

Correspondence

Edited by Kiriakos Xenitidis and
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Contents

- Neuroimaging distinction between neurological and psychiatric disorders – was there really one?

Neuroimaging distinction between neurological and psychiatric disorders – was there really one?

I read with great interest the article by Crossley *et al*¹ and, although commending their work, I was surprised to arrive at the opposite conclusion to that of the authors. In their meta-analysis of structural magnetic resonance imaging correlates of ‘psychiatric’ and ‘neurological’ conditions they find that both classifications appear to correlate with some distinct regional brain volume changes. In their discussion of these findings they conclude that their analysis lends weight to the argument that the disorders may be thought of as belonging to two distinct classes. I was surprised at this conclusion and would ask the reader to consider that these results may actually suggest the opposite for the following three reasons.

First, given the established functional organisation of brain anatomy one might, *a priori*, predict that different clinical symptoms (hallucinations *v.* motor apraxia for example) are associated with dysfunctional activity in spatially distinct brain regions. With this in mind, the finding that the psychiatric and neurological classes affected different brain structures is perhaps not surprising. Personally, I found the considerable overlap between the classes the most interesting finding. This finding suggests that disease-specific ‘lesions’ have a considerable effect on wider neural network structure. Understanding of the mechanisms of these shared findings requires input from both specialties.

Following on from this it is important to remember that the grey matter volume reduction was reliably found in both classes of disorder albeit in some different brain regions. A finding more parsimonious with the authors’ conclusion would have been if there was no evidence of volume loss in one set of disorders *v.* the other. This would clearly have segregated the conditions. Instead, we must now accept that the presence of structural brain changes does not *de facto* indicate a neurological condition as compared to a psychiatric one. Undoubtedly, the aetiological mechanisms of volume changes are not the same across disorders; no classically defined psychiatric condition is driven by known progressive proteinopathy, for example. However, the finding that both sets of conditions are associated with structural brain changes clearly establishes both as disorders of the central nervous system.

Finally, from a clinical perspective, the symptoms patients experience do not sit neatly on either side of the classic psychiatric and neurological divide and the findings from this paper may go some way as to explaining why. To segregate these classes based on a few regional differences in grey matter volume may appear somewhat artificial especially in face of the clinical burden of psychiatric symptoms in neurological patients and *vice versa*. Furthermore, I do not believe that either group of patients are best served by the call to keep the intellectual framework of these two groups of disorders separate.

Importantly, accepting that there are neurobiological similarities between traditionally neurological and psychiatric conditions does

not equate to saying that either clinical specialty should feel threatened by the other. The considerable differences in clinical approach, decision-making and support structures employed by neurologists and psychiatrists are sufficiently distinct that we should not feel threatened to admit that the disorders we are seeing manifest from dysfunction of the same organ. Accepting this stance will, hopefully, facilitate the cross-fertilisation of knowledge and lead to improved care for both sets of patients.

- 1 Crossley NA, Scott J, Ellison-Wright I, Mechelli A. Neuroimaging distinction between neurological and psychiatric disorders. *Br J Psychiatry* 2015; **207**: 429–34.

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doi: 10.1192/bjp.208.3.298

Authors’ reply: On reading the title of Dr Nair’s letter, we were surprised that he appeared to suggest that there was no neuroimaging distinction between neurological and psychiatric disorders in our investigation.¹ After all, a direct comparison had shown statistical differences in several functional networks, as well as higher degree of similarity within each class than between the two classes. On reading the rest of the letter, however, it became apparent that the author’s conclusion had little to do with the rigour of our methodology or the strength of our results. Rather, it was based on a more philosophical view that patients are not best served by the current distinction between the two classes.

We were puzzled by Dr Nair’s suggestion that the observation of different brain structures for neurological and psychiatric disorders does not suggest segregation, and that a single dissociation, in which one class affects the brain and the other does not, would have provided greater evidence of segregation. First, this suggestion is methodologically difficult to sustain, since a double dissociation provides greater evidence of segregation than a single dissociation.² Second, there is now compelling evidence that both neurological and psychiatric illnesses are disorders of the brain, and it would be misconceived to expect neuroimaging alterations for one class of disorders but not the other.

Dr Nair’s interpretation seems to be based on the premise that patients are not best served by the current classification – the empirical data, however, suggest that there is a neuroimaging distinction between neurological and psychiatric disorders. A more nuanced approach is to recognise, as we do in the manuscript, that ‘neuroimaging evidence does not necessarily mean that the existing distinction is useful from a clinical perspective’. In other words, neuroimaging evidence should be considered one of several factors informing this debate; negating such evidence, in contrast, will only cloud the debate.

In conclusion, the clinical rationale for combining neurological and psychiatric disorders into a single category, as well as the opposite view that this would be detrimental to patients, have been discussed extensively elsewhere.^{3–4} The aim of our manuscript was to help refine this debate by providing an alternative perspective based on current neuroimaging evidence. We believe that the neuroscientific perspective cannot be discarded if we are to develop integrated mind–brain models of disease that can be translated into clinical practice. Only this will enable psychiatry to become a ‘brain-based medicine of the mind’.⁵

- 1 Crossley NA, Scott J, Ellison-Wright I, Mechelli A. Neuroimaging distinction between neurological and psychiatric disorders. *Br J Psychiatry* 2015; **207**: 429–34.

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doi: 10.1192/bjp.208.3.298a