

EMERGING PARADIGMS IN MEDICINE: IMPLICATIONS FOR THE FUTURE OF PSYCHIATRY

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The causes of mental illness remain obscure in spite of rapid progress in the neurosciences. This is due in part to the fact that contemporary biomedical psychiatry rests on philosophically and scientifically ambiguous ground. In Western medicine paradigms, theories from physics, chemistry, and biology form the basis of an explanatory model of illness, including mental illness. Symptoms are conceptualized as subjective descriptions of effects caused by factors characterized in empirical terms. Conventional biomedicine asserts that all causes of illness, and by extension, mechanisms of action underlying legitimate treatment approaches, rest on biological processes that can be described in the reductionist language of Western science. However, in contemporary Western psychiatry, there is no single adequate explanatory model of the causes of mental illness. What remains are competing psychodynamic, genetic, endocrinologic, and neurobiological models of symptom formation reflecting disparate ideological positions and diverse clinical train-

ing backgrounds of mental health professionals. There is no unifying theory in psychiatry because no single explanatory model has been confirmed as more valid than any other. I hypothesize in this article that the synthesis of ideas and clinical approaches from Western biomedicine and non-Western systems of medicine based on understandings of human consciousness, the neurosciences, complexity theory, and quantum field theory, will lead to rapid evolution of conventional Western biomedical psychiatry toward truly integrative mental healthcare. The result will be the emergence of an integrative mental healthcare model that will more adequately address the disparate causes, conditions, and meanings of symptoms combining multimodal approaches from Western biomedicine and non-Western systems of medicine.

Key words: Paradigms, psychiatry, mental health, theories of consciousness

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INTRODUCTION

There are reasonable and appropriate roles for both established and emerging ideas and treatments in medicine and psychiatry. There is validity to both empirically derived scientific models and intuitive ways of understanding and treating illness. Western psychiatry rests on a coherent body of theory, research, and clinical data, and continues to benefit from fundamental scientific advances in neurophysiology, pharmacology, molecular biology, and genetics. However, the successes of conventional biomedical treatment approaches are limited by many factors, including incomplete or erroneous understandings of the postulated mechanisms of action of many drugs, the limited efficacy of many drugs in current use, significant safety problems and related compliance problems caused by toxic side effects or drug-drug interactions, and unaffordability or limited availability of drugs that are regarded by Western-trained physicians as the most effective treatments for a particular mental illness. These issues have resulted in controversy over the appropriate uses of conventional pharmacological treatments in mental healthcare, and it is the author's opinion that they result in serious limitations on the potential effectiveness of many conventional treatments. In this context, the systematic evaluation

of nonconventional treatment approaches is a reasonable—and I believe necessary—response to the inherent limitations of Western psychiatry.

Although conventional biomedical approaches are often effective, medications alone clearly do not adequately address the complex causes and meanings of mental illness. This is especially true when the broad goal of mental healthcare is to provide lasting symptomatic relief while prioritizing the patient's safety and overall quality of life. Every system of medicine is constrained by inherent limitations of its theories and clinical methods, and no single treatment approach is ideally suited to *all* patients who report similar symptoms. Particular kinds of treatments are often ineffective or partially effective because they fail to address the complex causes or *meanings* of mental illness. Biological treatments are beneficial in many cases but may be of limited value in cases where psychological, somatic, spiritual, or energetic causes or conditions underlie mental and emotional symptoms.

CHANGING EXPLANATORY MODELS AND SHARED BELIEFS OF BIOMEDICAL PSYCHIATRY

Recent advances in the neurosciences, molecular biology, and genetics suggest that the conventional Western medical model of brain functioning fails to adequately explain normal states of human consciousness, and by extension, mental illness. Basic understandings of neurochemical mechanisms associated with normal brain functioning are changing rapidly, pointing to limitations of the neurotransmitter theory and the biopsychosocial model. The neurotransmitter theory was put forward in the early

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1960s and is based on the assumption that certain functional molecules in the brain synthesized in neurons mediate both normal and abnormal states of consciousness in relationship to their relative activity or dysregulation at the levels of synthesis and receptor specificity. Until recently, research has focused on four neurotransmitters that are known to be widely distributed throughout the brain: serotonin, dopamine, norepinephrine, and γ -aminobutyric acid. Recent research findings have resulted in important modifications of the original theory, and over 100 discrete molecules are presently regarded as neurotransmitters or neuropeptides. D-serine, for example, has been called an *atypical* neurotransmitter because it is synthesized and stored in neuroglia (not neurons). D-serine has been shown to bind to N-methyl-D-aspartic acid receptors, and its dysregulation is probably involved in the pathogenesis of schizophrenia and other severe mental illnesses. Other so-called atypical neurotransmitters that probably have roles in both normal mental functioning and mental illness include nitric oxide, carbon monoxide, and possibly also hydrogen sulfide. Recent findings suggest that nitric oxide plays a significant role in learning and memory.¹

Basic research findings in physics and the life sciences will probably also lead to advances in the understanding of causes of mental illness. For example, complexity theory has been invoked to explain mood changes associated with different phases of the menstrual cycle in relation to subtle influences of hormones and neurotransmitters.² *Complexity theory* (also called chaos theory) examines relationships in living and nonliving systems from the perspective of nonlinear dynamics, taking into account complex relationships between the components of a *system*, the whole, and the environment, that sometimes result in novel emergent properties in the system.³

Recent studies suggest that complex interactions between immune functioning, neurotransmitters, and hormones are coupled to depressed mood, anxiety, and other mental and emotional symptoms.⁴ This interdisciplinary area has been called *psychoneuroimmunology*. Conventional Western biomedical psychiatry is beginning to acknowledge complex relationships between genetic and biochemical individuality and the subtleties of mental illness. For example, the wide variability of therapeutic responses to conventional drugs has been interpreted as preliminary evidence that specific neurotransmitter deficiencies or imbalances are associated with specific changes in mood, anxiety, and other symptoms.⁵ Genetic, cultural, and social differences translate into variability in effective dosing strategies and individual differences in susceptibility to adverse effects.⁶ Such variability in response to conventional medications may be especially problematic for patients of African or Asian ethnicity.^{7,8}

In spite of extensive research, studies on the effects of neurotransmitter depletion on mood *do not* support the hypothesis that brain serotonin or norepinephrine levels alone adequately explain depression and highly variable responses to antidepressants. Progress in functional brain imaging, including positron emission tomography, single photon emission computed tomography, and functional magnetic resonance imaging will eventually permit quantitative analysis of neurotransmitter systems underlying mental illness, resulting in more specific and more effective treatments of mental illness.⁹ Advances in understanding of the genetic basis of mental illness will certainly also

come from analysis of findings from the Human Genome Project.¹⁰

The causes of mental illness remain obscure and perplexing, in spite of rapid progress in the neurosciences, because of inconsistent research findings and the absence of consensus on a single explanatory model that takes into account evidence obtained from brain imaging studies, drug research, and basic research in neuroscience, genetics, and molecular biology. The conceptual framework employed by contemporary Western psychiatry is thus an eclectic mix of disparate traditions and theories; however, there is still no falsifiable theory of mental illness causation. This stands in contrast to Western biomedicine in general, in which relationships between identifiable disease-causing factors and particular symptoms or signs can be empirically demonstrated with a high degree of repeatability and reliability. An adequate explanatory model of mental illness causation will require novel research methodologies and advances in functional brain imaging, genetics, and molecular biology that can elucidate postulated relationships between the biological, electromagnetic, and possibly quantum-level activity of the brain and specific cognitive, affective, or behavioral symptoms. Future theories of mental illness causation will probably not rely exclusively on empirical verification of strictly biological processes but will take into account both classically described biological factors (ie, neurophysiological and immunological functioning) and nonclassical physical phenomena, including the postulated role of macroscopic coherent quantum fields in human consciousness.¹¹

CONCEPTUALIZING THE CAUSES AND MEANINGS OF MENTAL ILLNESS

Many nonconventional systems of medicine, including Chinese medicine, Ayurveda, and homeopathy, do not endorse the Western concept of linear causality. Practitioners of these established traditional systems of medicine claim that illness, health, and healing can be more completely understood within conceptual frameworks that differ fundamentally from Western medicine. For example, in Chinese medicine and Ayurveda, symptoms reflect imbalances of postulated energetic principles. Subsequently, the causes of mental illness cannot be described in simple causal terms according to broadly accepted Western scientific theories. In fact, emerging models like complexity theory and quantum field theory may be necessary to develop an adequate explanatory model of *energetic imbalances* postulated by non-Western systems of medicine. Although clinical approaches used in certain nonconventional systems of medicine are not based on empirical findings, they nevertheless yield consistent beneficial outcomes. Clearly, there is no necessary correlation between the requirement of empirical verification of a postulated mechanism of action and the efficacy of a particular treatment approach. Examples of this in mental healthcare include acupuncture, massage, yoga, Qigong, meditation, and mindfulness training. The disparate viewpoints of Western biomedicine and nonconventional systems of medicine suggest the need for conceptual bridges between different systems of medicine that will lead to practical strategies for integration.

In view of the enormous complexity of the brain, and the intrinsic limitations of explanatory models used in current West-

ern science, it is unlikely that the causes of mental illness will be fully explained or even explainable within the conceptual framework of current Western science. Progress in basic research together with advances in clinical biomedicine will probably confirm certain conventional models while refuting others. In this context, novel paradigms may yield different, perhaps more complete understandings of the causes of mental illness. Emerging paradigms reviewed in this article will probably contribute to future theories of both *normal* and *abnormal* brain function, leading to improved understandings of the biological, energetic, informational, and possibly spiritual causes or meanings of mental illness. Ongoing advances in Western science will ultimately validate some treatment approaches used in non-Western systems of medicine.

THE PERSPECTIVES OF WESTERN PSYCHIATRY

Contemporary Western psychiatry endorses at least four different perspectives about the nature and causes of mental illness. This diversity of viewpoints often results in debate among psychiatrists about the treatments that are most appropriate for different symptoms.¹² The disparate perspectives of Western psychiatry rest on different assumptions about the phenomeno-

logical nature of postulated social, psychological, and biological causes of cognitive, emotional, and behavioral symptoms. This translates into an important practical issue in mental healthcare, since diverse perspectives are associated with different clinical approaches when the same symptoms are being evaluated and treated. Table 1 lists core assumptions of the four dominant perspectives of contemporary Western psychiatry.

The perspective from which the clinician understands human psychological functioning depends largely on his or her intellectual and cultural framework and training. In Western countries, psychiatrists and psychologists are trained to think about mental illness in the broad context of the biopsychosocial model, an integral model that takes diverse perspectives into account. The biopsychosocial model regards depression, anxiety, and other psychiatric disorders as a manifestation of interacting social, psychological, and biological factors.¹³ Other integral models of mental illness causation include Schore's theory of affect regulation, which weaves together findings from the neurosciences with theories on attachment and trauma,¹⁴ and Kandel's eclectic model of the neurobiology of conscious and unconscious mental processes that examines the theoretical underpinnings of psychoanalytic theory in the context of recent advances in the cognitive neurosciences.¹⁵ Although the above perspectives are

Table 1. The Perspectives of Western Psychiatry

Perspective	Assumptions	Implications
Disease perspective	The defining characteristics of mental illness are discrete abnormalities of brain structure or function Unambiguous correspondences exist between etiology, pathological condition and clinical entity	Psychiatric diseases can be prevented or cured when underlying brain abnormalities are identified Valid treatments are pharmacologic agents that target presumed neurobiological substrate (psychopharmacology)
Dimensional perspective	Mental illness occurs in individuals who are susceptible to distress because of their relative intellectual or emotional functioning on a quantitative scale of human psychological variation There are no discrete mental illnesses, and patients experience different degrees or severities of symptoms depending on their relative position on the scale of variation	Causes of mental illness are the same stresses that affect all people, but result in cognitive or affective symptoms in certain individuals because of their relative level of intellectual or emotional functioning Distress and resulting symptoms are not cured but avoided Treatment involves cognitive skills training to improve future coping strategies (CBT, supportive psychotherapy)
Behavioral perspective	Disordered behaviors result from excessive attempts to satisfy biological drives in response to cultural or social conditioning Some abnormal behaviors result from psychiatric vulnerability in the context of anomalous early learning	Mental or emotional symptoms are caused by inappropriate or excessive responses to universal physiological drives Treatment entails psychological and medical approaches to prevent, improve or interrupt abnormal behaviors (psychopharmacology and CBT)
Life-story perspective	Disturbing experiences result in distress and associated cognitive or affective symptoms that are subsequently incorporated into self-defeating narratives	Causes of mental illness are expectable responses to distressed states of mind that become fixed as narratives Rescripting narratives in the context of supportive therapy will permit the patient to avoid disturbing future experiences (narrative therapy)

CBT, cognitive-behavioral therapy.

highly interdisciplinary in content, they are inherently limited because they do not take into account recently proposed theories of the role of human consciousness in illness and health. Wilber's integral psychology establishes a broad conceptual framework that attempts to reconcile disparate psychological, social, and spiritual perspectives of human consciousness.¹⁶ Dossey¹⁷⁻¹⁹ has argued that in order to adequately explain numerous reports of miraculous healing, the materialist paradigm of Western medicine must be extended to encompass postulated nonlocal effects of consciousness on illness. Although acknowledging the legitimacy of the biopsychosocial perspective, Dossey persuasively argues that illness, health, and healing can be more adequately explained by invoking emerging theories in the basic sciences, including complexity theory, quantum mechanics, and possibly also quantum field theory.

Although most Western mental health professionals are familiar with the biopsychosocial model, psychoanalysis, and the cognitive neurosciences, few researchers and clinicians think in terms of complex systems theory or postulated nonlocal effects of intention on health and illness. Furthermore, a very real and practical divide exists between psychiatrists and psychologists in terms of the way mental illness is understood and treated in clinical settings. The majority of psychiatrists currently restrict their medical practices to prescribing synthetic pharmaceuticals that target specific neurotransmitters or their receptors in the brain on the premise that dysregulations of neurotransmitters are the primary underlying causes of psychiatric disorders. In contrast, psychologists and other nonmedically trained mental health professionals generally approach patients from a more eclectic perspective that emphasizes social, cultural, and spiritual meanings of illness in addition to postulated neurobiological causes. In the day-to-day practice of mental healthcare, these disparate perspectives are often beneficial when used in parallel by psychiatrists and psychologists treating the same patient. Furthermore, as their underlying assumptions are not mutually exclusive, the clinical approaches employed by psychiatrists and psychologists are often compatible and synergistic. Many patients who take psychotropic medications are concurrently in psychotherapy and benefit from both treatment methods.

Over 100 years have passed since Freud announced his "project for a scientific psychology"; however, a rigorous methodology for verifying the neurophysiological correlates of cognitive or affective states has not yet been achieved. Nevertheless, advances in genetics, molecular biology, neuropharmacology, and functional brain imaging have provided considerable evidence in support of theories for the neural correlates of both normal and abnormal conscious states. Research evidence points to the existence of indirect relationships between dysregulation at many complex anatomical or functional levels of the brain and cognitive and affective symptoms. To date, only the most basic mechanisms of brain function at the level of single neurons or discrete systems of neurons in nonhuman animal models have been clearly elucidated. The enormous structural and functional complexity of the brain—together with inherent limitations of the tools of biomedical research—limit our ability to elucidate the postulated neurobiological causes of mental illness. It is unclear whether it will be possible to establish causal relationships between discrete neurophysiological substrates

and specified abnormal states of consciousness (ie, symptoms) by using available technologies.

The question Freud posed more than 100 years ago continues to bias research in Western psychiatry toward mechanistic explanations of mental illness because it rests on the implicit assumption that simple functional relationships exist between discrete neurophysiological substrates and particular normal states of consciousness. By extension, biological psychiatry contends that dysregulations of specific neurotransmitter systems correspond to particular cognitive, affective, and behavioral symptoms. In contrast to this naïve model, emerging understandings of the complex hierarchical relationships between molecular, cellular, synaptic, and modular levels of brain organization suggest that simple correspondences between discrete neurophysiological processes and specific mental states or symptoms seldom, if ever, occur. In summary, there is still no consensus on a best explanatory model of mental illness causation, and although several contemporary models are integral, they do not take into account recent scientific theories that may help to further elucidate the complex causes of mental illness and the role of human consciousness in health and illness.

EMERGING PARADIGMS LEADING TO NOVEL METHODOLOGIES FOR UNDERSTANDING MENTAL ILLNESS AND EVALUATING TREATMENT RESPONSE

Novel explanatory models of illness causation are emerging from the rigorous examination of non-Western systems of medicine in the context of recent advances in physics and the life sciences. Some nonconventional systems of medicine rest on metaphysical assumptions that are at odds with contemporary scientific understandings of the causes of mental illness. An example is *energy medicine*, which postulates the existence of so-called subtle energies independently of the human central nervous system. In this model, irreducible energies interacting with physical brain structures manifest as the fundamental properties (or qualia) of consciousness, and by extension, the multiplicity of normal and abnormal mental states. Metaphysical assumptions about *subtle energies* refer to fundamental energetic principles like Qi and prana, postulated by Chinese medicine and Ayurveda, respectively. Some writers interpret claims of a relationship between subtle energetic phenomena and mental functioning as ancient metaphors describing properties of highly coherent large-scale quantum fields in complex living systems. This is the domain of quantum field theory, an extension of quantum mechanics. Although the existence of quantum fields has not yet been verified, quantum field theory is widely regarded as a legitimate conceptual framework for the analysis of fundamental relationships between the *fieldlike* properties of matter and energy at the levels of electrons and photons.^{20,21} Any future empirical confirmation of the role of postulated subtle energies in health and healing will probably invoke both classical Newtonian physics and quantum models of energy and information in human brain functioning.

Basic research in physics, chemistry, and the life sciences has led to alternative explanatory models of phenomena that make up the natural world. Some postulated phenomena, for example, nonlocal influences of human intention, will probably eventu-

ally be confirmed and verified as mechanisms underlying illness or health—including mental health. Future phenomenological models will provide empirical evidence for claims of certain nonconventional treatment approaches. By the same token, other postulated phenomena will eventually be refuted by empirical findings of a future Western science.

Outcomes in mental healthcare generally reflect subjective reports of distress that do not clearly correspond to changes in brain function. This is complicated by the fact that high placebo response rates frequently confound efforts to determine the efficacy of conventional psychiatric treatments. Placebo effects related to positive expectation also confound efforts to evaluate nonconventional treatments, including mind-body practices, traditional energy healing methods (eg, Reiki and Qigong), herbal formulas, homeopathy, and numerous other modalities. There is considerable debate over the most appropriate research methodologies to use when evaluating nonconventional treatments. Some argue that conventional biomedical research standards should be applied to investigations of nonconventional modalities, whereas others contend that contemporary Western science cannot adequately elucidate postulated mechanisms of action underlying many nonconventional treatments, including homeopathy, acupuncture, Reiki, healing touch, and others.^{22,23}

Contemporary biomedicine argues that valid claims are, by definition, reducible to verifiable mechanistic descriptions of natural processes already familiar to Western science. In other words, the verifiability of a proposed mechanism of action determines whether or not any specified modality may be regarded as legitimate. Once the existence of a mechanism of action is confirmed, established empirical means must be used to verify causal relationships between the mechanism and outcomes of a treatment based on the described mechanism. Empirically verifiable causal relationships between a proposed mechanism and expected outcomes must be confirmed to support the claim that the mechanism of action has a specified effect. In conventional biomedicine, a treatment approach is substantiated when established empirical methods demonstrate the existence of strict causal relationships between observable effects of the mechanism and observable outcomes of the treatment. By extension, a particular modality is not validated when it is not possible to link outcomes to a postulated mechanism of action by using conventional empirical means.²⁴

In summary, Western biomedicine rejects many nonconventional modalities as nonvalid because it is not possible to verify correlations between postulated mechanisms and claimed effects by using established empirical methods and contemporary technologies. Practitioners of non-Western systems of medicine, nevertheless, claim that their approaches are efficacious and founded on legitimate principles foreign to contemporary Western science and biomedicine. A widely known example is the claim by Chinese medical practitioners that inserting fine needles in certain points on the skin causes changes in the quality of Qi in a network of meridians, manifesting as desirable improvements in energetic balance and improved health. Western science is not currently able to measure properties of Qi or characterize postulated relationships between the insertion of acupuncture needles and desirable changes in a target symp-

tom; however, a considerable body of evidence suggests that acupuncture is an effective treatment of many disorders.

Criteria used in Western biomedicine to verify the existence of a posited mechanism of action rest on implicit assumptions about kinds of phenomena that can have existence. According to this perspective, only phenomena that can be observed or measured by using contemporary empirical methods can have existence. Postulated phenomena that cannot be verified are a priori dismissed. This point goes to the heart of the philosophical and conceptual gap between conventional and nonconventional systems of medicine. Criteria used to establish evidence for claims of a postulated mechanism of action reflect disparate assumptions in different systems of medicine about the kind of information that is necessary and sufficient to confirm the existence of a postulated mechanism of action and to confirm claims of efficacy. The argument is circular, because the methods employed in Western biomedicine to verify the existence of a mechanism of action or its efficacy predetermine which research methodologies are regarded as valid. Western researchers see what is permitted within the conceptual framework of conventional biomedicine. Thus, claims of mechanism or outcomes that are not congruent with this worldview are a priori dismissed as nonvalid. Of course, the same self-limiting perspective also applies to research undertaken in the thought worlds of non-Western systems of medicine.

EMERGING METHODOLOGIES IN INTEGRATIVE MEDICINE RESEARCH

In light of the limitations of quantitative research methods, recent work has focused on developing qualitative outcome measures of nonconventional treatments that are not susceptible to quantitative analysis using contemporary scientific techniques.²⁵ Novel research methodologies for validating claims of a postulated mechanism of action or efficacy of nonconventional treatments will evolve from paradigms that are presently excluded from the domain of Western science. Table 2 shows methodologies being used to elucidate nonconventional and integrative approaches.

In addition to the methodologies in Table 2, qualitative approaches have been proposed for gathering outcomes data relevant to the subjective reports of patients in response to nonconventional interventions. Qualitative criteria include ratings of consistency of training, duration of training, the historical duration of use of a particular nonconventional modality, how well established the use of a particular modality is for a specified illness, the level of concern (if any) over potential safety issues when a nonconventional modality is administered by a professional practitioner, and the existence of a coherent body of theory supporting the use of a particular modality.

Combining quantitative and qualitative methodologies permits researchers to more adequately address the complex factors that contribute to health and illness.²⁶ The probability that studies on nonconventional modalities will yield useful information about mechanisms of action or outcomes is increased when conventional randomized controlled-trial research designs are complemented by observational studies, case series analysis, double-blinding, design-adaptive allocations, participant-centered research, and n-of-1 trials.²⁷

Table 2. Methodologies Used to Validate Nonconventional Assessment and Treatment Approaches in Psychiatry

Methodology	Example	Comments
Validating evidence from emerging technologies using established biomedical technologies	Using technologies that purportedly measure the human energy field in conjunction with fMRI or other conventional functional imaging modalities	Replicating findings from emerging and established functional brain imaging technologies will provide clues to relationships between classical and nonclassical mechanisms in mental illness
Linking established conventional models of empirical verification to nonconventional treatment approaches	Analyzing outcomes from nonconventional treatments in the framework of one or more emerging paradigms (eg, evaluating acupuncture using fMRI or other functional brain imaging), or using QEEG to monitor renormalization of brain function following treatment with a nonconventional approach	Consistently beneficial outcomes suggest that postulated mechanism of action of a particular nonconventional treatment approach takes place and can be empirically verified
Establishing consensual criteria for significance of outcomes or statistical requirements for validation of an assessment or treatment approach that <i>cannot be verified</i> by current Western science	Consensus on outcomes measures, trial design, and statistical power of findings to establish legitimacy of a particular energy medicine technique for a particular symptom or disorder	Often used to support claims of conventional medical practices when there is weak empirical evidence for a postulated mechanism of action The same approach can be applied to many nonconventional medical practices
Cooperative efforts between conventional and nonconventional medical practitioners to develop criteria for using nonconventional or integrative medical approaches in clinical settings when probable yields are high and probable risks are low	The NCCAM could promote development of cooperative efforts between conventionally and nonconventionally trained clinicians using nonconventional or integrative approaches in widespread practice, targeting specific mental illnesses	This approach is frequently used in conventional Western medicine in the absence of conclusive findings supporting a particular treatment The issue here is establishing conservative practice guidelines for nonconventional approaches addressing particular symptom patterns

fMRI, functional magnetic resonance imaging; QEEG, quantitative electroencephalography; NCCAM, National Center for Complementary and Alternative Medicine.

The issue of blinding in conventional research designs remains controversial. For many conventional and nonconventional treatments, it is impossible to blind both patient and researcher to the intervention. For example, a surgeon is necessarily aware of the surgical procedure being used, and a Chinese medical practitioner is aware that he or she is administering a protocol that is believed to be beneficial versus a protocol that is believed to be ineffective (ie, sham). This is significant because the absence of double blinding can potentially bias analysis of research findings. An alternative to double blinding is dual blinding, in which the patient is blinded, the researcher administering the treatment is not blinded, but a second investigator who evaluates outcomes is blinded (ie, to the treatment). This approach may improve the integrity of research in both conventional and nonconventional medicine by bypassing problems related to nonblinded experimenters.²⁸ A methodology called *design-adaptive allocations* has been suggested as an alternative to the conventional randomization used in randomized controlled-trial studies.²⁹ This research methodology permits a better balance between treatment groups and more accurate measurement of factors affecting outcomes, and may be especially useful for analyzing findings in small studies that would otherwise be regarded as statistically underpowered in Western biomedicine.

When there is limited evidence supporting the use of a particular modality, the single-case ($n = 1$) study may provide a valid way to determine whether the approach is beneficial and safe.³⁰ A single-case study is a prospective trial on one individual in which the treatment being investigated is administered and withheld in alternating fashion while an agreed-on outcome is measured. Single-case studies can follow a crossover design or a continuous treatment protocol. In contrast to conventional research designs that define treatment outcomes in terms of probabilities, single-case studies result in definitive, individualized outcomes for each patient. This approach has drawbacks and limitations, including the impossibility of generalizing findings to other patients and the fact that findings are not applicable to illnesses that are unstable over time.^{31,32} Case series are sometimes used to estimate the possible benefits of a particular medical treatment for a given population. Case series are accumulated reports of uncontrolled findings from one or more individuals. Although case series sometimes point clinicians and researchers in useful directions, they are limited because they cannot account for placebo effects or other nonspecific treatment effects. Participant-centered analysis is a variant of the case series approach, in which multiple measures of a single variable are taken for each individual in a sample. This method permits statistical analysis of complex relationships between treatments

and outcomes at the individual level and makes up for some of the disadvantages of typical case series.³³ A recently introduced approach for analysis of outcomes in integrative medicine research is *aptitude x treatment interaction*. This approach assumes that outcomes depend on the match or mismatch between patient characteristics or aptitudes, including biological, psychological, and cultural factors that affect treatment response and the specific treatment received. The model regards outcomes as manifestations of dynamic interactions in a complex system and argues that effective treatment planning must take these factors into account.³⁴

A THEORY OF CONSCIOUSNESS IN EXPLANATORY MODELS OF MENTAL ILLNESS

In all discussions of mental illness, there is an explicit or implicit contextual theory of consciousness that frames understandings of symptoms. Any argument for the validity or efficacy of a particular treatment approach assumes the analysis of causes or meanings of a symptom with respect to (an often implicit) theory of consciousness according to which treatment approach is regarded as legitimate. Disparate systems of medicine incorporate disparate implicit models or metaphors of consciousness that reflect their respective core assumptions. The assumptions of a particular system of medicine, in turn, provide an explanatory model of postulated mechanisms of action of treatments employed by practitioners of that tradition. Disparate systems of medicine use different metaphors of consciousness that define treatment outcomes in terms of desirable changes in complex biological or energetic patterns that manifest as clinical improvements. It is reasonable to assume that effective treatments result in specific changes in functions of human consciousness that correspond to clinical improvements in target symptoms of mental illness.

Western psychiatry endorses a simplified form of Cartesian dualism that posits two fundamentally irreducible ontological categories: a physical body brain and an embodied nonphysical mind. Certain nonconventional systems of medicine, for example Chinese medicine and Ayurveda, diverge from this formal reductionist theory of consciousness. This has led to a basic gap between the *presumed* role of consciousness in contemporary Western psychiatric treatments and the *implicit* role in which consciousness is believed to operate when certain nonconventional treatments are found to be beneficial. So far, Western science has failed to produce compelling evidence for any particular theory of consciousness. Furthermore, whether a scientific theory of consciousness can ever be formulated in a way that is falsifiable by Western science remains an open-ended question and is the subject of considerable debate. In the strictest sense, contemporary models of consciousness cannot be regarded as scientific theories because their premises are not falsifiable by using the tools and methodologies of current Western science. Methodologies used in biomedical research to investigate human consciousness have so far failed to confirm postulated correspondences between particular structural or functional characteristics of the brain and so-called normal or abnormal states of consciousness described in Western psychiatry. At the same time, emerging perspectives in neuroscience and

artificial intelligence have led to a multiplicity of competing models of consciousness.

Non-Western systems of medicine have likewise failed to provide compelling evidence for a best-fit theory of consciousness, that is, a single theory that provides a more adequate or more elegant explanation of consciousness phenomena compared with other theories. Most non-Western systems of medicine use nonmaterialist metaphors to describe consciousness, and like Western medicine, have so far been unable to demonstrate the existence of correspondences between posited energetic phenomena and the multiplicity of states of consciousness described by non-Western systems of medicine.

Reductionist models of consciousness are implicit in the philosophical and scientific foundations of Western medicine, although contemporary biomedicine does not formally develop or defend these views, which equate mental phenomena with the activity of specific neurotransmitters or brain circuits at the level of receptors, synapses, or complex neural circuits. At this point in the history of medicine, the principle reductionist model of consciousness is called functionalism. According to this view, consciousness is “what the brain does,” and correspondences between particular functional properties (ie, qualia) of consciousness and discrete neurochemical or biomagnetic events that take place in the brain are inferred from research evidence. The explanatory model of consciousness that is presently most widely endorsed by Western biomedicine—including conventional Western psychiatry—is a particular type of functionalism known as *computational functionalism*. This model contends that consciousness is “what the brain does,” and posits that various functional properties (qualia) of consciousness exactly correspond to specific neurochemical or biomagnetic events that take place at different levels of dynamic brain organization. Although computational functionalism has not been strongly substantiated by research evidence, this model is frequently put forward as a scientific explanation of the mind-body problem. Furthermore, because functionalism claims that mental events are equivalent to discrete physical processes in the brain, there is no need to invoke the existence of consciousness as a primary kind of phenomenon that warrants further analysis. Functionalist models have not been substantiated by research but are often implicit in discussions of mind-body medicine. This vagueness has interfered with rigorous theorizing about a model of consciousness that can more adequately explain normal and abnormal brain functioning.

In contrast to naive functionalist models, a more sophisticated model, the *dynamic core hypothesis* of consciousness has recently emerged from the application of complexity theory to neuroscience.^{35,36} According to this model, interactions between the thalamus and neocortex comprise the neural correlates of consciousness, and different kinds of conscious states are determined by the relative complexity and degree of integration of the dynamic core of neural circuits that is activated at any given time. Another more elegant functionalist model of consciousness is that of Sir Eccles, the Nobel Prize-winning neuroscientist, who proposed that mental events may constitute primary causes of neural activity when large-scale synaptic activity in the brain is viewed from the perspective of quantum mechanics.³⁷

In contrast to Western biomedicine, many non-Western systems of medicine rest on dualist models of consciousness that posit the existence of two fundamentally irreducible ontological categories of phenomena—the mental (or in some cases the spiritual) and the physical. *Nonphysicalist dualist* models are inherently at odds with Western *physicalist* models of consciousness and are generally regarded by Western science as a priori non-valid because they assign equal importance to ontological assumptions about physical and nonphysical kinds of phenomena. Systems of medicine or particular modalities based on dualist models of consciousness are seldom subjected to rigorous empirical investigation in Western science. All dualist models must contend with the problem of agency. *Agency* refers to philosophical problems that arise from efforts to develop an explanatory model that describes the nature of interactions between physical and nonphysical phenomena that somehow manifest as the qualia of consciousness. Contemporary Western reductionist models of consciousness avoid the problem of agency by positing that only physical brain structures and associated biological or biomagnetic processes characterize consciousness, and that these essential structures and processes correspond to and adequately explain normal and abnormal mental states. It is because of this difference that the problem of agency does not enter into a discussion of physicalist models of consciousness. A consequence is that Western scientific models of consciousness have historically emphasized empirical methods for establishing the behavioral or neurophysiological correlates of particular subjective experiences or other functions of consciousness.

In contrast, explanatory models employed in non-Western systems of medicine continue to rely on metaphysical arguments postulating nonphysical causation of mental or spiritual states. At present, it is not possible to confirm or refute any particular model of consciousness by using available empirical methods because correspondences between specified mental events and specified physical events—or, in the case of non-Western models, presumed metaphysical processes—cannot be rigorously and systematically demonstrated through measurement or observation. Attempts to do so have led to paradoxes of infinite causal chains of hypothesized neurobiological events underlying posited brain processes and naive solutions, including *super* or *sentient* neurons, which amount to contemporary versions of the homunculus theory. Continued advances in research methodologies and functional brain imaging technologies will lead to refinements in measurements of temporal, spatial, and energetic relationships between particular conscious experiences, including psychiatric symptoms, and changes in the metabolic, neurochemical, and biomagnetic properties of the brain.

In summary, the research methodologies and techniques of Western science cannot presently adduce or validate a falsifiable theory of consciousness. Therefore, there is no single best explanatory model of normal and (by extension) abnormal conscious states. The problem is still much more basic than the need to refine research methodologies to confirm the existence of a postulated mechanistic basis of consciousness at the level of neurotransmitters or neural circuits. Western science as well as non-Western systems of medicine that embrace nonrational ways of knowing have so far come up with only vague metaphors

about the kinds of phenomena consciousness may refer to. To date, only a few testable hypotheses have been put forward regarding postulated biological, energetic, informational, or other phenomena that may correspond to or cause different normal or abnormal conscious experiences, including subjective experiences interpreted in Western psychiatry as mental illnesses. Because of philosophical and scientific problems inherent in the study of human consciousness, it is unlikely that an adequate explanatory model of the phenomenological nature of the mind-brain-body will be achieved using contemporary Western research methods alone.

CONCLUSION

There is reason for optimism about the future of medicine in spite of inherent limitations in the methodology and techniques of contemporary Western science. Emerging scientific theories and parallel advances in technology will provide future biomedical researchers with the means to validate certain nonconventional treatments that are currently overlooked by Western medicine. The evolution of Western medical theory and functional brain imaging technologies in the context of complexity theory, quantum mechanics, and quantum field theory will lead to testable hypotheses about postulated nonlocal influences of intention on healing. The Western medical paradigm will gradually broaden to encompass rigorous discussions of the quantum fieldlike nature of postulated subtle energies and their roles in illness and health. The result will be fundamentally new understandings of the phenomenological nature, causes, and meanings of healing. Some approaches that are now dismissed will be validated by a future medicine, whereas others will be refuted.

Novel and more adequate models of complex dynamic relationships between biological, energetic, informational, and possibly also subtle energetic or spiritual processes associated with symptom formation will permit more effective integrative treatment approaches addressing the causes of symptoms at multiple interrelated hierarchic levels. Increasing openness to nonconventional systems of medicine in Western culture will facilitate the evolution of conventional Western psychiatry toward truly integrative mental healthcare, incorporating both reductionist and nonreductionist understandings of human consciousness and mental illness.

Nonconventional approaches used to treat depression, anxiety, cognitive impairment, sleep disturbances, and alcohol and drug abuse have been substantiated by compelling research evidence, and there is provisional evidence for many other non-mainstream approaches.³⁸ Clinical decision making in mental healthcare will be increasingly based on considerations of cost effectiveness and patient preferences. Important practical goals of integrative mental healthcare include reductions in the use of approaches that are unaffordable or not cost effective and increased use of less expensive and more cost-effective approaches. A trend toward increased patient use of cost-effective integrative approaches will translate into reductions in long-term costs associated with expensive conventional treatments that yield equivalent or poorer outcomes. The result will be generally improved mental healthcare delivery to all segments of the population and commensurate reductions in the enormous medical,

social, and financial burdens of mental illness. Less tangible benefits that will accrue from a future, more-integrative model of mental healthcare will include increased patient autonomy, reductions in job productivity losses, and reductions in indirect costs associated with widespread and undertreated mental health problems.

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