Praying in Tongues and the Brain

Andrew Newberg's Neuroimaging Findings and the Question of Psychiatric Recovery

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Independent working paper. This paper presents developing hypotheses, research questions, and interdisciplinary inquiry. It has not undergone peer review.

Abstract

In 2006, Andrew Newberg and his colleagues used SPECT brain imaging to study five experienced Christian women while they prayed in tongues. They compared the brain's blood-flow pattern during glossolalia with the pattern seen while the same women sang religious songs. The two states did not look the same. During glossolalia, several brain regions - including areas in the frontal lobes involved in deliberate control - showed lower relative blood flow. The study was small and did not test mental illness or healing, but it raised a compelling question: if praying in tongues produces a distinct and measurable brain state, could repeated practice also affect stress, emotional regulation, or psychiatric symptoms over time? This paper asks what we would need to measure to find out.

Author's Note

My interest begins with the Christian conviction that prayer in the Spirit has genuine spiritual significance. Passages such as 1 Corinthians 14:2, 14-15 and Romans 8:26-27 describe forms of prayer that go beyond ordinary conscious speech. Science cannot determine whether the Holy Spirit is the source of glossolalia. It can, however, ask what happens in the brain and body while a person is praying this way.

I am especially interested in a simple question: if a person repeatedly enters this prayer state, could something change in the way the brain and body respond to fear, intrusive thoughts, emotional distress, or other symptoms? And if people report improvement, can we measure it rather than assuming either that prayer caused it or that the experience is only subjective?

What Newberg Actually Studied

Newberg, Wintering, Morgan, and Waldman (2006) studied five women between ages 38 and 52 from Charismatic or Pentecostal Christian traditions. Each woman had been praying in tongues for more than five years. The researchers screened out current psychiatric disorders because their immediate goal was not to study treatment. They wanted to see whether the brain behaved differently during glossolalia than during another familiar religious activity: singing.

The researchers used SPECT imaging, which gives an estimate of blood flow in different parts of the brain. A tracer was injected while the women were praying, and the scan was taken afterward. In other words, the study captured a snapshot of the brain's blood-flow pattern during that period. It did not continuously record electrical brain activity second by second.

Compared with religious singing, glossolalia was associated with lower relative blood flow in several regions, including parts of the prefrontal cortex and the left caudate. Another region in the left parietal area showed higher relative blood flow. With only five participants, these findings should be treated as preliminary rather than as a final map of what praying in tongues does to the brain.

One of the most interesting findings involved the frontal lobes. These regions are often involved in deliberate planning and control. The researchers noted that the lower frontal activity fit with what participants themselves described: while praying in tongues, they did not feel as though they were consciously constructing or controlling the words. Newberg's team also observed that the pattern differed from patterns they had seen in some meditation studies. They called for larger and more detailed studies.

What Has Been Studied Since

In 2020, another research team studied 30 experienced glossolalia practitioners using structural MRI. Instead of asking what happens during a single prayer session, this study asked whether years of experience with glossolalia were associated with differences in brain structure. The researchers reported associations involving frontal regions, including the frontal pole. This does not show that glossolalia caused those differences, but it gives researchers another reason to investigate the practice more carefully.

The two studies therefore give us different pieces of the puzzle. Newberg's 2006 study looked at what the brain was doing during the prayer state. The 2020 study looked at whether long-term experience with the practice was associated with brain structure. Neither study tested whether praying in tongues reduces depression, anxiety, trauma symptoms, or other psychiatric symptoms. That question remains open.

The Central Research Question

The central question is straightforward: If praying in tongues produces a measurable state in the brain and body, could regularly entering that state also be connected to measurable improvement in mental-health symptoms?

From there, several questions follow. If symptoms improve, what is changing? Is the effect related to breathing, stress regulation, attention, emotional release, expectation, a person's sense of surrender to God, changes in brain activity, or some combination of these? Do any changes last after the prayer ends? And from a Christian theological perspective, could these measurable changes represent part of the embodied process through which believers experience the work of the Holy Spirit? Science can measure the changes; it cannot by itself identify a spiritual source.

How Could Prayer Affect Mental-Health Symptoms?

One possible pathway is worth testing. Praying in tongues may change a person's sense of control, attention, inner speech, breathing, emotional arousal, and stress response. Those immediate changes could affect the nervous system. If the practice is repeated, the effects might become more stable over time and potentially influence symptoms or daily functioning. This is not yet a finding. It is a proposed chain of events that a study could test step by step.

We also have to leave room for the possibility that the hypothesis is wrong. A change in brain activity is not automatically a healthy change. Lower activity in one frontal region does not, by itself, mean less anxiety, better emotional regulation, or healing. The only way to know whether the practice is clinically helpful is to measure actual symptoms and functioning alongside the brain and body changes.

Primary Research Questions

1. If Newberg's study were repeated with a much larger group, would researchers see the same brain pattern during praying in tongues?

2. Is that brain pattern actually unique to praying in tongues, or can it also appear during singing, spontaneous speech, ordinary prayer, rhythmic sounds, or other forms of vocal expression?

3. Does quiet, gentle prayer in tongues affect the brain differently from intense or highly emotional glossolalia?

4. What happens to a person's sense of control, surrender, inner speech, attention, and imagination while praying in tongues?

5. What happens at the same time in the rest of the body - heart rate, heart-rate variability, breathing, sweating, and stress hormones such as cortisol?

6. Can EEG or fNIRS show us what changes second by second as a person begins, continues, and stops praying in tongues?

7. Do people who regularly pray in tongues differ in stress response or emotional regulation from similar Christians who do not, and can we separate the effect of the practice from other differences between the groups?

8. Over several weeks or months, is regular praying in tongues associated with measurable decreases in depression, anxiety, trauma-related symptoms, or general psychological distress?

9. If symptoms improve, what seems to explain the improvement - expectation, breathing, social support, religious coping, feeling close to God, emotional regulation, measurable brain changes, or some combination?

10. Do changes in the brain or nervous system happen before symptom improvement, predict who improves, or simply occur alongside the improvement?

11. If improvement occurs, does it last one month or three months later? Does anyone become more distressed rather than less?

12. Who appears to benefit, who experiences no change, and who may find the practice unhelpful? Does previous spiritual experience matter?

13. Does praying in tongues change intrusive mental imagery, deliberate imagination, or the way distressing thoughts are experienced?

14. After a controlled stress challenge, does praying in tongues help the brain and body return to baseline differently from ordinary spoken prayer or another matched vocal activity?

15. How much symptom and functional improvement would we need to see before it would make sense to test this in a larger clinical trial?

What Would We Need to Measure?

Brain measurement. Different tools answer different questions. fMRI can show which brain regions and networks are more or less active, but speaking and movement can interfere with the scan. fNIRS is more portable and measures changes in oxygenated blood near the surface of the brain, especially in frontal areas. EEG records electrical activity from the scalp and can show very fast changes as prayer begins and ends. SPECT could be used to replicate Newberg's original method, but it gives more of a snapshot than a moment-by-moment recording.

Body and stress measurement. ECG or a reliable wearable can measure heart rate and heart-rate variability (HRV), which gives information about autonomic regulation. A breathing belt can show whether the person's breathing changes during prayer. Electrodermal sensors can measure changes in sweating associated with arousal. Saliva samples can be used to examine cortisol before and after a session. Together, these measures can tell us whether the prayer state is accompanied by a broader change in the body's stress response.

Mental-health outcomes. Brain scans are not enough. Researchers would also need established symptom measures for the condition being studied - for example, the PHQ-9 for depression, GAD-7 for anxiety, and appropriate trauma measures when trauma is the focus. Interviews, sleep measures, daily functioning, and brief phone-based check-ins could help determine whether any improvement is meaningful in everyday life rather than only visible on a scan.

The prayer experience itself. Researchers should also document what the participant actually experiences. With consent, sessions could be audio-recorded. Participants could describe how much control or surrender they felt, whether images or thoughts appeared, how emotionally intense the prayer felt, and how close to God they felt. Practice diaries could track how often they prayed in tongues between study visits. These measures would help connect the spiritual experience to the biological and psychological data without pretending that either one fully explains the other.

How I Would Build the Research Program

STAGE 1 - Replicate the brain finding. Begin with a larger group of experienced practitioners and compare several conditions: praying in tongues, ordinary spontaneous prayer, religious singing, and a matched vocal activity that is not prayer. Measure the brain and body during

each condition. The first goal is simply to determine whether Newberg's original pattern can be reproduced and whether it is truly distinctive.

STAGE 2 - Test stress recovery. Next, study what happens after a safe, standardized stress task. Measure how quickly participants recover when they pray in tongues compared with ordinary prayer or another matched condition. Track brain activity, heart-rate variability, breathing, arousal, cortisol, and self-reported distress. This begins to answer whether the prayer state does anything measurable to the stress system.

STAGE 3 - Study symptoms over time. If the first two stages produce meaningful findings, a clinical research team could then follow willing adults who already practice glossolalia and who have a clearly defined level of depression, anxiety, trauma-related symptoms, or another target condition. Participants would continue receiving appropriate care. Researchers could examine whether a structured period of regular prayer is associated with symptom improvement, whether the improvement is greater than in a carefully chosen comparison group, and whether any changes last.

How Would We Know What Caused the Change?

The hardest part of this research is determining what is actually causing any change we observe. Praying in tongues includes speech, breathing, emotion, expectation, religious meaning, and often a sense of God's presence. Every one of those factors can affect the brain and body. That means the comparison group matters enormously. Comparing glossolalia only with sitting quietly would tell us very little. A strong study needs comparison conditions that help separate the effects of vocalization, breathing, expectation, ordinary prayer, and glossolalia itself.

Random assignment can make some conclusions stronger, but participants will obviously know whether they are praying in tongues. We cannot truly blind them to the practice. We can, however, keep the people rating symptoms - and, where possible, the people analyzing the data - unaware of which condition produced which results. If glossolalia repeatedly produces differences even when expectation and other factors are carefully measured, the next question becomes what mechanism best explains those differences.

There is also a spiritual issue that deserves respect. Many Christians understand tongues as a gift of the Holy Spirit, not a laboratory technique that can simply be taught on command. A study should therefore recruit people who already practice glossolalia rather than pressuring someone to produce it. Researchers should never imply that a participant lacks faith or spiritual maturity if they do not pray in tongues.

Safety and Research Boundaries

Any study involving people with significant mental-health symptoms would need careful clinical oversight. Participants should be screened appropriately, monitored for worsening symptoms, and given clear pathways to professional care when needed. A person's spiritual understanding of an experience can be respected while researchers also measure distress, functioning, medication use, sleep, and other clinically important factors.

I would also define 'reversal of mental illness' very carefully in an actual study. Feeling better, having fewer symptoms, reaching clinical remission, functioning better in daily life, and remaining well over time are related but different outcomes. A rigorous study should say in advance exactly what kind of improvement it is testing rather than using 'healing' as a single undefined outcome.

Central Hypothesis

My working hypothesis is that praying in tongues may create a distinct and measurable state in the brain and nervous system. For some people who already practice it as part of their Christian faith, repeatedly entering that state may affect stress regulation, emotional processing, or other mechanisms that are relevant to mental-health symptoms. Whether those changes are large enough to produce sustained clinical improvement is an open question that should be tested rather than assumed.

Working Proposition

Newberg showed that praying in tongues can be studied with brain-imaging technology and that, in his small sample, the brain did not look the same during glossolalia as it did during religious singing. That finding does not prove healing. But it gives us a starting point. The next question is bigger: if we can measure what happens in the brain and body during this form of prayer, can we also measure whether repeated prayer changes the course of psychological distress? And if it does, what exactly is changing - in the brain, in the body, in the person's experience, and over time?

Selected References

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