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# MINDFULNESS MEDITATION IMPROVES COGNITION: EVIDENCE OF BRIEF MENTAL TRAINING

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## **Abstract:**

*While research has shown that long-term meditation practice of mindfulness improves executive functioning and the ability to maintain concentration, the effects of brief meditation training in mindfulness have not been thoroughly investigated. When compared to an active control group, we investigated whether brief meditation preparation affects cognition and mood. Participants with no previous meditation experience were tested with assessments of mood, verbal fluency, visual coding, and working memory after four sessions of either meditation training or listening to a recorded book. Both strategies were successful at improving mood, but exhaustion, anxiety, and increased consciousness were decreased only by brief meditation instruction. In addition, brief mindfulness training enhanced visuo-spatial awareness, working memory, and executive functioning dramatically. Our results indicate that 4 days of training in meditation will boost the ability to maintain attention; advantages previously recorded with long-term mediators.*

**Keywords:** *Mindfulness, Meditation, Cognition, Working memory, Mood, Attention, Meta-awareness.*

## **INTRODUCTION**

Improvements in cognitive performance and mood have been demonstrated by people who have received intensive meditation instruction. It has been found that long-term meditation practise enhances attentional and visuospatial processes. For example, 3 months of intense meditation training (10-12 h/day) enhanced the ability to maintain focus during a diagnostic listening exercise, as demonstrated by faster reaction times in response to a deviant tone and decreased blink responses in comparison to controls[1]. Moore and Malinowski (2009) found that, when compared to controls, self-reported mindfulness was positively associated with sustained focus in experienced Buddhist meditation practitioners.

In addition, in older adults, long-term meditation practise has been shown to decrease attention blink relative to age-matched and younger adults. Extensive meditation preparation improved

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activation in executive care networks in a study using neuro imaging that was associated with improvements in sustained focus and error monitoring[2]. Such results provide increasing proof of the promotion of higher-order cognitive processing through mindfulness meditation (MM), specifically aspects of conflict monitoring and cognitive control processes.

Mindfulness Related Stress Reduction (MBSR) services, which typically last 8 weeks and incorporate mindfulness meditation and gentle yoga, have been shown to enhance mood and affective processes and are linked to changes in the functioning of the immune system, stress, and emotional control. By focusing on automatic and complex stimuli, MBSR programmes are focused on teaching participants to respond non-judgmentally to stressful events. Top-down management systems monitor affective evaluations that contribute to a reduction in stress responses as participants cultivate these skills. A MBSR program supported reductions in stress ratings associated with decreases in the density of amygdala grey matter in an elegant review, presenting empirical proof of the beneficial effects of MBSR on stress[3].

### **IMPORTANCE OF MENTAL TRAINING**

MBSR services entail extensive time and financial effort, although they are beneficial for well-being. As a result, most people do not have the time or money to engage in intensive meditation interventions and few would prefer the monastic lifestyle that is often associated with contemplative Buddhists[4]. To understand the capacity of human consciousness, studying adept mediators is invaluable; however, it is important to investigate whether briefer formats of mental training can provide any of the advantages resulting from longer interventions.

MM is a mental exercise focused on concentrating on breath/body sensations while maintaining a calm state of mind. Distractions may occur during formal meditation practice and the mediator is taught to recognise discursive thoughts and return his/her attention to their breathing non-judgmentally. Training in mindfulness cultivates moment-to-moment perception of self and environment. To a degree, training in mindfulness increases meta-cognitive processing. Meta-cognition is the conscious understanding of mechanisms of cognitive regulation. Advances in meta-cognition are linked to the ability to restrict exogenously/endogenously guided, task-irrelevant knowledge from bottom-up processing[5]. To improve alerting and conflict monitoring, comprehensive training in mindfulness has been found, so mindfulness meditation training will hypothetically enhance meta-awareness. By teaching subjects to 'release' cognitive evaluations of irrelevant knowledge, this process improves the sustainability of attention. The cognitive advantages associated with mindfulness, however, have so far been limited to research investigating adept mediators.

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teaching subjects to “release 'cognitive evaluations of irrelevant knowledge, this process improves the sustainability of attention. The cognitive advantages associated with mindfulness, however, have so far been limited to research investigating adept mediators[6].A recent study showed that 3 days of MM preparation, relative to baseline and other cognitive manipulations, such as relaxation and a math distractor exercise, was successful at decreasing pain ratings and sensitivity, as well as anxiety scores. When compared to a placebo MM and control group, a similar training regimen increased mood and decreased heart rate.

The present research builds on our previous work by exploring whether it is possible to find the effects of brief meditation training on cognitive tasks with different criteria for working memory, sustained attention, visual coding, and verbal fluency. To assess working memory, processing speed, and executive focus, we used the Symbol Digit Modalities Test and the n-back task; the forward and backward digit interval to measure immediate attention span; and the Controlled Oral Word Association Test to measure verbal fluency. We predicted that these activities would be the most sensitive to the effects of meditation, based on prior study.We also anticipated that short MM training will promote positive mood, as assessed by the Center for Epidemiological Studies Depression Scale (CES-D), State Anxiety Inventory, and the Profile of Mood States, compared to a group listening to a book recording.

In comparing MM to placebo meditation and control interventions, a previous report, which examined brief MM preparation, found more pervasive mood changes. Listening to the book was intended to draw their attention in the current study and not supposed to influence the mood. It could have, however, acted as a calming practise, which may explain the reduction in negative mood after listening to the novel. In a new study investigating the effectiveness of mindfulness approaches, as compared to wait-listed participants, MBSR initiatives were not more successful than active control groups on mood outcomes.The association between mindfulness and cognitive improvement can be clarified by a variety of potential mechanisms. In comparison to controls, brief MM instruction decreased the fatigue and anxiety scores of participants. In affecting the processing of information, exhaustion and anxiety may be especially important[7]. However, it would be important to have more participants to better determine the relationship between these steps.

Prior studies with multiple sclerosis patients have found that fatigue adversely affects complex visual tracking speed measured by the Symbol Digit Modalities Test, 2-back task processing, and sustained attention on the Paced Auditory Serial Addition Test. Researchers discovered in two studies that both threat-induced and state anxiety impaired spatial but not verbal working memory in healthy undergraduates on a three-item n-back task. Given that exhaustion is the hallmark symptom of chronic fatigue syndrome, treatments that alleviate fatigue and anxiety and

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enhance vigilance, in addition to impairments in concentration and information processing, may also theoretically improve the efficiency of information processing.

MM is focused on the promotion of a balance between a state of mind that is calm and alert. A crucial factor in developing cognition has been found to be the capacity to self-regulate emotions. It is likely that after brief preparation, the relaxing effects of MM combined with the increased ability to concentrate on the current enhanced cognitive performance. MM preparation increases the perception of the present moment by teaching participants to note subtle distractions (feelings; thoughts; feelings) when taking focus back to the object of meditation regularly. This process will foster continuity of focus. Another example of why brief MM training enhanced cognition is related to the ability to regulate self-referential thought processing. Some have provided proof that networks converge between mindfulness, meta-awareness, executive functioning, and processes of mind-wandering. Mind-wandering negatively impacts cognitive efficiency by decreasing objective-directed focus oversight. Discursive thoughts become the main focus as the mind wanders, further decoupling attention directed towards the primary task[8]. This “automatic” process of mind-wandering suggests that there is a distinctive break in meta-awareness.

Meta-awareness is defined as the capacity to represent ongoing thoughts or mental states or be conscious of them. MM preparation is focused on teaching subjects to understand discursive thoughts and to return their focus gently back to the object of meditation. The immediate advantages of training in mindfulness meditation can be correlated with raising consciousness of ongoing cognitive states, which increases the efficacy of focus. As stated previously, the mood changes may also have improved the processing of information. In addition, recent results indicate that mood improvements can decrease mind wandering. Adverse mood, on the other hand, can result in rumination and more lapses in attention. We postulate that the mood changes of the meditation community may have led to decreased mind-wandering, demonstrated by substantial improvements in a variety of cognitive tasks and awareness scores[9].

## CONCLUSION

Our results apply to undergraduates and cannot be applied to older adults, but show hope that they can have a positive impact on attention tasks. In addition, the changes that the meditation community has shown could be due to the direct effects of only meditating in session four. The Hobbit listening group was a more involved control group than previous control groups (e.g. meditation on sham mindfulness), which can explain the absence of self-reported mood differences between groups. However, as compared to the monitors, the MM training group was substantially more effective at lowering anxiety and fatigue levels. Consistent and systematic meditation instruction facilitating lasting improvements in cognition and well-being is well

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known. Our results indicate that practicing mindfulness meditation has immediate, short-term advantages. Such advantages can have clinical consequences.

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