

Global Journal of Neurology and Neurological Disorders

<https://urfpublishers.com/journal/neurology-and-neurological-disorders>

Vol: 2 & Iss: 3

Why Has Neuroimaging Fallen Short in Psychiatry? From Promise to Clinical Reality

Michel Bourin*

Department of Neurobiology of Mood Disorders, University of Nantes, France

Citation: Bourin M. Why Has Neuroimaging Fallen Short in Psychiatry? From Promise to Clinical Reality. *Global J Neur Neurolog Dis*, 2026;2(3):86-87.

Received: 31 August, 2026; **Accepted:** 28 September, 2026; **Published:** 30 September, 2026

***Corresponding author:** Michel Bourin, Department of Neurobiology of Mood Disorders, University of Nantes, France, E-mail: Michel.Bourin@univ-nantes.fr

Copyright: © 2026 Bourin M., This is an open-access article published in Global J Neur Neurolog Dis and distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

1. Editorial

Over the past fifty years, neuroimaging has profoundly transformed our understanding of psychiatric disorders. Thousands of studies using Magnetic Resonance Imaging (MRI), Diffusion Tensor Imaging (DTI), and Positron Emission Tomography (PET) have mapped structural and functional alterations associated with a wide range of conditions. Yet, despite this considerable scientific output, neuroimaging has yielded remarkably little in terms of clinically useful biomarkers. Its contribution to everyday psychiatric practice remains marginal.

This paradox, substantial scientific progress alongside limited clinical translation raises an important question: why has neuroimaging failed to deliver on its initial promises in psychiatry?

First, expectations may have been overly optimistic. Advanced imaging technologies were expected to produce diagnostic or predictive biomarkers, but this has not proven true. Psychiatric disorders are not unitary entities but heterogeneous syndromes, shaped by complex interactions between biological, psychological, and social factors. It is therefore unlikely that any single imaging modality, in isolation, can capture their underlying causes or guide treatment decisions with sufficient precision.

Second, the field has often prioritized group-level differences

over individual-level prediction. Although numerous studies demonstrate statistically significant differences between patient groups and control cohorts, these results seldom yield clinically applicable tools. The variability within diagnostic categories, combined with overlapping neurobiological signatures across disorders, limits the specificity and sensitivity required for real-world application.

Third, methodological limitations continue to undermine reproducibility and generalizability. Small sample sizes, heterogeneous protocols, analytic flexibility, and limited external validation have contributed to a literature that is rich in findings but poor in robust, replicable markers. These issues are not unique to neuroimaging but are particularly consequential in a field aspiring to clinical relevance.

Fourth, psychiatric constructions themselves pose a challenge. Current diagnostic systems are based on symptom clusters rather than underlying mechanisms. As a result, attempts to map these categories into brain-based signatures may be inherently constrained. Without more precise phenotyping and a stronger integration of behavioral, cognitive, and environmental data, neuroimaging findings risk remaining disconnected from clinical reality.

Despite these limitations, it would be premature to dismiss the role of neuroimaging in psychiatry. The fundamental

premise that behavior and subjective experience are rooted in brain function remains compelling. Neuroimaging has already reshaped the conceptual landscape of the field and continues to inform pharmacological research. The issue lies not in neuroimaging's relevance, but in finding ways to use it more efficiently.

Several directions may help bridge the gap between discovery and clinical utility.

Integrating neuroimaging into clinical trials, rather than simply using it to predict outcomes, can improve our understanding of how treatments affect individuals differently. Biomarkers that inform treatment selection would represent a meaningful advance.

Second, deeper and longitudinal phenotyping is essential. Integrating multimodal imaging with detailed clinical, cognitive, and environmental data and treating social determinants as integral components rather than confounders may improve causal inference. Coupling these approaches with computational models of behavior could further enhance interpretability.

Third, neuroimaging should play a more significant role in drug development by verifying target engagement and quantifying pharmacodynamic effects. This application, already well established in other areas of medicine, remains underexploited in psychiatry.

Fourth, more robust connections between studies involving humans and animals should be established. Aligning imaging findings with conserved biological mechanisms across species may help link cellular processes to large-scale brain networks and behavior.

Furthermore, it is essential to enhance methodological rigor. Larger collaborative studies, pre-registration of analyses, standardized processing pipelines, external validation of predictive models, and the systematic publication of negative results are essential steps toward a more reliable evidence base.

It is important to be careful when dealing with modern technologies. Approaches such as organoids, single-cell sequencing, and high-density electrophysiology offer exciting opportunities but are not immune to the same statistical and conceptual pitfalls that have limited neuroimaging. Without rigorous methodology and clinically grounded questions, their translational impact may also fall short.

2. Conclusion

In conclusion, neuroimaging has not failed so much as it has been misaligned with the realities of psychiatric disorders and clinical practice. Its future lies not in technological escalation alone, but in a disciplined, integrative approach focused on clinically meaningful questions. By linking brain mechanisms, behavior, and treatment at the individual level, neuroimaging can still fulfill its promise provided that methodological rigor and translational relevance become central priorities.