Research Domain Criteria (RDoC) and the DSM—Two Methodological Approaches to Mental Health Diagnosis

The distinction between the approaches represented by the DSM and Research Domain Criteria (RDoC) does not lie in the choice between categorical and dimensional diagnosis. Every dimensional diagnosis can be converted to a corresponding categorical one by judiciously applying some dichotomization rule. Every categorical diagnosis can be converted to a corresponding dimensional one, for example, by requiring multiple assessments and using the percentage positive.

Generally, dimensional diagnoses will yield greater power in testing hypotheses and precision in estimation of parameters, since power and precision depend on the sensitivity of measures to individual differences among patients. Consequently, dimensional diagnoses are preferable in clinical research. However, in determining eligibility for a clinical trial, clinical researchers also need a categorical diagnosis. In clinical decision making, yes/no decisions, such as whether or not a patient should be given a particular medication, require categorical diagnoses. However, in tracking changes in a patient undergoing treatment, clinicians also need dimensional diagnoses. Clinical researchers and clinicians should be able to choose either a categorical or a dimensional form for the same diagnosis, whichever is optimal for a particular purpose. What matters is that medical decision making, to be evidence-based rather than subjective or arbitrary, must be based on clinical research. It is impractical and unwise to propose that one approach (eg, RDoC) be used for research and another (eg, the DSM) for clinical decision making. That would be a recipe for disaster for patients with mental health problems.

With that in mind, any methodological approach must be judged by its results, not by its promises. Because the DSM in its current form has a long history, we have 35 years of research and clinical results (since the DSM-III published in 1980) by which to judge it. RDoC approaches too have been used for many years. In 1987, I did a statistical review of the more than 200 published articles published to date on the Dexemethasone Suppression Test (DST) for psychiatric diagnosis, pointing out the sources of inconsistencies and nonreproducibility of the findings, concluding that “The crucial issue is not what is now known, but what we will know in the future, not only about the DST, but also about other biological signals of psychiatric disorders.” Now, almost 30 years later, the situation is much as it was then. RDoC remains a set of parameters,3 since power and precision depend on the sensitivity of measures to individual differences among patients. Consequently, dimensional diagnoses are preferable in clinical research. However, in determining eligibility for a clinical trial, clinical researchers also need a categorical diagnosis. In clinical decision making, yes/no decisions, such as whether or not a patient should be given a particular medication, require categorical diagnoses. However, in tracking changes in a patient undergoing treatment, clinicians also need dimensional diagnoses. Clinical researchers and clinicians should be able to choose either a categorical or a dimensional form for the same diagnosis, whichever is optimal for a particular purpose. What matters is that medical decision making, to be evidence-based rather than subjective or arbitrary, must be based on clinical research. It is impractical and unwise to propose that one approach (eg, RDoC) be used for research and another (eg, the DSM) for clinical decision making. That would be a recipe for disaster for patients with mental health problems.

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The DSM is flawed. The DSM-5 includes dimensional diagnoses only in section 3. While some DSM-5 diagnoses incorporate biomarkers (eg, polysomnography, hypocretin deficiency for sleep disorders), and most discuss biomarkers not yet shown to be diagnostic, the DSM-5 diagnoses focus on observable signs and self-described symptoms. Diagnostic rules (eg, cutpoints) have often been arbitrarily set. The DSM process is slow, too influenced by commercial, not scientific factors. The comorbidity among DSM diagnoses suggests that some diagnoses have been lumped when they should have been split and others split when they should have been lumped. Progress in identifying the causes, courses, and cures for mental health disorders is slow.

An unwarranted criticism of the DSM is that it lacks validity. What the DSM lacks is proof of validity, a problem that will also affect all future RDoC-based diagnoses. However, the first requirement for validity is test-retest reliability, and the test-retest reliabilities of DSM-5 diagnoses are comparable with those of objective medical tests for physical disorders. That means that these diagnoses correspond to patterns that clinicians commonly see in practice, and that patients commonly complain of, a fact not to be ignored.

RDoC concepts are right—understanding the biological bases of mental disorders is crucial. However, RDoC approaches remain flawed. Whether the result of a brain scan or an assay result would be the same if independently done in the same patients a day later, or at a different laboratory, is seldom documented. In absence of test-retest reliability and consistency over sites, RDoC-based diagnoses cannot be valid.

RDoC studies are often based on muddling samples from different laboratories (eg, data registries) in the belief that “big data,” no matter its quality, will answer questions. However, different laboratories have access to different populations, sampled in different ways, are staffed by different researchers who operate differently. If the conclusions based on analyses of data sets from individual laboratories disagree, muddling the samples from discordant studies only exacerbates the situation.

Multiple testing (full-genome scans, hundreds of brain areas) plagues RDoC studies. Statistical adjustment for P values does not solve this problem. P values are uninformative, reflecting sample sizes, distributions, and unreliability more than they do clinical importance. Requiring interpretable effect sizes and their 95% confidence intervals with every P value, as in recent clini-
NIMH decision was right: Just as the charge of the National Cancer
Research Institute is to reduce the burden of cancer and that of the National
Heart, Lung, and Blood Institute to reduce the burden of heart and
lung disease, the charge of the NIMH is to reduce the burden of
mental health disorders on patients and on society. That charge
has little to do with the issue of categorical vs dimensional diagno-
ses, or RDoC vs the DSM. Both approaches are right; both are
flawed; they should be complementary, not antagonistic. That
charge has everything to do with (1) producing consistently repli-
cable research results that benefit patients with mental health
problems: not promises, but results, and (2) identification and
elimination of flawed methods (eg, unreliable measures, unex-
plained site differences, ignoring complex interactions in analysis)
that yield inconsistent, nonreproducible results.

Ultimately, a diagnosis is valid if it predicts future outcome so
as to facilitate reducing the burden of mental health problems. All
validity criteria, in one way or another, reflect this. If a risk factor (bi-
ological, behavioral, environmental, or a combination of these) can
be found that identifies those likely to develop a mental health di-
agnosis, a factor that can be manipulated so as to reduce incidence
(categorical) or level (dimensional), that provides evidence of the
validity of that diagnosis. If a diagnosis can be used to identify pa-
tients whose mental health problems will be eliminated (categori-
ical) or substantially reduced (dimensional) by one treatment rather
than another, that provides evidence of the validity of that diagno-
sis. The more evidence for validity of a diagnosis accumulates, the
more valid the diagnosis. Valid diagnosis of mental health disor-
ders, like that of physical health disorders, is a developing process
based on accumulating evidence, not a fixed goal, and should use
all resources available: dimensional and categorical, DSM and RDoC.

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