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Editorial

Clinical neuroscience and mental health: filling the gap

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Abstract

Recent developments in neuroscience can help inform clinicians› understanding of cognition, emotion, behavior, and social interactions—all critical aspects of people›s lives that are dramatically affected in psychiatric disorders. Psychiatry is informed by a broad range of basic biological and social sciences and has at its disposal many tools, like brain imaging, genetics, neuropsychopharmacology, neurophysiology, epidemiological models, and neuropsychology, for developing new assessment and treatment approaches, grounded in understanding of etiology and pathophysiology. However, psychiatry as clinical neuroscience must strengthen its partnerships with the disciplines of public health, community and behavioral health science, and health economics. The WPA Action Plan 2017-2020 supports psychiatrists to promote mental health and improve care capacity, like service development, awareness raising and advocacy, education, research and publications. Establishing new approaches in publishing innovative research findings, I suggest that the creation of the new journal, *Dialogues in Clinical Neuroscience & Mental Health,* will contribute to guiding this interdisciplinary field in new directions.

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Human brain is probably the most complex object on Earth. In fact, the brain has an estimated 10^{11} neurons, each with an average 10^{4} connections with other neurons. Zooming in and out of this dense jumble of cells and cables reveals non-random structural patterns at different levels. Better understanding of brain functioning and brain plasticity has allowed neuroscientists to transfer findings from research to education, therapy and rehabilitation programs. However, advancements in some areas which have dominated the literature, like "reward" and "fear" circuits, have gradually paved the way for a more nuanced conceptualization of valuation in the brain and the mesocorticolimbic system can no longer be categorized as a "reward" or a "dopaminergic" circuit, nor can the amygdala be deemed the "fear center." Based on this concept, Haye (2015) **[1]** suggested that "our goal is to help generate new hypotheses about how to better apprehend affective circuits". Recently, Boyle et al (2017) **[2]** found that disease risk is driven mostly by genes with no direct relevance to disease, but which act as modifiers of more fundamental biologic processes, perhaps related to individual genetic backgrounds and environmental experience. Based on these findings, Weinberger (2017) **[3]** suggested: "This proposal echoes the question of whether psychiatric disorders are really "diseases" rather than varying states of brain development that have a particular way of expressing difficulties in particular environmental contexts, based on genomic background, development and experience".

Understanding the brain represents one of the most profound and pressing scientific challenges of the 21st century. Recent developments in neuroscience can help inform clinicians› understanding of cognition, emotion, behavior, and social interactions—all critical aspects of people›s lives that are dramatically affected in psychiatric disorders. Some areas of neuroscience, like the emotion regulation, are of particular relevance to clinicians because they help further the understanding of patients and can lead to the development of novel therapeutics. For many decades, scientists have thought of cognition and emotion as two largely separate systems in the brain, but even as researchers began to find evidence of the interdependence of the two, this interaction was often seen in the light of emotions interfering with the higher level of cognitive processes. Despite the *affective neuroscience* developments, scientists get still confused about what is meant by 'emotion', since there are distinctions between the functional emotion state ('the emotion state'), its conscious experience ('the experience of the emotion'), our ability to attribute emotions to others ('emotion perception'), our ability to think and talk about emotion ('conceptualizing emotion'), and the behaviors caused by an emotion state ('the expression of emotions', 'emotional reactions') **[4].** Although much still remains to be discovered, current findings in affective neuroscience have already influenced our understanding of drug use and abuse, psychological disorders such as panic disorder, and complex human emotions such as desire and enjoyment, grief and love.

During the last decade Neuroscience research has made also a step forward in virtual reality and big data analysis. The advent of plug-and-play technologies has simplified the connection between *Skinner boxes* and computers. At the present time, sophisticated software can provide user-friendly and intuitive panels for facilitating the creation of user-defined protocols, as well as direct access to analysis reports, providing straight-to-the-point integrated data, statistics and graphs. We know now that understanding how the brain works, needs to have three types of maps: first, **'**cell type map', i.e. to identify the diverse types of cells and their distributions in all brain regions, and the molecular expression pattern in each cell type. Using molecules specifically expressed in different cell types as markers, we can then draw the second type of map—**'**connectivity map', the so-called 'connectome'**,** which is the wiring diagram of nerve connections among all neurons in the brain. Mapping the 'connectome' is often compared to mapping the 'genome', the complete sequence of all nucleotides and genes they encode along the entire DNA of an organism. The third type, 'activity map'**,** refers to mapping of the firing or spiking pattern of all neurons in the brain associated with a particular state of the brain **[5].**

Psychiatry is grounded in clinical neuroscience. The components of psychiatry and the components of neurology are often arbitrary and historical rather than rational. Whereas neurology has traditionally focused on discrete anatomical lesions, psychiatry or modern clinical neuroscience addresses dysfunction in anatomical circuits and connectivity. Psychiatry, like neurology, rests on a foundation of clinical neuroscience. It also encompasses and is informed by a broad range of basic biological and social sciences and has at its disposal many tools, like brain imaging, genetics, neuropsychopharmacology, neurophysiology, epidemiological models, and neuropsychology, for developing new assessment and treatment approaches, grounded in understanding of etiology and pathophysiology. Brain-imaging methods such as CT, MRI and PET are now serving useful diagnostic functions, but further advance in the use of MRI requires more fundamental understanding of the meaning of MRI signals and how they relate to the structure and activity of neural circuits. Psychiatry as clinical neuroscience must strengthen its partnerships with the disciplines of public health, community and behavioral health science, and health economics. Psychiatry needs to pay attention to the inequalities in the delivery of mental health services to vulnerable populations, as well as to the integration of mental health services into other areas of medi-

cine, from pediatrics to geriatrics. Also, to the unmet mental health needs of medical students and physicians generally, whose rates of suicide are two to three times greater than in the general population. Moreover, several diagnostic concepts in psychiatry have changed to some extent through the years and that some of them have disappeared along this way. Several diagnostic categories have been split or lumped in a way that is questionable. The project launched in the early 1980s to validate DSM-III categories by elucidating their "specific" etiopathogenetic underpinnings seems to have failed **[6].** A dialogue should be kept between the neurosciences and other anthropological, psychological and social sciences. Psychiatry can improve both assessment and treatment strategies via deeper understanding of genetics, pathophysiology, functional neuroanatomy, and neuropsychopharmacology, allowing for the development of more personalized interventions.

On the other hand, mental health issues are found across the world and in every population. According to the World Health Organization, around a third of the adult population worldwide suffers from a mental disorder such as depression, anxiety and schizophrenia. However, treatments for depression and methods for preventing suicide, for example, are not evenly spread. There is clearly a gap between neuroscience research and mental health services. So it is important to find treatments for mental health disorders that can be delivered in culturally diverse low and middle-income countries, where there are challenges of poverty, stigma and a lack of clinicians with specialist training in mental health. Among all the conditions in the world of health, mental health occupies a unique and paradoxical place. There is an over-treatment and over-medicalization of mental health issues, often fueled by a pharmaceutical industry interested in the broadening of the boundaries of "illness" and in the creation of more and wider diagnostic categories and thus markets for "selling sickness." On the other hand, exists profound under-recognition of the suffering and breadth of mental health issues affecting millions of people across geographies, which is a global problem. The *WPA Action Plan 2017-2020* sets out a strategy for expanding the contribution of psychiatry to improved mental health for people across the globe **[7].** Three characteristics frame the strategic intent of the Action Plan. First, strengthening the contribution of psychiatrists to reducing distress, illness and suicidal behaviour among vulnerable populations, like women and girls, people under extreme stress, including those affected by conflict and emergencies, and people living with longstanding mental illnesses and their caregivers. Second, supporting psychiatrists to promote mental health and improve care capacity, like service development, awareness raising and advocacy, education, publications and research. Third, expanding the reach and effectiveness of partnerships and collaboration with service providers, service beneficiaries and policy makers. In addition, WPA proposes working with journals and other publications in low- and middle-income countries, re-establishing a task force on peer support for editors of psychiatric journals in low and middle-income countries.

Finally, it should be noted that many talented young scientists, especially in biological sciences, are under the "curse" of 'high-impact' journals**.** In most cases these scientists need to conform to not only rigorous standards of data collection, analysis and interpretation, but also to the generally accepted peers' paradigm and thinking, as well as to the financial burden. Innovative science may needs to break the existing paradigm of the field. We can try to establish new approaches to publishing innovative research findings that are not necessarily acceptable by high-impact journals and new review criteria that stress the innovative aspects of the research. In parallel, we can strengthen the dialog, in order to fill the gap between the neuroscience knowledge and the mental health needs. I suggest that the creation of the new journal *Dialogues in Clinical Neuroscience & Mental Health,* will contribute to guiding this interdisciplinary field in new directions. I hope that in the future, our journal will become more than a repository of articles in an interesting area of science. I hope that the Journal *Dialogues in Clinical Neuroscience & Mental Health* will take an active role in shaping the field, by helping create a new community of researchers with common interests in this very different disciplinary background. I am deeply grateful to the founding members of the editorial board for their support, and to our publisher, *obrela*, for providing essential resources to this endeavor. I am confident that together we will make important contributions to the future of the emerging field of clinical neuroscience and mental health.

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