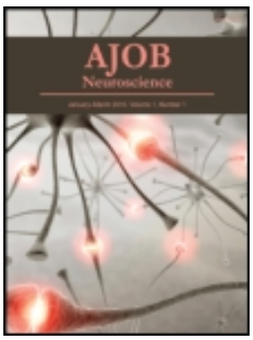

AJOB Neuroscience

ISSN: 2150-7740 (Print) 2150-7759 (Online) Journal homepage: http://www.tandfonline.com/loi/uabn20

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To cite this article: James A. Anderson & Judy Illes (2012) Neuroimaging and Mental Health: Drowning in a Sea of Acrimony, AJOB Neuroscience, 3:4, 42-43, DOI: 10.1080/21507740.2012.721454

To link to this article: http://dx.doi.org/10.1080/21507740.2012.721454

AJOB Neuroscience, 3(4): 42–62, 2012

ISSN: 2150-7740 print / 2150-7759 online
DOI: 10.1080/21507740.2012.721454

Open Peer Commentaries

Neuroimaging and Mental Health: Drowning in a Sea of Acrimony

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Some of the most vulnerable people in our society are put at risk by long-standing controversy concerning the clinical usefulness of functional neuroimaging for mental health disorders. Two new papers, out almost back-to-back in *AJOB Neuroscience* and *Molecular Psychiatry*, respectively, speak to these issues directly. In their article "The Puzzle of Neuroimaging and Psychiatric Diagnosis: Technology and Nosology in an Evolving Discipline," published in this issue of *AJOB Neuroscience*, Farah and Gillihan describe how functional imaging techniques have revealed correlates for virtually every psychiatric disorder. The puzzle of neuroimaging and psychiatric diagnosis, according to the authors, is that this technology has not yet achieved an accepted role in psychiatric practice despite these successes (Farah and Gillihan 2012).

In their article "Why Has It Taken So Long for Biological Psychiatry to Develop Clinical Tests and What to Do About It?," in *Molecular Psychiatry*, Kapur, Phillips, and Insel (2012) suggest a number of explanations for this puzzling state of affairs. According to the authors, the development of biological psychiatry has been slowed by the absence of a biological psychiatric nosology on the one hand, and limitations characteristic of much neuroimaging research in this area on the other. Specifically, they point to research that has yielded minimally differentiating findings across healthy and affected populations, and a general failure to replicate studies (Kapur, Phillips, and Insel 2012).

The authors of both of these papers suggest strategies for moving forward. Farah and Gillihan focus on the need to close the gap between the categories and dimensions of current nosology and those suggested by imaging. Kapur and colleagues urge researchers in the field to focus on differences that have clinically meaningful effect sizes in relevant populations, rather than hypothesis rejection versus normal controls. They also call for longitudinal studies with standardized measures, together with the sharing of individual patient data across studies, to move from the current conventional approach to one that is more appropriately stratified.

Like these authors, we believe that overcoming the hurdles of neuroimaging for clinical application in psychiatry will require a new approach. To this end, we call for empirical research aimed at understanding the views and experiences of the stakeholders actually involved in this controversy. Relevant stakeholders include neuroimagers who conduct neuroimaging studies focused on psychiatric illness, service providers who are currently offering neuroimaging services clinically to psychiatric patients, and consumers who, in order to obtain information related to their mental health, have purchased brain scans on the open market.

In our own studies, we have integrated previously orthogonal lines of inquiry—empirical stakeholder research and normative ethics research—in order to describe this landscape and the ethics and policy challenges looming on its horizon. In general, we have found high receptivity to neuroimaging across stakeholder groups. Neuroimaging researchers and mental health care providers see it as a potentially valuable tool for unlocking the mechanisms of mental illness and improving patient care. Patients and parents of affected children hope that neuroimaging will help transform their lived experience. These views are well articulated and consistent across studies, despite differences in study design and analysis, differences in imaging modality studied, and differences in the milieu in which the findings were elucidated (Borgelt et al. 2011; Buchman et al. 2012; Illes et al. 2008).

In work underway, however, we have found telling discrepancies in stakeholder views toward the use of neuroimaging in the here and now. Our findings point toward a fundamental tension between academic investigators on the one hand, and commercial service providers and their customers on the other.

Funding for this work was provided by NIH/NIMH R01 number MH 9R01MH84282. Judy Illes is Canada Research Chair in Neuroethics. Her related work is also supported by CIHR CNE number 85117, the British Columbia Knowledge Development Fund, and the Canadian Foundation for Innovation. The authors gratefully acknowledge all participants in their research on neuroimaging and mental health.
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Although service providers and consumers wax elegiac about the use of neuroimaging in clinical psychiatry, investigators consistently state that the technology is not yet ready for clinical roll-out. This scenario has caused significant acrimony (Adinoff and Devous 2010), and poses dangers both to the communities directly involved, and to public trust in science and medicine more generally (Anderson, Mizgalewicz, and Illes under review).

Within the pragmatic framework of bridge-building according to which neuroethicists often do their work, we argue that, with such evidence in hand, constructive measures that harness the respective strengths and perspectives of all three of these key stakeholder communities can be taken to move the field forward. What might some of these measures look like? Here we briefly describe three possibilities.

1. *Creation of a consortium for neuroimaging in mental health*, analogous to the Alzheimer's Disease Neuroimaging Initiative (ADNI)—the $130M research program involving partners across seven countries. Like members of the ADNI, members of this consortium would follow standardized protocols for data acquisition, data analysis, and repositories for data mining and sharing, facilitating multicenter cooperation and effective meta-analysis. Initially, the consortium might focus on validating promising biomarkers in large multicenter trials, perhaps in partnership with the pharmaceutical industry.
2. *Retrospective analyses of extant image databases*. The for-profit imaging sector boasts vast image databases—in one instance, a database of more than 60,000 images. To date, these databases constitute a largely untapped resource. Studies of these databases, including analysis of when imaging changed diagnosis, could be made possible through transparent partnerships involving rigorous methods and effective dissemination strategies, anchored in pre-engagement ethics agreements.
3. *Building on commercial reach and know-how*. The academic neuroimaging community, academic institutions, research sponsors, and others should harness the know-how and reach of the commercial marketing machine to raise awareness and improve education concerning mental health disorders. The visibility of the commercial sector is indisputable. With careful management, there is a significant opportunity to better promote mental health and well-being using these methods.

It is clear that much work is needed to maximize the potential of this exciting new technology. Farah and Gillihan, and Kapur and colleagues have suggested a number of concrete strategies for managing the difficult scientific challenges associated with neuroimaging and mental health. Here we offer a few more practical suggestions designed to address these and other aims. In general, we emphasize the need for more work aimed at understanding and managing the complex tensions currently characterizing stakeholder relations in this context. Acrimony slows progress and puts people at risk. Concerted efforts, based on sound empirical research, are needed to address these challenges. Such efforts will help to ensure that the neuroimaging community delivers on its promise to improve the lives and well-being of those whose suffer from disorders of mental health.

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