

Appendix 4

Structural Challenges = Translational Bottlenecks

Several structural challenges help explain why neuroscience translation bottlenecks persist:

1. Mismatch Between Global Demand and Delivery Infrastructure

The scale of need, across neurological and mental health conditions, brain ageing, neurodiversity, and learning exceeds the current capacity of systems to translate, particularly in under-resourced regions.

[The Lancet Commission \(2018\)](#) warned that the global mental health crisis could cause lasting harm to individuals, communities, and economies worldwide. Demographic shifts, such as ageing populations and the need for lifelong brain health, intensify this demand.

2. Entrenched Knowledge Gateways and Hierarchies

Translation is slowed by reliance on traditional knowledge hierarchies—such as journals, clinical pathways, and institutional guidelines—that were not originally designed for rapid, cross-sector, interdisciplinary implementation.

[Conventional research](#) paradigms can separate scientific knowledge from lived experience. Data is extracted from individuals but analysed and interpreted within institutional contexts. This can sideline insights that emerge from community co-production or experiential expertise, especially in marginalised populations.

3. Fragmentation Pathways to Implementation

Breaks in continuity between discovery, policy formulation, and real-world deployment lead to duplication, siloed efforts, and slow feedback loops.

[Fragmented pathways](#) means scientific discovery rarely follows a straight line into practice. Translation is slowed by complexity across data systems, interdisciplinary silos, regulatory hurdles, and funding structures, along the pipeline. The scale of modern neuroscience, with its convergence of biology, behaviour, technology, and computation, further complicates implementation at speed.

4. Complexity of Applying Brain Science in Context

Neuroscience deals with systems that are not only biologically complex, but also socially and culturally embedded. Effective translation requires adaptive, context-aware strategies and knowledge that go beyond evidence alone.

Working with the brain poses unique translational difficulties: 1) **Biological access:** The brain is difficult to study in vivo, with emergent properties, like consciousness and self-awareness, distributed across complex neural circuits. 2) **Conditions presenting late:** Delayed symptom visibility at advanced stages clinically, where early biomarkers, imaging, and predictive diagnostics remain underdeveloped. 3) **Plasticity:** Brain structure and function are dynamic, shaped by behaviour, environment, experience, and interventions, making prediction and generalisation harder.