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EDITORIAL

Objectivity in a Subjective Field: The Current State and Future Directions of "Objective" Diagnostics in Psychiatry

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Even in its most evidence-based practice, medicine is often an inherently subjective field, both in terms of self-reported symptoms on the patient side and clinical reasoning on the provider side. There is arguably no area of medicine as subjective as psychiatry, a specialty which often focuses on emotions, experiences, and realities that are difficult to quantify or "objectively" analyze. Historically, this subjectivity limited progress and treatment options in psychiatry in many ways. Until the mid-20th century, psychiatry was rooted in anecdotal cases within institutions, followed by a largely psychoanalytic framework supported by evidence which was tenuous at best. After years of psychiatric practice which was far from cohesively standardized, the development of early psychiatric medication (such as lithium in 1948) lent credibility to a biological basis of mental illness which helped emphasize the need for a set of diagnostic criteria in psychiatry. This culminated in the development of the third edition of Diagnostic and Statistical Manual of Mental Disorders (DSM-III) in 1980, which was revolutionary in finally providing a widely used collection of diagnostic criteria that was both easy to understand and reference in the United States.[1] The DSM with its subsequent updates as well as the International Classification of Diseases have provided an outline for diagnosing mental illnesses around the world to this day. The creation of more standardized diagnostic criteria thus presents an interesting example of progress in psychiatry as a result of incorporating more objectively standardized definitions and disease categorizations.

Since the creation of these objective criteria, the psychiatric diagnostics themselves in mainstream practice have remained subjectively based on clinical criteria alone. However, the growing field of neuropsychiatry has begun to alter this landscape, offering more advanced imaging and computational models for diseases which were previously poorly understood beyond their presentation of symptoms.[2] Neuroimaging for psychiatric conditions has involved extensive work which has proven informative in both associating brain regions with specific diseases as well as intervention development. For example, in the context of schizophrenia, positron emission tomography also known as PET imaging studies have been crucial to delineating information about dopamine receptor types, location, and relative activation. This research has furthered our collective understanding of the disease process in schizophrenia, but also demonstrates the translational value of such work. Our improved understanding of the neurobiological basis for symptom alleviation versus side effect development in schizophrenia helped improve targeted therapies in the atypical antipsychotic medication family, which have significantly reduced the highly morbid side effects associated with antipsychotics.[3] Measuring changes in size and blood flow of various brain regions has also helped localize the pathophysiology of psychiatric disorders such as obsessive-compulsive disorder, anxiety disorders, and post-traumatic stress disorder, which has contributed towards a more comprehensive understanding of these diseases.[4]

While the objectivity of neuroimaging has been valuable in advancing scientific knowledge in psychiatry, there are still significant shortcomings and concerns that limit its application to clinical practice today. A central limitation to the broad application of neuroimaging is the enormous variation across both "normal" and "diseased" brains. In the example of schizophrenia previously discussed, studies have consistently demonstrated that enlarged ventricles in the brain are associated with schizophrenia. However, this information has minimal diagnostic utility as studies have also demonstrated ventricular changes in asymptomatic relatives of people with schizophrenia, as well as significant overlapping variability in other asymptomatic disease-free controls.[5] Thus, even in the context of schizophrenia - a disease in which neuroimaging has significantly contributed to pathophysiological understanding and drug development - the complex variability of the brain has remained a barrier to diagnostic applications. This multifactorial complexity has also proven an obstacle in isolating predictive psychiatric genetic markers at a time when genetic testing is booming in medicine.[6] Aside from the immense difficulty of developing a truly useful biomarker, there is also the question of whether these markers would have utility beyond subjective experience in psychiatry. For example, if a sensitive and specific biomarker for schizophrenia was hypothetically developed, would a positive screen for schizophrenia in an asymptomatic patient change anything about how they were treated or managed? Or, would a negative screen for schizophrenia in a patient reporting psychosis conversely change their treatment or management? Such questions remain relevant across the wide array of potential psychiatric diagnoses, and they are especially pressing in a time when resources are being increasingly channeled into this area of research. Biomarkers may one day allow for more personalized treatment plans and scientific advancement within psychiatry. Still, they might always be limited diagnostically by the fact that a psychiatric diagnosis is a product of not only our unimaginably complex brains, but also our unimaginably complex subjective realities.

Looking forward, the growth of artificial intelligence and increasingly advanced computational models offer an additional layer to the promising yet controversial future of objective psychiatric biomarkers. Within neuroimaging, artificial intelligence offers an avenue for analyzing and applying immense amounts of data to generate more accurate predictive models. For example, multivariate pattern analysis, which has been regularly utilized in machine learning, is being increasingly discussed in the context of developing neuroimaging models.[7] While the utility of artificial intelligence and associated models is generally accepted in research, there is more controversy in the area of diagnostic value. Artificial intelligence models have proven promising in predicting psychiatric outcomes from mental health crises to the diagnosis of depression using data ranging from patient charts to social media posts.[8] Recent advances in affective computing and digital phenotyping have also provided exciting avenues for quantifying behavior and language in a more objective fashion to understand diagnostic status, behavior, and interpersonal synchrony in a dynamic and nuanced manner. Indeed, approaches like this have the potential to advance the field of psychiatry where the standard remains clinical interviews to one that embraces clinician expertise integrated with objective metrics such as analysis of voice, facial movements (i.e., facial action units), physical movements, and social synchrony. Still, the ethical concerns of artificial intelligence approaches must be considered as well. Privacy and data collection methods are especially relevant given the vulnerability associated with these outcomes, and they must be considered-like other biologically oriented biomarkers when looking to expand the use of artificial intelligence in psychiatry.

Medicine is both an objective science and a subjective art, and psychiatry has always been especially positioned at this intersection throughout its history. The simple beauty of psychiatry is that the interview is both diagnostic and therapeutic. While further research to advance the objectivity of psychiatric diagnoses may ultimately prove worthwhile, we must also ensure this objectivity never clouds the uniquely subjective and deeply human experiences at the core of a psychiatric diagnosis.

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