

# The Science Behind Binaural Beats: Can Sound Ease Anxiety and Boost Your Brain?

Sina Soltan

Lake Forest College  
Lake Forest, Illinois 60045

Imagine putting on your headphones, hearing two slightly different tones in each ear, and suddenly feeling calmer or sharper. Sounds like magic, right? This idea has sparked plenty of curiosity in the scientific community, leading researchers to investigate binaural beats, a fascinating auditory illusion. Two recent studies examine how these beats might reduce anxiety or influence brain activity. The results are intriguing.

## What Are Binaural Beats, Anyway?

This is how it works: when you listen to two slightly different frequencies—say, 100 Hz in one ear and 104 Hz in the other—your brain creates an “illusionary” beat at the difference between the two, in this case, 4 Hz. That is the binaural beat (Orozco Perez et al., 2020). Scientists think this beat could interact with your brainwaves and promote states like relaxation, focus, or even better sleep. However, is it all just hype?

### Study #1: Calming Pre-Surgery Jitters

Picture yourself about to undergo surgery. Your nerves are sky-high, and you do not want to rely on heavy sedatives to calm down. Could binaural beats help? That is what Padmanabhan and his team set out to explore in a 2005 study. They tested 108 surgical patients and divided them into three groups: one listened to binaural beats designed to promote relaxation, another listened to regular music, and the third just hung out watching TV or reading (Padmanabhan et al., 2005).

The results? Patients who listened to binaural beats had a whopping 26.3% drop in anxiety levels compared to 11.1% for the music group and 3.6% for the no-audio group (Padmanabhan et al., 2005). Padmanabhan concluded that binaural beats might be a valuable, drug-free way to ease pre-surgery anxiety. However, there is a catch: while the study showed that binaural beats worked, it didn't explain why they worked.

### Study #2: What's Happening in Your Brain?

Fast forward to 2020, and researchers Hector D. Orozco Perez and colleagues decided to tackle the “why.” They used EEG caps (a device that tracks electrical signals in the brain) to monitor brain activity. At the same time, 16 volunteers listened to binaural beats, monaural beats (similar frequencies played to the same ear), or no beats at all (Orozco Perez et al., 2020). The beats were set to specific frequencies: theta (7 Hz) for relaxation and gamma (40 Hz) for focus.

Their findings? Both binaural and monaural beats synced up with brainwaves at their respective frequencies, but monaural beats actually triggered stronger neural responses. Interestingly, neither type of beat had a noticeable effect on the participants' mood or anxiety levels (Orozco Perez et al., 2020). Perez's team concluded that while binaural beats influence brain activity, they aren't as unique or powerful as some claim.

## What Do These Studies Mean?

Together, these studies provide a more nuanced picture of binaural beats. Padmanabhan highlights their practical, anxiety-reducing potential, particularly in clinical environments, while Perez questions their uniqueness and generalizability. The difference in findings could stem from the contexts of the studies—pre-surgical patients in a heightened state of anxiety versus general participants in a lab setting. It's possible

that binaural beats are more effective when individuals are already experiencing elevated stress, aligning with Padmanabhan's results, but have less impact on people in calmer, everyday scenarios, as Perez suggests. This contrast highlights that binaural beats are not a one-size-fits-all solution; their impact likely depends on the context and individual.

Ultimately, binaural beats are intriguing, but the research highlights their limitations as much as their potential. Take-home points? Binaural beats can be an effective tool for reducing anxiety in targeted, high-stress scenarios like surgery prep. They influence brain activity, but their effects are not necessarily unique and may depend on the situation. Finally, more research is needed to understand their true potential, particularly regarding how and when they can be most helpful.

## Why Should You Care?

It can be overwhelming searching for ways to relax even aside from medication. Binaural beats are an easy, low-risk technique you can try at home, and they might help in the right circumstances. Plus, they're part of a more significant movement toward exploring how sound and music affect the brain. At the same time, these studies remind us to stay grounded. The science behind binaural beats is promising but not definitive. They're not a cure-all, and their effects depend on the context and individual.

So, next time you're stressed, pop on some headphones and give binaural beats a shot. Just don't be surprised if the results are subtle - science is still figuring out what's really happening in your brain. But if it works for you, why not enjoy the beat?

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\*This author wrote this paper for Neuroscience 302: Brain to Behavior taught by Dr. Hannah Carlson.