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Religious Experiences Shrink Part of the Brain

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A study links life-changing religious experiences, like being born again, with atrophy in the hippocampus.

The article, “Religious factors and hippocampal atrophy in late life,” by Amy Owen and colleagues at Duke University represents an important advance in our growing understanding of the relationship between the brain and religion. The study showed greater atrophy in the hippocampus in individuals who identify with specific religious groups as well as those with no religious affiliation. It is a surprising result, given that many prior studies have shown religion to have potentially beneficial effects on brain function, anxiety, and depression.

A number of studies have evaluated the acute effects of religious practices, such as meditation and prayer, on the human brain. A smaller number of studies have evaluated the longer term effects of religion on the brain. Such studies, like the present one, have focused on differences in brain volume or brain function in those people heavily engaged in meditation or spiritual practices compared to those who are not. And an even fewer number of studies have explored the longitudinal effects of doing meditation or spiritual practices by evaluating subjects at two different time points.

In this study, Owen et al. used MRI to measure the volume of the hippocampus, a central structure of the limbic system that is involved in emotion as well as in memory formation. They evaluated the MRIs of 268 men and women aged 58 and over, who were originally recruited for the NeuroCognitive Outcomes of Depression in the Elderly study, but who also answered several questions regarding their religious beliefs and affiliation. The study by Owen et al. is unique in that it focuses specifically on religious individuals compared to non-religious individuals. This study also broke down these individuals into those who are born again or who have had life-changing religious experiences.

The results showed significantly greater hippocampal atrophy in individuals reporting a life-changing religious experience. In addition, they found significantly greater hippocampal atrophy among born-again Protestants, Catholics, and those with no religious affiliation, compared with Protestants not identifying as born-again.

The authors offer the hypothesis that the greater hippocampal atrophy in selected religious groups might be related to stress. They argue that some individuals in the religious minority, or those who struggle with their beliefs, experience higher levels of stress. This causes a release of stress hormones that are known to depress the volume of the hippocampus over time. This might also explain the fact that both non-religious as well as some religious individuals have smaller hippocampal volumes.

This is an interesting hypothesis. Many studies have shown positive effects of religion and spirituality on mental health, but there are also plenty of examples of negative impacts. There is evidence that members of religious groups who are persecuted or in the minority might have markedly greater stress and anxiety as they try to navigate their own society. Other times, a person might perceive God to be punishing them and therefore have significant stress in the face of their religious struggle. Others experience religious struggle because of conflicting ideas with their religious tradition or their family. Even very positive, life-changing experiences might be difficult to incorporate into the individual's prevailing religious belief system and this can also lead to stress and anxiety. Perceived religious transgressions can cause emotional and psychological anguish. This "religious" and "spiritual pain" can be difficult to distinguish from pure physical pain. And all of these phenomena can have potentially negative effects on the brain.

Thus, Owen and his colleagues certainly pose a plausible hypothesis. They also cite some of the limitations of their findings, such as the small sample size. More importantly, the causal relationship between brain findings and religion is difficult to clearly establish. Is it possible, for example, that those people with smaller hippocampal volumes are more likely to have specific religious attributes, drawing the causal arrow in the other direction? Further, it might be that the factors leading up to the life-changing events are important and not just the experience itself. Since brain atrophy reflects everything that happens to a person up to that point, one cannot definitively conclude that the most intense experience was in fact the thing that resulted in brain atrophy. So there are many potential factors that could lead to the reported results. (It is also somewhat problematic that stress itself did not correlate with hippocampal volumes since this was one of the potential hypotheses proposed by the authors and thus, appears to undercut the conclusions.) One might ask whether it is possible that people who are more religious suffer greater inherent stress, but that their religion actually helps to protect them somewhat. Religion is frequently cited as an important coping mechanism for dealing with stress.

This new study is intriguing and important. It makes us think more about the complexity of the relationship between religion and the brain. This field of scholarship, referred to as neurotheology, can greatly advance our understanding of religion, spirituality, and the brain. Continued studies of both the acute and chronic effects of religion on the brain will be highly valuable. For now, we can be certain that religion affects the brain--we just are not certain how.

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Pulitzer prize-winning journalist at the Boston Globe. He can be reached at [garethideas AT gmail.com](mailto:garethideas@atgmail.com) or Twitter [@garethideas](https://twitter.com/garethideas).

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