

# Study shows compassion meditation changes the brain

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by Dian Land

Can we train ourselves to be compassionate? A new study suggests the answer is yes. Cultivating compassion and kindness through meditation affects brain regions that can make a person more empathetic to other peoples' mental states, say researchers at the University of Wisconsin–Madison.

Published March 25 in the *Public Library of Science One*, the study was the first to use functional magnetic resonance imaging (fMRI) to indicate that positive emotions such as loving–kindness and compassion can be learned in the same way as playing a musical instrument or being proficient in a sport. The scans revealed that brain circuits used to detect emotions and feelings were dramatically changed in subjects who had extensive experience practicing compassion meditation.

The research suggests that individuals — from children who may engage in bullying to people prone to recurring depression — and society in general could benefit from such meditative practices, says study director Richard Davidson, professor of psychiatry and psychology at UW–Madison and an expert on imaging the effects of meditation. Davidson and UW–Madison associate scientist Antoine Lutz were co-principal investigators on the project.

The study was part of the researchers' ongoing investigations with a group of Tibetan monks and lay practitioners who have practiced meditation for a minimum of 10,000 hours. In this case, Lutz and Davidson worked with 16 monks who have cultivated compassion meditation practices. Sixteen age–matched controls with no previous training were taught the fundamentals of compassion meditation two weeks before the brain scanning took place.

"Many contemplative traditions speak of loving–kindness as the wish for happiness for others and of compassion as the wish to relieve others' suffering. Loving–kindness and compassion are central to the Dalai Lama's philosophy and mission," says Davidson, who has worked extensively with the Tibetan Buddhist leader. "We wanted to see how this voluntary generation of compassion affects the brain systems involved in empathy."

Various techniques are used in compassion meditation, and the training can take years of practice. The controls in this study were asked first to concentrate on loved ones, wishing them well–being and freedom from suffering. After some training, they then were asked to generate such feelings toward all beings without thinking specifically about anyone.

Each of the 32 subjects was placed in the fMRI scanner at the UW–Madison Waisman Center for Brain Imaging, which Davidson directs, and was asked to either begin compassion meditation or refrain from it. During each state, subjects were exposed to negative and positive human vocalizations designed to evoke empathic responses as well as neutral vocalizations: sounds of a distressed woman, a baby laughing and background restaurant noise.

"We used audio instead of visual challenges so that meditators could keep their eyes slightly open but not focused on any visual stimulus, as is typical of this practice," explains Lutz.

The scans revealed significant activity in the insula — a region near the frontal portion of the brain that plays a key role in bodily representations of emotion — when the long-term meditators were generating compassion and were exposed to emotional vocalizations. The strength of insula activation was also associated with the intensity of the meditation as assessed by the participants.

"The insula is extremely important in detecting emotions in general and specifically in mapping bodily responses to emotion — such as heart rate and blood pressure — and making that information available to other parts of the brain," says Davidson, also co-director of the HealthEmotions Research Institute.

Activity also increased in the temporal parietal juncture, particularly the right hemisphere. Studies have implicated this area as important in processing empathy, especially in perceiving the mental and emotional state of others.

"Both of these areas have been linked to emotion sharing and empathy," Davidson says. "The combination of these two effects, which was much more noticeable in the expert meditators as opposed to the novices, was very powerful."

The findings support Davidson and Lutz's working assumption that through training, people can develop skills that promote happiness and compassion.

"People are not just stuck at their respective set points," he says. "We can take advantage of our brain's plasticity and train it to enhance these qualities."

The capacity to cultivate compassion, which involves regulating thoughts and emotions, may also be useful for preventing depression in people who are susceptible to it, Lutz adds.

"Thinking about other people's suffering and not just your own helps to put everything in perspective," he says, adding that learning compassion for oneself is a critical first step in compassion meditation.

The researchers are interested in teaching compassion meditation to youngsters, particularly as they approach adolescence, as a way to prevent bullying, aggression and violence.

"I think this can be one of the tools we use to teach emotional regulation to kids who are at an age where they're vulnerable to going seriously off track," Davidson says.

Compassion meditation can be beneficial in promoting more harmonious relationships of all kinds, Davidson adds.

"The world certainly could use a little more kindness and compassion," he says. "Starting at a local level, the consequences of changing in this way can be directly experienced."

Lutz and Davidson hope to conduct additional studies to evaluate brain changes that may occur in individuals who cultivate positive emotions through the practice of loving-kindness and compassion over time.