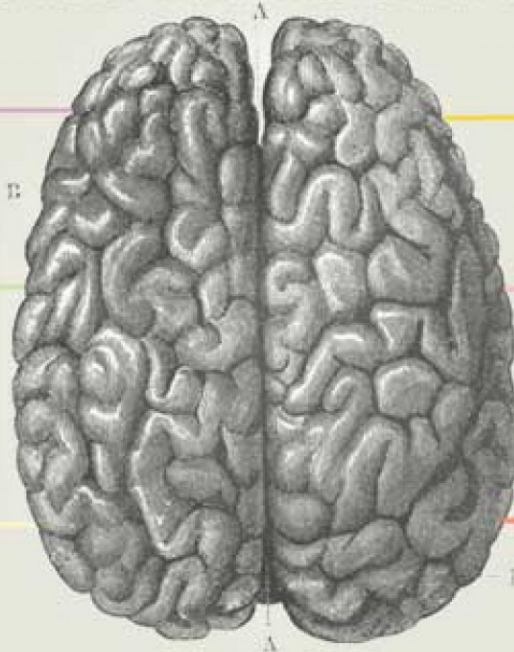
FIGHTS  
DEPRESSION

IMPROVES  
ACADEMIC  
PERFORMANCE

FIGHTS  
ANXIETY

HELPS  
REGULATE  
EMOTIONS

FIGHTS  
MEMORY  
LOSS



## THE PHYSICAL BENEFITS OF MINDFULNESS

IN ADDITION TO REDUCING STRESS AND BOOSTING RELAXATION, RESEARCH SUGGESTS MINDFULNESS CAN LOWER STRESS-INDUCED INFLAMMATION, WHICH CONTRIBUTES TO MANY PHYSICAL AILMENTS.

REDUCES  
RHEUMATOID  
ARTHRITIS

REDUCES  
HEART  
DISEASE  
RISK

FIGHTS  
CHRONIC  
PAIN

HELPS  
DIGESTIBLE



SLOWS  
HIV  
PROGRESSION

AIDS IN  
WEIGHT  
LOSS

IMPROVES  
SLEEP

LESSENS

IRRITABLE  
BOWEL  
DISEASE



COLD & FLU  
EFFECTS

<http://www.healthcentral.com/anxiety/cf/slideshows/16-ways-to-stop-stressing-out/say-om/>

<http://www.healthcentral.com/depression/c/458275/158946/healthcentral/>

<http://www.medicalnewstoday.com/releases/252204.php>

<http://www.medicalnewstoday.com/releases/255048.php>

<http://www.healthcentral.com/depression/c/4182/155892/meditation-good>

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