

How Mindfulness Meditation Can Improve Your Life

by

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EXECUTIVE SUMMARY

I researched mindfulness meditation for the final term paper of the Tufts University course Engineering Management 52: Technical and Managerial Communication.

The purpose of my research is to motivate readers to consider practicing mindfulness meditation so they can benefit from its positive effects.

In my research, I focused on (1) different types of meditation, (2) behavioral, cognitive, and neural effects of mindfulness meditation, and (3) some implications of these effects for children with low socioeconomic status, people with mental disorders and substance abuse disorders, and older adults.

Mindfulness meditation is the practice of directing attention to the present moment in a nonjudgmental way. Depending on the type of meditation, attention might be focused on a specific object or on the meditator's surroundings.

Mindfulness meditation has many beneficial effects. Researchers have shown that the behavioral effects of mindfulness meditation are improved self-control and improved sleep quality. The cognitive effects of mindfulness meditation are improved control over emotions and improved working memory capacity, which is involved in reasoning, comprehension, and executive functioning. The neural effects of mindfulness meditation are increased activity in brain regions involved in self-control, attention, and self-awareness. In addition, experienced mindfulness meditation practitioners have more efficient brain networks connecting these regions than individuals without mindfulness experience have.

These behavioral, cognitive, and neural effects have particularly important implications for (1) students of lower socioeconomic status, who could benefit from an increased working memory capacity, (2) people with disorders who could benefit from increased self-control, attention, self-awareness, and emotional regulation, and (3) older adults, who could benefit from preserving their intellectual capacity as their brain degenerates from age.

The effects of mindfulness meditation are not limited to those individuals. All individuals can improve their behavioral traits, cognitive performance, and the activity within their brains, any time, just by meditating mindfully.

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LIST OF INITIALISMS

ACC	anterior cingulate cortex
fMRI	functional magnetic resonance imaging
IBMT	Integrative Body-Mind Training
mPFC	medial prefrontal cortex
SES	socioeconomic status
WMC	working memory capacity

1.0 INTRODUCTION

1.1 Purpose

The purpose of this paper is to motivate the readers to consider practicing mindfulness meditation, so they can benefit from its positive behavioral, cognitive, and neural effects.

1.2 Scope

The scope of this paper is an introduction to mindfulness meditation and its effects. First, I address different types of mindfulness meditation and awareness. Next, I explain some behavioral, cognitive, and neural effects of mindfulness meditation. Then, I discuss the implications of some of these effects for children with a low socioeconomic status, people with disorders, and older adults. Finally, I conclude that the readers should consider practicing mindfulness meditation.

This paper does not include a discussion of specific meditation techniques, because different forms of meditation serve different purposes which vary by the practitioner's intent.

1.3 Definition of Mindfulness Meditation

Mindfulness meditation is the practice of directing attention to the present moment in a nonjudgmental way. This direction of attention differentiates mindfulness meditation from relaxation, because when individuals are relaxed, they allow their minds to wander.

The human mind wanders often, particularly during routine tasks such as taking a shower or commuting to work. As your mind is preoccupied with various thoughts, your body continues to function normally, as if you have activated your body's automatic pilot. Mindfulness begins when your mind stops wandering and returns to the present moment. During mindfulness, your mind is attentive to and aware of your body and its perceptions, sensations, thoughts, and feelings.

2.0 BASIC CONCEPTS OF MINDFULNESS MEDITATION

2.1 Types of Awareness Involved in Mindfulness Meditation

2.1.1 Mindful awareness

Mindful awareness is characterized by an openness to whatever thoughts may come to mind. During mindful awareness, meditators regulate attention by allowing thoughts to quickly and easily pass through the mind instead of trying to inhibit thoughts in the mind. (Raffone & Srinivasan, 2010)¹

2.1.2 Self-observational awareness

Self-observational awareness is characterized by curiosity, openness, acceptance, and love. During self-observational awareness, meditators investigate their thoughts. (Raffone & Srinivasan, 2010)

2.1.3 Reflexive awareness

Reflexive awareness is meta-awareness. It is the state of being aware of your awareness. During reflexive awareness, meditators seek to know their minds, without using effort or words. (Raffone & Srinivasan, 2010)

¹ See list of references for full citations.

2.2 Types of Mindfulness Meditation

2.2.1 Focused-attention meditation

Focused-attention meditation is a concentrative form of meditation. Meditators sustain their focus on a given object while detecting and disengaging from sources of distraction. (Raffone & Srinivasan, 2010)

2.2.2 Open-monitoring meditation

Open-monitoring meditation, also known as mindfulness-based meditation, is a reflexive form of meditation. Like meditators who practice focused-attention meditation, open-monitoring meditators disengage their attention from sources of distraction. However, instead of focusing on a specific object, open-monitoring meditators distribute their attention to their surroundings. This monitoring is nonreactive and nonjudgmental. (Raffone & Srinivasan, 2010)

3.0 EFFECTS OF MINDFULNESS MEDITATION

3.1. Introduction to Effects of Mindfulness Meditation

Mindfulness meditation has a number of positive effects. To study these effects, researchers have used mindfulness meditation training on various participants in various contexts. Through these studies, researchers have found that mindfulness meditation improves an individual's behavior, cognition, and neural activity and connectivity.

3.2 Behavioral Changes Related to Mindfulness Meditation

3.2.1 Reduced smoking and cravings after meditation training

Mindfulness meditation has beneficial effects on behavior, particularly in reducing behavior characterized by a lack of self-control. In a mindfulness training study, researchers randomly sorted smokers into either a mindfulness training group or a relaxation training group. Participants in the mindfulness group learned Integrative Body-Mind Training (IBMT), which involves training attention with an attitude of acceptance and openness. After two weeks of training, the mindfulness training group experienced significant behavioral changes: 60 percent reduced the percent of carbon dioxide in their lungs, and 30 percent quit smoking. The mindfulness group also reported a significant decrease in craving. The relaxation group, on the other hand, did not change their behaviors at all. (Tang, Tang, & Posner, 2016)

According to self-reports, smokers in the mindfulness group had no conscious intention to reduce smoking (Tang, Tang, & Posner, 2016). This subconscious change in behavior suggests that the effects of mindfulness meditation are not placebo effects—they are not influenced by expectations or desires—they are real.

Furthermore, in a follow-up study that took place one month later, researchers found that the smokers who had reduced their smoking behavior during the study continued to smoke less than they did before the study. The persistence of this effect is particularly promising for smokers because other studies have shown that if smokers can remain free of tobacco for one week, they will likely remain free of tobacco for six months. This persistence is also promising because it suggests that even temporary mindfulness meditation training is effective at changing behavior. In other words, smokers did not swap the habit of smoking for the habit of meditating; they used meditation as a means to overcome their smoking habit. And once the habit has been overcome, they no longer need to meditate if they do not wish to do so. (Tang, Tang, & Posner, 2016)

3.2.2 Improved sleep quality after meditation training

Mindfulness meditation also has beneficial effects on sleeping behavior. In a meta-analysis of randomized controlled trials, researchers examined the effects of mindfulness meditation training on participants with insomnia. They measured sleep in terms of quantity and quality. After 6 to 8 weeks of mindfulness training, participants reported significantly increased sleep quality (depth of sleep and general satisfaction

with sleep) compared to participants in the control group. However, researchers did not find a significant increase in sleep quantity. (Gong et al., 2016)

This meta-analysis is valuable for patients with insomnia because insomnia is associated with hypertension, cancer, and mental disorders such as anxiety and depression. The meta-analysis is also valuable for the average person, because sleep improves the function of the brain, immune system, metabolic system, and cardiovascular system. (Gong et al., 2016)

3.3 Cognitive Changes Related to Mindfulness Meditation

3.3.1 Improved regulation of emotions after meditation training

In addition to improving behavior, mindfulness meditation also improves cognitive performance, such as emotional regulation. Emotional regulation is the control over which emotions arise, when, and for how long. How emotions are experienced and expressed is also a matter of emotional regulation. (Tang, Tang, & Posner, 2016)

In a short study on emotional regulation, researchers randomly assigned college students to an IBMT group or a relaxation training group. Unlike the relaxation group, participants in the IBMT group reported lower negative affect, less fatigue, and higher positive feelings after training. IBMT participants also significantly improved their performance on executive control tasks. (Tang, Tang, & Posner, 2016)

Not only does this study indicate that mindfulness meditation can improve the way people regulate emotions, but also the study shows that this effect can be achieved

in a short amount of time (participants received only 20 minutes of training each day for only five days). (Tang, Tang, & Posner, 2016)

3.3.2 Improved working memory capacity after meditation training

Researchers have found that mindfulness meditation also affects the cognitive concept of working memory capacity (WMC). Working memory is the “mental workbench” upon which individuals briefly store and process information before shifting the information into short- and long-term memory. Working memory is involved in higher-level cognitive tasks such as reasoning, comprehension, and executive functioning. Similarly, working memory capacity (the amount of information that can be stored in working memory at a time) is strongly correlated with performance on processes involving reasoning, mathematical problem solving, language, and reading comprehension. (Quach, Jastrowski Mano, & Alexander, 2016)

Using a randomized controlled trial, researchers investigated the impact of mindfulness meditation on WMC in adolescents. Researchers randomly assigned participants to a mindfulness meditation group, a yoga group, or a control group. After 4 weeks of training, the mindfulness meditation group showed significant improvements in WMC, whereas neither of the other groups did. (Quach, Jastrowski Mano, & Alexander, 2016)

This finding is consistent with previous research on adult participants, which suggests that the effect of mindfulness meditation on WMC is not restricted to a specific age group (Quach, Jastrowski Mano, & Alexander, 2016).

3.4 Neural Changes Related to Mindfulness Meditation

3.4.1 Improved activity in self-control regions after meditation training

Furthermore, the effects of mindfulness meditation are not limited to behavior and cognition. Using neuroimaging techniques, researchers can investigate the correlation between mindfulness meditation and neural activity.

By comparing brain scans of smokers and nonsmokers, researchers have found that addiction symptoms (craving, impulsivity, compulsivity, negative mood, and stress reactivity) correspond to reduced activity in the anterior cingulate cortex (ACC) and adjacent medial prefrontal cortex (mPFC). These same regions are involved in higher-order functioning, emotional regulation, and self-control. (Tang, Tang, & Posner, 2016)

Researchers have explored the relationship between these brain regions and mindfulness meditation by conducting brain scans of participants who were randomly assigned to either a mindfulness meditation group or a relaxation control group. Unlike participants in the relaxation group, after five days of meditation training, participants in the mindfulness group showed increased activity in the ACC; after two weeks of training, they showed increased activity in the ACC *and* mPFC; and after four weeks of training, they showed an increase in the white matter tract connecting the ACC to other brain regions. (Tang, Tang, & Posner, 2016)

These studies show that mindfulness meditation not only induces *activity* in brain regions associated with self-control, but also mindfulness meditation induces *structural changes* in those brain regions. (Tang, Tang, & Posner, 2016)

3.4.2 Improved activity in attention regions after meditation training

Researchers have also investigated the neural effects of mindfulness meditation by measuring brain activity using functional magnetic resonance imaging (fMRI) before and after participants received mindfulness training. The fMRI results showed increased activation in the right dorsolateral prefrontal cortex, which is related to maintaining focus of attention; increased activation in the left caudate, which is related to direction of attention; and increased activation in the anterior insula, which is related to heightened self-awareness. Researchers also found that mindfulness training decreased activation in the rostral prefrontal cortex and right parietal area 3, which are related to mind-wandering. (Tomasino & Fabbro, 2016)

3.4.3 Improved network connectivity after meditation training

Although short-term mindfulness meditation improves brain activity and connectivity, long-term mindfulness meditation improves brain *efficiency*. Researchers have examined these long-term neural effects by studying experienced mindfulness-based yoga practitioners and experienced mindfulness meditation practitioners. They found that compared to a group with no mindfulness experience, the mindfulness-based yoga and mindfulness meditation practitioners had significantly more integrated and resilient brains, which means their brains function more efficiently and are less subject to cognitive decline. (Gard et al., 2014)

4.0 IMPLICATIONS OF MINDFULNESS MEDITATION FOR SPECIFIC GROUPS OF PEOPLE

4.1 Implications of Mindfulness Meditation for Students with Lower Socioeconomic Status

Researchers have shown that students with lower socioeconomic status (SES) perform worse than their higher-SES peers on tests of language, working memory, and executive functioning. Fortunately for these students, working memory is involved in language and executive functioning, and adolescents who received mindfulness meditation training significantly improved their working memory. This finding indicates that mindfulness meditation may improve academic performance by improving WMC. Because effective mindfulness meditation resources are easily available online, teachers could incorporate mindfulness meditation training in their school curriculum to improve the performance of their students with low SES at no extra cost to those students. (Quach, Jastrowski Mano, & Alexander, 2016)

4.2 Implications of Mindfulness Meditation for People with Disorders

Because mindfulness meditation has also been shown to improve self-control, reduce cravings, and increase activity in the ACC, mindfulness meditation training could be used to treat and prevent substance abuse and mood disorders. Self-control helps combat addiction symptoms such as craving and impulsivity, the latter of which is a risk factor not only for starting to use drugs but also for being vulnerable to drug abuse.

Furthermore, researchers have found reduced activity in the ACC of patients with substance abuse and mood disorders, which mindfulness meditation could improve. This effect has implications for both drug addictions—such as alcohol and cocaine addictions—and behavioral addictions—such as obesity, gambling, and even excessive internet use. (Tang, Tang, & Posner, 2016)

In addition, mindfulness meditation improves attention while decreasing mind-wandering, so mindfulness meditation training could also be used to treat attention hyperactivity disorders and anxiety-related disorders (Tomasino & Fabbro, 2016).

Finally, mindfulness meditation improves emotional regulation. Some mental disorders, such as depression, can be resistant to medications, so mindfulness meditation might be an effective alternative (Tomasino & Fabbro, 2016).

4.3 Implications of Mindfulness Meditation for Older Adults

Last, mindfulness meditation has implications for older adults. Studies have shown that older meditators outperform control participants of the same age in tasks that assess attention, short-term memory, speed of perception, and executive functioning.

Researchers have also found a negative correlation between age and gray matter volume in control groups but *not* in meditation practitioners of the same age. Plus, researchers have found that mindfulness is positively correlated with fluid intelligence and the integration and resiliency of brain networks. All these studies suggest that mindfulness meditation can reduce age-related cognitive decline and preserve

intellectual capacity with age. This implication is particularly relevant for a growing population with increasing life expectancies. (Gard et al., 2014)

5.0 CONCLUSION

Mindfulness meditation is worth practicing because mindfulness meditation induces positive behavioral, cognitive, and neural changes.

Perhaps you think these effects and their implications are not relevant to you. Perhaps you do not have an addiction such as smoking, a sleep disorder such as insomnia, or problems with emotional regulation. Perhaps you do not have problems stemming from deficits in working memory capacity, self-control, or attention. And perhaps you feel that you are too young to worry about preventing age-related cognitive decline. Nonetheless, you can still benefit from mindfulness meditation.

Mindfulness meditation is relevant to everyone. Not only can training allow disadvantaged individuals to reach the level of their peers, but also it can help individuals go *beyond* that level. You do not need to sleep poorly to sleep *better*, you do not need to have a short attention span to *lengthen* your attention span, and you do not need to wait for your brain to weaken to *strengthen* it. You can improve your behavioral traits, your cognitive performance, and the activity and connectivity within your brain, right now, just by meditating mindfully. It is simple, inexpensive, and effective. What do you have to lose?

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